



ANKARA-IZMIR HIGH SPEED RAILWAY PROJECT

Environmental and Social Impact Assessment (ESIA) Report

Ankara-Izmir YHT Yapımı İş Ortaklığı

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Prepared by	GEM Sustainability Services and Consultancy Inc. www.gemtr.com

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Table of Contents

ABBREVIATION	21
EXECUTIVE SUMMARY	26
1. PROJECT DESCRIPTION	34
1.1. Employer (Project Owner)/Operator	38
1.2. Contractor	38
1.3. Railway Route	39
1.3.1. Settlements Affected from Project-related Land Acquisition	40
1.3.2. Land Acquisition	45
1.4. Project Design and Components	46
1.4.1. Railway Design Criteria	46
1.4.2. Engineering Structures	47
1.4.2.1. Viaducts	48
1.4.2.2. Tunnels	50
1.4.2.3. Culverts	50
1.4.2.4. Underpasses	51
1.4.2.5. Overpasses	52
1.4.2.6. Bridges	52
1.4.3. Electrification and Telecommunications Infrastructure	53
1.4.4. Railway Stations	53
1.4.5. Sidings	54
1.4.6. Excavated Material Storage Sites	54
1.4.7. Temporary Facilities	54
1.4.7.1. Construction Camp Sites	54
1.4.7.2. Quarries and Material Borrow Sites	58
1.4.7.3. Concrete Plants	62
1.5. Passenger Number Forecast	62
1.6. Project Activities	63
1.6.1. Construction Phase	63
1.6.2. Operation and Maintenance Activities	65
1.7. Construction Machinery and Equipment	65
1.8. Project Organisation and Workforce	67
1.9. Project Schedule	68
2. INSTITUTIONAL AND LEGAL FRAMEWORK	70
2.1. Institutional Framework	70
2.1.1. Central Administrations	70
2.1.1.1. Ministries	72
2.1.1.2. Field Organisations of the Ministries	72
2.1.2. Local Administrations	72
2.2. National Legislation	75
2.2.1. Environmental and Social Legislation	75
2.2.1.1. Environmental Impact Assessment (EIA)	79
2.2.1.2. Regulation on Environmental Permits and Licenses	83
2.2.2. Environmental Permits, Licenses and Approvals under National Legislation	85
2.3. International Agreements, Conventions and Protocols	86
2.4. International E&S Standards and Guidelines	88
2.4.1. Equator Principles 4 (2020)	88
2.4.2. International Finance Corporation's (IFC) Policy and Performance Standards on E&S Sustainability (2012)	89
2.4.2.1. IFC Good Practice/Guidance Notes and Handbook	90

2.4.2.2. IFC's Interim Advices for IFC Clients on Safe Stakeholder Engagement in the Context of COVID-19 (May 2020)	90
2.4.2.3. World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines	91
2.4.3. OECD Common Approaches (2016)	91
2.4.4. UK Export Finance Environmental, Social and Human Rights Policy	91
2.5. Project E&S Categorisation	92
3. PROJECT ALTERNATIVES	94
3.1. Route Selection and Optimisation	96
3.1.1. Pre-tender Phase	96
3.1.2. Post-tender Phase	97
3.2. Quarry and Material Borrow Site Alternatives	101
3.3. Optimisation of Engineering Structures	108
3.4. No Project Alternative	108
4. E&S IMPACT ASSESSMENT METHODOLOGY	109
4.1. The ESIA Process	109
4.2. The ESIA Methodology	112
4.2.1. Assessment of Impact Significance	112
4.2.2. Approach to Management of Potential Impacts	114
4.3. Project's Area of Influence	115
5. LAND USE AND GEOLOGY	117
5.1. Project Standards	117
5.2. Baseline Conditions	117
5.2.1. Land Use	118
5.2.1.1. General Land Use Characteristics and Land Ownership	118
5.2.1.1.1. Agricultural Lands within the Expropriation Corridor - District-level Distribution	122
5.2.1.1.2. Pasture Lands within the Expropriation Corridor - District-level Distribution	123
5.2.1.1.3. Forest Lands within the Expropriation Corridor – District-level Distribution	124
5.2.1.2. Land Use Capability Classes	124
5.2.2. Geology	126
5.2.2.1. General Geological Setting and Tectonics	126
5.2.2.2. Geology of the Railway Route	128
5.2.2.2.1. Stratigraphy	128
5.2.2.2.2. Seismicity	130
5.2.2.2.3. Sinkhole Formation	138
5.2.2.2.4. Landslide Zones	139
5.2.2.2.5. Geosites	142
5.3. Impact Assessment and Management	143
5.3.1. Land Use	143
5.3.2. Topsoil Stripping	146
5.3.3. Earthworks (Excavation and Fill)	147
5.3.4. Soil Disturbance and Erosion	148
5.3.5. Soil Contamination	148
5.3.6. Geological and Geotechnical Risks	148
6. NOISE AND VIBRATION	154
6.1. Project Standards	154
6.1.1. Noise	154
6.1.2. Vibration	155
6.2. Baseline Conditions	157
6.3. Impact Assessment and Management	160
6.3.1. Noise	160
6.3.2. Vibration	184

7. AIR QUALITY AND GREENHOUSE GAS EMISSIONS	199
7.1. Project Standards	199
7.2. Baseline Conditions	200
7.3. Impact Assessment and Management	202
7.3.1. Dust Emissions	202
7.3.2. Gaseous Emissions from Construction Vehicles	243
7.3.3. Greenhouse Gas (GHG) Emissions	243
7.3.3.1. Construction Phase	245
7.3.3.1.1. Scope 1: Direct GHG Emissions	245
7.3.3.1.2. Scope 2: Electricity Indirect GHG Emissions	247
7.3.3.1.3. Land Clearance	248
7.3.3.1.4. GHG Assessment for Construction Phase	250
7.3.3.2. Operation Phase	251
7.3.3.2.1. Scope 2: Electricity Indirect GHG Emissions	251
7.3.3.2.2. Climate Change Risk Assessment	255
8. WATER AND WASTEWATER MANAGEMENT	263
8.1. Project Standards	264
8.2. Baseline Conditions	265
8.2.1. Surface Water Resources	267
8.2.1.1. Rivers and Creeks	267
8.2.1.2. Natural Lakes	273
8.2.1.3. Dams and Ponds	273
8.2.1.4. Surface Water Quality	274
8.2.2. Groundwater Resources	277
8.3. Impact Assessment and Management	278
9. WASTE MANAGEMENT	285
9.1. Project Standards	285
9.2. Baseline Conditions	286
9.3. Impact Assessment and Management	287
10. BIODIVERSITY	293
10.1. Project Standards	293
10.2. Baseline Conditions	296
10.2.1. Biodiversity Study Area	297
10.2.2. Overview of National Biodiversity Context	298
10.2.3. Legally Protected and Internationally Recognised Areas	301
10.2.3.1. Railway Alignment Overlapping with Legally Protected and Internationally Recognised Areas	308
10.2.3.2. Quarries Overlapping with Legally Protected and Internationally Recognised Areas	314
10.2.4. Biodiversity Field Surveys	316
10.2.5. Habitats Audit	347
10.2.6. Species Audit	369
10.2.6.1. Flora Studies	369
10.2.6.2. Fauna Studies	393
10.2.6.2.1. Amphibians	393
10.2.6.2.2. Reptiles	394
10.2.6.2.3. Mammals	396
10.2.6.3. Avifauna Studies	403
10.2.6.4. Aquatic Biodiversity Studies	417
10.2.6.5. Species of Conservation Importance	425
10.2.7. Invasive Alien Species	436
10.2.8. Ecosystem Services	437

10.2.9. Preliminary Critical Habitat Assessment	439
10.2.9.1. Criterion 1 –Critically Endangered (CR) and Endangered (EN) Species.....	440
10.2.9.1.1. CR Flora Species (Directly Observed)	440
10.2.9.1.2. CR Flora Species (Presumed Present)	443
10.2.9.1.3. EN Flora Species (Directly Observed).....	445
10.2.9.1.4. EN Flora Species (Presumed Present)	445
10.2.9.1.5. Terrestrial Fauna – EN Avifauna Species (Presumed Present)	449
10.2.9.1.6. Aquatic Fauna – CR Fish Species (Presumed Present).....	451
10.2.9.1.7. Aquatic Fauna – EN Fish Species (Presumed Present).....	456
10.2.9.1.8. Aquatic Fauna – VU Fish Species (Directly Observed and Presumed Present)	457
10.2.9.2. Criterion 2 – Endemic and Restricted-range Species.....	463
10.2.9.2.1. Flora Species (Directly Observed and Presumed Present)	463
10.2.9.2.2. Terrestrial Fauna Species (Presumed Present).....	467
10.2.9.2.3. Aquatic Fauna – Endemic Fish Species (Directly Observed).....	469
10.2.9.2.4. Aquatic Fauna – Endemic Fish Species (Presumed Present).....	480
10.2.9.3. Criterion 3 – Migratory and Congregatory Species	489
10.2.9.3.1. Directly Observed Migratory Bird Species.....	489
10.2.9.3.2. Presumed Present Migratory Bird Species.....	490
10.2.9.4. Criterion 4 – Highly Threatened or Unique Ecosystems.....	491
10.2.9.5. Criterion 5 – Key Evolutionary Processes	492
10.2.9.6. Summary of Critical Habitat Assessment	492
10.3. Impact Assessment and Management	497
10.3.1. Pre-ESIA Phase Avoidance Measures Embedded in the Project Design.....	497
10.3.2. Sensitivity of the Components.....	505
10.3.3. Construction Phase Impacts	509
10.3.4. Operation Phase Impacts	514
10.3.5. Considerations on No Net Loss/Net Gain for Critical Habitat and Natural Habitats	522
10.3.6. Post-ESIA Phase Biodiversity Management	529
11. SOCIO-ECONOMY	531
11.1. Methodology	539
11.1.1. Scoping Study.....	540
11.1.2. Social Surveys	541
11.1.2.1. Data Sources.....	541
11.1.2.2. Sampling	542
11.1.2.3. Limitations of the Study	545
11.1.3. Impact Assessment	547
11.2. Project Standards	548
11.3. Baseline Conditions	550
11.3.1. Population and Demographics	550
11.3.2. Infrastructure and Social Services.....	552
11.3.3. Socio-economic Conditions.....	556
11.3.3.1. Employment and Income Sources.....	556
11.3.3.2. House Ownership and Housing Characteristics	560
11.3.3.3. Lands and Assets	561
11.3.3.4. Agricultural Activity	562
11.3.3.5. Animal Husbandry	564
11.3.3.6. Benefiting from Forest	565
11.3.4. Vulnerable Groups	565
11.4. Impact Assessment and Management.....	568
11.4.1. Impacts on Population and Demographics.....	569
11.4.1.1. Migration	569

11.4.1.2. Worker Influx	569
11.4.2. Impacts on Life Conditions	572
11.4.2.1. Roads, Access and Traffic	572
11.4.2.2. Infrastructure and Facilities	577
11.4.2.3. Waste and Wastewater Management Systems and Services	578
11.4.2.4. Dust, Noise and Vibration	579
11.4.2.5. Social Services (Health and Education)	581
11.4.3. Impacts on Local Economy	581
11.4.3.1. Welfare and Wages	581
11.4.3.2. Local Employment	581
11.4.3.3. Procurement	590
11.4.3.4. Livelihood Activities in the PASs	591
11.4.4. Impacts on Land Use, Assets and Land-based Livelihood Activities	592
11.4.4.1. Agricultural Lands and Activities	599
11.4.4.2. Pasture Lands and Animal Husbandry	599
11.4.4.3. Forests and Benefiting Natural (Wood and Non-wood) Products	601
11.4.4.4. Beekeeping	602
11.4.4.5. Assets on Land and Houses	602
11.4.5. Impacts on Vulnerable Groups	610
12. LABOUR AND WORKING CONDITIONS	626
12.1. Project Standards	626
12.2. Baseline Conditions	627
12.2.1. Labour and Working Conditions	627
12.2.2. OHS in Construction of Railways Sector	629
12.2.3. Health Services in the Vicinity of the Project Route	630
12.3. Impact Assessment and Management	631
13. COMMUNITY HEALTH AND SAFETY	649
13.1. Project Standards	650
13.2. Baseline Conditions	651
13.2.1. Overview of COVID-19 Pandemic in Turkey	651
13.2.2. Forest Fires and Existing Fire Response Capacity	653
13.2.3. Road Traffic Infrastructure	654
13.2.4. Railway Accidents	655
13.3. Impact Assessment and Management	656
13.3.1. Traffic and Pedestrian Safety	656
13.3.2. Blasting Activities and Explosive Usage	657
13.3.3. Infrastructure and Equipment Safety	658
13.3.4. Workers Influx	659
13.3.5. Community Exposure to Diseases	659
13.3.6. Hazardous Materials Management and Safety	660
13.3.7. Security Personnel	660
13.3.8. Emergency Preparedness and Response	661
13.3.9. Safety of Visitors	663
14. CULTURAL HERITAGE	673
14.1. Methodology	673
14.2. Project Standards	674
14.2.1. National Legislation	674
14.2.2. International Conventions	676
14.2.3. International Standards and Guidelines	676
14.3. Baseline Conditions	677
14.3.1. Methodology for Baseline Studies	677

14.3.1.1. Tangible Cultural Heritage	677
14.3.1.2. Intangible Cultural Heritage	678
14.3.2. Findings of the Baseline Studies	679
14.3.2.1. Archaeological and Historical Background based on Desktop Review	679
14.3.2.2. Tangible Cultural Heritage based on Field Surveys	685
14.3.2.3. Intangible Cultural Heritage	738
14.3.2.4. Critical Cultural Heritage	750
14.4. Impact Assessment and Management	753
14.4.1. Tangible Cultural Heritage	753
14.4.2. Intangible Cultural Heritage	759
15. CUMULATIVE IMPACT ASSESSMENT	771
15.1. Methodology	771
15.2. Cumulative Impact Assessment Study	773
15.2.1. Step 1 – Scoping Phase I: VECs, Spatial and Temporal Boundaries	773
15.2.2. Step 2 – Scoping Phase II: Other Developments and E&S Drivers	776
15.2.3. Step 3: Establish Information on Baseline Status of VECs	785
15.2.4. Step 4: Assess Cumulative Impacts on VECs	785
15.2.5. Step 5: Assess Significance of Predicted Cumulative Impacts	791
15.2.6. Step 6: Management of Cumulative Impacts – Design and Implementation	793
16. STAKEHOLDER ENGAGEMENT	794
16.1. Project Stakeholders	794
16.2. Stakeholder Engagement in the Pre-ESIA Phase	795
16.3. Stakeholder Engagement as part of the ESIA Process	796
16.4. ESIA Disclosure Process	798
16.5. Stakeholder Engagement Plan (SEP)	798
16.6. Project Grievance and Feedback Mechanism	799
17. HUMAN RIGHTS IMPACT ASSESSMENT (HRIA)	801
17.1. Project Standards	802
17.2. Human Rights Impact Assessment (HRIA) and Management	804
18. ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM	818
18.1. Project-specific Policy	819
18.2. Identification of Risks and Impacts	820
18.3. Environmental and Social Management and Monitoring Framework Plan (ESMMFP)	822
18.4. Organisational Capacity and Competency	854
18.5. Emergency Preparedness and Response	860
18.6. Stakeholder Engagement	860
18.7. External Communications, Grievance Mechanism and Ongoing Reporting to Affected Communities	862
18.8. Monitoring and Review	863
APPENDICES	866
Appendix A – List of Settlements Affected from Project-related Land Acquisition	867
Appendix B – List of Engineering Structures to be Constructed by the Contractor	872
B.1 List of Culverts (as of January 2021)	872
B.2 List of Underpasses (as of January 2021)	880
B.3 List of Overpasses (as of January 2021)	884
B.4 List of Bridges (as of January 2021)	886
Appendix C – Noise and Vibration	888
C.1 Noise Measurement Data Sheets	888
C.2 Daytime Grid Noise Maps for the NSRs	969
C.3 Noise Modelling Results for Receptors within 500 m Distance to Noise Sources	997
Appendix D – Socio-economy	998

D.1	Number of Questionnaires per Settlement Affected from Project-related Land Acquisition.....	998
D.2	Settlement Based Status of Expropriation	1007
	Appendix E – Cultural Heritage Management Plan (including Chance Find Procedure).....	1014
	Appendix F – ISO Certifications	1039
F.1	ERG Construction ISO 9001:2015 Certification	1039
F.2	ERG Construction ISO 14001:2015 Certification	1040
F.3	ERG Construction ISO 45001:2018 Certification	1041
F.4	SSB AG ISO 9001:2015 Certification.....	1042
F.5	SSB AG ISO 14001:2015 Certification.....	1043
F.6	SSB AG ISO 45001:2018 Certification.....	1044

List of Tables

Table 1-1. Railway Sections	39
Table 1-2. Connection Lines	39
Table 1-3. Summary of Settlements Affected from Project-related Land Acquisition	40
Table 1-4. Land Acquisition Summary	45
Table 1-5. Railway Design Criteria	46
Table 1-6. Engineering Structures (as of January 2021)	47
Table 1-7. List of Viaducts (as of January 2021)	48
Table 1-8. List of Tunnels (as of January 2021).....	50
Table 1-9. Number of Culverts per Dimensions (as of January 2021).....	50
Table 1-10. Number of Underpasses per Dimensions (as of January 2021).....	51
Table 1-11. Number of Overpasses per Dimensions (as of January 2021)	52
Table 1-12. Number of Bridges per Dimensions (as of January 2021)	52
Table 1-13. Summary of Electrification System	53
Table 1-14. Signalisation and Telecommunication Infrastructure.....	53
Table 1-15. Railway Stations	53
Table 1-16. Sidings.....	54
Table 1-17. Planned Construction Camp Sites of the Contractor (as of Q2 2021)	55
Table 1-18. Quarries Considered for Use in the Project (as of Q2 2021)	59
Table 1-19. Material Borrow Sites Considered for Use in the Project (as of Q2 2021)	61
Table 1-20. Concrete Plants	62
Table 1-21. Annual Passenger Number Forecast during the Operation of the HSR by the State	62
Table 1-22. Progress of Excavation and Fill	63
Table 1-23. Scope of Construction Works	64
Table 1-24. Design and Construction Responsibility Matrix for Company's Scope of Work	64
Table 1-25. Construction Machinery Required for the Infrastructure and Superstructure Works	65
Table 1-26. Estimated Construction Workforce	67
Table 1-27. Estimated Workforce Composition	67
Table 1-28. Construction Schedule	69
Table 2-1. Civil Administration Divisions in Turkey	70
Table 2-2. Number of Municipalities in Turkey	73
Table 2-3. Main E&S Regulation Applicable to the Project	76
Table 2-4. Categorisation of Project Components and Status of Respective EIA Decisions as per national EIA Regulation	81
Table 2-5. Project Facilities that are Subject to the Requirements of the Regulation on Environmental Permits and Licenses	83
Table 2-6. Main Environmental Permits, Licenses and Approvals	85
Table 2-7. Conventions, Agreements and Protocols.....	86
Table 2-8. ILO Conventions Relevant to the Project.....	88
Table 2-9. Applicability of IFC PSs to the Project ESIA	89
Table 2-10. E&S Categorisation as per Applicable Standards.....	93
Table 3-1. Summary of Route Relocation/Revisions	97
Table 3-2. Summary of Route Relocation/Revisions	98
Table 3-3. Number of Quarries and Material Borrow Sites	101
Table 3-4. Alternative Quarries and Material Borrow Sites that are Under Evaluation as of Q2 2021	103
Table 3-5. Comparison of the Tunnel and Viaduct Numbers in the Current Design and National EIA Report	108
Table 4-1. Summary of Environmental (Physical) and Social Baseline Field Surveys conducted as part of the ESIA.....	110
Table 4-2. Specific Criteria for Predicting Overall Magnitude of Impacts	113
Table 4-3. Generic Criteria for Identification of Receptor/Resource Sensitivity and Impact Magnitude	113
Table 4-4. General Significance Assessment Matrix and Definition of Significance Levels	114
Table 4-5. Definition of AoI for Relevant E&S Subjects	115
Table 5-1. Number and Area of Affected Parcels within the Project Expropriation Corridor (based on Expropriation Plans for Full Alignment)	119
Table 5-2. Land Use Types of the Affected Parcels at the Quarry and Material Borrow Sites	121
Table 5-3. Agricultural Parcels within the Expropriation Corridor – District Level Distribution	122
Table 5-4. Pasture Parcels within the Expropriation Corridor – District Level Distribution	123
Table 5-5. Forest Parcels within the Expropriation Corridor – District Level Distribution	124

Table 5-6. Land Use Capability Classes of Agricultural Lands (within 2 km corridor) as indicated in the National EIA Report.....	124
Table 5-7. Geological Formations along the Project Route	128
Table 5-8. Description of the Geological Formations along the Project Route	129
Table 5-9. Geosites in the Vicinity of the High-Speed Railway Route	142
Table 5-10. Cumulative Area Affected within the Project Expropriation Corridor and the Quarries and Borrow Sites included in the Current Project Design.....	145
Table 5-11. Estimated Volume of the Topsoil at the Railway Route (at areas which have not been affected by Previous Infrastructure Works).....	146
Table 5-12. Estimated Volume of the Topsoil at the Quarries and Material Borrow Sites Planned to be Used by the Contractor (that have not been Previously Used) included in the Current Design	146
Table 5-13. Estimated Volume of the Topsoil at the Construction Camp Sites of the Contractor	147
Table 5-14. Cumulative Volume of Topsoil Estimated to be Stripped off in the scope of the Project	147
Table 5-15. Geological and Geotechnical Analyses Conducted for the Project in the Previous Phases	148
Table 5-16. Planned Schedule of Geological and Geotechnical Studies to be Conducted by the Contractor	150
Table 5-17. Impacts, Proposed Mitigation Measures and Residual Impacts (Land Use and Geology)	151
Table 6-1. Environmental Noise Limits for Construction Sites (as per Annex-VII, Table 5 of RAMEN).....	154
Table 6-2. WBG General EHS Guidelines for Noise Level (based on WHO Noise Guidelines)	155
Table 6-3. Project Standards for Residential Receptors.....	155
Table 6-4. Turkish Standards on Vibration Limits for Blasting	155
Table 6-5. Turkish RAMEN Vibration Limits for Construction Machinery and Equipment.....	155
Table 6-6. Turkish RAMEN Vibration Limits for Buildings (to be complied by Railway Transportation Vehicles) .	156
Table 6-7. Vibration Damage Criteria of FTA.....	156
Table 6-8. Baseline Noise Measurement Locations	157
Table 6-9. Baseline Noise Measurement Results at the NSRs	158
Table 6-10. Criteria for the Sensitivity of Noise Receptors	160
Table 6-11. Typical Human Response to Relative Changes in Noise Level	160
Table 6-12. Criteria for Magnitude of Change	160
Table 6-13. Sound Power Levels for the Construction Machinery and Equipment.....	162
Table 6-14. Other Potential Noise Receptors Considered in the Assessment.....	169
Table 6-15. Cumulative Construction Noise Level Modelling Results for NSRs and Other Potential Noise Receptors.....	170
Table 6-16. Potential Noise Sensitive Receptors (NSRs) within the Impact Corridor	175
Table 6-17. Distribution of the Number of Settlements within the Noise Impact Corridor per Section, Province and District.....	177
Table 6-18. Blasting Vibration Assessment for the Quarries to be Used in the Construction Phase	185
Table 6-19. Machine Equipment Damage Criteria.....	186
Table 6-20. Construction Vibration Levels.....	187
Table 6-21. Project Types for Vibration Screening Procedure	188
Table 6-22. Project Land Use Category	188
Table 6-23. Screening Distance for Vibration Assessments	189
Table 6-24. Potential Receptors within the Critical Vibration Distance	189
Table 6-25. Distribution of the Number of Settlements within the Noise Impact Corridor per Section, Province and District.....	190
Table 6-26. Impacts, Proposed Mitigation Measures and Residual Impacts (Noise and Vibration).....	192
Table 7-1. Air Quality (PM ₁₀ and PM _{2.5}) Standards.....	199
Table 7-2. Baseline Air Quality (Dust) Measurement Results.....	200
Table 7-3. Criteria for Magnitude of Change	202
Table 7-4. Emission Factors and Emission Calculations for Land Preparation and Construction Activities.....	203
Table 7-5. Emission Factors and Emission Calculations for Limestone and Andesite Quarries	203
Table 7-6. Emission Factors and Emission Calculations for Basalt Quarries	203
Table 7-7. Emission Factors and Emission Calculations for Concrete Plants	203
Table 7-8. Air Quality Modelling Results - Maximum Concentration Values for "Quarries".....	206
Table 7-9. Air Quality Modelling Results - Maximum Concentration Values for "Borrow Sites"	207
Table 7-10. Cumulative PM ₁₀ and PM _{2.5} Concentrations at the Receptors.....	208
Table 7-11. Gaseous Emissions from the Construction Vehicles and Equipment.....	243
Table 7-12. Scope Definitions as per Corporate Standard	244
Table 7-13. Global Warming Potentials	244
Table 7-14. GHG Emissions from Stationary and Mobile Emission Sources.....	246
Table 7-15. GHG Emissions from the Use of ANFO and Dynamite.....	247

Table 7-16. GHG Emissions from Electricity Consumed	247
Table 7-17. Definitions for Carbon Pools for each Land-Use Category	248
Table 7-18. GHG Emissions from Land Use Change	250
Table 7-19. Total GHG Emissions of the Project (Construction Phase)	250
Table 7-20 GHG Emissions from Electricity Consumed during Operation Phase	252
Table 7-21 GHG Emissions from the use of AIHSR along Ankara-Izmir Route (First Year of Operations)	253
Table 7-22. Distribution of Passenger Transportation Modes in Turkey in 2018.....	253
Table 7-23 GHG emissions from the use of private car and bus in "No-HSR scenario" as alternative transportation mode along Ankara – Izmir route (for the 1 st year of operations)	254
Table 7-24 GHG emissions from the use of conventional train in "No-HSR scenario" as alternative transportation mode along Ankara – Izmir route (for the 1 st year of operations)	254
Table 7-25 GHG emissions from the use of passenger aircraft in "No-HSR scenario" as alternative transportation mode along Ankara – Izmir route (for the 1 st year of operations)	254
Table 7-26. GHG Emissions from the Use of HSR and the Other Alternative Transportation Means	255
Table 7-27. Forest Fire Statistics.....	256
Table 7-28. Number of Flood Incidents in Provinces crossed by the Project.....	256
Table 7-29. Project Specific Climate-Related Opportunities and Potential Financial Impacts	258
Table 7-30. Positive Alignments related with Railway Investments in terms of Climate Change Policy.....	259
Table 7-31 Railway investment and Development Objectives.....	259
Table 7-32. Impacts, Proposed Mitigation Measures and Residual Impacts (Air Quality and GHG Emissions) ..	260
Table 8-1. Project Standards for the Treated Sanitary Wastewater Discharge to Receiving Environment	265
Table 8-2. RSWQ Inland Surface Waters Quality Criteria	265
Table 8-3. River Basins Crossed by the Project.....	265
Table 8-4. Rivers/Creeks in the Vicinity of the Project.....	267
Table 8-5. Surface Water Resources in the Vicinity of the Quarries.....	272
Table 8-6. Surface Water Resources in the Vicinity of the Stations.....	272
Table 8-7. Natural Lakes in the Vicinity of the Project	273
Table 8-8. Dams and Ponds in the Vicinity of the Project.....	273
Table 8-9. Surface Water Quality Sampling Locations	274
Table 8-10. Surface Water Quality Analysis Results.....	276
Table 8-11. Groundwater Reserves of the River Basins Crossed by the Project.....	277
Table 8-12. Indicative Water Use for the Construction Sites and Processes.....	279
Table 8-13. Estimated Daily Wastewater Generation from the Project.....	279
Table 8-14. Impacts, Proposed Mitigation Measures and Residual Impacts (Water and Wastewater Management)	282
Table 9-1. Municipal Waste Generation Statistics for 2018	286
Table 9-2. Licensed Landfills and Waste Management Facilities along the Project Route	286
Table 9-3. Municipal Waste Generation Estimation for the Project.....	287
Table 9-4. Progress of Excavation and Fill Amounts	288
Table 9-5. Impacts, Proposed Mitigation Measures and Residual Impacts (Waste Management)	290
Table 10-1. Legally Protected Areas along the Railway Alignment.....	301
Table 10-2. Internationally Recognised Areas along the Railway Alignment	302
Table 10-3. Balikdami Nationally Important Wetland (Section 1).....	308
Table 10-4. Species Qualifying Balikdami Nationally Important Wetland	309
Table 10-5. Legally Protected Areas Overlapping with the Railway Alignment.....	311
Table 10-6. Internationally Recognised Areas Overlapping with the Railway Alignment	311
Table 10-7. Polatlil-TIGEM KBA Qualifying Species.....	312
Table 10-8. Balikdami KBA Qualifying Species	312
Table 10-9. Murat Mountain KBA Qualifying Species	312
Table 10-10. Yamanlar Mountain KBA Qualifying Species	313
Table 10-11. Quarries Overlapping with Legally Protected and Internationally Recognised Areas.....	314
Table 10-12. Quarries Overlapping with Internationally Recognised Areas.....	314
Table 10-13. Acikir Steppes KBA Qualifying Species	315
Table 10-14. Spil Mountain KBA Qualifying Species	315
Table 10-15. Terrestrial Flora and Fauna and Aquatic Field Survey Locations.....	321
Table 10-16. Habitat Classification and Vegetation Characteristics at the Project Area	348
Table 10-17. Habitat Distribution along the Railway Alignment	368
Table 10-18. Flora Species Identified at the Project Area.....	376
Table 10-19. Flora Species of Importance Identified at the Project Area	382
Table 10-20. Local and Regional Endemic Flora Species – Seed Collection, Plantation and Flowering Periods	393

Table 10-21. Amphibian Species Presumed to be Present at the Project Area	394
Table 10-22. Reptile Species Presumed to be Present at the Project Area	395
Table 10-23. Mammal Species Presumed to be Present at the Project Area	398
Table 10-24. Avifauna Species Presumed to be Present at the Project Area	405
Table 10-25. Avifauna Species Presumed to be Present at the Project Area (Survey Point #1 to Survey Point #24)	408
Table 10-26. Avifauna Species Presumed to be Present at the Project Area (Survey Point #25 to Survey Point #44)	411
Table 10-27. Avifauna Species Presumed to be Present at the Project Area (Survey Point #45 to Survey Point #58)	414
Table 10-28. Algae Species Presumed to be Present at the Project Area	417
Table 10-29. Zooplanktonic Organisms Presumed to be Present at the Project Area	417
Table 10-30. Benthic Organisms Presumed to be Present at the Project Area	417
Table 10-31. Fish Species at each River Basin and Survey Station	419
Table 10-32. Summary of Aquatic Field Survey Results for Fish Species	420
Table 10-33. Species of Conservation Importance	426
Table 10-34. Summary of Critical Habitat (CH) Qualifying and Potential CH Trigger Species as per IFC PS6 Guidance Note (2019)	493
Table 10-36. Engineering Structures Providing Habitat Continuity (as of January 2021)	497
Table 10-36. Criteria for Sensitivity of Receptors	505
Table 10-38. Impacts, Proposed Mitigation Measures and Residual Impacts (Biodiversity)	516
Table 10-35. Review of CH Designated Biodiversity Features	523
Table 11-1. Number of Settlements Affected by Project-related Land Acquisition	532
Table 11-2. Summary of Remaining Expropriation Works (as of Q2 2021)	538
Table 11-3. Methodological Summary of the Social Studies	539
Table 11-4. Locations Visited within the Scope of the Field Study	540
Table 11-5. Data Collection Tools for Specific Target Groups	542
Table 11-6. Sampling Strategies Per Data Collection Tools and Number of Interviews per Target Groups	543
Table 11-7. Breakdown of CLQ and HHQ Numbers per PASs	545
Table 11-8. Population Growth Rate in Districts Crossed by the Project (2020)	550
Table 11-9. Population Change of PASs in the Last 10 Years	550
Table 11-10. Number and Population of Permanent Households in PASs	551
Table 11-11. Number and Population of Seasonal Households in PASs	551
Table 11-12. Gender Distribution of Household Members	551
Table 11-13. Population in PASs According to Age Groups	551
Table 11-14. Distribution of Household Members by Age	552
Table 11-15. Distribution of Adults by Educational Level	552
Table 11-16. Selected Health Service Indicators per Provinces Crossed by the HSR	553
Table 11-17. Primary Education (8 years) and High School Ratio of Students per Classroom and Teacher	553
Table 11-18. Collection of Solid Wastes in PASs	554
Table 11-19. Number of PAS according to the Authority Providing Municipal Solid Waste Collection Services	554
Table 11-20. Distribution of PASs according to Wastewater Disposal Methods	554
Table 11-21. Infrastructure and Social Service Facilities in PASs	555
Table 11-22. Working Situations of the Sample Household Members	556
Table 11-23. Type of Work/Employment of the Working Population	556
Table 11-24. Type of Work/Employment of the Working Population according to Districts and Provinces	557
Table 11-25. Distribution of Households by Main Source of Income	557
Table 11-26. Distribution of Households by Main Source of Income according to Provinces and Districts	558
Table 11-27. Distribution of Households by Supplementary Sources of Income	559
Table 11-28. Share of Food Expenditure in Household Expenditure	559
Table 11-29. The Rate of Homeowners in PASs	560
Table 11-30. Conditions of the Houses the Respondents are Living In	560
Table 11-31. House Ownership/Rental Status	560
Table 11-32. Number of Rooms Including Living Room	560
Table 11-33. Size of Your House (m ²)	561
Table 11-34. Main Building Material of the Houses	561
Table 11-35. Distance of the House to the Railway Construction	561
Table 11-36. Land Ownership	561
Table 11-37. Size of the Land as Owners or Shareholders	562
Table 11-38. Type of Lands Owned or Shared	562

Table 11-39. Agricultural Activity on Land Owned or Shared.....	562
Table 11-40. Agricultural Activity on Lands Owned by the Respondents and on Public Lands.....	562
Table 11-41. Total Land Size in Which Agricultural Activities Are Carried Out	563
Table 11-42. Products Produced in PASs.....	563
Table 11-43. Distribution of PASs by Household Numbers of Cattle and Ovine Owners	564
Table 11-44. Number of PASs Selling Milk	564
Table 11-45 Benefiting of PAPs from the Forests	565
Table 11-46. Number of Households with Beehives in PASs.....	565
Table 11-47. Number of Vulnerable Individuals Identified in the PASs	567
Table 11-48. Number of PAPs Having Vulnerabilities Related to Gender Issues in PASs	567
Table 11-49. Number of Adults with No Schooling Experience and their Literacy Status	567
Table 11-50. Anticipation of PAPs with regard to Future Project Impacts	568
Table 11-51. PAPs Anticipation of Impacts due to Construction Worker Influx	570
Table 11-52. Settlements with Retrospective Impacts on Local Roads due to Previous Project Construction Works conducted by Other Contractors (Suspended in 2018)	572
Table 11-53. Anticipated Impacts on Roads and Transport	573
Table 11-54. PAPs Anticipation of Project-related Impacts on Traffic	574
Table 11-55. Settlements with Expectations / Experience of Impacts on Roads and Access	575
Table 11-56. Impacts on the Infrastructure and Communication Facilities according to PAPs	577
Table 11-57. Impacts on Waste and Wastewater Services according to PAPs.....	578
Table 11-58. Dust and Noise Expectation from the Project of PAPs.....	580
Table 11-59. Project's Anticipated Impact on Welfare Level and Wages according to PAPs	581
Table 11-60. Project Impact on Employment According to PAPs.....	582
Table 11-61. Potential for Local Employment	583
Table 11-62. Unqualified and Semi-qualified Local Employment Potential of the Settlements	584
Table 11-63. Qualified Local Employment Potential of the Settlements	589
Table 11-64. Impacts on Livelihood Activities According to PAPs.....	591
Table 11-65. Summary of the Number and Area of Affected Parcels within the Project Expropriation Corridor (based on Expropriation Plans)	592
Table 11-66. Settlements with Agricultural Land Acquisition of over 25 ha within the Expropriation Corridor	593
Table 11-67. Settlements with Affected Forest Parcels within the Expropriation Corridor	594
Table 11-68. Settlements with Affected Pasture Parcels within the Expropriation Corridor	595
Table 11-69. Indicative Information on Number and Area of Affected Parcels, Number of PAPs (Owners/Shareholders) and Number of Affected Buildings within the Expropriation Corridor	598
Table 11-70. Potential for Negative Impacts on Agricultural Activity due to the Project	599
Table 11-71. Affected Status of Pastures by the Project.....	600
Table 11-72. Types of Impacts on Pasture Lands according to PAPs.....	600
Table 11-73. List of Pasture Affected PASs	600
Table 11-74. Affected Status of the Forest by the Project.....	601
Table 11-75. Affected Status of the Forest Beneficiary Activity from the Project.....	601
Table 11-76. List of Forest Affected PASs	601
Table 11-77. PASs Having Beehives	602
Table 11-78. Summary of the RAP Surveys of May 2021.....	605
Table 11-79. List of Affected Residential Buildings	605
Table 11-80. List of Structures with Potential Commercial Use	607
Table 11-81. PAPs Whose Immovable Assets on the Land are Affected by the Project	609
Table 11-82. Status of the Houses Affected by the Project.....	609
Table 11-83. Vulnerable Individuals Experiencing Difficulties with the Project	610
Table 11-84. Statements of Vulnerable PAPs Stating that Their Life Is Getting Harder due to Project Activities	610
Table 11-85. Vulnerable Individuals Anticipating Difficulties Related to the Project	612
Table 11-86. Statements of Vulnerable PAPs Stating that Their Life Will Be Difficult due to Project Activities	612
Table 11-87. Engagement Preferences of Vulnerable PAPs	614
Table 11-88. Impacts, Proposed Mitigation Measures and Residual Impacts (Socio-economy).....	616
Table 12-1. Distribution of Syrians Under Temporary Protection in Turkey by Provinces Crossed by the Railway	628
Table 12-2. Number and Percentage of Work Accidents and Fatal Incidents in Construction of Railways and Subways Sectors	630
Table 12-3. State Hospital and Healthcare Facilities Along the Project Route	630
Table 12-4. Contractor Camp Site Accommodation Capacities	632
Table 12-5. Impacts, Proposed Mitigation Measures and Residual Impacts (Labour and Working Conditions)	637

Table 13-1. Number of COVID-19 Cases (per 100 Thousand Population and Weekly New Cases) in Provinces Crossed by the Project (for the week of 6-12 March 2021)	652
Table 13-2. Forest Fire Statistics in Provinces Crossed by the Project (2015-2019)	653
Table 13-3. Railway Operations Accident Statistics for 2015-2020 (including Passenger, Freight, Inner-city and Other Railway Transportation Types)	655
Table 13-4. Nearest Settlements to the Tunnel Portals	661
Table 13-5. Railway Stations and Nearest Settlements	662
Table 13-6. Impacts, Proposed Mitigation Measures and Residual Impacts (Community Health and Safety)	665
Table 14-1. Scope of Tangible Cultural Heritage Studies	674
Table 14-2. Applicable Requirements of the Law No. 2863	675
Table 14-3. Archaeological and Immovable Cultural Heritage Sites Identified through Desktop Research (within an approximately 5 km Desktop Study Area)	683
Table 14-4. Site Classification Criteria	685
Table 14-5. Provincial Distribution of Registered and Non-registered Sites Identified within the Study Area	685
Table 14-6. Distribution of Sites with Respect to their Location/Position within the Study Area	685
Table 14-7. Registered and Non-registered Cultural Heritage Sites within the Study Area	687
Table 14-8. Intangible Cultural Heritage Elements in the Provinces Crossed by the Project	739
Table 14-9. Intangible Cultural Heritage Elements of the Provinces Crossed by the Project as Registered in the National Inventory	743
Table 14-10. Potential Intangible Cultural Heritage Elements Reported by the Settlement Heads in the Settlements Surveyed as part of the ESIA	747
Table 14-11. Internationally Recognised Cultural Heritage Areas (World Heritage List and World Heritage Tentative List of UNESCO)	750
Table 14-12. Legally Protected (Registered) Archaeological Sites	752
Table 14-13. Activities that may Cause Potential Impacts on Cultural Heritage Receptors during the Land Preparation and Construction Phase	753
Table 14-14. Criteria for the Sensitivity of Tangible Cultural Heritage Receptors	754
Table 14-15. Sensitivity Levels of the Archaeological/Immovable Cultural Heritage Receptors Identified within the Study Area	755
Table 14-16. Criteria for Magnitude of Change	756
Table 14-17. Cultural Heritage Impact Significance Assessment Matrix	757
Table 14-18. Cultural Heritage Authorities Responsible in the Provinces Crossed by the Project	757
Table 14-19. General Management Measures Applicable to Different Types of Sites	758
Table 14-20. Criteria for the Sensitivity of Intangible Cultural Heritage Receptors and Magnitude of Impact	760
Table 14-21. Impacts, Proposed Mitigation Measures and Residual Impacts (Cultural Heritage)	763
Table 15-1. Specific VECs of the CIA Study for the Ankara-Izmir HSR Project	774
Table 15-2. Existing and Future Developments in the CIA Study Area	777
Table 15-3. Distribution of Other Projects per District	784
Table 15-4. Definition of Cumulative Impact Potential Scales	785
Table 16-1. Public Participation Meetings within the scope of National EIA Process	795
Table 16-2. General Questions Posed by Participants During the Public Participation Meetings of 2005	795
Table 16-3. Governmental Stakeholders Consulted during the National EIA Process through Official Correspondence	795
Table 16-4. Summary of Engagement Activities Conducted as part of the ESIA Process	797
Table 18-1. Existing Management System Certifications	820
Table 18-2. Project Environmental and Social Management and Monitoring Framework Plan	825
Table 18-3. Roles and Responsibilities of the Project ESMS Team of the Contractor for the Construction Phase	857
Table 18-4. Framework for the Internal Environmental Monitoring Program during the Construction Phase	864

List of Figures

Figure 0-1. Project Layout and Division of Project Sections as per Responsible Parties for Infrastructure Works (ERG JV and Other Contractors)	27
Figure 1-1. Project Layout.....	35
Figure 1-2. Key Project Milestones	36
Figure 1-3. Status of Railway Projects in Turkey.....	37
Figure 1-4. Project Route (Section 1: Polatli-Afyon).....	41
Figure 1-5. Project Route (Section 2: Afyon-Banaz).....	42
Figure 1-6. Project Route (Section 3: Banaz-Salihli).....	43
Figure 1-7. Project Route (Section 4: Salihli-Menemen)	44
Figure 1-8. Sketches Representing Infrastructure Design for Ankara-Izmir HSR.....	47
Figure 1-9. Seydiler-1 Viaduct (KM 131+180.000-131+697.500).....	49
Figure 1-10. Current Status of Sinanpasa Camp Site at Railway KM 190+000 (as of January 2021).....	56
Figure 1-11. General Camp Site Layout.....	57
Figure 2-1. Institutional Framework Relevant to the Project – Central Administrations.....	71
Figure 2-2. Institutional Framework Relevant to the Project – Local Administrations	74
Figure 2-3. The EIA Process under the National EIA Regulation	80
Figure 2-4. Regulatory Process as per the Regulation on Environmental Permits and Licenses.....	84
Figure 3-1. Vision 2023 HSR Lines for Turkey (<i>Former Ministry of Transport, Maritime Affairs and Communications, November 2017. Improving Transnational Transport Corridors in OIC Member Countries – Country Report</i>).....	95
Figure 3-2. Bayat Relocation (Section 1: 108+740-120+520)	99
Figure 3-3. Hatipler Relocation (Section 2: 267+156.000-278+632.464).....	100
Figure 3-4. Alternative Quarry Sites in Section 1.....	104
Figure 3-5. Alternative Quarry Sites in Section 2.....	105
Figure 3-6. Alternative Quarry Sites in Section 3.....	106
Figure 3-7. Alternative Quarry Sites in Section 4.....	107
Figure 4-1. ESIA Process.....	111
Figure 5-1. Main Tectonic Zones of Turkey (Eyuboglu et al., 2018)	126
Figure 5-2. Tectonic Map of Turkey and General Region (<i>Source: Okay, 2008</i>)	127
Figure 5-3. Earthquake Risk Map of Turkey published by AFAD.....	131
Figure 5-4. Earthquake Risk Maps of Provinces Crossed by the Project (as Published by AFAD)	133
Figure 5-5. Project Route on Active Fault Map – Section 1	134
Figure 5-6. Project Route on Active Fault Map – Section 2.....	135
Figure 5-7. Project Route on Active Fault Map – Section 3.....	136
Figure 5-8. Project Route on Active Fault Map – Section 4.....	137
Figure 5-9. Sinkholes Identified (by the CoGE and based on Satellite Imagery) in the South of Railway KM 56+250 – 63+250 near Sigircik Neighbourhood (Eskisehir, Sivrihisar) in Section 1	140
Figure 5-10. Landslide Zones along the Project Route (Geoscience Map Viewer Database of MTA).....	141
Figure 6-1. Noise Measurement Locations	159
Figure 6-2. Day Time Grid Noise Maps for NSRs.....	168
Figure 6-3. Locations of NSRs and Other Potential Noise Receptors Covered in the Cumulative Noise Modelling	171
Figure 6-4. Train Type Categorisation according to SRM II.....	172
Figure 6-5. Indicative Noise Impact Corridor for Operation Phase based on Worst-case Modelling Study	174
Figure 6-6. Locations of the Potential NSRs within the Impact Corridor along the Project Route	178
Figure 6-7. Locations of the Potential NSRs within the Impact Corridor along the Project Route – Section 1 ...	179
Figure 6-8. Locations of the Potential NSRs within the Impact Corridor along the Project Route – Section 2	180
Figure 6-9. Locations of the Potential NSRs within the Impact Corridor along the Project Route – Section 3 ...	181
Figure 6-10. Locations of the Potential NSRs within the Impact Corridor along the Project Route – Section 4 .	182
Figure 6-11. Vibration Effect of Construction Machinery and Equipment with Distance	186
Figure 6-12. Flow Chart of Vibration Screening Process	187
Figure 7-1. Baseline Air Quality Measurement Locations.....	201
Figure 7-2. Modelling Study Area for Air Quality (Example for Railway Route and Quarry/Material Borrow Sites)	205
Figure 7-3. Maximum Daily Average PM ₁₀ Emissions from Project Activities (0-35 km).....	209
Figure 7-4. Maximum Daily Average PM ₁₀ Emissions from Project Activities (35-75 km).....	210

Figure 7-5. Maximum Daily Average PM ₁₀ Emissions from Project Activities (75-100 km).....	211
Figure 7-6. Maximum Daily Average PM ₁₀ Emissions from Project Activities (100-130 km).....	212
Figure 7-7. Maximum Daily Average PM ₁₀ Emissions from Project Activities (130-175 km).....	213
Figure 7-8. Maximum Daily Average PM ₁₀ Emissions from Project Activities (175-230 km).....	214
Figure 7-9. Maximum Daily Average PM ₁₀ Emissions from Project Activities (456-486 km).....	215
Figure 7-10. Maximum Daily Average PM ₁₀ Emissions from Project Activities (486-514 km).....	216
Figure 7-11. Emission Dispersion Maps of Beycegiz Quarry.....	217
Figure 7-12. Emission Dispersion Maps of Yagmurbaba Quarry.....	218
Figure 7-13. Emission Dispersion Maps of Yenice Quarry	219
Figure 7-14. Emission Dispersion Maps of Turktaciri Quarry	220
Figure 7-15. Emission Dispersion Maps of Kayakent Quarry	221
Figure 7-16. Emission Dispersion Maps of Alibeyce Quarry	222
Figure 7-17. Emission Dispersion Maps of Tabaklar Quarry	223
Figure 7-18. Emission Dispersion Maps of Emirinkoyu Quarry	224
Figure 7-19. Emission Dispersion Maps of Bayat Quarry.....	225
Figure 7-20. Emission Dispersion Maps of Gebeceler-2 Quarry	226
Figure 7-21. Emission Dispersion Maps of Beyyazi Quarry	227
Figure 7-22. Emission Dispersion Maps of Ayvali Quarry	228
Figure 7-23. Emission Dispersion Maps of Elvanpasa 2 Quarry	229
Figure 7-24. Emission Dispersion Maps of Dumenler Quarry	230
Figure 7-25. Emission Dispersion Maps of Ahmetlidag 2 Quarry	231
Figure 7-26. Emission Dispersion Maps of Hayalli Quarry	232
Figure 7-27. Emission Dispersion Maps of Dombayli Quarry.....	233
Figure 7-28. Emission Dispersion Maps of Akkoy Quarry	234
Figure 7-29. Emission Dispersion Maps of B-Campinar Quarry.....	235
Figure 7-30. Emission Dispersion Maps of Cikrikci Quarry	236
Figure 7-31. Emission Dispersion Maps of Ansizca Quarry	237
Figure 7-32. Emission Dispersion Maps of Ansizca 2 Quarry	238
Figure 7-33. Emission Dispersion Maps of Yunusemre Quarry.....	239
Figure 7-34. Emission Dispersion Maps of Gurle Quarry	240
Figure 7-35. Emission Dispersion Maps of Caltidere Quarry	241
Figure 7-36. Emission Dispersion Maps of Degirmendere Quarry	242
Figure 7-37. Carbon Cycle Showing the Flows of Carbon into and out of the System as well as between the Carbon Pools within the System (Source: IPCC Guideline for AFOLU, 2006)	249
Figure 7-38. Breakdown of the Project Construction Phase GHG Emissions	250
Figure 7-39. Historical Floods in Turkey.....	257
Figure 8-1. River Basins the Project Crosses.....	266
Figure 8-2. Surface Water Resources in Section 1	268
Figure 8-3. Surface Water Resources in Section 2	269
Figure 8-4. Surface Water Resources in Section 3	270
Figure 8-5. Surface Water Resources in Section 4	271
Figure 8-6. Surface Water Quality Sampling Locations.....	275
Figure 10-1. Phytogeographical Regions in Turkey.....	298
Figure 10-2. Bird Migration Routes passing through Turkey	299
Figure 10-3. Key Biodiversity Areas (KBAs) in Turkey	300
Figure 10-4. Important Bird Areas (IBAs) in Turkey.....	300
Figure 10-5. Section 1 – Legally Protected Areas and KBAs	304
Figure 10-6. Section 2 – Legally Protected Areas and KBAs	305
Figure 10-7. Section 3 – Legally Protected Areas and KBAs	306
Figure 10-8. Section 4 – Legally Protected Areas and KBAs	307
Figure 10-9. Balikdami Nationally Important Wetland	309
Figure 10-10. Section 1 – Selected Baseline Biodiversity Field Study Locations.....	318
Figure 10-11. Section 2 – Selected Baseline Biodiversity Field Study Locations.....	319
Figure 10-12. Section 4 – Selected Baseline Biodiversity Field Study Locations.....	320
Figure 10-13. EUNIS Habitat Map – Section 1 (KM 0+000-KM 50+000)	358
Figure 10-14. EUNIS Habitat Map – Section 1 (KM 50+000-KM 100+000)	359
Figure 10-15. EUNIS Habitat Map – Section 1 (KM 100+000-KM 151+500).....	360
Figure 10-16. EUNIS Habitat Map – Section 2 (KM 151+500-KM 200+000)	361
Figure 10-17. EUNIS Habitat Map – Section 2 (KM 200+000-KM 279+000)	362
Figure 10-18. EUNIS Habitat Map – Section 3 (KM 279+000-KM 350+000)	363

Figure 10-19. EUNIS Habitat Map – Section 3 (KM 350+000-KM 439+000)	364
Figure 10-20. EUNIS Habitat Map – Section 4 (KM 439+000-KM 500+000)	365
Figure 10-21. EUNIS Habitat Map – Section 4 (KM 500+000-KM 522+100)	366
Figure 10-22. Section 1 – Flora Species of Importance Identified Along the Project Route	384
Figure 10-23. Section 2 – Flora Species of Importance Identified Along the Project Route	385
Figure 10-24. Section 4 – Flora Species of Importance Identified Along the Project Route	386
Figure 10-25. Distribution of Local and Regional Endemic Flora Species in Turkey	392
Figure 10-26. Distribution of Endemic Reptile Species <i>Anatololacerta anatolica</i> in Turkey (Baran et al. 2021) ..	396
Figure 10-27. Burrows of Mammals Observed during the Field Study	401
Figure 10-28. Burrows of Mammals Observed during the Field Study	402
Figure 10-29. Aquatic Stations and the River Basins Along the Railway Alignment	418
Figure 10-30. Fish Species Directly Observed at the Project Area.....	424
Figure 10-31. Distribution of Endemic Reptile Species <i>Anatololacerta anatolica</i> in Turkey (Baran et al. 2021) ..	467
Figure 10-32. Project Area for Critical Habitat Assessment.....	496
Figure 10-33. Iscehisar Lake in the Vicinity of Afyon-Iscehisar Natural Site in Section 1	498
Figure 10-34. Railway Alignment through Balikdami Nationally Important Wetland, Balikdami Natural Site and Balikdami KBA-IBA in Section 1	500
Figure 10-35. Railway Alignment through Iscehisar Lake (Natural Site) and Afyon-Iscehisar Natural Site in Section 1	501
Figure 10-36. Juniper Woodland at KM 105+000.00 in Section 1	502
Figure 10-37. <i>Pinus nigra</i> Woodland at Hatipler Passage in Section 2	503
Figure 10-38. <i>Pinus nigra</i> Woodland in Section 2 at Murat Mountain KBA Overlap	504
Figure 11-1. Settlements Affected from Project-related Land Acquisition along the HSR Route – Section 1	534
Figure 11-2. Settlements Affected from Project-related Land Acquisition along the HSR Route – Section 2	535
Figure 11-3. Settlements Affected from Project-related Land Acquisition along the HSR Route – Section 3	536
Figure 11-4. Settlements Affected from Project-related Land Acquisition along the HSR Route – Section 4	537
Figure 11-5. Potential Impacts of Worker Influx.....	571
Figure 11-6. Potential Impacts related to Access Restrictions.....	575
Figure 11-7. Potential Impacts on Infrastructure with Impacts on Livelihoods and Life Conditions (Water and Energy)	578
Figure 11-8. Adverse Impacts of the Project on Agricultural Activities	599
Figure 12-1. Basic Indicators of Children Engaged in Economic Activities in Turkey as of Fourth Quarter of 2019, 5-17 Age Group (TurkStat, March 2020. Child Labour Force Survey).....	629
Figure 12-2. Change in Female Labour Force Participation Rate in Turkey for 1990-2020 (%of female population ages 15+) (Source: World Bank Open Data, 2020. Labour Force Participation Statistics).....	629
Figure 13-1. Overview of COVID-19 Pandemic in Turkey between 1 January 2021 and 12 March 2021	652
Figure 13-2. Distribution of Forest Area of Turkey	653
Figure 13-3. Existing Road Infrastructure of 4 th Regional Directorate	654
Figure 13-4. Existing Road Infrastructure of 3 rd Regional Directorate	654
Figure 13-5. Existing Road Infrastructure of 2 nd Regional Directorate.....	655
Figure 14-1. Archaeological/Immovable/Movable Cultural Heritage Sites in the Province of Ankara	686
Figure 14-2. Locations of the Registered Archaeological Sites and Non-registered Potential Site within the Study Area	693
Figure 14-3. (1) Yagmurbaba Tumuli (Non-registered Archaeological Site) within the Yagmurbaba-4 and Yagmurbaba-5 Quarry Site.....	694
Figure 14-4. (2) Calli Baba Flat Settlement (Non-registered Archaeological Site) Outside the Yagmurbaba-4 Quarry Site.....	695
Figure 14-5. Archaeological/Immovable/Movable Cultural Heritage Sites in the Province of Eskisehir.....	696
Figure 14-6. (3) Gumuskonak Pastoral Settlement (Non-registered Archaeological Site) within the Impact Corridor (KM 20+500)	697
Figure 14-7. (4) Capkininbel Tumuli (Non-registered Archaeological Site) outside the Impact Corridor (KM 45+155).....	698
Figure 14-8. (5) Alihoyugu Mound (Non-registered Archaeological Site) within the Expropriation Corridor (KM 50+800).....	699
Figure 14-9. (6) Sogutlu Slope Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (56+700).....	700
Figure 14-10. (7) Mahmutozu Grave Stele (Non-registered Site – Classified as Other) within the Impact Corridor (64+140).....	701
Figure 14-11. (8) Mahmutozu Flat Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (KM 65+900)	702

Figure 14-12. Archaeological/Immovable/Movable Cultural Heritage Sites in the Province of Afyonkarahisar....	703
Figure 14-13. (9) Samangedigi Flat Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (67+600).....	704
Figure 14-14. (10) Kelkaklik Stone Bridge (Non-registered Site – Classified as Other) within the Impact Corridor (KM 98+010)	705
Figure 14-15. (11) Tabaklar Smelting Furnace Complex (Non-registered Site – Classified as Other) within the Expropriation Corridor at Tabaklar-2 Quarry Site	706
Figure 14-16. (12) Hurriyet Tumuli (Non-registered Archaeological Site) outside the Impact Corridor (KM 99+300)	707
Figure 14-17. (13) Emirinkoy Slope Settlement (Non-registered Archaeological Site) within the Emirin Koy Quarry Site.....	708
Figure 14-18. (14) Emirinkoy Cemetery (Non-registered Potential Archaeological Site) within the Impact Corridor KM 105+250)	709
Figure 14-19. (15) Kumderesi Flat Settlement/Mound (Non-registered Archaeological Site) within the Expropriation Corridor (KM107+900)	710
Figure 14-20. (16) Tavsantepe Watch Tower (Non-registered Archaeological Site) within the Impact Corridor (KM 115+300).....	711
Figure 14-21. (17) Cinkic Mound (Registered Site) Outside the Impact Corridor (KM 119+500).....	712
Figure 14-22. (18) Seydiler Flat Settlement (Registered Site) within the Expropriation Corridor (KM 131+650) .	713
Figure 14-23. (19) Buyuk Kepez Hilltop Settlement (Registered Site) outside the Impact Corridor (KM 145+360)	714
Figure 14-24. (20) Kepez Altı Tumuli (Non-registered Archaeological Site) within the Expropriation Corridor (KM 145+437)	715
Figure 14-25. (21) Pirenlikuyu Mound (Non-Registered Archaeological Site) outside the Impact Corridor (KM 146+220).....	716
Figure 14-26. (22) Kuzviran Necropolis (Non-registered Potential Archaeological Site) within the Expropriation Corridor (KM 149+460)	717
Figure 14-27. (23) Eyupoglu Mound (Registered Site) within the Expropriation Corridor (KM 149+810)	718
Figure 14-28. (24) Eyupoglu Necropolis (Non-registered Archaeological Site) within the Expropriation Corridor (KM 150+030)	719
Figure 14-29. (25) Cesmealti Tumuli (Non-registered Archaeological Site) within the Expropriation Corridor (KM 150+865).....	720
Figure 14-30. (26) Yunakbasi Mound (Registered Site) within the Expropriation Corridor (Afyonkarahisar Connection Line).....	721
Figure 14-31. (27) Guzelim Tepesi Historical Site (Registered Site) outside the Beyyazi Quarry Site	722
Figure 14-32. (28) Oren Stone Bridge (Non-registered – Classified as Other) within the Expropriation Corridor (KM 204+413)	723
Figure 14-33. (29) Dolay Mound (Non-registered Archaeological Site) outside Impact Corridor (KM 205+930) .	724
Figure 14-34. Archaeological/Immovable Cultural Heritage Sites in the Province of Kutahya.....	725
Figure 14-35. (30) Olukbasi Pastoral Settlement (Non-registered Potential Archaeological Site) within the Expropriation Corridor (KM 217+087)	726
Figure 14-36. Archaeological/Immovable Cultural Heritage Sites in the Province of Usak.....	727
Figure 14-37. (31) Alaba Modern Cemetery (Non-registered Site – Classified as Other) within the Impact Corridor (KM 270+600)	728
Figure 14-38. (32) Ahmetlidag Hilltop Settlement (Non-registered Archaeological Site) outside the Kolankaya Quarry Site	729
Figure 14-39. Archaeological/Immovable Cultural Heritage Sites in the Province of Manisa	730
Figure 14-40. (33) Toprakcukuru Flat Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (KM 468+055)	731
Figure 14-41. (34) Kuslubahce Flat Settlement (Non-registered Potential Archaeological Site) within the Expropriation Corridor (KM 508+520)	732
Figure 14-42. (35) Magarabahce Flat Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (KM 510+724)	733
Figure 14-43. Archaeological/Immovable Cultural Heritage Sites in the Province of Izmir.....	734
Figure 14-44. (36) Degirmendere Old Cemetery (Non-registered Potential Archaeological Site) within the Degirmendere Quarry Site	735
Figure 14-45. (37) Caltidere Castle/Slope Settlement (Non-registered Archaeological Site) outside the Caltidere-2 Quarry Site	736
Figure 14-46. (38) Palamuttepe 3. Degree Archaeological Site (Registered Archaeological Site) outside the Impact Corridor	737

Figure 14-47. (39) Çardaktepe Tumuli (Registered Archaeological Site) outside the Impact Corridor	738
Figure 14-48. Martyr Father-Son Monument in Dumlupinar Martyrdom	749
Figure 14-49. Internationally Recognised Cultural Heritage Sites	751
Figure 15-1. Illustration of Cumulative Impacts	771
Figure 15-2. IFC's Six-step CIA Approach.....	772
Figure 15-3. ESIA (Project-centred) vs. CIA (VEC-centred) Perspectives.....	773
Figure 15-4. CIA Study Area of the Project	775
Figure 15-5. Categorisation of Future Projects	776
Figure 15-6. CIA Study Area, VECs and Projects Included in the CIA Study – Section 1.....	787
Figure 15-7. CIA Study Area, VECs and Projects Included in the CIA Study – Section 2.....	788
Figure 15-8. CIA Study Area, VECs and Projects Included in the CIA Study – Section 3.....	789
Figure 15-9. CIA Study Area, VECs and Projects Included in the CIA Study – Section 4.....	790
Figure 18-1. Management Programs under Project ESMS Implementation.....	823
Figure 18-2. Ankara-Izmir HSR Project – ESMS Team under the JV for the Construction Phase.....	856

ABBREVIATION

Abbreviation	Definition
ABPRS	Address-based Population Registration System
AFAD	Disaster and Emergency Management Presidency of Turkey
AYGM	Directorate General of Infrastructure Investments
BAP	Biodiversity Action Plan
BC	Before Christ
BERN	Convention on the Conservation of European Wildlife and Natural Habitats
BOD	Biochemical Oxygen Demand
CBD	UN Convention on Biological Diversity
CH	Cultural Heritage
CHC	The Central Hunting Commission
CHMP	Cultural Heritage Management Plan
CHS	Community Health and Safety
CIA	Cumulative Impact Assessment
CIMER	Presidency's Communications Centre
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	Community Liaison Officer
CLQ	Community Level Questionnaire
CLRTAP	Convention on Long Range Transboundary Air Pollution
CMS	Convention on the Conservation of Migratory Species of Wild Animals
COD	Chemical Oxygen Demand
CoGE	The Chamber of Geological Engineers
Contractor	Ankara-Izmir HSR Construction Joint Venture
CR	Critically Endangered
DD	Data Deficient
DLH	Former Directorate General of Railways, Harbors and Airports Construction
DSI	State Hydraulic Works
E&S	Environmental and Social
EAFZ	The East Anatolian Fault Zone
EBRD	The European Bank for Reconstruction and Development
EC	European Commission
ECA	Export Credit Agency
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EKF	Export Credit Fund

Abbreviation	Definition
Employer	Directorate General of Infrastructure Investments (AYGM)
EMRA	Energy Market Regulatory Authority
EN	Endangered
EP	Equator Principles
EPFI	Equator Principles Financial Institution
EPRP	Emergency Preparedness and Response Plan
ERG Construction	ERG Insaat Ticaret ve Sanayi A.S.
ESAP	Environmental and Social Action Plan
ESHR	Environmental, Social and Human Rights
ESIA	Environmental and Social Impact Assessment
ESMMFP	Environmental and Social Management and Monitoring Framework Plan
ESMS	Environmental and Social Management System
ETL	Energy Transmission Line
EU	European Union
EUNIS	The European Nature Information System
EUROBATS	Agreement on the Conservation of Populations of European Bats
EX	Extinct
FI	Financial Institution
FTA	Federal Transit Administration
FUND	The International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage
GBVH	Gender-based Violence and Harassment
GEM	GEM Sustainability Services and Consultancy Inc.
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GIP	Good Industry Practice
GIS	Geographic Information System
GISD	The Global Invasive Species Database
GPS	Geographical Positioning System
GRIIS	The Global Register of Introduced and Invasive Species
HES	Life Fits Into Home
HHQ	Household Level Questionnaire
HR	Human Resources
HSE	Health, Safety and Environment
HSR	High Speed Railway
IAS	Invasive Alien Species

Abbreviation	Definition
IBA	Important Bird Area
ICOMOS	International Council on Monuments and Sites
IESC	Independent E&S Consultant
IFC	International Finance Corporation
ILO	International Labour Organisation
IMO	International Maritime Organisation
ISO	International Standards Organisation
ISSG	Invasive Species Specialist Group
IUCN	The International Union for Conservation of Nature
KBA	Key Biodiversity Area
KGM	General Directorate of Highways
LC	Least Concern
MoCT	The Ministry of Culture and Tourism
MoEU	The Ministry of Environment and Urbanization
MoTI	The Ministry of Transport and Infrastructure
MS	Management System
MTA	General Directorate of Mineral Research and Exploration
N/A	Not Applicable
NAFZ	The North Anatolian Fault Zone
NE	Not Evaluated
NGO	Non-governmental Organisation
NSR	Noise Sensitive Receptor
NT	Near Threatened
NTS	Non-technical Summary
OECD	Organisation for Economic Co-operation and Development
OHS	Occupational Health and Safety
OIC	Organisation of Islamic Cooperation
Operator	The Republic of Turkey General Directorate of State Railways (TCDD)
OUV	Outstanding Universal Value
PAP	Project Affected Person
PAS	Project Affected Settlement
PCB	Polychlorinated Biphenyl
PCT	Polychlorinated Terphenyl
PDF	Project Description File
PDoEU	Provincial Directorate of Environment and Urbanisation
PIA	Participatory Impact Assessment

Abbreviation	Definition
POP	Persistent Organic Pollutant
PPE	Personal Protective Equipment
PS	Performance Standard
QC	Quality Control
RAMEN	The Turkish Regulation on the Assessment and Management of Environmental Noise
RAP	Resettlement Action Plan
RCNM	Roadway Construction Noise Model User's Guide
RCWIHC	Regulation Concerning Water Intended for Human Consumption
REGIO	REGIO Cultural Heritage Management Consultancy
RMS	Root Mean Square
RSWQ	Regulation on Surface Water Quality
SDS	Safety Data Sheet
SEP	Stakeholder Engagement Plan
SERV	Swiss Export Risk Insurance
SGK	Turkish Social Security Institute
SHA	Sexual Harassment and Abuse
SSC	Species Survival Commission
TBD	To Be Determined
TCDD	The Republic of Turkey General Directorate of State Railways
TurkStat	Turkish Statistical Institute
UK	United Kingdom
UKEF	United Kingdom Export Finance
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United National High Commissioner for Refugees
US	The United States
VEC	Valued Environmental and Social Component
VU	Vulnerable
WBG	World Bank Group
WH	World Heritage
WHO	World Health Organisation
WPCR	The Water Pollution Control Regulation

List of the Individuals / Organisations that Prepared or Contributed to the Environmental and Social Impact Assessment (ESIA) Disclosure Package

Individual/ Organisation	Company/Party	Position/ Expertise	Contribution to Relevant ESIA Chapter/ Component
Dr. Hande Yukseler	GEM Sustainability Services and Consultancy Inc.	Project Director	Full ESIA
Burcu Yazgan Kayabali	GEM Sustainability Services and Consultancy Inc.	Project Manager	Full ESIA
Sevil Avsaroglu	GEM Sustainability Services and Consultancy Inc.	Environmental, Health and Safety Specialist	Chapter 5 "Land Use and Geology" Chapter 8 "Water and Wastewater" Chapter 9 "Waste" Chapter 12 "Labour and Working Conditions" Chapter 13 "Community Health and Safety" Chapter 18 "ESMS"
Cansu Aksu	GEM Sustainability Services and Consultancy Inc.	Environmental and GIS Specialist	Chapter 3 "Project Alternatives" Chapter 5 "Land Use and Geology" Chapter 15 "CIA"
Gizem Sozen	GEM Sustainability Services and Consultancy Inc.	Social Specialist	Chapter 11 "Socio-economic Environment" Chapter 17 "HRIA" Stakeholder Engagement Plan
Ekim Bakirci Mahmut Cetin	Frekans Environmental Laboratory	Senior Noise and Vibration Modeling Experts	Chapter 6 "Noise and Vibration" (Baseline Measurements, Noise Modeling and Vibration Calculations)
Ismail Ulusoy	Ennotes Air Quality Management and Consult. Services Co.	Senior Air Quality Modeling Expert	Chapter 7 "Air Quality and GHG Emissions" (Air Quality Modeling)
Irem Kayiran Bozoglu	Independent Consultant	GHG Assessment Expert	Chapter 7 "Air Quality and GHG Emissions" (GHG Assessment)
Prof. Dr. Hayri Duman	Gazi University	Senior Flora Expert	Chapter 10 "Biodiversity" (Baseline)
Prof. Dr. Mustafa Sozen	Bulent Ecevit University	Senior Fauna Expert	Chapter 10 "Biodiversity" (Baseline)
Prof. Dr. Zafer Ayas	Hacettepe University	Senior Avi-fauna Expert	Chapter 10 "Biodiversity" (Baseline)
Dr. Aydin Akbulut	Hacettepe University	Senior Hydrobiology Expert	Chapter 10 "Biodiversity" (Baseline)
Celile Ertunc	CE Management Consultancy and Trade Ltd. Co.	Senior Social and Stakeholder Engagement Expert (Sociologist)	Chapter 11 "Socio-economic Environment" Chapter 16 "Stakeholder Engagement"
Dr. Feray Artar	Medipol University	Social Impact Assessment Expert (Sociologist)	Chapter 11 "Socio-economic Environment"
Dr. Ugur Dag Halim Ozatay Serkan Akdemir Yunus Ekim	REGIO Cultural Heritage Management Consultancy Co.	Senior Cultural Heritage Experts (Archaeologists)	Chapter 14 "Cultural Heritage" Cultural Heritage Management Plan (including Chance Find Procedure)
SEGAL Environmental Measurement and Analysis Laboratory (accredited by Ministry of Environment and Urbanisation of Turkey and Ministry of Foreign Affairs of Turkey - Turkish Accreditation Agency)			Chapter 7 "Air Quality and GHG Emissions" (Baseline Measurements) Chapter 8 "Water and Wastewater" (Baseline Measurements)

EXECUTIVE SUMMARY

Ankara-Izmir High Speed Railway (HSR) Project (hereinafter referred to as the **Ankara-Izmir HSR Project** or **AIHSR Project**) is a key national transportation project of the **Directorate General of Infrastructure Investments (AYGM¹ or the Project Owner or the Employer)** of the **Republic of Turkey Ministry of Transportation and Infrastructure (MoTI)**, connecting Ankara, the capital city of Turkey, to Izmir, the third largest city (by population).

The Project route crosses seven (7) provinces, namely Ankara, Eskisehir, Afyonkarahisar, Kutahya, Usak, Manisa and Izmir, as shown on the general layout presented in Figure 0-1.

Ankara-Izmir HSR Construction Joint Venture (Contractor), is a joint venture (JV) of three sister companies, namely ERG International UK Ltd., ERG Insaat Ticaret ve Sanayi A.S. (ERG Construction) and SSB Sauerwein&Schaefer Bau AG (SSB) (**ERG Group Partnership or Ankara-Izmir YHT Yapimi Is Ortakligi or ERG JV**). The Contractor has been awarded the tender of the AYGM for the construction (includes infrastructure, superstructure, electrification and signalling, structural works) of the Ankara-Izmir HSR through a Conditions of Contract for Construction (FIDIC Red Book 1999 1st Edition) + Finance model ("Construction Contract"). The investment cost of the Project is 2.16 billion Euro.

The entire main HSR route from Ankara (Polatli district) to Izmir (Menement district) has a total length of 503.2 km and consists of four (4) sections. There are also additional lines in the Project that will connect Ankara-Izmir HSR to other HSRs or conventional railways. As presented in the below table, external to the Construction Contract of the ERG JV, there are multiple other parties performing ongoing infrastructure works in Section 3a, Section 3b, Section 4a and Section 4d (as defined in the table) under different contracts procured by the State Railways of the Republic of Turkey (TCDD) at different times. Following the completion of infrastructure works by other contractors, those sections will be handed over to the Contractor (ERG JV) by the Employer for the execution of superstructure, electrification, signalisation and buildings/facilities works along the full HSR alignment.

Section	Sub-section		Start KM	End KM	Total Length of the Section (km)	Length of Sub-sections (km)	Responsibility	
							Infrastructure	Superstructure, Electrification, Signalisation, Buildings, Facilities
Section 1	-	Polatli-Afyon	0+000.000	151+500.000	151.2	151.2	Contractor (ERG JV)	Contractor (ERG JV)
Section 2	(2a)	Afyon-Hatipler Passage	151+500.000	230+370.612	90.3	78.8	Contractor (ERG JV)	Contractor (ERG JV)
	(2b)	Hatipler-Passage	267+156.053	278+632.464		11.5	Contractor (ERG JV)	Contractor (ERG JV)
Section 3	(3a)	Banaz-Esme	279+000.000	364+600.000	159.9	85.6	AGA Energy (infrastructure works on-going)	Contractor (ERG JV)
	(3b)	Esme-Salihli	364+600.000	438+918.726		74.3	Bayburt Grup + Kolin JV ² (infrastructure works on-going)	Contractor (ERG JV)
Section 4	(4a)	Salihli-Manisa	439+000.000	456+500.000	101.8	17.5	NAS+ Budakyol JV (infrastructure works on-going)	Contractor (ERG JV)
	(4b)		456+500.000	501+000.000		44.5	Contractor (ERG JV)	Contractor (ERG JV)
	(4c)	Manisa North Passage	501+000.000	514+983.302		14.0	Contractor (ERG JV)	Contractor (ERG JV)
	(4d)	Manisa-Menemen	522+100.000	547+805.481		25.8	AGA Energy (infrastructure works on-going)	Contractor (ERG JV)
Total					503.2	503.2		

¹ Former Directorate General of Railways, Harbors and Airports Construction (DLH) has been reorganised under the name of Directorate General of Infrastructure Investments – AYGM as of 1 November 2011.

² The JV was originally structured as Cengiz İnş. San. ve Tic. A.S., Kolin İnş. San. ve Tic. A.S., Ovgun Yapı San. ve Tic. A.S., Kalyon İnş. San. ve Tic. A.S., and Bayburt Grup İnş. Nak. Mad. İth. İhr. San. ve Tic. A.S. and reported to be transferred to Bayburt Grup and Kolin JV in the course of the Project.

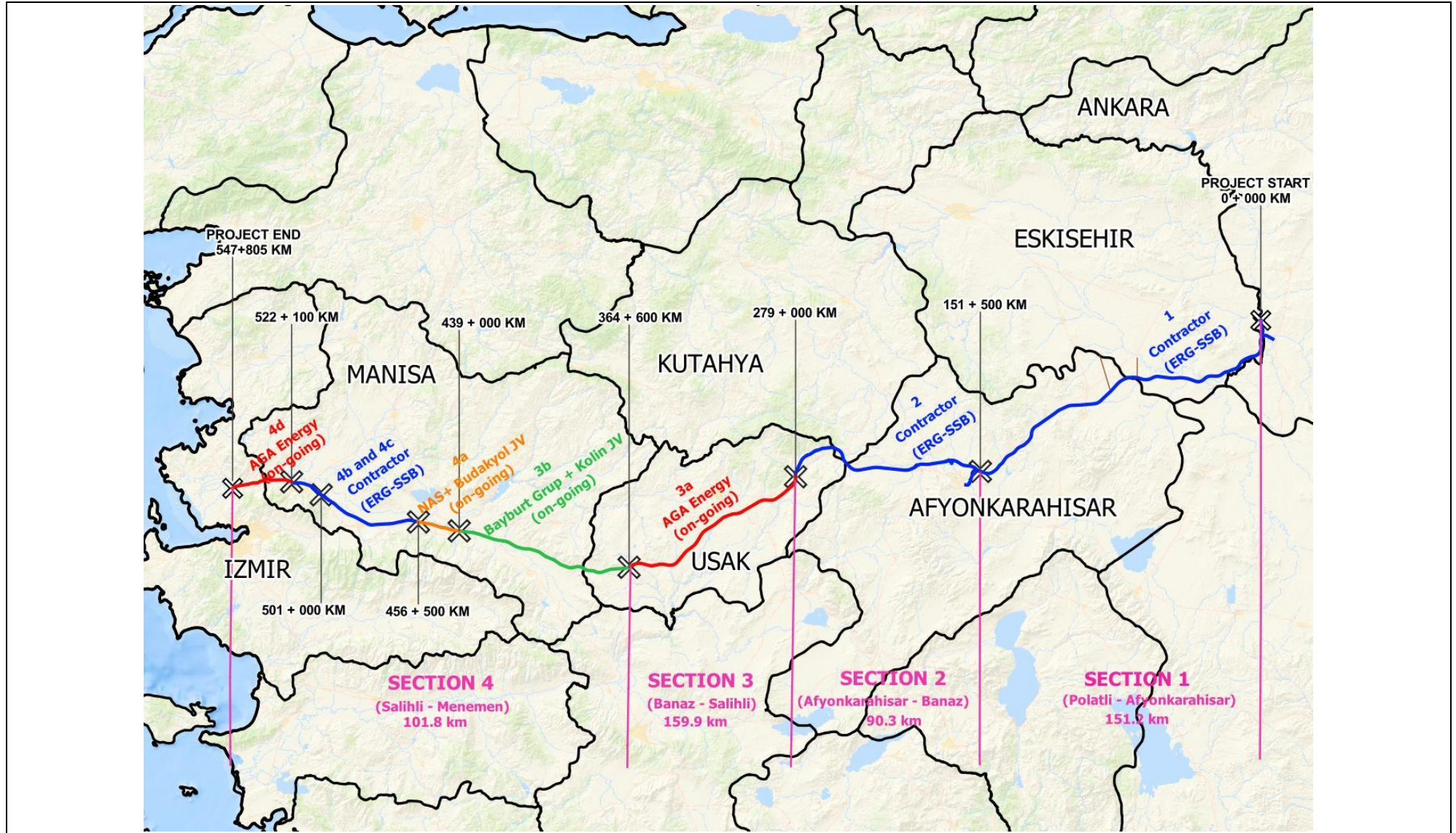


Figure 0-1. Project Layout and Division of Project Sections as per Responsible Parties for Infrastructure Works (ERG JV and Other Contractors)

The construction works of Section 1 and Section 2 initially started between 2012 and 2016. Afterwards, in 2018, the construction (infrastructure) works of the contractors in these sections were suspended. As of Q2 2021, the construction works in Section 3a (Banaz-Esme), Section 3b (Esme-Salihli), Section 4a (initial part of Salihli-Manisa between KM 439+000 and 456+500) and Section 4b (Manisa-Menemen section between KM 522+100 and 547+805) are still in progress under the responsibility of other contractors previously contracted by the TCDD.

As per the Construction Contract, the scope of works of the Contractor cover the following:

- Completion of the incomplete infrastructure works in Section 1, Section 2 and Section 4 including tunnels, bridges, viaducts and culverts.
- 100% of the superstructure, electrification and signalling works over the full railway alignment from Section 1 to Section 4.

Besides the HSR, the Project components include the engineering structures comprising viaducts, tunnels, culverts, underpasses, overpasses and bridges, electrification and telecommunication infrastructures, railway stations and sidings, excavated material storage areas as well as temporary facilities including the construction camp sites, quarries and material borrow sites, and concrete plants.

Once the construction of the Ankara-Izmir HSR is completed, for the operation phase, the railway will be commissioned in phases and with all relevant components and infrastructure, it will be transferred by the AYGM (Employer) to the TCDD (hereinafter referred to as the Operator), which is an affiliated state entity of the MoTI. Detailed planning of the operation and maintenance activities will be done by the Employer and Operator in due course consistent with their institutional systems and mechanisms.

Majority of the land acquisition within the Project expropriation corridor has been completed by the TCDD in line with the Expropriation Law (Law No. 2942, 1983). The remaining expropriation works along the HSR route are summarised below:

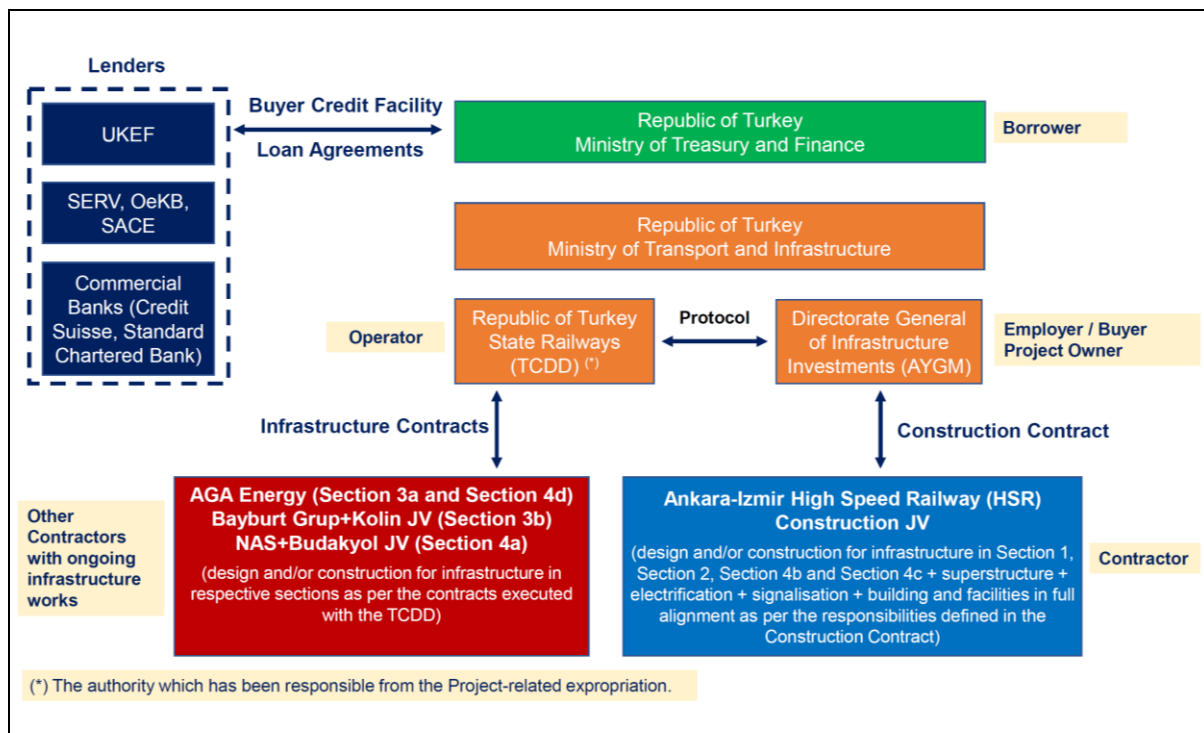
- Section 1:
 - Settlements located along the Ankara-Konya HSR Connection Line (starting from Railway KM 7+800; along a route of approximately 6.5 km) for which expropriation plans will be prepared once design works for this part proceed
 - Settlements located along the Bayat Relocation (between Railway KM 108+740-120+520) for which expropriation plans will be reconsidered/reprepared due to route relocation once the route modification is approved by the related authorities
- Section 2:
 - Settlements located along Hatipler Relocation (between Railway KM 267+156.053-278+632.464) for which expropriation plans will be repared due to route relocation once the route modification is approved by the related authorities
- Section 3:
 - Settlements for which legal procedures are ongoing in Section 3a (Koyunbeyli and Yavu)
- Section 4:
 - Settlements for which legal procedures are ongoing in Salihli-Manisa (4b) section (Asagicobanisa, Karaoglanli and Yukaricobanisa)
 - Settlements along Manisa North Passage (4c) for which expropriation plans have been prepared but expropriation works have not started (Yukaricobanisa, Sehitler, 2. Anafartalar, Kuslubahce and Horozkoy)
 - Settlements for which legal procedures are ongoing in Manisa-Menemen (4d) section (Uzunburun, Samar, Telekler, Suleymanli, and Degirmendere)

Remaining expropriation works will be conducted/finalised by the governmental agency responsible from Project-related expropriation works in line with the Expropriation Law (Law No. 2942, 1983) (responsibilities for future expropriation works will be clarified between AYGM and TCDD).

On 29 June 2020, a Ministry Circular was issued for the Project by the MoTI, requiring all the relevant governmental institutions, including the central and local organisations of the TCDD, provincial governorates as well as contractors and subcontractors serving the Project, to prioritise the Project-related works and procedures as such all relevant processes (e.g. Environmental Impact Assessment, permitting, etc.) are adequately undertaken without any interruption.

Under the Construction Contract, the Republic of Turkey – Ministry of Treasury and Finance is the Borrower and the Directorate General of Infrastructure Investments (AYGM) of the Ministry of Transport and Infrastructure is the Employer and the Project Owner. The Construction Contract includes a Project financing mechanism in which the Contractor also arranges the financing for the Project, through its relationships with international financing institutions. This said, the Contractor is not a party to the loan agreement. The Contractor of the Project is the **Ankara-Izmir HSR Construction Joint Venture**.

The FIDIC contract model of the Project is presented in a simplified version as below:



The funding for the Project is supported by a Buyer Credit Facility from UK Export Finance (the official Export Credit Agency (ECA) of the United Kingdom) with some reinsurance from SERV, OeKB and SACE. The commercial banks providing the loans are Credit Suisse and Standard Chartered Bank ("Lenders").

The Construction Contract of the Project has been executed between the Contractor and the AYGM on 23 November 2020. The commencement of the Construction Contract depends on, inter alia, the Financial Close (FC). The Loan Period continues for circa 14 years following issue of the Taking Over Certificate by the Employer.

As per the Construction Contract, total duration for the completion of works is 42 months. The liability of the Contractor extends until 2 years (defects liability period) after provisional acceptance of the Project by the Project Owner (Employer). The Construction Contract is a unit price contract based on FIDIC Conditions of Contract for Construction (Red Book-1999). This Contract as signed has no unit item for E&S requirements and any changes to the scope of works arising from E&S requirements are the responsibility of the Employer as well as costs incurred by the Contractor due to E&S requirements outside those of the Contract and current legislation.

A national Environmental Impact Assessment (EIA) study was carried out for the Project back in 2005 and the EIA Positive Decision was secured in March 2006.

To meet the environmental and social (E&S) requirements of the Lenders, **GEM Sustainability Services and Consultancy Inc. (GEM)** has been retained by the Contractor to carry out an E&S Impact Assessment (ESIA) study for the construction and operation phases of the Project in line with the national environmental, health and safety (EHS) legislation including international conventions and treaties and the following international standards:

- Equator Principles (EP) 4 (2020)
- The Organisation for Economic Co-operation and Development (OECD) Common Approaches (2016)
- UK Export Finance Environmental, Social and Human Rights Policy
- International Finance Corporation (IFC) Performance Standards (PSs) (2012)
- IFC/European Bank for Reconstruction and Development (EBRD) Worker's Accommodation: Processes and Standards (2009)
- World Bank Group (WBG)/IFC General EHS Guidelines (2007)
- WBG/IFC EHS Guidelines on Railways (2007)
- WBG/IFC EHS Guidelines for Construction Materials Extraction (2007)

In line with the international E&S standards, the Project is considered as "Category A" and the ESIA study for the Project has been designed to include the following deliverables:

- Gap Analysis and Scoping Report
- ESIA Disclosure Package including:
 - ESIA Report
 - Non-Technical Summary (NTS)
 - Stakeholder Engagement Plan (SEP)
 - Project E&S Management and Monitoring Framework Plan (ESMMFP) (establishing the roles and responsibilities of the Employer (AYGM), Operator (TCDD) and the Contractor for the management of construction and operation phase E&S topics, to be agreed between the Employer/Operator and the Contractor)

The ESIA Disclosure Package is reviewed, and the E&S Action Plan (ESAP) is prepared by the Independent E&S Consultant (IESC) acting on behalf of the Lenders'.

The ESIA Disclosure Package will be disclosed to public by the Contractor (on behalf of the Employer/Operator) and the Lenders for 30 days. As per the relevant requirements of the international standards, NTS, SEP and the ESMMFP will also be disclosed in Turkish language by using appropriate disclosure methods.

The ESIA Report has been prepared by GEM based on the outcomes of the Gap Analysis and Scoping Study (finalised in early February 2021) and built upon the existing technical Project documentation (reflecting the latest status of approved Project design) provided by the Contractor, information relevant to the Project in the publicly available resources, outcomes of the consultations conducted with the key stakeholders, findings of the baseline field surveys carried out by qualified specialists (between January to March 2021) and assessment of potential Project impacts and/or risks in accordance with internationally accepted methodologies as part of the ESIA process. The ESIA Report assesses both the construction and operation phase E&S impacts. This said, the mitigation of the potential operation phase impacts will be under the responsibility and control of the Employer/Operator as further clarified in the ESMMFP.

The comprehensive E&S baseline study included in the ESIA design to cover the **full railway alignment** including the quarries³ is summarised below:

E&S Subject	Baseline Data Collected as part of the ESIA				Total
	Section 1	Section 2	Section 3	Section 4	
Air Quality (# of measurement locations)	7	5	1	9	22
Noise (# of measurement locations)	4	6	5	11	26
Socio-economy (# of surveys*)	CLQs:43 HHQs:91	CLQs:43 HHQs: 73	CLQs:13 HHQs: 26	CLQs:29 HHQs: 39	CLQs:128 HHQs:229
Water Quality (# of measurement locations)	8	4	3	5	20
Biodiversity (Scope of field walkover survey)	HSR Quarries	HSR Quarries	Quarries	HSR Quarries	
Cultural Heritage (Scope of field walkover survey)	HSR Quarries	HSR Quarries	Quarries	HSR (excluding 4d) Quarries	

(*) CLQ: Community level interview; HHQ: Household level interview.

The ESIA Report, supplemented by the appendices as relevant, is structured as follows:

- Chapter 1 – Project Description
- Chapter 2 – Institutional and Legal Framework
- Chapter 3 – Project Alternatives
- Chapter 4 – Impact Assessment Methodology
- Chapter 5 – Land Use and Geology
- Chapter 6 – Noise and Vibration
- Chapter 7 – Air Quality and GHG Emissions
- Chapter 8 – Water and Wastewater Management
- Chapter 9 – Waste Management
- Chapter 10 – Biodiversity
- Chapter 11 – Socio-economic Environment
- Chapter 12 – Labour and Working Conditions
- Chapter 13 – Community Health and Safety
- Chapter 14 – Cultural Heritage
- Chapter 15 – Cumulative Impact Assessment
- Chapter 16 – Stakeholder Engagement
- Chapter 17 – Human Rights Impact Assessment
- Chapter 18 – Environmental and Social Management System (ESMS)

³ As already recognised in the ESIA Report, following design freeze during Scoping Phase, any new facilities (e.g. quarries, subcontractor camp sites, etc.) to be included within the Project will require identification of potential site-specific E&S impacts and management measures (e.g. including field surveys to be conducted for biodiversity, cultural heritage prior to entry into such new areas). The ESMMFP and the subject-specific management plans to be developed and implemented will be applicable to all Project facilities.

As part of the ESIA study, a Stakeholder Engagement Plan (SEP) and a Cultural Heritage Management Plan (CHMP) have been prepared in line with Project Standards.

It should be noted that, the infrastructure works in Section 3a, Section 3b, Section 4a, and Section 4d are currently ongoing in line with the applicable national legislation by three different contractors assigned by the TCDD as indicated previously. The ESIA Report covers these sections to the extent information is available/applicable. Field/walkover surveys and assessments, in addition to the studies conducted as part of this ESIA as summarised above and detailed in the respective ESIA chapters, will be conducted once authorisation of access to these sections is in place after the sites are handed over by the Employer to the Contractor.

To this end, an **E&S Audit⁴** will be carried out in line with IFC Performance Standards (2012) at the time these sections of the Project will be handed over to the Contractor (ERG JV) for the superstructure works. Following this audit, a **Management and Corrective Action Plan** will be developed and implemented for these sections of the Project.

The Contractor takes seriously its responsibilities to comply with the national laws and regulations and implement appropriate E&S standards in all its projects including but not limited to the standards relevant to management of biodiversity and cultural heritage, community and occupational health and safety, labour and working conditions including accommodation, environmental management including topsoil, air emission, noise, vibration, etc., local employment and procurement, management and erosion control as well as traffic management. This extends to the responsibilities of the Contractor defined in the Contract and assisting, within the framework of the Contract, the Employer to meet its obligations to Lenders under the relevant financing arrangements relating to applicable E&S requirements. To this end, the Contractor also included operation phase impact assessment within the scope of this ESIA Report although the management of potential impacts will be under the responsibility of the Employer/Operator as clarified in the ESMMFP.

It is the Employer's and the Operator's responsibility to comply with the national laws and regulations; permits and standards; IFC PSs, relevant WBG EHS Guidelines requirements; loan agreement commitments; ESIA requirements; and to ensure that all contractors providing any type of services to the Employer/Operator duly follow these requirements throughout the duration of the loan agreement.

The roles of the Employer/Operator and the Contractor in meeting E&S requirements are intertwined and must be worked out at the Project level. The Employer/Operator remains ultimately responsible to Lenders for ensuring E&S requirements are met throughout construction and operation phases of the Project, with the responsibilities of the Contractor defined in the Construction Contract.

As per the national legislation, the Employer (as the Project Owner) and the Operator, have in place inherent E&S responsibilities for the Project such as:

- Completion of national EIA process for the railway route (finalised) and the EIA process of any associated facilities.
- To acquire permits and licenses of associated facilities.
- To conduct the remaining expropriation process as per the Expropriation Law and make all the expropriation payments.
- Undertake any additional works including any re-alignment, as required.
- To operate the Project in line with all applicable national environmental, health and safety legislation and commitments as detailed in the national EIA Report.

To ensure that the obligations of the Employer/Operator and the Contractor are clear, a stand-alone Project Environmental and Social Management and Monitoring Framework (ESMMFP) has been prepared for the construction and operation phases building upon the ESIA study. The Project ESMMFP reflects, inter alia, the responsibilities of the Employer/Operator and the Contractor based on the foregoing contractual framework. Based on the ESMMFP, subject-specific E&S management/actions plans and procedures will be developed and implemented for the management of specific E&S impacts and/or risks throughout the Project construction and operation phases.

⁴ Such an E&S Audit would be devised and implemented in line with the objectives of IFC GN30. Accordingly, the E&S Audit would identify through desktop study and field surveys outstanding/ongoing/retrospective issues, impacts, risks and/or grievances in Section 3 and Sections 4a and 4d and define the management measures or corrective actions required to be implemented.

Implementation of the following E&S management/action plans during the construction and as applicable, operation phases of the Project will be under the Employer's/Operator's responsibility:

- Biodiversity Management/Action Plan (BMP/BAP)
- Cultural Heritage Management Plan (CHMP)
- Resettlement Action Plan (RAP)
- Stakeholder Engagement Plan (SEP)

The Project-related land acquisition conducted by the related governmental authority in line with the requirements of the Expropriation Law (Law No. 2942, 1983) has caused/will cause physical and economic displacement in the settlements affected from Project-related land acquisition. The RAP covering the full Project alignment in line with the requirements of IFC PS5 on Land Acquisition and Involuntary Resettlement has also been prepared as a stand alone document in parallel to ESIA studies. An overview of the land acquisition data for the full alignment that will be the basis of the RAP is presented below:

- The expropriation corridor for the HSR has a minimum width of 30 meters along the HSR alignment. The width of the expropriation corridor is extended up to 100 m based on the design of excavation and fill areas, footprint of the stations, etc.
- Within the expropriation corridor of the HSR, there are 11,326 parcels in 207 settlements affected from Project-related land acquisition. Approximately %76 (8,647 parcels) of these parcels is privately-owned, which are assumed to be utilised mainly for agricultural purposes.
- The area of affected parcels within the expropriation corridor of the HSR sums up to 3,556.5 ha, of which approximately 63% (2,247.45 ha) is privately-owned.
- The number of private owners/shareholders of the parcels affected from Project-related land acquisition is 14,421.
- Besides the parcels used for agricultural purposes, there are 421 pasture parcels (3.7%) and 88 forest parcels (0.8%) affected/to be affected from the Project within the Project expropriation corridor.
- Based on the expropriation data of the authorities and/or analysis of satellite imagery, a total of 210 residential buildings has been identified to be present or demolished within the expropriation corridor. Among the affected residential building 68 have been demolished (32%) and 142 are present (68%) according to the most recent satellite imagery and information obtained through the RAP surveys of February and May 2021.
- Based on the expropriation data of the authorities, 43 commercial buildings (18 demolished and 25 present) have been identified for the full alignment.

A Biodiversity Management/Action Plan (BMP/BAP) in line with the requirements of IFC PS6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources will be developed after finalisation of spring biodiversity field survey that are carried out in July 2021, in addition to field surveys completed as part of the ESIA study.

Consistent with the Construction Contract, costs associated with the E&S management/action plans that are under the responsibility of the Employer/Operator and any costs associated with changes to scope of works (including re-alignment) arising from geological and/or geotechnical risks shall be borne by the Employer.

For transactions and procedures executed on behalf of the Employer, the Contractor has no financial responsibility.

1. PROJECT DESCRIPTION

The Ankara-Izmir High Speed Railway (HSR) Project (hereinafter referred to as the Ankara-Izmir HSR Project, AIHSR Project or the Project) was initially planned by the former Directorate General of Railways, Harbors and Airports Construction (DLH) (which has been reorganised under the name of General Directorate of Infrastructure Investments – AYGM or Administration – as of 1 November 2011) as part of the Investment Program of 2004 with the Project No. 2004 E 010 010. Lately, the Project has been included in the Investment Program of 2021 with the Project No. 2020E01 – 154316 (2020-2025) and 2007E01 – 154124 (2007-2023).

The Project has an Environmental Impact Assessment (EIA) Report prepared in 2006 in line with the national EIA Regulation in force that time. The expropriation of parcels located within the expropriation corridor⁵ of the Project has been mostly completed along the Project route by the state authority (TCDD) responsible from Project-related expropriation in line with the Expropriation Law (Law No. 2942, 1983). The expropriation process for the sites, where route relocation is considered (e.g., Afyonkarahisar-Bayat district, Hatipler passage near Hatipler village), and acquisition of parcels/land use rights corresponding to off-site/associated Project facilities, such as quarries, borrow sites, camp sites, energy transmission infrastructure, etc., will further be completed by the state as per the requirements of the Expropriation Law (Law No. 2942, 1983).

Some of the key Project milestones are presented in Figure 1-2.

The Project aims to improve the efficiency and adequacy of the transport system in the region by addressing poor rail connectivity and lack of environmental alternative transport modes. It is designed to ease road traffic congestion and promote socio-economic development to support tourism in Izmir and intercity job and growth opportunities through a safe and improved commuting service. The HSR has the additional benefit of being an electric low carbon alternative, with hard currency savings to Government from reduced importation of higher polluting diesel fuel as currently used in conventional trains.

This line is particularly important for bringing Ankara closer to Izmir, an attractive tourist destination, along with regional/intercity connectivity with Manisa, Usak and Afyonkarahisar. When complete, the HSR travel time will be reduced to around three and a half hours from 14 hours by existing indirect railway routes. Ankara-Izmir by motorway is 587 km with travel time takes of around 9 hours. With airport transfers, operations and waiting time air travel between Ankara and Izmir is approximately three and a half hours. The substantial reduction in HSR time will make the HSR the best option when travelling between the two cities.

Being the final stage of the current national high speed railway masterplan, the Ankara-Izmir HSR Project is a priority for the Republic of Turkey Ministry of Transportation and Infrastructure (MoTI). HSR delivers more passengers per hour than roads and runways combined – at far less cost. Passengers will get to their destinations quickly, efficiently and on time. A single HSR line can carry the equivalent of a 10-lane highway, be built at much lower cost, is cheaper to operate and uses a fraction of the energy from electricity, not conventional fossil fuels.

The Project Layout is presented in Figure 1-1

⁵ The expropriation corridor for the HSR has a minimum width of 30 meters along the HSR alignment. The width of the expropriation is extended up to 100 m based on the design of excavation and fill areas, footprint of the stations, etc.

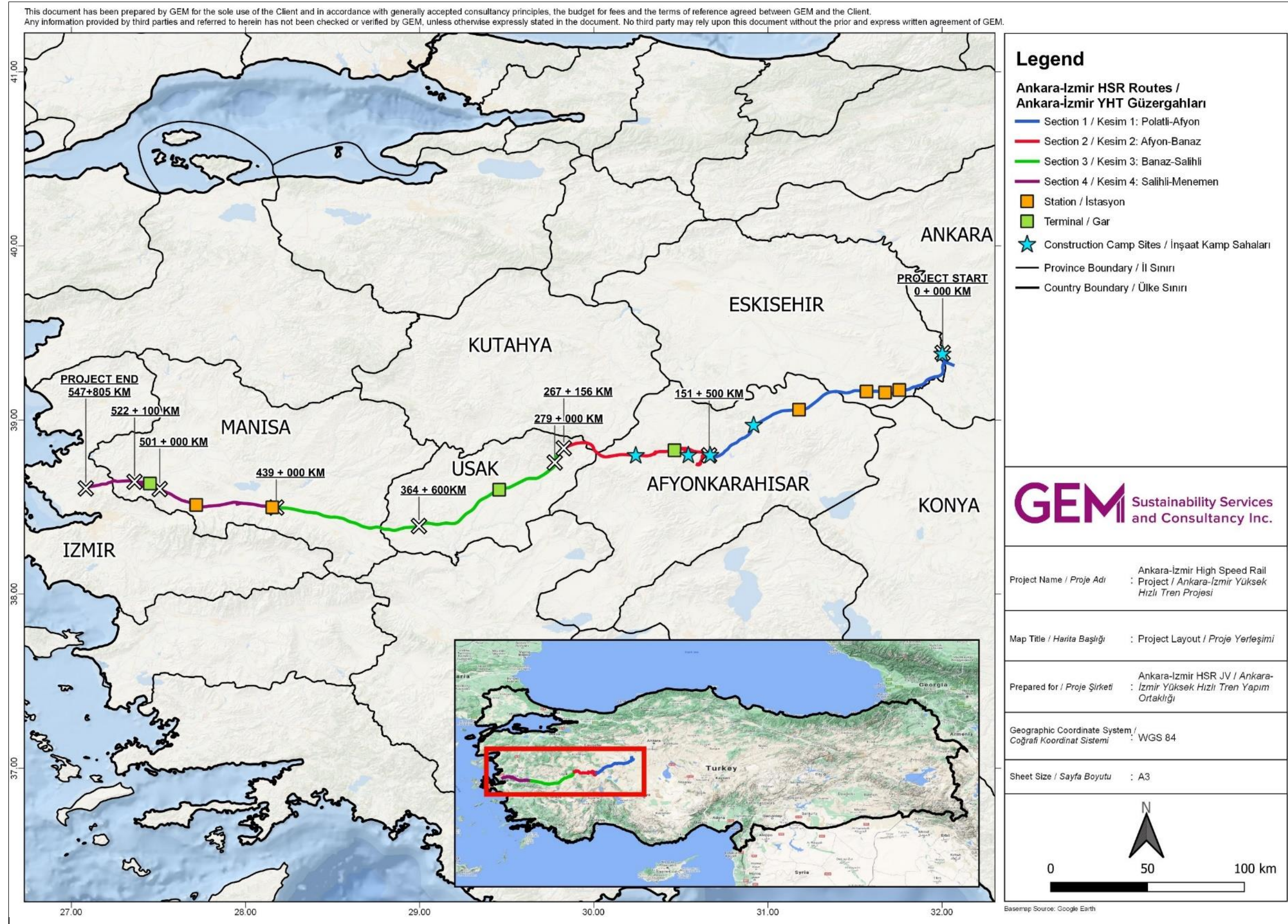


Figure 1-1. Project Layout

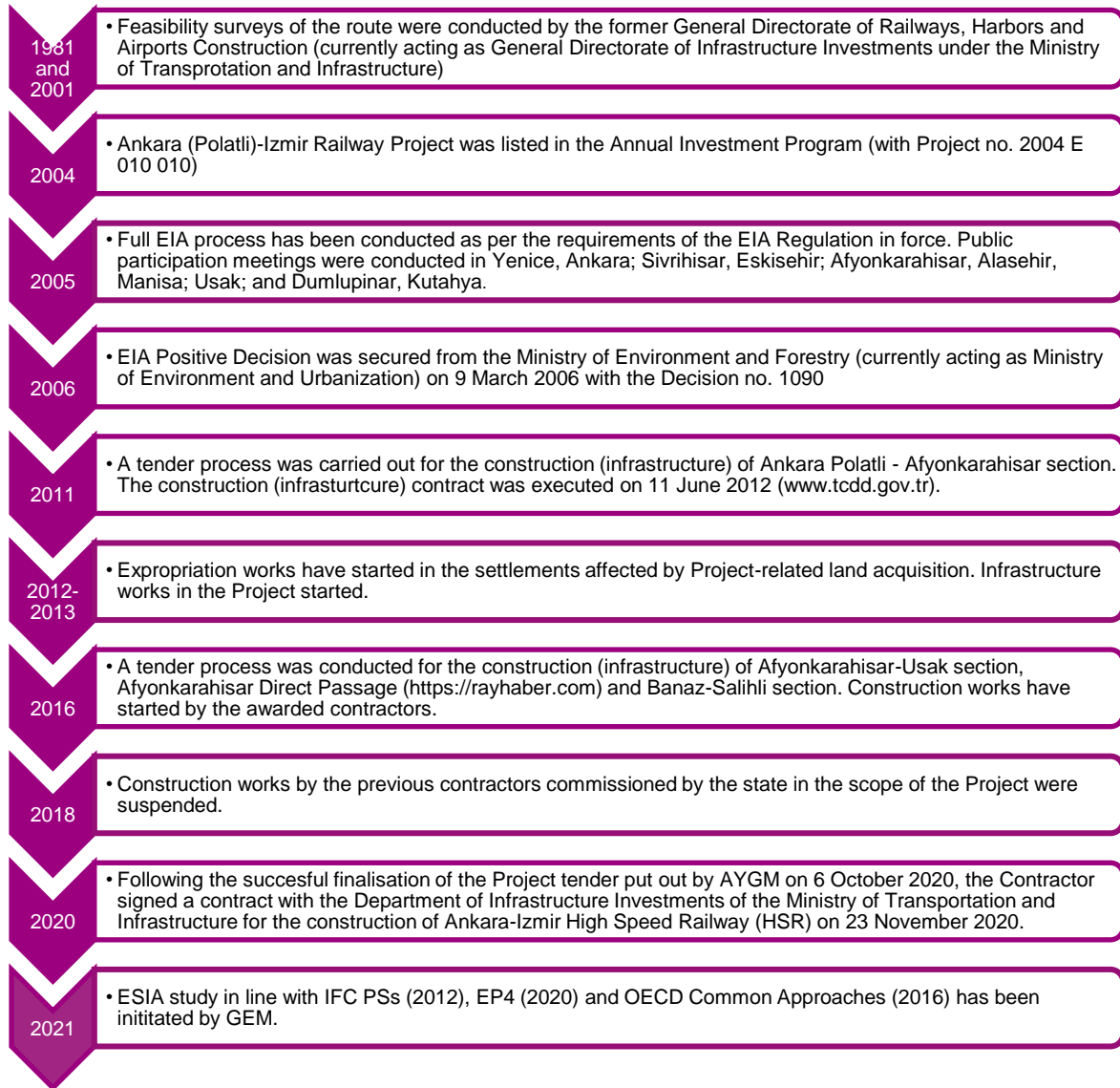


Figure 1-2. Key Project Milestones

Since 2009, Turkey has been putting HSR lines in operation as per the master plan of the MoTI, as summarized below. The Ankara-Izmir HSR constitutes the final stage of the current national HSR masterplan (see Figure 1-3).

- Ankara-Eskisehir HSR is in operation since 2009.
- Ankara-Konya HSR is in operation since 2011.
- Eskisehir-Konya HSR is in operation since 2013.
- Ankara-Istanbul HSR is in operation since 2014.

Besides the Ankara-Izmir HSR, the lines between Bursa-Bilecik and Ankara-Sivas HSR Projects are also components of the planned national HSR network.



Figure 1-3. Status of Railway Projects in Turkey

1.1. Employer (Project Owner)/Operator

The Republic of Turkey Ministry of Transport and Infrastructure (MoTI), Directorate General of Infrastructure Investments (AYGM) is the owner of the Ankara-Izmir HSR Project and the Employer within the context of the Construction Contract.

The AYGM, headquartered in Ankara (formerly operating under the name of Directorate General of Railways, Harbors and Airport Construction - DLH until 1 November 2011) is mainly responsible for planning and designing the railways, logistical villages, centres or bases, shelters, coastal structures, and airports or have such plans and designs prepared by related parties, and approve them.

The State Railways of the Republic of Turkey (TCDD), an affiliated state entity of the MoTI, will be the Operator of the Ankara-Izmir HSR during the operation phase, which covers the Loan Period that continues for circa 14 years following issue of the Taking Over Certificate to be issued by the AYGM. Once the construction of the Project is completed, the Ankara-Izmir HSR with all relevant components and infrastructure will be transferred by the AYGM (Employer) to the TCDD (Operator). Internal procedures between the Employer and the Operator are clarified between the institutions.

1.2. Contractor

Ankara-Izmir HSR Construction JV is a JV of three sister companies, namely ERG International UK Ltd., ERG İnşaat Ticaret ve Sanayi A.Ş. (ERG Construction) and SSB Sauerwein&Schaefer Bau AG).

Ankara-Izmir Yüksek Hızlı Tren (YHT) Yapımı İS Ortaklığı		
		
<p>ERG Construction, one of the leading construction companies of Turkey, was established in 1972.</p> <p>Since its establishment, the Company has been conducting design, planning, construction, and implementation of a variety of projects including roads, airports, dam and hydroelectric power plants, thermal power plants, industrial plants, infrastructure, etc.</p> <p>ERG Construction has a sister company active in the manufacturing of major construction plants and equipment.</p> <p>The headquarters of ERG Construction is located at Golbasi district in Ankara.</p>	<p>ERG International is a highly respected engineering, construction, and project management contractor of major infrastructure assets. Since incorporation in 1972, the Company has completed numerous significant projects in the power, water and transportation sectors. The Company delivers the full project cycle including development, planning, investment, design & build and the ongoing operations & maintenance.</p> <p>ERG International now operates internationally through its subsidiaries and affiliates in Switzerland and the United Kingdom with over 9,000 employees.</p>	<p>SSB SAUERWEIN & SCHAEFER is a globally active infrastructure developer, investor, and contractor company. The Group offers competent and competitive consulting, professional planning, and design services as well as the entire range of activities required for a successful completion of construction projects.</p> <p>SSB Group has been operating since 1912 and has completed numerous projects in Eastern Europe.</p> <p>The company has played a prominent role in technology development in a number of different construction fields over the past decades. Today the company is in a position to participate in the largest projects worldwide, both as a construction company and as a service provider in a planning and design capacity.</p>

External to the Construction Contract of the ERG JV, there are multiple other parties performing ongoing infrastructure works in Section 3a, Section 3b, Section 4a and Section 4d under different contracts procured by the TCDD at different times, as given in the Executive Summary and summarised below:

- AGA Energy in Section 3a (KM 279+000.000-364+600.000) and Section 4d (KM 522+100.000 and 547+805.481)
- Bayburt Grup and Kolin JV in Section 3b (KM 364+600.000 and 438+918.726)
- NAS and Budakyol JV in Section 4a (KM 439+000.000 and KM 456+500.000)

1.3. Railway Route

The railway route is divided into four sections as indicated in Table 1-1. Each section is shown on the maps presented between Figure 1-4 and Figure 1-7. The railway route runs through agricultural, pasture and forestry parcels. The route in Section 1 is running mainly through a rural setting, whilst in certain sections, it passes close to villages/neighbourhoods (in Section 2 and Section 3) and urban areas (in Section 4 near Manisa).

Table 1-1. Railway Sections

Section	Sub-section	Start KM (*)	End KM	Total Length of the Sub-sections (m)	Total Length of the Section (m)	(km)
Section 1	(-) Polatli-Afyon	0+000.000	151+500.000	151,170.39	151,170.39	151.2
Section 2	(2a) Afyon-Hatipler Passage	151+500.000	230+370.612	78,870.61	90,347.02	90.3
	(2b) Hatipler-Passage	267+156.053	278+632.464	11,476.41		
Section 3	(3a) Banaz-Esme	279+000.000	364+600.000	85,600.00	159,918.73	159.9
	(3b) Esme-Salihli (**)	364+600.000	438+918.726	74,318.73		
Section 4	(4a) Salihli-Manisa (**)	439+000.000	456+500.000	17,500.00	101,790.26	101.8
	(4b) Salihli-Manisa (**)	456+500.000	501+000.000	44,500.00		
	(4c) Manisa North Passage	501+000.000	514+983.302	14,113.56		
	(4d) Manisa-Menemen	522+100.000	547+805.481	25,676.70		
Total Route Length (***)					503,226.40	503.2

(*) The difference between the start and end kilometres of sections, if any, is caused by the fact that the design of different sections has been carried out by different companies. The route alignment is a continuous line and there are no physical gap in between different sections.

(**) Between approximately Railway KM 430+000-458+800, the conventional railway line running parallel to the HSR line is referred to as Salihli Passage.

(***) Infrastructure works for Section 3 (Banaz-Salihli) and part of Section 4 (initial part of Salihli-Manisa between KM 439+000 and 456+500 and Manisa-Menemen section between KM 522+100 and 547+805) are within the scope of other contractor as defined in the Executive Summary and Section 1.2.

The lines that will connect Ankara-Izmir HSR to other HSRs or conventional railways are summarised in Table 1-2. Progressive elaboration of the route of connection lines is ongoing through more detailed studies and discussions with the Employer. Technical information on the final routes (to be approved by the Employer) will be available once the ongoing discussions/evaluations are concluded with the Employer.

Table 1-2. Connection Lines

Section	Connection Line	Ankara-Izmir HSR Start KM	Approximate Length of the Connection Line (km)
Section 1	Ankara-Konya HSR Connection	7+983.000	6.3
Section 2	Afyonkarahisar-Konya Railroad Connection -1	152+038.000	9.2
	Afyonkarahisar-Konya Railroad Connection - 2	166+202.000	2.9
	Afyonkarahisar-Eskisehir Railroad Connection	166+698.000	0.8
Total			19.2

Information on the settlements within the Project expropriation corridor and Project-related land acquisition process is provided in the following sections. Information on the legally protected and internationally recognised areas along the Project route and in the vicinity of the Project/associated facilities, including baseline information based on field surveys conducted by the flora and fauna experts as part of the ESIA and assessments conducted in line with IFC PS6, are provided in Chapter 10 on Biodiversity.

1.3.1. Settlements Affected from Project-related Land Acquisition

The provinces and districts crossed by the railway route are listed in Table 1-3. The table also provides the number of neighbourhoods/villages affected by Project-related land acquisition per each section of the railway.

The full list of the settlements affected from Project-related land acquisition is presented in Appendix A.

Table 1-3. Summary of Settlements Affected from Project-related Land Acquisition

Section	Province	District	Type of Municipality	Number of Neighbourhoods/ Villages affected by Project-related Land Acquisition
Section 1	Ankara	Polatli	Metropolitan	47
	Eskisehir	Gunyuzu	Metropolitan	
		Sivrihisar		
	Afyonkarahisar	Emirdag	Non-metropolitan	
		Bayat		
		Iscehisar		
Section 2	Afyonkarahisar	Merkez		47
		Sinanpasa		
	Kutahya	Dumlupinar	Non-metropolitan	
	Usak	Banaz	Non-metropolitan	
Section 3 (*)	Usak	Banaz		71
		Merkez		
		Ulubey		
		Esme		
	Manisa	Alasehir	Metropolitan	
		Kula		
		Salihli		
Section 4 (*)	Manisa	Salihli		42
		Ahmetli		
		Sehzadeler		
		Turgutlu		
		Yunusemre		
	Izmir	Menemen	Metropolitan	
Total				207

(*) Infrastructure works for Section 3 (Banaz-Salihli) and part of Section 4 (initial part of Salihli-Manisa between KM 439+000 and 456+500 and Manisa-Menemen section between KM 522+100 and 547+805) are not within the scope of Contractor.

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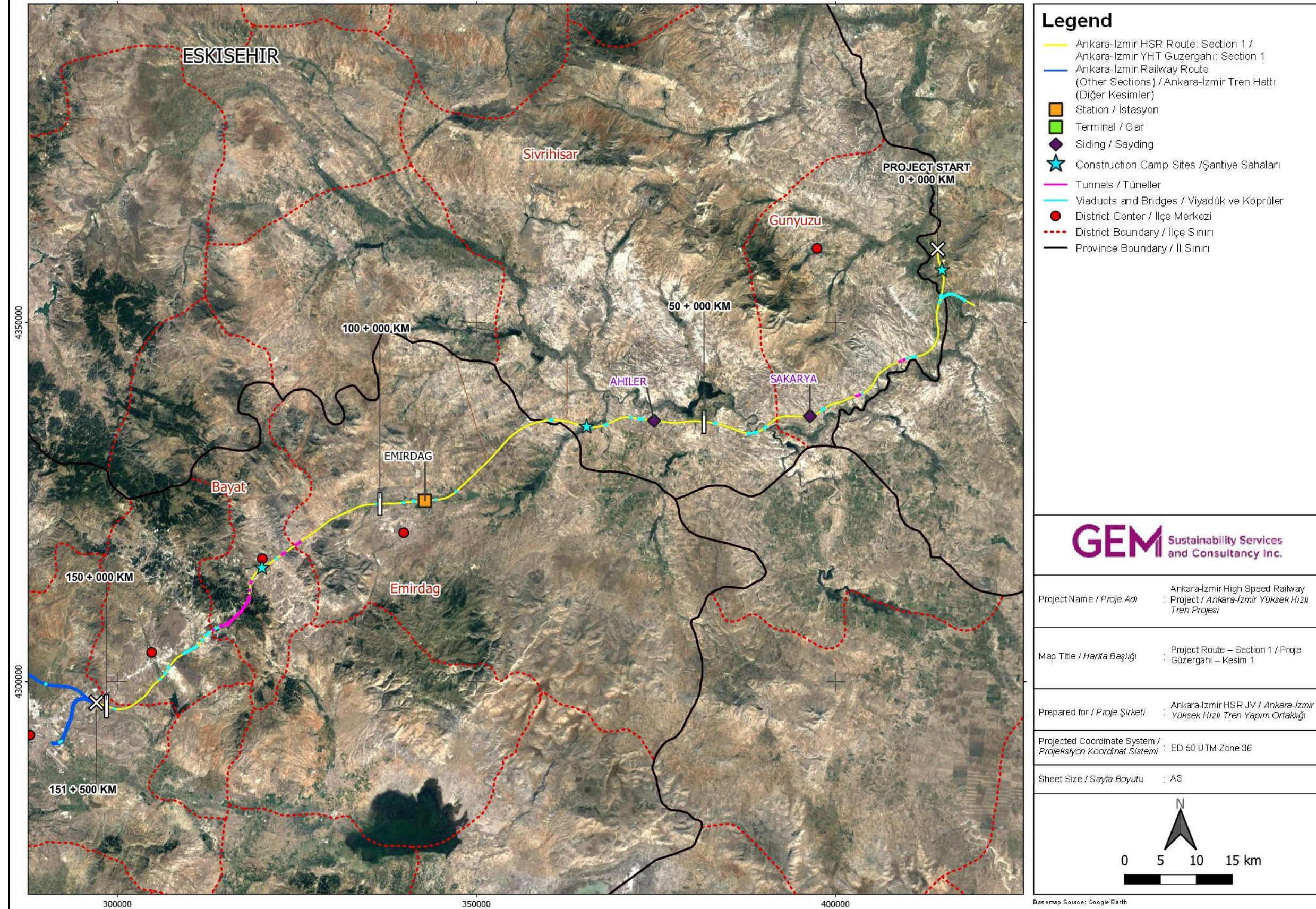


Figure 1-4. Project Route (Section 1: Polatli-Afyon)

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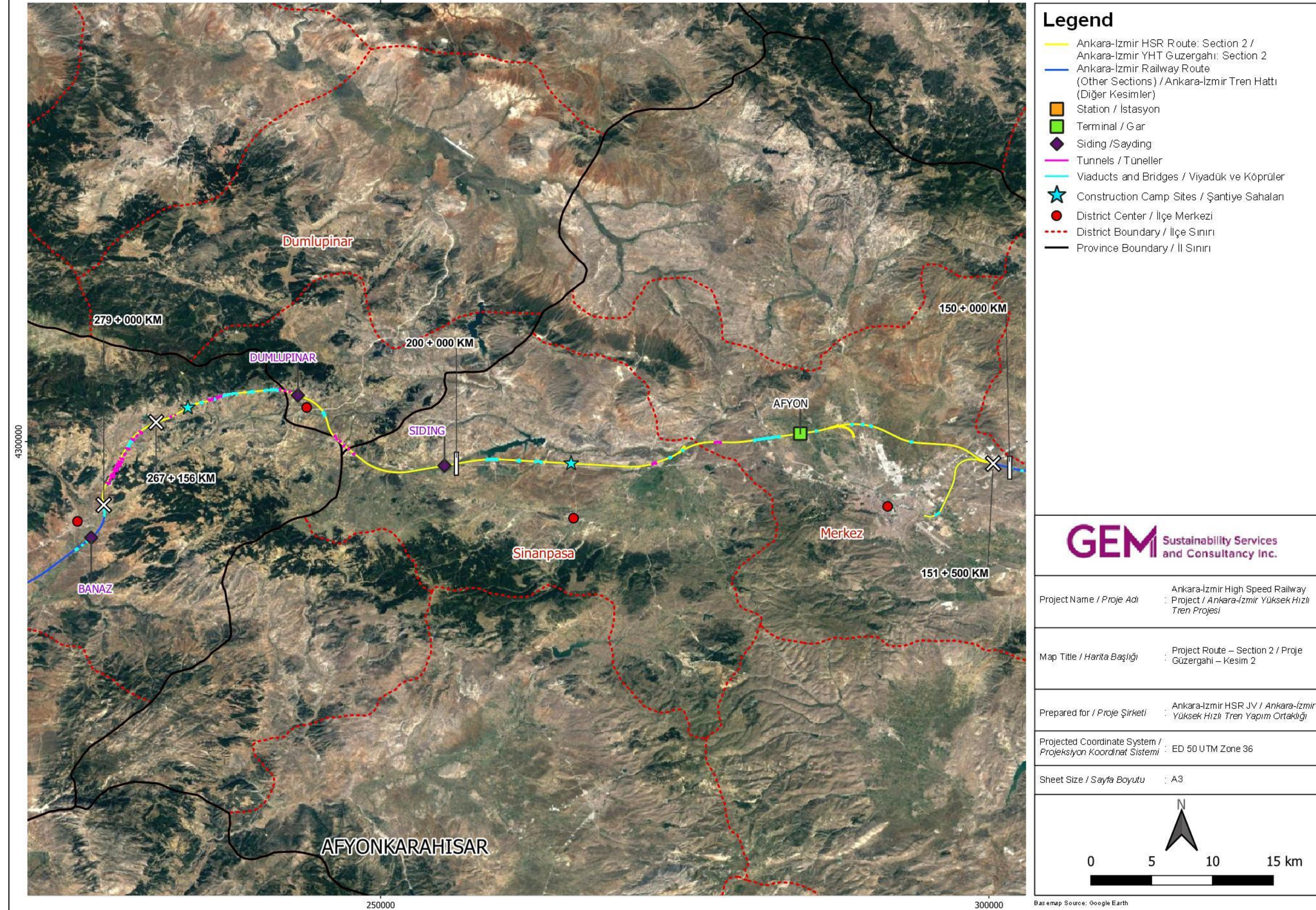


Figure 1-5. Project Route (Section 2: Afyon-Banaz)

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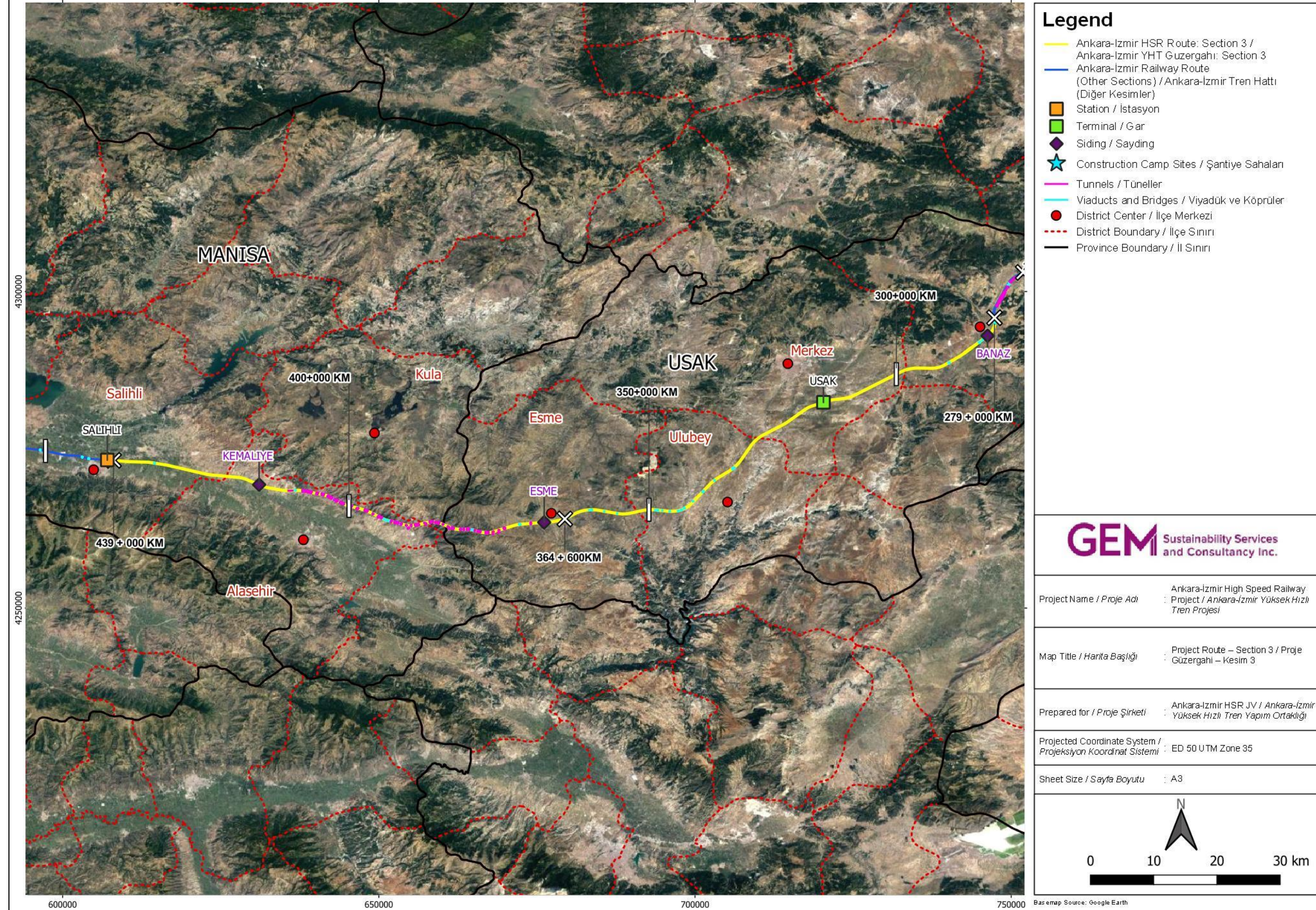


Figure 1-6. Project Route (Section 3: Banaz-Salihli)

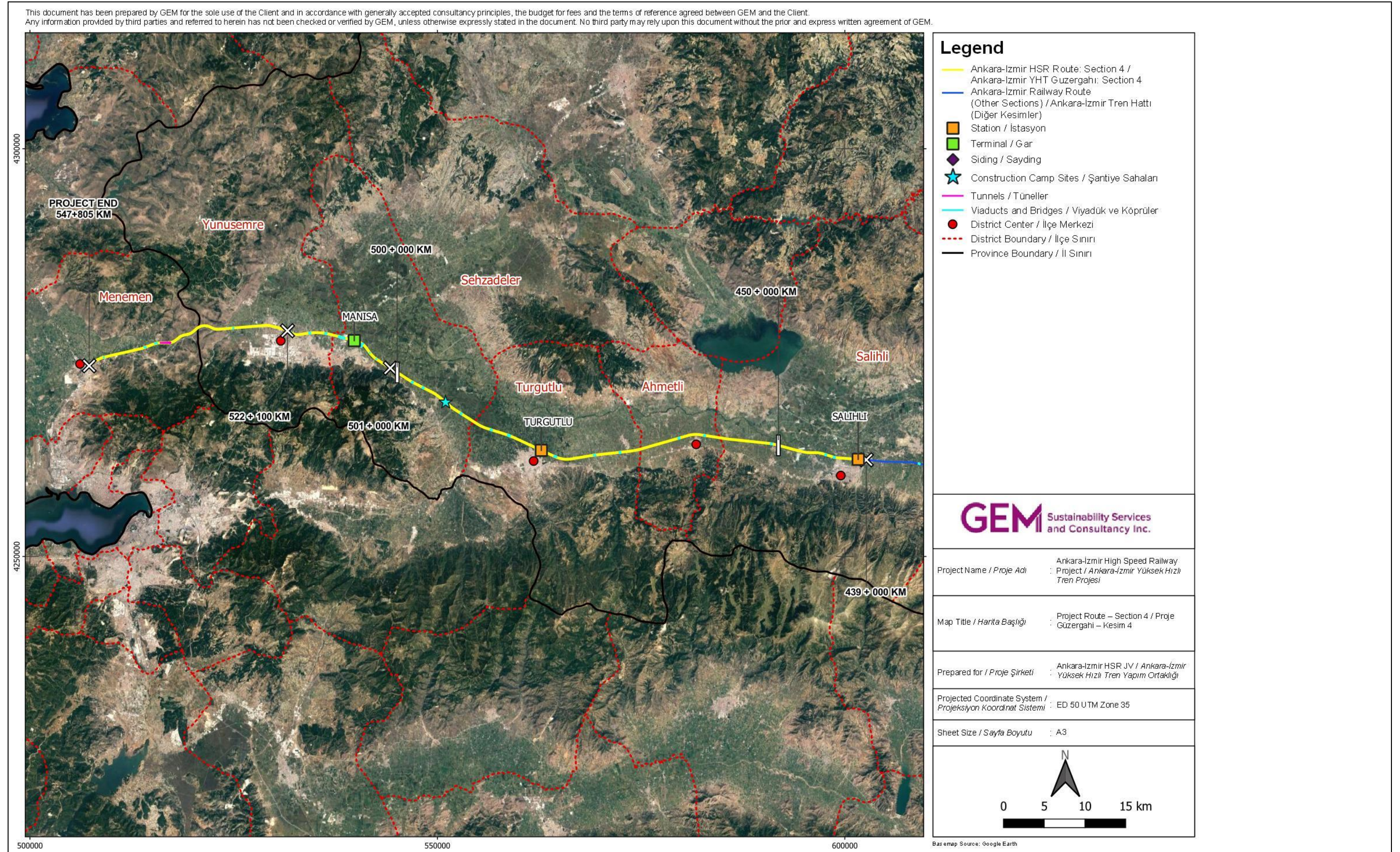


Figure 1-7. Project Route (Section 4: Salihli-Menemen)

1.3.2. Land Acquisition

Table 1-4 summarises the total number of affected parcels, the area and number of private owners/shareholders of the parcels subject to expropriation within the expropriation corridor of the railway based on a detailed analysis of the expropriation plans prepared for the route and approved by the TCDD. Breakdown of the public parcels and analysis of the land use impacts is provided in Chapter 5 on Land Use and Geology.

Table 1-4. Land Acquisition Summary

Section (*)		Number of Parcels			Expropriation Area (ha)			Number of Private Owners/ Shareholders
		Number of Private Parcels	Number of Public Parcels	Total Number of Parcels	Private Land	Public Land	Total	
Section 1 (Polatli-Afyon)		2,119	848	2,967	574.68	734.03	1,308.69	3,370
Section 2 (Afyon-Banaz)		2,123	614	2,737	395.18	164.44	559.62	4,286
Section 3 (Banaz-Salihli)	(3a)	1,669	393	2,062	500.21	139.95	640.16	2,319
	(3b)	907	375	1,282	306.66	213.07	519.73	1,094
Section 4 (Salihli-Manisa)	(4a-4b)	1,308	264	1,572	353.47	45.50	398.97	2,470
	(4c)	278	85	363	100.33	8.52	108.85	503
	(4d)	243	100	343	16.91	3.55	20.46	379
Total		8,647	2679	11,326	2247.45	1309.05	3556.50	14,421

Source: Expropriation Plans prepared for the Parcels (approved by TCDD) within the Expropriation Corridor, 2012-2018.

(*) Infrastructure works for Section 3a, Section 3b, Section 4a and Section 4d are within the scope of other contractors, as defined in Executive Summary and in Section 1.2. Expropriation plans for Ankara-Konya HSR Connection Line (KM 7+800; 0+000-6+683.120), Hatipler Relocation (KM267+156.053-278+632.464), and part of Manisa-Menemen (KM 531+517-539+100), will be prepared/reprepared thus have not been included in the data presented.

Majority of the land acquisition within the Project expropriation corridor has been completed by the TCDD in line with the Expropriation Law (Law No. 2942, 1983). As per the Construction Contract, the expropriation costs will be paid by the Administration. Detailed information on the settlement-based status of expropriation along the Project route is discussed in Chapter 11 on Socio-economy. The remaining expropriation works along the HSR route include the following:

- Section 1:
 - Settlements located along the Ankara-Konya HSR Connection Line (starting from Railway KM 7+800; along a route of approximately 6.5 km) for which expropriation plans will be prepared once design works for this part proceeds
 - Settlements located along the Bayat Relocation (between Railway KM 108+740-120+520) for which expropriation plans will be reconsidered/reprepared due to route relocation once the route modification is approved by the related authorities
- Section 2:
 - Settlements located along Hatipler Relocation (between Railway KM 267+156.053-278+632.464) for which expropriation plans will be reprepared due to route relocation once the route modification is approved by the related authorities
- Section 3:
 - Settlements for which legal procedures are ongoing in Section 3a (Koyunbeyli and Yavu)
- Section 4:
 - Settlements for which legal procedures are ongoing in Salihli-Manisa (4b) section (Asagicobanisa, Karaoglanli and Yukaricobanisa)
 - Settlements along Manisa North Passage (4c) for which expropriation plans have been prepared but expropriation works have not started (Yukaricobanisa, Sehitler, 2. Anafartalar, Kuslubahce and Horozkoy)
 - Settlements for which legal procedures are ongoing in Manisa-Menemen (4d) section (Uzunburun, Samar, Telekler, Suleymanli, and Degirmendere)

In addition to the parcels located within the expropriation corridor, parcels corresponding to the locations of the following associated/off-site facilities will also be affected from Project-related land acquisition:

- Camp sites (if located outside the expropriation corridor)
- Quarries and borrow sites (including access roads)
- Above ground facilities of the electricity transmission infrastructure
- Excavated material storage sites ((if located outside the expropriation corridor)

Once the physical elements of the above listed Project/associated facilities are specifically identified as a result of the relevant design studies, E&S requirements stemming from integration of such facilities to the Project design will be managed as per the Management of Change Procedure to be developed and implemented for the Project.

1.4. Project Design and Components

The Project, including the railway and engineering structures, will be designed, and constructed in accordance with the standards specified in the Construction Contract executed with the AYGM.

Following the completion of construction works, the HSR route and the facilities (e.g., stations) will be fenced off with appropriate materials (e.g., wire fence, concrete panels, etc.).

1.4.1. Railway Design Criteria

Design criteria for the Ankara-Izmir HSR are summarised in Table 1-5 (see Figure 1-8).

Table 1-5. Railway Design Criteria

Project Component	Railway
Number of Lanes	Double
Project Speed	250 km/hr
Transportation Types	Passenger and load (transportation type will be clarified between the Employer and the Contractor based on the ongoing discussions)
Power	Electricity driven
Maximum Slop	0.016
Minimum Curve Radius	3,500 m
Width of Platform	14.5 m
Distance Between Line Axis	4.5 m
Length of Stations	210-1,900 m
Level Crossing	None
Superstructure	Ballasted and unballasted

Source: Contractor, December 2020. Project Information Note.

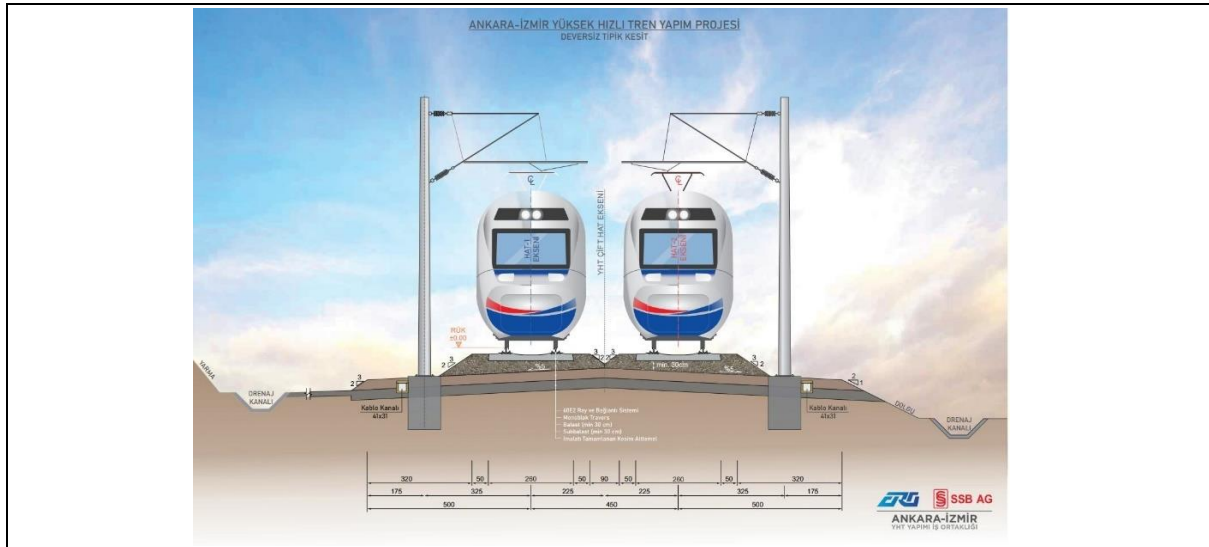


Figure 1-8. Sketches Representing Infrastructure Design for Ankara-Izmir HSR

1.4.2. Engineering Structures

Number of engineering structures (viaducts, tunnels, bridges, overpasses, underpasses, and culverts) to be designed and constructed by the Contractor in each section of the railway are listed in Table 1-6. This list reflects the design as of January 2021. Design for Section 4 is in the process of finalisation. Thus, the number of engineering structures will further be finalised once the design is approved by the AYGM.

Official list of engineering structures to be completed by other contractors is being procured by the Contractor at the time of compilation this report.

Table 1-6. Engineering Structures (as of January 2021)

Type of Engineering Structure	Total	Construction not Started	Construction Suspended	Construction Completed
Section 1 (Polatli-Afyon)				
Culvert	188	82	5	101
Underpass	78	31	2	45
Overpass	33	21	11	1
Bridge	32	16	9	7
Viaduct	19	2	5	12
On-Off Tunnel	2			2
Tunnel	10	2	6	2
Section 2 (Afyon-Banaz)				
Culvert	115	71	2	42
Underpass	48	27	3	18
Overpass	23	18	5	
Bridge	8	6	2	
Viaduct	11	6	5	
On-Off Tunnel				
Tunnel	14	7	6	1
Section 4 (Salihli-Manisa)				
Culvert	126	126	0	0
Underpass	48	48	0	0
Overpass	40	40	0	0
Bridge	21	21	0	0
Viaduct	1	1	0	0
On-Off Tunnel				
Tunnel				

There will also be a Control Centre to be constructed and operated in Izmir.

1.4.2.1. Viaducts

Topographical and geotechnical challenges (e.g. valley or river bed crossings) as well as environmentally sensitive areas will be crossed, as appropriate, by viaducts as listed in Table 1-7.

Table 1-7. List of Viaducts (as of January 2021)

No.	KM Start	KM End	Viaduct Name	Description	Status of Construction	Length (m)
Section 1 (Polatli-Afyon)						
1	7+750.000; 1+505.000	7+750.000; 2+135.000	Viaduct		Not started	630.00
2	7+750.000; 2+540.000	7+750.000; 2+960.000	Viaduct		Not started	420.00
3	6+502.000	6+597.000	Viaduct 1	Sakarya-1	Suspended	95.00
4	16+847.500	17+529.500	Viaduct 2	Avsar Yaylasi-1	Suspended	682.00
5	18+015.150	18+110.150	Viaduct 3	Avsar Yaylasi -2	Suspended	95.00
6	26+295.000	26+487.500	Viaduct 4		Suspended	192.50
7	32+002.000	32+097.000	Viaduct 5		Suspended	95.00
8	32+293.000	32+551.200	Viaduct 6	Kurtderesi	Suspended	258.20
9	40+797.500	41+218.700	Viaduct 7	Sakarya-2	Suspended	421.20
10	42+307.600	43+054.800	Viaduct 8	Akkaya	Suspended	747.20
11	43+306.000	43+694.600	Viaduct 9	Eski Yayla	Suspended	388.60
12	58+574.350	59+124.350	Viaduct 10	Buyuksulu Deresi	Suspended	550.00
13	130+263.750	130+423.750	Viaduct 11	DSI Golet-2	Suspended	160.00
14	131+180.000	131+697.500	Viaduct 12	Seydiler-1	Suspended	517.50
15	131+764.500	131+957.000	Viaduct 13	Seydiler-2	Suspended	192.50
16	132+570.000	132+892.500	Viaduct 14	Seydiler-3	Suspended	322.50
17	133+840.000	134+715.000	Viaduct 15	Seydiler-4	Suspended	875.00
18	134+925.000	135+020.000	Viaduct 16	Iscehisar -1	Suspended	95.00
19	135+210.000	135+955.000	Viaduct 17	Iscehisar-2	Suspended	745.00
Section 2 (Afyon-Banaz)						
1	171+212.850	173+420.350	Viaduct 1		Suspended	2,207.50
2	192+571.900	193+121.900	Viaduct 2		Suspended	550.00
3	194+491.825	194+651.825	Viaduct 3		Suspended	160.00
4	196+461.893	197+336.893	Viaduct 4&5		Suspended	875.00
5	214+688.250	215+043.250	Viaduct 6		Suspended	355.00
6	219+912.550	220+963.550	Viaduct 7		Not started	1,051.00
7	221+954.550	222+394.550	Viaduct 8		Not started	440.00
8	223+472.550	224+614.550	Viaduct 9		Not started	1,142.00
9	226+640.550	226+752.550	Viaduct 10		Not started	112.00
10	227+436.550	227+526.550	Viaduct 11		Not started	90.00
11	271+075.000	271+635.000	Viaduct		Not started	560.00
Section 4 (Salihli-Manisa)						
1	484+043	484+235	Viaduct 1	Kopru 10	Not started	192.00



Figure 1-9. Seydiler-1 Viaduct (KM 131+180.000-131+697.500)

1.4.2.2. Tunnels

Topographical and geotechnical challenges (e.g. valley or river bed crossings) as well as environmentally sensitive areas will be crossed, as appropriate, by viaducts as listed in Table 1-8.

Table 1-8. List of Tunnels (as of January 2021)

No.	KM Start	KM End	Tunnel Name	Status of Construction	Length (m)
Section 1 (Polatli-Afyon)					
1	18+465.000	18+705.000	On-off Tunnel-1	Construction suspended	218.00
2	19+064.000	19+306.000	On-off Tunnel-2	Construction suspended	242.23
3	26+585.000	26+845.000	Tunnel 1	Construction suspended	260.00
4	26+945.000	27+245.000	Tunnel 2	Construction suspended	300.00
5	112+540.000	113+300.000	Bayat 1	Not started	760.00
6	115+140.000	115+620.000	Bayat 2	Not started	480.00
7	121+420.000	121+760.000	Tunnel 3	Completed	340.00
8	122+620.000	122+920.000	Tunnel 4	Completed	300.00
9	123+115.000	123+655.000	Tunnel 5	Construction suspended	540.00
10	123+720.000	128+880.000	Tunnel 6-7-8	Construction suspended	5160.00
Section 2 (Afyon-Banaz)					
1	176+395.000	176+855.000	Tunnel 2	Construction suspended	460.00
2	182+613.000	182+892.000	Tunnel 3	Construction suspended	279.00
3	209+615.000	210+875.000	Tunnel 4	Construction suspended	1,260.00
4	211+436.000	212+176.000	Tunnel 5	Construction suspended	740.00
5	218+815.000	219+683.000	Tunnel 6	Construction suspended	868.00
6	224+835.000	225+225.000	Tunnel 7	Construction suspended	390.00
7	225+650.000	225+965.000	Tunnel 8	Construction suspended	315.00
8	229+363.550	230+059.550	Tunnel 9	Not started	696.00
9	269+735.000	270+830.000	Tunnel 1	Not started	1,095.00
10	271+958.000	273+193.000	Tunnel 2	Not started	1235.00
11	273+548.000	273+843.000	Tunnel 3	Not started	295.00
12	274+008.000	274+398.000	Tunnel 4	Not started	390.00
13	274+578.000	275+108.000	Tunnel 5	Not started	530.00
14	275+338.000	276+123.000	Tunnel 6	Not started	785.00
Section 4 (Salihli-Menemen)					
N/A	No tunnel planned in this section				

1.4.2.3. Culverts

Number of culverts in each section per their dimensions is summarised in Table 1-9. The list of culverts along the Project route is presented in Appendix B.1.

Table 1-9. Number of Culverts per Dimensions (as of January 2021)

Dimensions	Total
Section 1 (Polatli-Afyon)	
1.50*1.50	1
2.00*2.00	102
2.50*2.50	31
3.00*3.00	15
5.00*5.00	1
2.00*(2.00*2.00)	2
3.00*(3.00*3.00)	7
2.00*(3.00*3.00)	27
2.00*(3.00*2.00)	1
2.00*(2.50*2.50)	1
Total	188

Dimensions	Total
Section 2 (Afyon-Banaz)	
2.00*2.00	77
2.00*3.00	3
3.00*2.00	10
3.00*3.00	8
1.50*1.50	1
3.30*2.50	1
2.00*(3.00*2.00)	2
2.00*(3.00*3.00)	6
3.00*(3.00*3.00)	6
Dimension information N/A	1
Total	115
Section 4 (Salihli-Manisa)	
Dimension information N/A	126
Total	126

1.4.2.4. Underpasses

Number of underpasses in each section per their dimensions is summarised in Table 1-10. The list of underpasses in each section is presented in Appendix B.2.

Table 1-10. Number of Underpasses per Dimensions (as of January 2021)

Dimensions	Total
Section 1 (Polatli-Afyon)	
4.00*3.00	1
4.00*4.00	1
7.00*5.00	51
7.00*6.00	13
10.00*6.00	3
12.00*6.00	8
2.00*(12.00*6.00)	1
Total	78
Section 2 (Afyon-Banaz)	
5.00*4.00	1
7.00*5.00	32
7.00*6.00	1
10.00*5.00	4
10.00*6.00	3
12.00*6.00	4
12.00*5.50	1
2.00*(12.00*6.00)	1
2.00*(14.00*6.00)	1
Total	48
Section 3 (Salihli Passage)	
Dimension information N/A	1
Total	1
Section 4 (Salihli-Manisa)	
Dimension information N/A	47
Total	1

1.4.2.5. Overpasses

Number of overpasses in each section per their dimensions is summarised in Table 1-11. The list of overpasses in each section is presented in Appendix B.3.

Table 1-11. Number of Overpasses per Dimensions (as of January 2021)

Size Type	Total
Section 1 (Polatli-Afyon)	
12.50*8.50	33
Total	33
Section 2 (Afyon-Banaz)	
12.00*7.40	7
12.00*7.50	3
12.00*8.00	11
13.00*7.50	2
Total	23
Section 4 (Salihli-Manisa)	
Dimension information N/A	40
Total	40

1.4.2.6. Bridges

Number of bridges in each section per their dimensions is summarised in Table 1-12. The list of bridges in each section is presented in Appendix B.4.

Table 1-12. Number of Bridges per Dimensions (as of January 2021)

Length Type	Total
Section 1 (Polatli-Afyon)	
20.00	9
25.00	3
30.00	8
42.50	1
50.00	2
60.00	1
62.50	1
65.00	1
90.00	1
95.00	2
108.00	1
120.00	1
130.00	1
Total	32
Section 2 (Afyon-Banaz)	
25.00	2
30.00	3
62.50	2
95.00	1
Total	8
Section 4 (Salihli-Manisa)	
30.00	12
48.00	1
50.00	1
62.00	2
62.50	2
95.00	2
101.00	1
Total	21

1.4.3. Electrification and Telecommunications Infrastructure

The electricity to be required for the operation of the HSR will be supplied from the transformer stations of Turkish Electricity Transmission Company (TEIAS). The electricity supplied from TEIAS transformer stations will be conveyed to the HSR alignment by means of steel towers to be erected with 30-70 meters intervals.

Summary of electrification works is presented in Table 1-13 and signalisation and telecommunication infrastructure is presented in Table 1-14. The design of the energy transmission lines including the route and locations of the above ground facilities is ongoing as of Q2 2021.

Table 1-13. Summary of Electrification System

Parameter	Information/Value
Number of steel towers	23,787
Voltage level for the energy transmission lines	154 kV
Conductive wires	Copper and aluminium
Number of new transformer stations to be built	10
Number of existing transformer stations to be rehabilitated	1(*)
Area requirement of each transformer station	75 m x 100 m
SCADA system	To be applied for tunnels over 400 m and transformer stations

(*) Manisa Transformer Station will be rehabilitated.

Source: Contractor, December 2020. Project Information Note.

Table 1-14. Signalisation and Telecommunication Infrastructure

Parameter	Information/Value
Number of Control Centres	2
Length of signal cables	4 million metre
Length of energy cables	641 thousand metre
Length of fiber optic cables	3 million metre
Number of GSM-R towers	57
Alarm and monitoring system	62 set
Early earthquake warning system	324 accelerometers

Source: Contractor, December 2020. Project Information Note.

1.4.4. Railway Stations

Stations to be constructed along the railway route are listed in Table 1-15.

Table 1-15. Railway Stations

Section	Stations	Type	KM Start	KM End
Section 1	Emirdag	Station	93+349.91	94+805.09
Section 2	Afyon	Gar (*)	168+971.94	170+402.09
Section 3	Uşak	Gar (*)	312+925.55	314+541.33
Section 4	Salihli	Station	440+077.18	441+851.31
	Turgutlu	Station	479+096.98	480+910.72
	Manisa	Gar (*)	506+587.00	507+837.94

(*) Gar terminology is used for large stations.

1.4.5. Sidings

Sidings to be constructed along the railway route are listed in Table 1-16.

Table 1-16. Sidings

Section	Siding	KM Start	KM End
Section 1	Sakarya	35+574.37	36+844.81
	Ahiler	56+902.90	58+174.75
	Siding (naming to be made)	200+040.00	201+400.00
Section 2	Dumlupinar	217+610.84	218+175.05
Section 3	Banaz	283+543.75	284+633.80
	Esme	367+415.00	369+216.65
	Kemaliye	415+102.91	416+221.01

1.4.6. Excavated Material Storage Sites

Storage sites will be used to store part of the excavated materials that are not suitable for use in fill operations. The Contractor is planning to prioritise designating excavated material storage sites within the expropriation corridor of the railway so as to avoid additional land use impacts.

If proper storage sites cannot be designated within the expropriation corridor, the Contractor will identify parcels, for which usage rights will be obtained from the respective right holders as per the requirements of the applicable legislation. The following criteria will be considered in the selection of excavated material storage sites that will be located out of the expropriation corridor:

- Distance to settlement areas and residential buildings will be considered.
- Parcels that are not used for agricultural or grazing purposes will be prioritised.
- Parcels that are not suitable for future agricultural purposes (e.g., parcels with high slope, stony parcels)

It should be noted that infrastructure (excavation and fill) works have already been partly completed in Section 1 and Section 2, except the Hattipler Passage (KM 267+156-278+632) and Ankara-Konya HSR Connection Line (7+800; 0+000-6+683.120). Progress of excavation and fill per railway sections is provided in Section 1.6.1.

1.4.7. Temporary Facilities

Construction camp sites, quarries and material borrow sites will be temporary facilities to be used during the construction phase. Information on temporary facilities planned to be used in the scope of the Project is provided in the following sections. Prior to start of operations at each facility, the Contractor will review/verify the validity of any previous/existing decision (e.g. EIA decision as per the national EIA Regulation), permit, licenses, etc. and where required by legislation, relevant decisions, permits and licenses required for the operation of the temporary facilities (quarries and material borrow sites, concrete plants, etc.) will be obtained from the related authorities.

The other contractors continuing infrastructure works in Section 3a, Section 3b, Section 4a, and Section 4d use temporary facilities including construction camp sites, quarries and borrow sites, concrete plants, etc. The works at these facilities are being conducted as per the requirements of the applicable national legislation. The list of temporary facilities used by other contractors is not available to the Contractor at the time of compilation of this ESIA Report.

1.4.7.1. Construction Camp Sites

The construction camp sites planned to be used in the Project are listed in Table 1-17. Exact locations (parcels) on which the camp sites will be established are to be identified during the acquisition of land use rights of the relevant parcels for the duration of the construction phase. The camp sites are planned to be situated preferentially within the expropriation corridor of the railway. In case the lands outside the expropriation corridor are to be used for camp site establishment, land usage rights will be obtained from the respective right holders as per the requirements of the applicable legislation.

Table 1-17. Planned Construction Camp Sites of the Contractor (as of Q2 2021)

Section	Camp Site	Status	Approximate Railway KM	Province	District	Closest Neighbourhood/Village	Distance to the Closest Building in the Settlement (m)
Section 1	Gumusyaka	New	3+000	Ankara	Polatli	Gumuşyaka	470
	Sigircik	New	67+000	Eskisehir	Sivrihisar	Sigircik	2,340
	Bayat	New	119+000	Afyonkarahisar	Bayat	Merkez	20
Section 2	Sinanpasa (*)	Existing	190+000	Afyonkarahisar	Sinanpasa	Ayvali	1,000
	Halacilar	New	228+000	Usak	Banaz	Halacilar	1,230
Section 3	TBD						
Section 4	TBD	New	493+000	Manisa	Sehzadeler	Asagi Cobanisa	650

(*) The existing Sinanpasa (Dogus) Construction Camp Site is planned to be used as the main camp site of the Project.

Location of subcontractor construction camp sites (main and lower tier) will further be identified upon selection of subcontractors.

A sample layout for the camp sites is presented in Figure 1-11. The facilities that will be located at the camp site will include the following, as necessary:

- Administrative offices
- Dormitories (for engineers, foremen and workers)
- Water supply, water and wastewater management facilities (water wells or water supply lines, temporary waste storage areas, package wastewater treatment units/plants or septic tanks or sewerage connection lines in areas where sewerage infrastructure is present, as appropriate)
- Social facilities (television room, gym, prayer rooms, etc.)
- Cafeteria and dining halls
- Infirmary
- Heating centre
- Concrete Plant
- Traverse (Railway Sleeper) Manufacturing Facility
- Stock sites (aggregate, sleeper, panel, rail)
- Workshops (truck, machinery and maintenance)
- Storage areas and depots
- Security gates and barriers
- Parking area

Water is planned to be supplied from water wells existing/to be drilled and operated in accordance with relevant groundwater utilization permits to be obtained from the related authorities or purchased from nearby settlements.

Electricity will be supplied from the national grid and/or electricity generators will be used, as necessary. Telecommunication infrastructure will also be ensured by means of local service providers.

Among the planned construction camp sites, Sinanpasa (Dogus) Camp (KM 190+000) is the only existing site to be used by the Contractor. The Sinanpasa (Dogus) Camp Site is vacant as of January 2021. Photographs showing the current status of this camp site are presented in Figure 1-10.



Figure 1-10. Current Status of Sinanpasa Camp Site at Railway KM 190+000 (as of January 2021)



1.4.7.2. Quarries and Material Borrow Sites

As of Q2 2021, the quarries considered for use in the scope of the Project are listed in Table 1-18. The following materials will be extracted from the quarries:

- Basalt
- Limestone
- Andesite

The quarries listed in Table 1-18 have been prioritised (subject to final selection based on ongoing/planned material tests and results of licenses applications) as for the one or more of the following reasons:

- They had been used by the previous contractor for the past construction works conducted for the AIHSR Project, as such they are licensed quarries.
- They have been used by other state institutions such as General Directorate of State Highways, General Directorate of State Hydraulic works, etc., as such they are licensed quarries.
- They are in the proximity of the railway route and planned construction site.

Some of the material borrow sites have already been included in the national EIA Report that is basis for the EIA Positive Decision issued for the Project in 2006. Some of the quarries do already have in place raw material production licenses (see Table 1-18). All the permits/licenses required for the operation of these facilities will be obtained prior to start of operations at each quarry site.

Currently, the Contractor is at the stage of evaluation of additional (alternative) quarries and material borrows sites that can be used in the scope of the Project. These potential quarries are identified in Chapter 3 on Project Alternatives.

The quarries and material borrow sites will be operated by the Contractor during the construction phase of the Project. Necessary licenses and permits (e.g. Raw Material Production License) required for the operation of the quarries and material borrow sites will be obtained from the related authority on behalf of the Project Owner. License applications have started for the quarries and material borrow sites (for which material tests have been completed) in March 2021 and will continue based on the results of the ongoing material tests. In this ESIA Report, E&S impacts of the quarries and material borrow sites (e.g. land use, air quality, noise, vibration, biodiversity, cultural heritage, cumulative impacts, etc.) have been evaluated for the sites listed in Table 1-18 and Table 1-19, considering their site boundaries prior to license application, as shared by the Contractor at the scoping phase of the ESIA process. As necessary, license boundaries considered in the assessment of relevant impacts have been narrowed down or some of the sites have been cancelled to avoid/mitigate the predicted impacts based on the outcomes of the ESIA. Those avoidance/mitigation measures are discussed in Chapter 3 on Project Alternatives and/or within the respective ESIA chapters. Quarries will be operated with open-pit mining method. Blasting operations will be conducted at the quarries, as required. The quarries (except the andesite quarries) will be equipped with crushers, concrete plants, and plant mix base (PMT) facilities. The location of facilities will further be identified based on the outcomes of the material tests to be finalised for the quarries. The material borrow sites considered for use in the scope of the Project are listed in Table 1-19.

Following the completion of the construction phase, the quarries and material borrow sites will be either closed and rehabilitated in line with the requirements of the Construction Contract (including the environmental and health and safety requirements), and the relevant legislation or transferred to related authorities for future use as per their requirements.

Table 1-18. Quarries Considered for Use in the Project (as of Q2 2021)

No.	Facility Name	Past Production Status (including Turkish terminology)	Resource	License/ Raw Material Production License No. (if available)	EIA Status (*) (Decision Date/Number if the information is available to the Contractor)	Land Use Type (according to Online Title Deed Registry System)	Railway KM	Approximate Distance to Railway Route (m) (Air Distance)	License Holder	Province	District	Neighbourhood	Closest Settlement Approximate Distance of the License Boundary to the Closest Building (m)	Approximate Distance of the EIA Decision (if available) Boundary to the Closest Building (m)	Direction w.r.t. Settlement	
Section 1 (**)																
1	10 - Beycegiz	No previous production	Bakir ocak	Basalt	06/2016-31	PDF-2	Pasture	0+000	32,000	TCDD General Directorate	Ankara	Polatli	Beycegiz	2,257	2,257	SE
2	18 - Yagmurbaba 2	No previous production	Bakir ocak	Basalt			Agricultural Land Grassland	0+000	39,500		Ankara	Polatli	Yagmurbaba	1,557	N/A	SE
3	29 - Yenice	Previous production done	Faaliyet yapilmis	Limestone	06/2012-10	PDF-1 (YDA) (20.02.2013 / 1139)	Raw Soil	2+050	400	TCDD General Directorate	Ankara	Polatli	Yenice	730	N/A	NW
4	36- Turktaciri	No previous production	Bakir ocak	Limestone	06/2016-33	PDF-1 (YDA) (16.06.2017/ 53430385-220-02 E-2017637)	Pasture	16+000	3,800	TCDD General Directorate	Ankara	Polatli	Turktaciri	847	N/A	SW
5	40 - Kayakent	Previous production done	Faaliyet yapilmis	Limestone	26/2016-01	PDF-1 (YDA) (19.04.2016/ 43549071 220- 02-E2016122)	Pasture	31+200	6,850	TCDD General Directorate	Eskisehir	Gunyuzu	Kayakent	5,820	N/A	N
6	75 - Alibeyce	Previous production done	Faaliyet yapilmis	Limestone	03/2013-24	PDF-1 (YDA) (22.10.2014/ 56916320 220-02 E-2014498)	Forestry Raw Soil	92+200	6,900	KGM	Afyonkarahisar	Emirdag	Kuruca	2,390	N/A	SW
7	78 - Tabaklar	Previous production done	Faaliyet yapilmis	Limestone		PDF-2 (31.03.2016/ 56916320 220-02 E-201689)	Pasture	99+000	370		Afyonkarahisar	Emirdag	Tabaklar	1,416	N/A	W
8	82 - Emirin Koyu	No previous production	Bakir ocak	Basalt			Forestry	106+500	1,150		Afyonkarahisar	Emirdag	Emirin Koyu	350	N/A	SW
9	94 - Bayat	Previous production done	Faaliyet yapilmis	Limestone	03/2013-07	PDF-1 (YDA) (04.2013/ 2013-359)	Forestry	114+800	900	TCDD General Directorate	Afyonkarahisar	Bayat	Bayat	2,118	N/A	SW
(***)	97 - Bayat 2	No previous production	Bakir ocak	Basalt			Forestry	120+500	4,700		Afyonkarahisar	Bayat		2,140	N/A	SE
10	120 - Gebeceler 2	No previous production	Bakir ocak	Limestone			Pasture	145+500	1,200		Afyonkarahisar	Iscehisar	Gebeceler	2,747	N/A	SE
11	124 - Beyyazi	No previous production	Bakir ocak	Limestone	03/2016-21	PDF-1 (Dogus)	No registry	155+500	1,000		Afyonkarahisar	Merkez	Susuz	1,412	N/A	SW
Section 2																
12	152 - Ayvali	Previous production done	Faaliyet yapilmis	Limestone	03/2017-04	PDF-1 (Dogus)	Agricultural Land (litigious)	187+700	5,400	TCDD General Directorate	Afyonkarahisar	Sinanpasa	Igdeli	1,720	N/A	SW
13	176 - Elvanpasa 2	Previous production done	Faaliyet yapilmis	Limestone	03/2017-10	PDF-1 (Dogus)	Pasture Quarry Raw Soil	207+900	1,700	TCDD General Directorate	Afyonkarahisar	Sinanpasa	Elvanpasa	766	N/A	NE
14	197 - Dumenlerkoyu	No previous production	Bakir ocak	Limestone	64/2016-05	PDF-1 (Dogus) (20.12.2016/ 51634718 220-02 E-2016296)	Agricultural Land Pasture No registry	231+000	2,150	TCDD General Directorate	Usak	Banaz	Dumenler	1,354	N/A	SW
Section 3																
15	214 - Ahmetlidag 2	No previous production	Bakir ocak	Basalt		PDF-2	Forestry	353+000	4,750		Usak	Esme	Kolankaya	650	N/A	NW

No.	Facility Name	Past Production Status (including Turkish terminology)	Resource	License/ Raw Material Production License No. (if available)	EIA Status (*) (Decision Date/Number if the information is available to the Contractor)	Land Use Type (according to Online Title Deed Registry System)	Railway KM	Approximate Distance to Railway Route (m) (Air Distance)	License Holder	Province	District	Closest Settlement				
												Neighbourhood	Approximate Distance of the License Boundary to the Closest Building (m)	Approximate Distance of the EIA Decision (if available) Boundary to the Closest Building (m)	Direction w.r.t. Settlement	
16	226 - Hayalli (226- Access No No:3372776_MANGAN')	No previous production	Bakir ocak	Limestone				414+000	3,000		Manisa	Kula	Hayalli	1,288	N/A	E
17	232 - Dombayli	No previous production	Bakir ocak	Limestone	45/2009-01	PDF-2	Pasture	431+500	10,100	DSI 2 nd Regional Directorate	Manisa	Salihli	Dombayli	582	N/A	S
	Section 4															
18	234 - Akkoy	No previous production	Bakir ocak	Limestone	45/2019-04	PDF-2	No registry	471+500	8,600	TCDD General Directorate	Manisa	Turgutlu	Akkoy	555	N/A	S
19	234 - B - Campinar	No previous production	Bakir ocak	Limestone			Forestry	476+500	8,600		Manisa	Turgutlu	Temrek	1,468	N/A	W
20	235 - Cikrikci	Previous production done	Faaliyet yapilmis	Andesite	45/2018-06	PDF-2	No registry	472+000	2,700	KGM	Manisa	Turgutlu	Cikrikci	78	220	SW
(***)	239 – A- 3229556 (Asagi Cobanisa)			Limestone				497+600			Manisa	Merkez	Yukari Cobanisa	443	N/A	SE
21	238 - Ansizca 1	No previous production	Bakir ocak	Limestone	Site for request (Raw Material Production License requested by other agencies but not been obtained)	PDF-2	No registry	499+000	14,600		Izmir	Kemalpasa	Ansizca	1,280	N/A	SW
22	239 - Ansizca 2	No previous production	Bakir ocak	Limestone		PDF-2	No registry	501+000	13,500		Izmir	Kemalpasa	Kuyucak	2,180	N/A	SW
23	243 - Yunusemre	No previous production	Bakir ocak	Limestone	45/2020-04	PDF-2	Forestry	524+500	13,350	DSI	Manisa	Merkez	Karakilimli	300	625	W
24	245 - Gurle	Previous production done	Faaliyet yapilmis	Limestone			No registry	527+700	4,200		Manisa	Merkez	Gurle	606	N/A	NW
25	258 - Caltidere 2	Previous production done	Faaliyet yapilmis	Basalt	35/2012-21	PDF-2	Pasture Raw Soil	538+000	26,000	KGM	Izmir	Aliaga	Caltidere	6	67	NW
26	263 - Degirmendere	No previous production	Bakir ocak	Basalt	35/2017-04	PDF-2	Agricultural land, TCDD Auxiliary Building	539+500	1,000	TCDD General Directorate	Izmir	Menemen	Kir	479	540	NW

(*) PDF-1: EIA not Required Decisions obtained by the previous contractors in the scope of the Project based on the Project Description Files (PDF) prepared; PDF-2: EIA not Required Decisions obtained by other state institutions such as State Hydraulic Works, General Directorate of State Highways, TCDD, etc. in the scope of other projects based on the PDFs prepared.

(**) 26-Basri (Basalt) Quarry (not included in the table) planned in Ankara, Polatli, Basri neighbourhood near KM 0+000 has been eliminated from the Project design as the quarry is located in the proximity of a legally protected area (i.e. registered historical site for which further information is being compiled by the Contractor as of Q2 2021).

(***) These quarries, which were considered for use by the Contractor at the scoping phase of the ESIA, have been eliminated from the Project design and no license application has been done for these quarries in consideration of the overlapping non-registered cultural heritage sites identified during the ESIA studies. See Chapter 14 on Cultural Heritage for further details. These quarries have been considered in the impact assessment studies (presented within the respective chapters of this ESIA Report), which were finalised before the decision on elimination has been taken by the Contractor in March 2021.

Table 1-19. Material Borrow Sites Considered for Use in the Project (as of Q2 2021)

No.	Facility	Past Production Status (including Turkish terminology)		License/ Raw Material Production License No. (if available)	EIA Status (*)	Land Use Type (according to Online Title Deed Registry System)	Railway KM	Approximate Distance to Railway Route (m) (Air Distance)	License Holder	Province	District	Closest Settlement Neighbourhood	Approximate Distance of the License Boundary to the Closest Building) (m)	Direction w.r.t. Settlement
1	32-A.O.1-A.O.2	No previous production	Bakir Ocak		EIA	Pasture	11+000	2,550		Ankara	Polatlı	Beskopru	718	N
2	33-A.O.3	No previous production	Bakir Ocak		EIA	Pasture	12+500	1,850		Ankara	Polatlı	Kabakkoy	879	SW
3	34-Kabakkoy	Previous production done	Faaliyet Yapılmış	06/2017-08	PDF-1 (YDA)	Pasture	13+400	2,300	TCDD General Directorate	Ankara	Polatlı	Kabakkoy	126	SW
4	37-A.O.4	Previous production done	Faaliyet Yapılmış		EIA	Pasture Agricultural Land	16+200	400		Ankara Eskisehir	Polatlı Gunyuzu	Turktaciri	3,027	SE
5	38-A.O.5	No previous production	Bakir Ocak		EIA	Pasture	23+150	600		Eskisehir	Gunyuzu	Cakmak	4,755	SW
6	42-A.O.6	No previous production	Bakir Ocak		EIA	Pasture	34+000	20		Eskisehir	Gunyuzu	Kayakent	1,910	SE
7	59-A.O.9	No previous production	Bakir Ocak		EIA	Pasture	57+000	0		Eskisehir	Sivrihisar	Kurtseyh	1,103	NE
8	70-A.O.10	No previous production	Bakir Ocak		EIA	Pasture	70+800	4,000		Afyonkarahisar	Emirdag	Ciftlikkoy	17	SE
9	100-Koroglubeli-1	No previous production	Bakir Ocak	03/2016-07	PDF-2	Pasture	124+500	0		Afyonkarahisar	Bayat	Merkez	676	SW
10	101-Koroglubeli-2	No previous production	Bakir Ocak	03/2016-06	PDF-2	Pasture	124+500	0		Afyonkarahisar	Bayat	Merkez	566	SW
11	105-A.O.14	Previous production done	Faaliyet Yapılmış		EIA	Plot Raw Soil Agricultural Land	136+300	250	TCDD General Directorate	Afyonkarahisar	İscehisar	Cumhuriyet	528	SW
12	122-Akcın	Previous production done	Faaliyet Yapılmış	03/2013-11	PDF-2	Pasture	149+500	2,050	TCDD General Directorate	Afyonkarahisar	Merkez	Akcın	1,811	W
13	123- Akcın-2	Previous production done	Faaliyet Yapılmış	03/2015-05	PDF-2	Pasture	150+500	2,300	TCDD General Directorate	Afyonkarahisar	Merkez	Akcın	754	SW
14	198-64/2005-10	Previous production done	Faaliyet Yapılmış			Pasture	241+000	4,400		Usak	Banaz	Muratlı	168	SW
15	204-Derbent	Previous production done	Faaliyet Yapılmış		PDF-2	No registry	288+000	4,800		Usak	Banaz	Derbent	1,535	SW
16	231-2009-11	Previous production done	Faaliyet Yapılmış			Pasture No registry	430+700	5,100		Manisa	Salihli	Yesilkavak	720	SW

(*) PDF-1: EIA not Required Decisions obtained by the previous contractors in the scope of the Project based on the Project Description Files (PDF) prepared; PDF-2: EIA not Required Decisions obtained by other state institutions such as State Hydraulic Works, General Directorate of State Highways, TCDD, etc. in the scope of other projects based on the PDFs prepared.

1.4.7.3. Concrete Plants

Concrete plants (with a capacity of 120 m³/h) planned to be used in the scope of the Project are listed in Table 1-20.

Table 1-20. Concrete Plants

No.	Facility Name	Status	Indicative (*) Railway KM
Section 1			
1	Concrete Plant	To be established	8+000
2	Concrete Plant	To be established	44+000
3	Concrete Plant	To be established	66+000
4	Concrete Plant	To be established	117+000
Section 2			
5	Concrete Plant	To be established	170+000
6	Concrete Plant at Sinanpasa Construction Camp Site (Dogus)	Previously established (not in operation as of Q2 2021)	190+000
7	Concrete Plant	To be established	210+000
8	Concrete Plant	Previously established (not in operation as of Q2 2021)	228+000
Section 4			
9	Concrete Plant	Existing licensed plants (operated by other parties)	450+000
10	Concrete Plant	Existing licensed plants (operated by other parties)	500+000

(*) Exact locations to be identified by the Contractor prior to start of construction.

1.5. Passenger Number Forecast

The annual passenger number forecast for the operation of the HSR by the TCDD is provided in Table 1-21

Table 1-21. Annual Passenger Number Forecast during the Operation of the HSR by the State

Year	Annual Passenger Number (Passenger/Year)
2023	6.0 million
2028	6.9 million
2033	8.0 million
2038	9.3 million
2043	10.8 million
2048	12.5 million
2052	14.1 million

Source: Contractor, December 2020. Project Information Note.

1.6. Project Activities

1.6.1. Construction Phase

At some of the route parts where the infrastructure works are under the responsibility of the Contractor, Project construction works were started by the previous contractors between 2012 and 2016 and suspended in 2018. As of January 2021, there are no ongoing construction works along the route, except Section 3 and parts of Section 4 (initial part of the section between KM 439+000-456+500 and Manisa-Menemen part between KM 522+100-547+805), for which responsibility for infrastructure works belong to other contractors. Table 1-22 shows the progress of excavation and filling works for all four sections.

Table 1-22. Progress of Excavation and Fill

Section	Sub-section	Total Length of the Section (km)	Overall Progress (*) of Physical Works (**) (%) (as of Dec 2020)	Progress of Excavation and Fill (*) (as of December) 2020 (%)	
				Excavation	Fill
Section 1	(-) Polatli-Afyon	151.2	65.2	68.7	38.3
Section 2	(2a) Afyon-Banaz	90.3	31.8	70.0	16.0
Section 3	(3a) Banaz-Esme	159.9	27.4 (***)	49.6 (***)	13.2
	(3b) Esme-Salihli		27.4 (***)	78.8 (***)	0.0
Section 4	(4a-4b-4c) Salihli-Manisa	101.8	5.2	9.0	0.3
	(4d) Manisa-Menemen		30.0 (***)	N/A	N/A

(*) Contractor, December 2020. Project Information Note.

(**) Physical works represent route and quarry excavations, fill operations, construction of underpass, overpass, culverts, tunnel and bridge/viaducts.

(***) The infrastructure works by other contractors have been progressing at these sections since this data was compiled (December 2020). Official data reflecting the latest status of physical works was not available to the Contractor at the time of compilation of this ESIA Report. Thus, the level of physical works is at a more advanced level as of Q2 2021. Based on the analysis of satellite image and the site observations of the Contractor, it is estimated that the land disturbance has taken place at a level of around 80% in Section 3a. Further verification of Employer is required for the identification of current progress levels at each Project subsection.

The construction activities will be conducted in the following phases:

- Infrastructure
- Superstructure
- Electrification
- Signalisation
- Structural works (buildings and facilities)

The scope of work for each phase is summarised in Table 1-23.

Table 1-23. Scope of Construction Works

Work Phase	Scope of Works
Infrastructure	<ul style="list-style-type: none"> Earthworks (excavation, filling, etc.) Various engineering structures including viaducts, bridges, tunnels, underpasses, overpasses, culverts, retaining walls Drainage works Infrastructure transfer/displacement works
Superstructure	Construction and commissioning of line superstructure works, including: <ul style="list-style-type: none"> Ballasted rail with concrete sleepers and all connections Slab track rail with all connections Turnouts All completion works including welding and grinding
Electrification and Signalisation	<ul style="list-style-type: none"> Design, supply, installation, testing and commissioning of all electromechanical and signalling and communication systems Providing warranty and services Training of TCDD personnel
Structural Works (Buildings and Facilities)	<ul style="list-style-type: none"> Design and construction of a service and maintenance Depot Design and construction of stations

As per the Construction Contract, the design and construction responsibility of the Contractor in each section of the Project, is as summarised in Table 1-24. The grey highlighted cells represent the Project sections, for which the responsibility for infrastructure works does not belong to Contractor, but other contractors.

Table 1-24. Design and Construction Responsibility Matrix for Company's Scope of Work

Section No.	Sections	Infrastructure	Superstructure	Electrification	Signalization	Building & Facilities
Section 1	Polatli – Afyon	C	D + C	D + C	D + C	D + C
Section 2	Afyon – Hatipler Passage	C	D + C	D + C	D + C	
	Hatipler Passage	D + C	D + C	D + C	D + C	
	Hatipler Passage – Banaz	—	D + C	D + C	D + C	
	Section 3	Banaz – Usak	—	D + C	D + C	
Usak – Esme		—	D + C	D + C	D + C	
Esme – Salihli		—	D + C	D + C	D + C	
Section 4	Salihli Passage	D + C	D + C	D + C	D + C	
	Salihli – Manisa	D + C	D + C	D + C	D + C	
	Manisa Passage	D + C	D + C	D + C	D + C	
	Manisa – Menemen	—	D + C	D + C	D + C	
	Menemen – Alsancak Port Connection	Available Izban Line will be used, and improvements requested by the Authority will be done by the contractor with the offered Bill of Quantities (BOQ) rate				

D: Design; C: Construction
— : Not included in the scope

In the Salihli Passage, part of the railway (between approximately KM 430+000-458+800), the Contractor is responsible from construction of the conventional line in parallel to the HSR, for which infrastructure works are ongoing under the responsibility of another contractor (between KM 439+000 and 456+500). The scope of design and construction works for the conventional lines under the responsibility of the Contractor is same as the scope of HSR. At locations, where the conventional lines are present, the Contractor will modify the rail types. At locations, there is no conventional line present, the Contractor will ensure connection of the conventional lines with the HSR.

The engineering studies for the identification of blasting operations to be conducted along the route, tunnels and the quarries are ongoing as of Q2 2021.

For the assessment of noise and vibration impacts, worst-case blasting design information (including information on quarry production amounts, blasting frequencies, explosive amounts, and hole design per formation to be extracted) has been used in the assessments done as part of Chapter 6 on Noise and Vibration and Chapter 7 on Air Quality and Greenhouse Gas (GHG). The actual blasting design is being done to optimise the explosive amounts.

Tunnels will be constructed by using the New Austrian Tunneling Method (NATM). To minimise tunnel blasting, excavation by means of construction machinery will be the preferred method in the tunnels. In case of necessity, soft blasting (*yumusak patlatma*) technique will be used. Following the determination of blasting pattern, safe blasting distances will be calculated on a case-by-case basis and site-specific measures will be taken in consideration of the locations of the nearby NSRs.

There are buildings located within the expropriation corridor as identified in Chapter 11 on Socio-economy. A Resettlement Action Plan (RAP) has been developed and will be implemented for the management of physical and economic displacement impacts in line with IFC PS5 requirements. The building demolition works during the construction phase will be conducted in line with the requirements of the Regulation on Waste Management, Regulation on the Control of Excavation Soil, Construction and Demolition Waste, the Regulation on Health and Safety Measures in Working with Asbestos, Regulation on the Assessment and Management of Air Quality and Regulation on Assessment and Management of Environmental Noise. To this end, specific requirements defined for the demolition works, including occupational health and safety measures to be taken for the protection of employee health and safety, measures against dust and noise generation, management of hazardous demolition wastes will be fulfilled.

1.6.2. Operation and Maintenance Activities

Once the construction of the Ankara-Izmir HSR is completed, the railway will be commissioned in phases and with all relevant components and infrastructure, it will be transferred by the AYGM to the TCDD, which is an affiliated state entity of the MoTI.

As per the Construction Contract, the Warranty Period (Defect Liability Period) is 2 years, for each section, starting from the date of Provisional Acceptance. Periodical maintenance works will be performed by the Contractor throughout this Period.

The operational life of the systems to be established during the construction will be minimum 30 years.

Detailed planning of the operation and maintenance activities will be done by the AYGM and TCDD in due course.

1.7. Construction Machinery and Equipment

The estimated type and number of construction machinery and equipment to be used by the Contractor is provided below in Table 1-25.

Table 1-25. Construction Machinery Required for the Infrastructure and Superstructure Works

Construction Machinery for Infrastructure Works	Estimated Number	Construction Machinery for Superstructure Works	Estimated Number
Sprinkler trucks	65	Sprinkler trucks	47
Dozer (D7 equivalent-for depot)	4	Asphalt plant (*)	1
Dozer (D8 equivalent)	24	Asphalt cylinder	2
Dozer (D86 equivalent-Engineering Structures Backfilling)	4	Balast finisher	10
DSM team	12	Tamping machine	5
DKK team	12	Driller	55
Excavator (for tunnels)	24	Distributor	5
Excavator (20-30 ton) (for slopes)	23	Vertical press	5
Excavator (30 ton and above)	51	Manuel power wrench (Trifonez)	10
Excavator (40 ton and above)	84	Excavator	165
Excavator (50 ton and above)	24	Finisher	30
Bored pilling equipment	20	Tensioner pump	2
Grader	25	Heating vehicle	5
Hi-up	85	Fine grinding machine	27

Construction Machinery for Infrastructure Works	Estimated Number	Construction Machinery for Superstructure Works	Estimated Number
JCB	20	JCB	10
Generator	18	Generator	1
Jumbo	24	Generator (with spotlight)	18
Truck	1,322	Rough grinding machine	20
Kule Tower crane	7	Truck	1,243
Loader	87	Pickup truck	26
Mixer	161	Welding machine	10
Mobile crane (60 ton)	31	Shear motor	4
Concrete pump	34	Crushing Screening Facility (300 ton/h)	18
Rock	9	Compressor	15
Plant (120 m³/h)	11	Wheeled excavator	5
Shotcrete Robot	24	Wheeled cylinder	10
Cylinder (16 ton)	45	Loader	29
General Total	2,250	Locomotive	20
		Switch tamping machine	1
		Makita (Bolt tightening machine)	17
		Mixer	12
		Panel spreading machine	5
		Platform wagon	292
		Portal crane (35 ton)	10
		Rail lowering apparatus (pack of 6)	20
		Rail cutting machine	64
		Rail cutting motor	10
		Rail grinder	1
		Rail wheel Unimog	16
		Regulator	5
		SG ballast wagon	50
		Stripping machine (Geismar)	3
		Cylinder	33
		Stabilisator	5
		Spiral Motor	26
		Non-Destructive Testing Machine	1
		Wheeled Rail Excavator (20 Tonnes)	23
		Wheeled Rail Excavator (20-30 Tonnes)	10
		Telehandler	5
		Trailer	34
		Travers Changing Equipment	5
		Tractor	10
		Power wrench (Trifonöz)	123
		Wagonette	11
		Vibrator	8
		Crane (60 Ton)	22
		Crane (General Use)	6
		Horizontal Pres	5
		Road Measurement Machine	1
		General Total	2,632

(*) If the Project requires an asphalt plant (with a capacity of 250 ton/hr), this facility will be either fixed at the Sinanpasa Construction Camp Site or operate as a mobile facility transported along the route, as required. It is likely that the asphalt required for the Project is purchased from external licensed asphalt production facilities.

The list of construction machinery and equipment used by other contractors continuing infrastructure works in Section 3a, Section 3b, Section 4a, and Section 4d is not available to the Contractor at the time of compilation of this ESIA Report.

1.8. Project Organisation and Workforce

The existing Sinanpasa (Dogus) Camp Site located at KM 190+000 in Afyonkarahisar is planned to be used as the main construction camp site for the Project, where the General Project Management will be based. The main divisions under the General Project Management structure include the following:

- Financial and Administrative Affairs Management
- Infrastructure Works Management
- Superstructure Works Management
- Technical Works Management

The estimated number of the personnel to be employed by the Contractor and subcontractors during the construction phase is summarised in Table 1-26.

Table 1-26. Estimated Construction Workforce

Project Management	Description	Management Personnel of the Contractor (white and blue collar)	Site Personnel of the Subcontractors					Total
			Infrastructure	Superstructure	Electrification	Singalisation, Telecommunication, Support System	Buildings and Facilities	
General Project Management (*)		135						135
1 st Regional Project Management	Polatli-Afyon (KM 0+000-75+000)	266	1,468	693	180	120	0	2,727
2 nd Regional Project Management	Polatli-Afyon (KM 76+000-150+000)	281	1,876	576	180	120	100	3,133
3 rd Regional Project Management	Afyon-Banaz (KM 151+000-278+000)	290	2,432	647	180	120	300	3,969
4 th Regional Project Management	Banaz-Salihli (279+000-438+000)	215	0	585	180	120	300	1,400
5 th Regional Project Management	Salihli-Menemen (439+000-547+805)	284	1,535	496	180	120	800	3,415
Sub-total		1,471	7,311	2,996	900	600	1,500	14,778
Grand total		1,471	13,307					14,778

(*) The General Project Management is planned to be based in the existing Sinanpasa (Dogus) Camp Site located at KM 190+000, which will be the main construction camp for the Project.

The estimated construction workforce composition is provided in Table 1-27. Daily and monthly working hours during the construction phase will be regulated in line with the Turkish Labour Law (Law No. 4857, 2003).

Table 1-27. Estimated Workforce Composition

Workforce Qualification	Percent (%)
Qualified	25
Semi-qualified	8
Non-qualified	67
Total	100

Working hours and shifts will be regulated in compliance with the requirements of the national Labour Law (No. 4857, 2003), as summarised below:

- The work week is foreseen to comprise 6 working days of 7.5 hours each for a total of 45 work hours per week, which is the legal minimum requirement for full-time labour employment as per the national Labour Law (Law No. 4857, 2003).
- Employees will have one rest day per week as mandated by the Labour Law (Law No. 4857, 2003).
- Where needed and contingent on the employee's consent, overtime work will be regulated and compensated in accordance with the Labour Law (Law No. 4857, 2003).
- Single shifts are foreseen to be used throughout the project. However, additional shifts would be organised based on need, with the employees allocated to said additional shifts working within the legal limits mentioned above.

Information on the construction workforce (direct and contracted) of other contractors continuing infrastructure works in Section 3a, Section 3b, Section 4a, and Section 4d is not available to the Contractor at the time of compilation of this ESIA Report.

Detailed planning of the operation and maintenance workforce (direct and contracted) requirements of the Project will be done by the AYGM and TCDD in due course.

1.9. Project Schedule

The Construction Contract for the Project has been executed between the Contractor and the AYGM on 23 November 2020. The Loan Period for the Project continues for circa 14 years following issue of the Taking Over Certificate by the Employer.

As per the Construction Contract executed with the AYGM, the completion dates for the infrastructure (excluding Banaz-Salihli and Manisa-Menemen sections), superstructure, electrification and signalization works to be conducted by the Contractor are specified as below:

- Section 1 (Polatli-Afyon): November 2023 – in 30 months (900 days) following the Financial Close date)
- Section 2 (Afyon Banaz): November 2023 – in 30 months (900 days) following the Financial Close date)
- Section 3 (Banaz-Salihli) November 2024 – in 42 months (1,260 days) following the Financial Close date)
- Section 4 (Salihli-Menemen): November 2023 – in 30 months (900 days) following the Financial Close date)

The liability of the Contractor extends until 2 years (defects liability period) after provisional acceptance of the Project by the Project Owner.

Once commissioned, the HSR with all relevant components and infrastructure will be transferred by the AYGM (Employer) to the TCDD (Operator) for operation.

The Employer has information on the schedule of the ongoing infrastructure works by other contractors.

Detailed construction schedule for the Project is presented in Table 1-28.

[illegible]

2. INSTITUTIONAL AND LEGAL FRAMEWORK

This Chapter describes the institutional framework and national and international legal framework applicable to the Ankara-Izmir HSR Project ESIA. The legal framework includes;

- The national environmental and social legislation,
- The relevant international agreements, conventions and protocols to which Turkey is signatory and/or party, and
- International E&S standards including the International Finance Corporation's (IFC) Policy and related Performance Standards (PSs) on Environmental and Social Sustainability (2012), EP4 (2020), OECD Common Approaches (2016) and UK Export Finance (UKEF) E&S and Human Rights Policy.

Legal framework for the management of specific E&S aspects/components of the Project (e.g. biodiversity, land acquisition, cultural heritage) are presented in the respective chapters of this ESIA Report.

2.1. Institutional Framework

Administrative structure in Turkey consists of central administration ("*merkezi idare*") and local administrations ("*yerinden yonetim*"), as described in the following sections. The central and local administrations, with responsibilities relevant to the Project are presented in Figure 2-1.

2.1.1. Central Administrations

The central administration in Turkey is divided into capital city units and provincial administrations (local branches of central administration) at regional, provincial, district levels. Capital city units consist of the Presidency and the Ministries. The field organisations of the ministries, functioning at regional, provincial and district level to perform the tasks of the ministries, to which they are related and within a limited space, are described in Section 2.1.1.2.

Turkey is divided into 81 provinces on the basis of geographical situation, economic conditions, and public service requirements; provinces are further divided into lower levels of administrative units namely, districts ("*ilce*"), neighbourhoods ("*mahalle*") and villages ("*koy*"). There are also hamlets ("*bagli*"), which are small settlement areas connected to villages.

By the Law on the Establishment of Fourteen Metropolitan Municipalities and Twenty-Seven Districts and Amendments at Certain Law and Decree Laws (Law No. 6360, 2012), the legal statuses of villages within the boundaries of metropolitan municipalities have been abolished and transformed to neighbourhoods.

Each province/district is administered by the local units of the government. These are Governorate ("*Valilik*") at the provincial level and District Governorates ("*Kaymakamlik*") at the district level. Head of the provincial administration is governor ("*vali*"). Districts are governed by district governors ("*kaymakam*").

The civil administration divisions in Turkey are shown in Table 2-1.

Table 2-1. Civil Administration Divisions in Turkey

Civil Administration Division	Number in Turkey
Province	81
District	922
Neighbourhoods	32,172
Villages	18,294
Hamlets (connected to villages)	23,902

Source: Ministry of Interior website, <https://www.e-icisleri.gov.tr/Anasayfa/MulkildariBolumleri.aspx>

Central Administration (General administration)																			
Capital Administration																			
President																			
Ministries																			
Ministry of Environment and Urbanization			Ministry of Transport and Infrastructure			Ministry of Agriculture and Forestry			Ministry of Culture and Tourism			Ministry of Energy and Natural Resources			Ministry of Family, Labor and Social Services			Ministry of Health	
• General Directorate of Environmental Management • General Directorate of EIA, Permit and Inspection • General Directorate of Spatial Planning • General Directorate for Protection of Natural Assets			• General Directorate of Infrastructure Investments • General Directorate of Turkish State Railways (TCDD) Relevant Institution • General Directorate of Highways (KGM) - Affiliated Institution			• General Directorate of Nature Conservation and National Parks • General Directorate of Water Management • General Directorate of Agricultural Reform • General Directorate of State Hydraulic Works (DSI) - Affiliated Institution • General Directorate of Meteorological Services - Affiliated Institution • General Directorate of Forestry - Affiliated Institution			• General Directorate of Cultural Heritage and Museums			• General Directorate of Mining and Petroleum Affairs (MAPEG) - Affiliated Institution • Turkish Electricity Transmission Company (TEIAS) - Relevant Institution			• General Directorate of Occupational Health and Safety • General Directorate of Labor			• General Directorate of Health Services	
Local Branches of the Central Administration																			
Regional Administration	No regional directorate		Regional Directorates of Transport and Infrastructure			Regional Directorates of Agriculture and Forestry			Regional Councils for the Conservation of Cultural Property			Regional Directorates of TEIAS			No regional directorate			No regional directorate	
			• 2nd Regional Directorate of Transport and Infrastructure (Ankara) - for Ankara and Eskisehir • 3rd Regional Directorate of Transport and Infrastructure (Izmir) - for Usak, Manisa and Izmir • 4th Regional Directorate of Transport and Infrastructure (Bursa) - for Kutahya • 6th Regional Directorate of Transport and Infrastructure (Antalya) - for Afyonkarahisar			• 4th Regional Directorate of Agriculture and Forestry (Manisa), • 5th Regional Directorate of Agriculture and Forestry (Afyonkarahisar) • 9th Regional Directorate of Agriculture and Forestry (Ankara)			• Ankara-1 Regional Council for the Conservation of Cultural Property • Eskisehir Regional Council for the Conservation of Cultural Property • Usak Regional Council for the Conservation of Cultural Property • Afyonkarahisar Regional Council for the Conservation of Cultural Property • Kutahya Regional Council for the Conservation of Cultural Property • Izmir-2 Regional Council for the Conservation of Cultural Property			• 6th Regional Directorate of TEIAS (Ankara) • 15th Regional Directorate of TEIAS (Eskisehir) • 12th Regional Directorate of TEIAS (Izmir)							
			Regional Directorates of TCDD			Regional Directorates of DSI													
			• High Speed Railway Regional Directorate of TCDD (Ankara), • 2nd Regional Directorate of TCDD (Ankara), • 3rd Regional Directorate of TCDD (Izmir-Alsancak) • 7th Regional Directorate of TCDD (Afyonkarahisar)			• 2nd Regional Directorate of DSI (Izmir) • 3rd Regional Directorate of DSI (Eskisehir) • 5th Regional Directorate of DSI (Ankara)													
Provincial Administration	Ministry of Environment and Urbanization has provincial directorates in all provinces of Turkey		Regional Directorates of KGM			Regional Directorates of Forestry									No provincial directorate			Ministry of Family, Labor and Social Services has provincial directorates in all provinces of Turkey.	
			• 2nd Regional Directorate of KGM (Izmir) - for Izmir, Manisa and Usak • 3rd Regional Directorate of KGM (Konya) - for Afyonkarahisar • 4th Regional Directorate of KGM (Ankara) - for Ankara and Eskisehir • 13th Regional Directorate of KGM (Antalya) - for Afyonkarahisar • 14th Regional Directorate of KGM (Bursa) - for Kutahya			• Ankara Regional Directorate of Forestry • Eskisehir Regional Directorate of Forestry • Isparta Regional Directorate of Forestry - for some regions of Afyonkarahisar • Kutahya Regional Directorate of Forestry • Denizli Regional Directorate of Forestry - for Usak • Izmir Regional Directorate of Forestry			Ministry of Culture and Tourism has provincial directorates in all provinces of Turkey.			No provincial directorate			Ministry of Family, Labor and Social Services has provincial directorates in all provinces of Turkey.			Ministry of Health has provincial directorates in all provinces of Turkey.	
District Administration	No district directorate		No district directorate			Ministry of Agriculture and Forestry has district directorates in all districts located on Ankara-Izmir HSR Project route.			No district directorate			No district directorate			No district directorate			District directorates of Ministry of Health Ankara-Izmir HSR Project route are listed below • Polatli - Ankara • Emirdag, Sinanpasa - Afyonkarahisar • Banaz, Esme -Usak • Alasehir, Kula, Salihli, Ahmetli, Sehzadeler, Turgutlu, Yunusemre - Manisa • Menemen - Izmir	

Figure 2-1. Institutional Framework Relevant to the Project – Central Administrations

2.1.1.1. Ministries

Ministries are the core governmental bodies of the central administration. Ministries are headquartered in Ankara and they have regional, provincial and district directorates which serve as their field organisations. Local administrations/establishments of the ministries are provincial directorates connected to the governorates and district directorates connected to the district governorates.

The key central administration in the scope of the Project is the Ministry of Transport and Infrastructure (MoTI). The General Directorate of Infrastructure Investments (AYGM) of the MoTI is the owner of the Project. The Republic of Turkey General Directorate of State Railways (TCDD), which is an affiliated state entity of the MoTI, was and has also been responsible for the Project. In particular infrastructure construction works in certain sections of the Project were contracted by TCDD and currently (as of Q2 2021) construction works in some parts of the Project, for which responsibility for infrastructure works are not under the responsibility of the Contractor, are continuing under those contracts. Also, TCDD was the responsible from the expropriation processes conducted for the Project as per the Expropriation Law (Law No. 2942, 1983). Responsibility for future expropriation works will further be clarified internally between AYGM and TCDD. In the Annual Investment Program of 2021, the Project is separately (based on characteristics) listed under the investments of AYGM (Project no: 2020E01-154316; 2020-2025) and TCDD (Project no: 2007E01-154124; 2007-2023). The TCDD will be the Operator of the Project following the completion of construction and commission of the HSR as per the Construction Contract.

The Ministry of Environment and Urbanization (MoEU) is the key governmental body responsible from the development and implementation of policies and procedures for the protection and conservation of the environment and for sustainable development and management of natural resources.

Besides the MoEU, the Project Owner and where applicable the Contractor will collaborate with the following ministries for the management of E&S aspects (management of impacts, auditing, permitting, etc.) of the Project as also shown in Figure 2-1, including the related general directorates of each ministry:

- Ministry of Transport and Infrastructure
- Ministry of Agriculture and Forestry
- Ministry of Culture and Tourism
- Ministry of Energy and Natural Resources
- Ministry of Family, Labour and Social Services
- Ministry of Health

2.1.1.2. Field Organisations of the Ministries

The regional, provincial and district level directorates are the field organisations of the Ministries as presented in Figure 2-1.

2.1.2. Local Administrations

Local administrations are categorised into three as follows:

- Special Provincial Administrations
- Municipalities
- Neighbourhood/Village Administrations

The municipalities are organised as below:

- Metropolitan municipalities
 - Metropolitan district municipalities
- Provincial (non-metropolitan) municipalities
 - District municipalities
- Town municipalities

The number of municipalities in Turkey are summarised in Table 2-2.

Table 2-2. Number of Municipalities in Turkey

Municipalities	Number
Metropolitan municipalities	30
Provincial (Non-metropolitan) municipalities	51
Metropolitan district municipalities	519
District municipalities	403
Town municipalities	386
Total	1,389

Source: Ministry of Interior website, <https://www.e-icisleri.gov.tr/Anasayfa/MulkildariBolumleri.aspx>

The role of these municipalities is to provide public services for special needs of local communities. With the Law No. 6360, the number of metropolitan municipalities reached up to 30 and the presence of special provincial administrations in the provinces holding metropolitan municipality status were abolished. Furthermore, legal statuses of town municipalities within the boundaries of metropolitan municipalities were abolished and town municipalities within the metropolitan municipalities were transformed to neighbourhoods. At the local level, municipality mayors ("*belediye baskani*") and the elected head of neighbourhoods/villages ("*mukhtar*") are the representatives of the administrative structure.

The Project passes through the provinces of Ankara, Eskisehir, Afyonkarahisar, Kutahya, Usak, Manisa and Izmir. The local administrations in these provinces, with responsibilities relevant to the Project are presented in Figure 2-2.

Local Administration																
Local Administrations in terms of Location/Geography (Local Government)																
Special Provincial Administration	Municipalities					Neighbourhood Administration							Village Administration			
	Metropolitan Municipalities	Metropolitan District Municipalities	Provincial Municipalities (Non-metropolitan)	District Municipalities	Town Municipalities											
	Afyonkarahisar	Ankara	Polatli	Afyonkarahisar	Emirdag	Merkez - Bayat (Afyonkarahisar)	Ankara - Polatli	Yenice	Beskopru	Usak - Ulubey	Uyukbasi	Afyonkarahisar - Emirdag	Ciftlikkoy	Ekizce	Karaagac	
	Kutahya	Eskisehir	Gunyuzu		Bayat	Seydiler - Emirdag	Gumusyaka	Kabakkoy	Usak - Esme	Elvanlar	Eskiakoren		Suvermez	Yenikoy		
	Usak		Sivrihisar		Iscehisar	Gebeceler - Bayat	Cakmak	Kayakent	Manisa - Alasehir	Istasyon	Kiliclar		Dagilgan	Tabaklar		
					Merkez	Susuz - Iscehisar	Gumuskonak			Ismailbey	Tepekoy		Karayatak	Turkmenakore	Emirinkoyu	
			Kutahya	Sinanpasa	Cayirbag - Merkez (Afyonkarahisar)	Ilyaspasa	Kurtseyh	Aydogdu	Turkmen	Adayazi	Elhan	Yuregil				
				Dumlupinar	Fethibey - Merkez (Afyonkarahisar)	Yenidogan	Buhara	Gumuscay	Matarli	Imralli	Sagirli					
			Usak	Banaz	Duzagac - Merkez (Afyonkarahisar)	Goktepe	Sigircik	Serinyayla	Kasapli	Afyonkarahisar - Merkez	Cavdarli	Beyyazi				
				Merkez	Ahiler	Buzluca	Caberkakili	Toygarli	Koprulu		Sarayduzu					
				Ulubey	Kizilcasogut - Sinanpasa			Selce	Kavaklidere	Afyonkarahisar - Sinanpasa	Ayvali	Akdegirmen	Elvanpasa			
				Esme				Kavaklidere	Bulca		Guney					
										Kutahya - Dumlupinar	Kizilca					
										Usak - Banaz	Ciftlik	Hatipler	Gedikler			
											Buyukoturak	Banaz	Derbent			
										Usak - Merkez	Duzluce	Bagkonak	Kizilhisar			
											Dumenler	Gullucam	Halaclar			
										Usak - Ulubey	Alaba	Oksuz				
											Kirka	Yavi	Karahasan			
										Usak - Esme	Kabaklar	Hocalar	Demioren			
											Yapagilar	Elmacik				
										Usak - Esme	Koyunbeyli	Selikler				
											Omurca	Inay				
										Usak - Esme	Bekdemir	Karacaahmet				
											Koseler	Gedikler				
										Usak - Esme	Ahmetler	Guney	Davutlar			
											Yaylakoy	Balabanci	Narincali			
										Usak - Esme	Armutlu	Cevizli				
											Caberler	Manavli				

Figure 2-2. Institutional Framework Relevant to the Project – Local Administrations

2.2. National Legislation

National legislation applicable to the management of E&S aspects of the Project are described in the following sections.

On 29 June 2020, a Ministry Circular was issued for the Project by the MoTI, requiring all the relevant governmental institutions, including the central and local organisations of the TCDD, provincial governorates as well as contractors and subcontractors serving the Project, to prioritise the Project-related works and procedures as such all relevant processes (e.g. EIA, permitting, etc.) are adequately undertaken without any interruption.

As per the Expropriation Law (Law No. 2942, 1983), several Accelerated Expropriation Decisions have been issued for the immovable properties located along the HSR route. The summary of these decisions is given in Chapter 11 on Socio-Economy.

2.2.1. Environmental and Social Legislation

The Environmental Law (Law No. 2872, 1983) of Turkey first came into force after being published in the Official Gazette No. 18132 dated 11 August 1983. It defines the main principles for the protection of environment in line with sustainable environment and sustainable development principles and relevant institutional responsibilities. Under its broad scope, it also provides the legislative framework for regulation of industries/facilities and their liabilities regarding the assessment and management of their potential impacts on the environment including permitting and information/declaration requirements. Several amendments have been made in the Environmental Law since 1983, most recent ones being introduced by the Constitutional Court Decisions dated 3 July 2014 (No. E:2013/89, K: 2014/116) and 22 April 2015 (No. E: 2015/35, K: 2015/40) (in the subjects of EIA process and administrative penalties).

Environmental legislation have been developed under the Environmental Law to set out the procedures and principles for the management of specific environmental aspects and horizontal legislation. As part of the EU accession process, reforms including transposition of environmental legislation, enhancement of the institutional capacity and reorganisation of the institutional structure have been made to ensure harmonisation and alignment with the EU environmental acquis.

Complementary to the Environmental Law and the associated legislation, the following laws will be applicable to the Project:

- Agricultural Law (Law No. 5488, 2006)
- Cadastre Law (Law No. 3402, 1987)
- Expropriation Law (Law No. 2942, 1983)
- Forestry Law (Law No. 6831, 1956)
- Groundwater Law (Law No. 167, 1960)
- Highways Traffic Law (Law No. 2918, 1983)
- Labour Law (Law No. 4857, 2003)
- Land Registry Law (Law No. 2644, 1934)
- Law on Supporting the Development of Forest Villagers, Valuation of Areas Taken out of Forest Area Borders on behalf of the Treasury and Vending of Agriculture Lands Owned by the Treasury (Law No. 6292, 2012)
- Law on the Conservation of Cultural and Natural Property (Law No. 2863, 1983)
- Law on the Protection of Cemeteries (Law No. 3998, 1994)
- Law on Protection Against Flood Waters and Floods (Law No. 4373, 1943)
- Law on Soil Conservation and Land Use (Law No. 5403, 2005)
- Mining Law (Law No. 3213, 1985)

- Municipality Law (Law No. 5393, 2005)
- National Parks Law (Law No. 2873, 1983)
- Occupational Health and Safety Law (Law No. 6331, 2012)
- Pasture Law (Law No. 4342, 1998)
- Public Health Law (Law No. 1593, 1930)
- Settlement Law (Law No. 5543, 2006)
- Turkish Civil Code (Law No. 4721, 2001)
- Village Law (Law No. 442, 1924)

Under the relevant laws, E&S legislation including regulations, communiques, by-laws, etc. have been published and put in force to provide specific provisions for E&S management. Those that pertain to infrastructure projects include, but are not limited to, those listed in Table 2-3.

Legal framework for the management of specific E&S aspects/components of the Project (e.g. biodiversity, land acquisition, cultural heritage) are presented in the respective chapters of this ESIA Report.

Table 2-3. Main E&S Regulation Applicable to the Project

E&S Topic	Relevant Legislation
Environmental Permits and Licenses	<ul style="list-style-type: none"> • Regulation on Environmental Impact Assessment • Regulation on Environmental Permits and Licenses • Regulation on Environmental Audit • Regulation on Strategic Environmental Assessment • Regulation Concerning Environmental Officers, Environmental Management Unit and Environmental Consulting Firms • Communique on Certificate of Competency • Regulation for Starting Up and Opening a Workplace
Land Use and Soils	<ul style="list-style-type: none"> • Implementation Regulation of 16th Article of the Forestry Law • Implementation Regulation of 17/3rd and 18th Articles of the Forestry Law • Implementation Regulation on Soil Protection and Land Use • Regulation Concerning the Rehabilitation of the Lands Disturbed by Mining Activities • Regulation on the Conservation, Use and Planning of Agricultural Lands • Regulation on Pastures • Regulation on the Control of Soil Pollution and Lands Contaminated by Point Sources • Regulation on the Extraction, Operation and Control of Sand, Gravel and Similar Materials
Air Quality and Greenhouse Gas Emissions	<ul style="list-style-type: none"> • Regulation on the Control of Industrial Air Pollution • Regulation on the Assessment and Management of Air Quality • Regulation on the Control of Exhaust Gas Emissions • Regulation of Control of Air Pollution Originated from Heating • Regulation on the Reduction of Ozone Depleting Substances • Regulation on the Monitoring of Greenhouse Gas Emissions • Regulation on the Control of Emissions Causing Odour • Communiqué on Monitoring and Reporting of Greenhouse Gas Emissions
Chemicals	<ul style="list-style-type: none"> • Regulation on Classification, Labelling and Package of the Materials and Mixtures • Regulation on the Control of Polychlorinated Biphenyls (PCBs) and Polychlorinated Terphenyls (PCTs)
Health and Safety and Labour	<ul style="list-style-type: none"> • Regulation on the Duty, Authority, Responsibility and Training of Occupational Safety Specialists • Regulation on the Duty, Authority, Responsibility and Training of Occupational Physicians • Regulation on Occupational Health and Safety Services • Regulation on Occupational Health and Safety Committees • Regulation on Health and Safety Measures in Working with Display Screen Equipment

E&S Topic	Relevant Legislation
	<ul style="list-style-type: none"> Regulation on Health and Safety Measures in Working with Carcinogenic or Mutagenic Substances Regulation on Health and Safety Measures in Working with Asbestos Regulation on Equipment and Protective Systems Used in Potentially Explosive Atmospheres Regulation on Laboratories Conducting Occupational Hygiene Measurement, Testing and Analysis Regulation on Machinery Safety Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Annexes Regulation on Transportation of Dangerous Goods by Railway Railway Safety Regulation Communiqué on Hazard Classes List related to Occupational Health and Safety First Aid Regulation Regulation on Classification, Labelling and Packaging of Substances and Mixtures Regulation Concerning the Protection of Workers from Risks Associated with Noise Regulation Concerning the Protection of Workers from Risks Associated with Vibration Regulation Concerning the Use of Personal Protection Equipment at Workplaces Regulation on Emergency Situations in Workplaces Regulation on Health and Safety at Construction Works Regulation on Health and Safety Conditions Regarding Use of Work Equipment Regulation on Health and Safety Regarding Temporary and Time Limited Works Regulation on Health and Safety Precautions Regarding Working with Chemicals Regulation on Health and Safety Signs Regulation on the Implementation of the Law Concerning Private Security Services Regulation on Management of Dust Regulation on Safety Data Sheets on Hazardous Materials and Mixtures Regulation on Methods and Essential for Work Health and Safety Training for Works Regulation on Occupational Health and Safety at Mining Worksite Regulation on Risk Assessment for Occupational Health and Safety Regulation on Personal Protective Equipment Regulation on Protecting Workers from Hazards of Explosive Environments Regulation on Prevention and Mitigation of Impacts of Large-Scale Industrial Accidents Regulation on Subcontractors Regulation on Suspension of Work in Workplaces Regulation on the Transportation of Dangerous Materials on Motorways Regulation on Vocational Training of the Employees Working in Dangerous and Highly Dangerous Workplaces Regulation on the Control of Polychlorinated Biphenyl and Polychlorinated Terphenyls Regulation on Structures to be Built in Disaster Zones Regulation on Structures to be Built in Earthquake Zones Regulation on the Protection of Buildings from Fire Decree on Rules and Procedures for Production, Import, Transport, Storage, Sales, Use, Disposal and Inspection of Explosives and Hunting Equipment
Nature Protection	<ul style="list-style-type: none"> Regulation on the Protection of Wetlands Regulation Concerning the Wildlife Protection and Wildlife Development Areas
Noise	<ul style="list-style-type: none"> Regulation on Assessment and Management of Environmental Noise Regulation on Environmental Noise Emission Caused by Equipment Used Outdoors
Traffic	<ul style="list-style-type: none"> Regulation on Highways Traffic Regulation on the Transportation of Hazardous Substances by Road
Waste	<ul style="list-style-type: none"> Circular on COVID-19 Measures for the Waste Management of Single Use Masks, Gloves and Other Personal Hygiene Materials Communique on Transportation of Wastes by Highway Communique on Recovery of Some Non-Hazardous Wastes Regulation on Waste Management Regulation on the Control of End-of-Life Vehicles Regulation on the Control of Medical Wastes Regulation on the Control of Packaging Wastes

E&S Topic	Relevant Legislation
	<ul style="list-style-type: none"> • Regulation on the Control of Waste Oils • Regulation on the Control of Waste Batteries and Accumulators • Regulation on the Control of Waste Tires • Regulation on the Control of Waste Vegetable Oils • Regulation on the Control of Excavation Soil, Construction and Demolition Waste • Regulation on Mining Wastes • Regulation on the Landfill of Wastes • Regulation on the Control of Waste Electrical and Electronic Equipment • Regulation on Zero Waste
Water	<ul style="list-style-type: none"> • Regulation on Monitoring of Surface Water and Groundwater • Regulation on Surface Water Quality • Regulation Concerning Protection of Groundwater against Pollution and Deterioration • Regulation on Control of Pollution Caused by Hazardous Substances in the Aquatic Environment and Its Surroundings • Regulation Concerning Water Intended for Human Consumption • Water Pollution Control Regulation • Urban Wastewater Treatment Regulation • Regulation on Pit Opening Where Sewer System Construction is not Applicable

2.2.1.1. Environmental Impact Assessment (EIA)

The Article 10 of the Environmental Law (Law No. 2872, 1983) sets forth the legal basis for the EIA procedure in Turkey. According to this article, the institutions, organisations and facilities that can lead to environmental impacts as a result of their planned activities are obliged to prepare an EIA Report or a Project Description File (PDF).

Gaining its legal stand from the Environmental Law, the EIA Regulation was put into force for the first time after being published in the Official Gazette dated 7 February 1993 and numbered 21489. Since this date, several amendments were made on the original EIA Regulation and new EIA regulations were published in 2008 and 2013, repealing their predecessors. The latest and currently in force EIA Regulation was published in the Official Gazette dated 25 November 2014 and numbered 29186.

Based on the type of activity and/or capacity, the EIA Regulation categorises the investments as below:

- Annex-1: projects subject to full-scale EIA process that shall prepare an EIA Report; and
- Annex-2: projects subject to screening-elimination criteria that shall prepare a PDF.

If the planned investment is defined as an activity under Annex-1 of the EIA Regulation, a full EIA Report is required.

If the planned investment is defined as an activity under Annex-2 of the EIA Regulation, initially a PDF is prepared in accordance with a limited format specified in the Annex-4 of the EIA Regulation and the MoEU evaluates the need for a full EIA process for the project.

For activities that are below the thresholds defined in the Annex-1 or Annex-2 of the EIA Regulation or not listed in the Annex-1 and Annex-2 of the EIA Regulation, official applications are to be made to the MoEU to secure required EIA Exemption Decisions as per the official letter of the MoEU dated 25 July 2014 on EIA Exemptions (Letter No: 20289998/220.03/12368).

The categorisation of the Project Components and status of respective EIA Decisions as per the national EIA Regulation is summarised in Table 2-4.

For the Ankara-Izmir HSR Project, the EIA Positive Decision was secured from the Ministry of Environment and Forestry (currently acting as Ministry of Environment and Urbanization) on 9 March 2006 with the Decision no. 1090.

The relevant provisions of the national EIA Regulation regarding the monitoring and control of the Investment in the post-EIA Positive Decision are listed below:

- Article 18(4): After the issuance of the "EIA Positive" decision, the Project Owner is liable to notify the MoEU or the Governorate regarding the changes to be done in the Project, which are subject to the requirements of the EIA Regulation.
- Article 18(5): The Project Owner is liable to have the Project Progress Report prepared and uploaded to the electronical system by competent institutions/organisations, which are authorised by the MoEU and did not take part in the preparation of Project's EIA Report. They shall be presented to the MoEU during audits. The Project Progress Report is to be prepared as per the frequencies set by the commission and include information on the progress achieved by the investment within the respective period.

Article 16 of the Mining Activities Implementation Guidance of the MoEU (Guidance Date: 16 August 2017) requires an application to be made to the related Governorate with the PDF to be prepared in line with Article 16 of the EIA Regulation, in case there is an increase in the production or explosives amounts foreseen for the mining project (such as, quarry and material borrow site projects) in the relevant EIA documentation, which is the basis of the EIA Decision of the activity.

The full EIA process under the national legislation is presented in Figure 2-3.

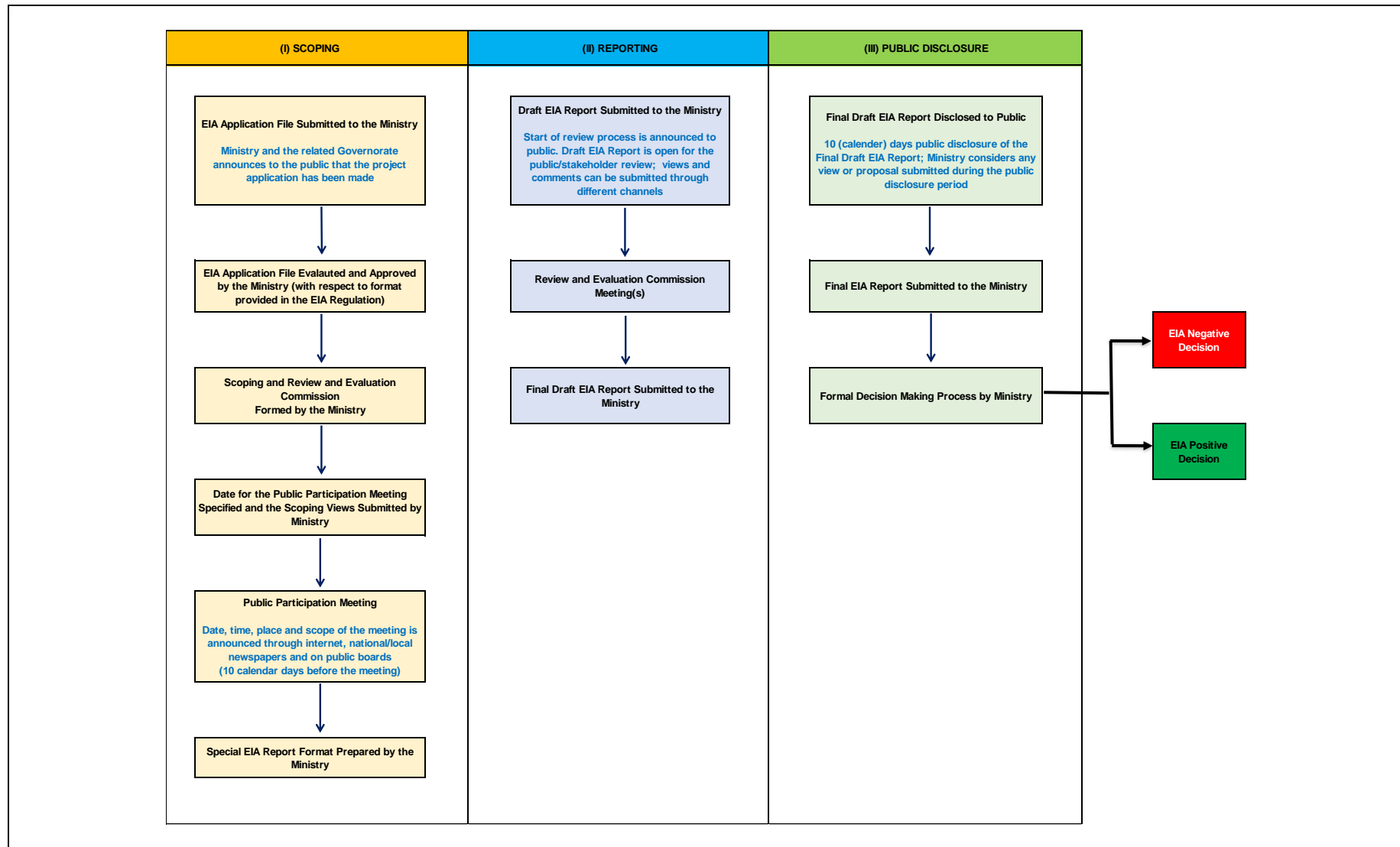


Figure 2-3. The EIA Process under the National EIA Regulation

Table 2-4. Categorisation of Project Components and Status of Respective EIA Decisions as per national EIA Regulation

Project Component	Categorisation of the Project Component as per Current EIA Regulation (2014)	Status of EIA Decision/Action for the Project Component
Railway	<ul style="list-style-type: none"> Annex-1 of the EIA Regulation (Item 8-a): Full EIA process is required for railway lines with a length of more than 100 km Annex-2 of the EIA Regulation (Item 42): Limited EIA process is required for; <ul style="list-style-type: none"> Railway lines not included in Annex-1 list (excluding connection/junction lines) (Item 31-e) Railway route changes, in case the sections diverging from railway route have a length of 30 km and more (Item 31-f) Increasing the number of railway lines maintaining the existing railway route (Item 31-g) 	<p>The EIA process for the Ankara-Izmir HSR Project was completed in 2006. Back then, the Project was subject to the requirements of the EIA Regulation in force, which was published in the Official Gazette dated 16 December 2003 and numbered 25318 (2003 EIA Regulation).</p> <p>As per the 2003 EIA Regulation, the Project was listed under Annex-1 (Item 8-a: Intercity Railway Lines). Thus, a full EIA process was carried out for the Project (for the railway and the material borrow sites defined in the EIA Report).</p> <p>Based on the EIA Report prepared by the EIA Consultant on behalf of the then Project Owner - General Directorate of Railways, Harbors and Airports Construction (DLH)⁶ of the Ministry of Transport (currently, Ministry of Transport and Infrastructure), an "EIA Positive Decision" was secured for the Project from the Ministry of Environment and Forestry (currently the Ministry of Environment and Urbanization) on 9 March 2006 with the Decision No. 1090.</p>
Quarries and Borrow Sites	<ul style="list-style-type: none"> Full EIA process is required for the following Annex-1 mining activities (Item 27): <ul style="list-style-type: none"> Open pit mines that are planned on a study area of 25 ha or more (including excavation and dump sites) Open pit coal mining activities on study areas exceeding 150 ha (total of excavation and dump sites) Ore enrichment facilities and/or waste facilities pertaining to these enrichment facilities that employ biological, chemical, electrolytic or thermal processing methods Facilities that employ at least one of the crushing, screening, washing and ore processing operations at a capacity of 400,000 tonnes/year or more Limited EIA process is required to be conducted for the following Annex-2 mining activities (Item 49): <ul style="list-style-type: none"> Extraction of mines (those not listed under Annex-1) Marble or dressing cutting, processing and sizing facilities with a capacity of 5,000 m³/year and/or 250,000 m² or more Methane extraction and storage at a capacity of 1,000,000 m³/year or more Facilities where carbon dioxide, shale gas or other gases are extracted, stored or processed 	<p>Status of EIA decisions as for the quarries and borrow sites planned to be used in the Project is summarised below (see Table 1-18 and Table 1-19)</p> <ul style="list-style-type: none"> 8 borrow sites were included in the national EIA Report of 2006. For the following sites, EIA not Required Decisions were obtained by the previous contractors in the scope of the Project based on the PDFs prepared: <ul style="list-style-type: none"> 1 borrow site 9 quarry sites For the following sites, EIA not Required Decisions were obtained by other state institutions such as State Hydraulic Works (DSI), TCDD, etc. in the scope of other projects based on the PDFs prepared: <ul style="list-style-type: none"> 5 borrow sites 11 quarry sites <p>The Contractor will use the quarries and material borrow sites, for which the EIA Decision required as per the EIA Regulation has been obtained prior to start of quarry/borrow site operations as part of the Project. For</p>

⁶ In 2011, DLH was renamed as General Directorate of Infrastructure Investments – AYGM.

Project Component	Categorisation of the Project Component as per Current EIA Regulation (2014)	Status of EIA Decision/Action for the Project Component
	<ul style="list-style-type: none"> Ore enrichment facilities and/or waste facilities pertaining to these enrichment facilities (that are not listed in Annex-1) 	any additional new quarry and material borrow site, the relevant EIA process will be undertaken as per the national EIA Regulation in force and the EIA decision will be secured from the MoEU/PDoEU on behalf of the Project Owner, i.e. AYGM.
Concrete Plants	<ul style="list-style-type: none"> Annex-2 of the EIA Regulation (Item 18): Limited EIA process is required for “Ready mixed concrete facilities, facilities producing shaped materials by using materials such as cement or other bounding materials, and those which produce pre-stressed concrete elements, gas concrete, etc (with a production capacity of 100m³/h and more) 	<p>See Section 1.4.5.3 for the list of concrete plants (with a capacity of 120 m³/h each) planned to be used in the Project.</p> <p>The Contractor will use concrete plants, for which the EIA Decision required as per the EIA Regulation has been obtained prior to start of facility operations as part of the Project.</p>
Asphalt Plants	<ul style="list-style-type: none"> Annex-2 of the EIA Regulation (Item 22): Limited EIA process is required for asphalt plants 	<p>If the Project requires an asphalt plant (with a capacity of 250 ton/hr), this facility will be either fixed at the Sinanpasa Construction Camp Site or operate as a mobile facility transported along the route, as required (see Section 1.6.3.1).</p> <p>The Contractor will use asphalt plants, for which the EIA Decision required as per the EIA Regulation has been obtained prior to start of facility operations as part of the Project.</p>
Crushing-Screening Facilities	<ul style="list-style-type: none"> Annex-1 of the EIA Regulation (Item 27-ç): Full EIA process is required for facilities that employ at least one of the crushing, screening, washing and ore processing operations at a capacity of 400,000 tonnes/year or more Annex-2 of the EIA Regulation (Item 49-d): Limited EIA process is required for facilities that employ at least one of the crushing, screening, washing and ore processing (those not listed under Annex-1) 	<p>Crushing and screening facilities will be established at some of the quarry sites.</p> <p>The Contractor will use crushing-screening facilities, for which the EIA Decision required as per the EIA Regulation has been obtained prior to start of facility operations as part of the Project.</p>
On-site Fuel/Explosive Storage Facilities (if any)	<ul style="list-style-type: none"> Annex-2 of the EIA Regulation (Item 7): Limited EIA process is required for explosive and inflammable substance depots with a total storage capacity over 500 tons. 	If required, the Contractor will use storage facilities, for which the EIA Decision required as per the EIA Regulation has been obtained prior to start of facility operations as part of the Project.
Energy Transmission Lines (ETLs)	<ul style="list-style-type: none"> Annex-1 of the EIA Regulation (Item 46): Full EIA process is required for ETLs with a voltage level of and above 154 kV and length of and over 15 km Annex-2 of the EIA Regulation (Item 40): Limited EIA process is required for ETLs with a voltage level of and above 154 kV and length of 5-15 km 	<p>See Section 1.4.2.7 for the electricity supply plans of the Project.</p> <p>Relevant EIA decisions as per the EIA Regulation will be secured by the related authority prior to construction.</p> <p>Operation of the ETLs following the commissioning of the Project will not be under the responsibility of the Contractor.</p>

2.2.1.2. Regulation on Environmental Permits and Licenses

Regulation on Environmental Permits and Licenses sets forth principles and procedures for the application of permits and licenses regarding the Environmental Law (Law No. 2872, 1983), concerning activities and facilities listed in Annex-1 and Annex-2. According to the Regulation;

- An Environmental Permit is issued for air emissions, environmental noise, wastewater discharge and deep sea marine discharges of the facilities that are covered by the Regulation.
- An Environmental License is issued for recovery, disposal, interim storage and/or processing of wastes or decontamination of PCBs.

The Regulation lists the facilities that are subject to Environmental Permit and/or License requirements in its Annex-1 and Annex-2. Environmental Permit is issued by the MoEU for the facilities listed under Annex-1 and by the Provincial Directorate of Environment and Urbanisation (PDoEU) for the facilities listed under Annex-2.

As per the Regulation, an Environmental Permit is issued for air emissions, environmental noise, wastewater discharge and deep-sea discharge of the facilities, as applicable. Project facilities that are subject to the requirements of the Regulation on Environmental Permits and Licenses are summarised in Table 2-5.

Table 2-5. Project Facilities that are Subject to the Requirements of the Regulation on Environmental Permits and Licenses

Facilities	Corresponding Annex of the Regulation on Environmental Permits and Licenses	Item No. as per the Relevant Annex of the Regulation
Facilities with production capacity of 10 m ³ /hour or above, producing concrete, grout or road aggregate by using cement; including the sites where the materials are mixed only when they are dry.	Annex-2	2.13
Asphalt plants that prepare road materials and facilities that melt and produce bitumen and tar mixtures with mineral materials (*)	Annex-2	2.15
Mining sites where explosives are used	Annex-2	2.16
Mining sites with a production capacity of 200 tons/day and above and where the mines included in Group I a and b, Group II (including limestone), Group IV and Group V of the Mining Law (Law No. 3213, 1985) are extracted	Annex-2	2.17
Crusher facilities for crushing, grinding, sieving mines and slags and debris in Group I a and b, Group II (including limestone), Group IV, Group V of the Mining Law (Law No. 3213, 1985) and with a production capacity of 200 tons/day and above	Annex-2	2.18
Urban and/or domestic wastewater treatment plants with a population of less than 100,000 (**)	Annex-2	10.3
Facilities with a total storage capacity of 1,000 tons or more and less than 50,000 tons for gasoline, naphtha, diesel, fuel-oil and similar fuels (excluding storage tanks used for heating purposes)	Annex-2	9.2.2

(*) These facilities are exempt from Environmental Permit for noise generation.

(**) These facilities are exempt from Environmental Permit for noise generation and air emissions.

The Environmental Permit is granted for a 5-year period. Facilities are required to apply for permit renewal 180 days before the permit expiry date and obtain the environmental permit before the expiry of the document validity period.

The regulatory process as per the Regulation on Environmental Permits and Licenses is summarised in Figure 2-4.

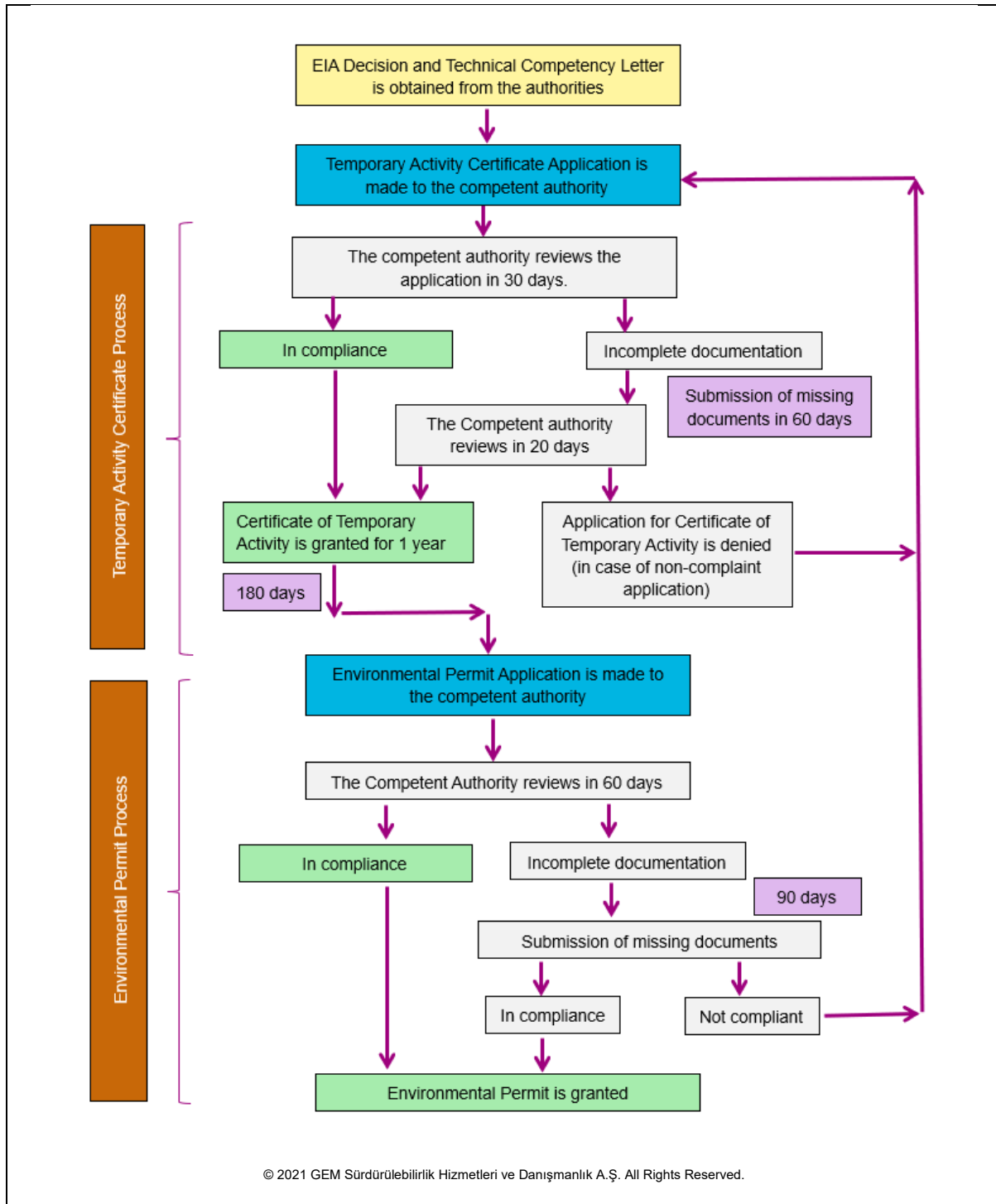


Figure 2-4. Regulatory Process as per the Regulation on Environmental Permits and Licenses

2.2.2. Environmental Permits, Licenses and Approvals under National Legislation

The main environmental permits, licenses and approvals listed in Table 2-6 are applicable to the scope of works to be conducted by the Contractor. It should be noted that the official process to secure some of these authorisations will be carried out by the Project Owner, i.e. AYGM.

Table 2-6. Main Environmental Permits, Licenses and Approvals

Subject	Permit/License/Approval/Agreement	Relevant Legislation
Land Preparation and Construction		
Land Use	Permit for the use of agricultural lands for non-agricultural purposes	Law on Soil Protection and Land Use (Law No: 5403, 2005)
	Soil Protection Project Approval	Law on Soil Protection and Land Use (Law No: 5403, 2005) Regulation on the Application of the Law on Soil Protection and Land Use Regulation on the Conservation, Use and Planning of Agricultural Lands
	Permit for the use of pasture lands (change of the allocation purpose)	Pasture Law (Law No: 4342, 1998)
	Land use agreements with state authorities for state owned lands	Relevant laws and regulations specific to the associated land use type
	Approval of expropriation plans	Expropriation Law (Law No: 2942, 1983)
Construction Camp Sites	EIA Decisions for relevant construction camp site facilities	Regulation on Environmental Impact Assessment
	Permits and approvals for roads, railroads, water bodies, canals, power supply lines, pipelines etc.	Protocols/approvals/official views of related state authorities
	Workplace notification for construction camp sites	Regulation on Starting Up and Operating a Workplace
	Permit for on-site (if any) fuel and explosive storage	Regulation on Environmental Permits and Licenses
Quarries and Material Borrow Sites	Raw material production license	Mining Law (Law No. 3213, 1985)
	EIA Decisions for quarries/material borrow sites	Regulation on Environmental Impact Assessment
	Environmental Permit/Exemption Letter	Regulation on Environmental Permits and Licenses
	Health Protection Zone	Regulation on Starting Up and Operating a Workplace
	Certificate for starting up and operating a workplace	Regulation on Starting Up and Operating a Workplace
Concrete Batch Plants, Asphalt Plant and Crushing Screening Facilities	Certificate for starting up and operating a workplace	Regulation on Starting Up and Operating a Workplace
	EIA Decisions for the facilities	Regulation on Environmental Impact Assessment
	Environmental Permit/Exemption Letter	Regulation on Environmental Permits and Licenses
Blasting and Explosives Management	Blasting permit	Regulation on Mining Permits Decree on Rules and Procedures for Production, Import, Transport, Storage, Sales, Use, Disposal and Inspection of Explosives and Hunting Equipment
Water and Wastewater Management	Groundwater use	Law on Groundwater Resources (Law No. 167, 1960)
	Environmental permit for the treated wastewater discharges	Regulation on Environmental Permits and Licenses Water Pollution Control Regulation
Waste	Approval for waste management plans	Waste Management Regulation
	Agreements made with licensed waste management and disposal companies	Waste Management Regulation
Other	Permit for private security	Regulation on the Implementation of the Law Concerning Private Security Services

2.3. International Agreements, Conventions and Protocols

Turkey has become party to several conventions and protocols to contribute to the management of environmental resources, biodiversity and cultural heritage at regional and global scales. Applicable international conventions and protocols are given in Table 2-7.

Table 2-7. Conventions, Agreements and Protocols

Convention, Agreement, Protocol	Date of Signature	Action	Date of Notification/ Deposit	Date of Effect
<i>Air Quality and Climate Change</i>				
United Nations - Convention on Long Range Transboundary Air Pollution (CLRTAP)	13.11.1979	Ratification	18.04.1983	17.07.1983
United Nations - Vienna Convention for the Protection of the Ozone Layer	22.03.1985	Accession	20.09.1991	19.12.1991
United Nations - Montreal Protocol on Substances Depleting the Ozone Layer	16.09.1987	Accession	20.09.1991	19.12.1991
United Nations Framework Convention on Climate Change (UNFCCC)	09.05.1992	Accession	24.02.2004	24.05.2004
United Nations - Kyoto Protocol to the UNFCCC	11.12.1997	Accession	28.05.2009	26.08.2009
United Nations - Paris Agreement	12.12.2015	Signature	22.04.2016	-
United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	14.10.1994	Ratification	31.03.1998	29.06.1998
<i>Biodiversity</i>				
UNESCO - Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR Convention)	02.02.1971	Accession	13.07.1994	13.11.1994
Council of Europe - Convention on the Conservation of European Wildlife and Natural Habitats (BERN)	19.09.1979	Accession	12.01.1996	01.05.1996
United Nations - Convention on Biological Diversity	05.06.1992	Ratification	14.02.1997	15.05.1997
United Nations - Cartagena Protocol on Biosafety to the Convention on Biological Diversity	29.01.2000	Ratification	24.10.2003	24.01.2004
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	03.03.1973	Accession	23.09.1996	22.12.1996
Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	10.06.1995	Ratification	01.06.1998	12.12.1999
Convention on the Conservation of Migratory Species of Wild Animals (CMS)	23.06.1979	-	-	-
Agreement on the Conservation of Populations of European Bats (EUROBATS)	4.12.1991	-	-	-
FAO - International Treaty on Plant Genetic Resources for Food and Agriculture	03.11.2001	Ratification	07.06.2007	05.09.2007
Council of Europe - European Landscape Convention	20.10.2000	Ratification	22.02.2013	01.06.2013
<i>Cultural Heritage</i>				
UNESCO - Convention concerning the Protection of the World Cultural and Natural Heritage	23.11.1972	Ratification	16.03.1983	16.06.1983
Council of Europe - Convention for the Protection of the Architectural Heritage of Europe	03.10.1985	Ratification	11.10.1989	01.02.1990
Council of Europe - European Convention on the Protection of the Archaeological Heritage	16.01.1992	Ratification	29.11.1999	30.05.2000
Council of Europe - European Cultural Convention	19.12.1954	Ratification	10.10.1957	10.10.1957
Council of Europe - Convention for the Protection of Human Rights and Fundamental Freedoms	04.11.1950	Ratification	18.05.1954	18.05.1954
Council of Europe - Protocol to the Convention for the Protection of Human Rights and Fundamental Freedoms	20.03.1952	Ratification	18.05.1954	18.05.1954

Convention, Agreement, Protocol	Date of Signature	Action	Date of Notification/ Deposit	Date of Effect
UNESCO - Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property	14.11.1970	Ratification	21.04.1981	21.07.1981
UNESCO - Convention for the Safeguarding of the Intangible Cultural Heritage	17.10.2003	Ratification	27.03.2006	27.06.2006
UNESCO - Convention on the Protection and Promotion of the Diversity of Cultural Expressions	20.10.2005	Accession	02.11.2017	02.02.2018
UNESCO - Convention concerning the Protection of the World Cultural and Natural Heritage	16.11.1972	Ratification	16.03.1983	16.06.1983
Environmental Protection				
Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention)	16.02.1976	Ratification	06.04.1981	06.05.1981
IMO - The International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND)	18.12.1971	Not signed by Turkey	-	-
Council of Europe - Convention on Civil Liability for Damage resulting from Activities Dangerous to the Environment	21.06.1993	Not signed by Turkey	-	-
Convention for the Protection of the Black Sea Against Pollution (Bucharest) and its protocols including the Protocol for the Protection of Biological and Landscape Diversity in the Black Sea	21.04.1992	Ratification	29.03.1994	29.03.1994
United Nations - Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	22.03.1989	Ratification	22.06.1994	20.09.1994
United Nations - Stockholm Convention on Persistent Organic Pollutant (POPs)	22.05.2001	Ratification	14.10.2009	12.01.2010
United Nations - Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	10.09.1998	Ratification	21.09.2017	20.12.2017
United Nations - Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)	25.02.1991	Not signed by Turkey	-	-
United Nations - Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention)	30.10.2001	Not signed by Turkey	-	-

In 1932, Turkey became a member of the International Labour Organization (ILO), a specialised United Nations (UN) agency. Turkey has ratified 59 Conventions, of which 55 are in force, 3 Conventions have been denounced and 1 instrument has been abrogated (<http://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm>). ILO Conventions relevant to the Project are listed in Table 2-8.

Table 2-8. ILO Conventions Relevant to the Project

ILO Convention	Date of Signature	Date of Ratification by Turkey
ILO Safety and Health in Construction Convention	11.01.1991 (enforced)	23.03.2015
ILO Occupational Safety and Health Convention	11.08.1983 (enforced)	22.04.2005
ILO Worst Forms of Child Labour Convention	19.11.2000 (enforced)	02.08.2001
ILO Forced Labour Convention	01.05.1932 (enforced)	30.11.1998
ILO Minimum Age Convention	19.06.1976 (enforced)	30.11.1998
ILO Freedom of Association and Protection of the Right to Organise Convention	04.07.1950 (enforced)	12.07.1993
ILO Worker's Representatives Convention	30.06.1973 (enforced)	12.07.1993
ILO Human Resources Development Convention	19.07.1977 (enforced)	12.07.1993
ILO Employment Policy Convention	15.07.1966 (enforced)	13.12.1977
ILO Social Security Convention	17.04.1955 (enforced)	29.01.1975
ILO Equal Remuneration Convention	23.05.1953 (enforced)	19.07.1967
ILO Discrimination (Employment and Occupation) Convention	15.06.1960 (enforced)	19.07.1967
ILO Abolition of Forced Labour Convention	17.01.1959 (enforced)	29.03.1961
ILO Right to Organise and Collective Bargaining Convention	18.07.1951 (enforced)	23.01.1952

2.4. International E&S Standards and Guidelines

The international standards applicable to the Project ESIA include the following:

- Equator Principles (EP) 4 (2020)
- International Finance Corporation (IFC) Performance Standards (PSs) (2012)
- The Organisation for Economic Co-operation and Development (OECD) Common Approaches (2016)
- UK Export Finance Environmental, Social and Human Rights Policy (2016, updated in 2020)

2.4.1. Equator Principles 4 (2020)

The Equator Principles (EP) is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence and monitoring to support responsible risk decision-making.

The EPs apply globally, to all industry sectors. As of July 2021, 118 Equator Principles Financial Institutions (EPFIs) in 37 countries have officially adopted the EPs, covering the majority of international project finance debt within developed and emerging markets

As per the fourth version of the EPs (July 2020), all EPFIs must implement EP4 by 1 October 2020. As such, all EPFIs will be required to implement EP4 on any new Projects (including term sheets or mandates) signed on/after 1 October 2020.

EP 4 comprises 10 principles⁷, as listed below:

- Principle 1: Review and Categorization
- Principle 2: Environmental and Social Assessment
- Principle 3: Applicable Environmental and Social Standards
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan
- Principle 5: Stakeholder Engagement
- Principle 6: Grievance Mechanism
- Principle 7: Independent Review
- Principle 8: Covenants
- Principle 9: Independent Monitoring and Reporting
- Principle 10: Reporting and Transparency

Relevant guidance notes published by the EP and applicable to the Project ESIA include the following:

- EP Guidance Note on Implementation of Human Rights Assessments Under the EP (2020)
- EP Guidance Note on Climate Change Risk Assessment (2020)
- EP Guidance Note on Biodiversity Data Sharing for EPFI Clients (2020)
- EP Guidance Note on Implementation of EP during the COVID-19 Pandemic (2020)

2.4.2. International Finance Corporation's (IFC) Policy and Performance Standards on E&S Sustainability (2012)

The Policy on E&S Sustainability describes IFC's commitments, roles, and responsibilities related to E&S sustainability. It comprises eight Performance Standards (PSs) directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. All investment and advisory clients whose projects go through IFC's initial credit review process are expected to meet these standards. The PSs are also applicable for other financial institutions willing to apply them.

The applicability of the IFC PSs to the Project ESIA is presented in Table 2-9.

Table 2-9. Applicability of IFC PSs to the Project ESIA

PS	Definition	Applicability to the Project ESIA
PS 1	Assessment and Management of Environmental and Social Risks and Impacts	Applicable
PS 2	Labour and Working Conditions	Applicable
PS 3	Resource Efficiency and Pollution Prevention	Applicable
PS 4	Community Health, Safety, and Security	Applicable
PS 5	Land Acquisition and Involuntary Resettlement	Applicable
PS 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	Applicable
PS 7	Indigenous Peoples	Not applicable
PS 8	Cultural Heritage	Applicable

⁷ <https://equator-principles.com/wp-content/uploads/2020/05/The-Equator-Principles-July-2020-v2.pdf>.

2.4.2.1. IFC Good Practice/Guidance Notes and Handbook

Relevant good practice/guidance notes published by the IFC and applicable to the Project ESIA include the following:

- IFC Stakeholder Engagement Handbook: A Good Practice Handbook for Companies Doing Business in Emerging Markets (2007)
- IFC Good Practice Note on Addressing Grievances from Project-Affected Communities (2009)
- IFC Handbook for Addressing Project-Induced In-Migration (2009)
- IFC Introduction to Health Impact Assessment (2009)
- IFC and EBRD Guidance Note on Workers' Accommodation: Processes and Standards (2009)
- IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (2013)
- IFC E&S Management System Implementation Handbook: Construction (2014)
- IFC E&S Management System Implementation Handbook: General (2015)
- IFC Good Practice Note on Managing Contractors' E&S Performance (2017)
- IFC Good Practice Handbook on Use of Security Forces: Assessing and Managing Risks and Impacts (2017)
- CDC, EBRD and IFC Emerging Good Practice for the Private Sector on Addressing Gender-Based Violence and Harassment (2020)

2.4.2.2. IFC's Interim Advices for IFC Clients on Safe Stakeholder Engagement in the Context of COVID-19 (May 2020)

The main objective of IFC with this Interim Advice is to assist IFC clients in identifying alternative approaches and mechanisms for engaging stakeholders, for continuing to deliver project-related information to the communities within their areas of operations and for receiving feedback, while taking all feasible steps to protect the health and safety of those involved. IFC recognises in this Interim Advice that it may not be possible for companies due to COVID-19 circumstances to conduct stakeholder engagement as they would under normal circumstances. To this end, the Interim Advice presents a framework for developing alternative approaches to engagement and access to grievance mechanisms offering advice on key aspects of decision-making and other relevant issues.

As part of the Interim Advice, IFC lists the key elements to consider during the development of a robust interim stakeholder engagement process to support communication and sharing of information.

The Interim Advice introduces examples of safe stakeholder engagement methods as virtual and remote engagement approaches such as online communication tools, audio options, offline communication channels.

There are also complementary stakeholder engagement related provisions in the following IFC COVID-19 documents:

- Tip Sheet for Company Leadership on Crisis Response: Facing the COVID-19 Pandemic
- Interim Advice for IFC Clients on Preventing and Managing Health Risks of COVID-19 in the Workplace
- Interim Advice for IFC Clients on Supporting Workers in the Context of COVID-19
- Interim Advice for IFC Clients on Developing a COVID-19 Emergency Preparedness and Response Plan (EPRP)
- Addressing Increased Reprisals Risk in the Context of COVID-19
- Interim Advice for IFC and EBRD Clients on Migrant Workers and COVID-19

2.4.2.3. World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines

The WBG EHS Guidelines⁸ are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP) and are referred to in the IFC's Performance Standards.

The WBG EHS Guidelines contain the performance levels and measures that are normally acceptable to the WBG, and that are generally considered to be achievable in new facilities at reasonable costs by existing technology.

The following WBG EHS Guidelines are applicable to the Project:

- General EHS Guidelines (2007)
- EHS Guidelines on Railways (2007)
- EHS Guidelines for Construction Materials Extraction (2007)

2.4.3. OECD Common Approaches (2016)

The Recommendation of the Council on Common Approaches for Officially Supported Export Credits and Environmental and Social Due Diligence ("the Common Approaches")⁹, which was adopted on 28 June 2012 and revised by the OECD Council on 6 April 2016, sets common approaches for undertaking E&S due diligence to identify, consider and address the potential E&S impacts and risks relating to applications for officially supported export credits as an integral part of Members' decision-making and risk management systems.

2.4.4. UK Export Finance Environmental, Social and Human Rights Policy

UKEF is the United Kingdom's Export Credit Agency (ECA) and UKEF's statutory function is to support exports. The Policy and Practice¹⁰ of the UKEF on Environmental, Social and Human Rights Due Diligence and Monitoring sets out UKEF's policies, commitments, roles and responsibilities in respect of the management of environmental, social and human rights (ESHR) risks and impacts when the agency supports projects overseas.

In line with the ESHR Policy, the UKEF;

- Takes account of factors beyond the purely financial and of relevant government policies in respect of ESHR impacts on individual transactions;
- Complies with all international agreements which apply to the operations of ECAs. These agreements include the OECD Common Approaches, which informs the way in which member ECAs should address ESHR due diligence for projects and existing operations they are asked to support and ESHR monitoring after support has been agreed;
- Complies with the requirements of the Equator Principles, which UKEF has adopted (UKEF began implementing the latest iteration of the Equator Principles (EP4) from 1 July 2020);
- Operates beyond international agreements which apply to ECAs or the Equator Principles and from 1 April 2020 UKEF has committed to consider how it will take account of climate change within their decision-making processes across all products. This consideration will be proportionate to the risks and impacts associated with the projects and UKEF support.

⁸https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

⁹ [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?doclanguage=en&cote=tad/ecg\(2016\)3](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?doclanguage=en&cote=tad/ecg(2016)3).

¹⁰ <https://www.gov.uk/government/publications/uk-export-finance-environmental-social-and-human-rights-policy>

In line with the OECD Common Approaches and Equator Principles, the UKEF;

- identifies ESHR risks and carry out due diligence to be satisfied that projects should comply with applicable local and relevant international laws, and align with international ESHR standards before support is provided; and
- monitors ESHR performance of projects to be satisfied they are being constructed and operated in compliance with applicable local and international laws and align with international environmental and social standards after support has been provided.

This ESHR risk identification and due diligence is conducted alongside commercial and financial underwriting, which includes anti-bribery and corruption and sustainable lending.

2.5. Project E&S Categorisation

As per the E&S categorisation criteria of the applicable standards (presented in Table 2-10) the Project has been considered as "Category A".

Annex I of the OECD Common Approaches presents an illustrative list containing examples of the types of new projects and major expansion projects that may be classified as Category A and states that in practice, classification should be undertaken in accordance with the potential E&S impacts of each project. "*Construction of railway lines that go beyond urban areas and of long-distance railway lines*" are listed amongst Category A projects in Annex I of the OECD Common Approaches.

The project and E&S impact information of Category A projects are published on UKEF's website at least 30 days prior to final commitment to grant support¹¹.

¹¹https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909200/ukef-eau-external-process-update-june-2020.pdf

Table 2-10. E&S Categorisation as per Applicable Standards

IFC PSs (2012)	EP4 (2020)	OECD Common Approaches	UKEF ESHR Policy (2016, updated in 2020)
<ul style="list-style-type: none"> Category A – Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented. Category B – Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures. Category C – Business activities with minimal or no adverse environmental or social risks and/or impacts. Category FI – Business activities involving investments in financial institutions (FIs) or through delivery mechanisms involving financial intermediation. This category is further divided into three (i.e. FI-1, FI-2, and FI-3). 	<ul style="list-style-type: none"> Category A – Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented. Category B – Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures. Category C – Projects with minimal or no adverse environmental and social risks and/or impacts. 	<ul style="list-style-type: none"> Category A – a project is classified as Category A if it has the potential to have significant adverse environmental and/or social impacts, which are diverse, irreversible and/or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. Category A, in principle, includes projects in sensitive sectors or located in or near sensitive areas. An illustrative list of Category A projects is set out in Annex I of the OECD Common Approaches. Category B – a project is classified as Category B if its potential environmental and/or social impacts are less adverse than those of Category A projects. Typically, these impacts are few in number, site-specific, few if any are irreversible, and mitigation measures are more readily available. Category C – a project is classified as Category C if it has minimal or no potentially adverse environmental and/or social impacts. 	<ul style="list-style-type: none"> Category A – where there are potential significant adverse ESHR risks and/or impacts. Category B – where there are less adverse ESHR risks and/or impacts (than Category A). Category C – where there are minimal or no adverse ESHR risks and/or impacts.

3. PROJECT ALTERNATIVES

The HSR projects planned and implemented in Turkey are key components of the intercontinental railway corridors between Europe, Caucasus, Middle East, Asia, and Africa. After completion of the HSR and conventional railway projects in Turkey, transportation corridors anticipated to gain more importance with continents being interconnected by rail, which will further contribute to Turkey's strategic position in the region.

The Ankara-Izmir HSR Project is part of Turkey's Vision 2023 (see Figure 3-1). Being a priority for both the State Railways of the Republic of Turkey (TCDD) and the General Directorate of Infrastructure Investments (AYGM), the Project constitutes the final stage of the current national HSR masterplan, through which the following HSR lines have been put in operation since 2009:

- Ankara-Eskisehir HSR is in operation since 2009.
- Ankara-Konya HSR is in operation since 2011.
- Eskisehir-Konya HSR is in operation since 2013.
- Ankara-Istanbul HSR (with the extension of Ankara-Eskisehir line) is in operation since 2014.

Besides the Ankara-Izmir HSR, construction of the lines between Bursa-Bilecik (to be connected to Ankara-Istanbul HSR) and Ankara-Sivas HSR projects are also under construction (*TCDD, 2019. Annual Activity Report*).

As of 2019, the length of the HSR lines in Turkey is 1,213 km (total length of our railway lines, including HSR and conventional lines is 12,803 km). Along this existing corridor, the HSR operation is carried out covering 13 cities and 42 percent of the country's population, with combined transportation between Ankara, Istanbul, Eskisehir and Konya. More than 52 million people have travelled on HSR lines in 2019 (*TCDD, 2019. Annual Activity Report*). In addition to the cities connected by HSR lines, combined transportation between HSR and bus networks, as well as HSR and conventional trains, has significantly reduced the travel time across cities in Central Anatolia, Aegean, Mediterranean and Marmara regions. Consequently, commissioning of the HSR services in Turkey has altered the travelling patterns of the car and bus passengers in the past 10 years and the number of passengers travelling with HSR has increased substantially (*Former Ministry of Transport, Maritime Affairs and Communications, November 2017. Improving Transnational Transport Corridors in Organisation of Islamic Cooperation-OIC Member Countries – Country Report*).

In line with the national Vision 2023 objectives, the Ankara-Izmir HSR Project aims to contribute to the improvement of the efficiency and adequacy of the transport system in the region by addressing poor rail connectivity and lack of alternative environmental transport modes. The Project is designed to ease road traffic congestion and promote socio-economic development to support tourism in Izmir and intercity job and growth opportunities through a safe and improved commuting service.

The Ankara-Izmir HSR line is particularly important for bringing Ankara closer to Izmir, an attractive tourist destination, along with regional/intercity connectivity with Manisa, Usak and Afyonkarahisar. When complete the travel time between Ankara and Izmir will be reduced to around 3.5 hours from 14 hours by existing indirect rail routes. Ankara-Izmir by motorway is 587 km with travel time of around 9 hours. With airport transfers, operations and waiting time, the air travel between Ankara and Izmir is approximately 3.5 hours. Furthermore, the HSR travel time between Ankara and Afyon will be less than 1.5 hours and Afyon and Izmir will be approximately 2.5 hours. The substantial reduction in travel time by HSR will make the Project the best option when travelling between these cities. Enhanced connectivity between cities will expand the job markets, contribute to tourism and support local economies.

The HSR lines deliver more passengers per hour than roads and runways combined, at far less cost. A single HSR line can carry the equivalent of a 10-lane highway, be built at much lower cost and is cheaper to operate.

Once constructed, the Project will result in considerable amount of transportation load shifting from motorways to HSR, leading to substantial cost savings due to reduced motorway maintenance and operation costs and also reduced number of road accidents. On the environmental side, shift to HSR will contribute to reduction in overall fuel consumption and subsequent reduction in greenhouse gas (GHG) emissions. Overall, it is estimated that 880 thousand tons of carbon dioxide emissions will be avoided annually by the HSR projects to be completed in Turkey by 2023 (*Source: Contractor, December 2020. Project Information Note*).



Figure 3-1. Vision 2023 HSR Lines for Turkey (Former Ministry of Transport, Maritime Affairs and Communications, November 2017. Improving Transnational Transport Corridors in OIC Member Countries – Country Report)

3.1. Route Selection and Optimisation

The route selection and optimisation studies conducted at the pre-tender phase by the AYGM and the post-tender phase by the Contractor (subject to final approval of the AYGM) are described below.

3.1.1. Pre-tender Phase

The field surveys and route selection studies for the Ankara-Izmir HSR Project were conducted by the TCDD Survey and Project Department. As part of the route selection studies, initially, alternative route corridors were determined based on wide-scale assessments conducted on digital maps by using computer software. To this end, seven alternative corridors were identified for the Project.

Based on an initial screening, four of the alternative corridors were prioritised, for which project drawings and plans were prepared to conduct detailed assessment of alternatives. The main criteria considered in the assessment of these four corridors included the following:

- Route length
- Slope
- Engineering structure requirements such as tunnels and bridges
- Earthwork requirements for construction
- Operational expenses

This detailed assessment led to designation of two alternative corridors for final evaluation. Detailed digital project drawings and plans (1/25,000 scale) were prepared for both alternatives incorporating the digital data on the fixed structures, including but not limited to the following:

- Settlements
- Roads
- Energy transmission lines
- Irrigation channels

In consideration of the fixed structures, the drawings and plans were optimised to reduce the investment and operating costs and minimise the potential E&S impacts for both alternatives.

At the last stage, final route of the Project was selected based on the evaluation of the optimised alternatives with respect to the below criteria:

- Feasibility
- Conformity with the Project design criteria
- Proximity to settlements causing impact on residential area/houses and agricultural lands
- Cost of land acquisition
- Construction cost
- Duration of construction
- Maintenance and operation cost and challenges/requirements
- Accessibility to targeted settlements

During the national Environmental Impact Assessment (EIA) process completed in 2006 in line with the EIA Regulation in force, official views of the related authorities were obtained to minimise potential impacts of the Project on the following legally protected areas (see Chapter 10 on Biodiversity):

- General Directorate of Nature Conservation and National Parks regarding the Baskomutan Historical National Park overlapping with the railway route at KM 217+900-219+300 in Kutahya, Dumlupinar and KM 219+300-223+800 in Usak, Banaz¹²
- Regional Councils for the Conservation of Cultural and Natural Property regarding the Natural Site overlapping with the railway route at KM 131+600-131+900 in Afyonkarahisar, Iscehisar¹³.

In the Esme-Salihli section of the railway, a route revision was conducted in the pre-tender phase as summarised in Table 3-1.

Table 3-1. Summary of Route Relocation/Revisions

Relocation/ Revision	Section	KM Chainage	Settlements	Remarks/Reason for Relocation/Revision
Esme-Salihli Revision	Section 3	364+600 - 438+900	Usak province; Esme district Manisa province, Alasehir and Saligli districts	<p>Following the EIA Positive Decision issued for the Project on 9 March 2006 (Decision No. 1090), a revision was made in the respective section of the Project route (364+600 - 438+900) as notified to the Ministry of Environment and Urbanisation (MoEU) with the Project Owner's official letter dated 6 May 2014 (Decision No: 10581).</p> <p>As per the decision of the MoEU (Decision Date: 17 May 2014; Decision: No: 81195450/220.03/7599), the revision made in the Project does not call for a process under the EIA Regulation in force.</p> <p>A Project Description File (PDF) was prepared for the revision planned in the Esme-Salihli section and application was made to the Manisa Governorate, Provincial Directorate of Environment and Urbanisation (PDoEU) as per the national EIA Regulation in force. Based on this application and review of the PDF, Manisa PDoEU issued an EIA not Required Decision for the revised Esme-Salihli section of the Project (Decision Date: 30 October 2014; Decision No: 34629761 220-02 E-2014745)</p> <p>As per the information provided in the relevant PDF, the revision in the Esme-Salihli section of the railway was made as a result of feasibility studies leading to a need for reduced operating costs and modifications in Project standards consistent with the changes in the applicable conditions.</p>

3.1.2. Post-tender Phase

The main modifications (e.g., route relocation or revision) planned to be made on the railway route by the Contractor (subject to the final approval of the AYGM) in the post-tender phase are listed below:

- Section 1: Bayat Relocation
- Section 2: Hatipler Relocation

Information on the planned modifications in these sections is summarised in Table 3-2.

¹² The location of Baskomutan Historical National Park is indicated in the national EIA Report of 2006 as around KM 250+000.

¹³ The location of Natural Site is indicated in the national EIA Report of 2006 at KM 131+000-133+000.

There may be need for local modifications to be applied during the construction for technical purposes and/or for minimisation of site-specific E&S impacts (e.g., avoidance of impact on fixed structures along the route, minimisation of excavation and fill requirements, management of geotechnical risks, etc.).

Table 3-2. Summary of Route Relocation/Revisions

Relocation/ Revision	Section	KM Chainage	Settlements	Remarks/Reason for Relocation/Revision
Bayat Relocation (see Figure 3-2)	Section 1	108+740- 120+520	Afyonkarahisar province, Bayat district, Merkez; Emirdag district, Yuregil village	- Proximity to the existing motorway
Hatipler Relocation (see Figure 3-3)	Section 2	267+156.000- 278+632.464	Usak province, Banaz district; Dumenler, Alaba, and Hatipler villages	<ul style="list-style-type: none"> - Impact on buildings/structures including greenhouses - High excavation volumes - Poor soil quality in terms of geotechnical properties <p>The route change incorporated to the design in Hatipler passage has required addition of 6 tunnels with a total length of 4,330 m and 1 viaduct with a length of 560 m.</p> <p>Also, the expropriation plans for the affected parcels will be reprepared for the modified route section once the route change is approved by the related authorities.</p>

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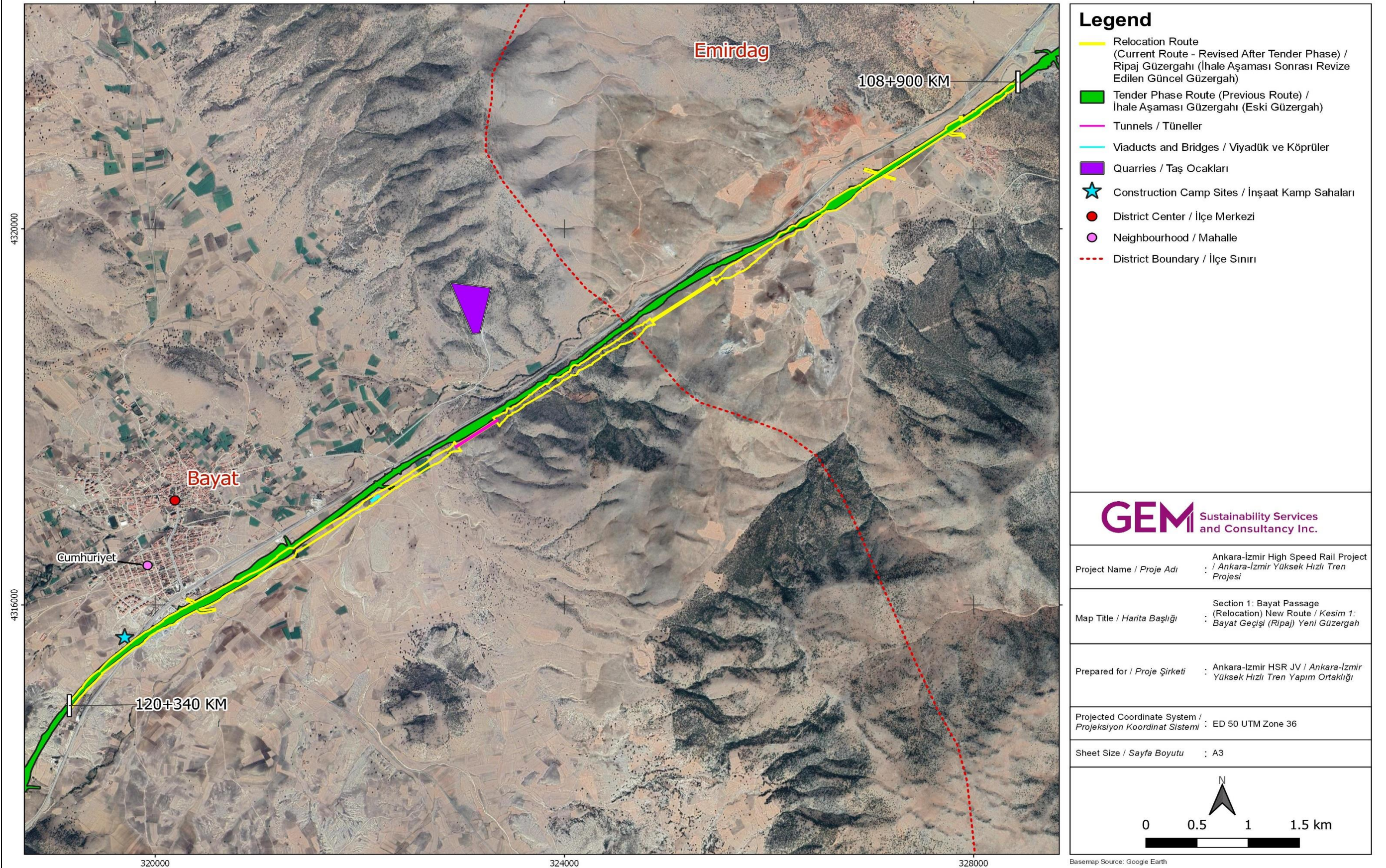


Figure 3-2. Bayat Relocation (Section 1: 108+740-120+520)

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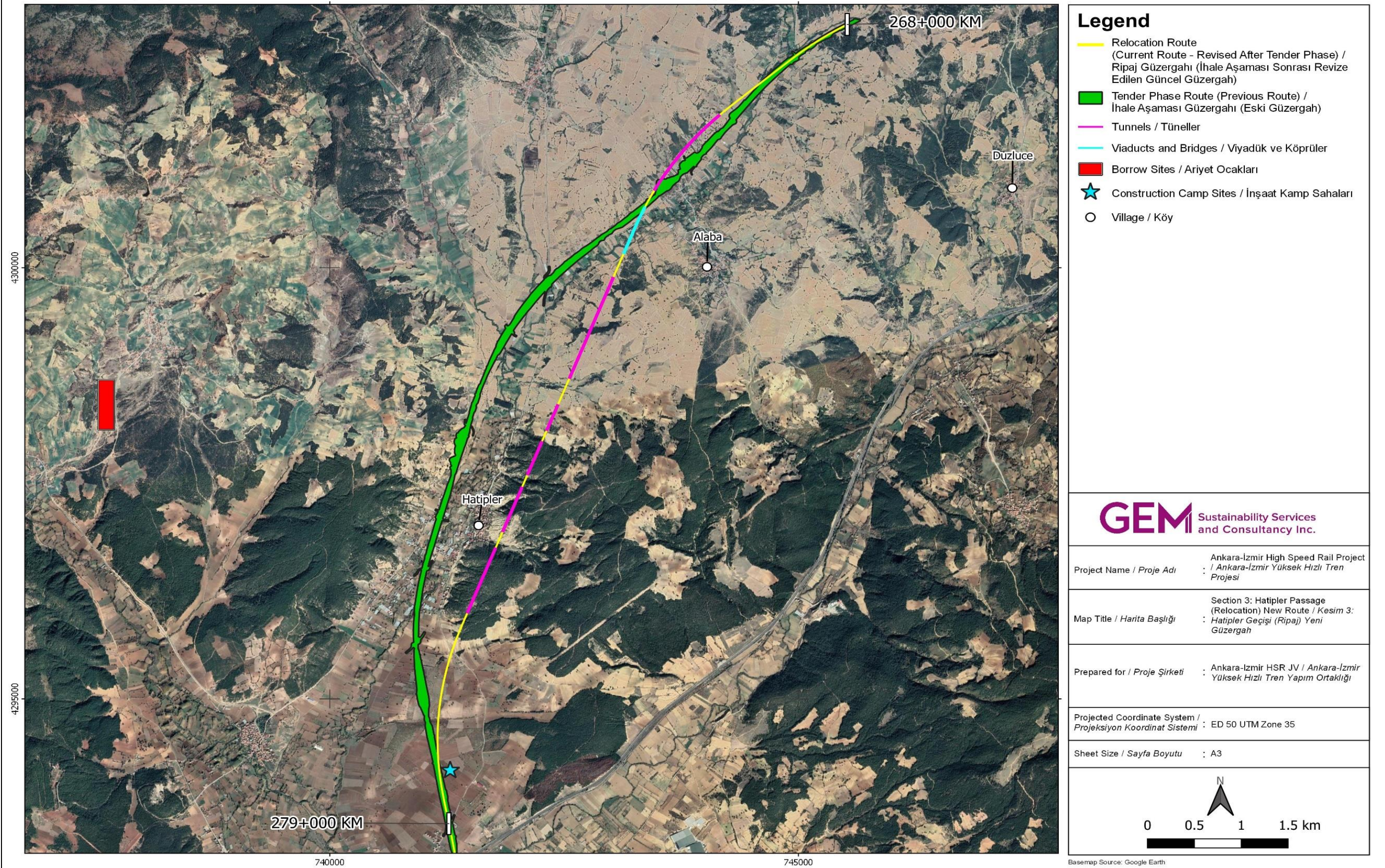


Figure 3-3. Hatipler Relocation (Section 2: 267+156.000-278+632.464)

3.2. Quarry and Material Borrow Site Alternatives

The quarries and material borrow sites planned to be used in the scope of the Project as per the current design are listed in Section 1.4.7.2. For these quarries and material borrow sites, at which biodiversity (see Chapter 10) and cultural heritage (see Chapter 14) field surveys were completed, the findings might suggest use of alternative sources, which will further be considered by the Contractor.

Throughout the ESIA process, the following quarries and borrow sites have been eliminated by the Contractor due to the reasons mentioned below:

- 26 – Basri (Basalt) Quarry planned in Ankara, Polatli, Basri neighbourhood near KM 0+000 has been eliminated as the quarry is located in the proximity of a legally protected area (i.e. registered historical site for which further information is being compiled by the Contractor as of Q2 2021).
- 97 – Bayat 2 Quarry planned in Afyonkarahisar, Bayat near KM 120+500 has been eliminated as the quarry is overlapping with a non-registered archaeological site (see Chapter 14 on Cultural Heritage for information on Karatepe Slope Settlement/ Old Cemetery) identified by the cultural heritage team as part of the ESIA field surveys.
- 138 – Demircevre Borrow Site planned in Afyonkarahisar, Merkez, Inaz (Demircevre) neighbourhood near KM 173+400 has been eliminated as the borrow site, which was originally included in the national EIA Report, corresponds to a privately-owned parcel (with 13 private shareholders) located within the zoning plan boundaries of the city.
- 239 – A- 3229556 (Asagi Cobanisa) Quarry planned in Manisa, Merkez, Yukaricobanisa near KM 497+600 as the quarry is overlapping with a non-registered archaeological site (see Chapter 14 on Cultural Heritage for information on Cobanisa Mithological Mountain/Cave) identified by the cultural heritage team as part of the ESIA field surveys (It should be noted that at this area, material extraction activities are already being conducted by third-party operators).
- 212 – Ahmetlidag 1 (Basalt) Quarry planned in Usak, Esme, Ahmetler village near KM 352+000 has been eliminated as the quarry, which was originally included in the national EIA Report, has started to be operated by another party, which obtained the operation license in the post-EIA period.

The number of quarries and material borrow sites considered for use in the current design and covered in the national EIA Report of 2006 is summarised in Table 3-3.

Table 3-3. Number of Quarries and Material Borrow Sites

Site	Number of Sites Considered as per the Current Design (see Table 1-18 and Table 1-19 in Chapter 1)	Number of Sites included in the national EIA Report of 2006
Quarry	26 (*)	3
Material Borrow Site	16	9

(*) As described above, 97-Bayat 2 and 239-Asagi Cobanisa quarries, which were considered for use by the Contractor at the scoping phase of the ESIA, have been eliminated from the Project design and no license application has been done for these quarries in consideration of the overlapping non-registered cultural heritage sites identified during the ESIA studies.

In addition to the quarries eliminated based on the ESIA findings, as necessary, license boundaries for the following quarries – presented in this ESIA Report and taken into consideration in the assessment of relevant impacts – have been narrowed down to mitigate the predicted impacts mainly on cultural heritage and biodiversity:

- 18 – Yagmurbaba (due to non-registered Yagmurbaba Tumuli and Calli Baba Flat Settlement identified by the cultural heritage team as part of the ESIA; see Chapter 14 on Cultural Heritage)
- 78 – Tabaklar (due to non-registered Tabaklar Smelting Furnace Complex identified by the cultural heritage team; see Chapter 14 on Cultural Heritage)
- 82 – Emirinkoyu; (due to both the natural habitat of Juniper Forests - EU Habitats Directive Annex I habitat – identified by the biodiversity team; see Chapter 10 on Biodiversity and non-registered Emirinkoy Slope Settlement identified by the cultural heritage team; see Chapter 14 on Cultural Heritage)

Besides the quarries and material borrow sites included in the current design, the Contractor is currently in the process of evaluating additional sites that may be required/used during the Project construction works. The list of alternative quarries and material borrow sites that are under evaluation as of Q2 2021, is presented in Table 3-4. As given in the table, the ESIA studies have identified that some of the alternative quarry and material borrow sites overlap with legally protected or internationally recognised areas (see Figure 3-4, Figure 3-5, Figure 3-6 and Figure 3-7).

It should be noted that these alternative sites were not considered within the scope of the ESIA Report. Therefore, following the final selection of the alternative quarry and material borrow sites to be used in the scope of the Project (in addition to the sites described in Section 1.4.7.2), field surveys will be conducted by qualified experts (biodiversity and cultural heritage) prior to site entry as to identify site-specific E&S impacts and management measures. The Environmental and Social Management and Monitoring Framework Plan (ESMMFP) prepared as part of this ESIA and the specific E&S management plans (see Chapter 18), including the site-specific management measures to be determined by the qualified experts prior to site entry, will be implemented during the activities to be conducted at the alternative quarry and material borrow sites.

As of Q2 2021, material tests are ongoing for both the quarries and material borrow sites considered for use in the current design (as presented in Chapter 1) and also for the alternative sites. Following the completion of the ongoing material testing process and confirmation of the reserve status at each site (in terms of quantity and quality), final sites will be identified by the Contractor based on the following criteria:

- Previous/current production status (e.g., sites where previous production activities were conducted will be prioritised)
- Permit status (e.g., valid production licenses, valid EIA decision obtained in the scope of the Project or by other authorities such as TCDD, KGM, DSI, etc. in the scope of other Projects as per the requirements of the EIA Regulation in force)
- Ownership and land use characteristics for site where production activities were not conducted previously
- E&S restrictions (associated with cultural heritage, biodiversity, land use, etc.) as indicated in the official views of the related authorities or identified during the ESIA or post-ESIA surveys
- Proximity to route, material transportation distances between the quarry/material borrow sites and the construction sites, service road construction needs
- Proximity of the quarry/material borrow sites and service roads to settlements

Permitting process for the quarry and material borrow sites to be used in the scope of the Project will be completed by the AYGM prior to site entry and start of operations at the quarry and material borrow sites by the Contractor.

Table 3-4. Alternative Quarries and Material Borrow Sites that are Under Evaluation as of Q2 2021

No.	Name of the Additional Quarry	Province	District	Past Production Status	License/ Raw Material Production License No. (if available)	EIA Status(*)	Land Use Type (according to Online Title Deed Registry System)	Railway KM	Approximate Distance to Railway Route (m) (Air Distance)	License Holder	Overlapping Legally Protected Area	Overlapping Internationally Recognised Area
1	17 - SR3_1	Ankara	Polatli	No previous production			Pasture	0+000	39,300			
2	19 - T1	Ankara	Polatli	No previous production			Pasture	0+000	39,600			
3	20 - T2	Ankara	Polatli	No previous production			Pasture	0+000	39,600			
4	21 - SR3_3	Ankara	Polatli	No previous production			Pasture	0+000	36,400			
5	61 - SR7	Afyonkarahisar	Emirdag	No previous production			Pasture, Raw Soil	60+500	20,700			
6	66 - Sigircik	Eskisehir	Sivrihisar	Previous production done	26/2016-09	PDF-1 (YDA)	No registry	66+250	150	TCDD General Directorate		
7	79 - K.C.O-4	Afyonkarahisar	Emirdag	Previous production done		EIA	Pasture	101+000	340			
8	121 - K-48	Afyonkarahisar	Merkez	Previous production done	03/2013-11	PDF-2	Pasture	149+500	2,050	TCDD General Directorate		
9	122_A - ER-3110015	Afyonkarahisar	Merkez	No previous production			Pasture, No registry	149+800	400			
10	123_B - ER-3233127	Afyonkarahisar	Merkez	Previous production done			Forest, Plot, Agricultural Land, No registry	153+500				
11	131 - Kislacik	Afyonkarahisar	Merkez	No previous production	03/2019-12	PDF-2	Pasture	166+000	12,000	DSI 18 th Regional Directorate		
12	133 - Fethibey	Afyonkarahisar	Merkez	Previous production done	03/2013-06	PDF-1 (Dogus)	Pasture, Agricultural Land	167+100	4,600	KGM 3 rd Regional Directorate		
13	143 - Koprulu	Afyonkarahisar	Merkez	Previous production done	03/2016-29	PDF-1 (Dogus)	Agricultural Land, No registry	177+000	950	TCDD General Directorate		
14	144 - SR26	Afyonkarahisar	Merkez	No previous production			No registry	177+000	1,400		Omer Gecek Natural Site	
15	145 - 667XXX	Afyonkarahisar	Merkez	No previous production			No registry	177+500	1,700			
16	148 - Balmahmut	Afyonkarahisar	Sinanpasa	No previous production	03/2016-22	PDF-1 (Dogus)	Forest, Agricultural Land	181+400	1,600	TCDD General Directorate		
17	149 - Catkuyu Merkez	Afyonkarahisar	Sinanpasa	Previous production done			Forest	184+700	7,700			
18	150 - Catkuyu	Afyonkarahisar	Sinanpasa	Previous production done	03/2005-37	PDF-2	Pasture	185+000	10,600	KGM 3 rd Regional Directorate		
19	159 - Basagac	Afyonkarahisar	Sandikli	No previous production	03/2014-06	PDF-2	Agricultural Land, No registry	192+500	27,000	KGM 3 rd Regional Directorate		
20	165_A - ER	Afyonkarahisar	Sinanpasa	No previous production			Raw Soil, Agricultural Land, No registry	196+500	7,200			
21	170 - Guney K.C.O	Afyonkarahisar	Sinanpasa	Previous production done	03/2019-08	PDF-1 (Dogus)	Pasture, Forest, Threshing Field	205+000	200	TCDD General Directorate		
22	172 - Elvanpasa	Afyonkarahisar	Sinanpasa	No previous production	03/2016-24	PDF-1 (Dogus)	Pasture, Agricultural Land, Grassland	207+000	1,100	TCDD General Directorate		
23	182_A - S.T.-7	Usak	Banaz	No previous production			Pasture	213+500				
24	190 - Halaclar	Usak	Banaz	No previous production	64/2017-03	PDF-1 (Dogus)	Agricultural Land, Forest, No registry	227+000	600	T.C.D.D. General Directorate		Murat Mountain KBA
25	191 - Halaclar Koyu	Usak	Banaz	Previous production done	64/2014-03	PDF-2	Forest	227+000	1,100	DSI 2 nd Regional Directorate		
26	201 - Bahadir-2	Usak	Banaz	No previous production	Site for request	PDF-2	No registry	270+000	6,100			Murat Mountain KBA
27	205 - Derbent	Manisa	Salihli	Previous production done	64/2020-02	PDF-2	No registry	290+000	4,400	TCDD General Directorate		
28	231_A - ER3322480	Manisa	Salihli	No previous production			Agricultural Land, No registry	434+200	4,100			Boz Mountains KBA
29	231_B - ER3219731	Manisa	Salihli	No previous production			Agricultural Land	435+000	4,350			Boz Mountains KBA
30	232_A - ER 3219954	Manisa	Salihli	No previous production			Agricultural Land, Pasture, Forest	449+700	4,600			Boz Mountains KBA
31	232_B - ER3052851	Manisa	Salihli	No previous production			Forest	453+200	7,000			Boz Mountains KBA
32	232_C - S.T.-8	Manisa	Salihli	Previous production done			Forest	453+600	3,700			Boz Mountains KBA
33	232_D - ER3065348	Manisa	Ahmetli	No previous production			Agricultural Land, No registry	454+000	6,350		Golmarmara Golu Nationally Important Wetland	
34	233_A - ER 3051218	Manisa	Merkez	Previous production done			Pasture	465+500	5,800			
35	234_A - ER-3189068	Manisa	Merkez	No previous production			No registry	473+500	10,500			
36	240 - Bahadir	Manisa	Saruhanli	No previous production	Site for request	PDF-2	No registry	507+500	23,500			
37	241 - Davutlar-1	Manisa	Merkez	No previous production	Site for request	PDF-2	Forest	523+500	15,000			
38	242 - Davutlar-2	Izmir	Menemen	No previous production	Site for request	PDF-2	Forest	524+000	16,000			
39	265_A - ER2395406	Izmir	Menemen	No previous production			Forest	545+500	3,700			
40	265_B - ER3180448	Izmir	Aliaga	No previous production			Forest	545+500	22,600			

(*) EIA: Included in the national EIA Report of 2006. PDF-1: EIA not Required Decisions obtained by the previous contractors in the scope of the Project based on the Project Description Files (PDF) prepared; PDF-2: EIA not Required Decisions obtained by other state institutions such as State Hydraulic Works, General Directorate of State Highways, TCDD, etc. in the scope of other projects based on the PDFs prepared.

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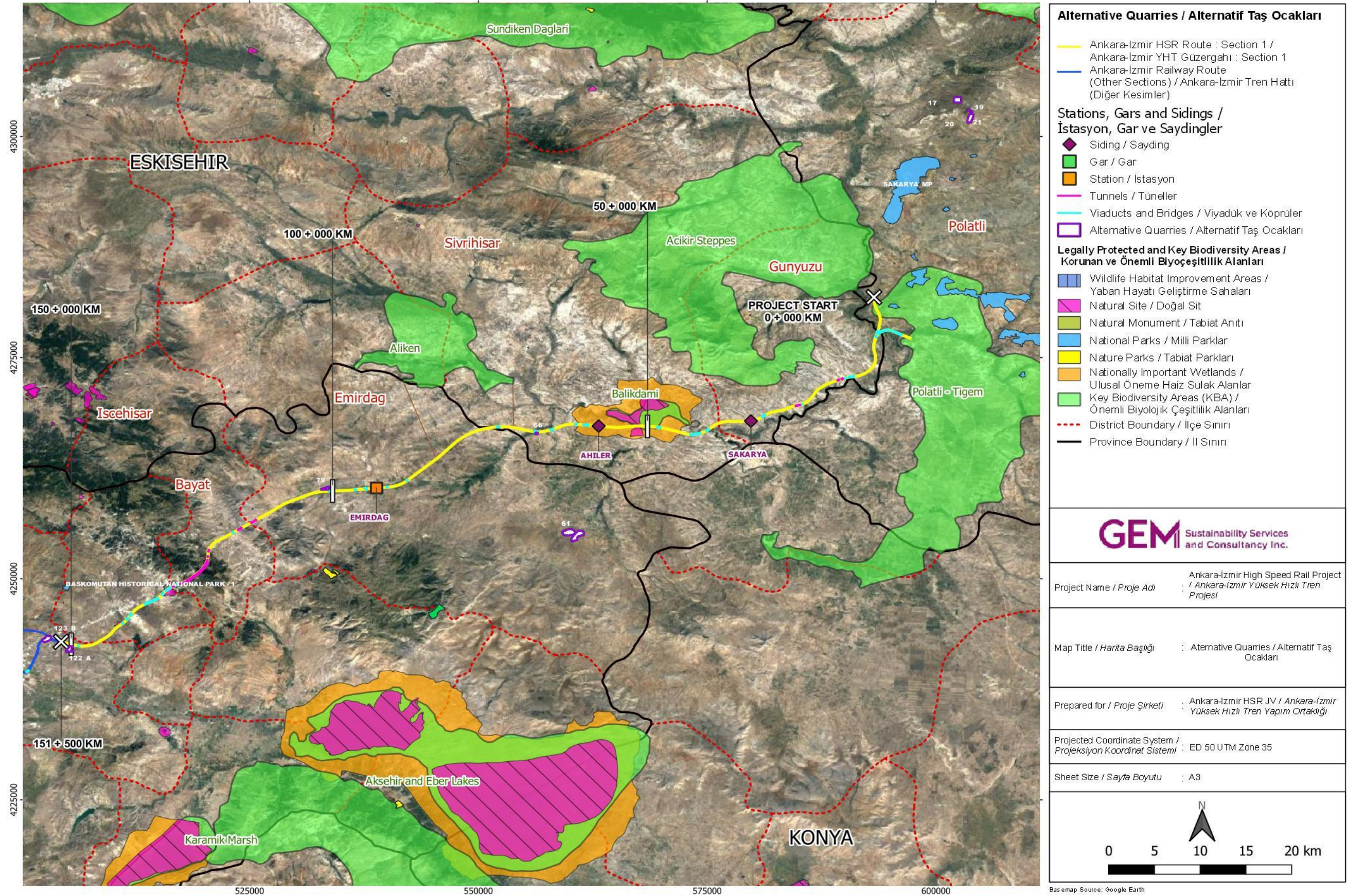


Figure 3-4. Alternative Quarry Sites in Section 1

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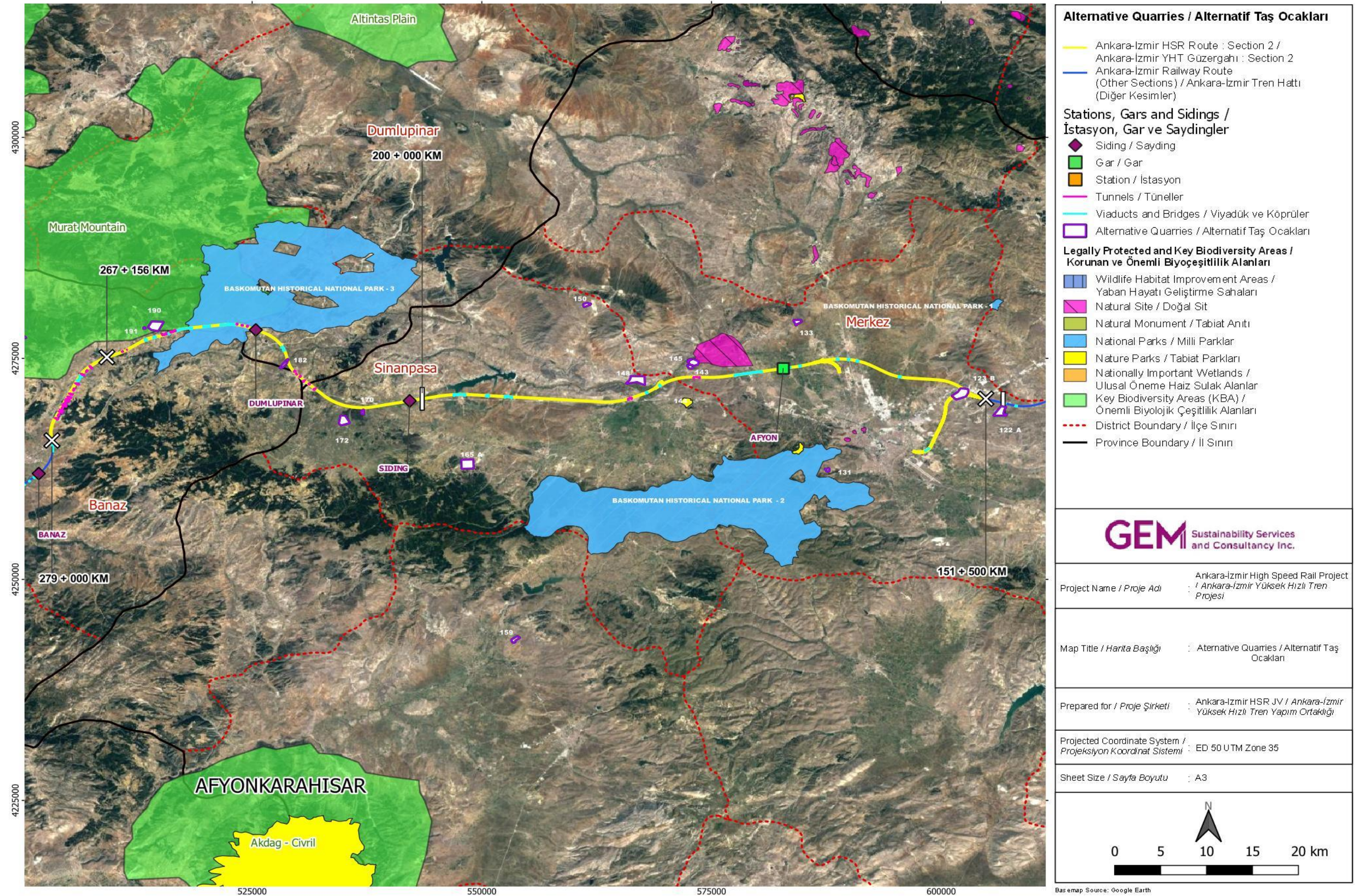


Figure 3-5. Alternative Quarry Sites in Section 2

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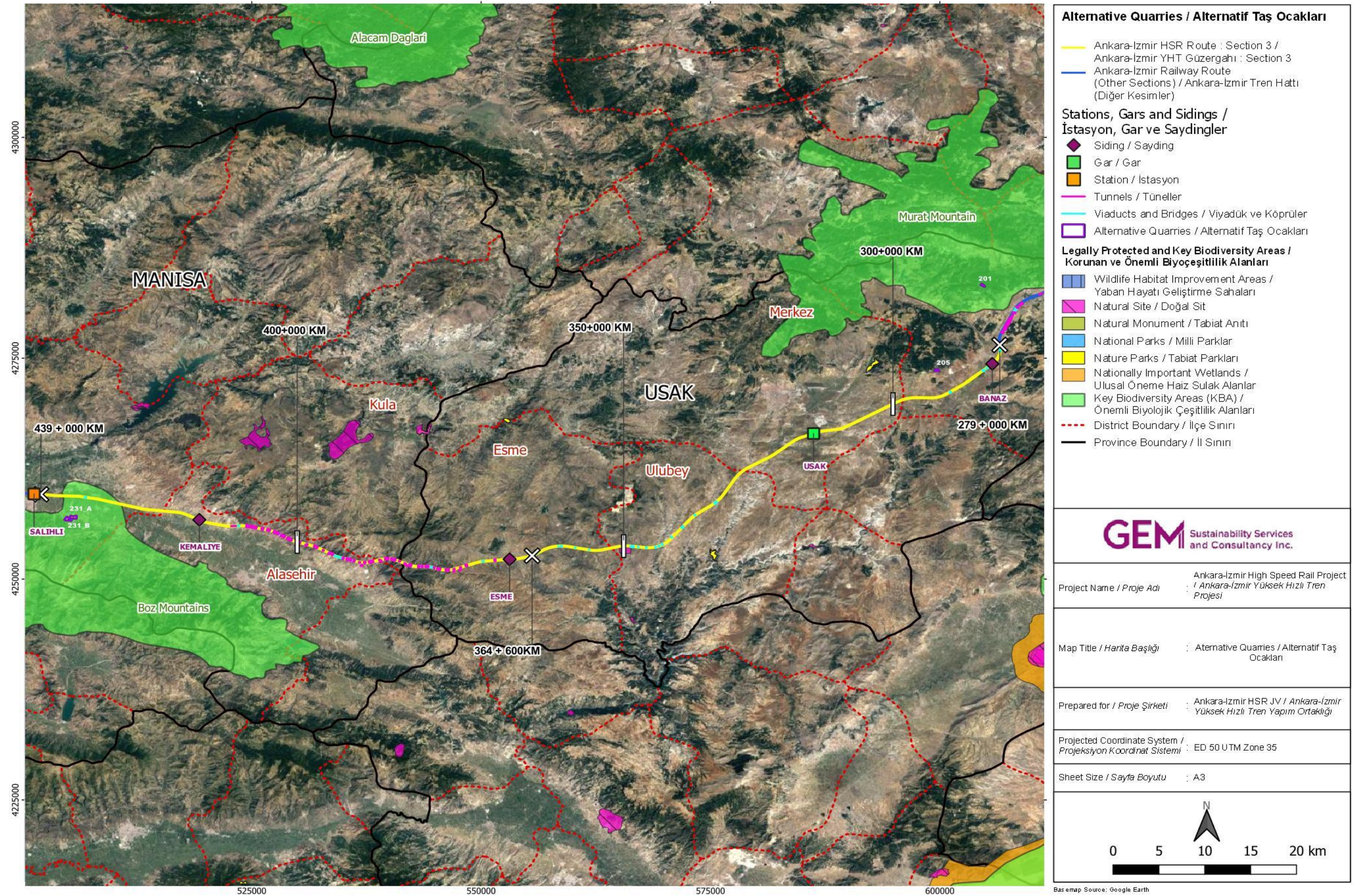


Figure 3-6. Alternative Quarry Sites in Section 3

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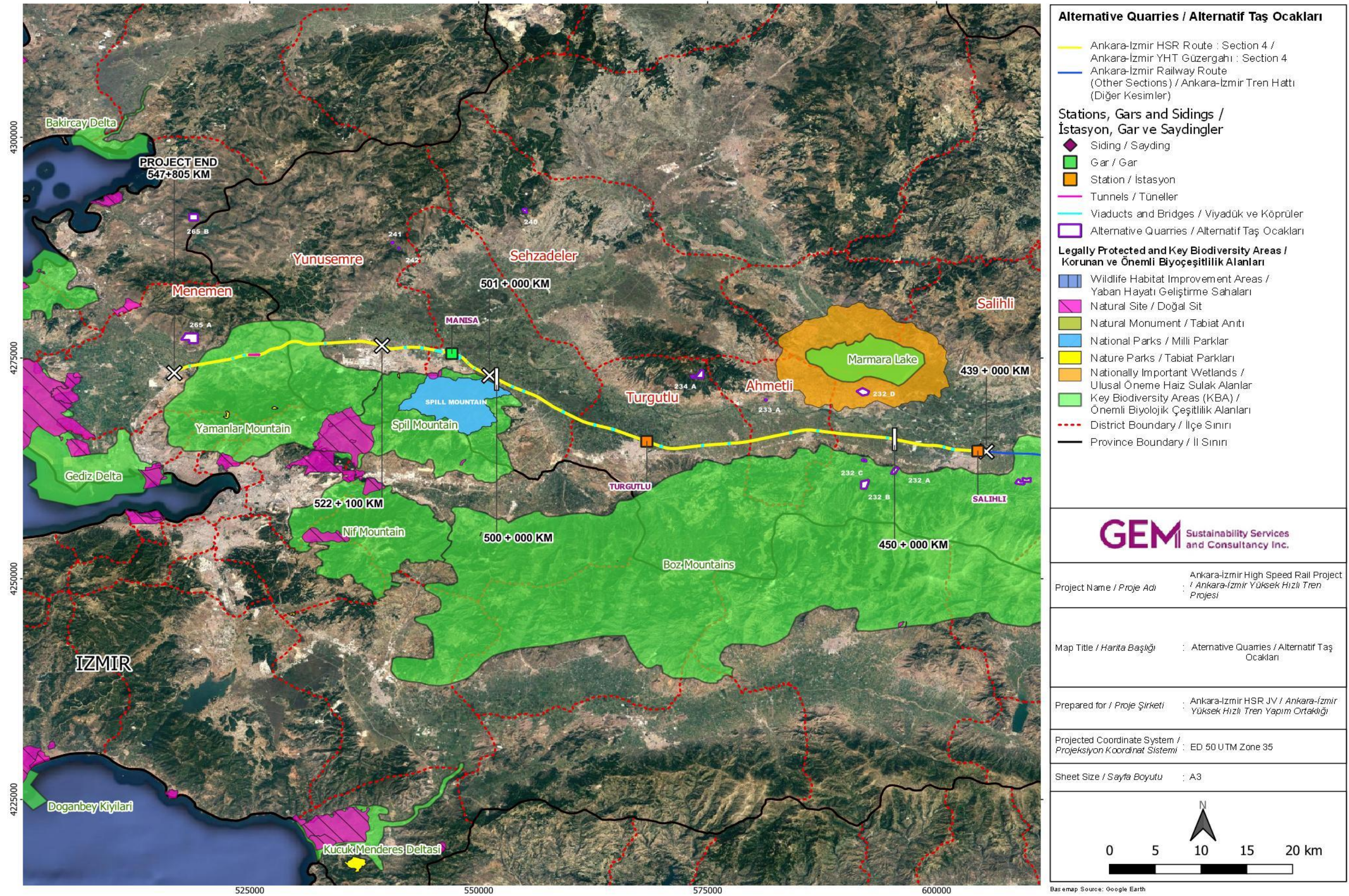


Figure 3-7. Alternative Quarry Sites in Section 4

3.3. Optimisation of Engineering Structures

Several tunnels and viaducts have been included in the design at the post-EIA period. Besides providing engineering solutions to topographical and geotechnical challenges, the tunnels and viaducts allow the Project to minimise impacts on land use and biodiversity (e.g., forestland in Afyonkarahisar province and habitats along the route), cultural heritage sites (e.g. Seydiler 3. Degree Archaeological Site at KM 131+950-132+530 in Section 1), water resources (e.g. Sakarya River passage with viaducts in Section 1).

Comparison of the number of tunnels and viaducts included in the current design and indicated in the national EIA Report is provided in Table 3-5.

Table 3-5. Comparison of the Tunnel and Viaduct Numbers in the Current Design and National EIA Report

Section(*)	Engineering Structures in the Current Design as of Q2 2021	Engineering Structures in the National EIA Report of 2006
Tunnels		
Section 1	10	1
Section 2	14	1
Section 4	0	1
Total Length of Tunnels	17.9 km	7.2 km
Viaducts		
Section 1	19	0
Section 2	11	0
Section 4	1	0
Total Length of Viaducts	14.2 km	0

(*) Infrastructure works for Section 3 (Banaz-Salihli) and part of Section 4 (initial part of Salihli-Manisa between KM 439+000 and 456+500 and Manisa-Menemen section between KM 522+100 and 547+805) are not within the scope of Contractor.

In addition to the tunnel and viaducts, overpasses, underpasses, and culverts have been included in the current design to allow crossing of the railway route (see Chapter 1, Table 1-6 for the summary of number of engineering structures in each section as per the current design).

3.4. No Project Alternative

In the No Project alternative, the Project will not bring the benefits foreseen by its construction and operation (e.g. enhanced connectivity between cities, low carbon transportation alternative to conventional systems and motorways, local employment/procurement opportunities), whilst there would be no E&S impacts stemming from the construction and operation works of the Project (e.g. economical/physical displacement, occupational and community H&S, construction related dust/noise emissions, workers influx, waste/wastewater generation).

It is the Employer's and Operator's responsibility to comply with the national laws and regulations; permits and standards; IFC PSs, relevant WBG EHS Guidelines requirements; loan agreement commitments; ESIA requirements; and to ensure that all contractors providing any type of services to the Employer/Operator duly follow these requirements throughout the duration of the loan agreement. This said, The Contractor will manage the construction phase E&S impacts of the Project in compliance with the Project Standards through implementation of the Project-specific Environmental and Social Management System (ESMS) as detailed in Chapter 18 ("Environmental and Social Management System"). With effective implementation of the ESMS and the ESMMFP by the Contractor, Project's potential E&S impacts, as identified in this ESIA, will be managed in line with the mitigation hierarchy.

4. E&S IMPACT ASSESSMENT METHODOLOGY

This Chapter presents the process for undertaking the ESIA study of the Project and the methodology used for the assessment of identified potential impacts, taking into account both the receptor/resource sensitivity and the magnitude of the impact.

All baseline and impact assessment studies conducted as part of the ESIA process are in line with the Project E&S Standards (Project Standards) set by the following national and international E&S requirements:

- National EHS legislation including international conventions and treaties
- Equator Principles (EP) 4 (2020)
- OECD Common Approaches (2016)
- UK Export Finance Environmental, Social and Human Rights Policy¹⁴
- IFC Performance Standards (PSs) (2012)
- IFC/EBRD Worker's Accommodation: Processes and Standards (2009)
- World Bank Group (WBG) General EHS Guidelines (2007)
- WBG EHS Guidelines on Railways (2007)
- WBG EHS Guidelines for Construction Materials Extraction (2007)

4.1. The ESIA Process

The ESIA is the process that predicts and assesses a project's potential environmental and social risks and impacts, in quantitative terms to the extent possible, and identifies mitigation and management measures to be implemented during the Project lifetime to avoid, minimise, mitigate, or compensate/offset risks and impacts.

As per the international good ESIA practice, the process includes a scoping stage to identify the potential future E&S risks and impacts associated with the project. The ESIA includes an examination of technically and financially feasible alternatives to the source of such impacts, including the non-project alternative, and document the rationale for selecting the particular course of action proposed. The process is based on recent Project-specific E&S baseline data collected through field surveys and desk-based studies as appropriate and identifies potential improvement opportunities and defines any measures needed to avoid, or where avoidance is not possible, minimise and mitigate adverse impacts. The assessment of E&S impacts considers potential direct, indirect and cumulative impacts related to the project, as well as potential transboundary impacts, where relevant.

The ESIA process also includes a public consultation and disclosure process. As depicted by IFC PS1, effective consultation with stakeholders should be a two-way process beginning early in the process of identification of environmental and social risks and impacts and continue on an ongoing basis as risks and impacts arise. It is an integral part of the assessment, management and monitoring of environmental and social impacts and issues of the project. To this end, stakeholder engagement is an ongoing process which involves: (i) public disclosure of appropriate information; (ii) meaningful consultation with stakeholders; and (iii) an effective procedure or mechanism by which people can make comments or raise grievances.

¹⁴ <https://www.gov.uk/government/publications/uk-export-finance-environmental-social-and-human-rights-policy>

The ESIA study was designed to include a comprehensive E&S baseline assessment along the full railway alignment including the quarries as summarised in Table 4-1 for the physical environmental and social components. In addition, for terrestrial and aquatic biodiversity and tangible cultural heritage, field walkover surveys have been conducted by qualified specialists of the biodiversity and cultural heritage teams along the route and the quarry sites considered in the Project design (see Chapter 1, Table 1-18) at the design freeze during the Scoping Phase. Detailed description of the field survey methodologies are provided in the respective chapters of this ESIA Report.

Table 4-1. Summary of Environmental (Physical) and Social Baseline Field Surveys conducted as part of the ESIA

E&S Subject	Baseline Data Collected as part of the ESIA				Total
	Section 1	Section 2	Section 3	Section 4	
Air Quality (# of measurement locations)	7	5	1	9	22
Noise (# of measurement locations)	4	6	5	11	26
Socio-economy (# of surveys*)	CLQs:43 HHQs:91	CLQs:43 HHQs: 73	CLQs:13 HHQs: 26	CLQs:29 HHQs: 39	CLQs:128 HHQs:229
Water Quality (# of measurement locations)	8	4	3	5	20

(*) CLQ: Community level interview; HHQ: Household level interview.

It should further be noted that, as the infrastructure works of Banaz-Salihli (Section 3) and part of Section 4 (initial part of Salihli-Manisa between KM 439+000 and 456+500 and Manisa-Menemen section between KM 522+100 and 547+805) are not within the scope of Contractor, the E&S works to identify baseline conditions (other than those detailed below in the respective section) for Section 3 and parts of Section 4 are excluded from the ESIA scope of works. As the earthworks and all ground disturbing activities are/will be carried out by another contractor, mitigation and monitoring of any E&S impacts stemming from the “infrastructure works” of Section 3 and parts of Section 4 will be under the responsibility of the assigned contractor. However, with the start of the “superstructure works” which will be under Contractor’s responsibility, relevant E&S measures will be in place in line with the impacts identified within this ESIA Report.

Once commissioned, the HSR with all relevant components and infrastructure will be transferred by the AYGEM (Employer) to the TCDD (Operator) for operation. This ESIA addresses the operation phase impacts based the available information on operational facilities and activities. Detailed planning of the operation and maintenance activities will be done by the Employer/Operator in due course.

The ESIA Disclosure Package will be disclosed to public by the Contractor and the Lenders for 30 days. As per the relevant requirements of the international standards, NTS, SEP, and the ESMMFP will also be disclosed in Turkish language by using appropriate disclosure methods.

In the post-ESIA period, E&S performance of the Project will be continually monitored and improved through monitoring activities in accordance with the Project ESAP and the ESMMFP developed as part of this ESIA Report.

The approach to the assessment and management of E&S risks and impacts followed for the Project is presented in Figure 4-1.

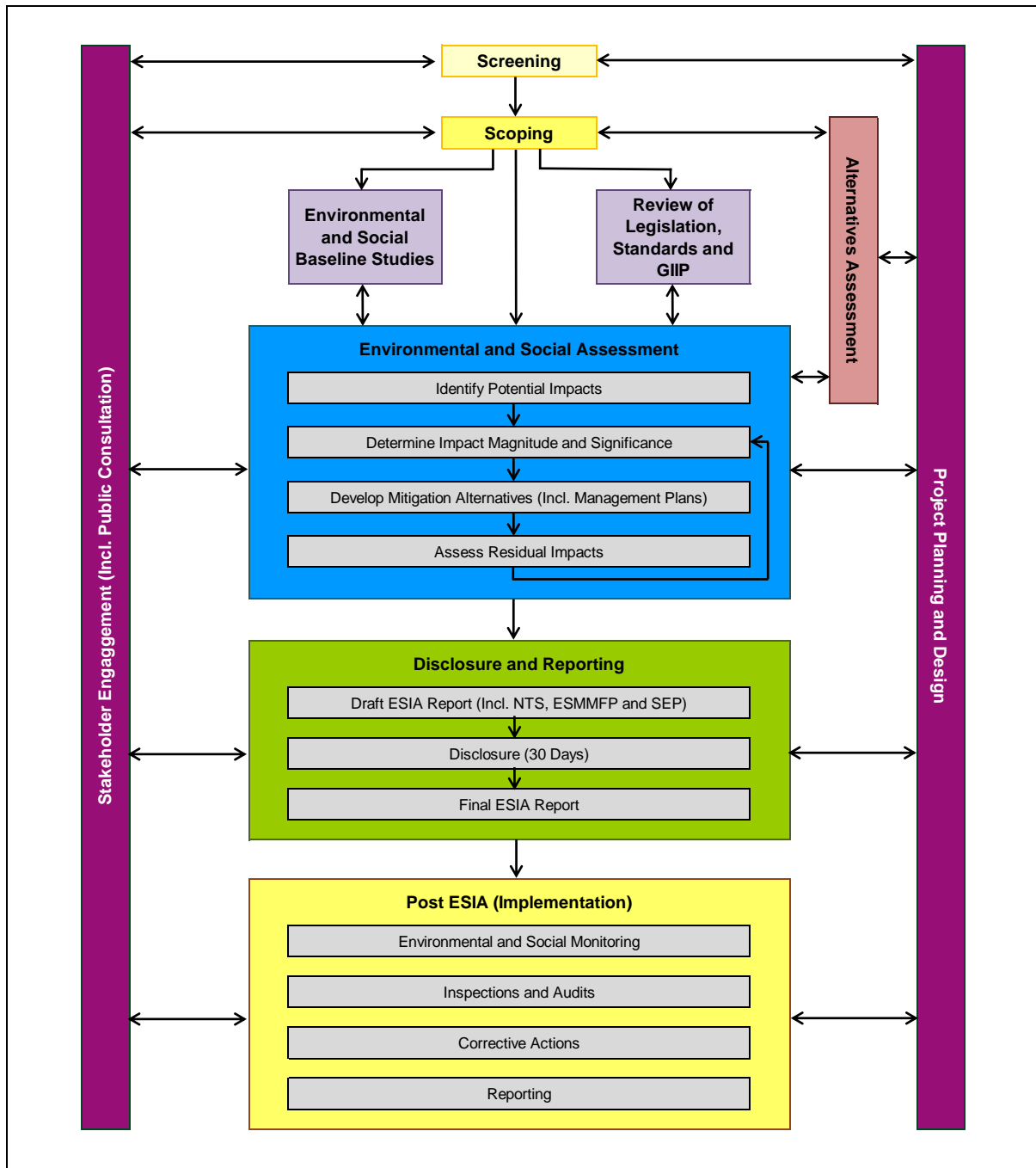


Figure 4-1. ESIA Process

4.2. The ESIA Methodology

The methodology for the assessment of potential E&S impacts of the Project is based on, but not limited to, the following available and applicable literature on environmental and social impact assessment:

- Institute of Environmental Management and Assessment (IEMA), 2011: The State of Environmental Impact Assessment Practice in the UK;
- HA 205/08: Volume 11, Section 2 Environmental Impact Assessment and Handbook for Scoping Projects: Environmental Impact Assessment;
- Scottish Natural Heritage's (SNH) Handbook on Environmental Impact Assessment (2013);
- Other available guidance documents and literature (e.g. Canter, L. 1993, The role of environmental management in responsible project management, The Environmental Professional 15: 76-87; Canter, L. 1996, Environmental Impact Assessment; Standards Association of Australia, 1999)

As required by IFC PS1, the ESIA process for the Ankara-Izmir HSR Project has been based on recent E&S baseline data collected in parallel to the ESIA studies and presented in the respective chapters of this ESIA Report.

4.2.1. Assessment of Impact Significance

In accordance with international good ESIA practice, significance of impacts are determined based on the sensitivity of the receptor/resource and the overall magnitude of the Project's impact on that specific receptor/resource. The magnitude of the impact is determined using quantitative or, where this is not practicable, qualitative methods based mainly on professional judgement. An impact may be either beneficial or adverse, direct or indirect.

The sensitivity of the receptor/resource is identified based on the baseline information established for the Project throughout the ESIA process considering public interest, designations, legal requirements, acceptability, sustainability, etc., and where relevant, in consultation with the affected communities.

The overall magnitude of the impact, on the other hand, represents the degree of change and is influenced by several different factors as given below:

- Geographical extent (wide, local or restricted);
- Magnitude (high, medium or low; e.g. size of the affected area, level of air/water/noise emissions, etc.);
- Reversibility (long-term reversible or irreversible, medium-term reversible or short term reversible);
- Duration (long-term, mid-term or short-term);
- Frequency (continuous, intermittent or one-off).

The specific criteria considered for the prediction of impact magnitude in this Project are given in Table 4-2.

Table 4-2. Specific Criteria for Predicting Overall Magnitude of Impacts

Factor of Overall Magnitude		Scales	
Geographical Extent (*)	Restricted (e.g. within land acquisition corridor, at the footprint of quarry site/borrow site)	Local (e.g. beyond land acquisition corridor, within 1,000 m corridor, within the License Area of the quarry/borrow site)	Wide (e.g. beyond 1,000 m corridor, beyond the license area of the quarry/borrow site)
Duration	Short (within the construction period)	Medium (within 2 years following the completion of construction)	Long (beyond 2 years following the completion of construction)
Reversibility	Short term reversible (within the construction period)	Medium term reversible (within 15 years after construction period)	Long term reversible or Irreversible (reversible at minimum more than 15 years after construction period)
Frequency	One-off/rare	Intermittent	Continuous/Recurrent
Magnitude (*)	Low	Medium	High
Overall Magnitude	Major / Moderate / Minor / Negligible		

(*) Determined separately for each subject; magnitude criteria is based on applicable thresholds, where available, or professional judgement.

The sensitivity of the receptor/resource and the overall magnitude of the Project's impact on that receptor/resource are specifically identified for each E&S topic. The generic criteria are given in Table 4-3, whilst specific assessments are done for each E&S component in the relevant chapters of this ESIA report.

Table 4-3. Generic Criteria for Identification of Receptor/Resource Sensitivity and Impact Magnitude

Level	Receptor/Resource Sensitivity	Impact Magnitude	
		Adverse	Beneficial
High	Highly important (national and international scale of importance), high rarity, potential for substitution very limited	Loss of resource and/or quality and integrity of resources; severe damage to key characteristics, features or elements.	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Medium	Moderately important (regional scale of importance) and moderate rarity, potential for substitution limited	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features and elements	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Minor importance (local scale of importance), not rare	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	No or very low importance and rarity	No or very minor loss or detrimental alteration to one or more characteristics, features or elements	No or very minor benefit to or positive addition of one or more characteristics, features or elements

Source: HA 205/08 Volume 11, Section 2.

Once the sensitivity of the receptor/resource and the overall magnitude of the impact on that specific receptor/resource are identified, the significance of the impact is determined by using a standard 4x4 matrix¹⁵ as given in Table 4-4 including the description of each significance level.

¹⁵ A separate matrix published by the ICOMOS will be used for the assessment of impacts on cultural heritage.

Table 4-4. General Significance Assessment Matrix and Definition of Significance Levels

		Receptor/Resource Sensitivity			
		High	Medium	Low	Negligible
Overall Magnitude	High				
	Medium				
	Low				
	Negligible				
Major	Impacts are considered to be very important and are likely to be material in decision-making, which would be associated with sites or features of international, national or regional importance as well as local importance if the site or feature is subject to a major change. Mitigation measures are imperative to reduce the significance to lower levels before proceeding with the Project.				
Moderate	Impacts are not likely to be key decision-making factors. The cumulative impacts of such factors may influence decision-making, if they lead to an increase in the overall adverse effect on a particular receptor/resource. If possible, impact significance are to be reduced to lower levels by taking mitigation measures; otherwise acceptance of associated risks is required for proceeding with the Project.				
Minor	Impacts may be raised as local factors, which are unlikely to be critical in the decision-making process, but important in enhancing the subsequent design of the Project. Assurance of compliance with standards and safety criteria is sufficient to proceed.				
Negligible	No impact or impacts are beneath the level of perception so that they are acceptable with normal operating procedures.				

Note: The matrix and the definitions have been adapted by GEM from IEMA, 2011; HA 205/08 Volume 11, Section 2 and other impact assessment methodology guidance/handbooks.

For the assessment of impacts on cultural heritage, the specific criteria defined by Burra Charter (International Council on Monuments and Sites - ICOMOS, 1999) are be considered to follow ICOMOS approach and the principles of Guidance on Heritage Impact Assessment for Cultural World Heritage Properties (UNESCO 2011). Thus, the magnitude of the impact of the Project activities on the registered and non-registered cultural heritage sites and the degree of importance of the sites are identified in accordance with the criteria proposed in ICOMOS Guidance (2011), which is recommended by the Ministry of Culture and Tourism for cultural heritage impact assessment studies. The significance of impacts is identified through professional judgement using the impact assessment matrices published by the ICOMOS¹⁶.

4.2.2. Approach to Management of Potential Impacts

Based on the outcomes of the impact assessment, measures and management plans/programs that would avoid, minimise, mitigate, and as a last resort, offset and/or compensate any potential residual adverse impacts is developed in line with the mitigation hierarchy. The ESIA study aims to propose measures regardless of the identified level of significance (even for potentially low or medium significance impacts), except for some of the impacts identified as “negligible”.

Residual impacts are impacts that remain after the implementation of the proposed management measures, plans and programs. Significance of residual impacts is also assessed as part of the ESIA study.

The management/mitigation measures developed as part of the ESIA have been incorporated to an ESMMFP as part of the Project ESMS. The ESMMFP covers all the commitments and management measures proposed throughout the ESIA Report, with monitoring/key performance indicators for successful implementation. The ESMMFP forms the basis of specific E&S management plans to be developed by the Contractor based on the Final ESIA Report. Effective implementation of the management measures, plans and programs will aim at ensuring Project's E&S performance is maintained at a level that achieves compliance with national and international standards. The Project-specific E&S management system (ESMS) is described in Chapter 18 of this ESIA Report. The ESMS includes a Monitoring and Review component (see Section 18.8) detailing the monitoring system to be implemented to measure the effectiveness of the ESMS and the management program and compliance of the Project's E&S performance with the Project Standards.

¹⁶ Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, January 2011, pages 9-10.

4.3. Project's Area of Influence

IFC PS1 states that “where the project involves specifically identified physical elements, aspects, and facilities that are likely to generate impacts, environmental and social risks and impacts will be identified in the context of the project's area of influence (Aol)”, which is defined as to encompass the following (IFC, 2012):

- The area likely to be affected by:
 - (i) the project and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project;
 - (ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or
 - (iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.
- Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable.
- Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

In line with IFC's definition of Aol, the overall ESIA study area for the Project, consisting sub-study areas for specific E&S impacts, has been determined wide enough to cover the Project Aol, over which E&S impacts could reasonably occur either on their own or in combination with other projects/developments. For the railway, a linear study corridor has been defined. For other separate Project facilities (quarries, borrow sites, etc.) outside the linear study corridor, specific study areas have been defined around the facility boundaries. For each E&S subject (e.g. biodiversity, socio-economy, cultural heritage noise, air quality, water quality), specific study areas have been identified and described in respective chapters of this ESIA Report. Then, the potential E&S impacts of the Project have been identified and assessed within the context of Project Aol.

The specific Aols for the relevant E&S components are defined in Table 4-5.

Table 4-5. Definition of Aol for Relevant E&S Subjects

E&S Subject	Definition of the Aol
Land Use	Expropriation corridor of the HSR and the footprint of the off-site Project facilities (located outside the expropriation corridor) including the quarries, material borrow sites, construction camp sites, excavated material storage sites, etc.
Noise	<p>For the construction;</p> <ul style="list-style-type: none"> - Area within which the noise emission levels at the source diminish below the most stringent Project Standard for noise, which is the night-time guideline value of the WBG EHS Guidelines for Noise Level (45 dBA). Depending on the topographical and site-specific factors, this area varies for each noise source (please see Chapter 6 for the grid noise maps), restricted with 500 m from the noise emission source based on the outcomes of the modeling studies. <p>For the operation;</p> <ul style="list-style-type: none"> - Area within which the noise emission levels at the source diminish below the most stringent Project Standard for noise, which is the night-time guideline value of the WBG EHS Guidelines for Noise Level (45 dBA). Depending on the topographical and site-specific factors, this area varies for each noise source and the details of the operations (type of trains, number of wagons, etc.). According to the worst-case noise modeling study, the maximum potential impact corridor for the operation phase of the Project is 1,250 meters from both sides of the railway axis (in total 2,500 meters corridor)

E&S Subject	Definition of the Aol
Vibration	<p>For the construction;</p> <ul style="list-style-type: none"> - 200 meters for basalt resources - 220 meters for limestone resources <p>According to the vibration assessment study carried out in line with the FTA Guideline Vibration Screening Procedure, the critical distance has been determined as 61 m (200 ft) for all receptor locations along the Project route. A detailed vibration exposure analysis will be carried out for receptors beyond this distance to detail the mitigation measures to be implemented on infrastructure design.</p> <p>-</p>
Air Quality (Dust Emissions)	<p>1 km corridor (500 m at each side of the HSR axis)</p> <p>2 km x 2 km study area around the quarries and material borrow sites, impact area varying and being restricted within the study area based on the meteorological, topographical and site-specific factors.</p>
Biodiversity	<p>Biodiversity Study Area/Biodiversity Aol - 500 m corridor (250 m at each side of the HSR) along the rail alignment, Biodiversity Study Area for the quarries - License Area of the quarries (operational activities of quarries are carried out in a limited area within their license area), Area of Analysis for Critical Habitat Assessment - Please see Section 10.2.8 of the ESIA Report</p>
Socio-economy	<p>Settlements affected from Project-related land acquisition along the railway route between Ankara (Polatli district) and Izmir (Menemen district) (see Appendix A)</p> <p>Settlements located in the proximity of the associated/off-site Project facilities including quarries, material borrow sites, construction camp sites, etc. (see Table 1-17, Table 1-18 and Table 1-19 in Chapter 1)</p> <p>Settlements located in the proximity of the stations/gars (see Chapter 11 on Socio-economy and Chapter 13 on Community Health and Safety)</p>
Cultural Heritage	<p>Expropriation corridor of the HSR plus 50 m corridor at each side of the expropriation corridor boundary, and the footprint of the off-site Project facilities (located outside the expropriation corridor) including the quarries, material borrow sites, construction camp sites, excavated material storage sites, etc.</p>
Cumulative Impacts	<p>For Cumulative Impact Assessment (CIA), the CIA area has been identified as 50 km wide corridor (25 km from each side of the Railway axis) for the assessment of potential cumulative impacts, as defined in Chapter 15. The present and reasonably foreseeable developments and the valued environmental and social components (VECs) have been searched and identified within the CIA area.</p>

5. LAND USE AND GEOLOGY

This Chapter has been structured to identify existing characteristics and potential impacts of the Project with respect to land use and geology and describe the mitigation measures to be taken for the management of potential impacts. The potential social impacts of the changes in land use types and users of the affected parcels (e.g. agricultural, pasture, forest, etc.) are discussed in Chapter 11 on Socio-economy.

The potential Project impacts on land use stemming from the Project/associated facilities located within and outside the expropriation corridor have been included in the ESIA study to the extent information was made available up until ESIA design freeze during Scoping Phase. Any new facilities (e.g. quarries) to be included within the Project will require identification of potential site-specific impacts and management measures, where necessary.

5.1. Project Standards

Depending on the land use characteristics of the railway route and off-site Project/associated facilities (e.g. quarries, material borrow sites, construction camp sites when they are located outside the expropriation corridor), the following national laws and regulations will be applicable to the permitting processes and management of impacts on different land use types:

- Agricultural Reform Law on Land Rearrangement in Irrigated Areas (Law No: 3083, 1984)
- Expropriation Law (Law No: 2942, 1983)
- Law on Soil Conservation and Land Use (Law No:5403, 2005)
- Pasture Law (Law No:4342, 1998)
- Forestry Law (Law No:6831, 1956)
- Implementation Regulation on Soil Protection and Land Use
- Regulation on the Conservation, Use and Planning of Agricultural Lands
- Regulation on the Control of Soil Pollution and Lands Contaminated by Point Sources
- Regulation on the Extraction, Operation and Control of Sand, Gravel and Similar Materials

5.2. Baseline Conditions

The baseline conditions of the land use characteristics overlapping with the Project expropriation corridor and Project/associated facilities located outside the expropriation corridor (e.g. quarries, material borrow sites) have been analysed by using Geographic Information System (GIS) tools based on the following main data sources:

- Expropriation Plans prepared for all¹⁷ settlements within the expropriation corridor of the Project and approved by the State Railways of the Republic of Turkey (TCDD) (settlement by settlement prepared between 2012 and 2018);
- Expropriation progress reports of TCDD regional directorates;
- The public information system of the General Directorate of Land Registry and Cadastre¹⁸;
- Public databases of the governmental institutions:
 - General Directorate of Mineral Research and Exploration (MTA), Online Geoscience Map Viewer¹⁹
 - Disaster and Emergency Management Presidency of Turkey (AFAD), Earthquake Research Department's database²⁰

¹⁷ Remaining expropriation works and locations where expropriation plans will be prepared/reprepared are summarised in Chapter 11 on Socio-economy.

¹⁸ <https://parselsorgu.tkgm.gov.tr/>

¹⁹ <http://yerbilimleri.mta.gov.tr>

²⁰ <https://tdth.afad.gov.tr/TDTH/main.xhtml>

5.2.1. Land Use

5.2.1.1. General Land Use Characteristics and Land Ownership

The land use characteristics/ownership of the parcels located within the expropriation corridor of the railway and at the quarry and material sites included in the current Project design are described below.

Expropriation Corridor

Based on the expropriation plans prepared for the Project and approved by the TCDD, the land use/ownership characteristics of the parcels affected/to be affected within the expropriation corridor²¹ are classified as below:

- Privately owned lands
- Treasury lands
- Lands owned by legal entities
- State-owned pasture lands
- State-owned forest lands
- Lands subject to court cases (litigious parcels regardless of land use and ownership)

Number and area of affected parcels within the Project expropriation corridor for the full HSR alignment are summarised in Table 5-1 based on the Expropriation Plans. Accordingly, total area within the expropriation corridor of the Project sums up to 3,556.50 ha. In the ESIA, it has been assumed that all the privately-owned lands are agricultural, and the treasury lands do not include any agricultural land. As such, approximately 63% (2,247.45 ha) of the land (in terms of area) and %76 (8,647 parcels) of the parcels (in terms of parcel numbers) acquired/will be acquired within the expropriation corridor of the Project is classified as agricultural land.

Majority of the land acquisition within the Project expropriation corridor has been carried out by the TCDD in line with the Expropriation Law (No. 2942, 1983). Settlement based status of expropriation along the Project is explained in Chapter 11 on Socio-economy. Institutional responsibilities for the future expropriation works will be clarified between the Employer/Project Owner - AYGM - and the TCDD. As such, all land within the expropriation corridor have been/will be acquired and allocated by the Employer/Project Owner to the Project.

As required by the related authorities (i.e. Ministry of Agriculture and Forestry and its district and provincial directorates), permit for the use of agricultural lands for non-agricultural purposes will be obtained as per the requirements of the Law on Soil Protection and Land Use (Law No: 5403, 2005). As per the national legislation and consistent with the Construction Contract, the Employer (as the Project Owner) will acquire the land use related permits required for the Project, where needed ensuring preparation of necessary documentation (e.g. soil conservation projects).

²¹ The expropriation corridor for the HSR has a minimum width of 30 meters along the HSR alignment. The width of the expropriation is extended up to 100 m based on the design of excavation and fill areas, footprint of the stations, etc.

Table 5-1. Number and Area of Affected Parcels within the Project Expropriation Corridor (based on Expropriation Plans for Full Alignment)

Section (*)	Description	Privately Owned Lands (Agricultural)	Treasury Land	State-owned Pasture Land	State-owned Forest Land	Lands owned by the Legal Entities	Lands Subject to Court Cases (Litigious – Not related to the Project)	Total
Number of Affected Parcels								
Section 1	- Polatli-Afyon	2,119	287	157	21	380	3	2,967
Section 2	- Afyon-Banaz	2,123	201	178	2	233	0	2,737
Section 3	(3a) Banaz-Esme	1,669	304	54	22	10	3	2,062
	(3b) Esme-Salihli	907	226	29	43	77	0	1,282
Section 4	(4a) –(4b) Salihli-Manisa	1,308	17	2	0	245	0	1,572
	(4c) Manisa North Passage	278	5	0	0	79	1	363
	(4d) Manisa-Menemen	243	57	1	0	42	0	343
Total		8,647	1,097	421	88	1,066	7	11,326
Percentage of Affected Parcels in terms of Number of Affected Parcels (%)								
Section 1	- Polatli-Afyon	18.71	2.53	1.39	0.19	3.36	0.03	26.20
Section 2	- Afyon-Banaz	18.74	1.77	1.57	0.02	2.06	0.00	24.17
Section 3	(3a) Banaz-Esme	14.74	2.68	0.48	0.19	0.09	0.03	18.21
	(3b) Esme-Salihli	8.01	2.00	0.26	0.38	0.68	0.00	11.32
Section 4	(4a) –(4b) Salihli-Manisa	11.55	0.15	0.02	0.00	2.16	0.00	13.88
	(4c) Manisa North Passage	2.45	0.04	0.00	0.00	0.70	0.01	3.21
	(4d) Manisa-Menemen	2.15	0.50	0.01	0.00	0.37	0.00	3.03
Total		76.35	9.69	3.72	0.78	9.41	0.06	100.00
Area of Affected Parcels (ha)								
Section 1	- Polatli-Afyon	574.68	158.70	486.34	46.08	42.62	0.29	1,308.69
Section 2	- Afyon-Banaz	395.18	58.89	59.01	7.08	39.46	0.00	559.62
Section 3	(3a) Banaz-Esme	500.21	55.02	56.08	21.78	0.51	6.56	640.16
	(3b) Esme-Salihli	306.66	36.35	39.52	128.37	8.83	0.00	519.72
Section 4	(4a) –(4b) Salihli-Manisa	353.47	4.29	2.22	0.00	38.99	0.00	398.98
	(4c) Manisa North Passage	100.33	1.29	0.00	0.00	7.00	0.23	108.86
	(4d) Manisa-Menemen	16.91	1.84	0.07	0.00	1.64	0.00	20.46
Total		2,247.45	316.38	643.23	203.31	139.05	7.08	3,556.50

Section (*)	Description	Privately Owned Lands (Agricultural)	Treasury Land	State-owned Pasture Land	State-owned Forest Land	Lands owned by the Legal Entities	Lands Subject to Court Cases (Litigious – Not related to the Project)	Total
Percentage of Affected Parcels in terms of Affected Area (%)								
Section 1	- Polatli-Afyon	16.16	4.46	13.67	1.30	1.20	0.01	36.80
Section 2	- Afyon-Banaz	11.11	1.66	1.66	0.20	1.11	0.00	15.74
Section 3	(3a) Banaz-Esme	14.06	1.55	1.58	0.61	0.01	0.18	18.00
	(3b) Esme-Salihli	8.62	1.02	1.11	3.61	0.25	0.00	14.61
Section 4	(4a) –(4b) Salihli-Manisa	9.94	0.12	0.06	0.00	1.10	0.00	11.22
	(4c) Manisa North Passage	2.82	0.04	0.00	0.00	0.20	0.01	3.06
	(4d) Manisa-Menemen	0.48	0.05	0.00	0.00	0.05	0.00	0.58
Total		63.19	8.90	18.09	5.72	3.91	0.20	100.00

Source: Expropriation Plans prepared for the Parcels (approved by TCDD) within the Expropriation Corridor, 2012-2018.

(*) Expropriation plans for Ankara-Konya HSR Connection Line (KM 7+800; 0+000-6+683.120), Hatipler Relocation (KM267+156.053-278+632.464), and part of Manisa-Menemen (KM 531+517-539+100) will be prepared/reprepared thus have not been included in the data presented.

Quarries and Material Borrow Sites included in the Current Project Design of the Contractor (Full Alignment)

The land use/ownership characteristics of the quarries and material borrow sites included in the current Project design are presented in Table 5-2 based on the Land Registry and Cadastre Database of Turkey²². Total area of the parcels where the quarries and material borrow sites are located sums up to 1,794.87bha (this cover the entire license area of the quarries and material borrow sites; the operation license area for each site, where the material extraction activities will be conducted, might be smaller than the license area).

Table 5-2. Land Use Types of the Affected Parcels at the Quarry and Material Borrow Sites

Facility Name	Construction Facility	Railway KM	Land Use Type (according to Online Land Registry and Cadastre Database of Turkey)	Area (ha)
Section 1				
10 – Beycegiz	Quarry	0+000	Pasture	22.47
18 - Yagmurbaba 2	Quarry	0+000	Agricultural land Grassland	123.81
29 - Yenice	Quarry	2+050	Raw Soil	11.52
32-A.O.1-A.O.2	Borrow Site	11+000	Pasture	67.83
33-A.O.3	Borrow Site	12+500	Pasture	66.70
34-Kabakkoy	Borrow Site	13+400	Pasture	9.87
36- Turktaciri	Quarry	16+000	Pasture	11.98
37-A.O.4	Borrow Site	16+200	Pasture, Agricultural land	37.14
38-A.O.5	Borrow Site	23+150	Pasture	38.32
40 - Kayakent	Quarry	31+200	Pasture	20.02
42-A.O.6	Borrow Site	34+000	Pasture	42.20
59-A.O.9	Borrow Site	57+000	Pasture	59.47
70-A.O.10	Borrow Site	70+800	Pasture	45.68
75 - Alibeyce	Quarry	92+200	Forestry Raw Soil	25.33
78 - Tabaklar	Quarry	99+000	Pasture	19.88
82 - Emirin Koyu	Quarry	106+500	Forestry	243.22
94 - Bayat	Quarry	114+800	Forestry	12.01
97 - Bayat 2	Quarry	120+500	Forestry	65.18
100-Koroğlubeli-1	Borrow Site	124+500	Pasture	0.97
101-Koroğlubeli-2	Borrow Site	124+500	Pasture	0.69
105-A.O.14	Borrow Site	136+300	Plot, Raw Soil Agricultural Land	63.94
120 - Gebeceler 2	Quarry	145+500	Pasture	10.00
122-Akcın	Borrow Site	149+500	Pasture	9.63
123- Akcın-2	Borrow Site	150+500	Pasture	9.98
124 - Beyyazi	Quarry	155+500	No registry	99.80
Total				1,117.64
Section 2				
152 - Ayvali	Quarry	187+700	Agricultural Land (litigious)	97.71
176 - Elvanpasa 2	Quarry	207+900	Pasture Quarry Raw Soil	79.78
197 - Dumenlerkoyu	Quarry	231+000	Agricultural land Pasture No registry	99.48
198-64/2005-10	Borrow Site	241+000	Pasture	9.85
Total				286.82
Section 3				
204-Derbent	Borrow Site	288+000	No registry	8.03

²² <https://parselsorgu.tkgm.gov.tr/>

Facility Name	Construction Facility	Railway KM	Land Use Type (according to Online Land Registry and Cadastre Database of Turkey)	Area (ha)
214 – Ahmetlidag 2	Quarry	353+000	Forestry	26.29
226 – Hayalli	Quarry	414+000	No registry	20.34
231-2009-11	Borrow Site	430+700	Pasture, No registry	8.11
232 – Dombayli	Quarry	431+500	Pasture	2.43
Total				65.20
Section 4				
234 - Akkoy	Quarry	471+500	No registry	9.94
234 - B - Campinar	Quarry	476+500	Forestry	71.84
235 - Cikrikci	Quarry	472+000	No registry	30.02
239 – A- 3229556 (Asagi Cobanisa)	Quarry	497+600	No registry	75.37
238 - Ansizca 1	Quarry	499+000	No registry	2.16
239 - Ansizca 2	Quarry	501+000	No registry	4.68
243 - Yunusemre	Quarry	524+500	Forestry	54.78
245 - Gurle	Quarry	527+700	No registry	14.34
258 - Caltidere 2	Quarry	538+000	Pasture Raw Soil	25.67
263 - Degirmendere	Quarry	539+500	Agricultural land, TCDD Auxiliary Building	36.41
Total				352.21
Grand Total				1,794.87

Source: Land Registry and Cadastre Database, January 2021.

The other contractors continuing infrastructure works in Section 3a, Section 3b, Section 4a, and Section 4d use quarries and borrow sites. These works are conducted as per the requirements of the applicable national legislation. The list of quarries and material borrow sites used by other contractors is not available to the Contractor at the time of compilation of this ESIA Report.

5.2.1.1.1. Agricultural Lands within the Expropriation Corridor - District-level Distribution

Table 5-3 presents the district-level breakdown of the number and area of agricultural parcels within the expropriation corridor of the Project based on the expropriation plans for the full HSR alignment.

Table 5-3. Agricultural Parcels within the Expropriation Corridor – District Level Distribution

Section	Province	District	Number of Agriculture Parcels	Expropriation Area (ha)
Section 1	Ankara	Polatli	124	54.34
	Eskisehir	Gunyuzu	80	39.66
		Sivrihisar	109	42.44
	Afyonkarahisar	Emirdag	748	230.68
		Bayat	208	35.41
		Iscehisar	424	60.68
		Merkez	426	111.48
Section 2		Merkez	622	164.07
		Sinanpasa	1,066	140.82
	Kutahya	Dumlupinar	145	36.85
	Usak	Banaz	290	53.44
Section 3		Banaz	697	111.05
		Merkez	399	196.82
		Ulubey	466	160.95
		Esme	441	131.52
	Manisa	Alasehir	224	91.51
		Kula	33	10.58
		Salihli	316	104.44

Section	Province	District	Number of Agriculture Parcels	Expropriation Area (ha)
Section 4		Salihli	265	92.60
		Ahmetli	298	70.54
		Sehzadeler	319	119.26
		Turgutlu	591	132.99
		Yunusemre	99	12.48
	Izmir	Menemen	257	42.86
Total			8.647	2.247.45

Source: Expropriation Plans prepared for the Parcels (approved by TCDD) within the Expropriation Corridor, 2012-2018.

5.2.1.1.2. Pasture Lands within the Expropriation Corridor - District-level Distribution

Table 5-4 presents the district-level distribution of the number and area of pasture parcels within the expropriation corridor of the Project based on the expropriation plans for the full HSR alignment.

Table 5-4. Pasture Parcels within the Expropriation Corridor – District Level Distribution

Section	Province	District	Number of Pasture Parcels	Expropriation Area (ha)
Section 1	Ankara	Polatli	9	45.99
	Eskisehir	Gunyuzu	30	170.06
		Sivrihisar	29	172.63
	Afyonkarahisar	Emirdag	37	73.19
		Bayat	32	20.76
		Iscehisar	19	3.49
Section 2		Merkez	82	32.31
		Sinanpasa	45	10.00
	Kutahya	Dumlupinar	7	1.68
	Usak	Banaz	45	15.23
Section 3		Banaz	30	17.85
		Merkex	7	5.65
		Ulubey	4	3.75
		Esme	27	48.85
	Manisa	Alasehir	4	2.28
		Salihli	11	17.20
Section 4		Salihli	2	2.22
		Yunusemre	1	0.07
Total			421	643.23

Source: Expropriation Plans prepared for the Parcels (approved by TCDD) within the Expropriation Corridor, 2012-2018.

5.2.1.1.3. Forest Lands within the Expropriation Corridor – District-level Distribution

Table 5-5 presents the district-level distribution of the number and area of forest parcels within the expropriation corridor of the Project based on the expropriation plans for the full HSR alignment.

Table 5-5. Forest Parcels within the Expropriation Corridor – District Level Distribution

Section	Province	District	Number of Forest Parcels	Expropriation Area (ha)
Section 1	Afyonkarahisar	Emirdag	2	4.12
		Bayat	16	33.16
		Iscehisar	3	8.79
Section 2		Merkez	1	4.37
		Sinanpasa	1	2.71
Section 3	Usak	Merkez	1	0.00
		Ulubey	4	4.22
		Esme	38	60.08
	Manisa	Alasehir	14	78.35
		Kula	8	7.50
Total			88	203.31

Source: Expropriation Plans prepared for the Parcels (approved by TCDD) within the Expropriation Corridor, 2012-2018.

5.2.1.2. Land Use Capability Classes

In the national context, land capability classes are designated by the numbers I through VIII. I-IV land classes are classified as arable lands suitable for agricultural practices and the remaining classes (V-VIII) are unsuitable for cultivation, non-arable lands.

The land use capability classes of the agricultural lands were discussed within the national Environmental Impact Assessment (EIA) Report for a corridor of 2 km along the Project route, as summarised in Table 5-6.

Table 5-6. Land Use Capability Classes of Agricultural Lands (within 2 km corridor) as indicated in the National EIA Report

Railway KM(*)	District	Dominant Land Use Capability Classes of Agricultural Lands	Land Type	Comments
0+000 – 6+000	Polatli	Class II, III and IV	Arable lands	The most dominant type of land is Class II.
6+000 – 10+000		Class II	Arable lands	
10+000 – 14+000		Class IV	Arable lands	
14+000 – 46+000	Gunyuzu Sivrihisar	Class II Class VII	Non-arable lands	The most dominant type of land is Class II.
46+000 – 72+000	Sivrihisar Emirdag	Class I, II, III and IV	Arable lands	The most dominant type of land is Class VI.
		Class VI and VII	Non-arable lands	
72+000 – 80+000	Emirdag	Class III and IV	Arable lands	
80+000 – 100+000		Class II and IV	Arable lands	
100+000 – 110+000		Class I, II, III and IV	Arable lands	
110+000 – 116+000	Bayat	Class VII	Non-arable lands	The most dominant type of land is Class VII.
116+000 – 121+000		Class III	Arable lands	
		Class VI and VII	Non-arable lands	
121+000 – 133+000	Bayat Iscehisar	Class VII	Non-arable lands	
133+000 – 138+000	Iscehisar	Class II and IV	Arable lands	
		Class VI and VII	Non-arable lands	
140+000 – 145+000		Class II and III	Arable lands	
		Class VI and VII	Non-arable lands	

Railway KM(*)	District	Dominant Land Use Capability Classes of Agricultural Lands	Land Type	Comments
145+000 – 153+000	Merkez	Class I	Arable lands	
153+000 – 164+000		Class I, II and III Class VI	Arable lands Non-arable lands	
164+000 – 200+000	Merkez Sinanpasa	Class III and IV Class VII	Arable lands Non-arable lands	
200+000 – 210+000	Sinanpasa	Class II, III and IV	Arable lands	
210+000 – 220+000	Dumlupinar	Class I and II Class VII	Arable lands Non-arable lands	
220+000 – 230+000	Banaz	Class III and IV Class VII	Arable lands Non-arable lands	
230+000 – 250+000		Class II, III and IV Class VI	Arable lands Non-arable lands	
250+000 – 256+000		Class II, III and IV	Arable lands	
256+000 – 263+000		Class VII and VIII	Non-arable lands	
263+000 – 280+000		Class I, II and III Class VI	Arable lands Non-arable lands	The most dominant type of land is Class VI.
280+000 – 292+000		Class I, II, III and IV Class V	Arable lands Non-arable lands	The most dominant type of land is Class II.
292+000 – 323+000	Merkez	Class I, II, III and IV Class VI	Arable lands Non-arable lands	The most dominant types of land are Class II and III.
323+000 – 345+000		Class II, III and IV Class VI	Arable lands Non-arable lands	The most dominant type of land is Class II.
345+000 – 348+000	Ulubey	Class III	Arable lands	
348+000 – 353+000		Class III and IV Class VI and VII	Arable lands Non-arable lands	
353+000 – 360+000	Esme	Class VII	Non-arable lands	
360+000 – 377+000		Class VI	Non-arable lands	
377+000 – 403+000	Esme Kula Alasehir	Class VII	Non-arable lands	
403+000 – 410+000	Kula Alasehir	Class I, II and III	Arable lands	
410+000 – 414+000	Alasehir	Class I	Arable lands	
414+000 – 418+000		Class IV	Non-arable lands	
418+000 – 431+000	Alasehir Salihli	Class I	Arable lands	
431+000 – 438+000	Salihli	Class III	Arable lands	
438+000 – 485+000	Salihli Ahmetli Turgutlu	Class I	Arable lands	
485+000 – 530+000	Sehzadeler	Class I and II	Arable lands	
530+000 – 538+000	Yunusemre	Class VI and VII	Non-arable lands	
538+000 – 548+000	Menemen	Class I and II	Arable lands	

(*) Railway KMs are obtained from National EIA Report. There may be differences in the KM chainages in the current design considered in this ESIA Report.

Source: National EIA, 2016.

5.2.2. Geology

5.2.2.1. General Geological Setting and Tectonics

Turkey is composed of three main tectonic sections, called the Pontides the Anatolides – Taurides and the Arabian Platform, as can be observed in Figure 5-1. These tectonic sections and the fragments were separated by the oceans during most of the Phanerozoic era. These oceans, then, were closed during late Tertiary era, and three main tectonic sections were separated by the suture zones that mark the closing points of the former oceans (Okay, 2008).

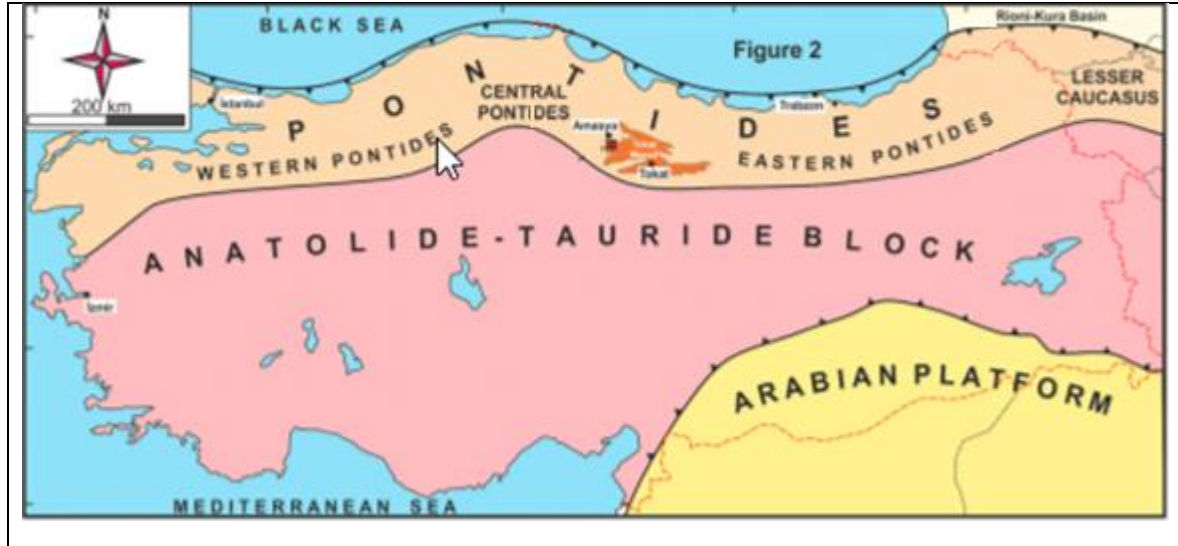


Figure 5-1. Main Tectonic Zones of Turkey (Eyuboglu et al., 2018)

The Strandia Massif, the Istanbul Terrane and the Sakarya Terrane used to represent the northern part of the Neo-Tethys Ocean, comprises the Pontides. The Neo-Tethys Ocean completely disappeared because of the collision of the Anatolia – Taurus platform and the Pontide Island Arc, and the collision zone is currently labelled by the Izmir-Ankara-Erzincan suture zone (Okay, 2008).

The Anatolides-Taurides is the main tectonic unit the Project route passes through. It is composed of several zones, massifs and crystalline complexes. The intense deformation and metamorphosis that was caused by Alpidic Orogeny was one of the reasons of this complex structure, as well as the disappearance of the southern branch of Neo-Tethys Ocean during Miocene era by continental collision of the Anatolian Platform and the Arabian Plate.

The Bitlis-Zagros Suture Zone was formed along the line of continental collision due to the closure of the southern Neo-Tethys Ocean. During the Middle Miocene era, the Red-Sea-Aden Gulf was also formed, which further pushed the Arabian Plate towards north/northeast.

These events caused formation of two main fault zones in Turkey; the North Anatolian Fault Zone (NAFZ) and the East Anatolian Fault Zone (EAFZ). These two fault zones are the result of Arabian Plate's constant movement towards northeast, which causes compressional forces on the zones. This also causes a north/south directional stress in Aegean Region, and in return, tectonic structures in that region were formed, such as horsts and grabens. The north/northeast movement of the Arabian Plate is still ongoing, and it has a large role in the current tectonic situation of Turkey (Okay, 2008). A tectonic map of Turkey showing the described main zones and terranes is presented in Figure 5-2.

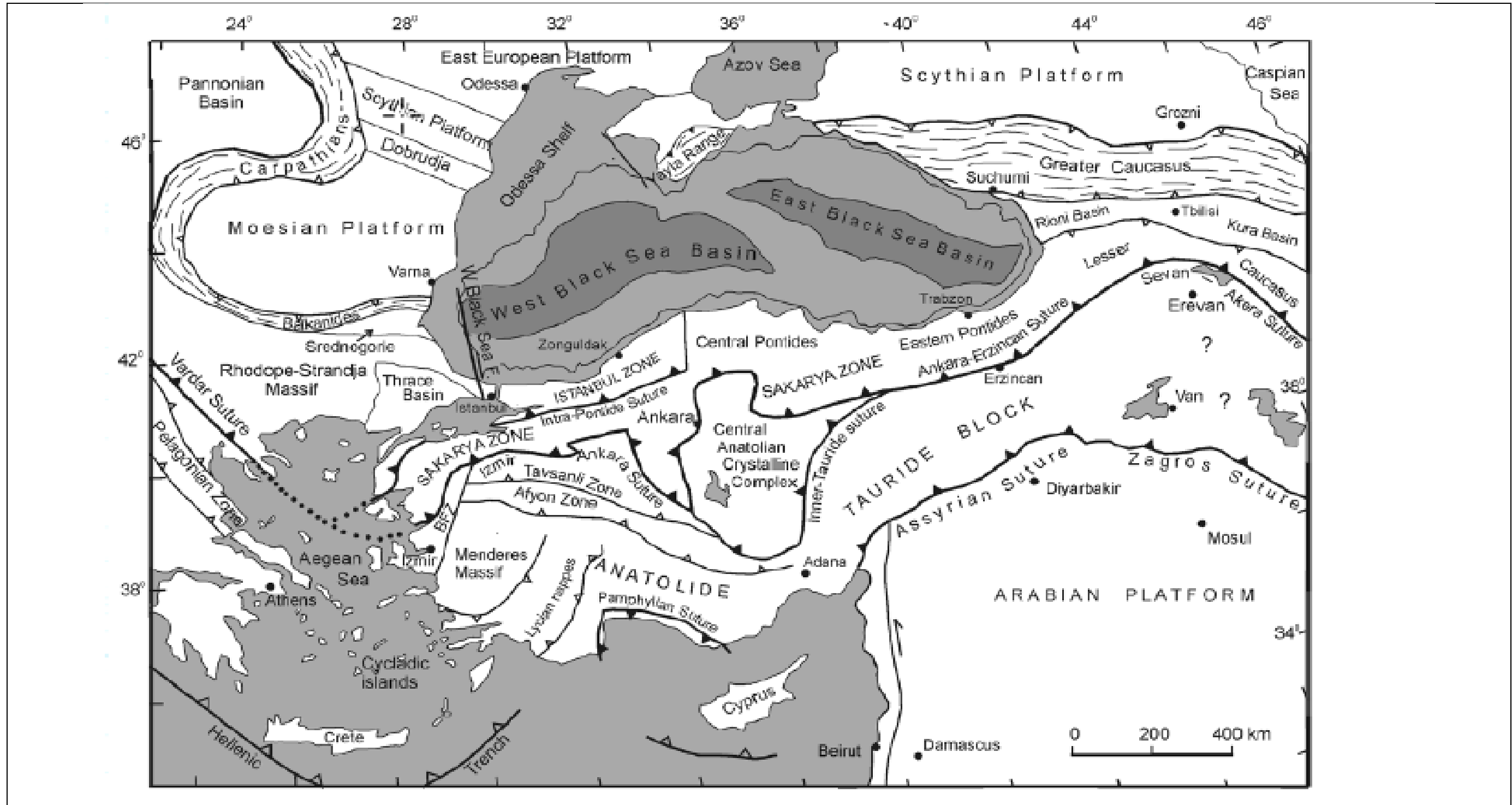


Figure 5-2. Tectonic Map of Turkey and General Region (Source: Okay, 2008)

5.2.2.2. Geology of the Railway Route

5.2.2.2.1. Stratigraphy

The Project route from Ankara (Polatli district) to Izmir (Menemen district) passes through two different geographical regions in Turkey (Central Anatolia and Aegean) and is represented by a high number of different geological formations in each section of the Project. The geological formations in each section of the Project have been identified based on the geotechnical reports prepared by specialised engineering companies between 2013 and 2018 and are summarised in Table 5-7.

For Section 3a, Section 3b, Section 4a, and Section 4d, preparation of the geological and geotechnical surveys have been under the responsibility of other contractors that will conduct and complete the ongoing infrastructure works in these sections consistent with the requirements of the applicable national legislation and their existing contracts with the TCDD. The existing geological and geotechnical survey results for these sections will be requested (through the Employer) during the site hand over and the documentation along with the site-specific measures implemented during the infrastructure works will reviewed/updated through any necessary study by the Contractor.

Table 5-7. Geological Formations along the Project Route

Section	Sub-section	Geological Formations														
		Caldag Formation	Kartal Formation	Kirkkayak Formation	Eskipolatli Formation	Afyon Metamorphites	Olucak Formation	Balihisar Formation-Aktas	Balihisar Formation-Acikir	Cakmak Formation	Gebeciler Formation	Afyon Volcanites	Golsel Cokeller	Hacibekir Group	Menderes Massif	Neojen Yasli Cokel Istifi
Section 1	Polatli – Afyon	+	+	+	+	+	+	-	+	+	+	+				
Section 2	Afyon – Hatipler Passage												+	+		
	Hatipler Passage															
Section 4	Salihli Passage															
	Salihli – Manisa														+	+
	Manisa Passage															
– : Not within the scope of the Contractor																
+ : Available formations in the Section																

Source: Various Engineering and Consultancy Companies contracted in the scope of the Project, 2013-2018. Geotechnical Reports.

Description of each formation²³ along the Project Route is provided in Table 5-8 based on literature research.

Table 5-8. Description of the Geological Formations along the Project Route

Section	Formation	Description
Section 1	Caldag Formation	On the Project route, the Caldag ophiolite were observed between 0+000 km and 55+000 km. The Caldag ophiolite is a fragment of Neo – Tethys in western Turkey (Tavlan, Thorne, & Herrington, 2011). The Caldag ophiolite was weathered only from the the Mid-Palaeocene to the Late Miocene and from the Mid-Pliocene until the present. There are favourable conditions for weathering of Caldag ophiolite, as biological, palaeoecological and isotropic records suggested (Tavlan, Thorne, & Herrington, 2011).
	Kartal Formation	On the Project route, the Kartal formation were observed between 0+000 km and 55+000. Kartal Formation is the micaceous shales of Pendik Formation, overlying the limestones and designate clastic sediment input into the basin. It is abundant with macro fossils like tabulate corals, brachiopods, trilobites etc (Lom, Ülgen, Sakinç, & Şengör, 2016). It was formed with red terrestrial fragments (Turgay & Kurtuluş, 1985).
	Kirkkavak Formation	On the Project route, the Kirkkavak formation were observed between 0+000 km and 55+000 km. Kirkkavak Formation is turbiditic, and composed of organic rich shales. The upper part of Kirkkavak Formation incorporates lenticular channel fills that consist of gravels and sandstones. In the upper part, in some higher regions, limestone interbeds can be observed. Potential reservoirs can be encountered in the shallow layers of Kirkkavak formation (Aydemir, 2011).
	Eskipolatli Formation	On the Project route, the Eskipolatli formation were observed between 0+000 km and 55+000 km. Eskipolatli formation is composed of sandstones with marl and gray mudstones (Turgay & Kurtuluş, 1985).
	Afyon Metamorphites	On the Project route, Afyon Metamorphites were observed between 10+000 km and 150+000 km. Afyon metamorphites are in Afyon metasedimentary group, along with Anatolian carbonate platform. The metamorphic evolution of Afyon metamorphites were unconformably covered by Triassic sediments, and before Mesozoic era. (Tolluoğlu, Erkan, Sümer, Boyacı, & (Bektaş) Yavaş, 1997)
	Olucak Formation	On the Project route, the Olucak Formation were observed between 10+000 km and 150+000 km. Olucak formation consists of limestone, dolomite, intercalation of mudstone, marl and quartzite. It unconformably overlies Hasanbeyli, Karlıdere and Seydisehir formation (Körmü, 2019).
	Cakmak Formation	On the Project route, the Cakmak Formation were observed between 10+000 km and 55+000 km. Cakmak Formation of the Middle Miocene age, starts with conglomerate at the bottom and upwards it continues with alternations of limestone-marl (Özsayın, 2002).
	Gebeciler Formation	Gebeciler Formation consists of alluvial deposits at its base and volcano sedimentary lacustrine sediments at the upper region of the formation. It unconformably overlies both Paleozoic Afyon Marbles and Seydiler Ignimbrite that is late Early Miocene era calc-alkaline volcanism (Kaya, Geraads, & Tuna, 2003).
Section 2	Afyon Volcanites	The Afyon volcanites are predominantly composed of trachytic flows associated with scarce trachytic-porphiroidal trachytetrachyandesite-andesite to porphrioidal andesite necks/plugs. They have have porphyric texture with grey colour in fresh samples, and light-brownish grey colour in altered samples (Kibici, Dinç, & Uçar, 2012).
	Hacıbekir Group	The Hacıbekir group consists of the Kurtkoyu and Yenikoy formations and intercalated Dikendere and Karaboldere volcanics (Ersoy, Helvacı, & Sözbilir, 2010).
Section 4	Menderes Massif	Menderes Massif covers large areas in western part of Turkey (Bozkurt & Oberhänsli, 2001). Menderes Massif is commonly viewed as a continuation of Cycladic Massif in Aegan (RING, GESSNER, GÜNGÖR, & PASSCHIER, 1999).

²³ Information on Ballıhisar Formation, Gölsel Cökeltiller (Lake Sediments), and Neojen Yaslı Cökel İstifi (Neogene Sediments) is not accessible through publicly available resources.

5.2.2.2.2. Seismicity

The earthquake zone map of Turkey published by AFAD is presented in Figure 5-3. Earthquake risk maps of AFAD for the provinces crossed by the Project are presented in Figure 5-4.

The Project route (per section) is shown on the 1/250,000 scale active fault maps of MTA in Figure 5-5, Figure 5-6, Figure 5-7, and Figure 5-8 for the full HSR alignment. Description of the faults shown on the maps is provided below:

- Earthquake Surface Rupture (*Deprem Yüzey Kirigi*): Fault ruptured since 1900
- Holocene Fault (*Holocene Fault*): Fault produced surface rupture in Holocene (11,000 years)
- Quaternary Fault (*Kuvaterner Fayı*): Fault produced surface rupture in Pleistocene (1,600,000 years), suspicious for Holocene activity
- Probable-Quaternary Fault or Lineament (*Olası Kuvaterner Fayı ve Cizgisellik*): Fault formed in Quaternary or Pre-Quaternary period or distinctive morphological lineament
- Normal Fault (*Normal Fay*): Ticks indicate downthrown side
- Strike Slip Fault (*Dogrultu Atimli Fay*): arrows indicate sense of lateral motion
- Unspecified Fault (*Niteligi Belirlenmemis Fay*)
- Inferred Fault (*Olasili Fay*)

The national EIA Report refers to the collaboration to be made with AFAD regarding the faults to be crossed by the railway, especially in the Gediz Graben located in Aegean Region, as well as the sites with natural stability risks or sites that may be exposed to heightened risks due to route excavations works.

Site-specific seismicity risks and faults will be further identified by the Contractor for the Ankara-Izmir HSR Project through the geological and geotechnical reports surveys and reports that will be based on the drilling and laboratory works to be completed.

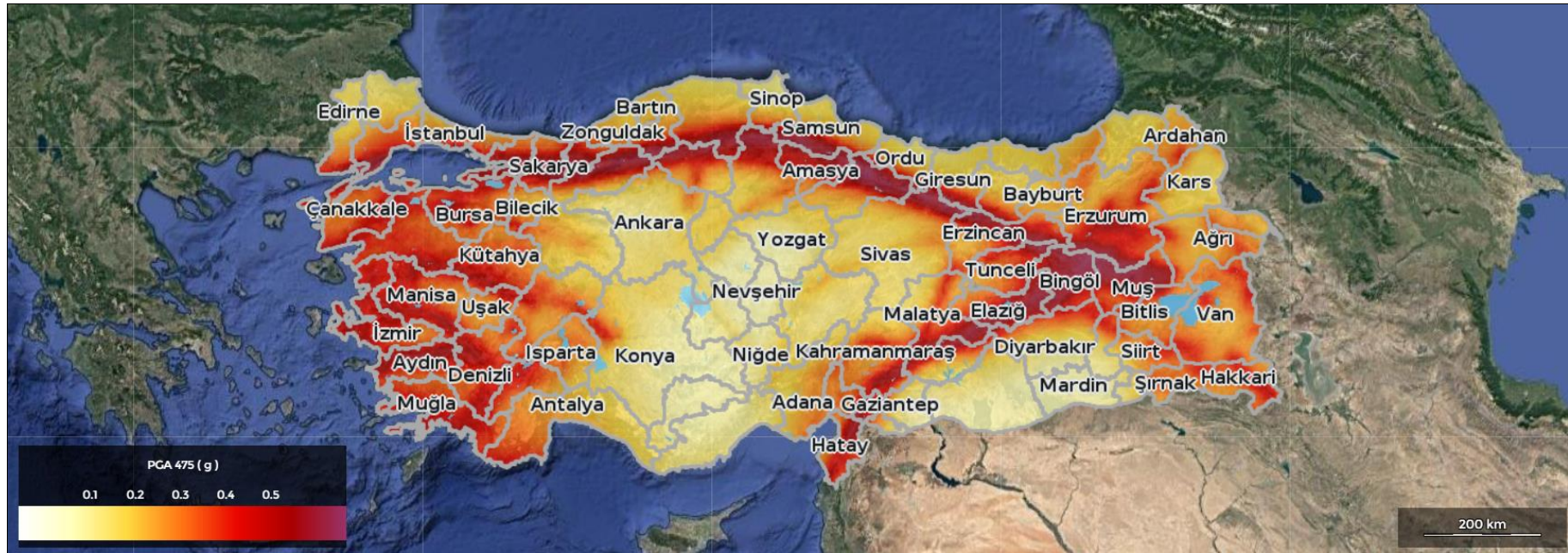
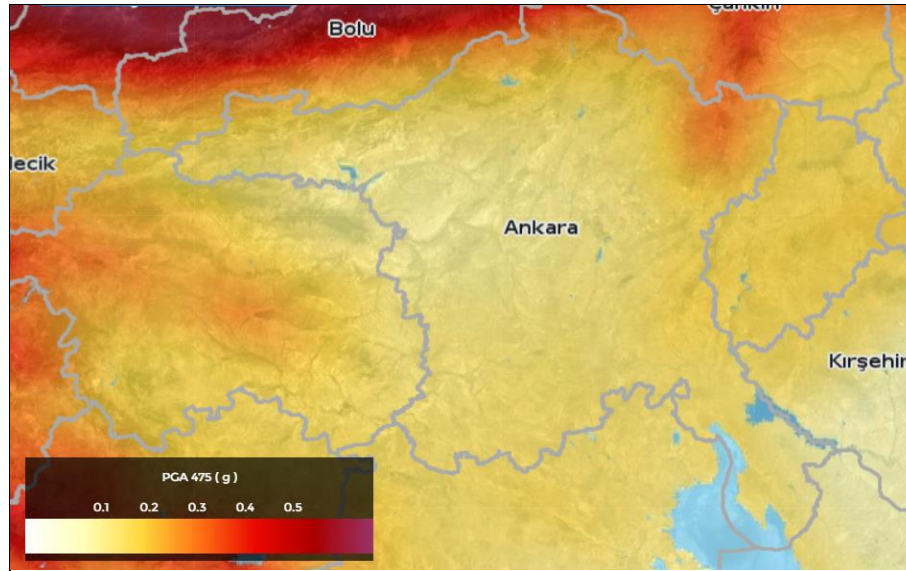
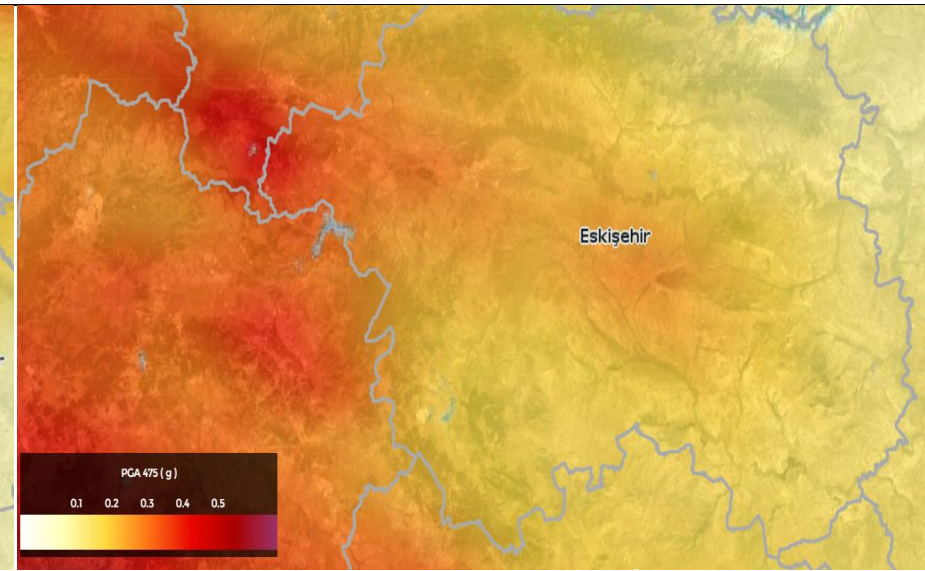


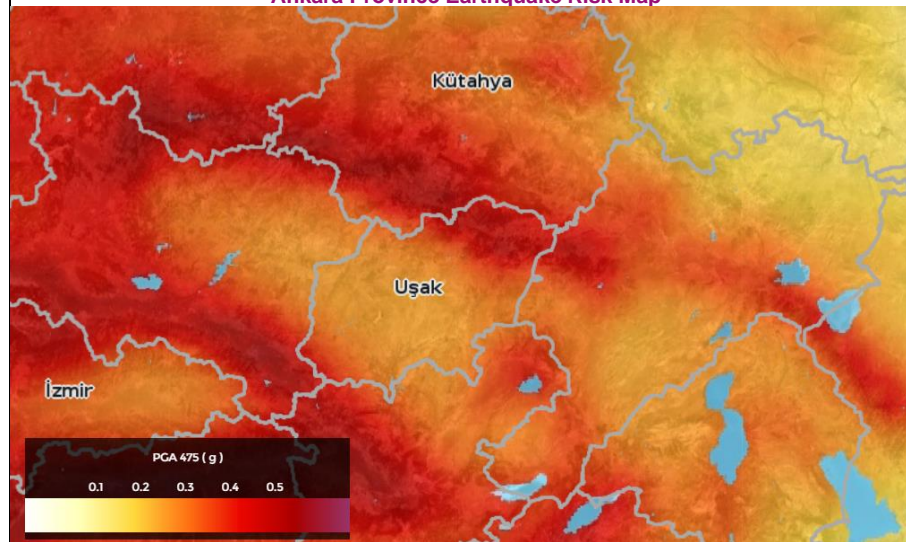
Figure 5-3. Earthquake Risk Map of Turkey published by AFAD



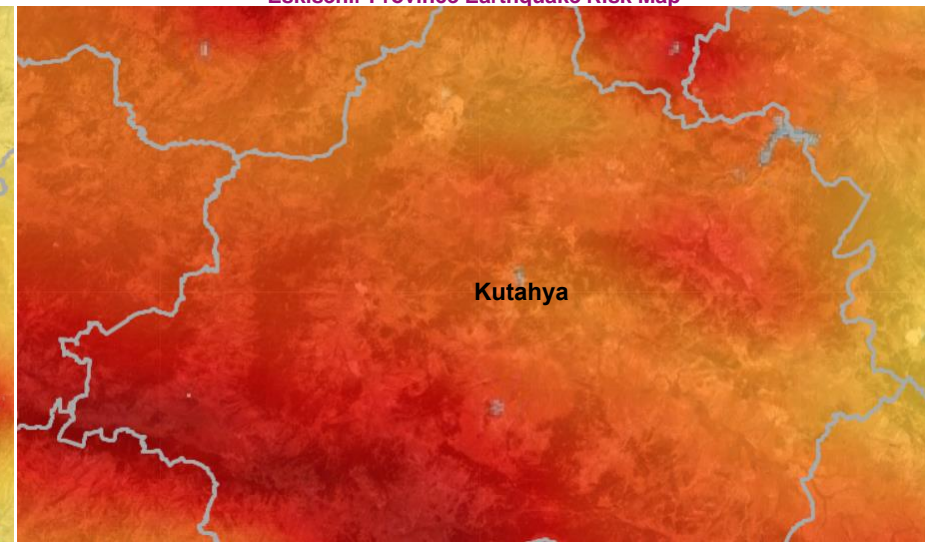
Ankara Province Earthquake Risk Map



Eskisehir Province Earthquake Risk Map



Afyonkarahisar/Usak/Kutahya Provinces Earthquake Risk Map



Kutahya Province Earthquake Risk Map

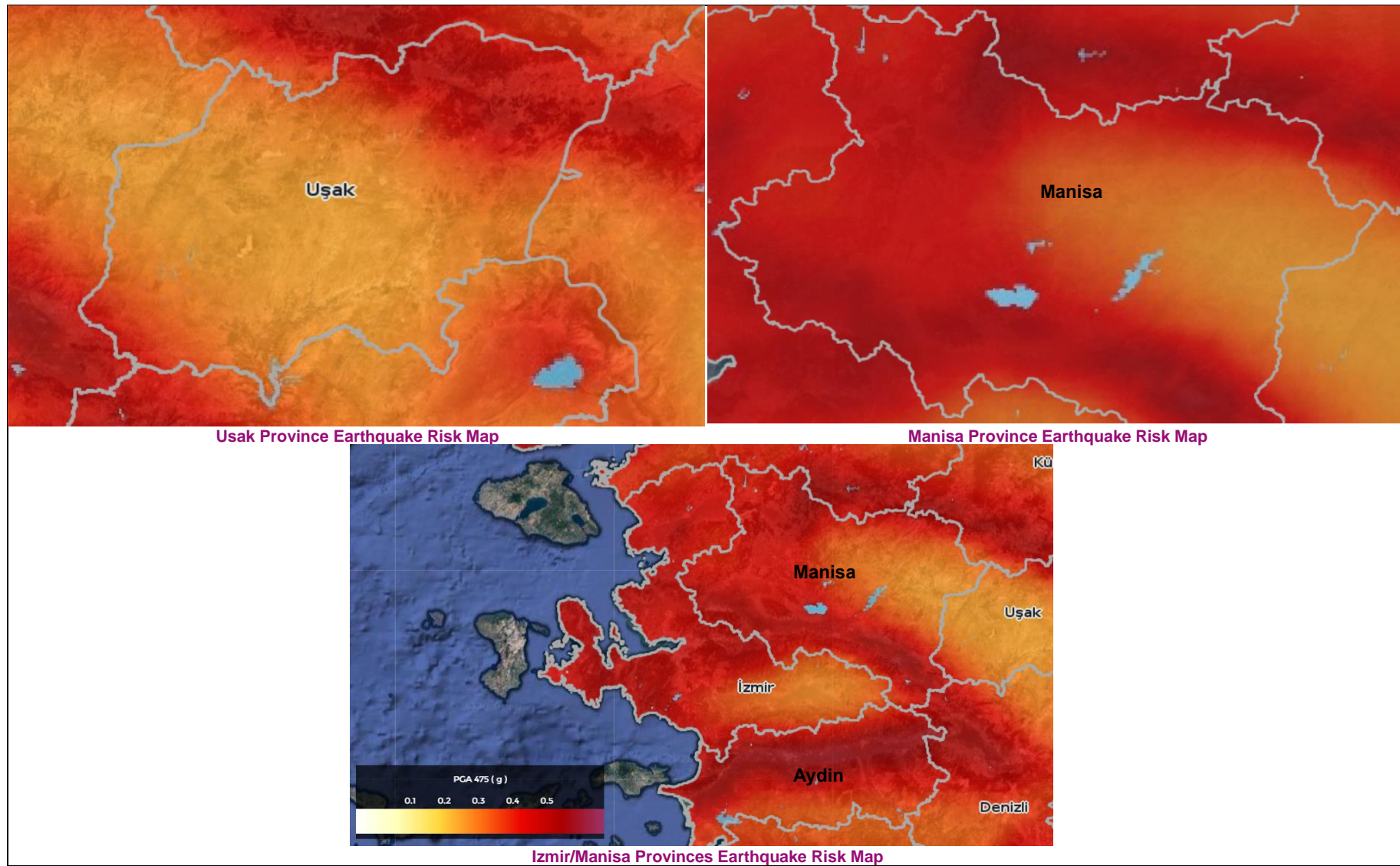


Figure 5-4. Earthquake Risk Maps of Provinces Crossed by the Project (as Published by AFAD)

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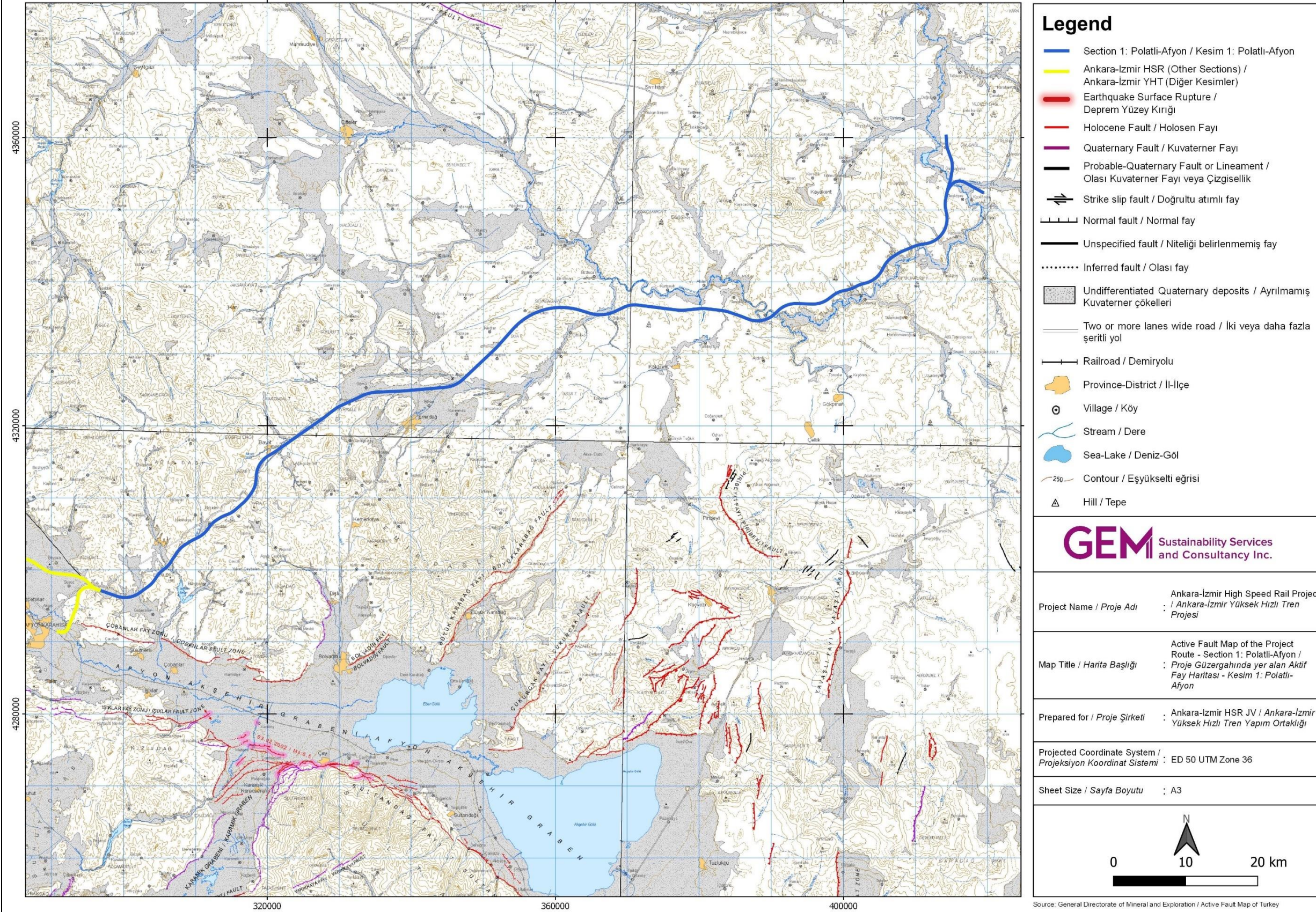


Figure 5-5. Project Route on Active Fault Map – Section 1

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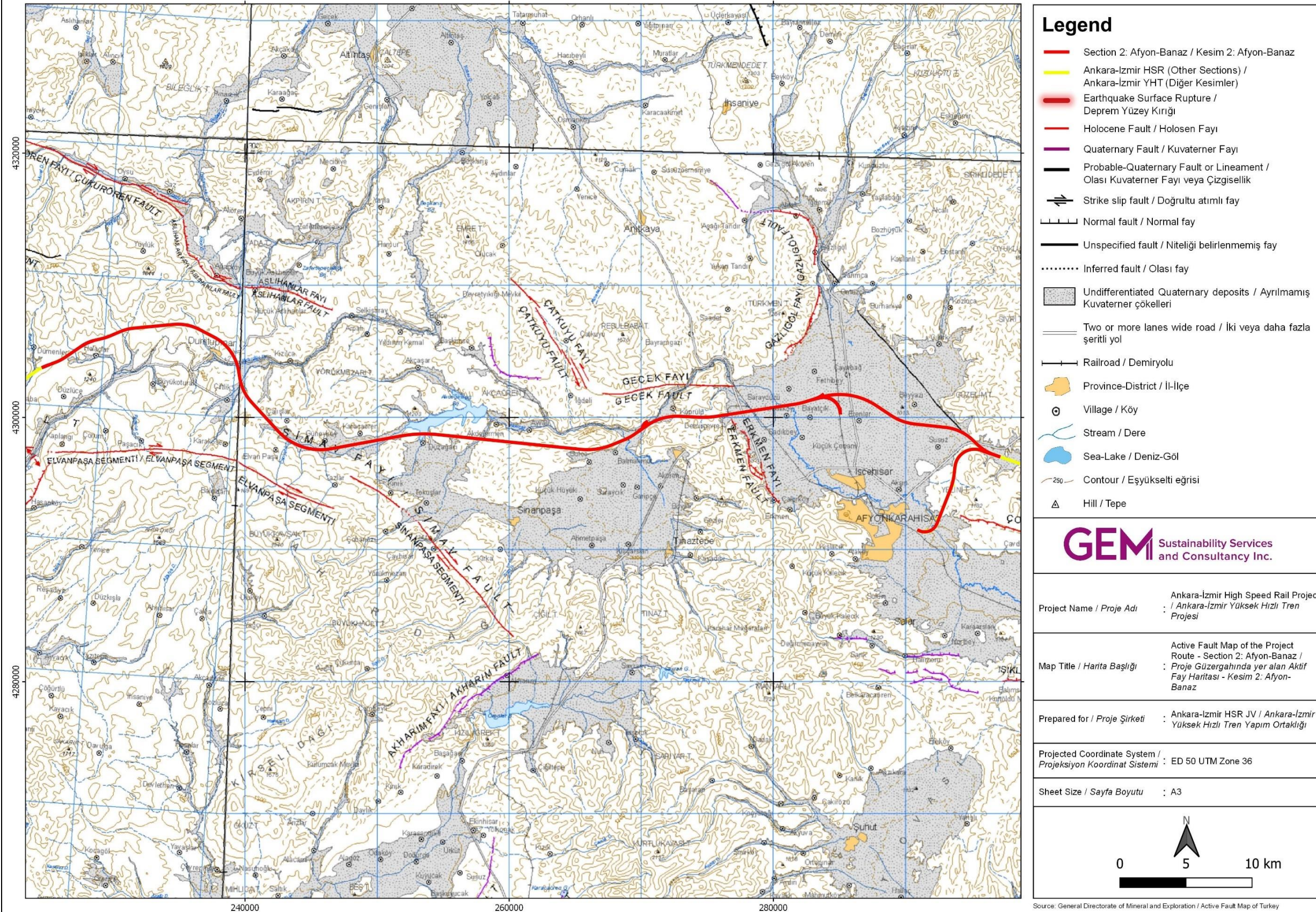


Figure 5-6. Project Route on Active Fault Map – Section 2

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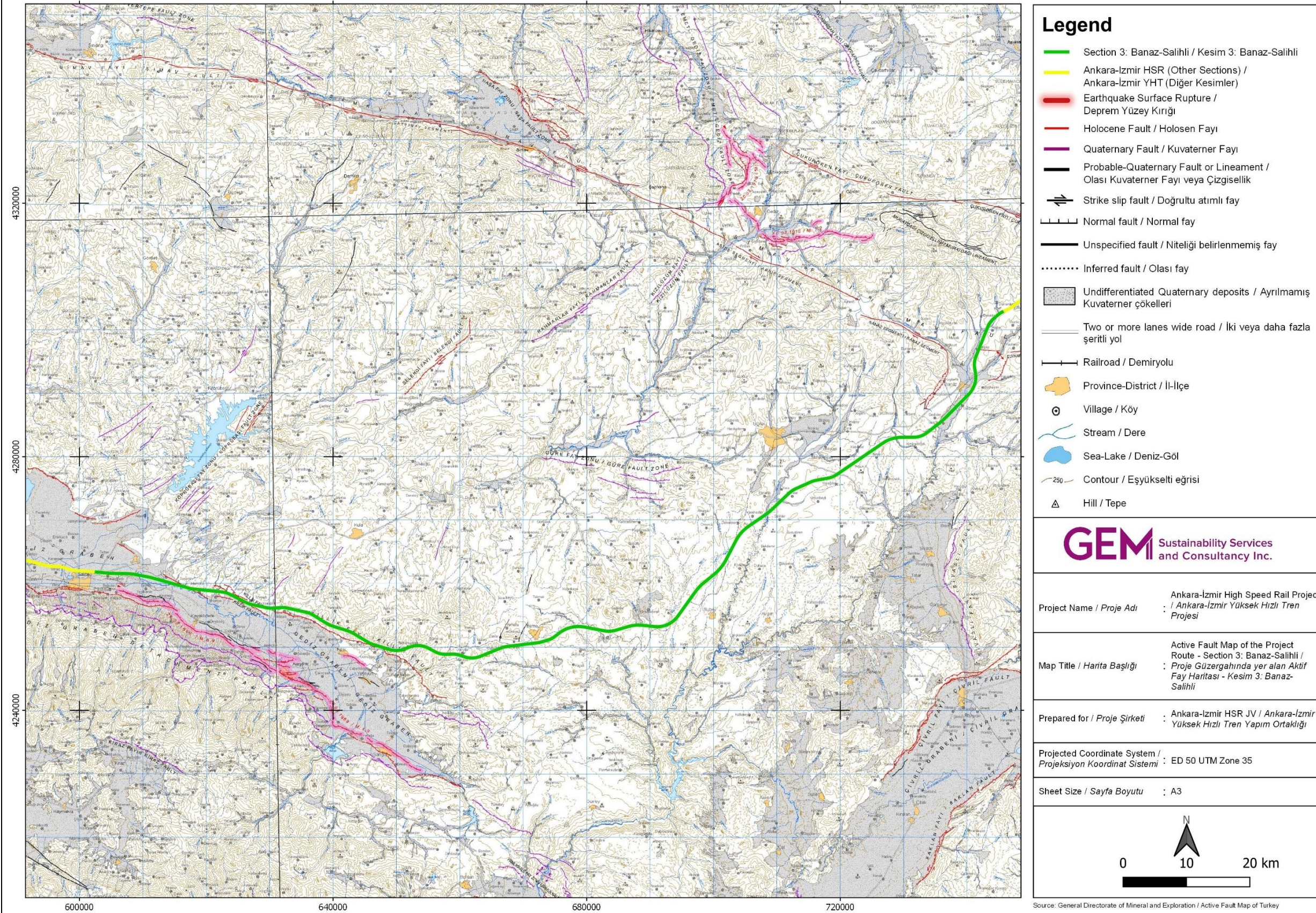


Figure 5-7. Project Route on Active Fault Map – Section 3

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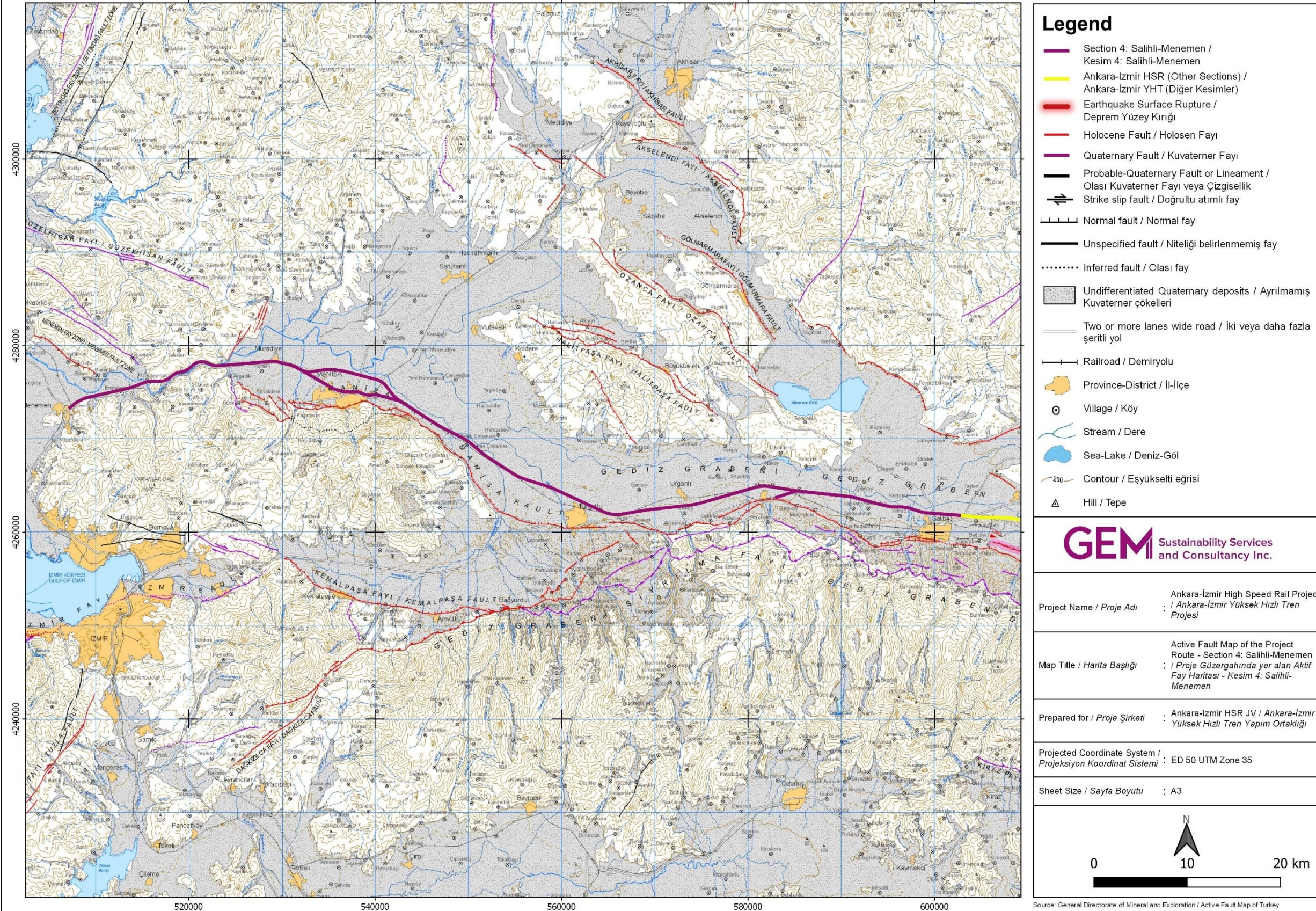


Figure 5-8. Project Route on Active Fault Map – Section 4

5.2.2.2.3. Sinkhole Formation

Sinkholes (*obruk*) occur when surface soils subside continuously or abruptly collapse into subsurface cavities (Xiao, Kim, Nam, & Wang, 2016). Although sinkholes are regarded as natural hazard by the public, it is often caused, or triggered, by human related activities (Youssef, Al-Harbi, Zabramwi, & El-Haddad, 2016).

One of the reasons for sinkhole (doline) occurrence is groundwater recharge rate (Xiao, Kim, Nam, & Wang, 2016). According to a study conducted in Sakarya Basin, there is an imbalance between recharge and discharge rates (Demiroğlu, Örgün, & Yaltırak, 2011), which affects a wider area in terms of sinkhole formation.

The Chamber of Geological Engineers (CoGE) has published a report²⁴ in 2020 on the Sinkhole Formation and Risks along the Eskişehir-Sivrihisar part of the Ankara-Izmir HSR Project in Section 1 covering the outcomes of the field observations including positioning of the sinkholes and relevant assessments. The CoGE informs that the main factors causing sinkhole formation include lithological, hydrogeological, tectonic, climatological, etc. factors, noting that the anthropogenic effects of the human activities accelerate the natural occurrences and increases their frequency. The report of the CoGE identifies that the geological, geotechnical, mineralogical, geochemical and hydrogeological research/surveys conducted in the Central Anatolia have set forth the effect of excessive and uncontrolled utilisation of groundwater resources and the reduced groundwater levels on the increased sinkhole formation frequency in this region. According to the report of the CoGE, besides Eskişehir (Sivrihisar), sinkhole occurrence has been identified in different provinces of Turkey including Konya (Karapınar), Karaman, Aksaray, Cankiri, Sivas, Kahramanmaraş, Sanliurfa, Afyonkarahisar, Manisa and Izmir (CoGE, 2020).

The CoGE report informs that the sinkholes in the Sivrihisar region are formed as a result of sudden collapse of the cohesive soils and the underground voids grow in time in these types of soils. The formations on which sinkhole formation is observed consist of evaporite sedimentary rocks (CoGE, 2020).

With regard to sinkhole formation in the proximity of the Ankara-Izmir HSR route, the report of CoGE indicates that the sinkhole formation in Sivrihisar district of Eskişehir has evolved in the recent years within the area restricted by Sigircik, Yenikoy and Kaldirimkoy neighbourhoods. The CoGE reports that in the recent years, eight (8) sinkholes, with diameters ranging between 2 m and 50 m and depths ranging between 0.5 m and 15 m (identified by means of laser measurement devices), have developed in this area (CoGE, 2020). Coordinates of the eight (8) sinkholes identified by the CoGE are provided in their report and water presence has been reported only in one (1) of the eight (8) sinkholes.

There are 21 additional location with sinkhole occurrence potential, as identified and mapped by CoGE in their report based on an analysis of the satellite images, for which the Chamber recommends further field surveys to be conducted for ground-truthing the coordinates and verification of sinkhole occurrence/potential.

The report of the CoGE states that it has been identified during the field surveys conducted in the region that the local farmers do not report/conceal the sinkhole occurrences to the authorities as they are concerned about potential actions that may affect their lands and activities.

Figure 5-9 provides a map of these eight (8) sinkholes identified by the CoGE (coded by CoGE as Gediz 5 to 13) and additional sinkholes identified as part of the ESIA based on an analysis of the satellite images (2021) of the area.

The CoGE report suggests that the route is passing approximately 1.5 km north of the area²⁵ where intensive sinkhole occurrence is observed. As per Figure 5-9, the sinkholes are observed to be distributed over an area stretching in the south of Railway KM 56+250²⁶ and 63+250 and the closest sinkhole to the Project route (identified as part of ESIA based on satellite images of 2021) is observed at a distance of approximately 4 km in the south of the Railway KM 60+745 near Sigircik neighbourhood in Eskişehir, Sivrihisar. The sinkhole identified and coded by CoGE as Gediz 5 (diameter: 1.5 km; depth: 2 m) is located at a distance of approximately 5.1 km in the south of Railway KM 63+250.

The sinkhole identified and coded by the CoGE as Gediz 11 (diameter: 28 m; depth: 12.6 m) is the largest sinkhole in this region (located 6.2 km south of Railway KM 59+000. This sinkhole is located approximately 5.3 km west of

²⁴ https://www.jmo.org.tr/resimler/ekler/c11705838d99392_ek.pdf

²⁵ The CoGE Report includes Map of Intensity Distribution and Risk Zones. The report (page 22) states that the distance of the Ankara-Izmir HSR Railway to the risk zone is 1.5 km according to the map.

²⁶ The sinkhole (Gediz-13) identified by CoGE in the south of KM 56+250 is not shown on the map due to the scale of the map. The distance of this sinkhole (Gediz-13) to the railway is 8.1 km.

Kaldirim neighbourhood, where regional settlement/subsidence issue is also observed over sunflower fields. The CoGE report concludes that the sinkhole formation becomes denser on the south-southeast of Sigircik neighbourhood, causing this area to be assigned as risk zone in terms of sinkhole formation.

Site-specific risks for the Ankara-Izmir HSR Project will be further identified by the Contractor through the geological and geotechnical reports surveys and reports that will be based on the drilling and laboratory works to be completed.

5.2.2.2.4. Landslide Zones

Figure 5-10 shows the landslide zones in the wider Project area based on the Geoscience Map Viewer Database of MTA. According to the map, in the vicinity of Afyonkarahisar (Merkez and Sinanpasa) and Usak (Banaz), there are former and active landslide zones (<http://yerbilimleri.mta.gov.tr>).

Site-specific risks for the Ankara-Izmir HSR Project will be further identified by the Contractor through the geological and geotechnical reports surveys and reports that will be based on the drilling and laboratory works to be completed.

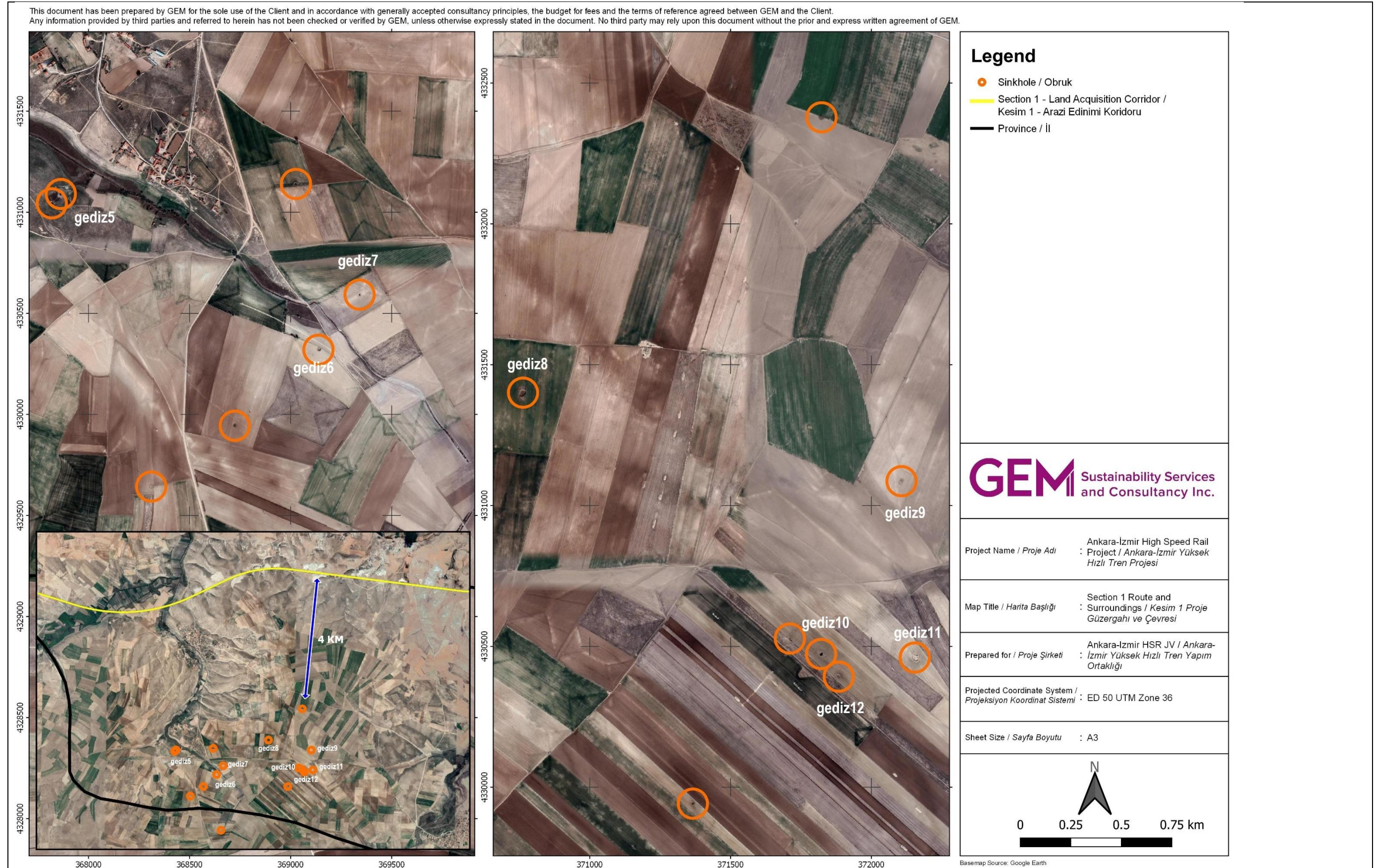


Figure 5-9. Sinkholes Identified (by the CoGE and based on Satellite Imagery) in the South of Railway KM 56+250 – 63+250 near Sigircik Neighbourhood (Eskisehir, Sivrihisar) in Section 1

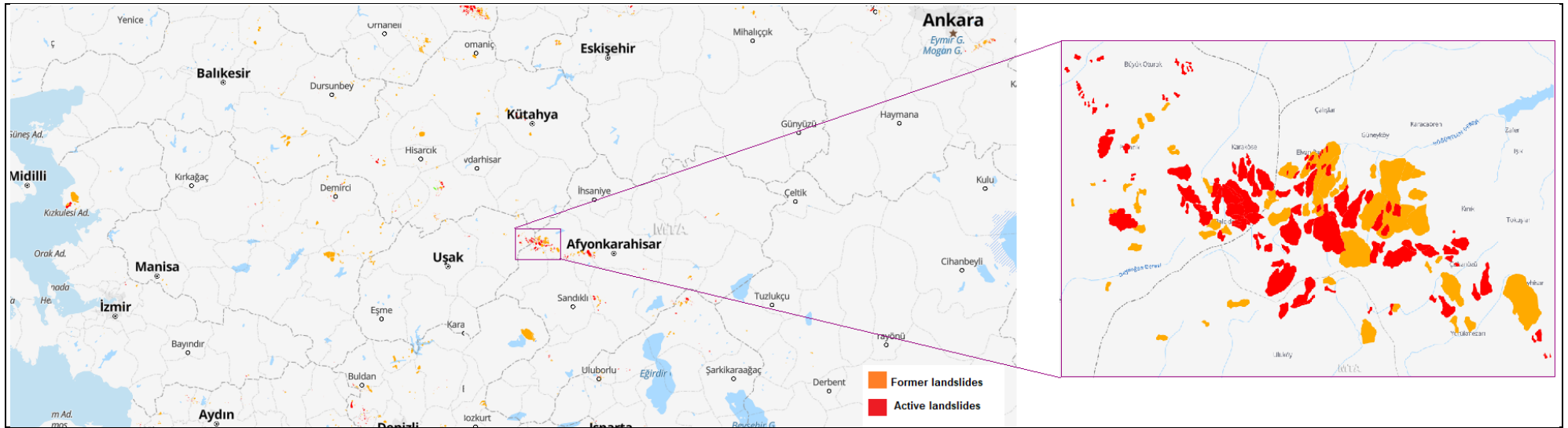


Figure 5-10. Landslide Zones along the Project Route (Geoscience Map Viewer Database of MTA)

5.2.2.2.5. Geosites

Geosites are cultural formations that represent geological and geomorphological occurrence representing a certain process, event, time or result that are rarely encountered on the earth and that can provide evidence of the past of the earth's crust. Geosites located in the vicinity of the Project route is listed in Table 5-9.

Table 5-9. Geosites in the Vicinity of the High-Speed Railway Route

Name	Province	Description	Distance to the Project Route (km)	Distance to the Nearest Quarry/Borrow Site	Direction and Railway KM
Section 1					
Thanetian's Reference Section	Ankara	This locality is the type section of the Kirkkavak Formation (Holostrate) (<i>Rigo de Righi and Cortesini, 1959</i>). This section is one of the sections that best represents the Thanetian layer in the regions between the Caribbean and India in terms of completeness, fossil coverage, and ease of access.	13.0	13.0	NE (0+000)
Seydiler Natural Park	Afyon karahisar	It is a thick sequence of mainly composed of andesite, trachyandesite, basalt and tuffs, cutting the Afyon Metamorphites, and has lateral vertical transitions with early-Middle Miocene lacustrine units. It presents well-developed columnar structures, lava flows, and morphological shapes formed by erosion. Both the beauty and appearance of the structures and their intertwining with archaeological values seem to be another twin of Cappadocia.	0.1	3.5	SE (132+300)
Section 2					
Leucite Occurences	Afyon karahisar	-	25.0	24.7	South (156+000)
Section 3					
Rutile Crystals	Manisa	-	9.5	20.0	NE (383+000)
Divlittepe Volcanics and Human Footprints	Manisa	The Karadivlit Tepe Cone in the Sandal Valley to the west of Sandal village is one of the youngest lavas, and there are traces of human life and ruins in the crater. Primitive human footprints were found on basalt tuffs around two craters, Divlittepe and Kucukdivlittepe, in Cakallar locality, on the western side of Demirkopru Dam on the far west. Additionally, the lavas related to volcanism around Kula were named as "Kulait" by Washington (1900) many years ago and this name was written in the literature.	17.3	11.0	North (418+000)
Section 4					
Turgutlu-Urganli Thermal Springs and Surrounding Traverties	Manisa	-	8.5	1.8	North (468+200) (Section 4b)
Spil Mountain Pillow-Lavas	Manisa	Well-preserved pillow lavas can be observed.	4.8	8.7	South (508+200) (Section 4c)

Source: Jemirko, <http://www.jemirko.org.tr>

5.3. Impact Assessment and Management

Potential impacts of the Project on existing land use characteristics, soils and geology will occur during the land preparation and construction activities.

The operation activities of the Project are not anticipated to cause any additional impact on the existing land use characteristics or soils under normal operation conditions. In case of a need for additional operation and maintenance (O&M) buildings or facilities, there would be land use changes at the footprint of such buildings and facilities to be constructed. The measures to be taken in case of an unexpected accident that may affect lands and soils will be defined in the Emergency Preparedness and Action Plan (EPRP) to be developed and implemented for the operation phase of the Project.

The potential Project risks and impacts stemming from the Project/associated facilities located within and outside the expropriation corridor have been included in this Chapter to the extent information was made available up until ESIA design freeze during Scoping Phase. Further impacts on land might take place be required for the camp sites, quarries, energy transmission lines (ETLs), excavated material storage sites, alternative quarries (see Chapter 3 on "Project Alternatives") etc. should they be located partially or fully outside the boundaries of the expropriation corridor.

Besides the physical impacts that would result from Project activities, changes in the existing land use may also bring in socio-economic impacts on the land-based livelihood activities of the local communities. Thus, this Chapter is required to be read in conjunction with Chapter 11 ("Socio-economy"), which provides detailed assessment of land use changes that may result in physical and/or economic displacement of affected land owners and/or users.

Tunnels and viaducts included in the Project design are listed in Section 1.4.2. These engineering structures, which are primarily designed and constructed for crossing areas with topographical and geotechnical challenges, help avoiding/minimising impacts on land use at their footprint. Such that, only the land use at the footprint of tunnel portals and viaducts are affected by the construction works. In sections for which the responsibility for infrastructure works belongs to the Contractor, the total length of the tunnels sums up to 17.9 km and total length of the viaducts sums up to 14.2 km. The calculations given in this section do not take into account the area and soils to be conserved by means of tunnels and viaducts.

5.3.1. Land Use

Construction of the railway and its components will result in changes in the land use characteristics along the expropriation corridor of the Project and at the footprint of offsite facilities such as quarries, material borrow sites, camp sites, excavated material storage sites, above ground facilities of the electricity transmission infrastructure etc. should they be located outside the expropriation corridor. Land take that will result in permanent modification of agricultural lands, pastures, forests, etc. along the railway corridor. Temporary changes in land use due to construction facilities, impacts of which will be restored following completion of construction phase and rehabilitation of disturbed lands.

Land use characteristics within the expropriation corridor of the railway and at the quarry and material borrow sites have been described per Project facility and land use type. Table 5-10 provides the cumulative area of the affected lands for the railway expropriation corridor as wells the quarries and material borrow sites included in the current Project design. Construction camp sites have not been included in this table due to negligible area to be occupied by these facilities.

The Project construction works were started by the previous contractors between 2012 and 2016 and suspended in 2018. Infrastructure (excavation and fill) works have already been partly completed in Section 1 and Section 2, except the Hatipler Passage (KM 267+156-278+632) and Ankara-Konya HSR Connection Line (7+800; 0+000-6+683.120). Progress of excavation and fill per railway sections is provided in Section 5.3.3. As of Q2 2021, there is no ongoing construction works along the route, except Section 3a, Section 3b, Section 4a, and Section 4d. Similarly, previous production was carried out at part of the quarries and borrow sites, either by previous Contractors for the extraction of materials to be used in the scope of the Project or by other institutions such as TCDD, State Hydraulic Works (DSI), General Directorate of State Highways (KGM), etc. for the extraction of materials to be used in the scope of other projects undertaken in the region. The past production status of the quarries and borrow sites to be used by the Contractor is presented in Section 1.4.7.2.

The other contractors continuing infrastructure works in Section 3a, Section 3b, Section 4a, and Section 4d use quarries and borrow sites. These works are conducted as per the requirements of the applicable national legislation. Land use changes caused by the operation of those quarries and material borrow sites by other contractors contribute to the cumulative land use impact of the Project. This said, the list of quarries and material borrow sites by other contractors is not available to the Contractor at the time of compilation of this ESIA Report.

Once the construction works resume in the suspended sections, lands that have not been affected by previous construction works will be affected due to infrastructure activities to be performed by the Contractor, which will involve vegetation clearing, topsoil stripping, construction of railway and other facilities, as relevant. Also, land use at the previous unused quarry sites and borrow sites will also be modified as a result of material extraction activities.

Table 5-10. Cumulative Area Affected within the Project Expropriation Corridor and the Quarries and Borrow Sites included in the Current Project Design

Section	Sub-section	Railway (*)				Quarries and Material Borrow Sites planned to be used by the Contractor (**)				Total Affected Project Area			
		Agricultural Land (ha)	Pasture Land (ha)	Forest Land (ha)	Other	Agricultural Land (ha)	Pasture Land (ha)	Forest Land (ha)	Other	Agricultural Land (ha)	Pasture Land (ha)	Forest Land (ha)	Other
Section 1	Polatli-Afyon	574.68	486.34	46.08	201.61	28.73	589.75	342.66	156.5	603.41	1,076.09	388.74	358.11
Section 2	Afyon-Banaz	395.18	59.01	7.08	98.35	133.98	87.16	0.00	65.68	529.16	146.17	7.08	164.03
Section 3	Banaz-Salihli	806.87	95.60	150.15	107.28	0.00	10.54	26.29	28.37	806.87	106.14	176.44	135.65
Section 4	Salihli-Menemen Manisa North Passage	470.71	2.29	0.00	55.28	0.49	21.5	126.62	176.6	471.20	23.79	126.62	231.88
Total		2,247.45	643.23	203.31	462.52	163.2	708.95	495.57	427.15	2,410.64	1,352.19	698.88	889.67
Grand total		3,556.50				1,794.87				5,351.38			

Source: (*) Expropriation Plans prepared for the Parcels (approved by TCDD) within the Expropriation Corridor, 2012-2018; (**) Land Registry and Cadastre Database, 2021.

5.3.2. Topsoil Stripping

At lands that have not been affected by the previous infrastructure activities, vegetation will be cleared and topsoil will be stripped off at sufficient depth prior to start of infrastructure works within the Project expropriation corridor and at the footprint of facilities located outside the expropriation corridor (e.g. quarries, material borrow sites, construction camp sites, etc.). The depth of topsoil varies between 5 cm to 50 cm along the route per different land use types such as agricultural, pasture or forest depending on the local soil properties. The average depth of the topsoil across the Project is assumed as 30 cm.

The estimated volume of topsoil corresponding to the Railway route (expropriation corridor) is provided in Table 5-11 in consideration of the overall progress of physical works (see Section 1.6.1) at areas where soil has already been stripped off/disturbed during previous infrastructure works.

Table 5-11. Estimated Volume of the Topsoil at the Railway Route (at areas which have not been affected by Previous Infrastructure Works)

Section	Description	Area (ha)	Estimated Volume of Topsoil Corresponding to the Railway Route (million m ³)	Overall Progress (*) of Physical Works (**) (%) (as of Q2 2021)	Estimated Volume of Topsoil to be Stripped off (million m ³)
Section 1	Polatli-Afyon	1,308.69	3.9	65.2	1.4
Section 2	Afyon-Banaz	559.62	1.7	31.8	1.2
Section 3	Banaz-Esme (3a)	640.16	1.9	27.4(***)	1.4
	Esme-Salihli (3b)	519.72	1.6	27.4(***)	1.2
Section 4	Salihli-Manisa (4a and 4b)	398.98	1.2	5.2(***)	1.4
	Manisa North Passage	108.86	0.3		
	Manisa Menemen	20.46	0.1	30.0(***)	0.1
Total		3,556.50	10.7		6.7

(*) Contractor, December 2020. Project Information Note.

(**) Physical works represent route and quarry excavations, fill operations, construction of underpass, overpass, culverts, tunnel and bridge/viaducts.

(***) The infrastructure works by other contractors have been progressing at these sections since this data was compiled (December 2020). Official data reflecting the latest status of physical works was not available to the Contractor at the time of compilation of this ESIA Report. Thus, the estimated volume of topsoil to be stripped off in these sections is potentially lower than the figures indicated in this table as the level of physical works is at a more advanced level as of Q2 2021.

Assuming the same average topsoil depth (30 cm), volume of topsoil to be stripped off at the footprint of quarries and borrow sites, which have not been previously used, is provided in Table 5-12. The area presented for the quarries and material borrow sites cover the entire license area of the facilities; the operation license area for each site, where the material extraction activities will be conducted, might be smaller than the license area considered in this assessment.

Table 5-12. Estimated Volume of the Topsoil at the Quarries and Material Borrow Sites Planned to be Used by the Contractor (that have not been Previously Used) included in the Current Design

Section	Description	Area (ha)	Estimated Volume of Topsoil to be Stripped off (million m ³)
Section 1	Polatli-Afyon	898.32	2.7
Section 2	Afyon-Banaz	99.48	0.3
Section 3	Banaz-Salihli	49.06	0.2
Section 4	Salihli-Manisa	255.18	0.8
Total		1,302.04	4.0

The other contractors continuing infrastructure works in Section 3a, Section 3b, Section 4a, and Section 4d use quarries and borrow sites. These works are conducted as per the requirements of the applicable national legislation. Topsoil stripping caused by the operation of those quarries and material borrow sites by other contractors contribute to the cumulative impact of the Project. This said, the list of quarries and material borrow sites by other contractors is not available to the Contractor at the time of compilation of this ESIA Report.

The existing construction camp site at KM 190+000 (Afyonkarahisar, Sinanpasa, Ayvali village) will be used as the main construction camp for the Project. Therefore, no additional land use impact will be caused by the main camp site establishment. Assuming the same average topsoil depth (30 cm), the estimated volume of topsoil to be stripped off at the locations of the camp sites (that have been selected as of Q2 2021) is presented in Table 5-13. The list of selected and planned Contractor construction camp sites is provided in Section 1.4.7.1. In addition, there will be construction camp sites of the subcontractors, of which location information will be clarified upon selection of subcontractors. The list of construction camp sites used by other contractors is not available to the Contractor.

Table 5-13. Estimated Volume of the Topsoil at the Construction Camp Sites of the Contractor

Section	Camp Site	Approximate Railway KM	Closest Settlement			Area (ha)	Estimated Volume of Topsoil to be Stripped off (million m3)
			Province	District	Neighbourhood/ Village		
Section 1	Gumusyaka	3+000	Ankara	Polatli	Gumusyaka	17.3	0.1
	Sigircik	67+000	Eskisehir	Sivrihisar	Sigircik	5.3	TBD
	Bayat	119+000	Afyonkarahisar	Bayat	Merkez	19.3	0.0
Section 2	Sinanpasa	190+000	Afyonkarahisar	Sinanpasa	Ayvali	17.5	0.1
	Halacilar	228+000	Usak	Banaz	Halacilar	TBD	TBD
Section 3	TBD					TBD	TBD
Section 4	TBD	493+000	Manisa	Sehzadeler	Asagi Cobanisa	TBD	TBD
Total						59.4	0.2

Cumulative volume of topsoil estimated to be stripped off along the railway route (expropriation corridor) and at the footprint of quarries, borrow sites and construction camp sites of the Contractor is summarised in Table 5-14 as per the current Project design (as of Q2 2021).

Table 5-14. Cumulative Volume of Topsoil Estimated to be Stripped off in the scope of the Project

Section	Estimated Volume of Topsoil (million m³)			Total (million m³)
	Railway Route (Expropriation Corridor)	Quarries and Borrow Sites	Construction Camp Sites of the Contractor	
Section 1	1.4	2.7	0.1	4.2
Section 2	1.2	0.3	0.1	1.6
Section 3	2.6	0.2	TBD	2.8
Section 4	1.5	0.8	TBD	2.2
Total	6.7	4.0	0.2	10.9

Topsoil management measures to be applied for the conservation of the vegetative properties of the topsoil to be stripped off and stored temporarily at designated topsoil storage sites (along the railway route and at the facility locations) are presented in the Table 5-17. Measures to be taken as part of the rehabilitation of quarries and material borrow sites, construction camp sites and other off-site facilities are also summarised in this table.

5.3.3. Earthworks (Excavation and Fill)

The remaining estimated volume of earthworks to be conducted following topsoil stripping is provided in Chapter 9 ("Waste Management"). Depending on the quality of the excavated material, it will be further used as fill material wherever appropriate. If proper storage sites cannot be designated within the expropriation corridor, the Contractor will identify parcels, for which usage rights will be obtained from the respective right holders as per the requirements of the applicable legislation. Alternatively, excess excavated material will be disposed at storage sites in line with the related permits to be obtained from the authorities.

The earthworks design, management methods of excavated materials (reuse and disposal ratios) and list of excavated material storage sites used by other contractors are not available to the Contractor at the time of compilation of this ESIA Report.

5.3.4. Soil Disturbance and Erosion

Disturbance caused/to be caused during topsoil stripping, earthworks and excavation activities will eventually cause the soil surface to become more susceptible to erosion by rain and/or wind. Soil erosion may also trigger transport of soil material to surrounding surface water bodies through surface drainage, which may in turn affect the quality of natural water receptors.

In order to prevent/minimise soil erosion, exposed work areas will be immediately rehabilitated following the completion of construction works. To prevent contamination of surface water and manage surface runoff water, drainage systems and sediment control measures will also be implemented as part of the Erosion Control and Management Plan to be developed for the Project.

5.3.5. Soil Contamination

Soil contamination during the land preparation and construction activities may occur as a result of accidental spills and releases of hazardous materials and wastes. A Hazardous Materials Management Plan will be developed and implemented during the construction phase of the Project to ensure that the amount of release and spills can be taken under control before reaching substantial amounts that may potentially affect the quality of soil and/or groundwater resources.

During the operation phase, the HSR will be electricity-driven. Unexpected train accidents may result in potential spill and/or leakage incidents, depending on the type of transportation mode (i.e. transportation type will be clarified between the Employer and the Contractor based on the ongoing discussions) and/or materials needed to be presented in the trains for routine HSR operations. In case of train accidents or accidental spills/leakages at the stations/gars and O&M facilities, the EPRP to be developed for the operation phase will be implemented.

5.3.6. Geological and Geotechnical Risks

Geological analyses were conducted, and geotechnical reports have been prepared by various engineering companies contracted in the previous phases of the Project. Table 5-15 summarises the previous studies completed for the Project. A total of 500 drills (206 along Section 1, 69 along Section 2 and 225 along Section 4) have been conducted.

Table 5-15. Geological and Geotechnical Analyses Conducted for the Project in the Previous Phases

Section No.	Sections	Geotechnical Analysis for Engineering Structures	Geotechnical Analysis for Fills	Geological Analysis
Section 1	Polatli – Afyon	Partially Available (except culverts, on-off tunnels and tunnels)	Not Available	Available
Section 2	Afyon – Hatipler Passage	Available (**)	Available between 151,000 -166,000 km and 212,475 and 231,214 kilometres of the project only (*)	Available
	Hatipler Passage	Available (**)		Available
Section 4	Salihli Passage	Partially Available (culverts and underpasses only)	Not Available	Available between 460,000 and 507,639.27 kilometres of the project only (*)
	Salihli – Manisa	Partially Available (culverts and underpasses only)	Not Available	
	Manisa Passage	Partially Available (culverts and underpasses only)	Not Available	

(*) Done by the current Contractor

(**) Partially done by the current Contractor

The planned schedule of the geological and geotechnical studies to be conducted by the Contractor is summarised in Table 5-16. Through these studies, Contractor will address the geological and geotechnical risks along the railway route and at the locations of the engineering structures.

For Section 3a, Section 3b, Section 4a, and Section 4d, preparation of the geological and geotechnical surveys have been under the responsibility of other contractors that will conduct and complete the ongoing infrastructure works in these sections consistent with the requirements of the applicable national legislation and their existing contracts with the TCDD. The existing geological and geotechnical survey results for these sections will be requested (through the Employer) during the site hand over and the documentation along with the site-specific measures implemented during the infrastructure works will reviewed/updated through any necessary study by the Contractor.

Prior to start of superstructure works in Section 3a, 3b, 4a and 4d (at the time these sections of the Project will be handed over to the Contractor for the superstructure works), any outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances in Sections 3a, 3b, 4a and 4d related to land use, top soil management and geological/geotechnical aspects related to the infrastructure works completed by other contractors (see Chapter 1 for the definition of other contractors) in these sections will be assessed by an E&S Audit to be carried out by the Contractor.

The contractors for the ongoing infrastructure works of Sections 3a, 3b, 4a and 4d are contractually required to comply with the national legislation. The national legislation and international standards with respect to land use, topsoil management and management of geological/geotechnical risks in projects are principally in alignment. Though, compliance of Project/site practices is required to be verified.

For the E&S Audit, the relevant documentation related to land use, top soil management and geological/geotechnical aspects will be requested (through the Employer) during the site hand over and outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances, if any, will be identified for incorporation to the Management and Corrective Action Plan, as appropriate:

- List of and information on the quarries, material borrow sites, construction camp sites, topsoil storage sites, excavated material storage sites and other Project facilities used by other contractors
- Documentation/information on the rehabilitation works done/to be done at the quarries and material borrow sites that will not be further used in the Project or transferred to other authorities for future use
- Documentation/information on topsoil management practices
- Geological/geotechnical survey reports and sites-specific measures implemented

Following this audit, a Management and Corrective Action Plan will be developed and implemented for these sections of the Project. The implementation responsibilities for the Management and Corrective Action Plan will be further clarified between the Employer and the Contractor.

The potential impacts of the Project, significance of the impacts prior to mitigation, proposed mitigation measures and the significance of residual impact are summarised in Table 5-17. Socio-economic impacts of land use changes on the local communities are discussed in Chapter 11 ("Socio-economy").

Table 5-16. Planned Schedule of Geological and Geotechnical Studies to be Conducted by the Contractor

Section No.	Sections	Geological Analyses (Drills and Laboratory Work)	Geotechnical Designs for Viaducts	Geotechnical Designs for Tunnels	Geotechnical Designs for Bridges	Geotechnical Designs for Underpasses	Geotechnical Designs for Overpasses	Geotechnical Designs for Culverts	Geotechnical Design for the Route
Section 1	Polatli – Afyon	Q1 2021	Q1-Q2 2021	Q1 2021	Q1-Q2 2021	Q1 2021	Q1-Q2 2021	Q1 2021	Q1-Q2 2021
Section 2	Afyon – Hatipler Passage	TBD	Q1-Q2 2021	Q1 2021	TBD	Q1 2021	Q1 2021	Q1 2021	Q1 2021
	Hatipler Passage	Q1-Q2 2021	Q2 2021	Q2 2021	TBD	TBD	TBD	TBD	Q2 2021
Section 4	Salihli Passage	TBD	Q3 2021	TBD	Q3 2021	Q3 2021	Q3 2021	TBD	TBD
	Salihli – Manisa	Q2 2021	Q2 2021	TBD	Q2 2021	Q2-Q3-Q4 2021	Q1-Q2-Q3 2021	TBD	TBD
	Manisa Passage	TBD	Q2-Q3 2021	TBD	Q2-Q3 2021	Q2-Q3 2021	Q2 2021	TBD	TBD

Table 5-17. Impacts, Proposed Mitigation Measures and Residual Impacts (Land Use and Geology)

Impact Description	Project Phase	Receptor	Impact Magnitude				Frequency	Overall Magnitude	Sensitivity/Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration						
Changes in existing land use (agricultural, pasture and forest) due to Project infrastructure works along the Railway corridor	• Land preparation and construction	• Agricultural lands • Pasture lands • Forest lands	Restricted	High	Irreversible	Long-term	Continuous	High	Low to High	Moderate to Major	<ul style="list-style-type: none"> Land preparation and construction works will be conducted at designated sites that will be visibly and appropriately marked. Training will be provided to the construction personnel (direct and contracted) so that they maintain the pre-established construction boundaries. Project-specific Stakeholder Engagement Plan (SEP) will be implemented to address any grievance related to damage on off-site land (e.g. lands adjacent to the expropriation corridor or the access roads) and plan/take corrective actions, where necessary. In case of direct or indirect damage to adjacent state or privately owned lands as a result of Project-related activities, the Contractor will ensure that necessary corrective measures are taken as per the requirements of the related authorities and in consultation with the owners of the affected parcels. 	Minor to Moderate
Changes in existing land use (agricultural, pasture and forest) due to Project infrastructure works at the off-site Project/associated facilities including quarries, material borrow sites, construction camp sites, excavated material storage sites, etc. located outside the expropriation corridor	• Land preparation and construction	• Agricultural lands • Pasture lands • Forest lands	Local to Wide	Medium	Medium-term reversible	Short-term	Continuous	Medium	Low to High	Minor to Major	<ul style="list-style-type: none"> The Project-specific Resettlement Action Plan (RAP) will be implemented. The affected areas will be rehabilitated as per the requirements of the authorities following the completion of the activities at each site. As applicable, measures defined in Chapter 10 ("Biodiversity") will be implemented at forest and/or pasture areas as part of the rehabilitation works. 	Minor
Topsoil stripping along the Project route (within the expropriation corridor) and at the off-site Project/associated facilities (at land that have not been affected by previous infrastructure works or quarry/material borrow site operations)	• Land preparation and construction	• Topsoil	Restricted	Low to Medium	Short term reversible	Short term	One-off/ Rare	Low to Medium	Low to High	Minor to Major	<ul style="list-style-type: none"> The fertile topsoil will be stripped off at sufficient depth at the footprint of Project facilities prior to start of construction works. Topsoil will be stored separately from subsoil at designated topsoil storage areas along the route and other work sites at suitable conditions so as to preserve its vegetative properties. Appropriate labels will be placed at the storage sites to distinguish the topsoil and subsoil storage sites. Topsoil stripping will not be carried when soil is wet, so that soil compaction is avoided. Drainage at topsoil storage areas will be provided by open channels. If storage of topsoil will last longer than three months, upper part of fertile soil will be planted so that the organic content is conserved. In such cases, proper species and seed mixture ratios will be selected in consultation with the biodiversity specialists Organic or inorganic materials will be applied on the topsoil to improve quality and avoid erosion, desiccation or invasion of wild species. Stripped topsoil will be stored at suitable conditions for the rehabilitation of work and temporary construction sites after the completion of construction activities. Topsoil will be loosen to a depth of 15 cm before reinstatement (increase depth of loosening up to 40-50 cm for compact heavy clay soils). The depth of topsoil will be arranged to a suitable for side slopes, shrub plantation areas, tree roots etc. at necessary locations. 	Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance	
			Extent	Magnitude	Reversibility	Duration	Frequency					Overall Magnitude
Soil disturbance and erosion	<ul style="list-style-type: none">Land preparation and construction	<ul style="list-style-type: none">Soils	Restricted to Local	Low to Medium	Medium-term reversible	Short term	Continuous	Low to Medium	Low to High	Minor to Major	<ul style="list-style-type: none">Following the reinstatement of top soil, grading will be conducted in line with the natural slope and local drainage conditions.Any undesired materials will be removed prior to planting operations.Any excess topsoil will be utilised (e.g. distribution to local communities upon request, use in rehabilitation works along the route and at the O&M facilities) in agreement with the Employer and/or the Operator).Project-specific Erosion Control and Management Plan will be developed and implemented.Before the onset of construction works, erosion control measures like geotextile filters, drainage channels, settling structures, etc. will be applied as necessary in order to prevent or reduce off-site sediment transport.Topsoil stripping and excavation works will be designed so that the area to be exposed at once will be limited.Under extreme weather conditions, land preparation and construction works will be altered wherever feasible to avoid risk of erosion.Water from surrounding areas and side slopes will be diverted via temporary channels and earth banks so that non-contact and contact runoff is separated.Erosion control measures will be implemented following the completion of excavation works, also at the culvert outlets, and slopes will be improved.Around the excavated material stored at designated storage sites, dikes will be established to prevent loss of soil.Disturbed sites will be revegetated to the most possible extent in a timely manner following the completion of stripping and excavation works, in line with the specification of TCDD.	Negligible
Soil contamination	<ul style="list-style-type: none">Land preparation and constructionOperation	<ul style="list-style-type: none">Soils	Restricted to Local	Low	Short term reversible	Short term	One-off/ Rare	Low	Low	Minor	<ul style="list-style-type: none">Project-specific Hazardous Materials Management Plan will be developed and implemented.Discharge of materials into soil that would cause contamination will be prohibited.Solid wastes and wastewater to be generated as a result of land preparation and construction activities will be managed as per relevant management plan (Waste Management Plan, Water and Wastewater Management Plan, etc.).Generators will be equipped with drip trays and to be checked regularly to prevent soil contamination.Accidental spills and leakages will be managed through implementation of the Emergency Preparedness and Response Plan (EPRP).	Negligible
Geological, Geotechnical, Seismic Risks	<ul style="list-style-type: none">Land preparation and construction	<ul style="list-style-type: none">Project personnelProject infrastructure	Restricted to Local	Low	Reversible to Irreversible	Short term	One-off/ Rare	Low to High	Low to High	Minor to Major	<ul style="list-style-type: none">Project-specific geological and geotechnical studies will be conducted by the Contractor (through competent/certified professional) as summarised in Table 5-16 to identify site-specific conditions and risks (including risks pertaining to the locations/structures where construction activities were previously conducted, seismic risks, etc.) and incorporate required measures into the design of the railway route and engineering structures as per the requirements of the Construction Contract, TCDD/AYGM specifications and applicable standards.The design and construction, including the infrastructure, superstructure, electrification, signalisation and structural works, will be conducted by the Contractor as per the General and Special Conditions and Technical Specifications (including the standards and regulations indicated) contained in the Construction Contract executed between the Contractor and the AYGM on 23 November 2020 (will be effective after the date of financial close).Design of the viaduct, bridge, overpass and tunnels will be in accordance with the highest Eurocodes, AASHTO and Turkish standards using a 2475-year	Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Risk of Sinkhole Occurrence	• Land preparation and construction	• Project personnel • Project infrastructure	Restricted to Local	Low to High	Reversible to Irreversible	Long term	Continuous	Low to High	Low to High	Minor to Major	<p>return period.</p> <ul style="list-style-type: none">Geological, geotechnical and hydrogeological site investigations and assessments will be conducted by competent/certified professionals to identify site-specific risks (including risks pertaining to locations/structures where construction activities were previously conducted) including factors effecting sinkhole formation. The surveys to be conducted in the Eskisehir, Sivrihisar area will focus on, inter alia, sinkhole formation. Specific measures for the management of the risks associated with sinkhole formation will be developed as necessary in collaboration with - following the start of the Construction Contract - the related governmental and non-governmental institutions (e.g. AYGM, DSI, MTA, AFAD, Chamber of Geophysical Engineers of Turkey, Chamber of Geological Engineers of Turkey - CoGE, related universities, etc.), including those performing geophysical studies along the route on the presence and risks of the sinkholes. The engagement results and proposed mitigation measures will be shared with AYGM. Subject to approval of AYGM, measures including relocation of the line will be evaluated and the Project will be constructed in accordance with those approved design measures.Construction of the railway near the sinkhole risk zones will be monitored by the Contractor at frequencies to be set based on the findings of the geological, geotechnical and hydrogeological site investigations and assessments. Monitoring results will be shared with related institutions, if requested.The Contractor will collaborate with AYGM to provide technical input on the design of geotechnical monitoring studies to be performed by AYGM or their consultants in parallel to the operation of the railway by the government.	Negligible
	• Operation	• HSR operations personnel • HSR passenger	Restricted to Local	High	Short Term Reversible to Irreversible	Long Term	One-off	High	High	Major	<ul style="list-style-type: none">Based on the technical information to be collated by the Contractor on site-specific risks through geological, geotechnical and hydrogeological site investigations and assessments, and the collaborations that will take place between the Contractor and the Employer/Operator in the pre-construction and construction periods, development and implementation of the operational plans and procedures, including long-term geotechnical monitoring studies to be conducted by the Operator and/or their consultants, that will ensure stability and integrity of the infrastructure and safety of HSR operations, will be under the responsibility of the Employer/Operator.	Negligible

6. NOISE AND VIBRATION

This Chapter provides information on the background noise levels measured (in January-February 2021) at the selected noise sensitive receptors (NSRs) in the vicinity of the Project Area, assesses potential construction phase impacts on the NSRs and other potential noise receptors located along the Project route and in the vicinity of the quarries and noise impact due to operation of the Project, and describes the mitigation measures to be taken for the management of potential impacts on the receptors.

6.1. Project Standards

6.1.1. Noise

The Turkish Regulation on the Assessment and Management of Environmental Noise (RAMEN) provides limit values for the environmental noise for construction phase of projects for day-time (07:00-19:00), evening-time (19:00-23:00) and night-time (23:00-07:00). Daytime noise limits for construction sites are presented in Table 6-1. The activities to be conducted as part of the Project would be categorised under the activity type referred to as "other sources".

Table 6-1. Environmental Noise Limits for Construction Sites (as per Annex-VII, Table 5 of RAMEN)

Type of Activity (Construction, Demolition and Renovation)	L _{eq} -daytime (dBA) Day (07:00 – 19:00)
Building	70
Road	75
Other Sources	70

Environmental noise criteria for construction works to be performed during evening and night time as well as weekends and holidays are governed by Article 23 of RAMEN, as below:

- Construction activities within and in the vicinity of the residential areas are not permitted during evening and night time periods.
- Construction activities to be conducted during weekend and public holidays may be restricted with the decision to be issued by the Local Environmental Board of the relevant Province (*Il Mahalli Cevre Kurulu*) based on the grievance received from residential areas and surroundings.
- Construction activities of projects subject to public benefit decision (*kamu yarari karari*) such as dams, tunnels, motorways, intercity main roads, mass housing and on the condition that the construction activities are not conducted during day time the construction activities that affect day time urban traffic are permitted to be conducted during evening and night time as per the decision to be issued by the Local Environmental Board of the relevant Province (*Il Mahalli Cevre Kurulu*) and the limit values for evening and night time are met by reducing the values indicated in Table-5 of RAMEN by 5 dBA and 10 dBA, respectively.

The Article 19 of the RAMEN governs environmental noise criteria for rail systems by stipulating that the environmental noise sourced from rail systems shall not exceed 65 dBA during daytime, 60 dBA during evening, and 55 dBA during night time.

The World Bank Group (WBG) General EHS Guidelines also provides noise guideline values separately for residential, institutional, educational receptors and industrial, commercial receptors for the day time (07:00-22:00) and" night time (22:00-07:00) based on World Health Organisation (WHO) Guidelines for Community Noise (WHO Noise Guidelines). The WBG General EHS Guidelines for Noise Management further states that the noise impacts should not exceed the levels provided in Table 6-2 or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table 6-2. WBG General EHS Guidelines for Noise Level (based on WHO Noise Guidelines)

Receptor	One Hour L _{eq} (dBA)	
	Daytime (07:00 – 22:00)	Nighttime (22:00 – 07:00)
Residential areas (*)	55	45
Commercial/industrial areas	70	70

(*) Guideline values are applicable to noise levels measured out of doors. Acceptable indoor noise levels for residential, institutional, and educational settings are provided by WHO Guidelines, which recommends, at night-time, outside sound levels about 1 meter from facades of the living spaces should not exceed 45 dB LAeq, so that people may sleep with bedroom windows open (WHO, 1999).

The noise limits set by the RAMEN and WBG General EHS Guidelines (based on WHO Noise Guidelines) have been considered and the strictest levels have been adopted as Project Standards for Environmental Noise as presented in Table 6-3.

Table 6-3. Project Standards for Residential Receptors

Time of the Day	Noise Guidelines/Limits			Project Standards at Residential Receptors (for time slots specified by WBG)
	WBG General EHS Guidelines (2007) for Residential Receptors (*)	Turkish RAMEN (Environmental Noise Criteria for Construction Sites)	Turkish RAMEN (Environmental Noise Criteria for Rail Systems)	
Day-time	55 dBA	70 dBA	65 dBA	55 dBA
Evening-time	-	65 dBA	60 dBA	-
Night-time	45 dBA	60 dBA	55 dBA	45 dBA

(*) Noise impacts should not exceed the levels presented or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

6.1.2. Vibration

Vibration assessment in the scope of the Project has been conducted in compliance with the limits provided in the Turkish RAMEN, which are listed in Table 6-4. It should be noted that there is no numerical evaluation of the blasting activities in the WBG General or Sectoral EHS guidelines.

Table 6-4. Turkish Standards on Vibration Limits for Blasting

Vibration Frequency (Hz)	Peak Allowed Vibration Speed (mm/sec)
1	5
4-10	19
30-100	50

The Turkish RAMEN additionally provides limit values for the vibration sourced from construction machinery and equipment, as presented in Table 6-5.

Table 6-5. Turkish RAMEN Vibration Limits for Construction Machinery and Equipment

Type of Area	Peak Allowed Vibration Speed (mm/sec)	
	Continuous Vibration	Discontinuous Vibration
Residential Areas	5	10
Industrial and Commercial Areas	15	30

The Turkish RAMEN limit values for the vibration sourced from railway transportation vehicles are presented in Table 6-6.

Table 6-6. Turkish RAMEN Vibration Limits for Buildings (to be complied by Railway Transportation Vehicles)

Type of Area	Vibration Frequency (Hz)	Vibration Speed Permitted (RMS (***) value-mm/sec)
Residences	1(*)	1.5
	8-100	0.3
Offices	1(**)	3.5
	8-100	0.6

(*) Between 1Hz-8Hz, decreases linearly in logarithmic chart plotted from 1.5 mm/sec to 0.3 mm/sec.

(**) Between 1Hz-8Hz, decreases linearly in logarithmic chart plotted from 3.5 mm/sec to 0.3 mm/sec.

(***) Root mean square.

In addition to the Turkish RAMEN, Federal Transit Administration's (FTA) "Transit Noise and Vibration Impact Assessment Manual" document has been considered as GIIP as it defines vibration damage criteria as provided in Table 6-7. The document identifies potential receiving locations as categories of land uses. Dynamic limiting values are defined in the document based on current background levels. Non-engineered timber and masonry buildings category (Category III) of FTA document is applicable to the receptors of the Project.

Table 6-7. Vibration Damage Criteria of FTA

Building Category	PPV (mm/sec)	Approximate Lw (*)
Reinforced concrete, steel or timber (no plaster)	12.70	102
Engineered concrete and masonry (no plaster)	7.62	98
Non-engineered timber and masonry buildings	5.08	94
Buildings extremely susceptible to vibration damage	3.05	90

(*) Root Mean Square (RMS) velocity in decibels (VdB) refers to 1 micro-inch/sec.

6.2. Baseline Conditions

Baseline environmental noise levels were measured at 26 residential NSRs in line with ISO 1996-2: 2017 for outdoor noise measurement. Noise measurement locations have been selected in consideration of the proximity of the noise source (i.e. HSR route, engineering structures and the quarry sites) to the residential receptors, urban/rural setting and the length of the route.

Noise measurement data sheets including information on the measurement location, time period, microphone height and measurement results are presented in Noise Measurement Data Sheets in Appendix C.1. The baseline noise measurement locations selected along the full alignment of the HSR are presented in Table 6-8.

Table 6-8. Baseline Noise Measurement Locations

Noise Station Code	Corresponding NSR	Settlement	Potential Noise Impact Caused By		Distance of the Measurement Location Impact Source (m)		Railway KM as the Potential Noise Source	Quarry Causing the Potential Noise Impact
			Railway Construction	Quarry Operation	Railway Construction	Quarry Operation		
N-01 (*)	NSR-01	Polatli	-	+	-	50	-	Basri
N-02	NSR-02	Yenice	+	+	20	730	0+000	Yenice
N-03	NSR-03	Emirinkoyu	+	+	130	330	105+300	Emirin Koyu
N-04	NSR-04	Bayat	+	-	95	-	118+500	-
N-05	NSR-04	Susuz	+	-	150	-	156+000	-
N-06	NSR-06	Beyazit	+	-	65	-	161+000	-
N-07	NSR-07	Balmahmut	+	-	60	-	182+450	-
N-08	NSR-08	Duzagac	+	-	40	-	196+800	-
N-09	NSR-09	Dumlupinar	+	-	400	-	216+400	-
N-10	NSR-10	Hatipler	+	-	150	-	275+000	-
N-11	NSR-11	Banaz	+	-	40	-	281+800	-
N-12	NSR-12	Inay	+	-	90	-	342+600	-
N-13	NSR-13	Esme	+	-	40	-	364+100	-
N-14	NSR-14	Kasapli	+	-	0	-	409+900	-
N-15	NSR-15	Torunlu	+	-	30	-	425+900	-
N-16	NSR-16	Salihli	+	-	0	-	442+500	-
N-17	NSR-17	Kapanci	+	-	40	-	450+600	-
N-18	NSR-18	Ahmetli	+	-	200	-	460+200	-
N-19	NSR-19	Urganli	+	-	80	-	468+900	-
N-20	NSR-20	Turgutlu	+	-	180	-	481+250	-
N-21	NSR-21	Manisa	+	-	0	-	512+100	-
N-22	NSR-22	Degirmendere	+	-	10	-	541+550	-
N-23	NSR-23	Menemen	+	-	40	-	546+700	-
N-24	NSR-24	Cikrikci	-	+	-	80	-	Cikrikci
N-25 (*)	NSR-25	Yukaricobanisa	+	+	-	450	-	Y.cobanisa
N-26	NSR-26	Caltildere	-	+	-	8	-	Caltildere-2

(*) The quarries affecting these NSRs, which were considered for use by the Contractor at the scoping phase of the ESIA, have been eliminated from the Project design and no license application has been done for this quarry in consideration of the proximity (to N-01) and overlapping (with N-25) non-registered cultural heritage sites identified during the ESIA studies. See Chapter 14 on Cultural Heritage for further details. These quarries have been considered in the baseline and impact assessment studies, which were finalised before the elimination decision has been taken by the Contractor in March 2021.

The baseline noise measurement results are given in Table 6-9. The noise measurement locations are shown on the map given in Figure 6-1. Photographs showing the noise measurement locations are presented in Appendix C.1.

Table 6-9. Baseline Noise Measurement Results at the NSRs

NSR No.	Measurement Day	Measurement Results (dBA) as per Time Periods				
		Turkish RAMEN			WBG General EHS Guidelines	
		L _{day} (07:00-19:00)	L _{evening} (19:00-23:00)	L _{night} (23:00-07:00)	L _{day} (07:00-22:00)	L _{night} (22:00-07:00)
N-01	Day 1	51.6	47.2	44.2	50.9	46.1
	Day 2	51.3	46.6	45.9	50.7	45.6
N-02	Day 1	48.1	56.0	44.3	51.4	46.2
	Day 2	50.6	51.7	47.1	51.1	47.6
N-03	Day 1	52.2	50.8	46.7	51.9	47.4
	Day 2	49.4	48.6	45.0	50.27	44.8
N-04	Day 1	51.9	52.1	48.9	51.7	49.9
	Day 2	50.8	49.5	43.6	50.7	43.9
N-05	Day 1	52.5	52.7	40.7	52.2	41.2
	Day 2	52.7	49.1	34.3	52.0	35.2
N-06	Day 1	59.7	58.7	48.4	59.6	49.5
	Day 2	59.3	56.6	47.3	58.1	47.5
N-07	Day 1	56.4	54.0	49.5	55.7	49.7
	Day 2	58.4	52.6	46.9	57.8	47.3
N-08	Day 1	56.3	49.3	47.4	55.6	47.3
	Day 2	57.0	48.7	47.8	56.2	47.1
N-09	Day 1	48.9	50.4	47.5	49.7	47.6
	Day 2	45.1	47.6	46.7	45.8	45.4
N-10	Day 1	56.4	54.0	47.4	55.7	48.7
	Day 2	52.5	54.1	46.2	52.5	47.1
N-11	Day 1	57.5	59.8	54.1	57.0	54.6
	Day 2	60.4	59.7	53.2	59.2	52.8
N-12	Day 1	44.8	40.7	40.1	44.0	39.2
	Day 2	46.2	41.2	40.2	45.1	40.1
N-13	Day 1	49.6	42.4	35.5	48.6	36.4
	Day 2	46.4	40.8	35.3	45.8	35.7
N-14	Day 1	58.7	55.1	59.0	58.3	58.7
	Day 2	56.1	53.8	51.7	55.9	51.0
N-15	Day 1	57.4	55.5	52.9	57.1	52.6
	Day 2	58.5	53.3	54.5	57.9	54.1
N-16	Day 1	56.3	50.5	53.3	54.9	52.9
	Day 2	57.6	51.4	51.5	56.9	51.3
N-17	Day 1	52.0	44.6	42.0	51.6	42.7
	Day 2	49.0	43.2	38.2	48.3	38.2
N-18	Day 1	53.7	49.0	48.1	53.1	48.4
	Day 2	52.6	48.6	47.2	52.0	46.8
N-19	Day 1	48.9	50.2	42.7	48.3	42.4
	Day 2	48.1	49.1	42.6	48.3	43.2
N-20	Day 1	53.9	49.8	45.2	52.2	44.3
	Day 2	55.6	45.7	43.1	54.7	43.4
N-21	Day 1	59.8	55.2	47.5	58.6	48.1
	Day 2	59.7	56.1	46.2	58.5	47.2
N-22	Day 1	58.9	58.6	53.9	59.5	53.4
	Day 2	57.1	56.6	53.4	56.3	53.1
N-23	Day 1	65.3	63.8	52.6	65.0	53.6
	Day 2	65.9	65.9	50.8	65.9	53.6
N-24	Day 1	58.4	53.2	48.2	59.2	49.1
	Day 2	56.4	54.0	47.2	56.0	49.2
N-25	Day 1	58.2	56.2	55.6	57.0	56.0
	Day 2	59.0	57.5	51.0	58.9	51.5
N-26	Day 1	46.0	42.4	36.5	49.8	37.7
	Day 2	49.4	44.2	36.8	50.1	38.2

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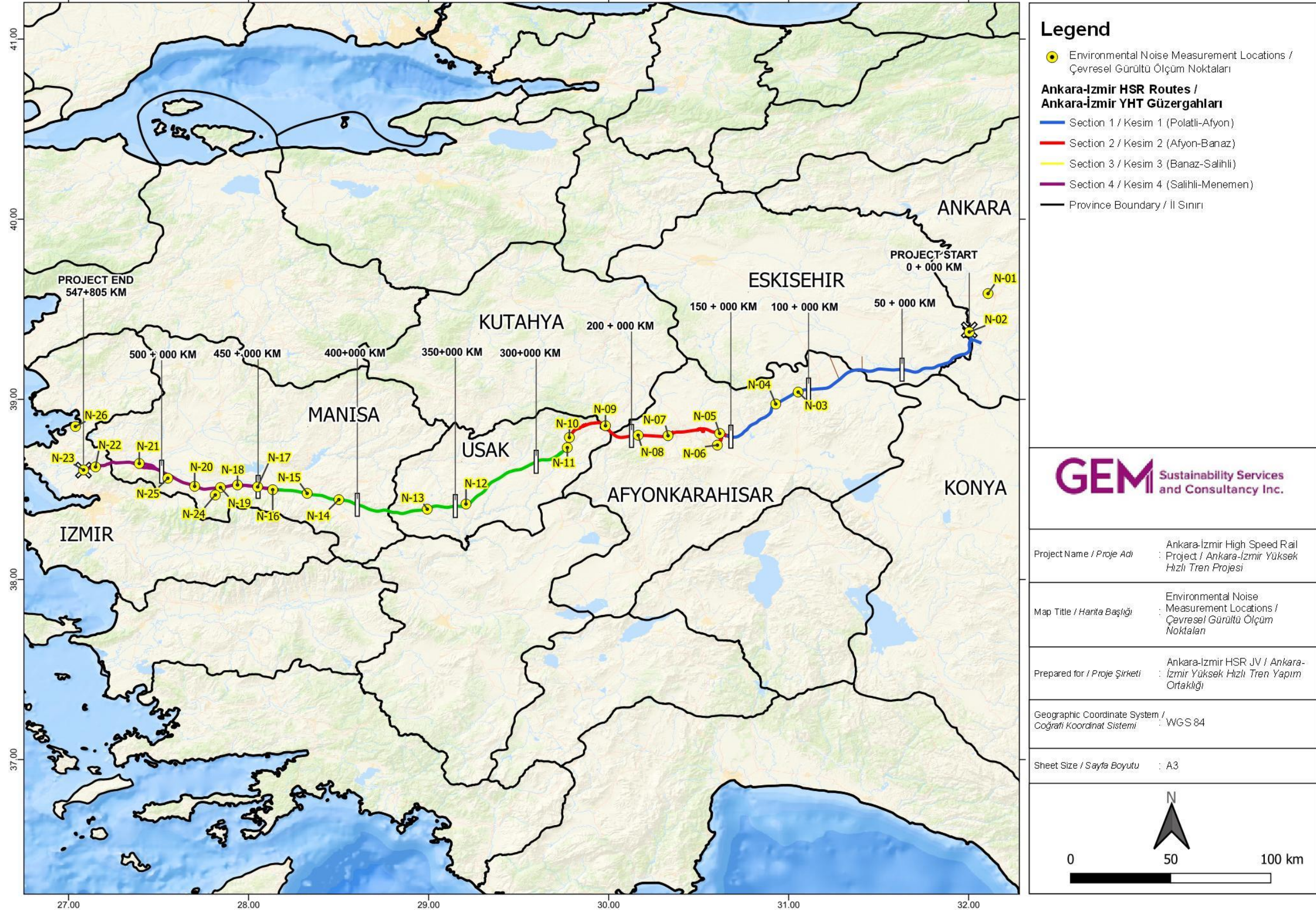


Figure 6-1. Noise Measurement Locations

6.3. Impact Assessment and Management

6.3.1. Noise

This section assesses the potential impacts of the noise to be generated as a result of the construction activities in accordance with the methodology defined in Chapter 4 ("ESIA Methodology"). It also assesses the noise to be caused by HSR operations based on the Worst-case Noise Modelling Study conducted as part of this ESIA study.

The construction of the infrastructure and superstructure will result in generation of noise due to operation of relevant construction machinery and equipment at the construction sites along the railway route and at the quarry and material borrow sites to be used in the scope of the Project. The construction phase noise will be temporary and removed upon completion of activities at respective work sites. The noise impact of the construction activities at the NSRs has been assessed as a combination of the sensitivity of the receptors and magnitude of the impact.

The specific sensitivity criteria used for the evaluation of noise receptors have been developed in consideration of the definitions provided in the Turkish RAMEN and Good International Industry Practices (GIIPs) and presented in Table 6-10.

Table 6-10. Criteria for the Sensitivity of Noise Receptors

High	Medium	Low	Negligible
Areas mainly with noise sensitive uses including educational, cultural and healthcare facilities and recreational/summer houses, camping sites	Areas dominated by residential buildings where workplaces/ commercial buildings are found together with noise sensitive uses	Areas dominated by workplaces/commercial buildings where commercial sites are found together with noise sensitive uses	Industrial areas

Typical response of human to relative changes in noise level is summarised in Table 6-11.

Table 6-11. Typical Human Response to Relative Changes in Noise Level

Change in Noise Level	Human Response to Change
3 dBA	Threshold of change detectable by the human ear
5 dBA	Readily noticeable
10 dBA	Perceived as a doubling or halving of noise level (as twice as loud)

Source: https://www3.epa.gov/hudson/quality_of_life_06_04/appendixa.pdf

The overall magnitude of each impact is estimated in line with the methodology defined in Chapter 4. The criteria for the magnitude of change component of the overall magnitude are provided in Table 6-12.

Table 6-12. Criteria for Magnitude of Change

High	Medium	Low	Negligible
More than 10 dBA exceedance of Project Standards for noise levels or noncompliance with noise limits defined in RAMEN	5-10 dBA exceedance of Project Standards or regulatory limits	3-5 dBA exceedance of Project Standards or regulatory limits	Compliance with regulatory limits and less than 3 dBA exceedance of Project Standards

Cumulative Noise Modelling for Construction Phase

The construction phase noise has been modelled by using the software CadnaA 2019 and IMMI 2016 Premium. As sound propagation is strongly affected by the terrain levels as obstacles, the construction phase noise model has taken the topographical conditions in and around the Project Area into consideration.

Different types of noise sources can be used in the model including point, line and area sources. Because of the mobility and dynamic behaviours of the construction equipment, they have been modelled as area sources.

Another important parameter for the noise model is the ground absorption (G). Ground absorption varies between 0 to 1 for hard - reflective surfaces and soft - absorptive surfaces, respectively. When calculating the noise propagation, G has been assumed as 0.8 due to mostly rural and agricultural setting throughout the Project alignment.

Identification of the calculation area is critical for the noise model. This area has been determined as wide as possible such that the noise emission levels at the source will diminish below the most stringent Project Standard for noise, which is the night-time guideline value of the WBG EHS Guidelines for Noise Level. Through this method, the calculations have continued until the noise impact becomes negligible as per the limits defined by both RAMEN and WBG General EHS Guidelines.

Methodology to develop the noise model has been based on an NSR-by-NSR approach as the Ankara-Izmir HSR is a linear construction Project. The model has assumed designated work areas along the Project alignment, where construction activities will be held simultaneously at each of the NSRs.

The sound power levels and quantities for the construction machinery and equipment considered in the noise impact assessment are provided in Table 6-13. In order to determine L_w of construction machine and equipment, Roadway Construction Noise Model User's Guide (RCNM) of the United States (US) Federal Highway Administration have been used. The Dutch National Railway Noise Modelling Method (SRM II) standard has been used for determining the sound power level of the equipment working on rails.

According to sound power level calculations, total sound power levels for infrastructure and superstructure works are as below:

- 131.5 LwA for infrastructure works
- 132.7 LwA for superstructure works

As the scope of Contractor's work cover superstructure works for the entire Project, the total sound power level calculated for superstructure works has been used for the modelling of entire route so as to represent the worst-case conditions. As part of the modelling, it has been assumed that the total calculated sound power level is homogenously distributed over each work area designated in the model.

For quarries, point sources of 115 LwA has been considered in the noise model. This sound power level value has been determined based on the data available for quarries with similar capacities.

While conducting assessment as per WBG General EHS Guideline Requirements cumulative noise levels have been used for all of the NSR and sensitive locations. As such; modelling results and determined baseline levels are added up logarithmically to estimate the anticipated cumulative noise level. Those values have been used for exceedance calculations.

For assessments conducted as per RAMEN, modelling results have been directly compared with the defined constant limiting values, because of the way that limiting values defined in RAMEN.

Table 6-13. Sound Power Levels for the Construction Machinery and Equipment

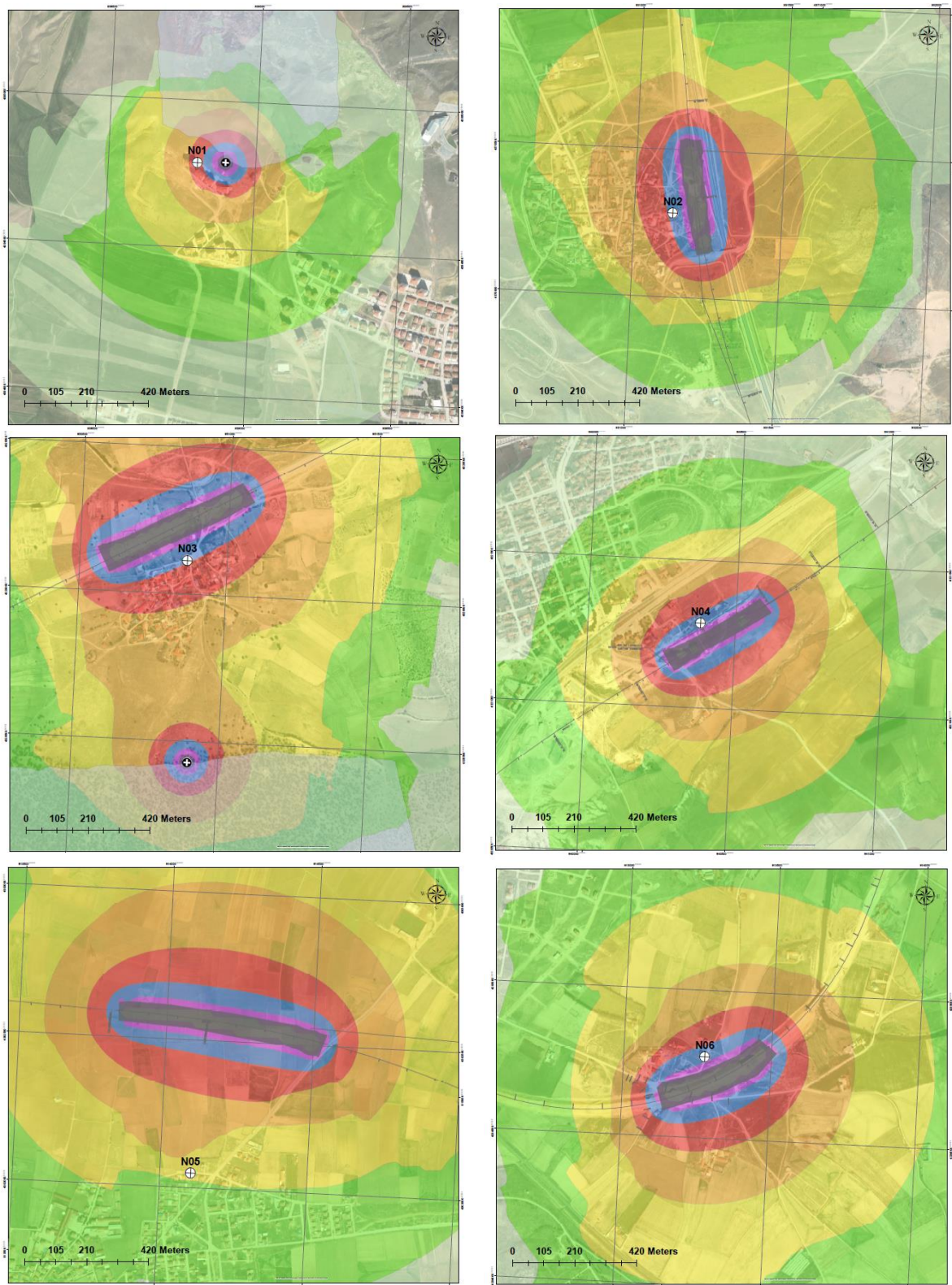
Construction Machinery for Infrastructure Works	Estimated Number	Sound Power Level "L _w " (dBA)	Construction Machinery for Superstructure Works	Estimated Number	Sound Power Level (L _w)
Sprinkler trucks	65	121.7	Sprinkler trucks	47	120.3
Dozer (D7 equivalent-for depot)	4	110.6	Asphalt plant(*)	1	98.3
Dozer (D8 equivalent)	24	118.3	Asphalt cylinder	2	99.5
Dozer (D86 equivalent-Engineering Structures Backfilling)	4	110.6	Balast finisher	10	114.5
DSM team(*)	12	115.3	Tamping machine	5	115.9
DKK team(*)	12	115.3	Driller	55	122.9
Excavator (for tunnels)	24	118.3	Distributor	5	113.5
Excavator (20-30 ton) (for slopes)	23	118.7	Vertical press	5	118.7
Excavator (30 ton and above)	51	121.6	Manuel power wrench (Trifonez)	10	111.5
Excavator (40 ton and above)	84	123.8	Excavator	165	126.7
Excavator (50 ton and above)	24	118.3	Finisher	30	119.3
Bored pilling equipment	20	124.5	Tensioner pump	2	100.5
Grader	25	118.5	Heating vehicle	5	105.0
Hi-up	85	119.9	Fine grinding machine	27	110.8
JCB	20	117.6	JCB	10	114.5
Generator	18	115.1	Generator	1	102.5
Jumbo	24	118.3	Generator (with spotlight)	18	115.1
Truck	1,322	134.8	Rough grinding machine	20	109.5
Kule Tower crane	7	109.0	Truck	1,243	134.5
Loader	87	118.9	Pickup truck	26	88.7
Mixer	161	122.6	Welding machine	10	102.5
Mobile crane (60 ton)	31	115.5	Shear motor	4	105.0
Concrete pump	34	113.8	Crushing Screening Facility (300 ton/h)	18	114.0
Rock	9	111.1	Compressor	15	111.3
Plant (120 m³/h)	11	108.7	Wheeled excavator	5	111.5
Shotcrete Robot	24	118.3	Wheeled cylinder	10	106.5
Cylinder (16 ton)	45	118.1	Loader	29	114.2
			Locomotive	20	118.9
			Switch tamping machine	1	108.9
			Makita (Bolt tightening machine)	17	117.8
			Mixer	12	111.3

Construction Machinery for Infrastructure Works	Estimated Number	Sound Power Level "Lw" (dBA)	Construction Machinery for Superstructure Works	Estimated Number	Sound Power Level (Lw)
			Panel spreading machine	5	108.0
			Platform wagon	292	115.6
			Portal crane (35 ton)	10	110.6
			Rail lowering apparatus (pack of 6)	20	85.0
			Rail cutting machine	64	119.6
			Rail cutting motor	10	110.0
			Rail grinder	1	100.4
			Rail wheel Unimog	16	115.6
			Regulator	5	105.0
			SG ballast wagon	50	118.9
			Stripping machine (Geismar)	3	105.0
			Cylinder	33	116.7
			Stabilisator	5	114.8
			Spiral Motor	26	124.0
			Non-Destructive Testing Machine(**)	1	-
			Wheeled Rail Excavator (20 Tonnes)	23	118.2
			Wheeled Rail Excavator (20-30 Tonnes)	10	114.5
			Telehandler	5	106.5
			Trailer(**)	34	-
			Travers Changing Equipment	5	-
			Tractor	10	113.5
			Power wrench (Trifonoz)	123	122.4
			Wagonette(**)	11	-
			Vibrator	8	114.5
			Crane (60 Ton)	22	114.0
			Crane (General Use)	6	108.3
			Horizontal Pres	5	118.7
			Road Measurement Machine(**)	1	-

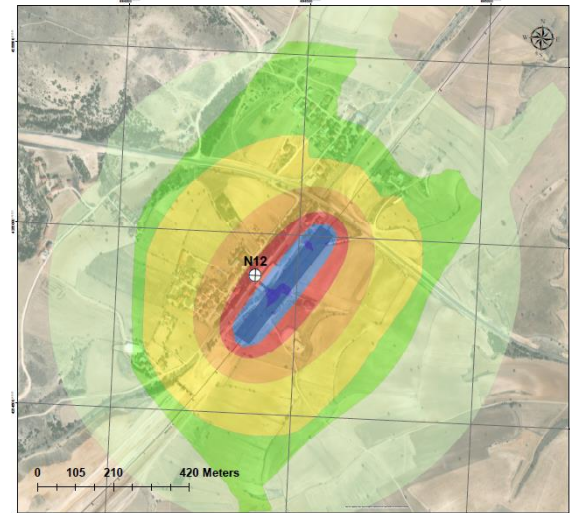
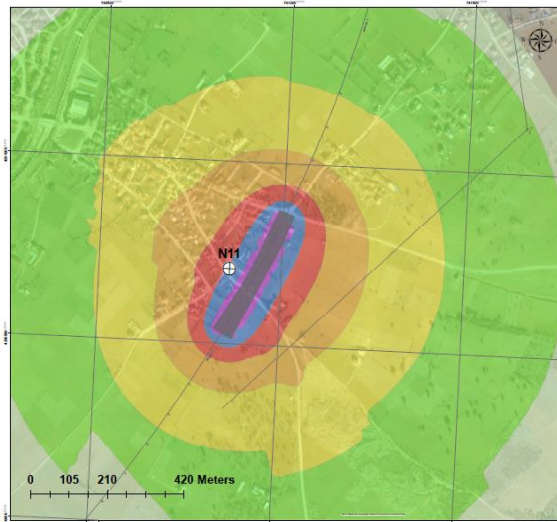
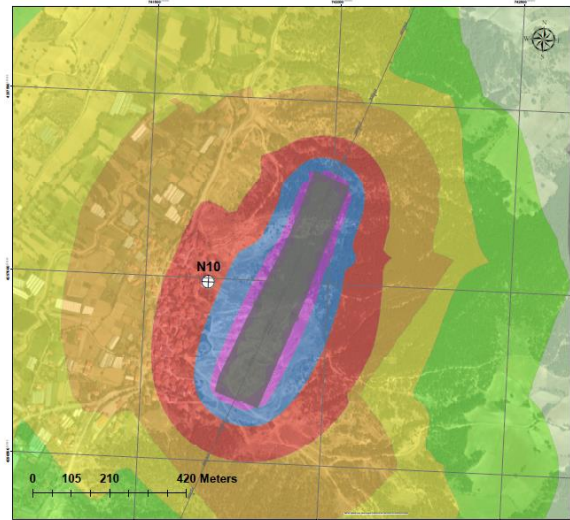
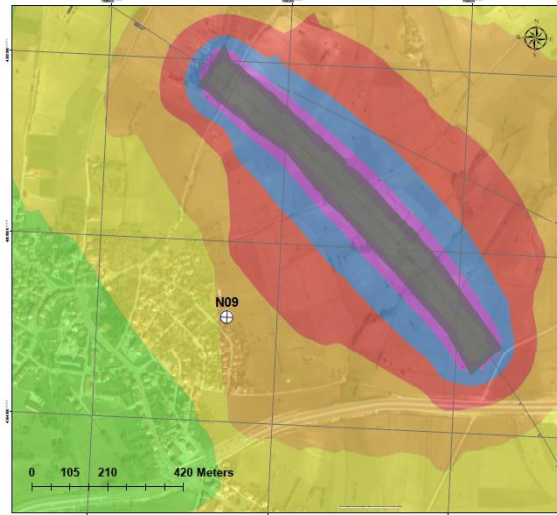
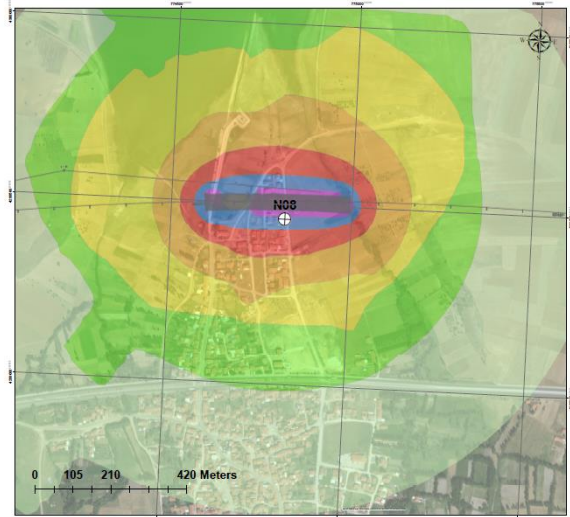
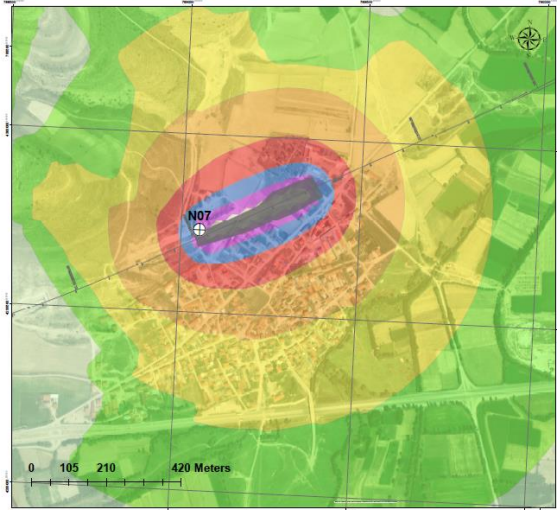
(*) The asphalt plant has been included in the noise and vibration assessments finalised in February 2021 as part of the ESIA process. The Contractor plans to purchase asphalt from external licensed asphalt production facilities.

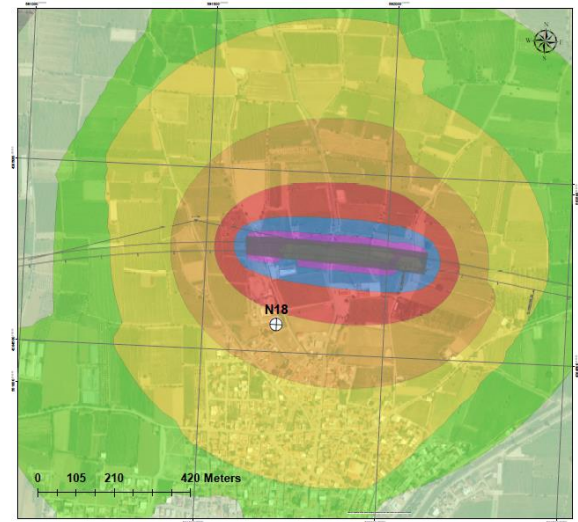
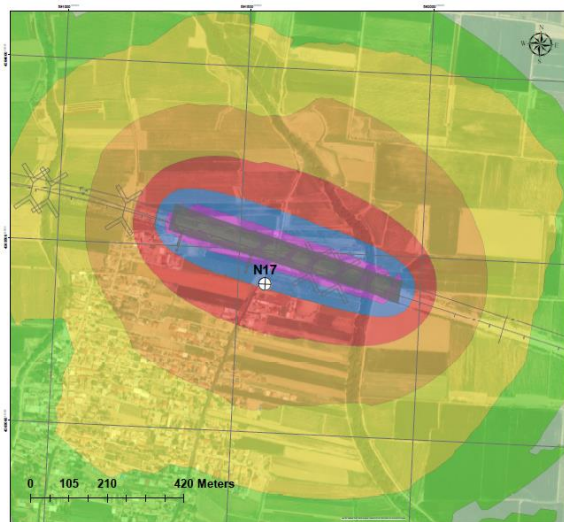
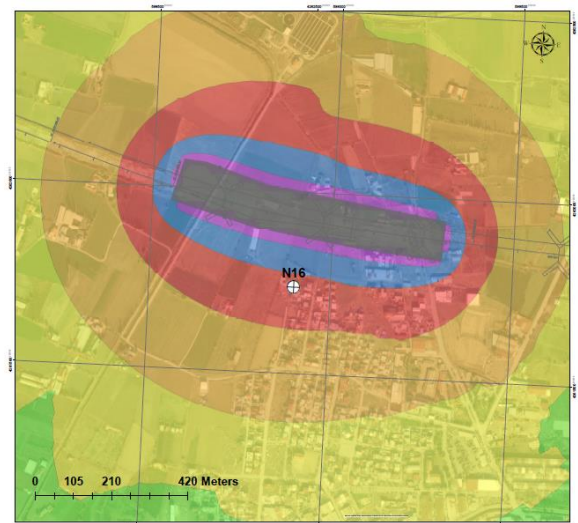
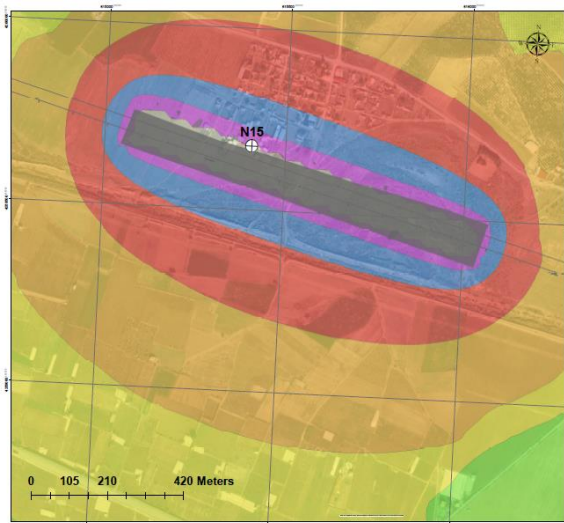
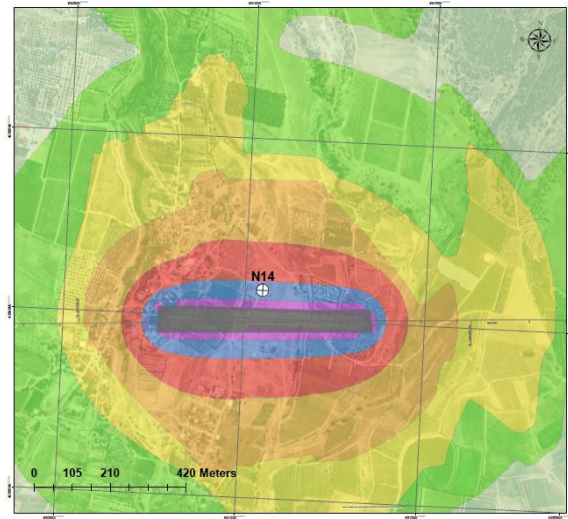
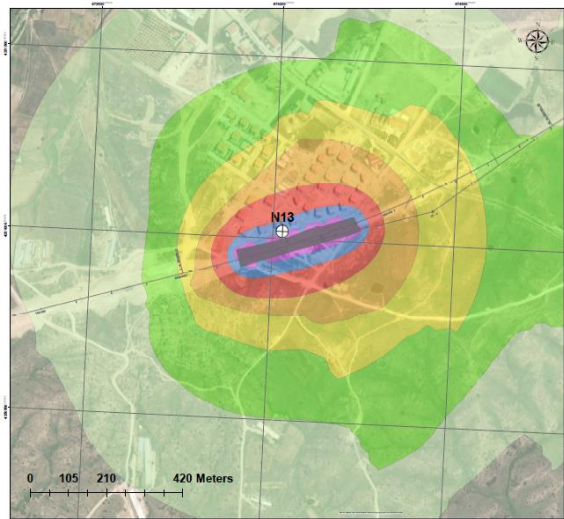
(**) No contribution expected to environmental noise.

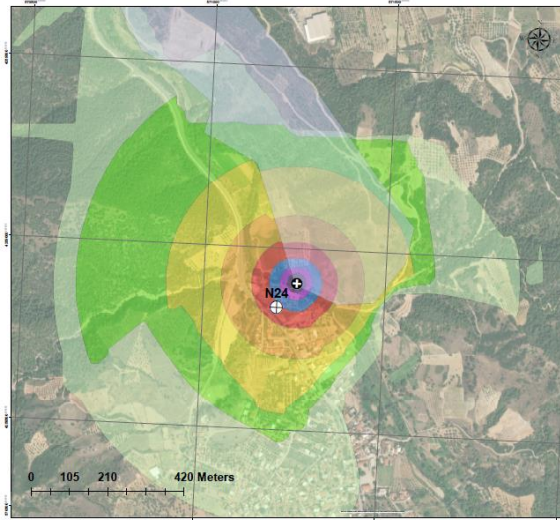
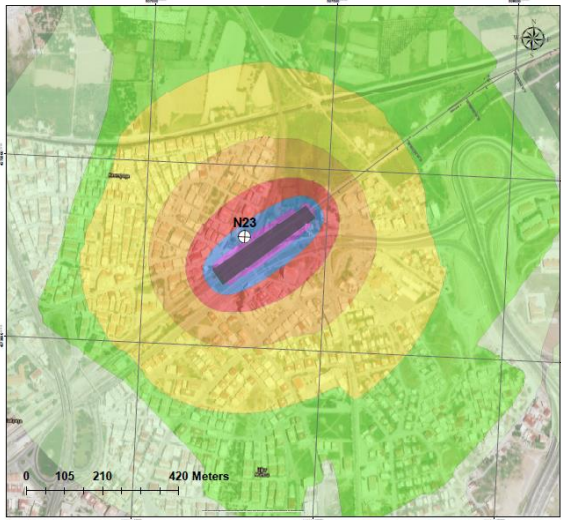
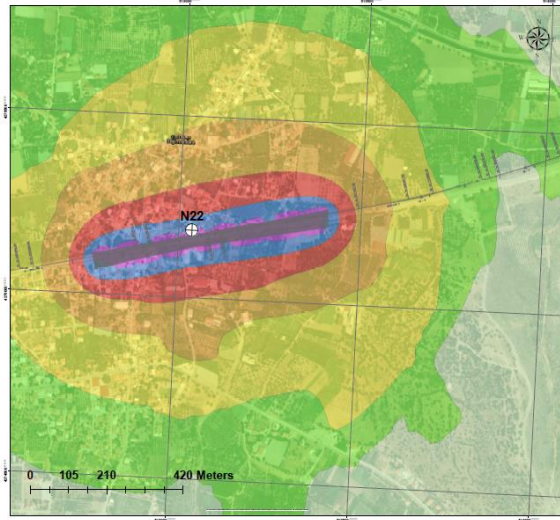
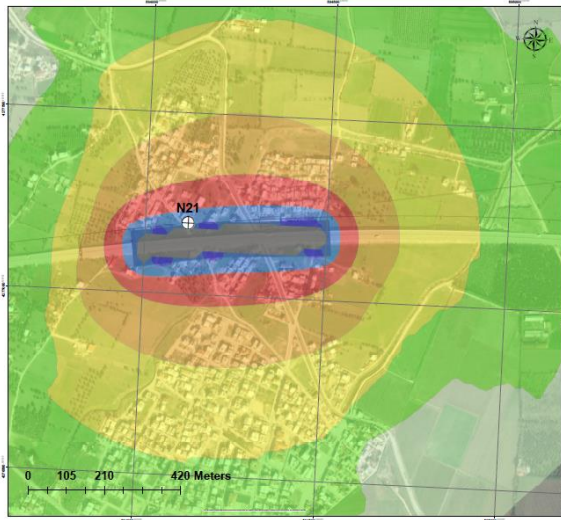
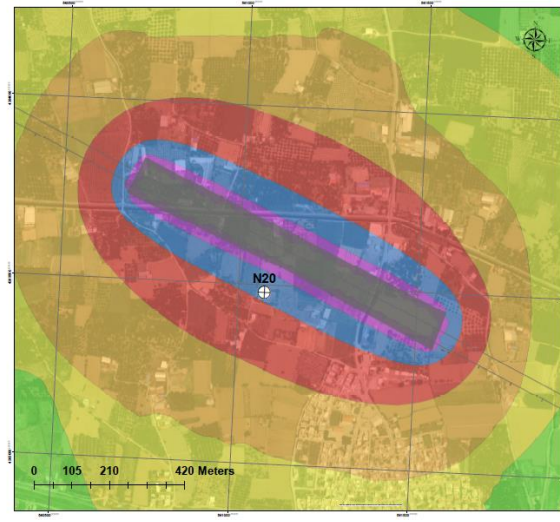
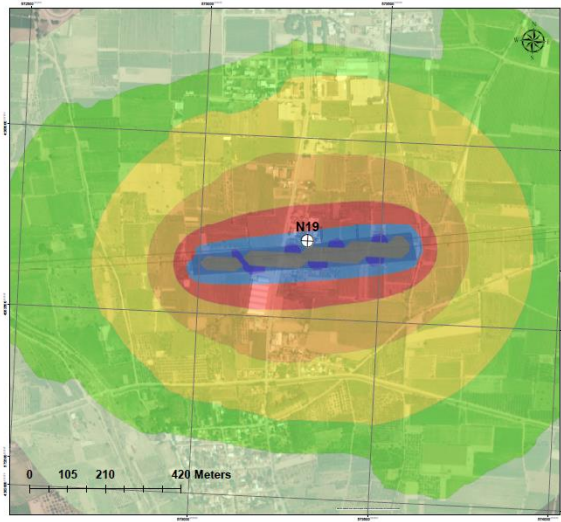
Cumulative construction phase noise modelling results, incorporating the baseline and modelled noise levels at each NSR are given in Table 6-15. The daytime grid noise maps²⁷ for NSRs are presented in Figure 6-2 (see Appendix C.2 for high resolution grid maps).



²⁷ Grid noise maps are prepared only for daytime period as the noise propagation trends are similar for day, evening and night time periods, besides minor differences in meteorological factors that make conditions relatively more favourable during night time when compared to evening and during evening when compared to day time.







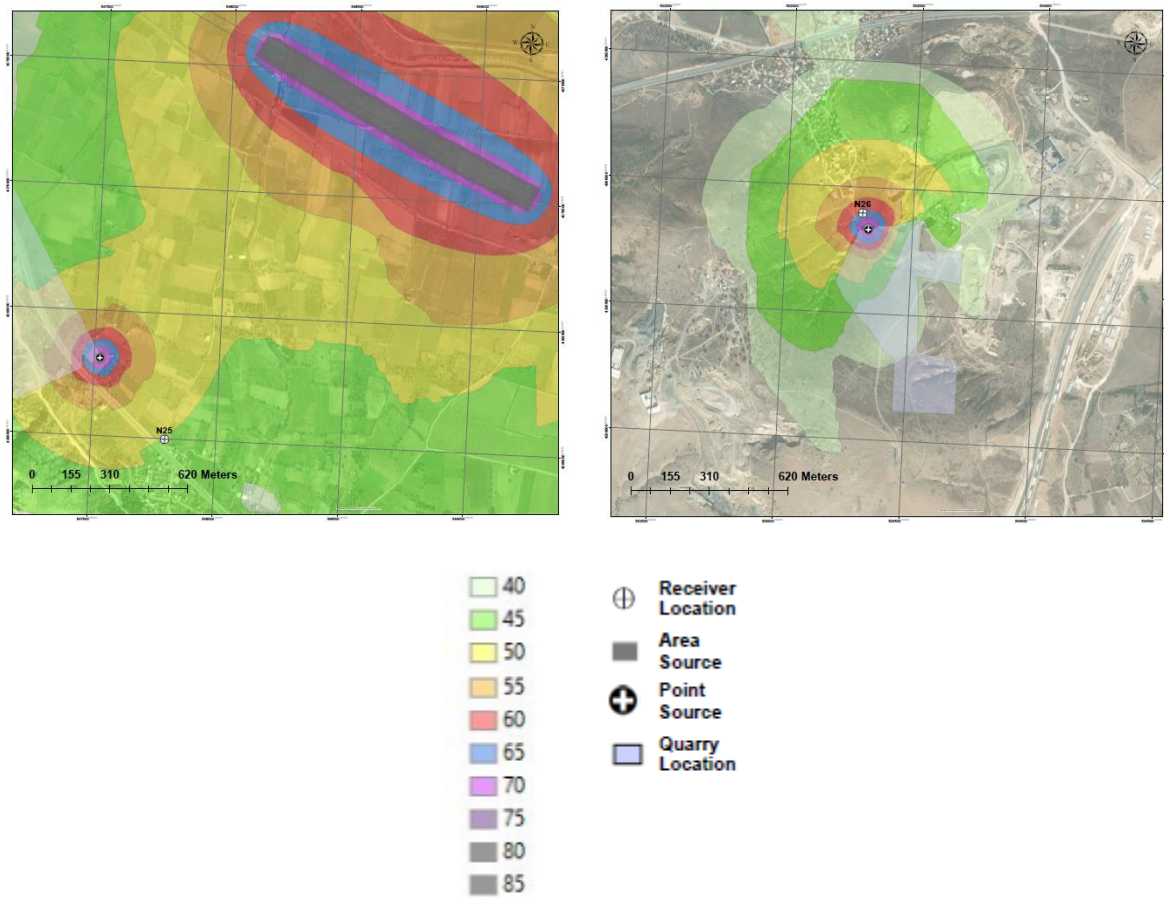


Figure 6-2. Day Time Grid Noise Maps for NSRs

There are other potential noise receptors located within 500 m distance of the Project route, for which baseline noise levels measured at certain NSRs are assumed to be representative, as listed in Table 6-14.

Table 6-14. Other Potential Noise Receptors Considered in the Assessment

Receptor No	Corresponding Railway KM	Potential Noise Receptor		
		Province	District	Neighbourhood/ Village
NM-01	KM 101+201	Afyonkarahisar	Emirdag	Tabaklar
NM-02	KM 101+886	Afyonkarahisar	Emirdag	Gomu
NM-03	KM 108+350	Afyonkarahisar	Emirdag	Yuregil
NM-04	KM 109+557	Afyonkarahisar	Emirdag	Yuregil Koseli
NM-12	KM 184+548	Afyonkarahisar	Sinanpasa	Bulca
NM-13	KM 201+175	Afyonkarahisar	Sinanpasa	Karacaoren
NM-14	KM 204+141	Afyonkarahisar	Sinanpasa	Guney
NM-15	KM 207+833	Afyonkarahisar	Sinanpasa	Calislar
NM-16	KM 226+472	Usak	Banaz	Halaclar
NM-17	KM 269+743	Usak	Banaz	Alaba
NM-22	KM 373+083	Usak	Esme	Ceberler
NM-26	KM 408+619	Manisa	Alasehir	Matarli
NM-31	KM 422+112	Manisa	Salihli	Hacili
NM-32	KM 424+238	Manisa	Salihli	Mevlutlu
NM-33	KM 427+817	Manisa	Salihli	Yesilova
NM-35	KM 448+482	Manisa	Salihli	Hasalan
NM-37	KM 469+072	Manisa	Turgutlu	Urganli
NM-39	KM 524+515	Manisa	Yunusemre	Evrenos

Representative baseline noise levels for these potential noise receptors are indicated and cumulative construction phase noise modelling results are presented in Table 6-15 (locations are shown together with NSRs in Figure 6-3). The criteria considered in the determination of representativeness of the baseline noise measurements for the potential noise receptors include the following:

- Proximity to noise measurement locations
- Population similarity
- Similarity in terms of number of buildings located in the settlement
- Distance to major noise sources (such as highways or intercity roads, etc.)

Modelling results for additional receptors located within 500 m distance to main noise sources (railway construction sites and quarries) are presented in Appendix C.3.

As indicated in Chapter 1 ("Project Description"), working hours and shifts will be regulated in compliance with the requirements of the national Labour Law (Law No. 4857, 2003). Single shifts are foreseen to be used throughout the Project. However, additional shifts would be organised based on need. In case evening and night time shifts are decided to be organised, number of construction machinery and equipment operating at locations close to the NSRs and other potential noise receptors, where the RAMEN limits are exceeded and/or where the WBG exceedances are moderate and high according to the modelling results (based on the sound power levels assumed - 132.7 LwA at the source), are required to be optimised to ensure compliance with Project Standards and/or night time work is to be avoided at locations close to (app. 500 m) the NSRs and potential noise receptors, to the extent feasible. It should be noted that the noise to be generated as a result of the construction works will be temporary and removed upon removed upon completion of activities at respective work sites along the HSR route and at quarry sites.

Table 6-15. Cumulative Construction Noise Level Modelling Results for NSRs and Other Potential Noise Receptors

NSR No.	Representative Baseline Location	(A) Measurement Results (dBA)					(B) Modelling Results (dBA)					(C) Cumulative Noise (dBA)					(D) Noise Limits (dBA)					(E) Exceedances Difference (*)					(F) Magnitude of Change				
		Turkish RAMEN			WBG		Turkish RAMEN			WBG		Turkish RAMEN			WBG		Turkish RAMEN			WBG (**)		Turkish RAMEN			WBG		Turkish RAMEN			WBG	
		L _{day}	Levening	L _{night}	L _{day}	L _{night}	L _{day}	Levening	L _{night}	L _{day}	L _{night}	L _{day}	Levening	L _{night}	L _{day}	L _{night}	L _{day}	Levening	L _{night}	L _{day}	L _{night}	L _{day}	Levening	L _{night}	L _{day}	L _{night}	L _{day}	Levening	L _{night}	L _{day}	L _{night}
		(07:00-19:00)	(19:00-23:00)	(23:00-07:00)	(07:00-22:00)	(22:00-07:00)	(07:00-19:00)	(19:00-23:00)	(23:00-07:00)	(07:00-22:00)	(22:00-07:00)	(07:00-19:00)	(19:00-23:00)	(23:00-07:00)	(07:00-22:00)	(22:00-07:00)	(07:00-19:00)	(19:00-23:00)	(23:00-07:00)	(07:00-22:00)	(22:00-07:00)	(07:00-19:00)	(19:00-23:00)	(23:00-07:00)	(07:00-22:00)	(22:00-07:00)	(07:00-19:00)	(19:00-23:00)	(23:00-07:00)	(07:00-22:00)	(22:00-07:00)
NSR-01	N01	51.5	46.9	45.1	50.8	45.9	61.9	62.3	62.7	61.9	62.7	62.3	62.4	62.8	62.2	62.8	70.0	65.0	60.0	55.0	48.9	NE	NE	2.7	7.2	13.9	Negligible	Negligible	Negligible	Medium	High
NSR-02	N02	49.5	54.4	45.9	51.3	47.0	62.6	63.0	63.3	62.6	63.3	62.8	63.6	63.4	62.9	63.4	70.0	65.0	60.0	55.0	50.0	NE	NE	3.3	7.9	13.4	Negligible	Negligible	Low	Medium	High
NSR-03	N03	51.0	49.8	45.9	51.1	46.3	61.8	62.3	62.8	61.8	62.8	62.1	62.5	62.9	62.2	62.9	70.0	65.0	60.0	55.0	49.3	NE	NE	2.8	7.2	13.6	Negligible	Negligible	Negligible	Medium	High
NSR-04	N04	51.4	51.0	47.0	51.2	47.9	64.0	64.2	64.4	64.0	64.4	64.2	64.4	64.5	64.2	64.5	70.0	65.0	60.0	55.0	50.9	NE	NE	4.4	9.2	13.6	Negligible	Negligible	Low	Medium	High
NSR-05	N05	52.6	51.3	38.6	52.1	39.2	47.0	47.7	48.3	47.0	48.3	53.7	52.8	48.7	53.3	48.8	70.0	65.0	60.0	55.0	45.0	NE	NE	NE	NE	3.8	Negligible	Negligible	Negligible	Negligible	Low
NSR-06	N06	59.5	57.8	47.9	58.9	48.6	64.3	64.7	64.9	64.3	64.9	65.5	65.5	65.0	65.4	65.0	70.0	65.0	60.0	61.9	51.6	NE	NE	4.9	3.5	13.4	Negligible	Negligible	Low	Low	High
NSR-07	N07	57.5	53.4	48.4	56.9	48.7	67.0	67.1	67.1	67.0	67.1	67.5	67.3	67.2	67.4	67.2	70.0	65.0	60.0	59.9	51.7	NE	2.1	7.1	7.5	15.5	Negligible	Negligible	Medium	Medium	High
NSR-08	N08	56.7	49.0	47.6	55.9	47.2	64.7	64.8	64.9	64.7	64.9	65.3	64.9	65.0	65.2	65.0	70.0	65.0	60.0	58.9	50.2	NE	NE	4.9	6.3	14.8	Negligible	Negligible	Low	Medium	High
NSR-09	N09	47.4	49.2	47.1	48.2	46.6	51.7	52.5	53.1	51.7	53.1	53.1	54.2	54.1	53.3	54.0	70.0	65.0	60.0	55.0	49.6	NE	NE	NE	NE	4.3	Negligible	Negligible	Negligible	Negligible	Low
NSR-10	N10	54.9	54.1	46.8	54.4	48.0	59.9	60.5	61.1	59.9	61.1	61.1	61.4	61.3	61.0	61.3	70.0	65.0	60.0	55.0	51.0	NE	NE	1.1	6.0	10.3	Negligible	Negligible	Negligible	Medium	High
NSR-11	N11	59.2	59.8	53.7	58.2	53.8	61.6	61.9	62.2	61.6	62.2	63.6	64.0	62.8	63.2	62.8	70.0	65.0	60.0	61.2	56.8	NE	NE	2.2	2.0	6.0	Negligible	Negligible	Negligible	Negligible	Medium
NSR-12	N12	45.6	41.0	40.2	44.6	39.7	61.3	61.7	62.0	61.3	62.0	61.4	61.7	62.0	61.4	62.0	70.0	65.0	60.0	55.0	45.0	NE	NE	2.0	6.4	17.0	Negligible	Negligible	Negligible	Medium	High
NSR-13	N13	48.3	41.7	35.4	47.4	36.1	65.4	65.5	65.6	65.4	65.6	65.5	65.5	65.6	65.5	65.6	70.0	65.0	60.0	55.0	45.0	NE	0.5	5.6	10.5	20.6	Negligible	Negligible	Medium	High	High
NSR-14	N14	57.6	54.5	56.7	57.3	56.4	63.1	63.5	63.8	63.1	63.8	64.2	64.0	64.6	64.1	64.5	70.0	65.0	60.0	60.3	59.4	NE	NE	3.8	3.8	5.2	Negligible	Negligible	Low	Low	Medium
NSR-15	N15	58.0	54.5	53.8	57.5	53.4	68.3	68.5	68.7	68.3	68.7	68.7	68.7	68.8	68.6	68.8	70.0	65.0	60.0	60.5	56.4	NE	3.5	8.7	8.1	12.4	Negligible	Low	Medium	Medium	High
NSR-16	N16	57.0	51.0	52.5	56.0	52.2	59.8	60.4	61.0	59.8	61.0	61.6	60.9	61.6	61.3	61.5	70.0	65.0	60.0	59.0	55.2	NE	NE	1.0	2.3	6.4	Negligible	Negligible	Negligible	Negligible	Medium
NSR-17	N17	50.8	44.0	40.5	50.3	41.0	62.0	62.4	62.8	62.0	62.8	62.3	62.5	62.8	62.3	62.8	70.0	65.0	60.0	55.0	45.0	NE	NE	2.8	7.3	17.8	Negligible	Negligible	Negligible	Medium	High
NSR-18	N18	53.2	48.8	47.7	52.6	47.7	55.0	55.7	56.2	55.0	56.2	57.2	56.5	56.8	57.0	56.8	70.0	65.0	60.0	55.0	50.7	NE	NE	NE	2.0	6.1	Negligible	Negligible	Negligible	Negligible	Medium
NSR-19	N19	48.5	49.7	42.7	48.3	42.8	68.2	68.3	68.4	68.2	68.4	68.2	68.4	68.4	68.2	68.4	70.0	65.0	60.0	55.0	45.0	NE	3.3	8.4	13.2	23.4	Negligible	Low	Medium	High	High
NSR-20	N20	54.8	48.2	44.3	53.6	43.9	61.9	62.5	62.9	61.9	62.9	62.7	62.7	63.0	62.5	63.0	70.0	65.0	60.0	55.0	45.0	NE	NE	2.9	7.5	18.0	Negligible	Negligible	Negligible	Medium	High
NSR-21	N21	59.8	55.7	46.9	58.6	47.7	69.2	69.3	69.4	69.2	69.4	69.7	69.5	69.4	69.6	69.4	70.0	65.0	60.0	61.6	50.7	NE	4.3	9.4	8.0	18.8	Negligible	Low	Medium	Medium	High
NSR-22	N22	58.1	57.7	53.7	58.2	53.3	66.1	66.2	66.3	66.1	66.3	66.7	66.8	66.5	66.8	66.5	70.0	65.0	60.0	61.2	56.3	NE	1.2	6.3	5.6	10.3	Negligible	Negligible	Medium	Medium	High
NSR-23	N23	65.6	65.0	51.8	65.5	53.6	65.2	65.3	65.4	65.2	65.4	68.4	68.2	65.6	68.3	65.7	70.0	65.0	60.0	68.5	56.6	NE	0.3	5.4	NE	9.1	Negligible	Negligible	Medium	Negligible	Medium
NSR-24	N24	57.5	53.6	47.7	57.9	49.2	62.9	63.3	63.6	62.9	63.6	64.0	63.7	63.7	64.1	63.8	70.0	65.0	60.0	60.9	52.2	NE	NE	3.6	3.2	11.6	Negligible	Negligible	Low	Low	High
NSR-25(***)	N25	58.6	56.9	53.9	58.1	54.3	48.7	49.5	50.1	48.7	50.1	59.0	57.6	55.4	58.5	55.7	70.0	65.0	60.0	61.1	57.3	NE	NE	NE	NE	NE	Negligible	Negligible	Negligible	Negligible	Negligible
NSR-26	N26	48.0	43.4	36.7	50.0	38.0	65.6	65.9	66.1	65.6	66.1	65.7	65.9	66.1	65.7	66.1	70.0	65.0	60.0	55.0	45.0	NE	0.9	6.1	10.7	21.1	Negligible	Negligible	Medium	High	High
NM-01	N03	65.2	61.2	45.9	64.8	46.3	60.3	60.6	60.9	60.3	60.9	66.4	63.9	61.0	66.1	61.0	70.0	65.0	60.0	67.8	49.3	NE	NE	0.9	NE	11.8	Negligible	Negligible	Negligible	Negligible	High
NM-02	N03	65.2	61.2	45.9	64.8	46.3	63.5	63.7	63.8	63.5	63.8	67.4	65.6	63.9	67.2	63.9	70.0	65.0	60.0	67.8	49.3	NE	NE	3.8	NE	14.6	Negligible	Negligible	Low	Negligible	High
NM-03	N03	65.2	61.2	45.9	64.8	46.3	62.4	62.7	62.9	62.4	62.9	67.0	65.0	63.0	66.8	63.0	70.0	65.0	60.0	67.8	49.3	NE	NE	2.9	NE	13.7	Negligible	Negligible	Negligible	Negligible	High
NM-04	N03	65.2	61.2	45.9	64.8	46.3	62.1	62.3	62.5	62.1	62.5	66.9	64.8	62.6	66.7	62.6															

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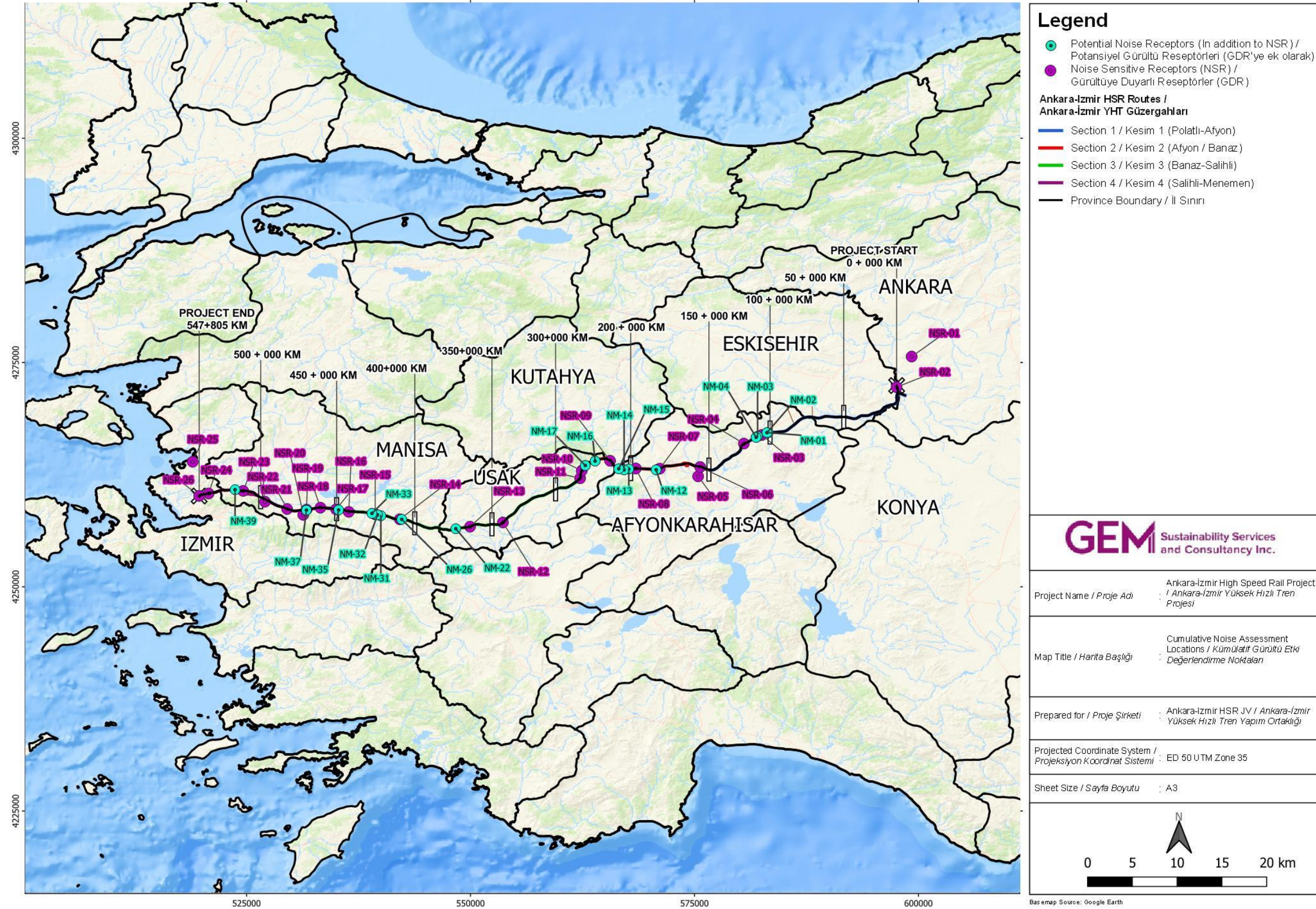


Figure 6-3. Locations of NSRs and Other Potential Noise Receptors Covered in the Cumulative Noise Modelling

Noise Assessment for the Operation Phase

During the operation phase of the Project, noise will be generated as a result of the HSR operations, intermittently affecting the receptors located along the Project route parallel to the HSR operation hours. On the other hand, as the road traffic load is anticipated to decrease because of the shift of passengers from motorways to HSR operations, the noise impact on the receptors caused by the road vehicles is anticipated to reduce.

For the assessment of the noise to be generated during the operation of the Project, a Worst-case Noise Modelling Study has been conducted by a specialist company (Frekans Acoustics & Environmental Laboratory) in 2021 as part of the ESIA in order to determine the potential impact corridor and the NSRs for the operation phase. In consideration of the noise guideline values of the WBG General EHS Guidelines, for determination of the potential impact corridor, the distance at which noise sourced from railway is diminished to the 40dBA level has been selected as the threshold with a conservative approach based on the following criteria:

- L_{night} noise limit of 45dBA defined in WHO Guidelines (adopted by WBG General EHS Guidelines)
- Rough average night time background noise level throughout the railway axis according to 26 baseline noise measurement results from January-February 2021

The indicative Worst-case Noise Modelling study has been conducted according to SRM II international document, which is the Dutch national railway noise calculation method.

According to SRM II, train types are categorised based on different components and usage, as presented in Figure 6-4. The SRM II categorises the high speed trains as Category 9A and Category 9B.

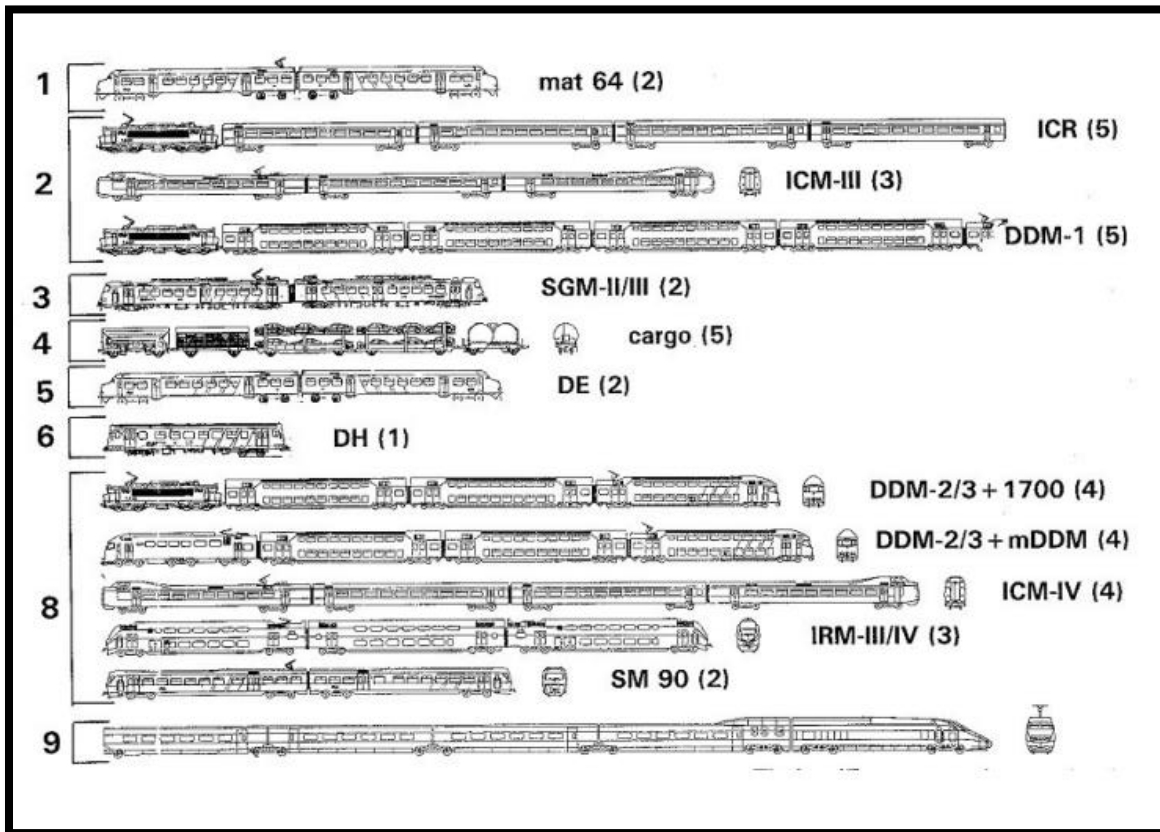


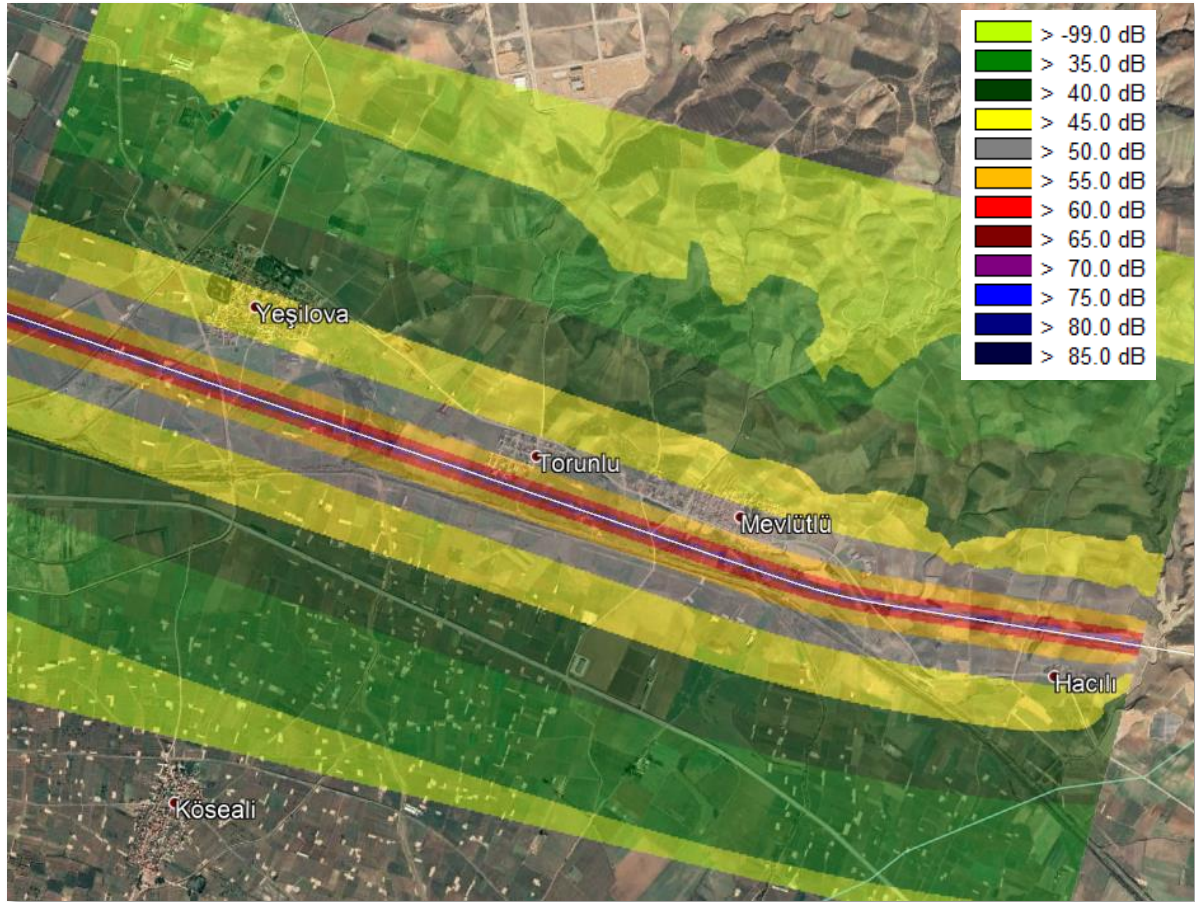
Figure 6-4. Train Type Categorisation according to SRM II

The national EIA Report of 2006 includes an operation phase noise assessment based on the calculations conducted by using the Dutch Calculation Method and evaluates the results against the noise limits described in the RAMEN in force. In the Worst-case Operation Phase Noise Modelling Study conducted as part of this ESIA in 2021, the load of the railway has been assumed as 60 trains/day (worst-case scenario) as proposed by the national EIA Report potentially for the last of the operations. Distribution of train services within the day are assumed as below;

- 60% passes at day time,
- 20% passes at evening time, and
- 20% passes at night time.

The Worst-case Operation Phase Noise Model has been run for approximately 36 kilometers square area in order to identify the maximum possible impact corridor for the Project. This pilot model area has been selected to represent the flattest terrain conditions along the Project route to represent the maximum noise propagation. The study concluded that the maximum potential impact corridor for the operation phase of the Project is 1,250 meters from both sides of the railway axis (in total 2,500 meters corridor). As such, according to the worst-case scenario, a potential receptor which would be affected by environmental noise can be located at a maximum distance of 1,250 meters from the railway. The maximum potential impact corridor of 2,500 m produced by the noise model has been applicable to the full Project alignment in line with the worst-case approach. The width of the impact corridor would reduce according to the topographical factors along the route, Project design and final operational scenario of the railway (for reference, daily trip number of the the Ankara-Istanbul HSR, which is currently in operation, is 10 (5+5) (<https://www.tcddtasimacilik.gov.tr/yht/ankara-istanbul-ankara-yuksek-hizli-tren/>)).

The indicative noise impact corridor for the operation phase based on worst-case modelling study is presented in Figure 6-5. The Contractor's scope of work includes design as per the Construction Contract. Building on the results of this Worst-case Noise Modelling Study, a Realistic Noise Modelling Study will be conducted with the input data reflecting the latest status of design to be carried out by the Contractor and the terrain details. The Design and Construction Responsibility Matrix for the Contractor's Scope of Work is presented in Chapter 1 (see Table 1-24).



- **Figure 6-5. Indicative Noise Impact Corridor for Operation Phase based on Worst-case Modelling Study**

The potential NSRs (78 in total) within the impact corridor have been identified as a result of the Worst-case Noise Modeling Study, as listed in Table 6-16. In the identification of the potential NSRs, the settlement locations have been analysed based on the most recent satellite imagery and the barrier effect of the topography and layout of the settlements as well as the effect of the engineering structures such as tunnels have been taken into consideration to the extent possible. The locations of the potential NSRs within the impact corridor along the Project route are shown on the maps presented between Figure 6-6 and Figure 6-10.

Table 6-16. Potential Noise Sensitive Receptors (NSRs) within the Impact Corridor

Section	Zone No.	App. KM	Orientation According to Axis	Distance of Closest Structure to the Axis (m)	Potential Noise Level at Noise Receptor (dBA)	Turkish RAMEN (dBA)			WBG		Settlement	District	Province
						L _{day}	L _{evening}	L _{night}	L _{day}	L _{night}			
Section 4	1	547+000	S(outh)	24	68.0	65	60	55	55	45	Yahseli	Menemen	Izmir
	2	542+000	S	5	74.8	65	60	55	55	45	Emiralem Merkez		
	3	542+000	N(orth)	3	77.0	65	60	55	55	45	Emiralem Merkez		
	4	540+000	S	61	63.9	65	60	55	55	45	Kir		
	5	539+000	N	17	69.5	65	60	55	55	45	Suleymanli		
	6	532+000	S	40	65.7	65	60	55	55	45	Muradiye		
	7	532+000	N	3	77.0	65	60	55	55	45	Muradiye		
	8	512+100	N	0	81.8	65	60	55	55	45	Maresal Fevzi Cakmak		
	9	512+000	S	67	63.5	65	60	55	55	45	Maresal Fevzi Cakmak		
	10	503+000	S	365	56.1	65	60	55	55	45	Yukari Cobanisa	Sehzadeler	Manisa
	11	494+000	S	20	68.8	65	60	55	55	45	Asagi Cobanisa		
	12	481+000	S	56	64.3	65	60	55	55	45	Yildirim	Turgutlu	
	13	476+000	S	350	56.3	65	60	55	55	45	Avsar		
	14	469+000	S	200	58.8	65	60	55	55	45	Yenikoy		
	15	469+000	N	18	69.2	65	60	55	55	45	Yenikoy		
	16	460+000	S	169	59.5	65	60	55	55	45	Ahmetli	Ahmetli	
	17	456+000	N	48	64.9	65	60	55	55	45	Yarasli		
	18	450+600	S	40	65.7	65	60	55	55	45	Kapanci	Salihli	
	19	449+000	S	236	58.0	65	60	55	55	45	Hasalan		
	20	445+000	S	122	60.9	65	60	55	55	45	Yilmaz		
	21	442+500	S	0	81.8	65	60	55	55	45	Ataturk		
	22	439+000	S	158	59.8	65	60	55	55	45	Kirveli		
	23	437+000	S	47	65.0	65	60	55	55	45	Karaoglanli		
Section 3	24	428+000	N	243	57.9	65	60	55	55	45	Yesilova		
	25	425+000	N	3	77.0	65	60	55	55	45	Torunlu		
	26	417+000	N	123	60.9	65	60	55	55	45	Kemaliye	Alasehir	
	27	414+000	N	67	63.5	65	60	55	55	45	Toygar		
	28	414+000	S	39	65.9	65	60	55	55	45	Toygar		
	29	409+900	S	0	81.8	65	60	55	55	45	Kasapli		
	30	403+000	S	228	58.2	65	60	55	55	45	Selce		
	31	379+000	S	5	74.8	65	60	55	55	45	Manavli		
	32	368+000	N	58	64.1	65	60	55	55	45	Esme	Esme	Usak
	33	368+000	S	29	67.1	65	60	55	55	45	Esme		
	34	365+000	N	326	56.6	65	60	55	55	45	Esme		
	35	364+000	N	47	65.0	65	60	55	55	45	Esme		
	36	363+000	S	136	60.4	65	60	55	55	45	Esme		
	37	342+000	N	39	65.9	65	60	55	55	45	Inay		
	38	316+000	S	444	55.3	65	60	55	55	45	Hocalar	Merkez	
	39	316+000	N	586	54.1	65	60	55	55	45	Hocalar		

Section	Zone No.	App. KM	Orientation According to Axis	Distance of Closest Structure to the Axis (m)	Potential Noise Level at Noise Receptor (dBA)	Turkish RAMEN (dBA)			WBG		Settlement	District	Province
						L _{day}	L _{evening}	L _{night}	L _{day}	L _{night}			
	40	308+000	S	5	74.8	65	60	55	55	45	Yapagilar	Banaz	
	41	308+000	N	35	66.3	65	60	55	55	45	Yapagilar		
	42	294+000	S	270	57.4	65	60	55	55	45	Kizilcasogut		
	43	289+000	S	225	58.2	65	60	55	55	45	Oksuz		
	44	284+000	S	264	57.5	65	60	55	55	45	Gullucam		
	45	284+000	N	285	57.2	65	60	55	55	45	Gullucam		
	46	281+000	S	10	71.8	65	60	55	55	45	Banaz		
	47	282+000	N	36	66.2	65	60	55	55	45	Banaz		
	48	279+000	S	15	70.0	65	60	55	55	45	Banaz		
Section 2	49	279+000	N	62	63.8	65	60	55	55	45	Banaz	Sinanpasa	Kutahya Afyonkarahisar
	50	275+000	N	120	61.0	65	60	55	55	45	Hatipler		
	51	272+000	N	102	61.7	65	60	55	55	45	Alaba		
	52	270+000	S	122	60.9	65	60	55	55	45	Alaba		
	53	224+000	S	28	67.3	65	60	55	55	45	Halaclar		
	54	216+400	S	400	55.6	65	60	55	55	45	Dumlupinar		
	55	205+000	S	211	58.5	65	60	55	55	45	Guney		
	56	201+000	S	281	57.3	65	60	55	55	45	Karacaoren		
	57	197+000	S	38	66.0	65	60	55	55	45	Duzagaç		
	58	185+000	S	243	57.9	65	60	55	55	45	Bulca		
	59	182+000	S	15	70.0	65	60	55	55	45	Balmahmut		
	60	177+000	N	70	63.3	65	60	55	55	45	Koprulu		
	61	172+000	S	320	56.7	65	60	55	55	45	Demircevre		
	62	169+000	S	255	57.7	65	60	55	55	45	Ismail		
	63	162+000	S	70	63.3	65	60	55	55	45	Erenler		
	64	159+000	S	71	63.2	65	60	55	55	45	Beyyazi		
	65	159+000	N	52	64.6	65	60	55	55	45	Beyyazi		
Section 1	66	156+000	S	150	60.0	65	60	55	55	45	Susuz	Iscehisar	Eskisehir Ankara
	67	132+000	S	24	68.0	65	60	55	55	45	Seydiler		
	68	132+000	N	42	65.5	65	60	55	55	45	Seydiler		
	69	118+500	N	57	64.2	65	60	55	55	45	Bayat		
	70	108+000	S	70	63.3	65	60	55	55	45	Yüregil		
	71	109+000	S	58	64.1	65	60	55	55	45	Yüregil		
	72	105+300	S	67	63.5	65	60	55	55	45	Emirinkoyu		
	73	102+000	N	125	60.8	65	60	55	55	45	Gomu		
	74	101+000	S	68	63.4	65	60	55	55	45	Tabaklar		
	75	90+000	N	574	54.2	65	60	55	55	45	Türkmenakoren		
	76	76+000	N	601	54.0	65	60	55	55	45	Eskiakoren		
	77	65+000	S	644	53.7	65	60	55	55	45	Sigircik		
	78	0+000	N	20	68.1	65	60	55	55	45	Yenice		

Distribution of the number of settlements within the operation phase noise impact corridor per section, province and district based on the Worst-case Noise Modelling Study is presented in Table 6-17.

Table 6-17. Distribution of the Number of Settlements within the Noise Impact Corridor per Section, Province and District

Section	Section-based Number of NSRs	Province	Province-based Number of NSRs	District	District-based Number of NSRs
Section 1	12	Ankara	1	Polatli	1
		Eskisehir	1	Gunyuzu	-
		Afyonkarahisar	22	Sivrihisar	1
				Emirdag	7
				Bayat	1
				Iscehisar	2
				Merkez	7
Section 2	17	Kutahya	1	Sinanpasa	5
				Dumlupinar	1
		Usak	23	Banaz	12
Section 3	27	Manisa	21	Merkez	4
				Ulubey	1
				Esme	6
				Alasehir	5
				Kula	-
Section 4	22	Izmir	9	Salihli	8
				Ahmetli	2
				Turgutlu	4
				Sehzadeler	2
				Yunusemre	-
Total	78		78	Menemen	9
					78

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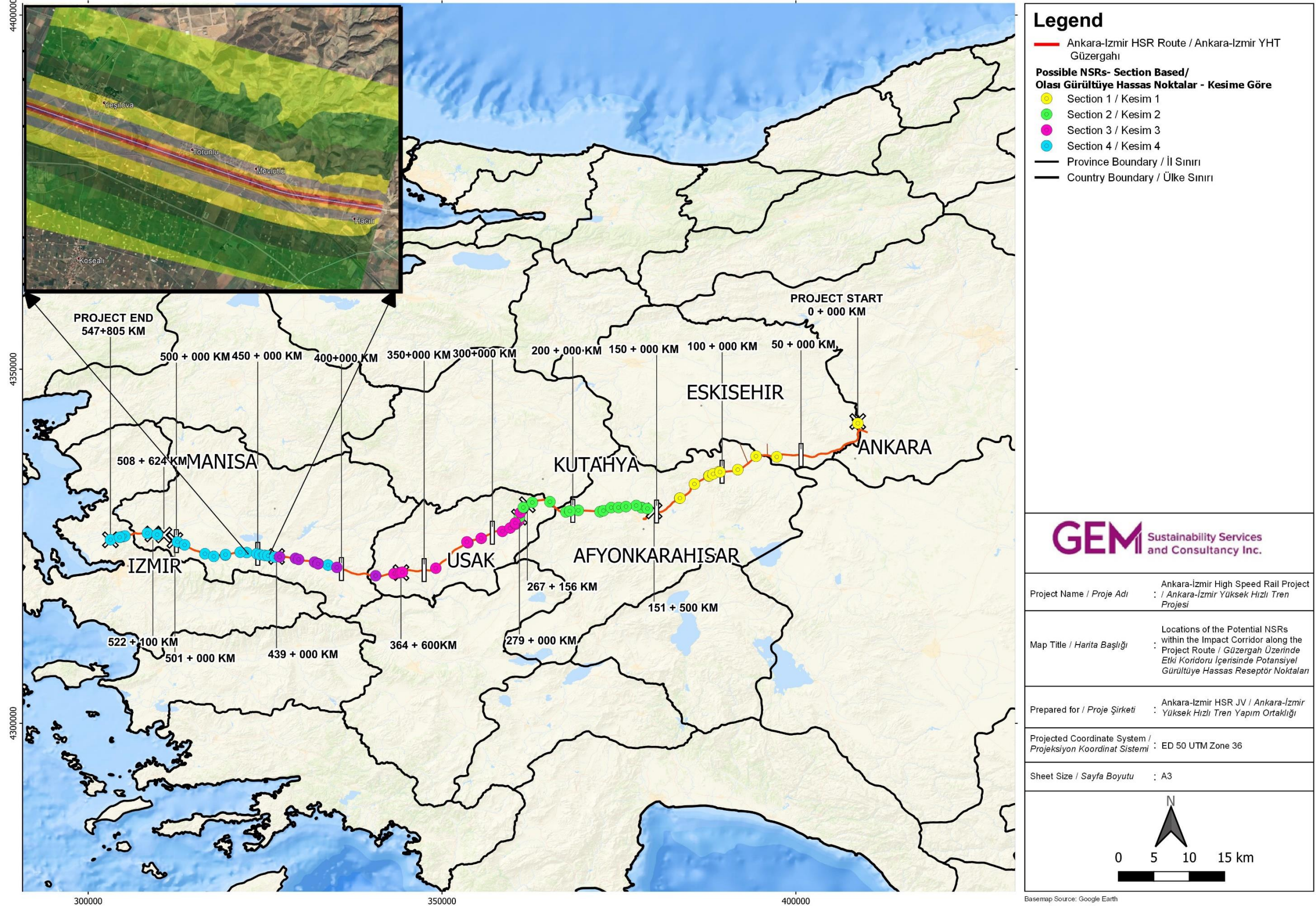


Figure 6-6. Locations of the Potential NSRs within the Impact Corridor along the Project Route

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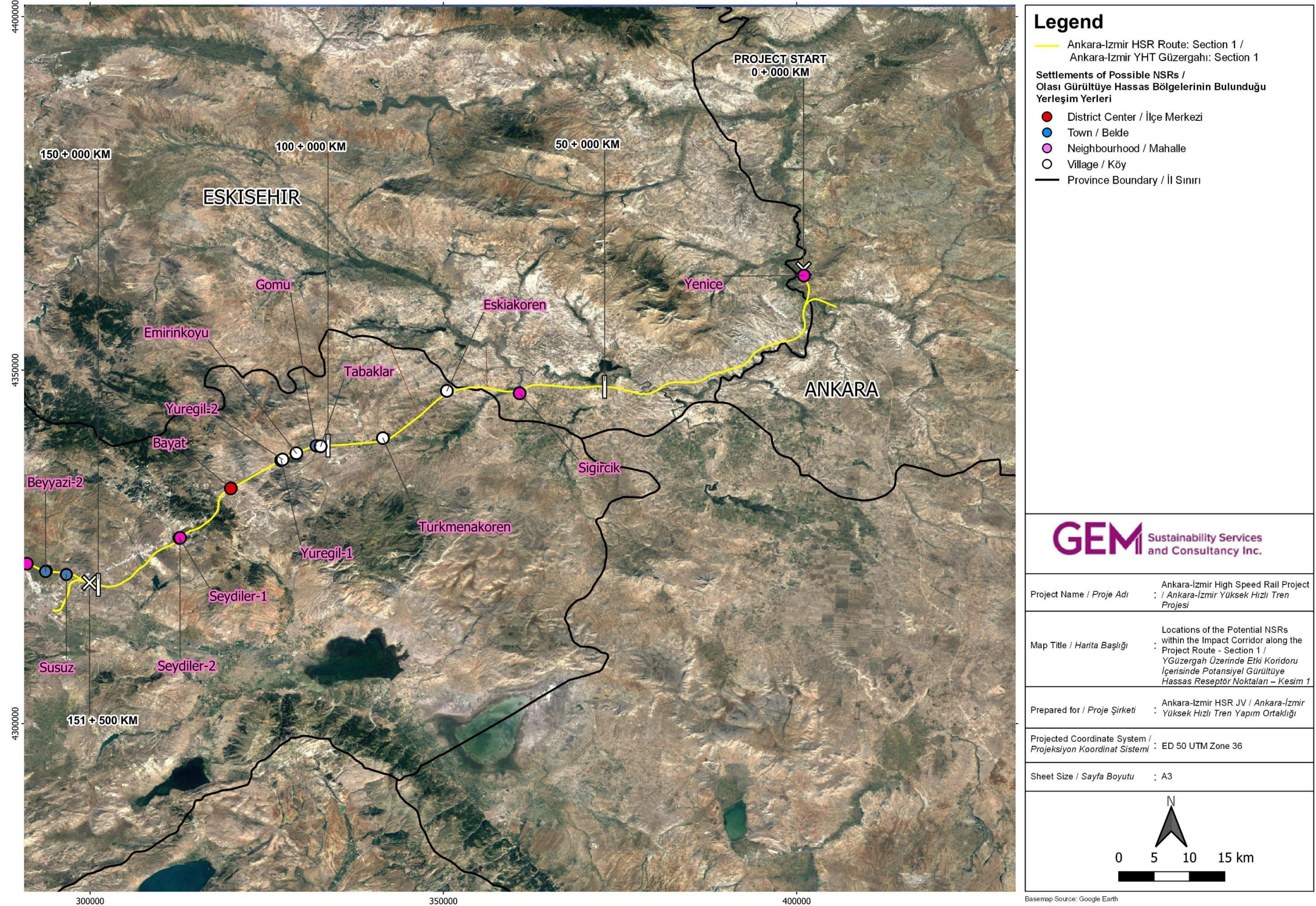


Figure 6-7. Locations of the Potential NSRs within the Impact Corridor along the Project Route – Section 1

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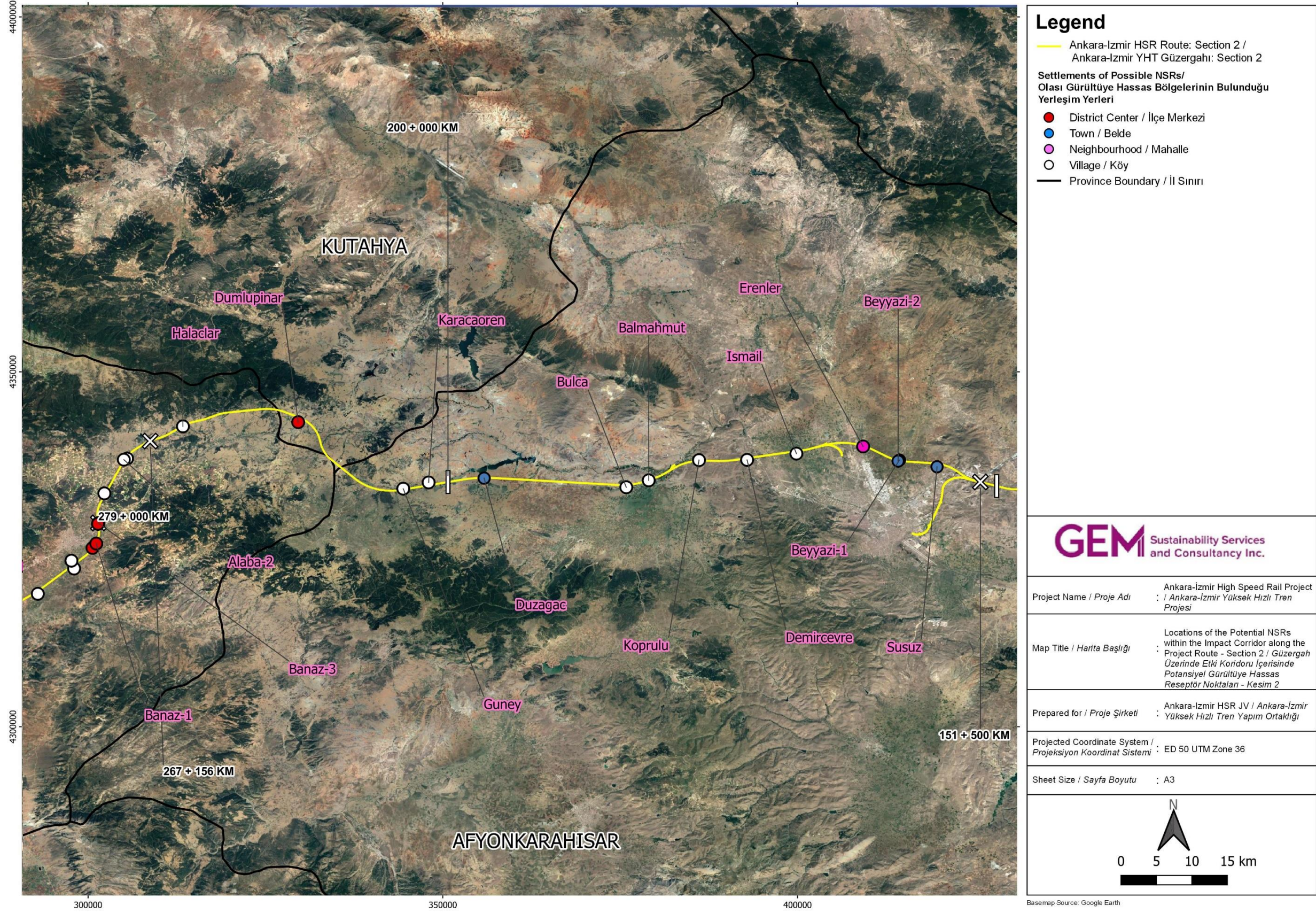


Figure 6-8. Locations of the Potential NSRs within the Impact Corridor along the Project Route – Section 2

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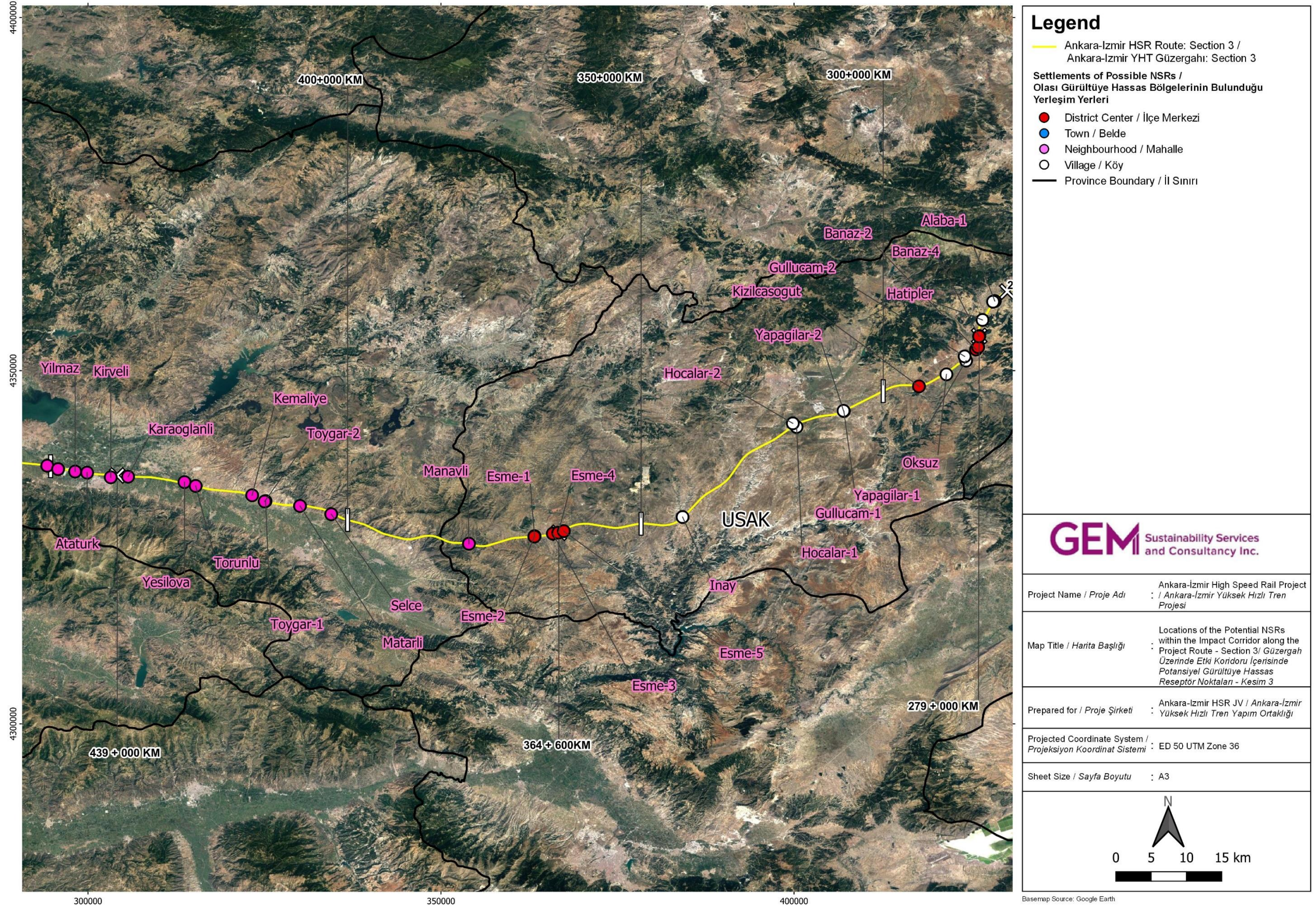


Figure 6-9. Locations of the Potential NSRs within the Impact Corridor along the Project Route – Section 3

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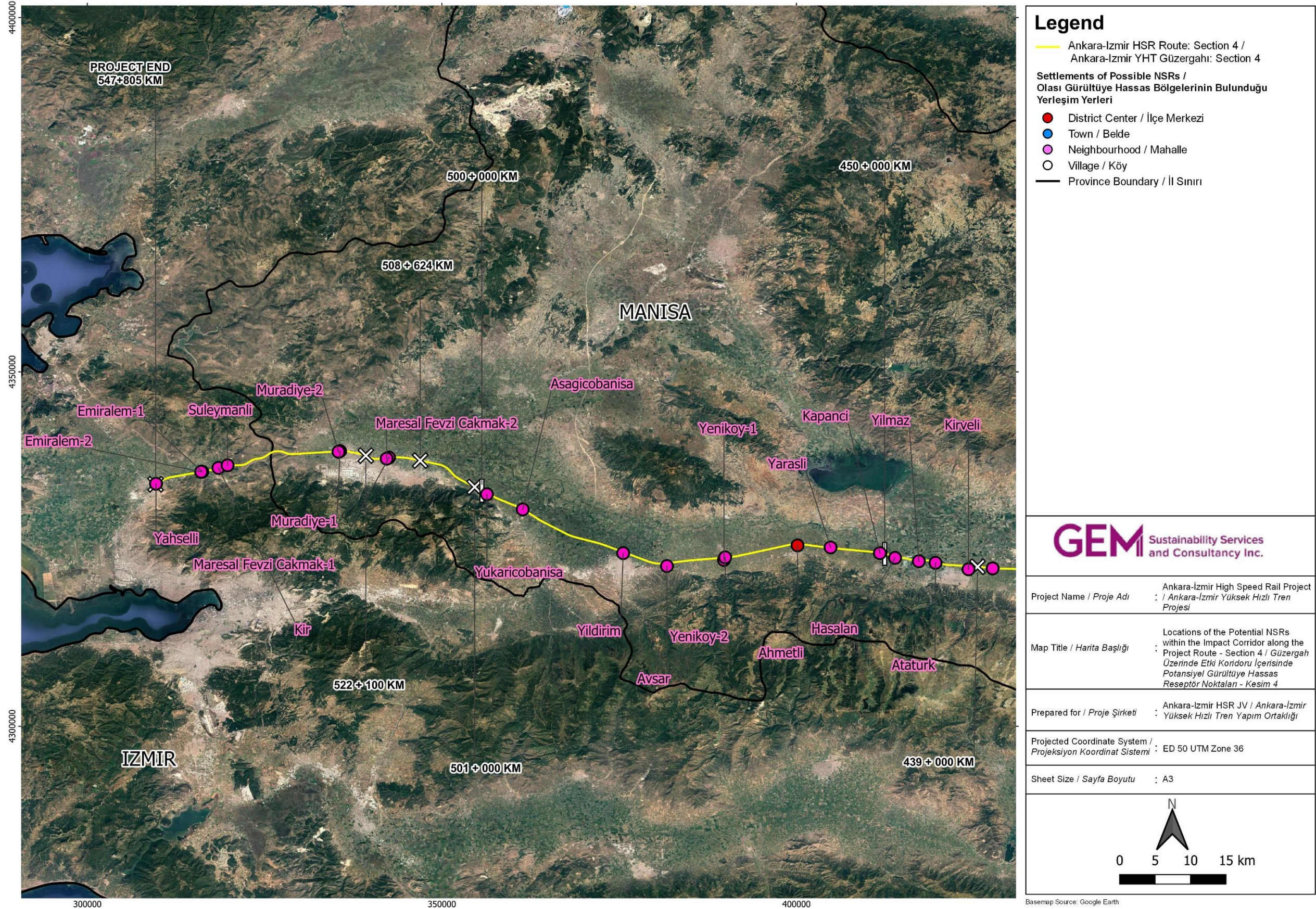


Figure 6-10. Locations of the Potential NSRs within the Impact Corridor along the Project Route – Section 4

To refine the results based on the latest status of the design and establish the basis of the detailed planning of the mitigation measures (e.g. noise barrier locations, geometry, dimensions, etc.) in consideration of point-specific environmental noise values to be predicted, a Realistic Noise Modelling Study will be carried out prior to finalisation of design/start of construction. Key data to be incorporated to the Realistic Noise Modelling Study includes the following:

- Terrain model
- Buildings in the environment including usage and storey information
- Structures around the route
- Information on the switches throughout the HSR route
- Detailed schedule of the HSR vehicles (HSR trains, freight trains, etc.) with distribution between day, evening, and night
- Locomotive types
- Car quantities for specific train sets
- Acoustical and vibration technical data sheets belonging to the railway vehicles
- Speed profile of the full railway axis
- Station information for specific train types

Based on the outcomes of the Realistic Noise Modelling Study, mitigation measures, which may be a combination of berms²⁸ and wall systems, will be designed and implemented to ensure that operation phase environmental noise levels fulfil the Project Standards at the NSRs. Compliance with the Project Standards will be monitored throughout the operation phase of the Project and where necessary, corrective actions will be planned and implemented. The structural mitigation measures (e.g. noise barriers) will be considered in the finalisation of the design in order to incorporate the areal and construction-related requirements of the foundations and fundamental elements of such structures to avoid difficulties during the installation.

As summarised below, the noise mitigation measures committed within the national EIA Report will also be taken into consideration in the detailed planning of the mitigation measures:

- The noise impact of the Project during the operation phase shall be reassessed after the commissioning of the HSR based on the characteristics of the trains, rail system, etc. by taking into account the theoretical calculation results obtained through the Dutch Calculation Method and as per the applicable requirements of the regulation in force.
- The environmental noise levels in the vicinity of the HSR route shall be determined through the environmental noise measurements to be conducted in line with the provisions of the applicable regulation.
- The management measures compliant with the noise barrier standards defined in the regulation are committed to be implemented by the Operated in consideration of the locations where the regulatory limit values are exceeded, the number of noise sensitive residential buildings and structures and the resident population affected.
- Noise barriers²⁹ compliant with the standards shall be used at locations deemed necessary according to the results of noise measurements to be performed following the construction phase.

²⁸ Noise barriers constructed from natural earthen materials such as soil, stone, rock, rubble, etc. in a natural, unsupported condition are termed, noise berms.

²⁹ Noise barrier is a physical obstruction that is constructed between the highway noise source and the noise sensitive receptor(s) that lowers the noise level such as noise walls.

The Construction Contract specifies application of subballast liner and sub travers liner in line with the technical specifications of the TCDD.

6.3.2. Vibration

Vibration caused by blasting and construction machinery and equipment has been calculated by using the following methodologies.

Blasting Vibration

Vibration levels anticipated to be generated by blasting operations have been calculated by using the following formulas (Devine, 1966):

$$V = K \times \left(\frac{D}{\sqrt{W}} \right)^{-1.6} \text{ where;}$$

PPV = vibration peak particle velocity (inches/sec) D = Distance to the receiver to blasting point (feet)

W = weight of the explosives (lbs) K = Ground vibration transmissibility coefficient

The transmitted vibrational velocity to the basement of the structures is calculated in between $\frac{1}{2}V$ and $\frac{1}{5}V$.

Construction Machine and Equipment Vibration

The reference vibration values of the machine and equipment have been used to predict the vibration velocity created at the receptor locations.

$$PPV = PPV_{ref} \times \left(\frac{D_{ref}}{D} \right)^n$$

Where:

PPV = Vibration peak particle velocity at the receptor location D = Source to receiver distance

PPV_{ref} = Vibration peak particle velocity at the source location D_{ref} = Reference distance

n = empirical constant based on a number of factors such as the geology, ground profile, frequency of transmitted wave, predominant waveform.

The value of n is obtained from regression analysis and generally has a value between 0.5 and 1.5. For n, 1.5 has been selected to present the worst case scenario.

The reference machine and equipment vibration velocity levels have been taken from ISO 10816-3 Standard.

All the receiving locations are accepted as Category III according to FTA document which is non-engineered timber and masonry buildings.

Vibration during the construction phase is mainly from two sources:

- Blasting activities to be held at quarry site
- Construction vibration due to the operation of construction machinery and equipment required for the Project

Vibration from blasting activity has been calculated for all quarries based on the worst case scenario. In this scenario, it is assumed that the blasting is practiced at the closest point of the permitted area boundary (if available the EIA decision boundary otherwise the license area boundary) to the buildings located in the nearest settlement.

This said, it should be noted that the blasting will be practiced at the open pit area, thus the blasting locations will potentially be located at distances higher than the minimum distances assumed in the worst-case scenario calculations.

Table 6-18 summarises the results of the vibration calculation analysis, which is based on the assumption that same amount of explosive materials, same explosion pattern and technique will be used at all facilities.

Table 6-18. Blasting Vibration Assessment for the Quarries to be Used in the Construction Phase

Facility (*)	Resource	Number of Holes	Explosive amount in Single hole (kg)	Minimum Receptor Distance (m)	Vibration PPV (mm/s)			Magnitude of Change	
					V	0,2* V	0,5* V	RAMEN Limits	FTA Limits Cat. 3
Section 1									
10-Beyceğiz Quarry	Basalt	90	57,13	2,257	0,20	0,04	0,10	Negligible	Negligible
18-Yağmurbaba Quarry	Basalt	90	57,13	1,557	0,37	0,07	0,18	Negligible	Negligible
29-Yenice Quarry	Limestone	90	67,54	730	1,42	0,28	0,71	Negligible	Negligible
36-Türktaciri Quarry	Limestone	90	67,54	847	1,12	0,22	0,56	Negligible	Negligible
40-Kayakent Quarry	Limestone	90	67,54	5,820	0,05	0,01	0,03	Negligible	Negligible
75-Alibeyce Quarry	Limestone	90	67,54	2,390	0,21	0,04	0,11	Negligible	Negligible
78-Tabaklar Quarry	Limestone	90	67,54	1,416	0,49	0,10	0,25	Negligible	Negligible
82-Emirin Köyü Quarry	Basalt	90	57,13	350	4,02	0,80	2,01	Negligible	Negligible
94-Bayat Quarry	Limestone	90	67,54	2,118	0,26	0,05	0,13	Negligible	Negligible
120-Gebeceler Quarry	Limestone	90	67,54	2,747	0,17	0,03	0,08	Negligible	Negligible
124-Beyyazi	Limestone	90	67,54	1,412	0,49	0,09	0,25	Negligible	Negligible
Section 2									
152-Ayvalı Quarry	Limestone	90	67,54	1,720	0,36	0,07	0,18	Negligible	Negligible
176-Elvanpaşa Quarry	Limestone	90	67,54	766	1,31	0,26	0,66	Negligible	Negligible
197-Dümenlerköyü Quarry	Limestone	90	67,54	1,354	0,53	0,11	0,26	Negligible	Negligible
Section 3									
214-Ahmetlidağ - 2 Quarry	Basalt	90	57,13	650	1,49	0,30	0,75	Negligible	Negligible
226-Hayalli Quarry	Limestone	90	67,54	1,288	0,57	0,11	0,29	Negligible	Negligible
232-Dombaylı Quarry	Limestone	90	67,54	582	2,04	0,41	1,02	Negligible	Negligible
Section 4									
234-Akköy Quarry	Limestone	90	67,54	555	2,20	0,44	1,10	Negligible	Negligible
234-Çampınar Quarry	Limestone	90	67,54	1468	0,46	0,09	0,23	Negligible	Negligible
235-Çıkrıkçı Quarry	Limestone	90	67,54	220	9,66	1,93	4,83	Negligible	Negligible
238-Ansızca-1 Quarry	Limestone	90	67,54	1280	0,58	0,12	0,29	Negligible	Negligible
239-Ansızca-2 Quarry	Limestone	90	67,54	2,180	0,25	0,05	0,12	Negligible	Negligible
243-Yunusemre Quarry	Limestone	90	67,54	625	1,81	0,36	0,91	Negligible	Negligible
245-Gürle Quarry	Limestone	90	67,54	606	1,91	0,38	0,95	Negligible	Negligible
258-Çaltıdere 2 Quarry	Basalt	90	57,13	67	56,57	11,31	28,28	High	High
263-Değirmendere Quarry	Basalt	90	57,13	540	2,01	0,40	1,00	Negligible	Negligible

(*) 26-Basri, 97-Bayat-2, 239-Asagi Cobanisa, and 212- Ahmetlidag 1 quarries have been eliminated from the Project due to E&S reasons explained in Chapter 3 ("Project Alternatives"). Thus, they have not been included in the blasting assessments.

For the assessment of construction vibration due to the operation of construction machinery and equipment, calculations have been carried out according to ISO 10816-3 vibration estimation standard. Reference vibration levels for the weakest mounting conditions accepted and calculations have been conducted for the worst case. Reference vibration levels for machine and equipment is given in Table 6-19.

Table 6-19. Machine Equipment Damage Criteria

ISO 10816-3		Machinery Groups 2 and 4		Machinery Groups 1 and 3	
Velocity		Rated power			
mm/sec Peak	mm/sec RMS	15 kW – 300 kW		Group 1: 300 kW – 50 MW Group 3: Above 15 kW	
15.5	11.0	DAMAGE OCCURS			
10.0	7.1	RESTRICTED OPERATION			
6.3	4.5	UNRESTRICTED OPERATION			
4.9	3.5	UNRESTRICTED OPERATION			
3.9	2.8	UNRESTRICTED OPERATION			
3.2	2.3	UNRESTRICTED OPERATION			
1.9	1.4	NEWLY COMMISSIONED MACHINERY			
0.9	0.7	NEWLY COMMISSIONED MACHINERY			
0.00	0.0	NEWLY COMMISSIONED MACHINERY			
Foundation		Rigid	Flexible	Rigid	Flexible

As can be seen from table above, the maximum vibration level that a machine can produce before damaging itself is 15.5 mm/sec peak at 0.5 m. While determining and evaluating construction vibration, this data has been used to calculate vibration levels at receptors.

The vibration effect with respect to the distance and RAMEN vibration limits is presented in Figure 6-11.

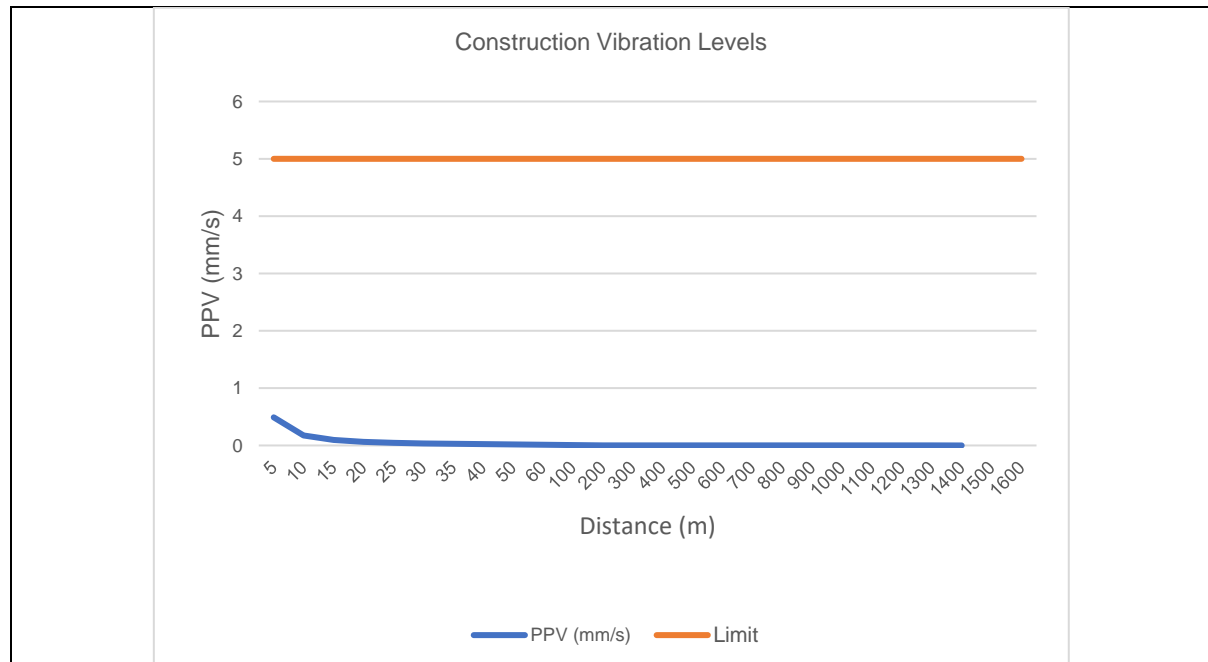


Figure 6-11. Vibration Effect of Construction Machinery and Equipment with Distance

Construction vibration levels calculated at the receptor points (NSRs of the noise assessment study) are given in Table 6-20.

Table 6-20. Construction Vibration Levels

Vibration Receptor	Distance (m)	PPV (mm/s)	Vibration Receptor	Distance (m)	PPV (mm/s)
N01	160	0.006	N14	90	0.015
N02	80	0.018	N15	40	0.051
N03	118	0.010	N16	185	0.005
N04	63	0.026	N17	81	0.018
N05	512	0.001	N18	197	0.005
N06	87	0.016	N19	37	0.057
N07	28	0.086	N20	94	0.014
N08	49	0.037	N21	62	0.026
N09	490	0.001	N22	32	0.071
N10	190	0.005	N23	60	0.027
N11	65	0.024	N24	370	0.002
N12	80	0.018	N25	900	0.000
N13	45	0.042	N26	210	0.004

The key findings of the vibration assessment conducted for the Project are summarised below:

- For blasting activities, safe distance has been determined as 200 meters for basalt resources and 220 meters for limestone resources.
- Any blasting activity with given blasting pattern is safe further away 220 meters and would have no impact on the nearby receptors.
- According to the results of the calculations, the vibration impact of the construction equipment and machinery is below the limits at the location of the vibration receptors considered in the study.

Vibration Assessment for the Operation Phase

As part of the ESIA study, the vibration assessment for the operation phase of the Project has been conducted by a specialist company (Frekans Acoustics & Environmental Laboratory) in 2021 according to the Federal Transit Administration (FTA) of the United States (FTA Guidelines).

To this end, as the initial step of the vibration assessment, the process depicted in Figure 6-12 has been carried out in line with the FTA Guideline Vibration Screening Procedure.

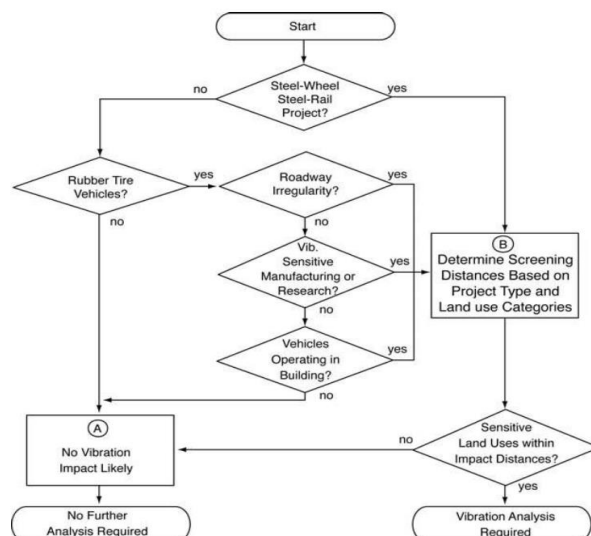


Figure 6-12. Flow Chart of Vibration Screening Process

According to the FTA Guidelines, the Project is included in **Option B**. Thus, determination of screening distance is required for vibration analysis. Screening distance is related to the Project type and land use categories.

As per the Project Type descriptions given in the FTA Vibration Screening Procedure (see Table 6-21), the Project type has been determined as RRT (Project Type Number: 2).

Table 6-21. Project Types for Vibration Screening Procedure

Project Type Number	Project Type	Description
1	Conventional Commuter Railroad	Both locomotives and passenger vehicles create vibration. For commuter trains, the highest vibration levels are typically created by the locomotives. Electric commuter rail vehicles create levels of ground-borne vibration that are comparable to electric rapid transit vehicles.
2	RRT	Ground-borne vibration impact from rapid transit trains is one of the major environmental issues for new systems. Ground-borne vibration is usually a major concern for subway operations. It is less common for at-grade and elevated rapid transit lines to create intrusive ground-borne vibration and noise since air-borne noise typically dominates.
3	LRT and Streetcars	The ground-borne vibration characteristics of light rail systems are very similar to those of rapid transit systems. Because the speeds of light rail systems are usually lower, typical vibration levels are usually lower. Steel-wheel/steel-rail AGT is included in either this category or the ICT category depending on the level of service and train speeds.
4	Intermediate Capacity Transit	Because of the low operating speeds of most ICT systems, vibration problems are not common. However, steel-wheel ICT systems that operate close to* vibration-sensitive buildings have the potential of causing intrusive vibration. With a stiff suspension system, an ICT system could create intrusive vibration.
5	Bus and Rubber-Tire Transit Projects	This category encompasses most projects that do not include steel-wheel trains of some type. Examples include diesel buses, electric trolley buses, and rubber-tired people movers. Most projects that do not include steel-wheel trains do not cause vibration impacts.**

*See the screening distances for category 1 land uses in Table 6-8.

** Most complaints about vibration caused by buses and trucks are related to rattling of windows or items hung on the walls. These vibrations are usually the result of airborne noise and not ground-borne vibration. In the case where ground-borne vibration is the source of the complaint, the vibration can usually be attributed to irregularities in the road.

As per the land use category descriptions given in the FTA Vibration Screening Procedure (see Table 6-21), the land use category has been determined as **Residential (Category 2)** for all receptor locations.

Table 6-22. Project Land Use Category

Land Use Category	Land Use Type	Description of Land Use Category
-	Special Buildings	This category includes special-use facilities that are very sensitive to vibration and noise that are not included in the categories below and require special consideration. However, if the building will rarely be occupied when the source of the vibration (e.g., the train) is operating, there is no need to evaluate for impact. Examples of these facilities include concert halls, TV and recording studios, and theaters.
1	High Sensitivity	This category includes buildings where vibration levels, including those below the threshold of human annoyance, would interfere with operations within the building. Examples include buildings where vibration-sensitive research and manufacturing* is conducted, hospitals with vibration-sensitive equipment, and universities conducting physical research operations. The building's degree of sensitivity to vibration is dependent on the specific equipment that will be affected by the vibration. Equipment moderately sensitive to vibration, such as high resolution lithographic equipment, optical microscopes, and electron microscopes with vibration isolation systems are included in this category.** For equipment that is more sensitive, a Detailed Vibration Analysis must be conducted.
2	Residential	This category includes all residential land use and buildings where people normally sleep, such as hotels and hospitals. Transit-generated ground-borne vibration and noise from subways or surface running trains are considered to have a similar effect on receivers.***
3	Institutional	This category includes institutions and offices that have vibration-sensitive equipment and have the potential for activity interference such as schools, churches, doctors' offices. Commercial or industrial locations including office buildings are not included in this category unless there is vibration-sensitive activity or equipment within the building. As with noise, the use of the building determines the vibration sensitivity.

* Manufacturing of computer chips is an example of a vibration-sensitive process.

** Standard optical microscopes can be impacted at vibration levels below the threshold of human annoyance.

*** Even in noisy urban areas, the bedrooms will often be in quiet buildings with effective noise insulation. However, ground-borne vibration and noise are experienced indoors, and building occupants have practically no means to reduce their exposure. Therefore, occupants in noisy urban areas are just as likely to be exposed to ground-borne vibration and noise as those in quiet suburban areas.

Based on the Project type and land use category determined for the Project, the critical distance has been determined as **61 m (200 ft)** for all receptor locations along the Project route.

Table 6-23. Screening Distance for Vibration Assessments

Type of Project	Critical Distance for Land Use Categories*		
	Distance from ROW or Property Line, ft		
	Land Use Cat. 1	Land Use Cat. 2	Land Use Cat. 3
Conventional Commuter Railroad	600	200	120
RRT	600	200	120
LRT and Streetcars	450	150	100
ICT	200	100	50
Bus Projects (if not previously screened out)	100	50	--

*For the Vibration Screening Procedure, evaluate special buildings as follows: Category 1 - concert halls and TV studios, Category 2 - theaters and auditoriums

Based on the vibration assessment conducted as per FTA Guidelines, the receptors identified to be located within the critical distance are listed in Table 6-24. Out of the 78 receptors identified in the Worst-case Noise Modelling Study, 37 have been evaluated to be sensitivity for vibration impacts of the HSR operations.

Table 6-24. Potential Receptors within the Critical Vibration Distance

Project Section	Zone No.	Km	Distance of Closest Structure to the Axis (m) (*)	Settlement	District	Province
Section 4	1	547+000	24	Yahseli	Menemen	Izmir
	2	542+000	5	Emiralem Merkez		
	3	542+000	3	Emiralem Merkez		
	4	540+000	61	Kir		
	5	539+000	17	Suleymanli		
	6	532+000	40	Muradiye		
	7	532+000	3	Muradiye		
	8	512+000	0	Maresal Fevzi Cakmak		
	9	512+000	67	Maresal Fevzi Cakmak		
	12	481+000	56	Yildirim	Turgutlu	Manisa
	15	469+000	18	Yenikoy		
	17	456+000	48	Yarasli	Ahmetli	
Section 3	18	450+600	40	Kapanci	Salihli	
	21	442+500	0	Ataturk		
	23	437+000	47	Karaoglanli	Salihli	
	25	425+000	3	Torunlu		
	28	414+000	39	Toygar	Alasehir	
	29	409+900	0	Kasapli		
	31	379+000	5	Manavli	Esme	Usak
	32	368+000	58	Esme		
	33	368+000	29	Esme		
	35	364+000	47	Esme		
	37	342+000	39	Inay	Ulubey	
	40	308+000	5	Yapagilar	Merkez	
	41	308+000	35	Yapagilar		
	46	281+000	10	Banaz	Banaz	
	47	282+000	36	Banaz		
	48	279+000	15	Banaz		
Section 2	53	224+000	28	Halaclar	Banaz	
	57	197+000	38	Duzagac	Sinanpasa	Afyon karahisar
	59	182+000	15	Balmahmut		
	65	159+000	52	Beyyazi	Merkez	
Section 1	67	132+000	24	Seydiler	Iscehisar	
	68	132+000	42	Seydiler		
	69	118+000	57	Bayat	Bayat	
	71	109+000	58	Yuregil	Emirdag	
	78	0+000	20	Yenice	Polatli	Ankara

Distribution of the number of settlements within the critical vibration distance for the operation phase is presented in Table 6-25.

Table 6-25. Distribution of the Number of Settlements within the Noise Impact Corridor per Section, Province and District

Section-based		Province-based		District-based	
Section	Number of NSRs	Province	Number of NSRs	District	Number of NSRs
Section 1	5	Ankara	1	Polatli	1
		Eskisehir	-	Gunyuzu	-
				Sivrihisar	-
		Afyonkarahisar	7	Emirdag	1
				Bayat	1
				Iscehisar	2
				Merkez	1
Section 2	4			Sinanpasa	2
		Kutahya	-	Dumlupinar	-
		Usak	11	Banaz	4
				Merkez	2
Section 3	15			Ulubey	1
				Esme	4
		Manisa	9	Alasehir	2
				Kula	-
				Salihli	4
Section 4	13			Ahmetli	1
				Turgutlu	2
				Sehzadeler	-
				Yunusemre	-
		Izmir	9	Menemen	9
Total	37 Receptors	37 Receptors		37 Receptors	

Prior to finalisation of design/start of construction, a detailed Vibration Modelling Study will be carried out based on the latest status of the design and establish the basis of the detailed planning of the mitigation measures that would include elastic rail pads, base plate pads, under ballast mat and combinations depending on the exposure amount at specific receptor locations. A detailed vibration exposure analysis will be carried out to detail the mitigation measures to be implemented on infrastructure design.

. Key data to be incorporated to the study includes the following:

- Buildings in the environment including usage and storey information
- Structures around the route
- Information on the switches throughout the HSR route
- Detailed schedule of the HSR vehicles (HSR trains, freight trains, etc.) with distribution between day, evening, and night
- Vibration technical data sheets belonging to the railway vehicles
- Speed profile of the full railway axis
- Station information for specific train types

As per the EIA Report, compliance with the regulatory vibration limits shall be verified following the commissioning of the Project and necessary management measures are committed to be implemented by the Operator in case of exceedance of the regulatory limits.

The Construction Contract specifies application of subballast liner and sub travers liner in line with the technical specifications of the TCDD.

The potential Project impacts, proposed mitigation measures and residual impact significances are summarised in Table 6-26. Due to temporary nature of the construction activities, sensitivity of the residential receptors has been assumed to be medium for the construction phase assessments, whilst it has been assumed as high during the operation phase due to recurrent nature of the impact. Receptors such as hospitals/inpatient healthcare facilities, education facilities, rehabilitation centre, etc., located in the vicinity of the route and may be subject to operation phase noise impact, will further be identified by the Contractor (impact zones for the receptors will be based on the updated modelling study to be done prior to finalisation of design/construction that will take into account operation planning of the Operator including number of train services, train types, number of wagons, etc. as well as site assessments and measurements) and considered as very sensitive receptors.

Table 6-26. Impacts, Proposed Mitigation Measures and Residual Impacts (Noise and Vibration)

Impact Description	Project Phase	Receptor		Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
				Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Noise generation due to construction of HSR route and operation of quarries	• Land preparation and construction	<u>Daytime:</u> N-13 N-19 N-26	<u>Nighttime:</u> N-02 N-03 N-04 N-06 N-07 N-08 N-10 N-12 N-13 N-15 N-17 N-19 N-20 N-21 N-22 N-24 (Cikrikci Quarry) N-26 (Caltildere-2 Quarry) NM-01 NM-02 NM-03 NM-04 NM-22 NM-35 NM-37 NM-39	Local	High	Short term Reversible	Short-term	Intermittent	High	Medium	Major	<ul style="list-style-type: none"> Project-specific Noise and Vibration Management Plan will be developed implemented by the Contractor and the sub-contractors (through contractual requirements). All Project personnel including direct and contracted workers will be trained on the implementation of Noise and Vibration Management Plan. At locations where the Project Standards are exceeded during day or night time, activities will not be conducted simultaneously and use of equipment with high noise levels will be restricted/optimised to the extent possible. At locations where the night time noise impact magnitude is anticipated to be high, noise generating activities will be avoided during night time where possible. Natural topography will be used to create a barrier against noise where feasible. Machinery, equipment and vehicles with lower sound power levels and sound reduced models will be preferred. 	Minor to Moderate
		<u>Daytime:</u> N-01 N-02 N-04 N-07 N-08 N-10 N-12 N-15 N-17 N-20 N-21 N-22 NM-22 NM-39	<u>Nighttime:</u> N-11 N-14 N-16 N-18 N-23 NM-12 NM-13 NM-14 NM-15 NM-17 NM-32	Local	Medium	Short term Reversible	Short-term	Intermittent	Medium	Medium	Moderate	<ul style="list-style-type: none"> Properly refurbished and/or new machinery, equipment and vehicles will be used to the extent possible. Maintenance of construction vehicles will be conducted regularly by means of a regular vehicle maintenance and repair program as per the recommendations of the manufacturer. The Contractor will enforce speed limits for the Project vehicles that will transport construction materials/equipment. Ancillary components (e.g. concrete plants, generators, etc.) will be positioned at the camp sites and other stationary plants by taking into account the location of noise receptors. 	Minor
		<u>Daytime:</u> N-06 N-14 N-24 NM-26	<u>Nighttime:</u> N-05 N-09	Local	Low	Short term Reversible	Short-term	Intermittent	Low	Medium	Minor	<ul style="list-style-type: none"> Construction traffic through the settlements will be avoided, whenever alternative routes and/or service roads are available. 	Negligible

Impact Description	Project Phase	Receptor		Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
				Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
												<ul style="list-style-type: none"> Designated site access roads will be used by the Project vehicles. Idling of construction vehicles will be avoided. Noise monitoring will be carried out as per the Noise and Vibration Management Plan throughout the construction phase. Project-specific Stakeholder Engagement Plan (SEP) will be implemented to address any noise-related grievance and plan/take corrective actions, where necessary. 	
Vibration due to blasting operations to be conducted at the quarries	<ul style="list-style-type: none"> Land preparation and construction 	N-26 (due to operation of Caltildere Quarry)		Local	High	Short term Reversible	Short-term	Intermittent	High	Medium	Major	<ul style="list-style-type: none"> Project-specific Noise and Vibration Management Plan will be implemented by the Contractor and the subcontractors (through contractual requirements). All Project personnel including direct and contracted workers will be trained on the implementation of Noise and Vibration Management Plan. Project-specific SEP will be implemented to address any noise-related grievance and plan/take corrective actions, where necessary. All blasting activities will be held at least 220 meters away from receptors/settlements. If blasting activities are to be carried out at a location closer than 220 meters to a receptor/settlement, blasting pattern and explosive quantities will be optimised by increasing the hole number and/or decreasing the explosive material/hole quantity. Tunnels will be constructed by using the New Austrian Tunneling Method (NATM). To minimise tunnel blasting, excavation by means of construction machinery will be the preferred method in the tunnels. In case of necessity, soft blasting (<i>yumusak patlatma</i>) technique will be used. Following the determination of blasting pattern, safe blasting distances will be calculated on a case-by-case basis and site-specific measures will be taken in consideration of the locations of the nearby NSRs. Relevant records will be kept during blasting operations and blasting related impacts will be monitored. Vibrometers will be at suitable 	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<p>locations and keep records on charge amounts, delays and other relevant parameters.</p> <ul style="list-style-type: none"> Sensitivity of nearby settlements/ buildings (within approximately 250 m) against vibration will be evaluated prior to blasting operations. Modern blasting techniques will be applied. Blasting will be carried out with millisecond delays with low charge weight by considering geological formation and characteristics of the area. Number of holes to be blasted at one shot and total charge amounts per shot will be optimised. Construction and blasting activities will be scheduled to minimise potential vibration related impacts. 	
Noise generation due to operation of the HSR	<ul style="list-style-type: none"> Operation 	<p>See Table 6-16 for potential NSRs within the Operation Phase Impact Corridor (78 receptors)</p> <p>For the full list of the residential receptors in the buildings located along the route (see Appendix A for the List of Settlements)</p> <p>Highly sensitive receptors e.g. hospital/inpatient healthcare facilities, education facilities, rehabilitation centres, and other sensitive uses (if any within the operational noise impact zones)</p>	Restricted	High to Low	Short-term reversible	Long-term	Intermittent/ Recurrent	High to Low	High	Major to Minor	<ul style="list-style-type: none"> A Realistic Noise Modelling Study will be carried out prior to finalisation of design/start of construction with input from the latest Project design and Employer/Operator regarding the information on train services, train types, etc. Through the modelling study, site specific mitigation measures required to be implemented to ensure compliance with the Project Standards during the operation phase of the Project will be identified. Highly sensitive receptors (if any within the operational noise impact zones) will be identified by the Contractor through site surveys in parallel to the updated noise modelling study. Background environmental noise measurements will be conducted at the potentially affected receptors (to be identified through the noise modelling study) in line with the applicable GIIP during the trial operations. 	Low to negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
		Receptors at commercial building, offices, industrial sites, etc.		High to negligible				High to negligible	Low	Negligible to Moderate	<ul style="list-style-type: none"> Project-specific Noise and Vibration Management Plan will be updated following the completion of the modelling study based on the study outcomes. During the construction phase, the Contractor will apply the subballast liner and sub travers liner in line with the technical specifications of the TCDD. Modern disc brakes and rail types reducing noise will be used as per the technical specifications of the TCDD and as per the Construction Contract. The noise impact of the Project during the operation phase will be reassessed after the commissioning of the HSR based on the characteristics of the trains, rail system, etc. by taking into account the theoretical calculation results obtained through the Dutch Calculation Method and as per the applicable requirements of the regulation in force, as required by the national EIA Report. Throughout the operation phase, the environmental noise levels at the potentially affected receptors (to be identified through the updated noise modelling study) will be measured in line with the applicable GIIPs in order identify locations where Project Standards would be exceeded. The frequency of the measurements will be identified by the Employer/Operator based on the outcomes of the modelling study to be conducted during the construction phase and background environmental noise measurements to be conducted during the trial operations. The management measures compliant with the noise barrier standards defined in the regulation are committed to be implemented by the Operator in consideration of the locations where the regulatory limit values are exceeded, the number of noise sensitive residential buildings and structures and the resident population affected, as committed in the national EIA Report. Noise barriers compliant with the standards will be used at locations deemed necessary according to the results of noise measurements to be performed following the construction phase, as committed in the national EIA Report. 	

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<ul style="list-style-type: none">During the operation phase, regular maintenance of wheels and tracks will be implemented by the Operator to reducing the roughness of running surfaces.As applicable and consistent with the operational procedures of the Operator, planning of the HSR speed along the route will take into consideration the locations of residential and other highly sensitive receptors.Project-specific SEP will be implemented during the operation phase (including trial operations) to address any noise-related grievance and plan/take corrective actions (e.g. soundproofing, noise barriers as necessary and feasible).	

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Vibration generation due to operation of the HSR	<ul style="list-style-type: none"> Operation 	See Table 6-24 for potential receptors within the Critical Vibration Distance for Operation Phase (37 receptors)	Restricted	High to Minor	Short-term reversible	Long-term	Intermittent/ Recurrent	High to Low	High	Major to Minor	<ul style="list-style-type: none"> Prior to finalisation of design/start of construction, a detailed Vibration Modelling Study will be carried out based on the latest status of the design and establish the basis of the detailed planning of the mitigation measures that would include elastic rail pads, base plate pads, under ballast mat and combinations depending on the exposure amount at specific receptor locations to ensure compliance with the Project Standards during the operation phase of the Project will be identified. Project-specific Noise and Vibration Management Plan will be updated following the completion of the modelling study based on the study outcomes. During the construction phase, the Contractor will apply the subballast liner and sub travers liner in line with the technical specifications of the TCDD. The vibration impact of the Project during the operation phase will be reassessed after the commissioning of the HSR based on the characteristics of the trains, rail system, etc. by taking into account the theoretical calculation results obtained through the Dutch Calculation Method and as per the applicable requirements of the regulation in force, as required by the national EIA Report. Throughout the operation phase, the vibration levels at the potentially affected receptors (to be identified through the updated vibration modelling study) will be measured in line with the applicable GIIPs in order identify locations where Project Standards would be exceeded. The frequency of the measurements will be identified by the Employer/Operator based on the outcomes of the modelling study to be conducted during the construction phase and vibration measurements to be conducted during the trial operations. Compliance with the regulatory vibration limits will be verified following the commissioning of the Project and necessary management measures are committed to be implemented by the Operator in case of exceedance of the regulatory limits, as required in the national EIA Report. 	Low to negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<ul style="list-style-type: none">Project-specific SEP will be implemented during the operation phase (including trial operations) to address any vibration-related grievance and plan/take corrective actions, where necessary.	

7. AIR QUALITY AND GREENHOUSE GAS EMISSIONS

This Chapter provides information on the background air quality levels at the receptors selected in and around the Project, assesses potential impacts of the Project-related air emissions on the sensitive receptors and describes the mitigation measures to be taken for the management of potential impacts on the receptors.

The Project related air emissions that will take place during the construction phase will mainly include dust emissions (PM₁₀, PM_{2.5}) due to earthworks and exhaust emissions from the construction equipment and vehicles to be operated along the Project route and at the auxiliary Project facility sites such as quarries and material borrow sites.

Greenhouse Gas (GHG) emissions due to Project construction activities to be conducted by the Contractor have been assessed in this Chapter in line with the Greenhouse Gas Protocol (the "GHG Protocol"), as required by EP4. A Climate Change Risk Assessment (CCRA) was conducted for the operation phase as per the requirements of the EP4.

7.1. Project Standards

The national legislative requirements as per the Regulation on the Control of Industrial Air Pollution (IAPCR) and applicable international standards for PM_{2.5} and PM₁₀ are summarised in Table 7-1.

Table 7-1. Air Quality (PM₁₀ and PM_{2.5}) Standards

Parameter	Averaging Period	Turkish IAPCR Limit Values (*) (µg/m ³)	WBG General EHS Guideline Values (**) (µg/m ³)	Project Standards
PM 10	24 hours	50 (not to be exceeded more than 35 times a year)	50	50
	Annual	40	20	20
PM 2.5	24 hours	-	25	25
	Annual	-	10	10

(*) Ambient air quality limit values as given in the Industrial Air Pollution Control Regulation (IAPCR) for the period 2019-2023 and 2024 and beyond. PM10 limit values defined in the Turkish IAPCR are aligned with the EU limit values specified in the Directive 2008/50/EC on Ambient Air Quality.

(**) WBG General EHS Guidelines: Environmental – Air Emissions and Ambient Air Quality based on WHO Ambient Air Quality Guidelines.

7.2. Baseline Conditions

Baseline PM₁₀ and PM_{2.5} (dust) measurements were conducted by an accredited laboratory at selected receptors as shown in Figure 7-1. At each location, site measurements were carried out for 24 hours.

The baseline PM₁₀ and PM_{2.5} measurement results are given in Table 7-2.

Table 7-2. Baseline Air Quality (Dust) Measurement Results

No	Station ID	Measurement Location	Distance of the Measurement Location to Impact Source		Description of the Receptor	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)
			Railway Construction	Quarry Operation			
1	A-01	Basri		50 m	Residential Receptor	11	4
2	A-02	Yenice	20 m	730 m	Residential Receptor	10	3
3	A-03	Turktaciri		850 m	Residential Receptor	12	5
4	A-05	Emirinkoyu	130 m	330 m	Residential Receptor	12	4
5	A-06	Yuregil	20 m		Residential Receptor	17	6
6	A-07	Bayat	95 m	-	Residential Receptor	13	4
7	A-08	Seydiler	50 m		Residential Receptor	13	3
8	A-09	Erenler	35 m		Rural Receptor	14	4
9	A-10	Balmahmut	60 m	-	Residential Receptor	11	3
10	A-11	Duzagac	20 m	-	Residential Receptor	13	4
11	A-12	Guney	280 m		Rural Receptor	18	7
12	A-13	Banaz	40 m	-	Residential Receptor	13	3
13	A-14	Dombayli		650 m	Residential Receptor	12	4
14	A-15	Salihli	0 m	-	Residential Receptor	14	5
15	A-16	Urganli	80 m	-	Residential Receptor	11	3
16	A-17	Cikrikci	-	200 m	Residential Receptor	10	3
17	A-18	Turgutlu	180 m	-	Residential Receptor	12	4
18	A-19	Cobanisa	900 m	450 m	Rural Receptor	13	5
19	A-20	Manisa	0 m	-	Residential Receptor	16	6
20	A-21	Degirmendere	220 m	540 m	Rural Receptor	11	4
21	A-22	Caltildere	-	70 m	Residential Receptor	10	3
22	A-23	Menemen	50 m	-	Residential Receptor	15	5

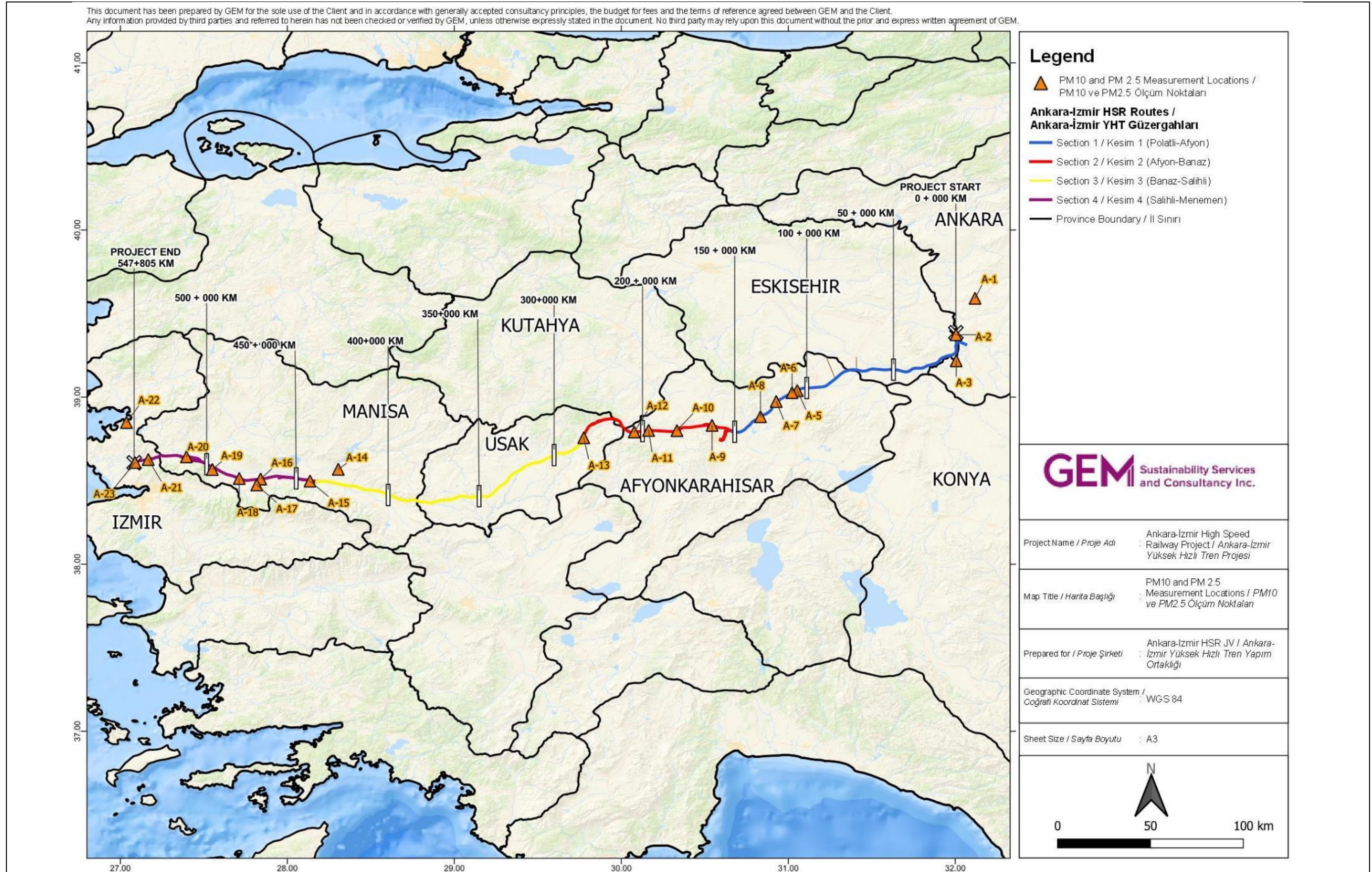


Figure 7-1. Baseline Air Quality Measurement Locations

7.3. Impact Assessment and Management

The impact on air quality of the receptors located along the Project route and in the vicinity of the quarries and material borrow sites will be mainly caused by the earthworks to be carried out within the Project expropriation corridor and material extraction and production works to be conducted at the quarry and material borrow sites and concrete plants (see Section 1.4.5.2 for the list of quarries and material borrow sites included in the current Project design)

The exhaust emissions from the construction equipment and vehicles will also make contribution to Project-related air emissions in the vicinity of each receptor. Because of the linear nature of the Project and the fact that the construction equipment and vehicles will be mobile along the route, impacts associated with the exhaust emissions are estimated to be insignificant.

It should be noted that the Project construction works were started by the previous contractors in 2016 and suspended in 2018. Infrastructure (excavation and fill) works have already been partly completed in Section 1 and Section 2, except the Hattipler Passage (KM 267+156-278+632) and Ankara-Konya HSR Connection Line (7+800; 0+000-6+683.120). Progress of excavation and fill per railway sections is provided in Section 1.6.1. As of Q2 2021, there is no ongoing construction works along the route, except Section 3, Section 4a (initial part of Salihli-Manisa between KM 439+000-456+500) and Section 4d (Manisa-Menemen between KM 522+100-547+805) being conducted by other contractors in accordance with the requirements of the national legislation. The earthworks design, construction machinery and equipment, any modelling and/or monitoring studies conducted for these sections and/or the management measures being taken by those contractors as per the requirements of the national legislation is not available to the Contractor at the time of compilation of this ESIA Report.

Dust generation due to infrastructures works will be a concern mainly at route parts, where infrastructure works have not been started/conducted in the previous Project phases. The impact will be short-term and temporary, limited to the duration of works at respective parts of the route because of the linear nature of the Project.

At quarry and material borrow sites, the impact will continue intermittently throughout the operation of these facilities within the scope of the Project. Distance of the closest receptors to the quarry and material borrow sites (included in the current design) are presented in Table 1-18 and Table 1-19 in Section 1.4.7.2.

Quantification and assessment of the GHG emissions to be sourced from the construction activities to be conducted by the Contractor throughout the construction phase of the Project are presented in Section 7.3.2.

7.3.1. Dust Emissions

Residential receptors have been taken into consideration in the assessment of the Project related impacts due to dust (PM₁₀ and PM_{2.5}) emissions. The sensitivity of all residential receptors considered in the assessment have been accepted as high. The criteria for the magnitude of change component of the overall magnitude are presented in Table 7-3.

Table 7-3. Criteria for Magnitude of Change

High	Medium	Low	Negligible
Exceedance of the Project Standards at the residential receptors (in cases where background pollutant levels are below the Project Standards) <u>or</u> significant increase (i.e. more than 50%) of the background air quality levels at the residential receptors even if the Project Standards are met	Project Standards are not exceeded at the residential receptors <u>and</u> the increase of background air quality levels at the receptors is 25% to 50%	Project Standards are not exceeded at the residential receptors <u>and</u> the increase of background air quality levels at the receptors is 10% to 25%	Project Standards are not exceeded at the residential receptors <u>and</u> the increase of background air quality levels at the receptors is less than 10%

The emission factors used for the land preparation and construction activities are given in Table 7-4 with the calculated hourly emissions.

Table 7-4. Emission Factors and Emission Calculations for Land Preparation and Construction Activities

Section	Emission Source Area (m ²)	Emissions Factor (*) (kg/m ² /y)		Emission (kg/h)	
		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
Polatli-Afyon	3,272,464.00	2.3	0.23	859.2	85.9
Afyon-Banaz	2,229,765.00	2.3	0.23	585.4	58.5
Salihli-Manisa	350,000.00	2.3	0.23	91.9	9.2
Salihli North Passage	280,000.00	2.3	0.23	73.5	7.4

(*) Source: European Monitoring and Evaluation Programme (EMEP)/European Environment Agency (EEA) Air Pollutant Emission Inventory Guidebook 2016-2.A.5.b-Construction and Demolition- Tier 1 Emission Factors

The emission factors used for the limestone and andesite quarries are given in Table 7-5 with the calculated hourly emissions.

Table 7-5. Emission Factors and Emission Calculations for Limestone and Andesite Quarries

Emission Source	Activity Rate	Emissions Factor (*)		Emission (kg/h)	
		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
Blasting	585 m ²	$0.52 \times 0.00022 \times (A)^{1.5}$	$0.03 \times 0.00022 \times (A)^{1.5}$	1.610	0.0900
Transportation	60.5 km/h	0.2925 kg/km	0.02925 kg/km	17.700	1.7700
Crusher (3 pcs)	300 ton/h	$(0.00027 \text{ kg/t}) \times 0.85 \text{ (ER)}$	$(0.00005 \text{ kg/t}) \times 0.85 \text{ (ER)}$	0.200	0.0380
Screenner (3 pcs)	300 ton/h	$(0.00037 \text{ kg/t}) \times 0.5 \text{ (ER)}$	$(0.000025 \text{ kg/t}) \times 0.5 \text{ (ER)}$	0.170	0.0110
Storage	0.5 ha/d	1.02 kg/ha	0.4 kg/ha	0.021	0.0083

(*) Source: US Environmental Protection Agency (EPA) AP-42 Sections 11.9, Section 13.2.2, 11.19-2 and 13.2.4

A: Blasting area; ER: overall emission reduction efficiency (%)

The emission factors used for the basalt quarries are given in Table 7-6 with the calculated hourly emissions.

Table 7-6. Emission Factors and Emission Calculations for Basalt Quarries

Emission Source	Activity Rate	Emissions Factor (*)		Emission (kg/h)	
		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
Blasting	596.2 m ²	$0.52 \times 0.00022 \times (A)^{1.5}$	$0.03 \times 0.00022 \times (A)^{1.5}$	1.660	0.0900
Transportation	28.57 km/h	0.2925 kg/km	0.02925 kg/km	8.350	0.5300
Crusher (3 pcs)	300 ton/h	$(0.00027 \text{ kg/t}) \times 0.85 \text{ (ER)}$	$(0.00005 \text{ kg/t}) \times 0.85 \text{ (ER)}$	0.200	0.0380
Screenner (3 pcs)	300 ton/h	$(0.00037 \text{ kg/t}) \times 0.5 \text{ (ER)}$	$(0.000025 \text{ kg/t}) \times 0.5 \text{ (ER)}$	0.170	0.0110
Storage	0.5 ha/d	1.02 kg/ha	0.4 kg/ha	0.021	0.0083

(*) Source: US Environmental Protection Agency (EPA) AP-42 Sections 11.9, Section 13.2.2, 11.19-2 and 13.2.4.

A: Blasting area; ER: overall emission reduction efficiency (%)

The emission factors used for the concrete plants are given in Table 7-7 with the calculated hourly emissions.

Table 7-7. Emission Factors and Emission Calculations for Concrete Plants

Emission Source	Activity Rate	Emissions Factor (*)		Emission (kg/h)	
		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
Transportation	5 km/h	0.2925 kg/km	0.02925 kg/km	1.460	0.1460
Storage	0.5 ha/d	1.02 kg/ha	0.4 kg/ha	0.021	0.0083

(*) Source: US Environmental Protection Agency (EPA) AP-42 Section 13.2.2 and 13.2.4.

Air quality modelling study has been carried out by using AERMOD View – Gaussian Plume Air Dispersion Model software for the construction phase dust emissions of the Project. The meteorological data was obtained from the General Directorate of Meteorological Works of Turkey. As such, the following nine meteorological stations were determined to be representative for the modelling studies to be conducted for the route and Project facilities: Polatli, Sivrihisar, Afyonkarahisar, Bayat, Dumlupınar, Emirdag, Salihli, Manisa, and Menemen.

For each of the nine meteorological stations, long-term meteorological data was reviewed and compared to the number of wind blows recorded within the last ten years in order to determine the representative model year. The meteorological data used in the model included the hourly wind direction, speed, temperature, humidity, precipitation, pressure, cloudiness, and sounding data. The data was converted to the format suitable for the AERMOD software (AERMET) and the model was run accordingly.

The modelling study area for the railway route has been assigned as 1 km-wide corridor (500 m at each side of the Railway axis) and 2 km x 2 km area for the quarries and material borrow sites as shown in Figure 7-2. The average width of the corridor in which the dust-generating activities will be conducted has been assumed as 50 m (25 m at each side of the railway axis) along the Railway axis.

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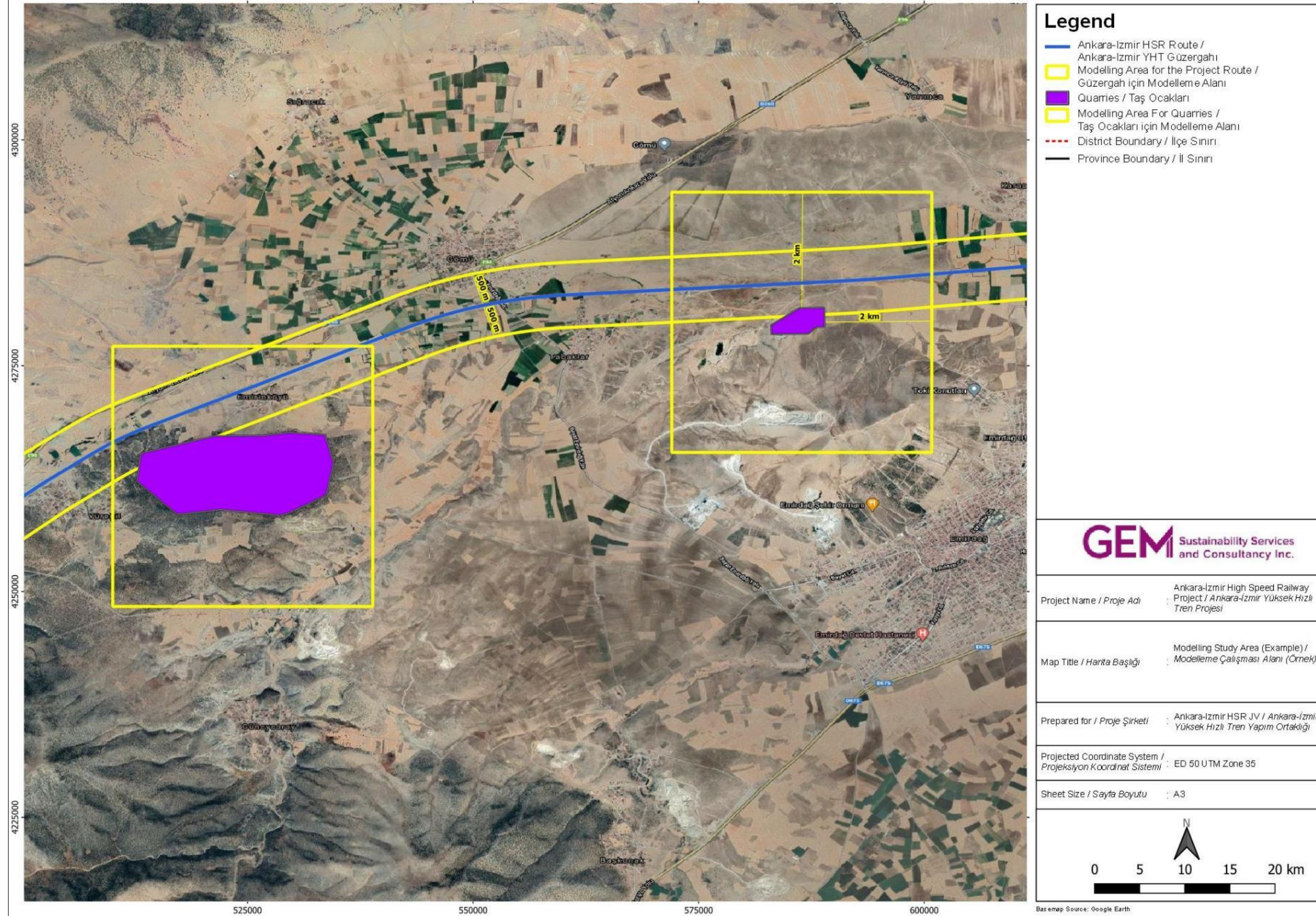


Figure 7-2. Modelling Study Area for Air Quality (Example for Railway Route and Quarry/Material Borrow Sites)

The air quality modelling results for the construction phase of the Project are given in Table 7-8 for quarries and Table 7-9 for borrow sites. The number of annual exceedance cases for PM₁₀ fulfils the requirements of the Turkish IAPCR for both the quarries and material borrow sites.

Table 7-8. Air Quality Modelling Results - Maximum Concentration Values for “Quarries”

Station ID	Maximum Concentration within the Modelling Area Daily		Maximum Concentration within the Modelling Area Yearly	
	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)
10-Beycegiz	36.51	3.70	1.69	0.17
18-Yagmurbaba	37.59	3.83	1.64	0.17
29-Yenice	71.41	4.87	3.84	0.26
36-Turktaciri	130.88	8.75	3.48	0.23
40-Kyakent	28.42	1.97	2.14	0.15
75-Alibeyce	60.00	4.10	1.95	0.13
78-Tabaklar	54.75	3.74	2.07	0.14
82-Emirinkoyu	26.56	2.70	1.03	0.10
94-Bayat	13.07	0.89	1.79	0.12
97-Bayat 2 (*)	6.08	0.62	0.66	0.07
120-Gebeceler 2	102.99	7.03	4.32	0.30
124-Beyyazi	84.18	5.75	2.81	0.19
152-Ayvali	88.09	6.13	3.09	0.22
176-Elvanpasa 2	96.03	6.42	3.63	0.24
197-Dumenlerkoyu	204.93	12.99	7.97	0.53
214-Ahmetlidag 2	17.57	2.39	1.63	0.18
226-Hayalli	50.60	3.46	4.27	0.29
232-Dombayli	48.82	4.74	4.33	0.29
234-Akkoy	51.03	3.48	4.67	0.32
234-B. Campinar	45.38	3.09	2.06	0.14
235-Cikrikci	144.64	9.88	4.05	0.28
239-A- 3229556 (Asagicobanisa) (*)	89.19	6.09	1.73	0.12
238-Ansizca 1	221.69	21.81	3.94	0.22
239-Ansizca 2	93.01	6.35	2.90	0.20
243-Yunusemre	126.48	8.64	2.32	0.16
245-Gurle	89.07	6.08	2.43	0.17
258-Caltidere 2	5.01	0.51	0.78	0.08
263-Degirmendere	4.34	0.44	0.79	0.08
Project Standard (µg/m³)	50.00	25.00	20.00	10.00

(*) These quarries, which were considered for use by the Contractor at the scoping phase of the ESIA, have been eliminated from the Project design and no license application has been done for these quarries in consideration of the overlapping non-registered cultural heritage sites identified during the ESIA studies. See Chapter 14 on Cultural Heritage for further details. These quarries have been considered in the impact assessment studies (presented within the respective chapters of this ESIA Report), which were finalised before the decision on elimination has been taken by the Contractor in March 2021.

Table 7-9. Air Quality Modelling Results - Maximum Concentration Values for “Borrow Sites”

Station ID	Maximum Concentration within the Modelling Area Daily		Maximum Concentration within the Modelling Area Yearly	
	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)
32-A.O.1-A.O.2	20.39	3.32	1.07	0.17
33-A.O.3	24.77	4.03	1.16	0.19
34-Kabakkoy	24.30	3.95	1.18	0.19
37-A.O.4	34.97	41.30	1.19	1.99
38-A.O.5	17.40	2.61	1.12	0.16
42-A.O.6	13.30	2.18	1.10	0.18
59-A.O.9	13.50	2.19	1.08	0.18
70-A.O.10	20.10	3.28	0.86	0.14
100-Koroglubeli-1	4.93	0.80	0.65	0.10
101-Koroglubeli-2	4.94	0.80	0.66	0.10
105-A.O.14	29.40	4.78	0.99	0.16
122-Akcın	23.60	3.83	1.07	0.17
123- Akcın-2	23.60	3.84	1.10	1.18
138-A.O.-15	27.20	4.43	1.01	0.16
198-64/2005-10	26.20	4.26	1.40	0.23
204-Derbent	56.30	9.16	2.86	0.47
231-2009-11	22.30	3.63	1.40	0.23
Project Standard (µg/m³)	50.00	25.00	20.00	10.00

The cumulative concentrations of PM10 and PM2.5, including both the background concentrations and daily air emission due to route construction and where applicable, quarry works at the selected receptors are given in Table 7-10, respectively. The number of annual exceedance cases for PM10 fulfils the requirements of the Turkish IAPCR for both the quarries and material borrow sites.

Table 7-10. Cumulative PM10 and PM2.5 Concentrations at the Receptors

Station ID	Measurement Location (Receptor)	Background Concentration		Daily Air Emission due to Construction (Route and Quarry) Activities		Cumulative Concentration at the Receptor	
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)
A-02	Yenice	10	3	32	5.7	42	8.7
A-03	Turktaciri	12	5	39.23	2.7	51.23	7.7
A-04	Emirin Köyü	12	4	3.89	0.49	15.89	4.49
A-06	Yuregil	17	6	3	0.3	20	6.3
A-07	Bayat	13	4	4.12	2.03	17.12	6.03
A-08	Seydiler	13	3	3	0.3	16	3.3
A-09	Erenler	14	4	41	4.1	55	8.1
A-10	Balmahmut	11	3	32	3.2	43	6.2
A-11	Duzagac	13	4	110	11	123	15
A-12	Guney	18	7	60	6	78	13
A-13	Banaz	13	3	4.75	0.34	17.74	3.34
A-14	Dombayli	12	4	4.42	0.6	16.42	4.6
A-15	Salihli	14	5	55	5.5	69	10.5
A-16	Urganli	11	3	105	10.5	116	13.5
A-17	Cikrikci	10	3	6.37	0.67	16.37	3.67
A-18	Turgutlu	12	4	14	1.4	26	5.4
A-19	Cobanisa	13	5	1.46	0.15	13.46	5.15
A-20	Manisa	16	6	4	0.4	20	6.4
A-21	Degirmendere	11	4	0.6	0.06	11.6	4.06
A-22	Caltildere	10	3	2.8	0.26	12.8	3.26
Project Standard (µg/m³)		50.00	25.00	50.00	25.00	50.00	25.00

(*) The modelling results for the receptor A-01 have not been presented as the Basri Quarry affecting this receptor has been cancelled as described in Chapter 3 ("Project Alternatives"). The modelling results for the receptor A-23 have not been presented as infrastructure works for this part is under the responsibility of another contractor.

The maximum daily and yearly average emissions for PM₁₀ for the entire route are plotted on the maps presented between Figure 7-3 and Figure 7-10. Emission dispersion maps of the quarries are presented between Figure 7-11 and Figure 7-36.

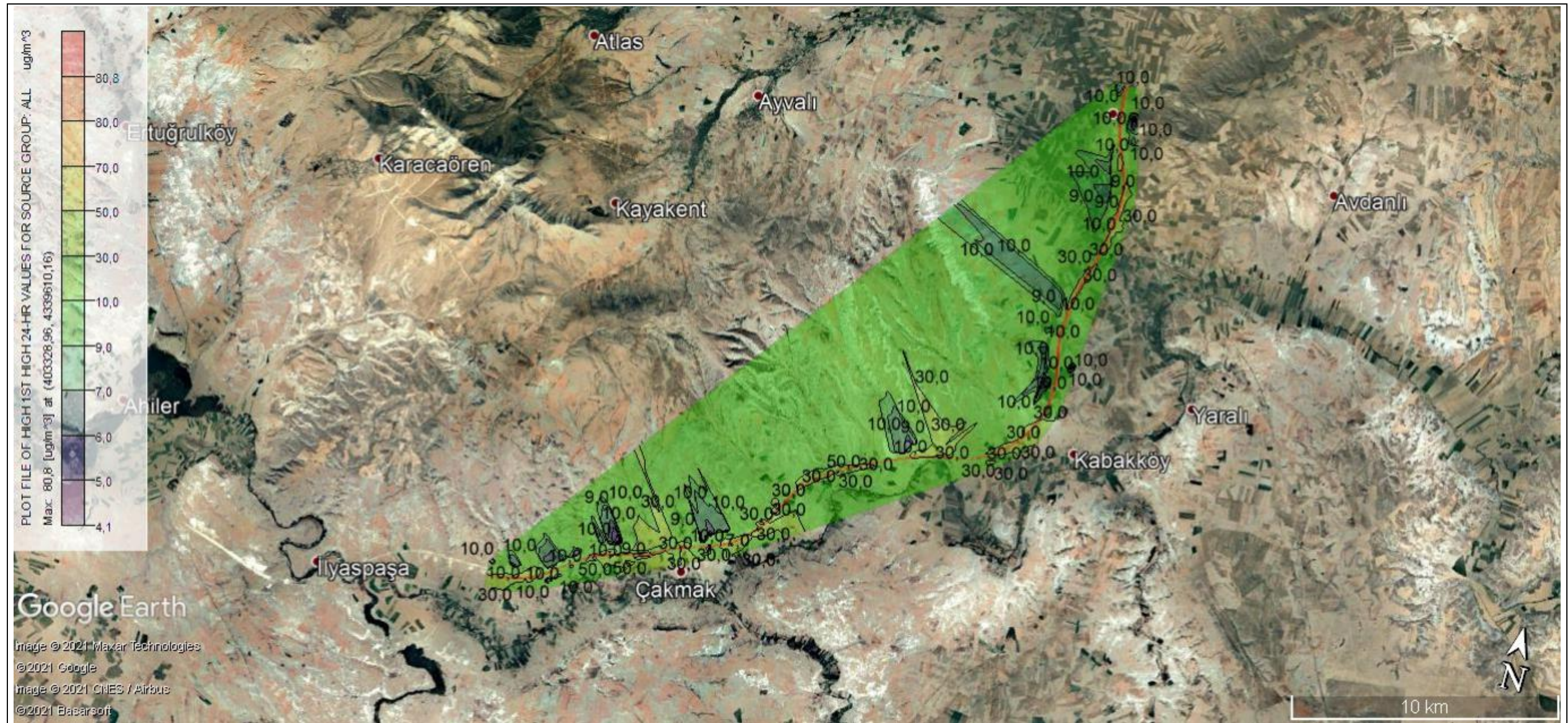


Figure 7-3. Maximum Daily Average PM₁₀ Emissions from Project Activities (0-35 km)

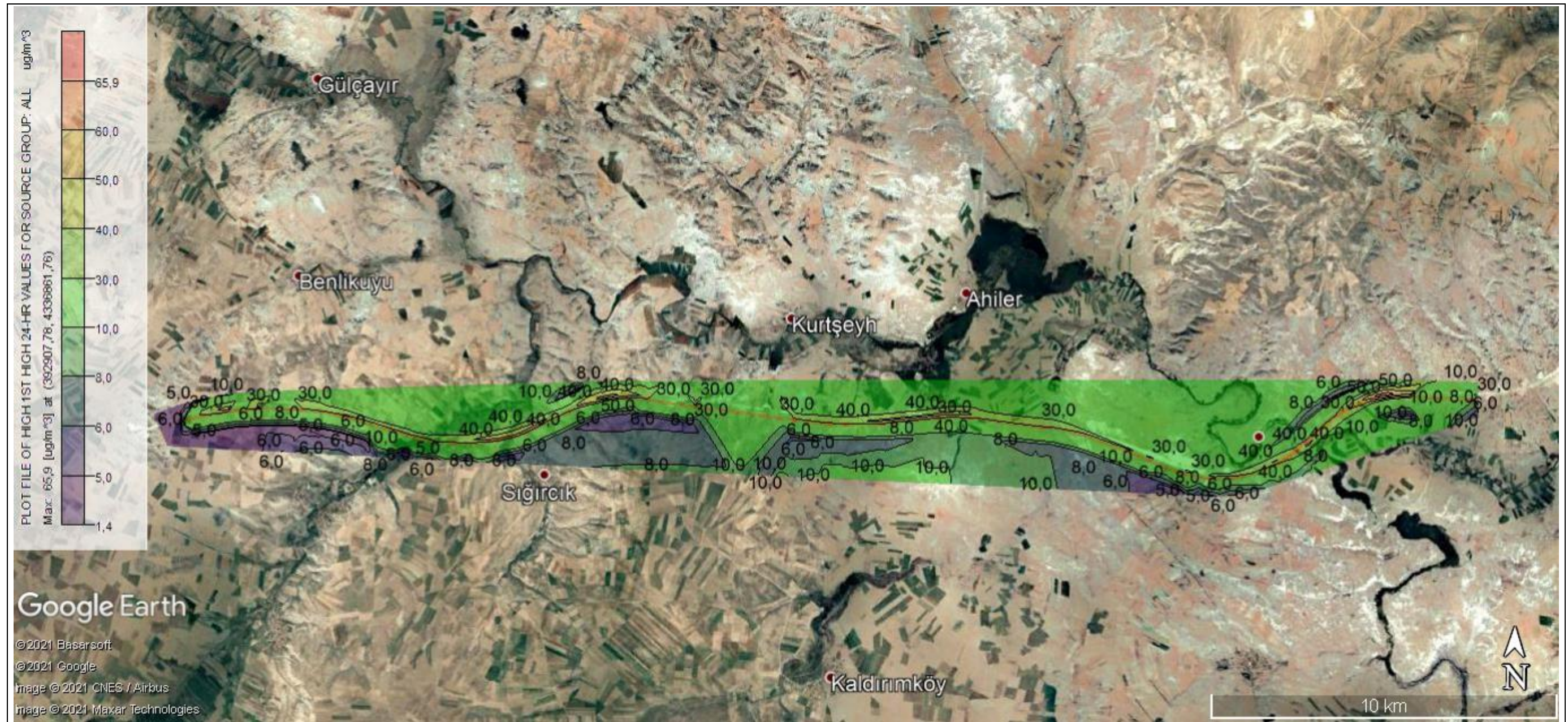


Figure 7-4. Maximum Daily Average PM₁₀ Emissions from Project Activities (35-75 km)

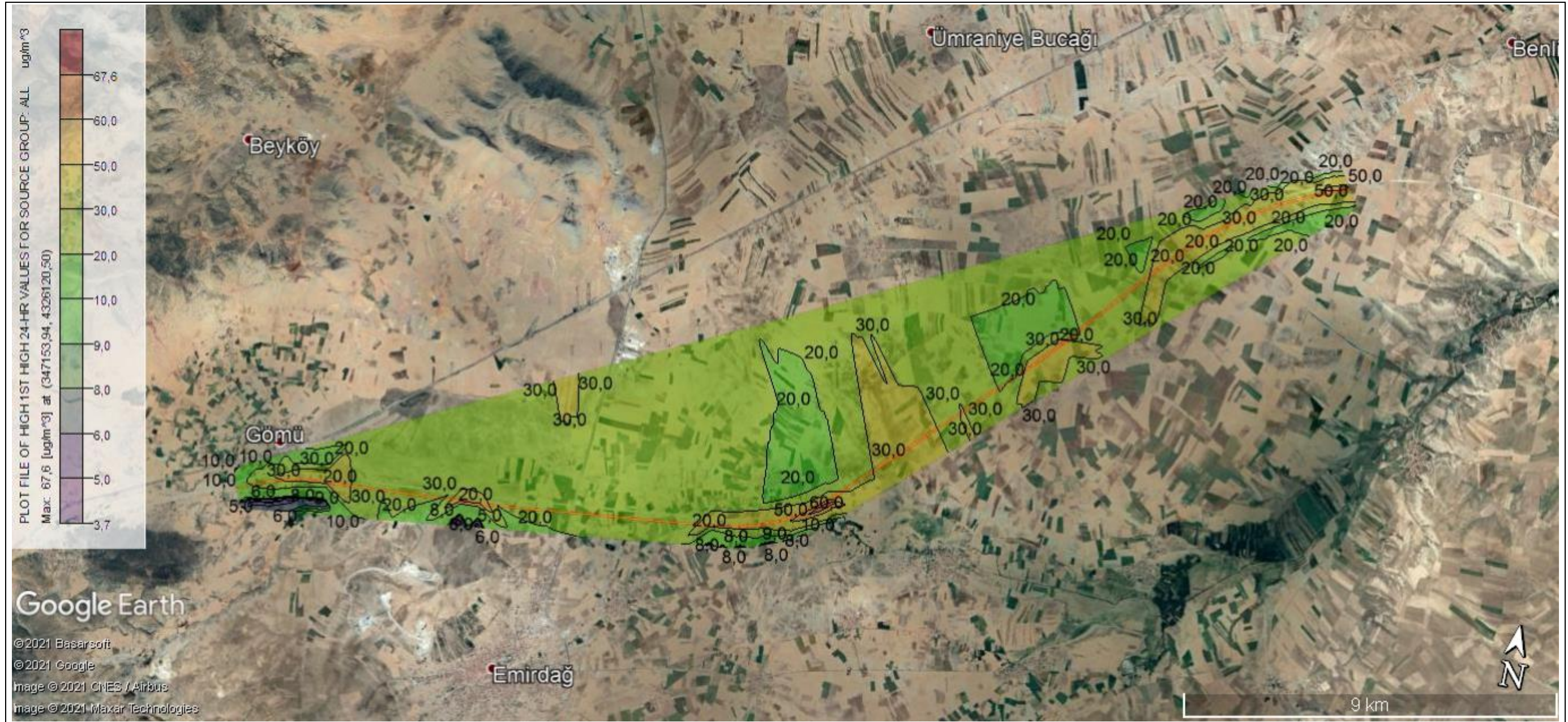


Figure 7-5. Maximum Daily Average PM₁₀ Emissions from Project Activities (75-100 km)



Figure 7-6. Maximum Daily Average PM₁₀ Emissions from Project Activities (100-130 km)

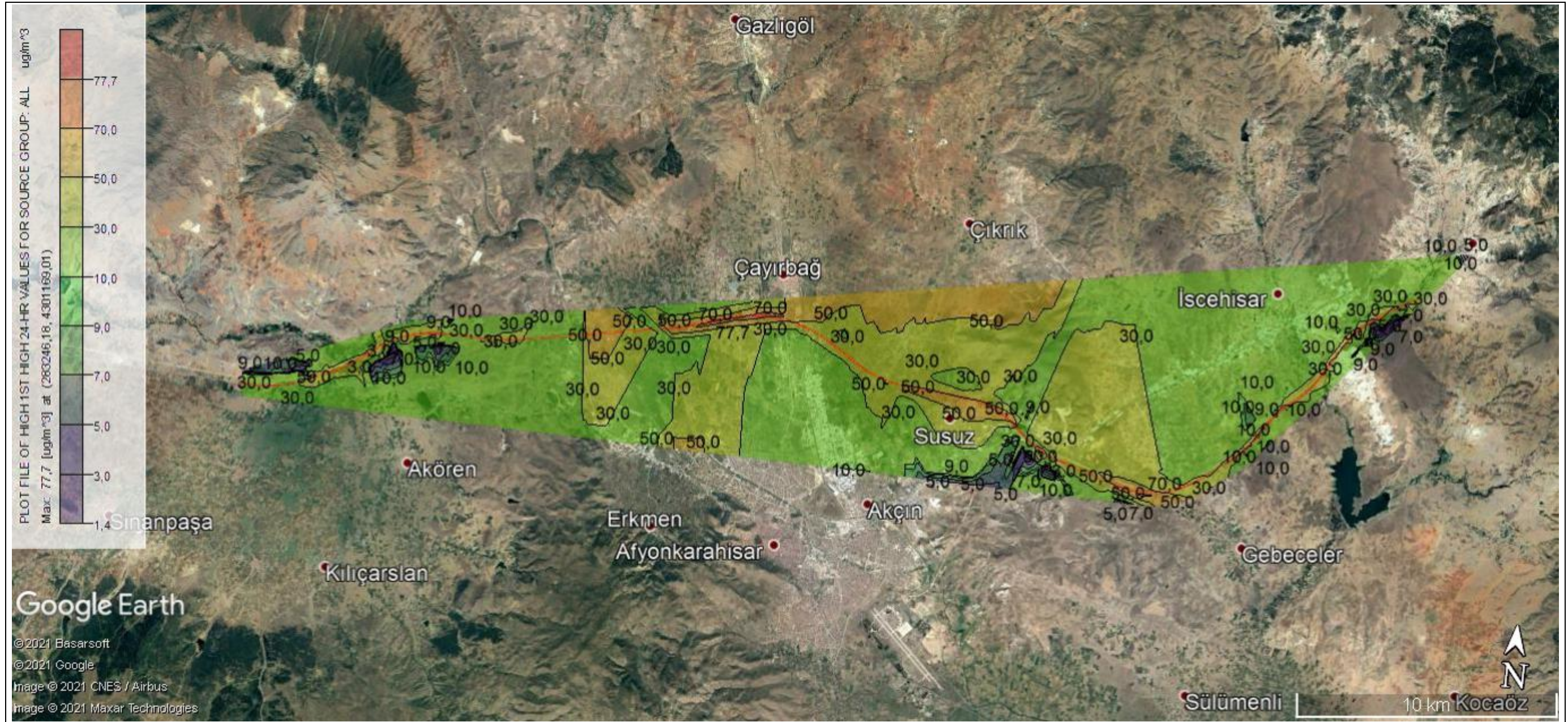


Figure 7-7. Maximum Daily Average PM₁₀ Emissions from Project Activities (130-175 km)

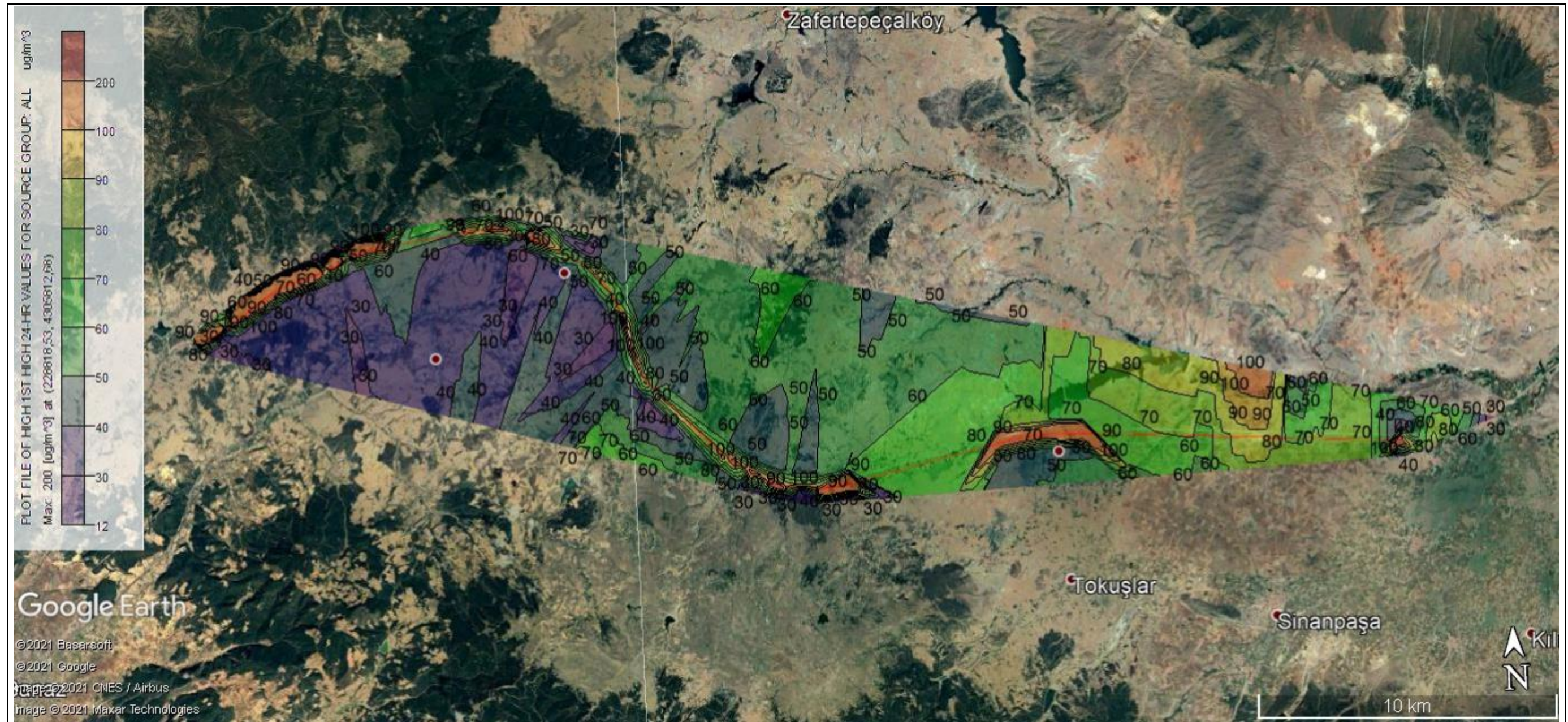


Figure 7-8. Maximum Daily Average PM₁₀ Emissions from Project Activities (175-230 km)

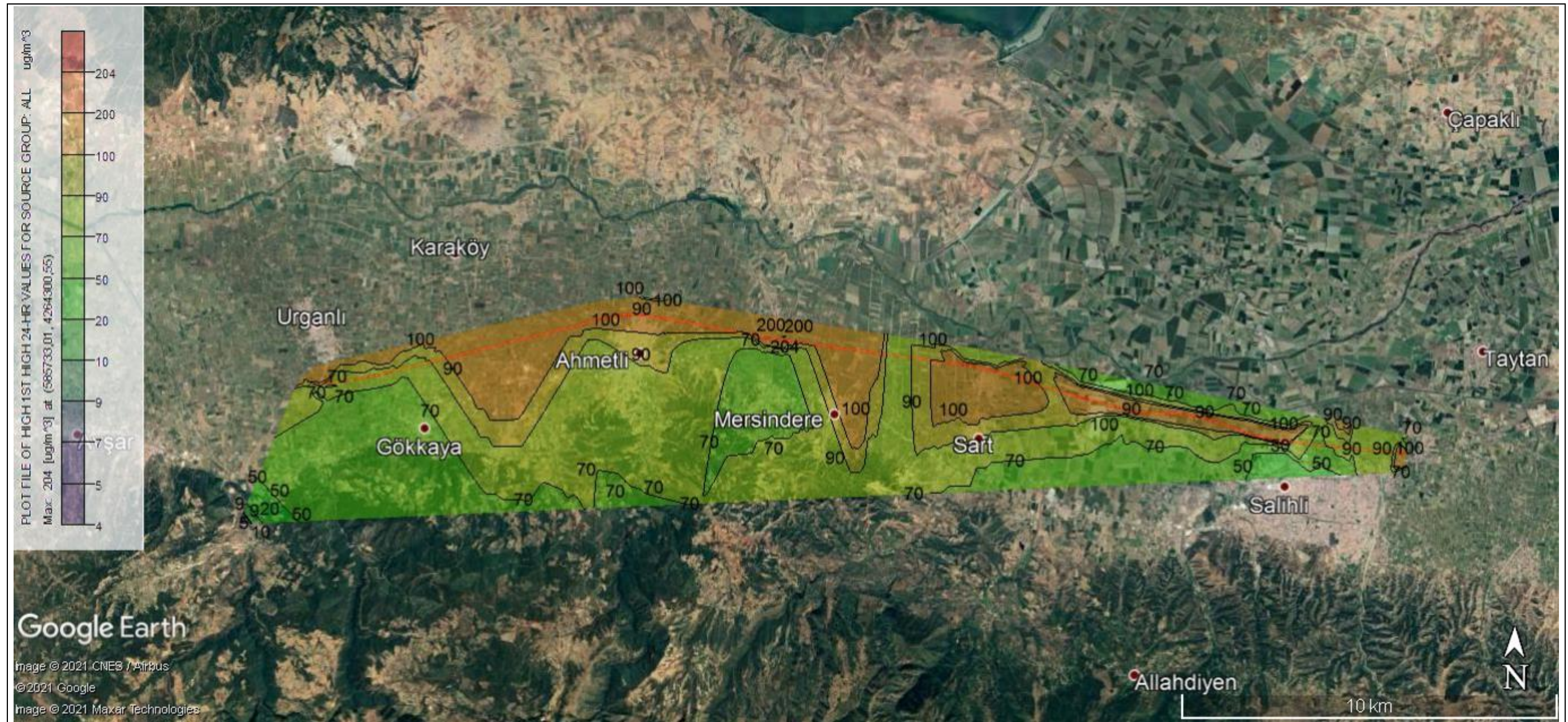


Figure 7-9. Maximum Daily Average PM_{10} Emissions from Project Activities (456-486 km)



Figure 7-10. Maximum Daily Average PM₁₀ Emissions from Project Activities (486-514 km)

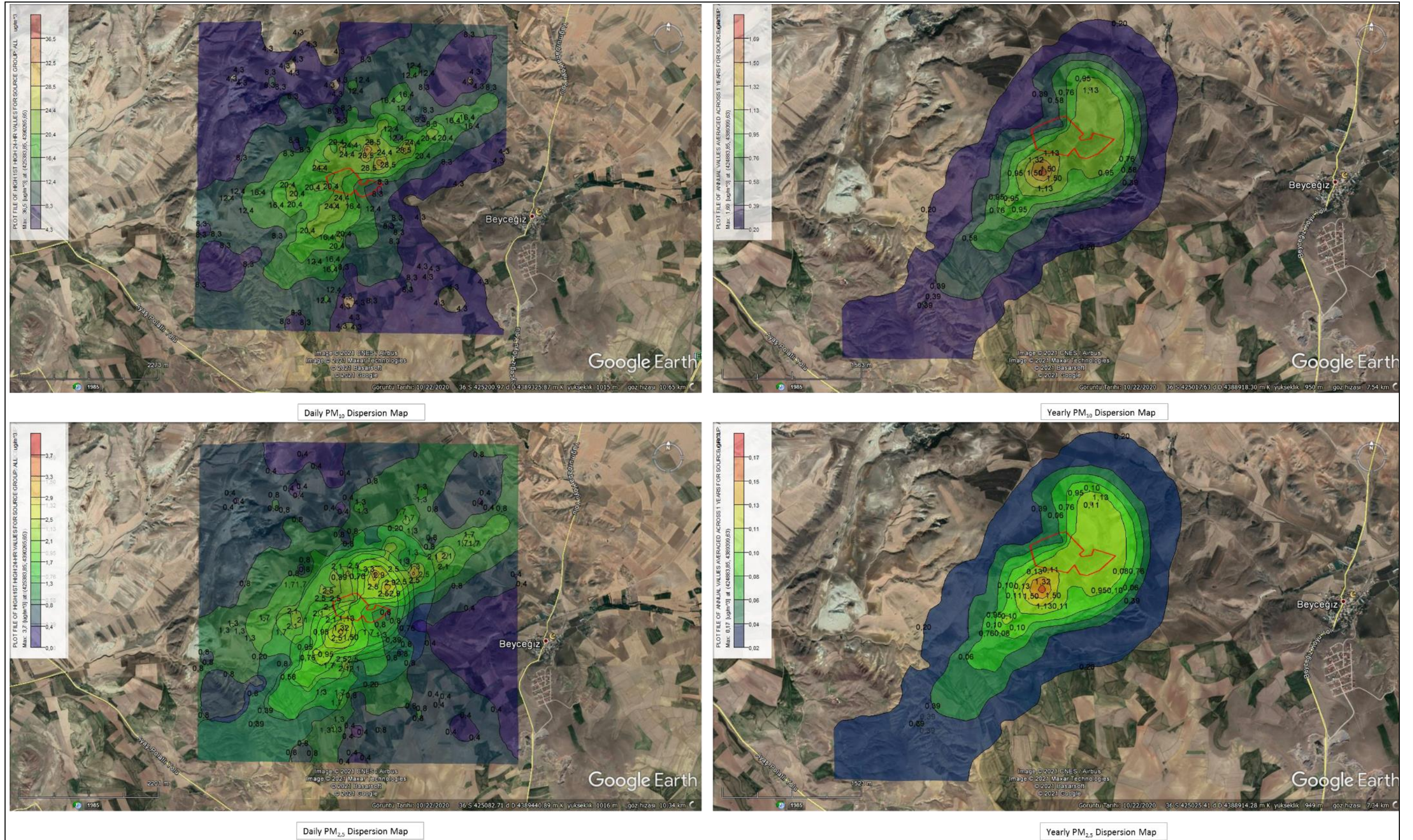


Figure 7-11. Emission Dispersion Maps of Beyceğiz Quarry

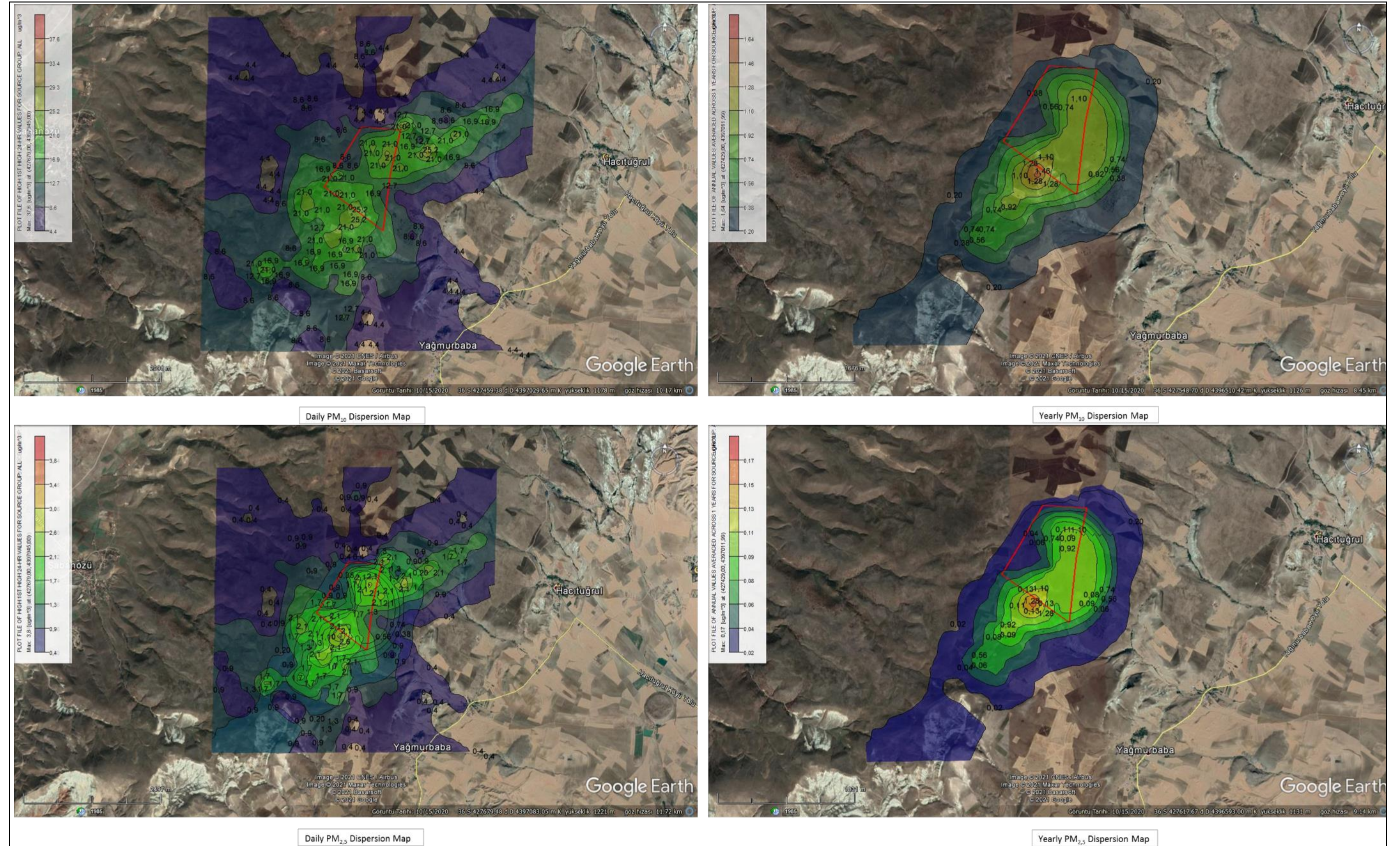


Figure 7-12. Emission Dispersion Maps of Yagmurbaba Quarry

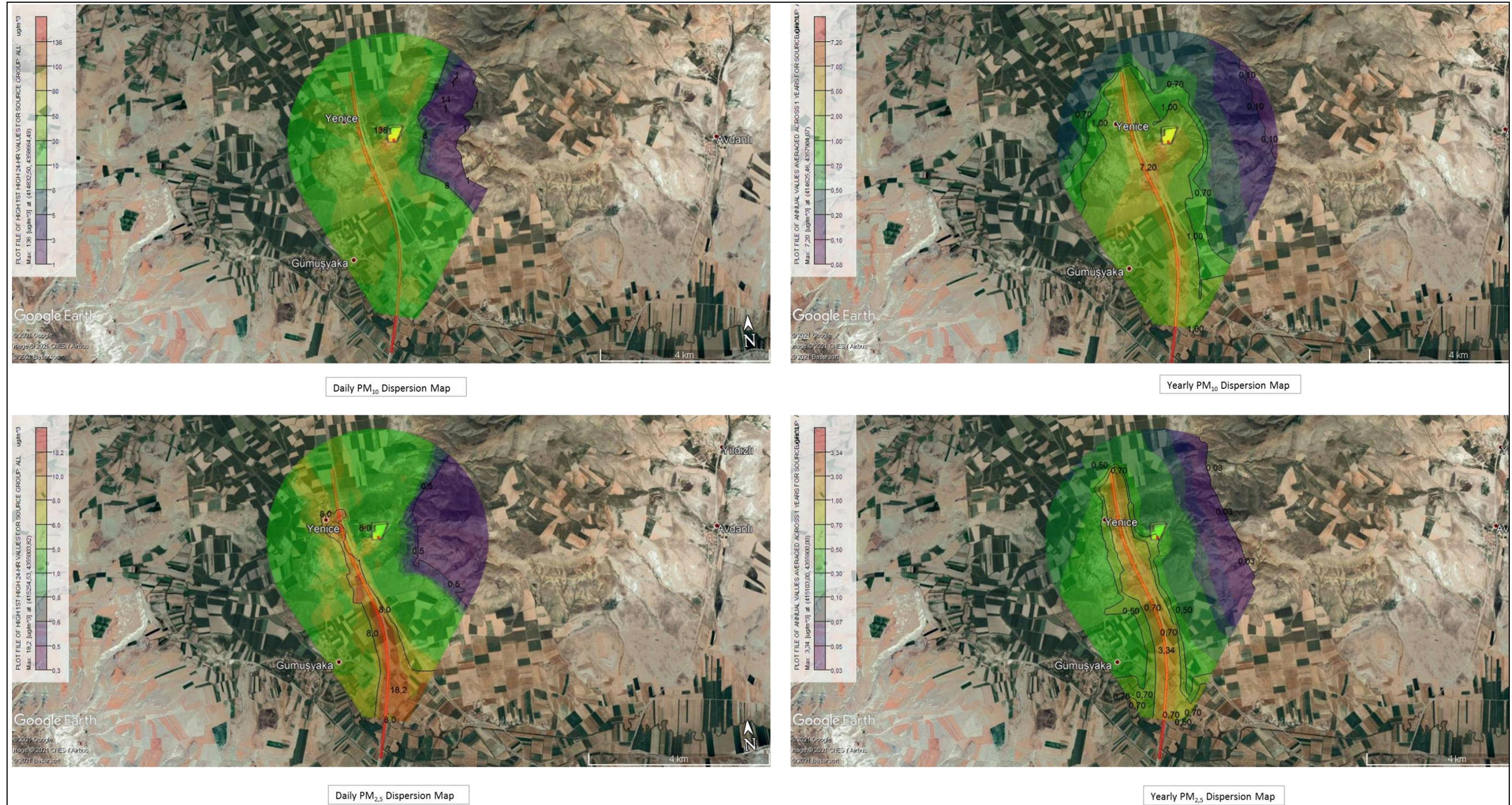


Figure 7-13. Emission Dispersion Maps of Yenice Quarry

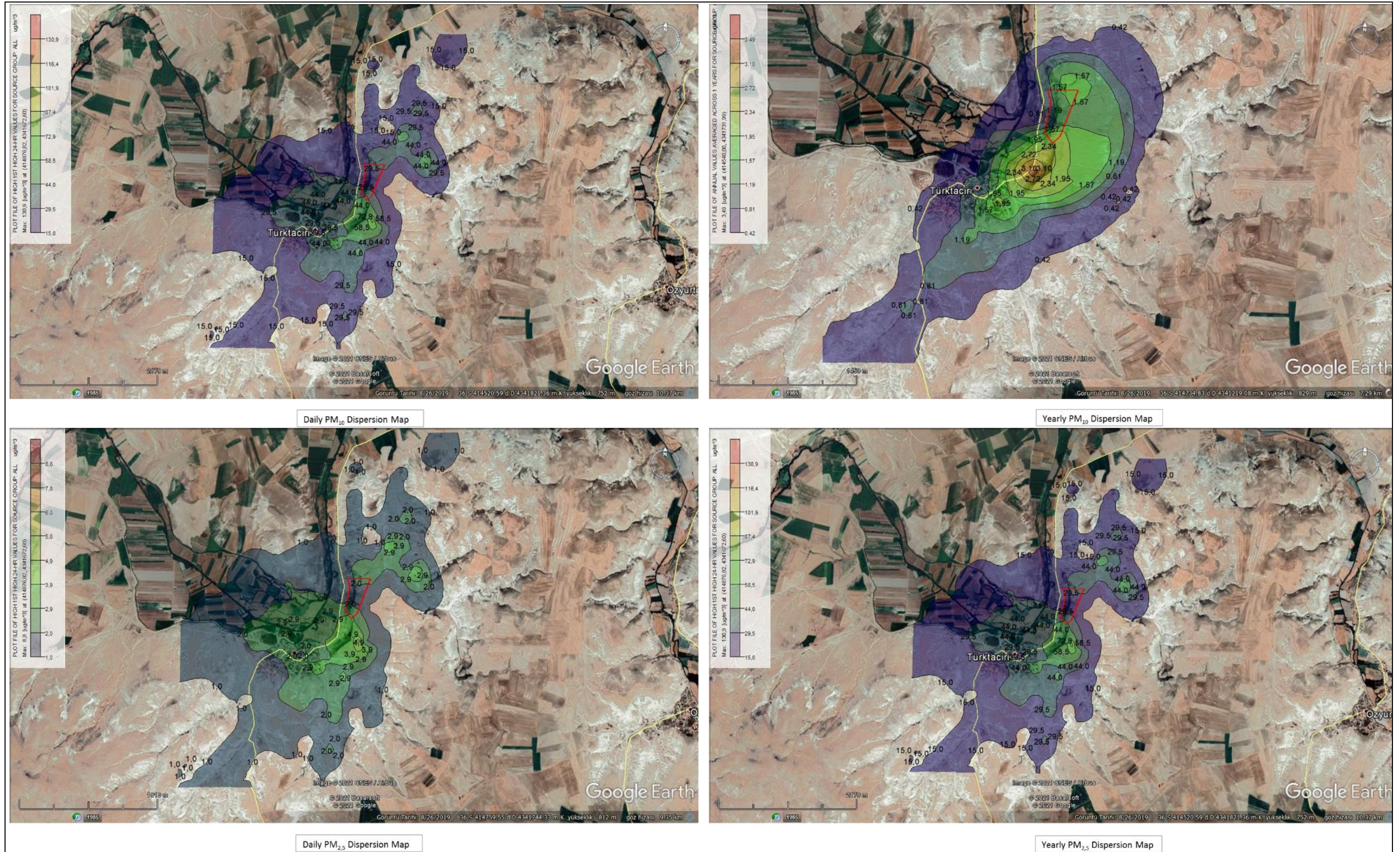


Figure 7-14. Emission Dispersion Maps of Turktaciri Quarry

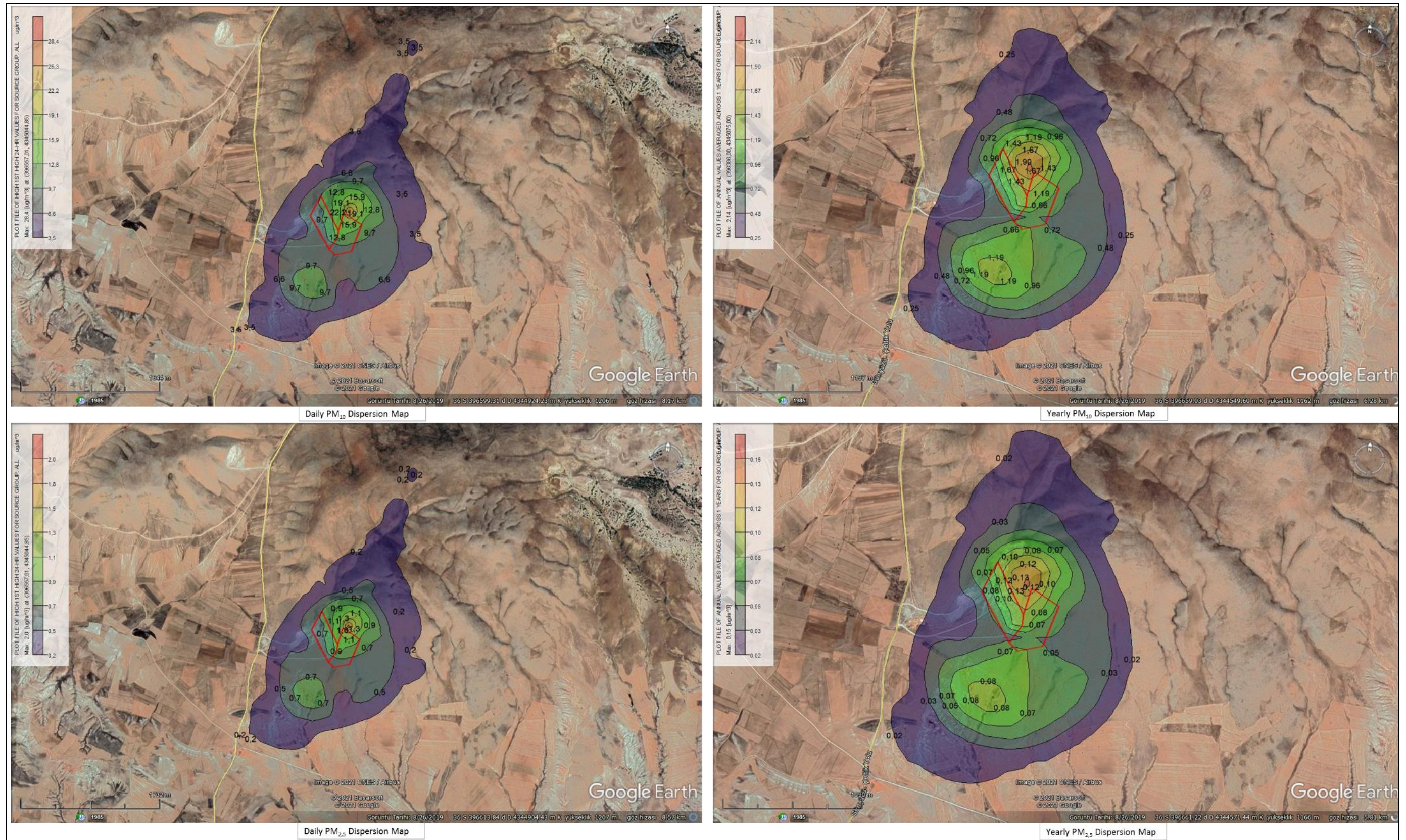


Figure 7-15. Emission Dispersion Maps of Kayakent Quarry

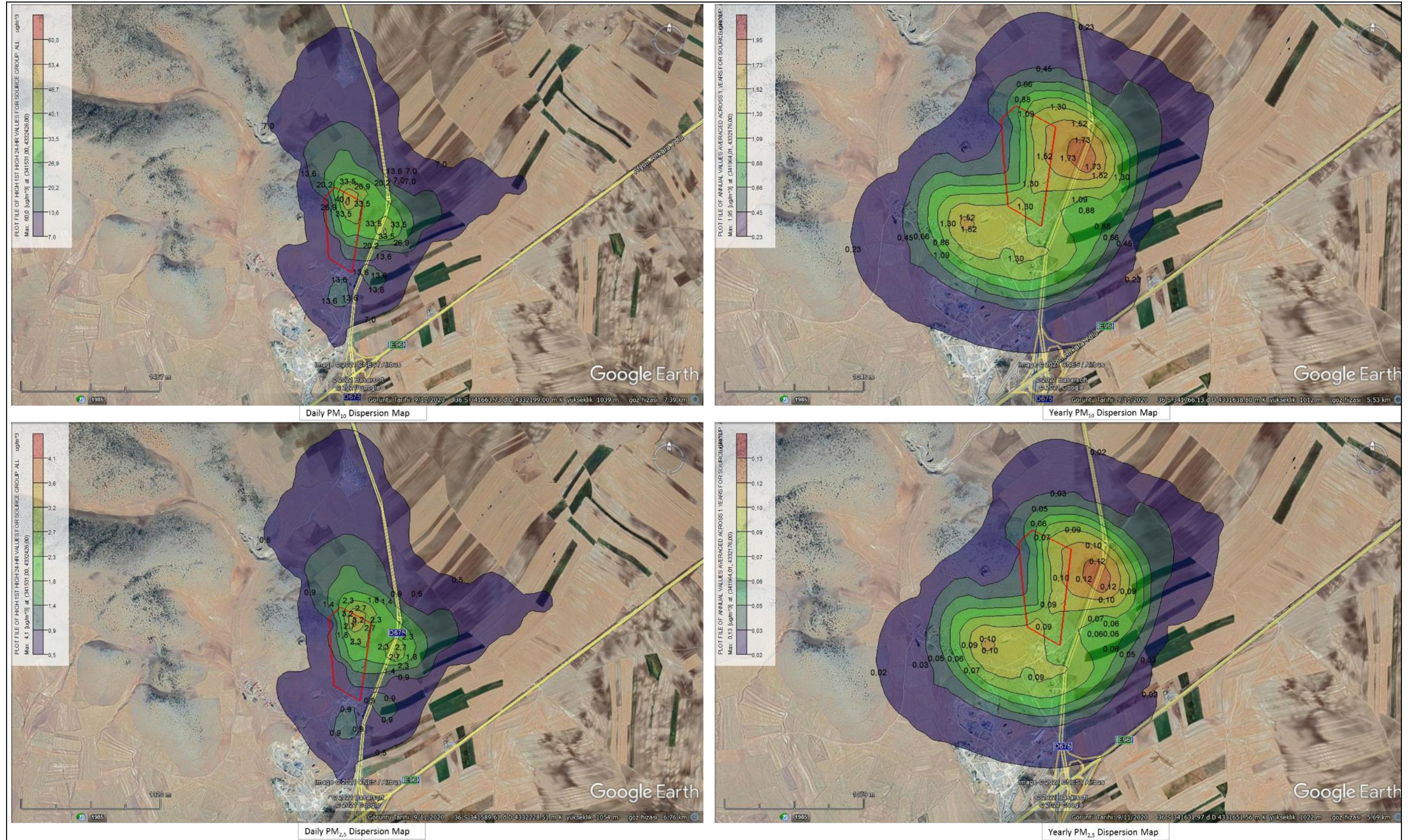


Figure 7-16. Emission Dispersion Maps of Alibeyce Quarry

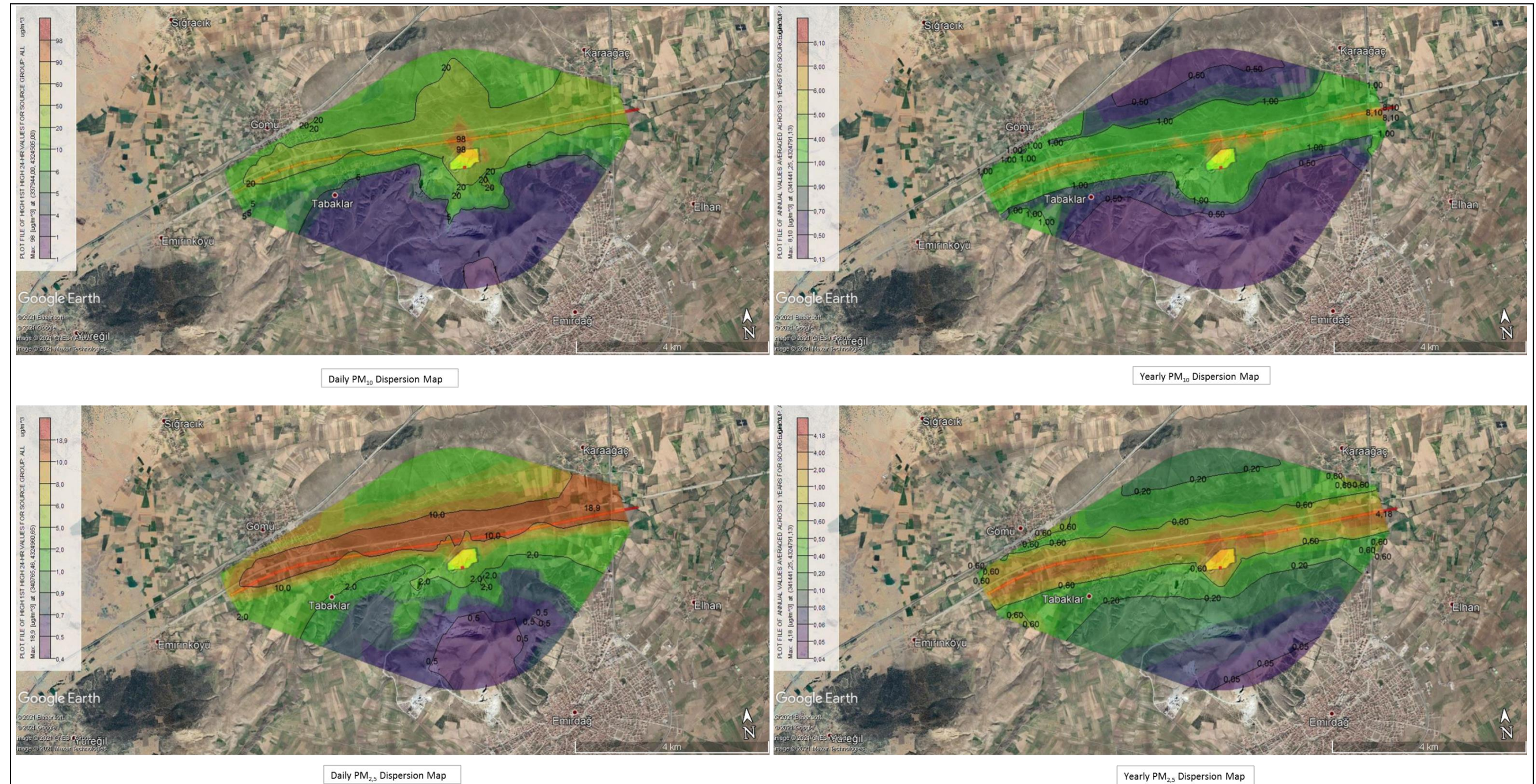


Figure 7-17. Emission Dispersion Maps of Tabaklar Quarry

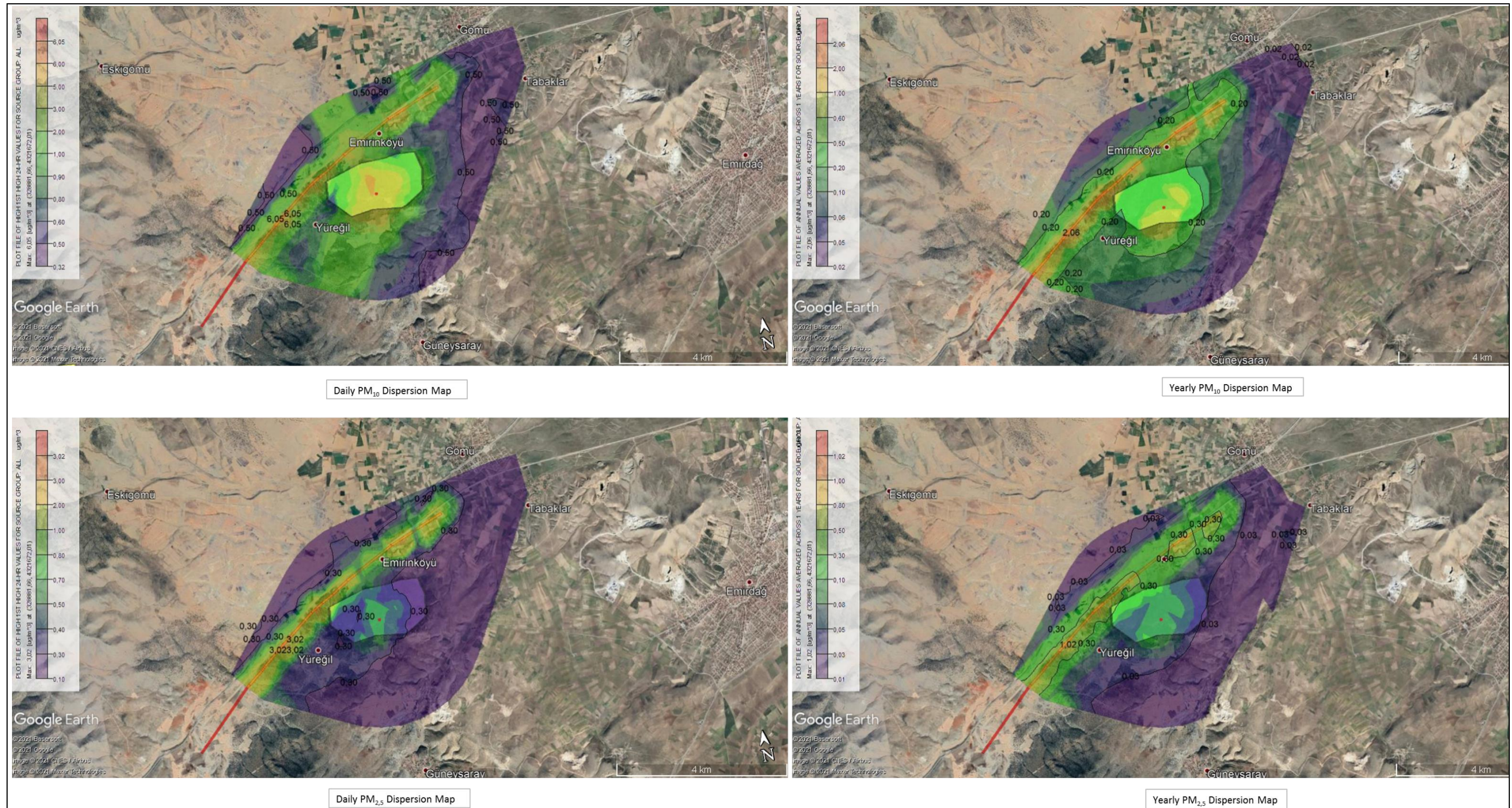


Figure 7-18. Emission Dispersion Maps of Emirinköyü Quarry

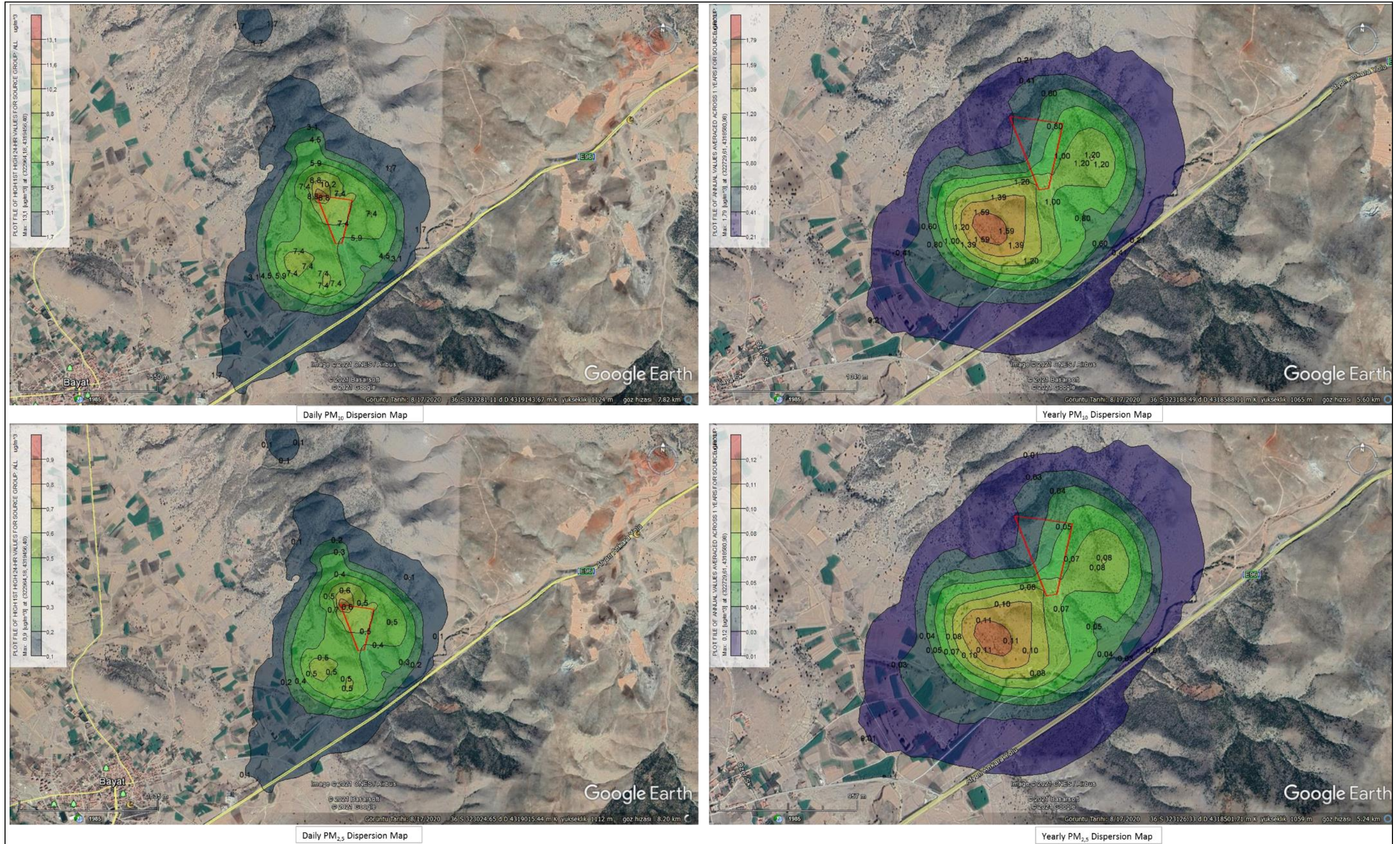


Figure 7-19. Emission Dispersion Maps of Bayat Quarry

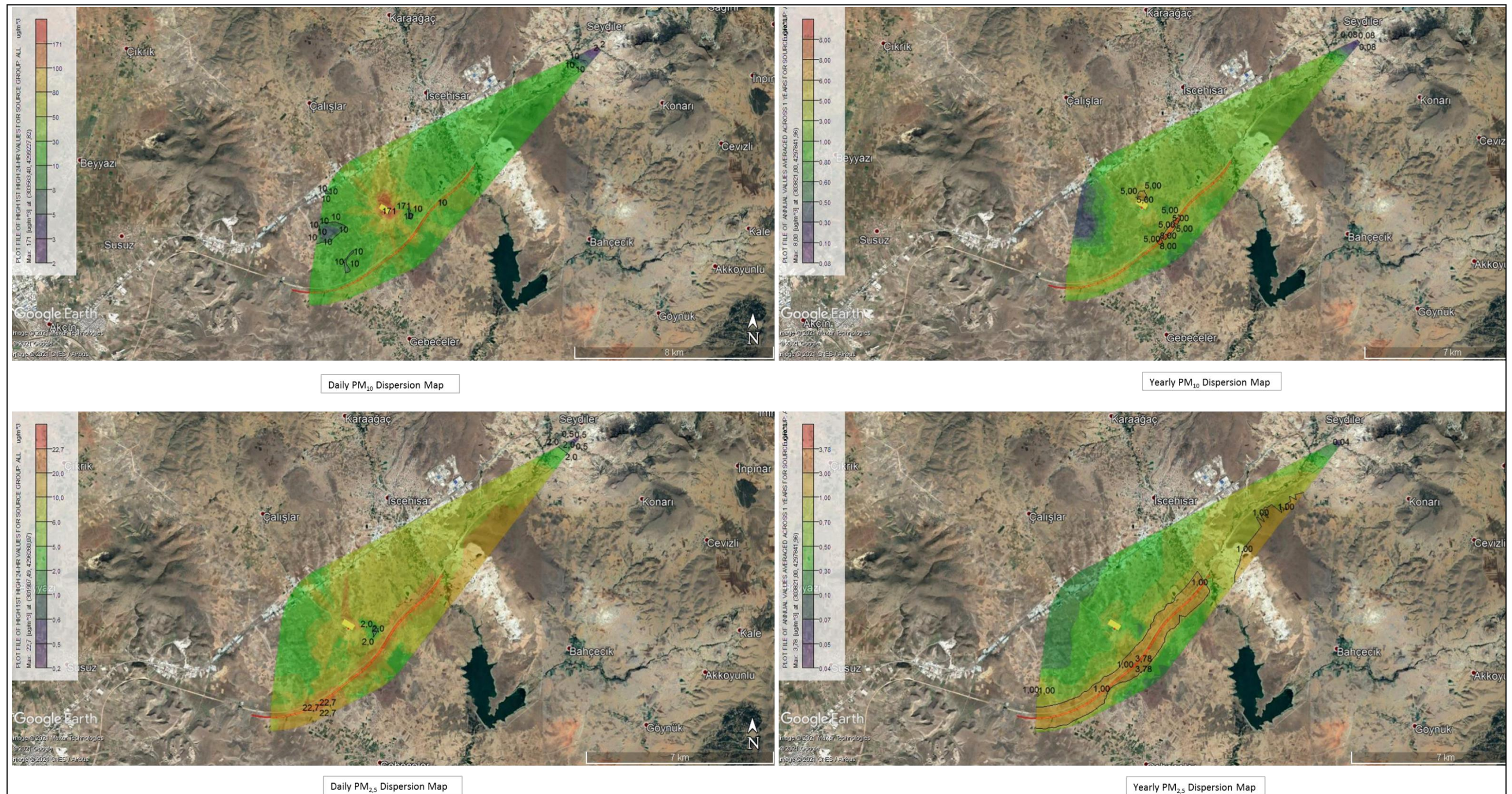


Figure 7-20. Emission Dispersion Maps of Gebeceler-2 Quarry

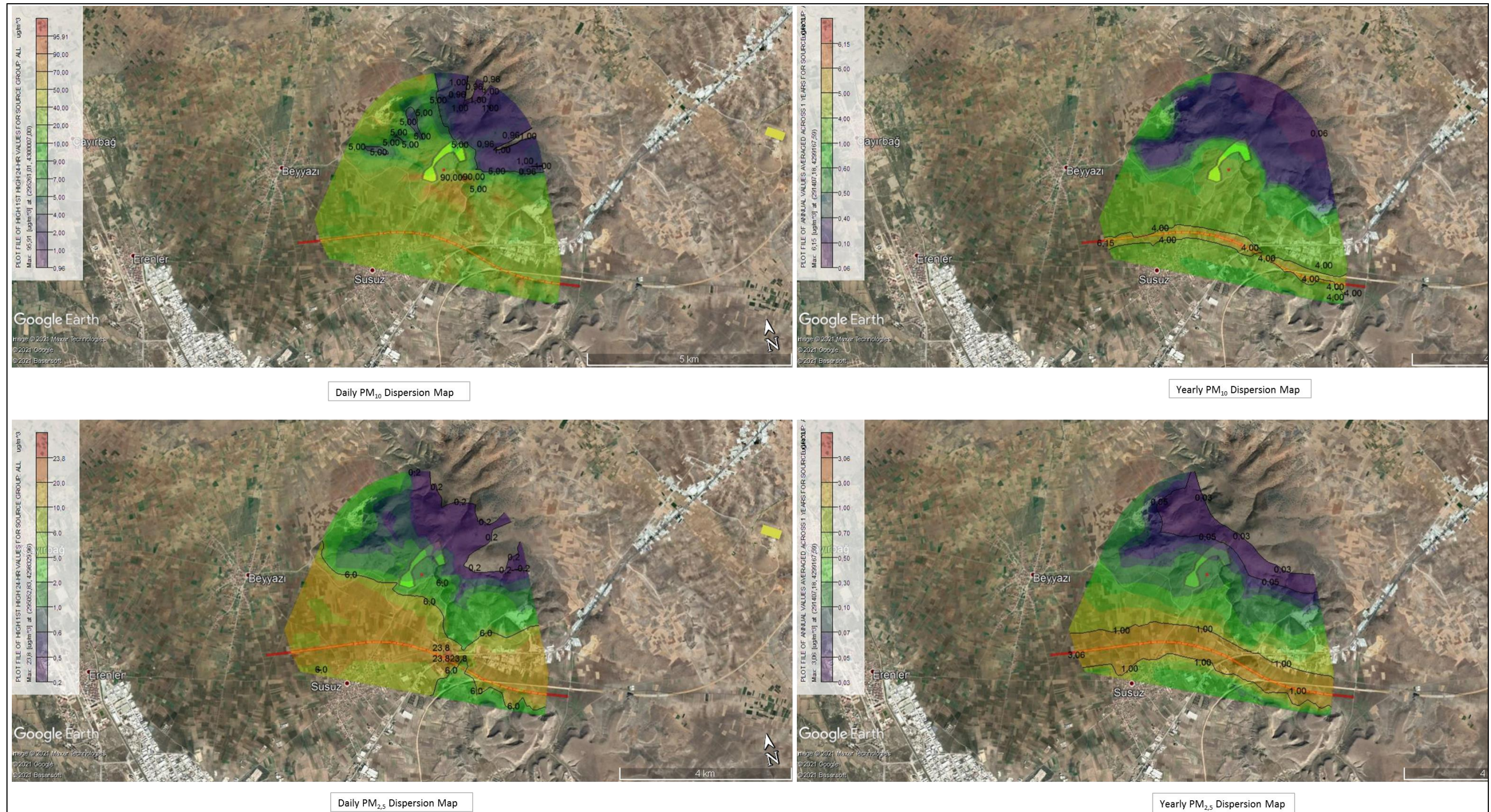


Figure 7-21. Emission Dispersion Maps of Beyyazi Quarry

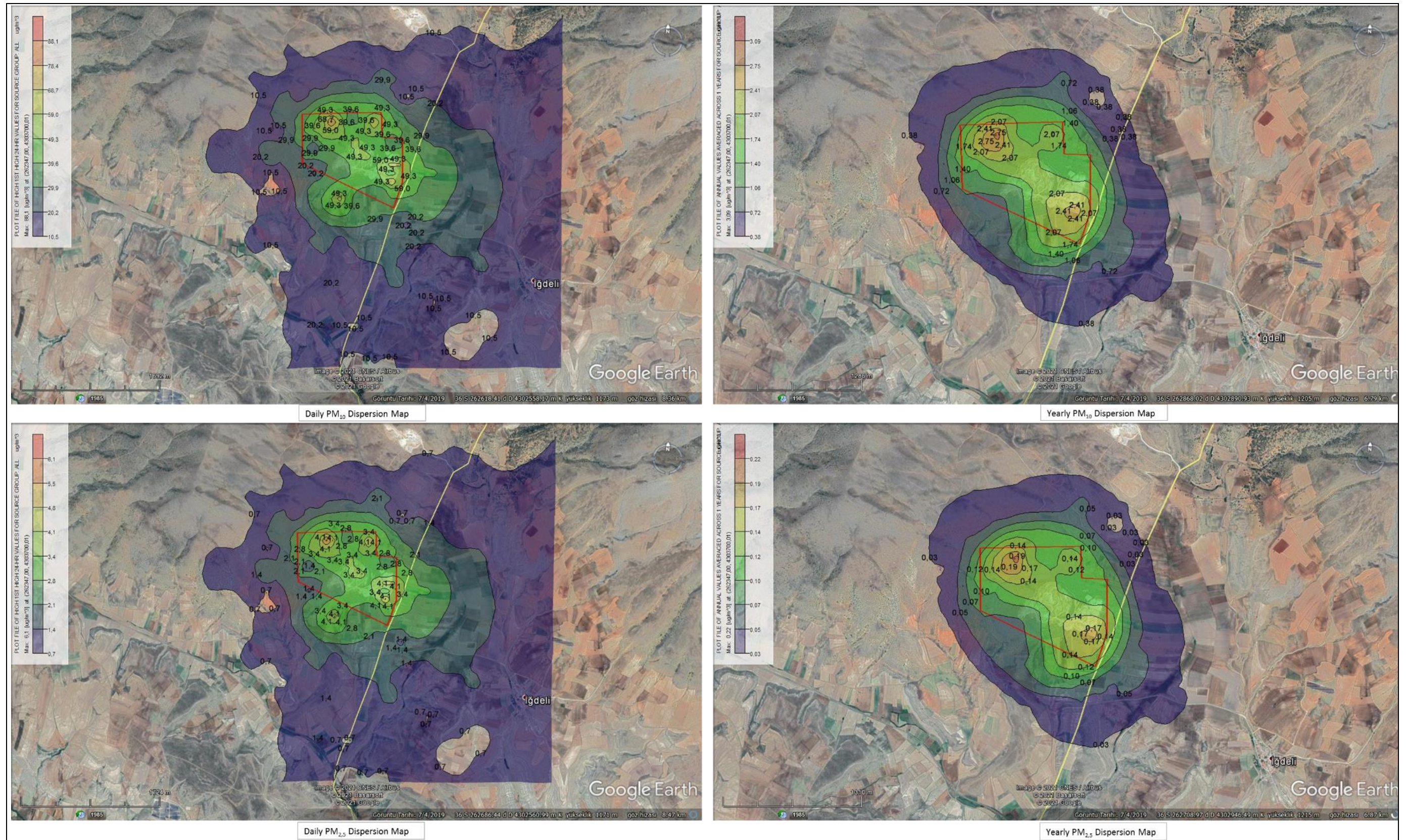


Figure 7-22. Emission Dispersion Maps of Ayvalı Quarry

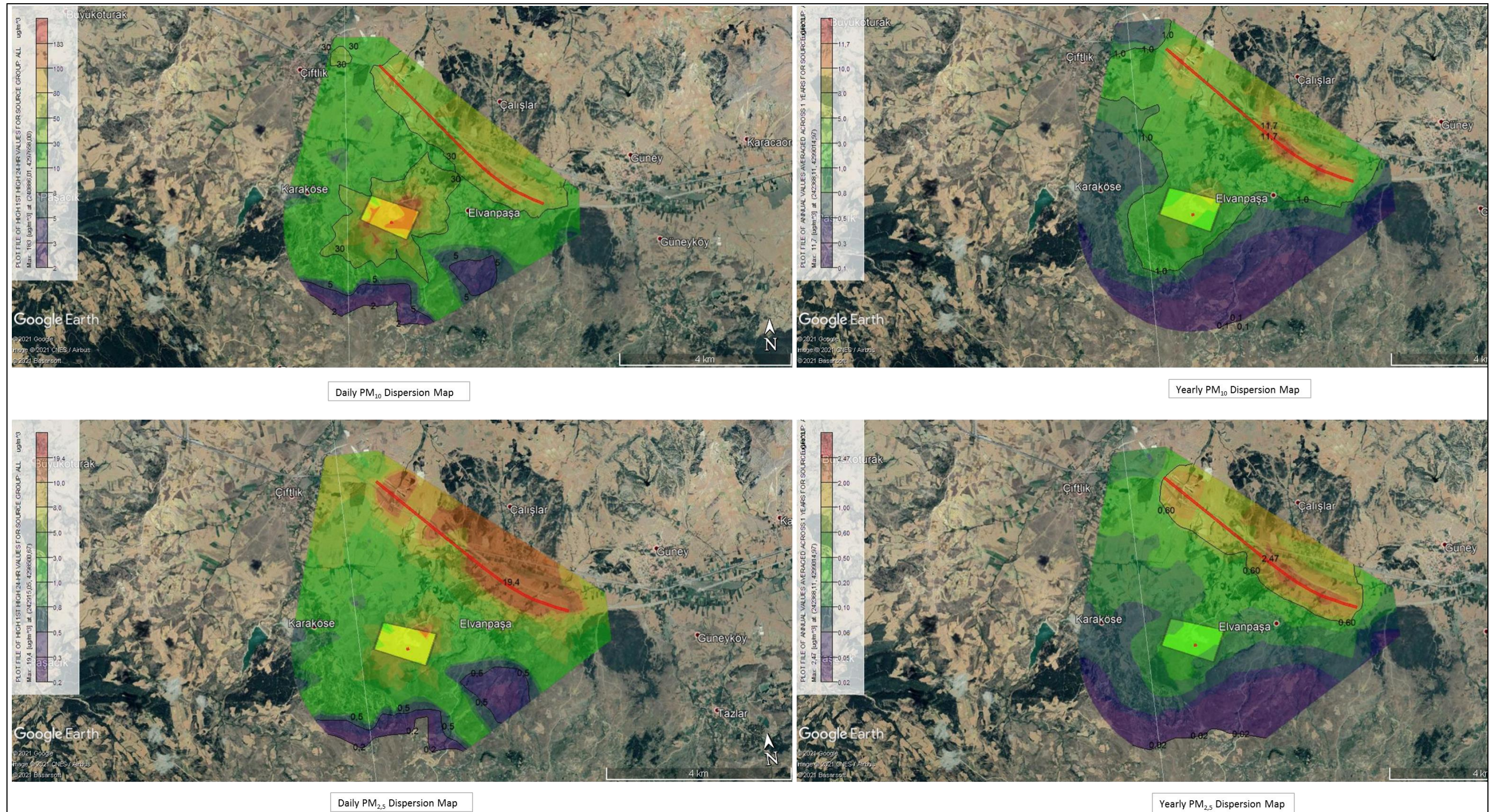


Figure 7-23. Emission Dispersion Maps of Elvanpaşa 2 Quarry

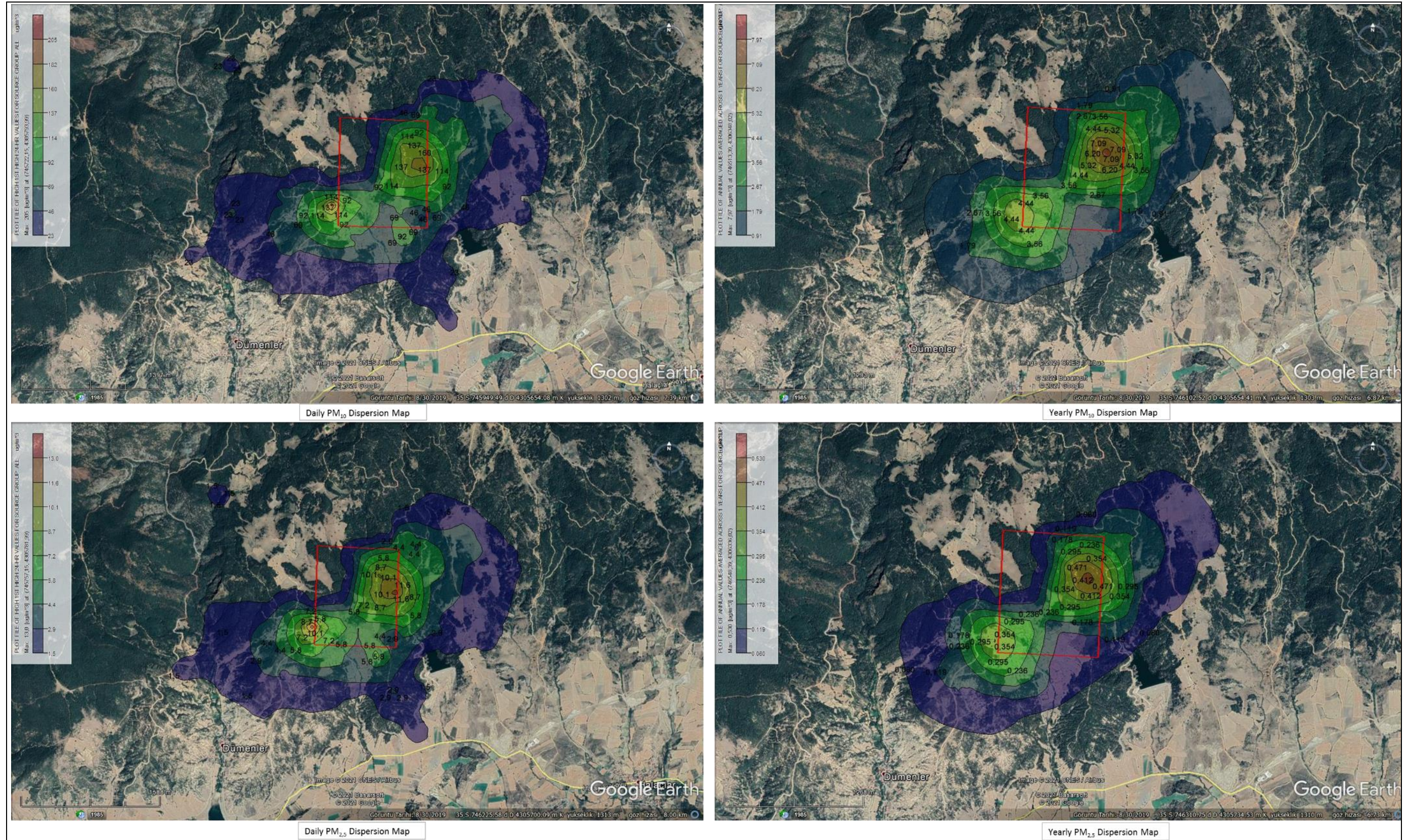


Figure 7-24. Emission Dispersion Maps of Dumenler Quarry

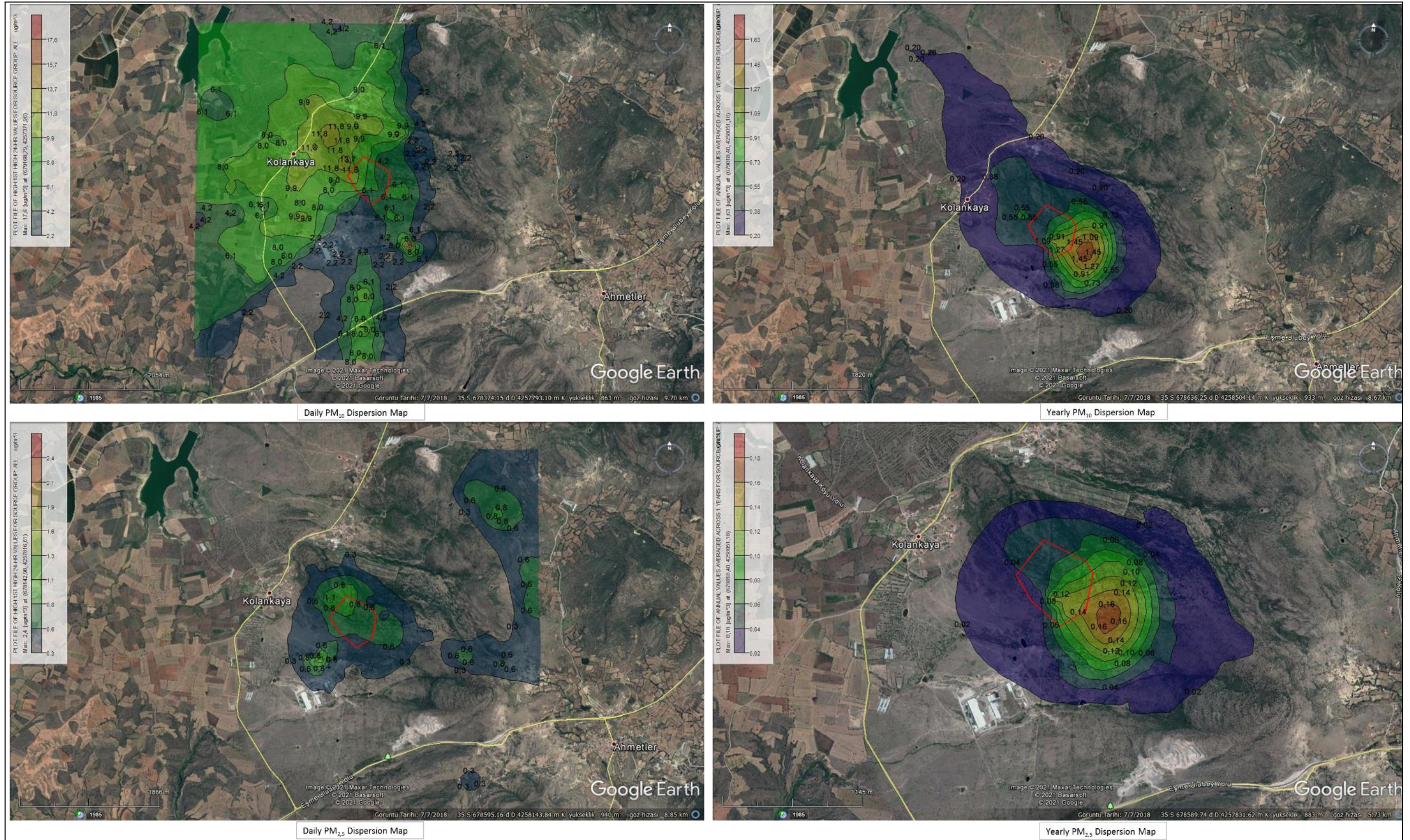


Figure 7-25. Emission Dispersion Maps of Ahmetlidag 2 Quarry

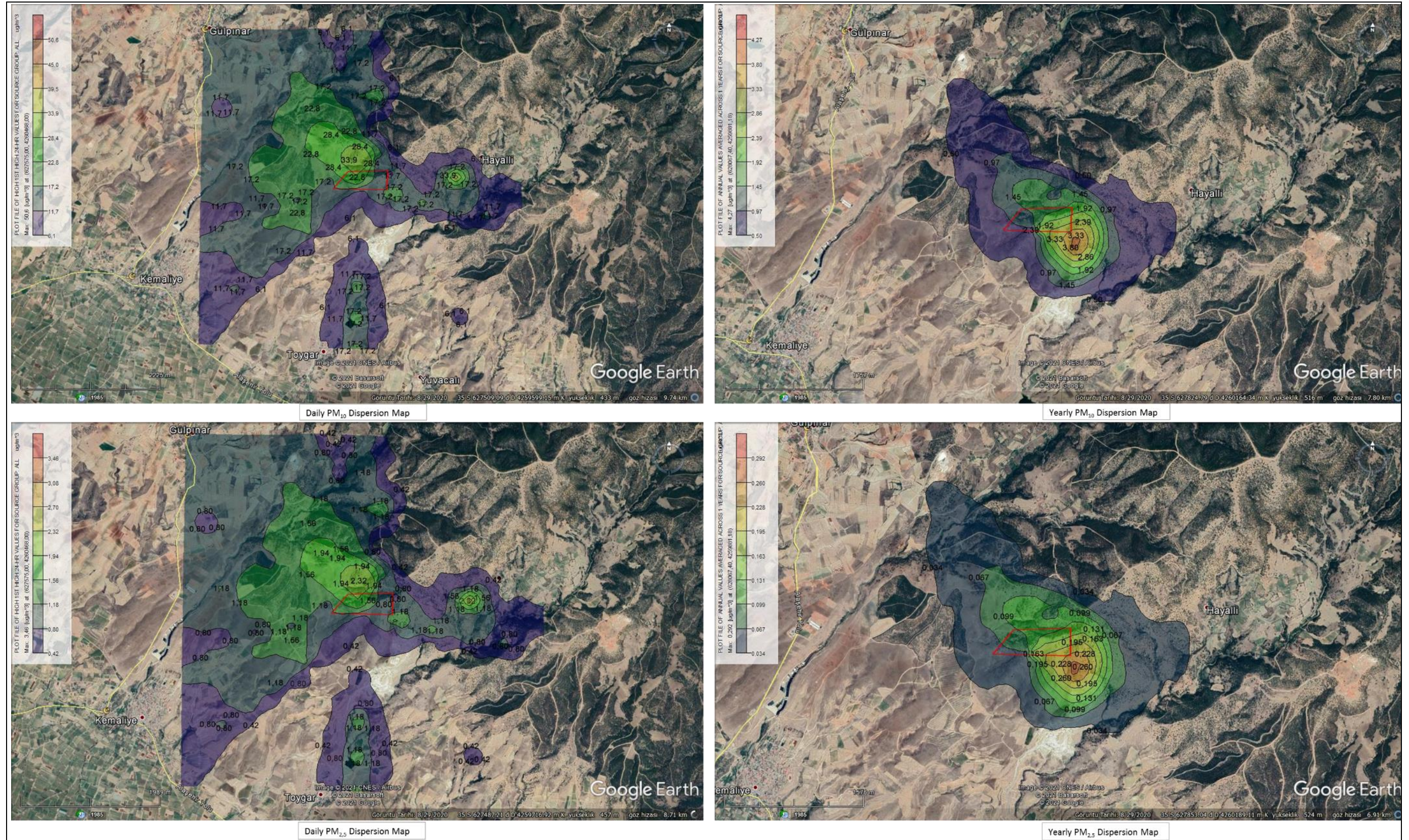


Figure 7-26. Emission Dispersion Maps of Hayalli Quarry

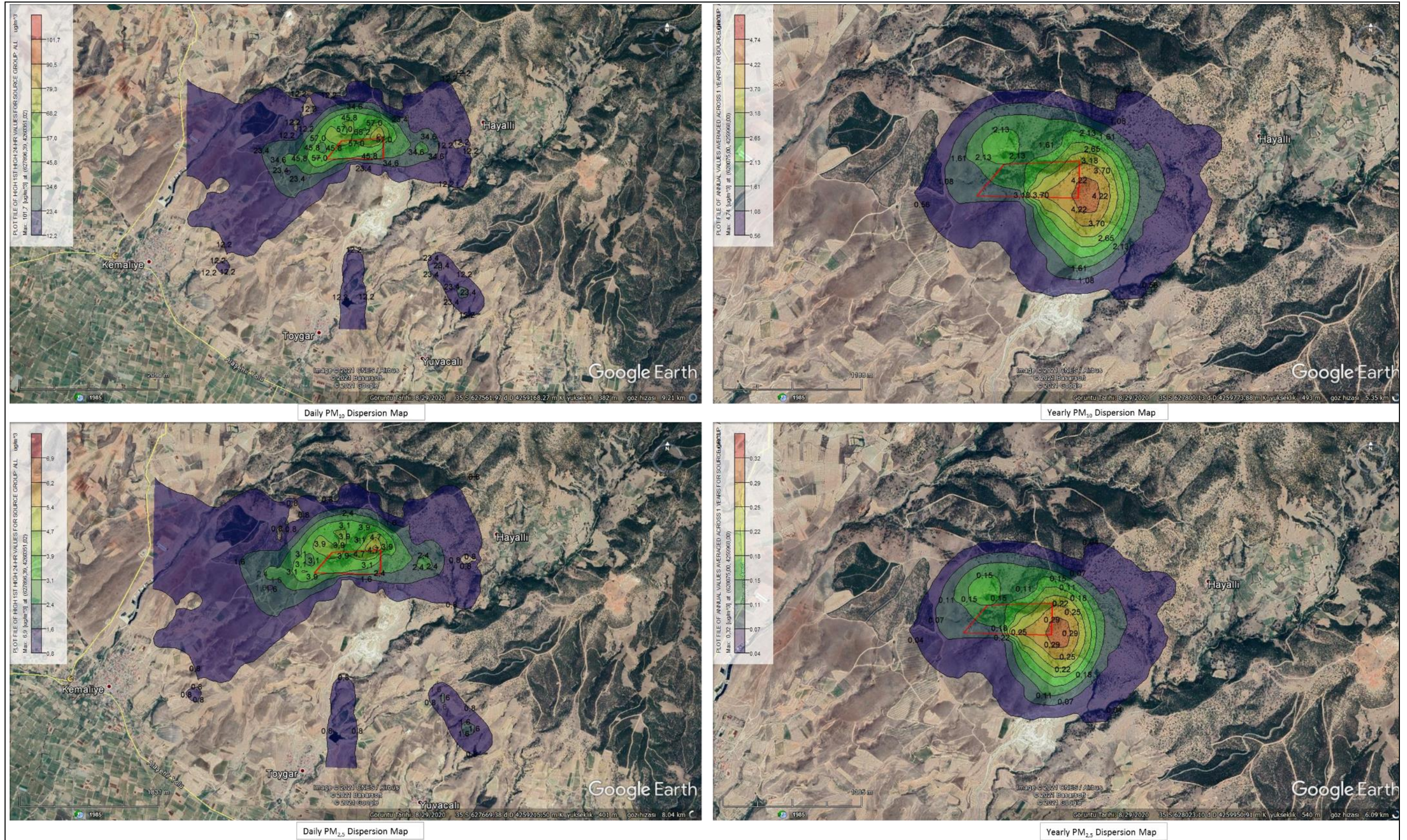


Figure 7-27. Emission Dispersion Maps of Dombayli Quarry

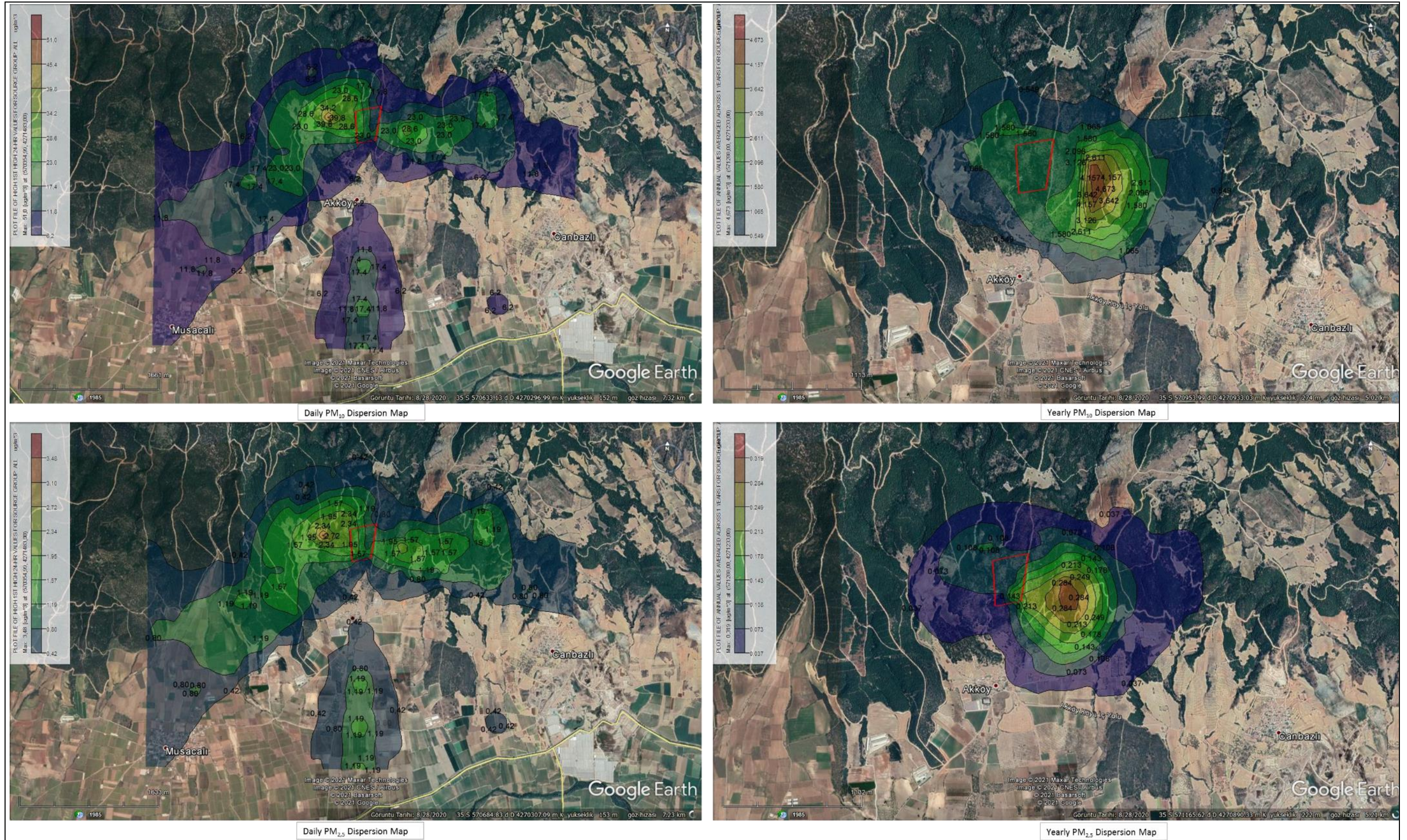
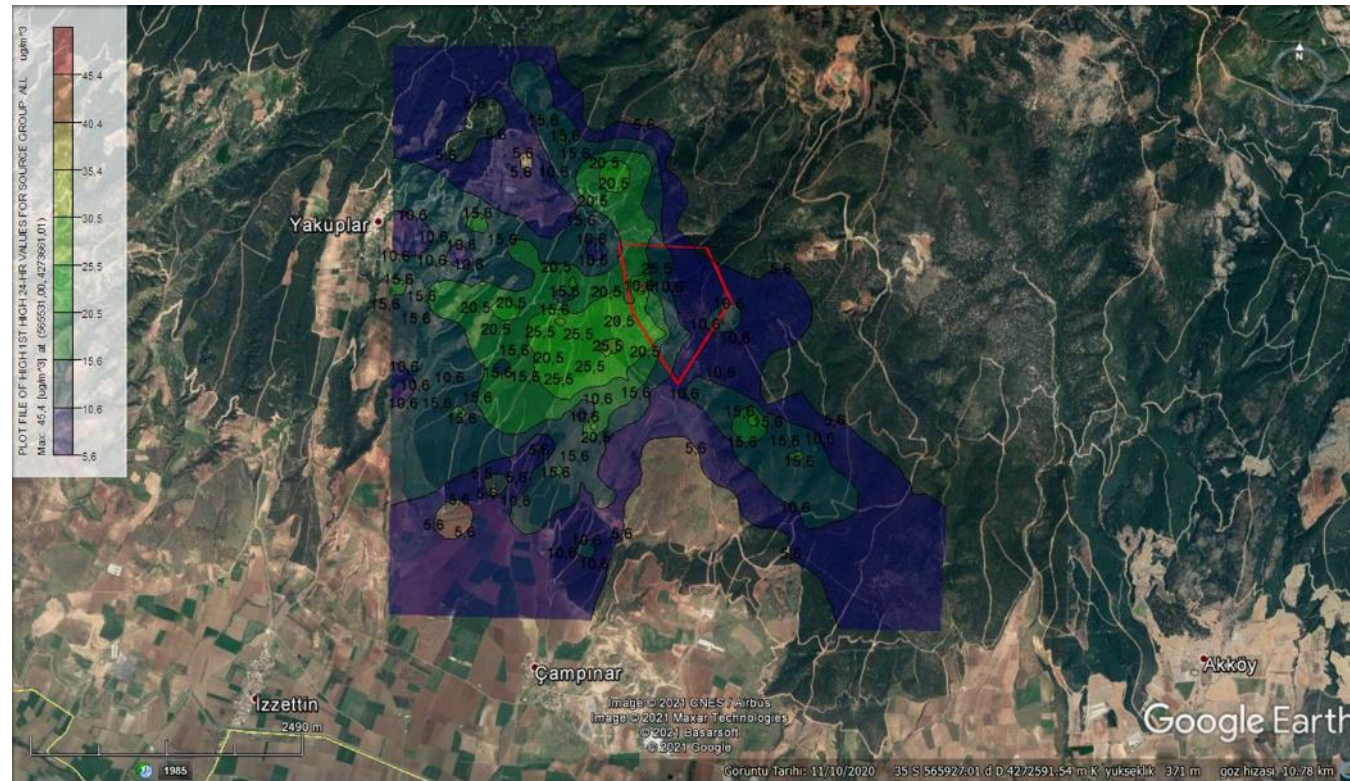
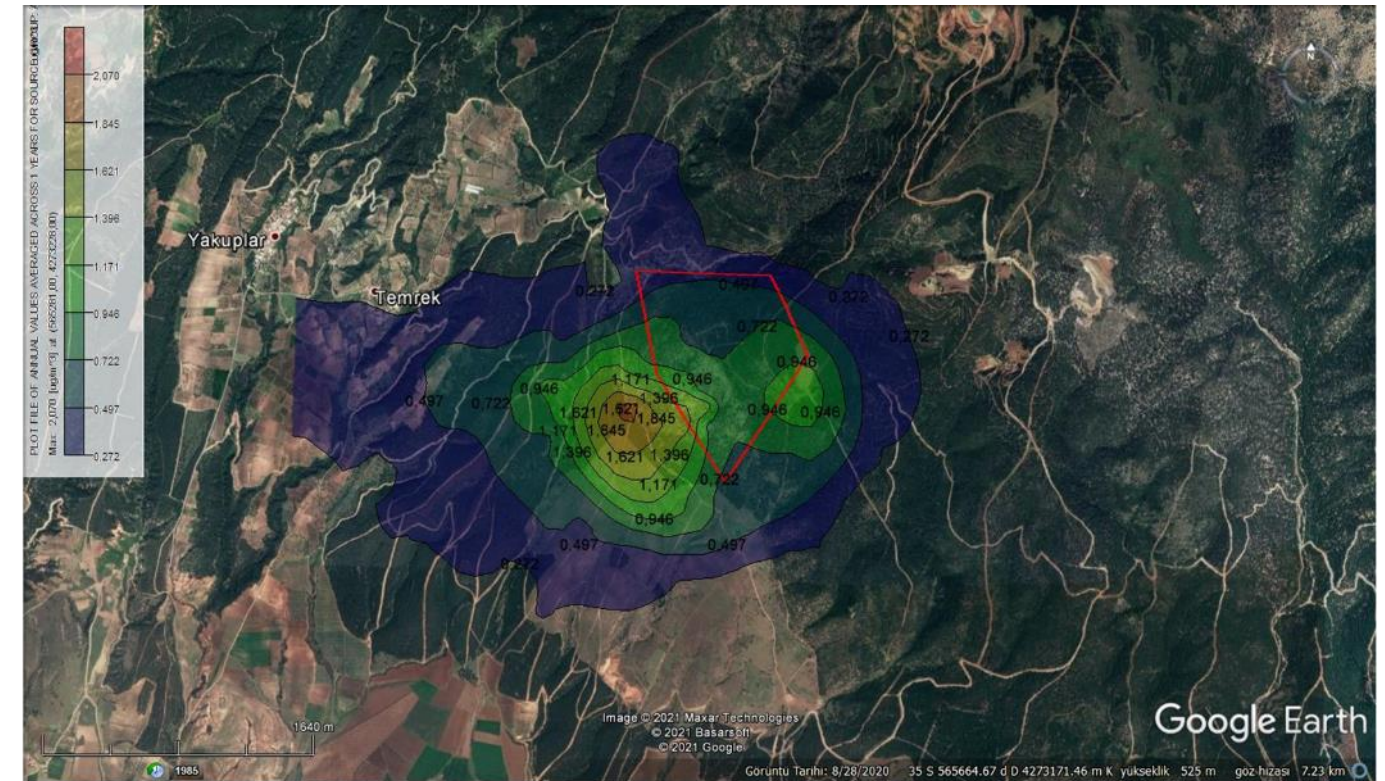


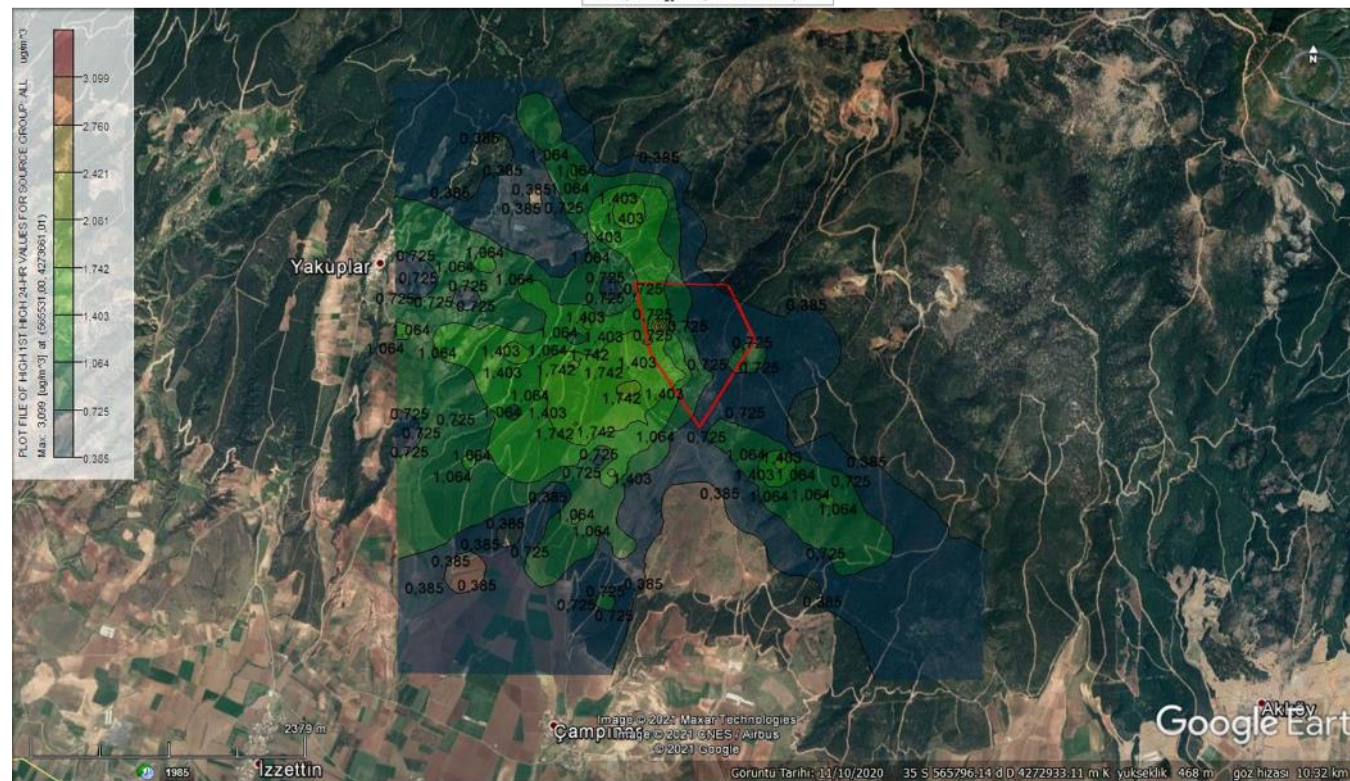
Figure 7-28. Emission Dispersion Maps of Akkoy Quarry



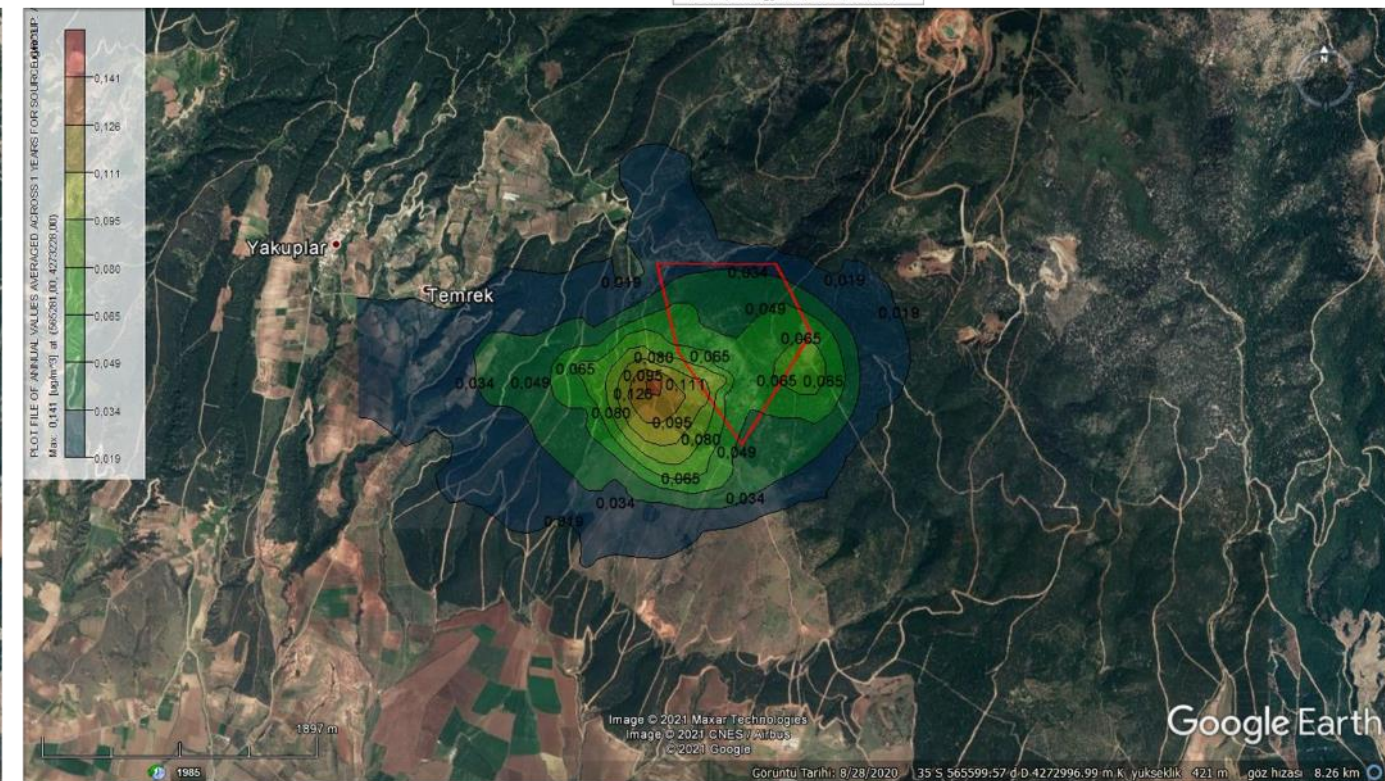
Daily PM₁₀ Dispersion Map



Yearly PM₁₀ Dispersion Map



Daily PM_{2.5} Dispersion Map



Yearly PM_{2.5} Dispersion Map

Figure 7-29. Emission Dispersion Maps of B-Campinar Quarry

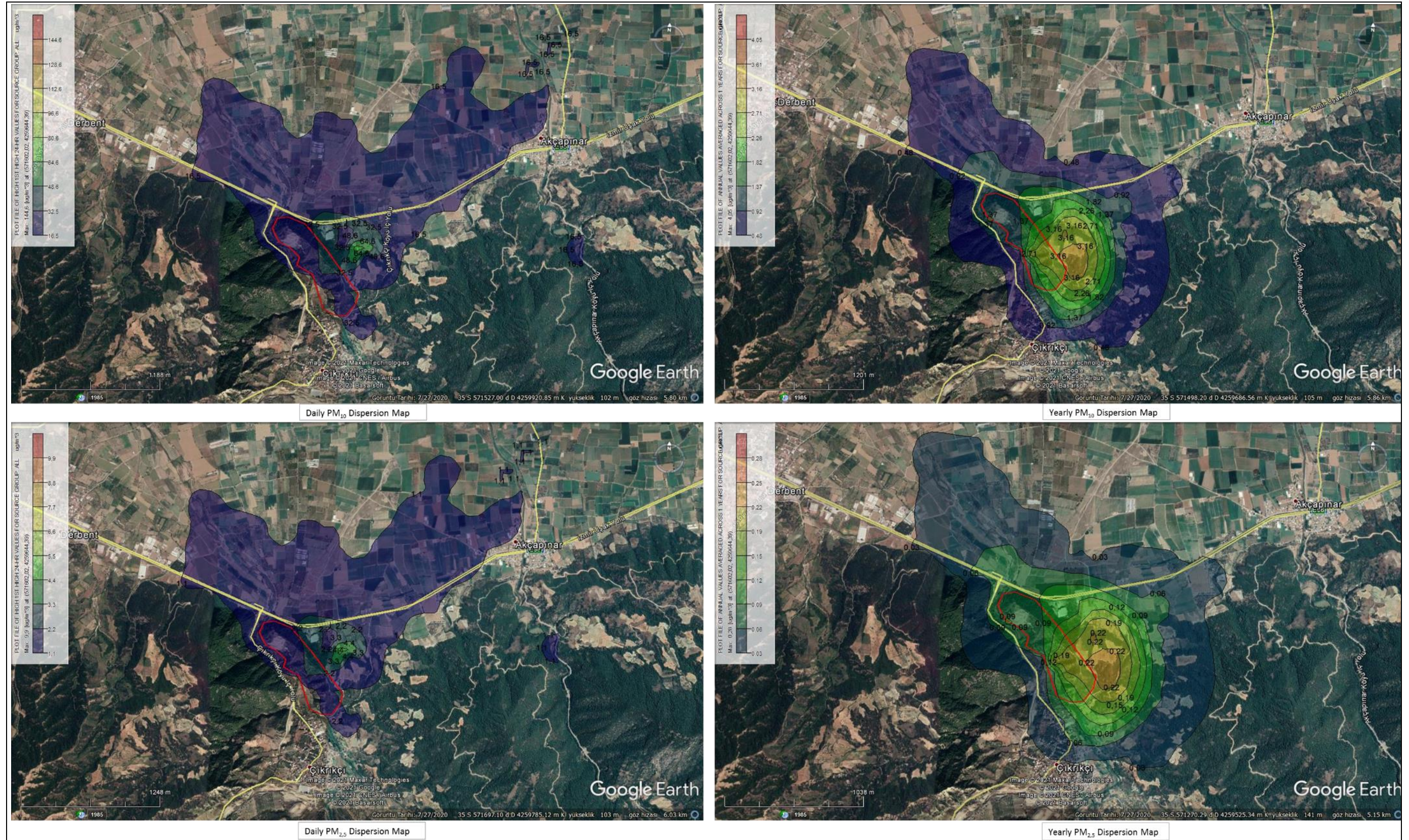


Figure 7-30. Emission Dispersion Maps of Cikrikci Quarry

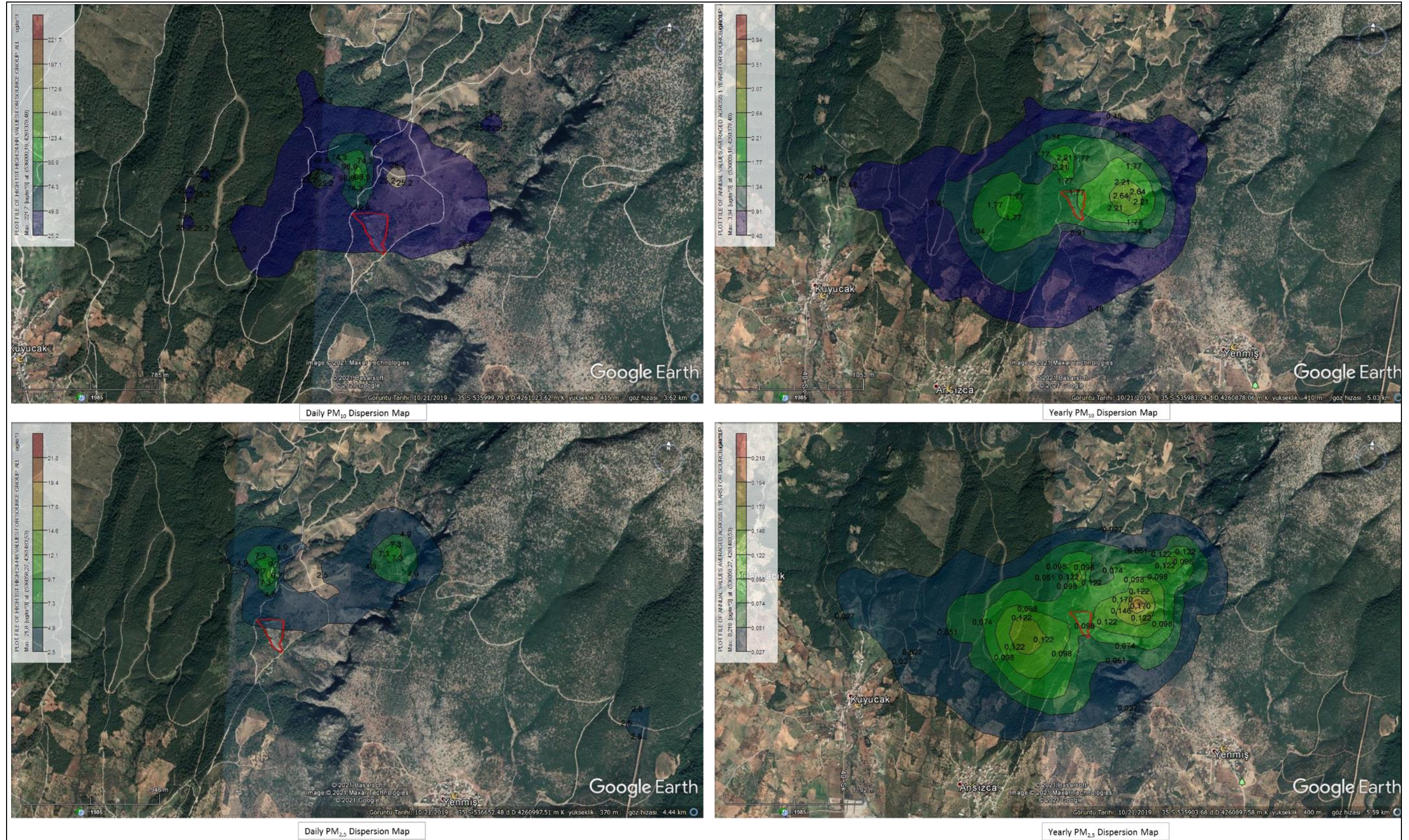


Figure 7-31. Emission Dispersion Maps of Anzizca Quarry

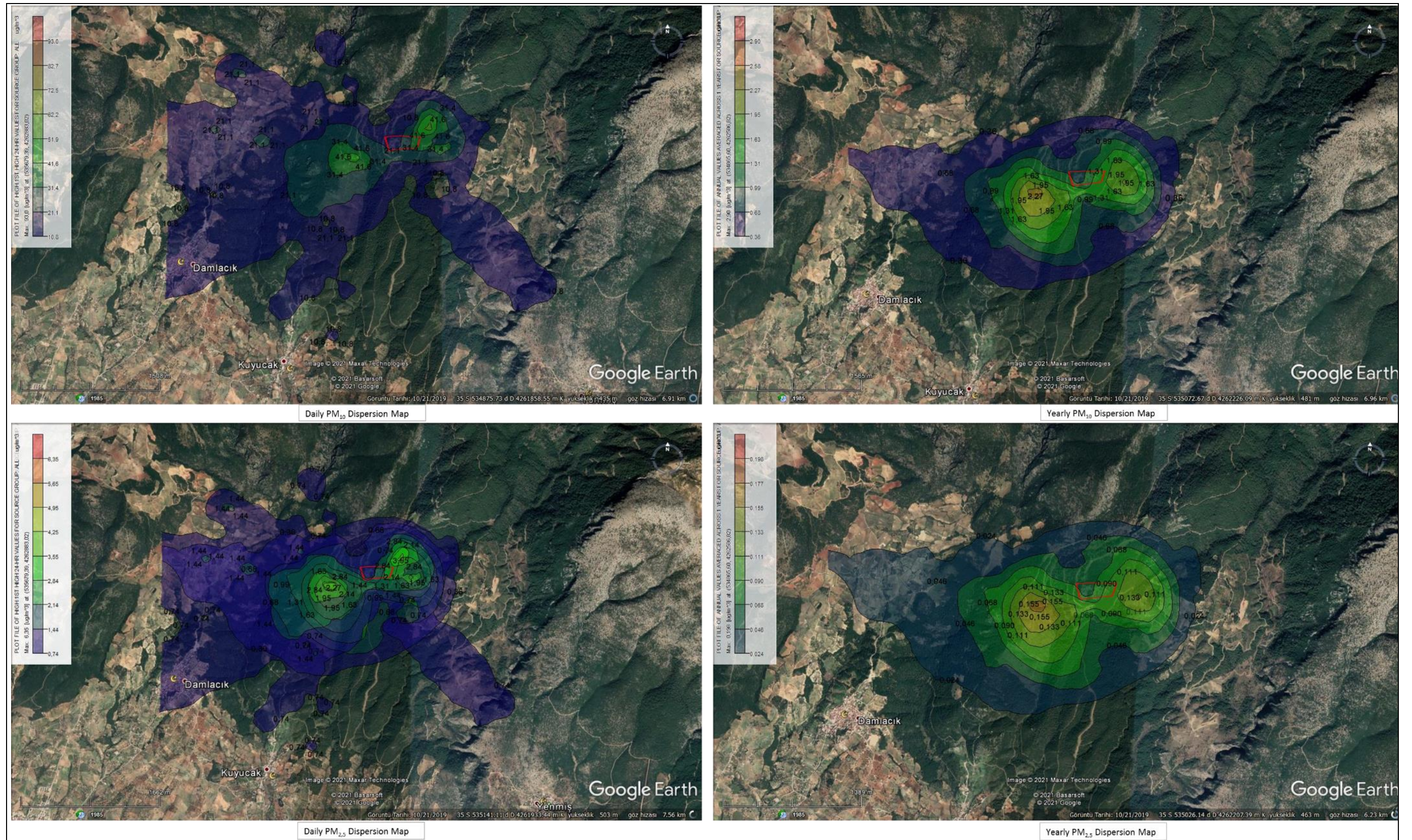


Figure 7-32. Emission Dispersion Maps of Anzic 2 Quarry

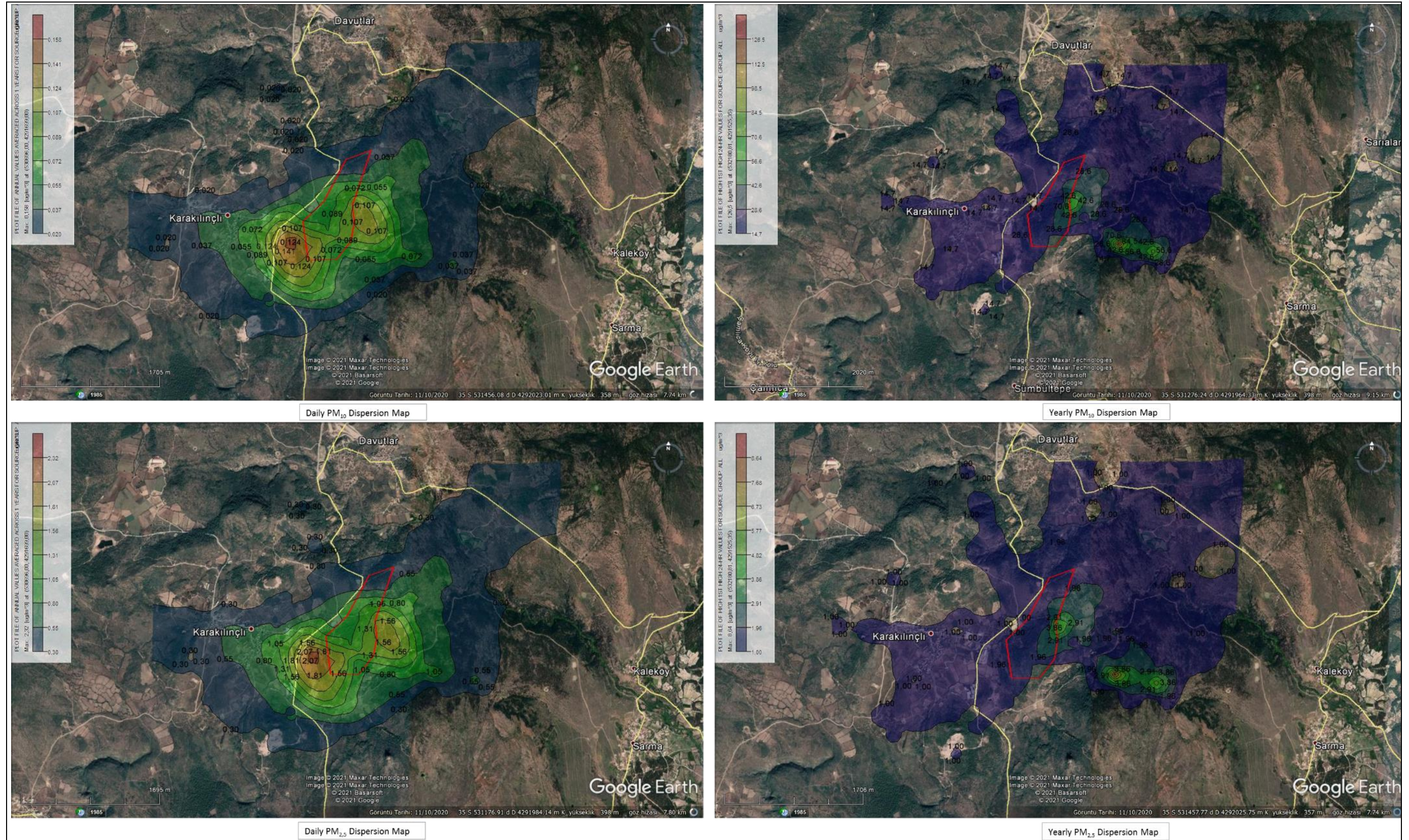


Figure 7-33. Emission Dispersion Maps of Yunusemre Quarry

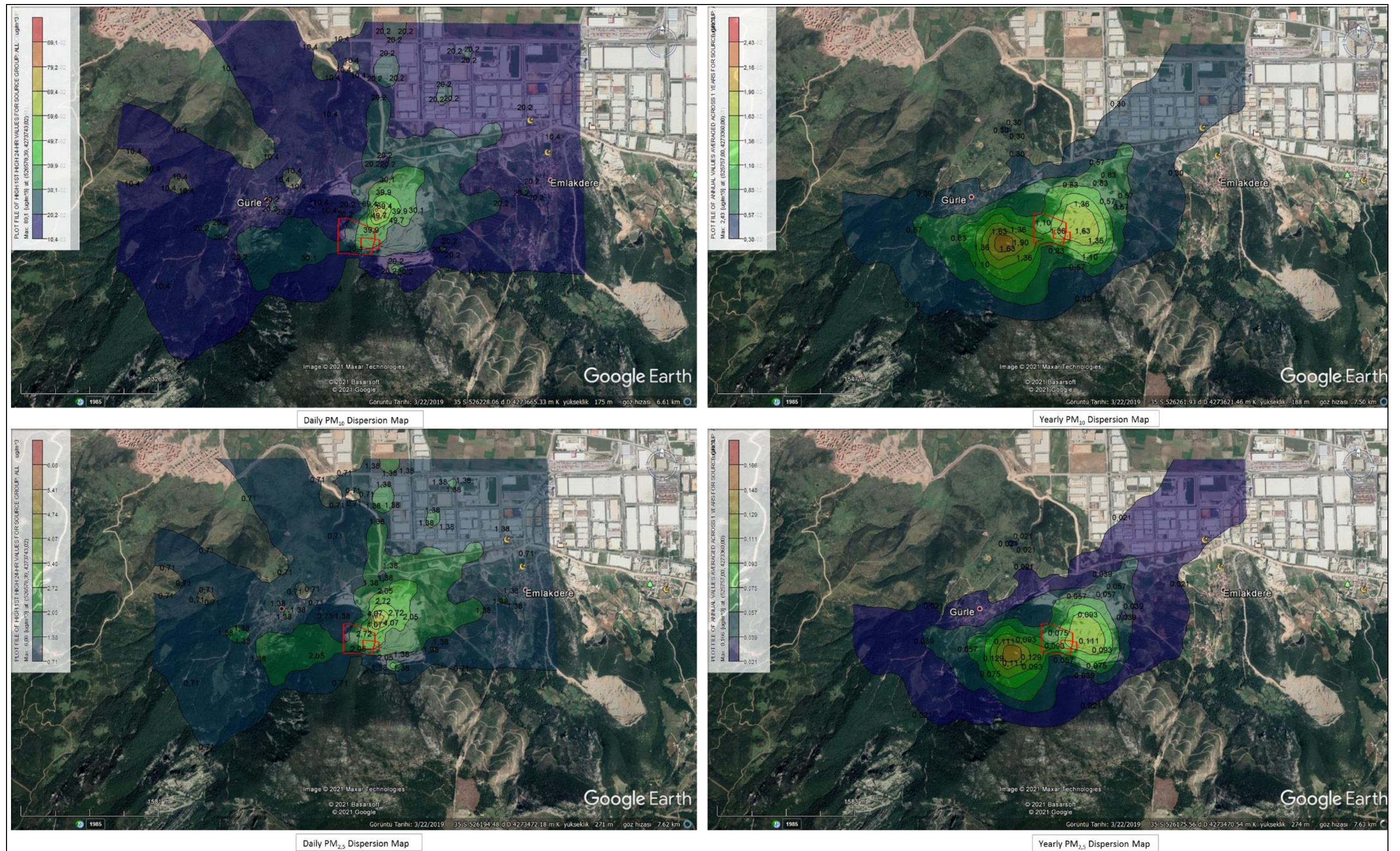


Figure 7-34. Emission Dispersion Maps of Gurle Quarry

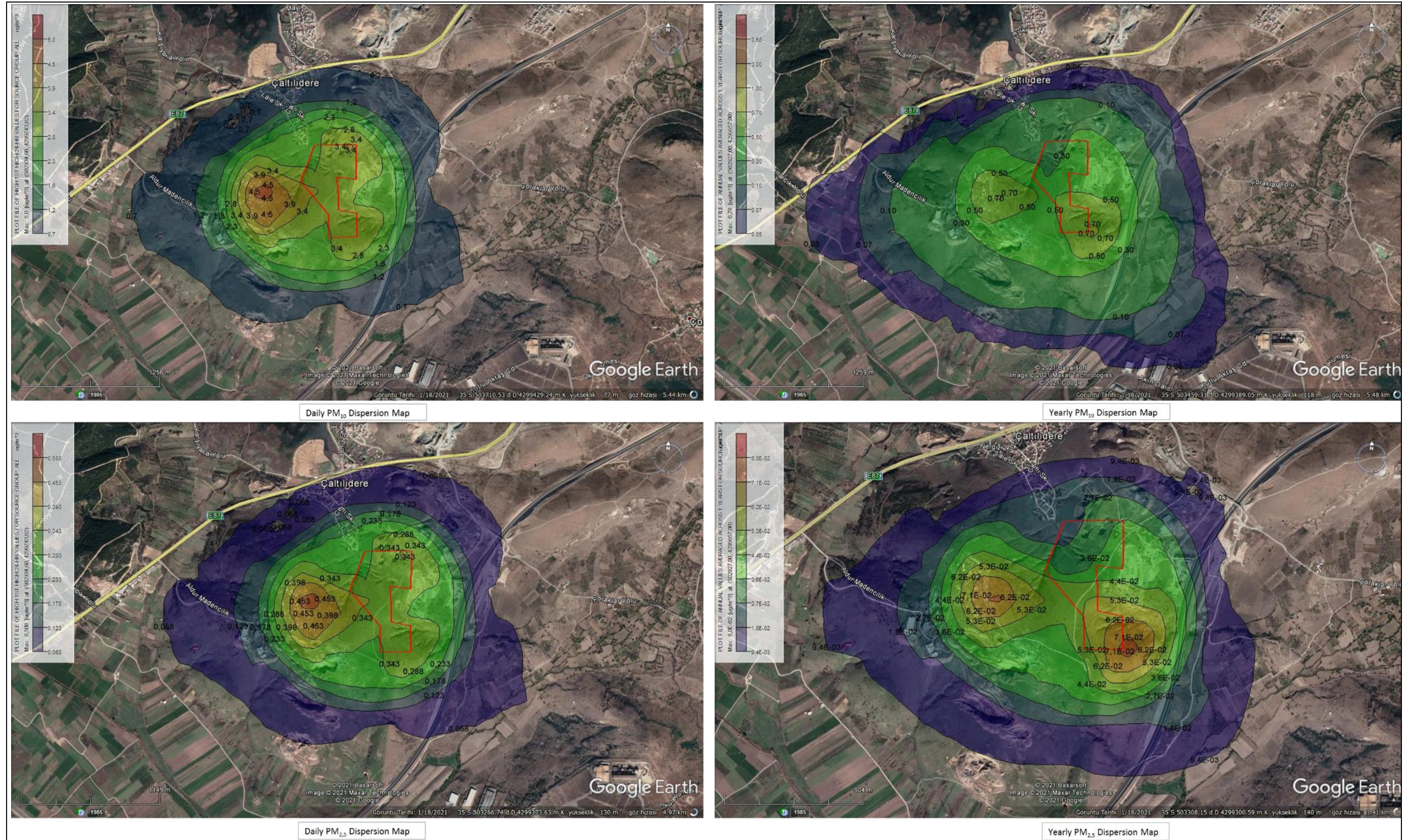


Figure 7-35. Emission Dispersion Maps of Caltidere Quarry

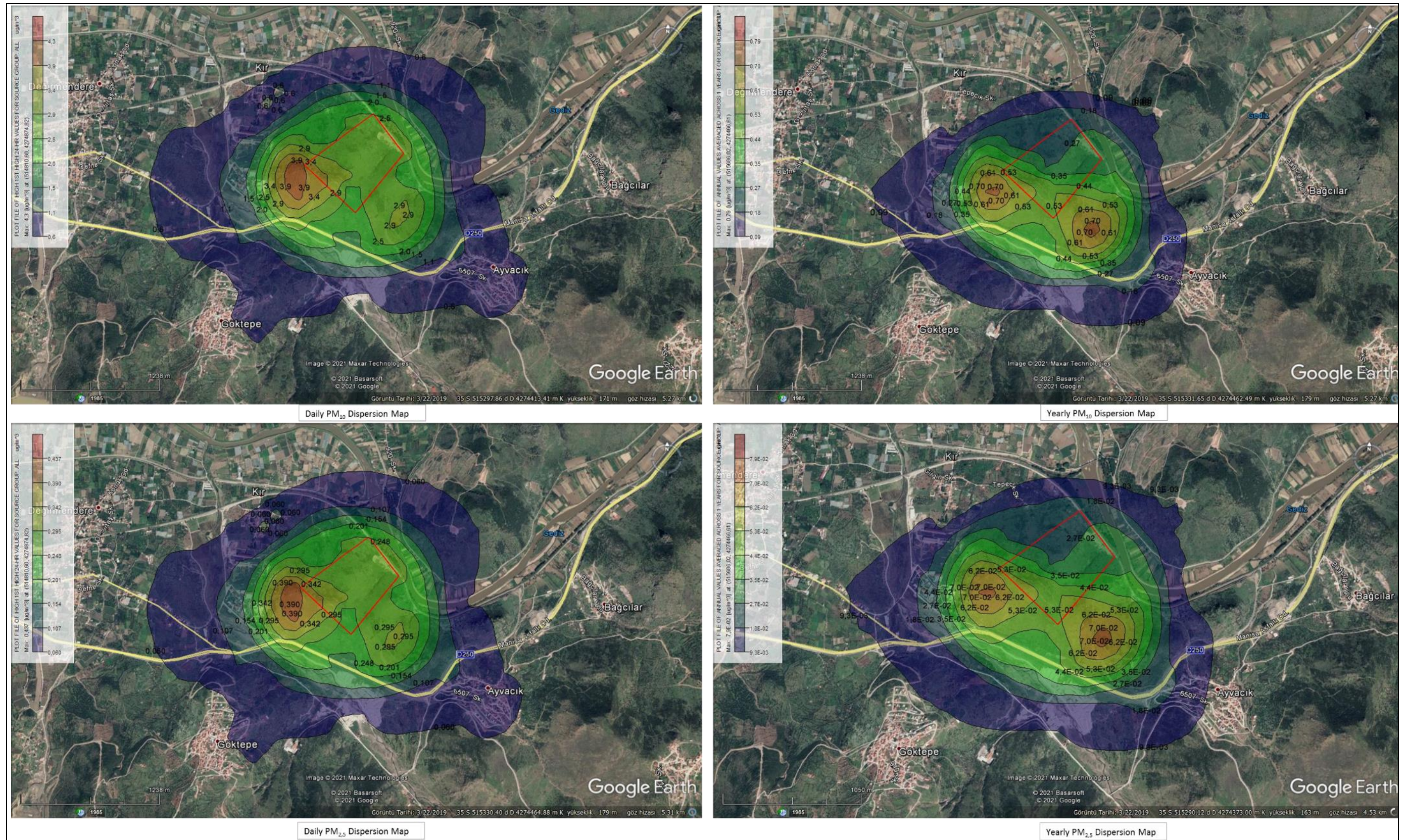


Figure 7-36. Emission Dispersion Maps of Degirmendere Quarry

7.3.2. Gaseous Emissions from Construction Vehicles

The gaseous (exhaust) emissions have been calculated for the work sites (separately for excavation and quarry work sites) for worst case and realistic case conditions. For the HSR route, because of the linear nature of the Project and the fact that the construction equipment and vehicles will be mobile along the route, each work site will be under the influence of gaseous emissions from a single team working at that site for a temporary period as the works progress along the route. On the other hand, the works at the quarries will be continuous.

Based on the maximum and minimum number of construction vehicles/equipment foreseen to be present at a single work site (route or quarry) simultaneously, the gaseous emissions from the Project have been calculated to be insignificant (for both the realistic and worst-case calculations), as summarised in Table 7-11.

Table 7-11. Gaseous Emissions from the Construction Vehicles and Equipment

Pollutant	Emission Factor (*)	Fuel consumption (g/h)	Emission Per Vehicle (kg/h)	Area			
				Infrastructure		Quarries	
				Number of Vehicle	Total Emission (kg/h)	Number of Vehicle	Total Emission (kg/h)
Realistic case							
NO_x	32,629 g/tonnes fuel	240	0.007831	13	0.101802	14	0.109633
CO	10,774 g/tonnes fuel	240	0.002586	13	0.033615	14	0.036201
PM	2,104 g/tonnes fuel	240	0.000505	13	0.006564	14	0.007069
SO₂	14 g/kg fuel	240	0.00336	13	0.04368	14	0.04704
VOC	3,377 g/tonnes fuel	240	0.00081	13	0.010536	14	0.011347
Worst case							
NO_x	32,629 g/tonnes fuel	240	0.007831	33	0.258422	46	0.360224
CO	10,774 g/tonnes fuel	240	0.002586	33	0.08533	46	0.118945
PM	2,104 g/tonnes fuel	240	0.000505	33	0.016664	46	0.023228
SO₂	14 g/kg fuel	240	0.00336	33	0.11088	46	0.15456
VOC	3,377 g/tonnes fuel	240	0.00081	33	0.026746	46	0.037282

(*) The EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019-Non-Road mobile sources and machinery.

7.3.3. Greenhouse Gas (GHG) Emissions

This Chapter presents an assessment of the potential impact on climate change of greenhouse gas (GHG) emissions associated with the construction and the operation phases of the Project. The Company is responsible only for the construction phase of the Project. The operation phase is not within the Company's scope of works, the operation will be under the responsibility of TCDD.

Project's contribution to the climate of the region has been assessed considering the amount of GHG emissions which has been calculated in line with the Greenhouse Gas Protocol (the "GHG Protocol"), as required by EP4. GHG Protocol, which was jointly convened in 1998 by World Business Council for Sustainable Development and World Resources Institute, provides GHG accounting and reporting standards, guidance, tools and training for businesses and governments to measure and manage their GHG emissions.

Under the GHG Protocol - Corporate Accounting and Reporting Standard (2004, the "Corporate Standard"), emission sources are categorised as direct and indirect and then further divided into "scopes" (Scope 1, Scope 2 and Scope 3) for GHG accounting and reporting purposes. The definitions of scopes are given in Table 7-12 in line with the Corporate Standard.

Table 7-12. Scope Definitions as per Corporate Standard

Scope	Definition
Scope 1: Direct GHG emissions	Scope 1 emissions are 'direct' greenhouse gas emissions from sources that are owned by or under the direct control of the company ³⁰ . All direct sources are classified as Scope 1. Stationary combustion, mobile combustion, process and fugitive emissions are counted as Scope 1 emission sources.
Scope 2: Electricity indirect GHG emissions	Scope 2 emissions are 'indirect' greenhouse gas emissions associated with the Project that are a consequence of the activities of the company but occur at sources owned or controlled by another company. Emissions associated with the generation of purchased electricity, heat or steam that is consumed by the reporting company are reported in Scope 2.
Scope 3: Other indirect GHG emissions	Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are wider greenhouse gas emissions that occur along the value chain.

Source: The Corporate Standard, 2004.

This GHG assessment conducted within the scope of the ESIA has been undertaken in accordance with the EP4, and therefore includes the quantification of Scope 1 and Scope 2 emissions and excludes consideration of the Scope 3 emissions.

The Corporate Standard provides the accounting and reporting of the GHGs addressed in the United Nations Framework Convention on Climate Change (UNFCCC)/Kyoto Protocol. These gases are:

- Carbon dioxide (CO₂),
- Methane (CH₄),
- Nitrous oxide (N₂O),
- Hydro fluorocarbons (HFC),
- Per fluorocarbons (PFC),
- Sulphur hexafluoride (SF₆) and
- Nitrogen trifluoride (NF₃)

Non-CO₂ GHGs are calculated as "CO₂-equivalence" (CO₂-e) based on their contribution to the enhancement of the greenhouse effect. The CO₂-equivalence of a GHG is calculated using an index called the Global Warming Potential (GWP). The GWP values for 100-year time horizon of relevance to this assessment are presented in Table 7-13 below.

Table 7-13. Global Warming Potentials

Gas	Chemical Formula	GWP Values
Carbon dioxide	CO ₂	1
Methane	CH ₄	28
Nitrous oxide	N ₂ O	265

Source: Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), 2014.

GHG calculations for the construction and operation phases of the Project are presented below.

³⁰ Throughout this section, Company refers to the Contractor (activities of subcontractors are also considered within the scope of works to be conducted by the Contractor as part of the GHG assessment).

7.3.3.1. Construction Phase

7.3.3.1.1. Scope 1: Direct GHG Emissions

Direct GHG emissions of the Project are the result of the following activities undertaken by the Company during construction:

- Combustion of fuels in stationary sources
- Combustion of fuels in company owned/controlled mobile combustion sources
- Use of asphalt
- Blasting

Stationary Combustion Emission

Stationary combustion emission sources are devices that combust solid, liquid or gaseous fuel, generally for the purposes of producing electricity, generating steam or heat. Equipment that cannot move under its own power but can be transported site-to-site, (such as an emergency generator) is also defined as a stationary (not mobile) combustion source. Direct GHG emission sources from stationary combustion processes during construction phase of the Project are as follows.

- Combustion of fuel in plants (including concrete batch, asphalt plants and crushing-screening facilities) and equipment
- Combustion of diesel fuel in generators to produce electricity for use on site

Stationary combustion emissions for the construction phase of the Project have been calculated based on total estimated fuel consumption in plants, equipment and generators.

Mobile Combustion Emission

Mobile combustion emission sources refer to a wide variety of company-owned or operated vehicles, engines and equipment that generate GHG emissions through the combustion of various fuels while moving from one place to another. They include vehicles used on roads for transportation as well as off-road vehicles, engines and equipment used for construction. By definition, other combustion sources are considered to be stationary.

Mobile combustion emissions have been calculated using the amount of fuel to be consumed in on-road and non-road vehicles during the construction phase of the Project. GHG emissions from both stationary and mobile emission sources are presented in Table 7-14 below.

Table 7-14. GHG Emissions from Stationary and Mobile Emission Sources

Emission Sources	Consumption (kL of fuel)	Calorific value of diesel oil (TJ/Gg)	Consumption (TJ)	GHGs	Emission factor (kg/TJ) (*)	Global Warming Potential (GWP)	GHG (tons)	GHG (tons CO ₂ -e)	total GHG (tons CO ₂ -e)
Stationary Combustion Emission									
Combustion of fuel in plants (including concrete batch, asphalt plants and crushing-screening facilities) and equipment	15,000.0	43.0	548.3	CO ₂	74,100	1	40,625.3	40,625.3	41,251.8
				CH ₄	3.9	28	2.1	59.9	
				N ₂ O	3.9	265	2.1	566.6	
Combustion of diesel fuel in generators to produce electricity for use on site									
Mobile Combustion Emission									
Combustion of fuel in on-road vehicles	30,000.0	43.0	1,096.5	CO ₂	74,100	1	81,250.7	81,250.7	81,517.1
				CH ₄	3.0	28	3.3	92.1	
				N ₂ O	0.6	265	0.7	174.3	
Combustion of fuel in non-road vehicles (mobile machinery)	55,000.0	43.0	2,010.3	CO ₂	74,100	1	148,959.5	148,959.5	149,448.0
				CH ₄	3.0	28	6.0	168.9	
				N ₂ O	0.6	265	1.2	319.6	

(*) 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Non-Combustion Emissions from the Use of Asphalt

According to IPCC Guidelines (2006) for National Greenhouse Gas Inventories – Industrial Processes and Product Use (“IPCC Guideline for IPPU”), the use of asphalt as a pavement material is a source of non-methane volatile organic compounds (NMVOC) and carbon monoxide (CO) emissions which eventually oxidise to CO₂ in the atmosphere. Non-combustion emission from the use of asphalt during construction phase has been calculated as 14 ton using EMEP/CORINAIR Emission Inventory Guidebook and considering the Project’s overall GHG emissions during the construction phase, the amount of GHG emission has been considered to be negligible.

Blasting

The combustion of fossil fuels within explosives to be used in the mining process will result in emissions of GHGs. The quantity of emissions and the type of gases emitted depend on the type of explosive used. In the Project ammonium nitrate fuel oil mixture (ANFO) and dynamite will be used for explosion in the quarries. ANFO is an explosive composed of approximately 94% ammonium nitrate and 6% fuel oil by weight. Dynamite is also an explosive based on the explosive potential of nitro-glycerine. GHG emissions generated due to use of ANFO and dynamite is calculated and shown in Table 7-15.

Table 7-15. GHG Emissions from the Use of ANFO and Dynamite

Type of Explosive	Total Amount (kg/year) for Limestone Quarries	Total Amount (kg/year) for Basalt Quarries	Total Amount (kg/year) for Andesite Quarry	Total Amount for All Quarries (kg/year)	Total Amount to be Used Throughout the Construction (tons)	Total GHG (ton CO ₂ -e)
ANFO	13,534,240	4,950,960	676,712	19,161,912	67,066.69	12,585.4
Dynamite	406,800	88,200	20,340	515,340	1,803.69	3,246.6
Total GHG Emission from Blasting (tons CO₂-e)						15,832

7.3.3.1.2. Scope 2: Electricity Indirect GHG Emissions

Average quantity of electricity that will be consumed at the site during construction period has been estimated as 57,771,437.12 MWh. Emissions factor used for the calculation is Turkish National Electricity Grid Emission Factor calculated by the Turkish Ministry of Energy and Natural Resources for the year 2018 (see Table 7-16).

Table 7-16. GHG Emissions from Electricity Consumed

Electricity use (kWh)	Emission factor(*) (tCO ₂ /MWh)	Ton (CO ₂)
57,771,437.12	0.6993	40,399.6

(*) Turkish National Electricity Grid Emission Factor calculated by the Ministry of Energy and Natural Resources for 2018 is 0.6993 tCO₂/MWh.

7.3.3.1.3. Land Clearance

According to IPCC Guidelines (2006) for National Greenhouse Gas Inventories - Agriculture, Forestry and Other Land Use ("IPCC Guideline for AFOLU"), land area is classified into six land-use categories: Forest Land (FL), Cropland (CL), Grassland (GL), Wetlands (WL), Settlements (SL) and Other Land (OL). Each land-use category is further subdivided into land remaining in that category and land converted from one category to another. GHG emissions and removals, which are determined separately for each specific land-use category, includes CO₂ (as carbon stock changes) from carbon pools which are described in Table 7-17 in line with IPCC Guideline for AFOLU.

Table 7-17. Definitions for Carbon Pools for each Land-Use Category

Carbon Pools		Description
Biomass	Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds and foliage
	Below-ground biomass	All biomass of live roots, often excluding fine roots of less than 2 mm diameter because these often cannot be distinguished empirically from soil organic matter or litter
Dead Organic Matter (DOM)	Dead wood	All non-living woody biomass (not contained in the litter) either standing, lying on the ground, or in the soil. Dead wood includes surface wood, dead roots, and stumps larger than diameter used by country to distinguish from litter (e.g. 10 cm).
	Litter	All non-living biomass with a size greater than the limit for soil organic matter (suggested 2 mm) and less than the minimum diameter chosen for dead wood (e.g. 10 cm), lying dead, in various states of decomposition above or within the mineral or organic soil
Soils	Soil Organic Matter	Organic carbon in mineral and organic soils to a specified depth chosen by the country. Live and dead fine roots and DOM within the soil which are less than the minimum diameter limit (suggested 2 mm) for roots and DOM, are included with soil organic matter where they cannot be distinguished from it empirically.
Harvested Wood Products (HWP)		HWP includes all wood material (including bark) that leaves harvest sites. Slash and other material left at harvest sites should be regarded as dead organic matter in the associated land-use category.

Source: IPCC Guideline for AFOLU, 2006.

The use of carbon stock change (CSC) to determine CO₂ emissions and removals is based on the fact that changes in ecosystem carbon stocks are predominately through CO₂ exchange between the land surface and the atmosphere. Hence, CO₂ emissions from land surface to the atmosphere occur as carbon stock losses from carbon pools while removals from the atmosphere occur as carbon stock gains.

Carbon cycle includes flows of carbon into and out of the system as well as between the carbon pools within the system. Plants absorb carbon (as CO₂) from the atmosphere as they grow. They store this carbon in "carbon pools" until it is cycled back into the atmosphere. This storage of carbon in living plants (above-ground and below-ground biomass), dead organic matter/litter and soils is called "biological carbon sequestration". Because biological sequestration takes CO₂ from the atmosphere and stores it in these carbon pools, it is also called a carbon sink. The emissions associated with land clearance arise from the removal of a carbon sink. Carbon flow out of the system can be due to both continuous processes and discrete events (i.e., disturbances like harvest, fire and land-use change). Continuous processes can affect carbon stocks in all areas in each year, while discrete events cause emissions and redistribute ecosystem carbon in specific areas (i.e. where the disturbance occurs) and in the year of the event. The flowchart of the carbon cycle shows all six carbon pools and carbon stock flows into and out of the system, as well as all possible transfers between the carbon pools is shown in Figure 7-37.

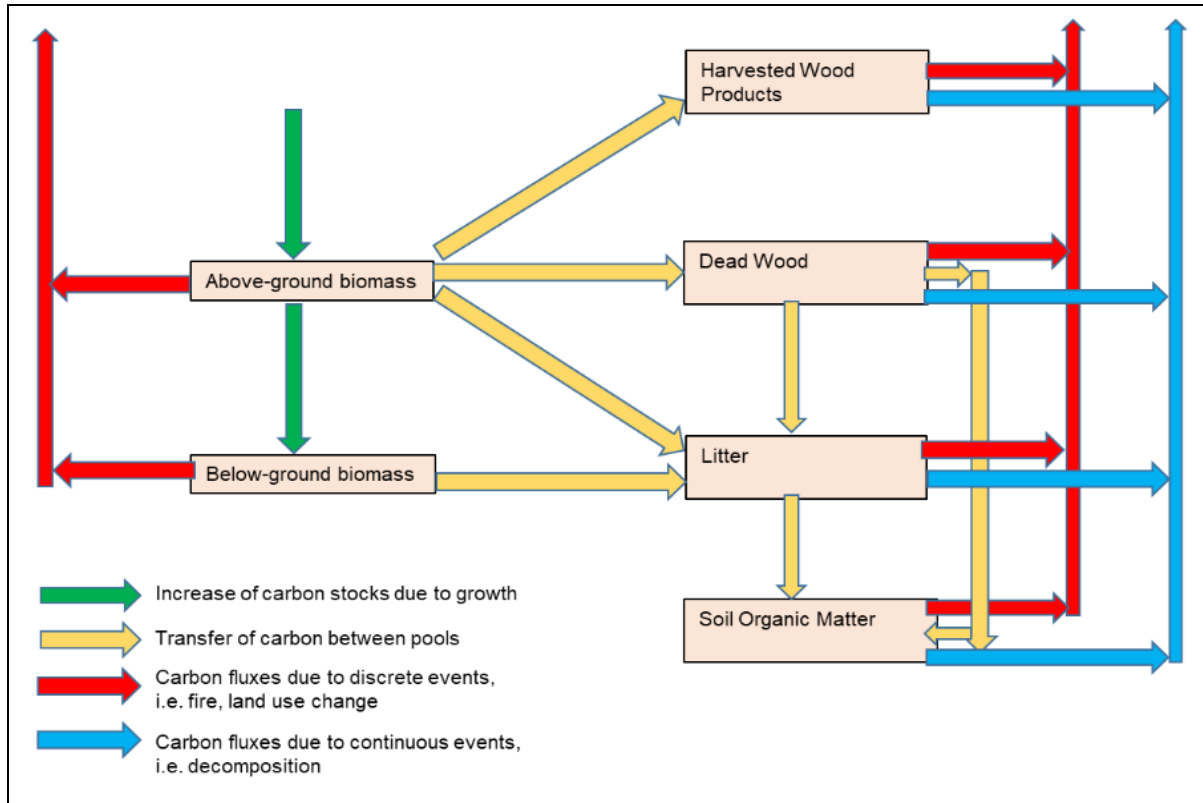


Figure 7-37. Carbon Cycle Showing the Flows of Carbon into and out of the System as well as between the Carbon Pools within the System (Source: IPCC Guideline for AFOLU, 2006)

Within the scope of this Project, the emissions associated with the land clearance is from the land use change, which is a discrete event and cause emissions in the year that land-use change occurs (i.e. vegetation clearance and topsoil removal prior to start of construction at respective work sites).

Impact of the Project on the existing land use characteristics along the Project route and at the off-site facility sites such as quarries, material borrow sites, construction camp sites (should they be located outside the expropriation border) are discussed in Chapter 5 on "Land Use and Geology". GHG emissions from land use change have been quantified as part of this assessment and reported separately from the scopes, as required in the Corporate Standard. The GHG emissions is associated with the land use change from other land use categories (Forest Land (FL), Cropland (CL), Grassland (GL), Wetlands (WL), Settlements (SL) and Other Land (OL)) to Settlements (SL). Settlements (SL) are defined in IPCC Guideline for AFOLU as "all developed land -- i.e., residential, transportation, commercial, and production (commercial, manufacturing) infrastructure of any size, unless it is already included under other land use categories".

GHG emissions from land use change is shown in Table 7-18. It has been calculated using land use categories to be converted to Settlements (SL) within the scope of this Project. These affected areas in the quarries/borrow sites and camp sites and along the railway route based on land use types were presented in Chapter 5 ("Land Use and Geology"). To quantify the GHG emissions from land clearing, the equations and the default parameters available in IPCC Guideline for AFOLU were used. Where necessary, national estimates and national statistics given in Turkish GHG Inventory for the year 2020 (submitted under the UNFCCC) were also used for GHG quantification.

It should be noted that the Project construction works were started by the previous contractors in 2016 and suspended in 2018. Infrastructure (excavation and fill) works have already been partly completed in Section 1 and Section 2, except the Hattipler Passage (KM 267+156-278+632) and Ankara-Konya HSR Connection Line (7+800; 0+000-6+683.120). Progress of excavation and fill per railway sections is provided in Section 1.6.1. In this assessment, land use changes that have previously occurred have also been taken into consideration to reflect the total impact.

Table 7-18. GHG Emissions from Land Use Change

Initial Land-Use Category	New Land-Use Category	CSC in Biomass	CSC in Dead Wood/Litter	CSC in Soils	Total CSC	GHG Emission
FL	SL	15,582.2	16,820.2	6,250.8	38,653.2	141,728.4
CL	SL	10,204.1	57,749.9	21,461.5	89,415.5	327,856.8
GL	SL	1,358.9	42,272.4	15,709.6	59,340.9	217,583.3
WL	SL	20.2	765.7	284.5	1,070.40	3,924.8
Total						691,093.3

7.3.3.1.4. GHG Assessment for Construction Phase

GHG emissions for the construction phase of the Project were estimated in above sections of this Chapter. The Project is anticipated to generate total GHG emissions of 1,019,554 tons CO₂-e (291,301.2 tons CO₂-e per year) during construction phase. The breakdown of the total GHG emissions between the activities is shown in Figure 7-38 and Table 7-19. The majority of these emissions are associated with the land clearing, emissions from mobile and stationary combustion sources, electricity use and blasting. It was observed from the calculations that land clearing is the major GHG emission source during construction.

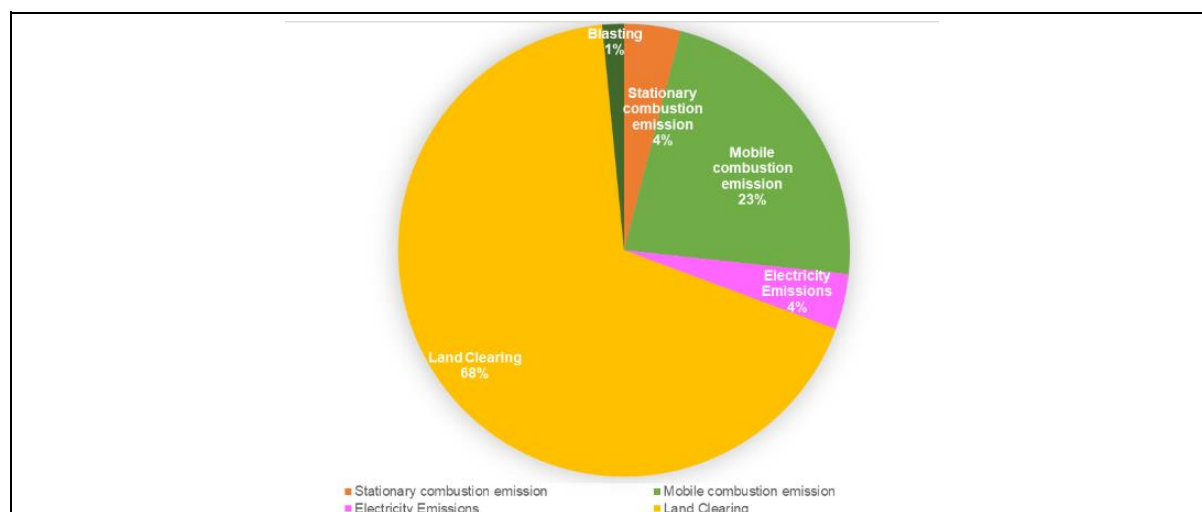


Figure 7-38. Breakdown of the Project Construction Phase GHG Emissions

Table 7-19. Total GHG Emissions of the Project (Construction Phase)

Scope	Direct GHG Emission source categories	Activities to be undertaken by the Company during construction phase	GHG Emissions (tons CO ₂ -e)
Scope 1			288,062
	Stationary combustion emission	Combustion of fuel in plant and equipment (including concrete batch, asphalt plants and crushing-screening facilities) Combustion of diesel fuel in generators to produce electricity for use on site	41,252
	Mobile combustion emission (from owned or leased mobile sources)	Combustion of fuel in on-road vehicles	81,517
		Combustion of fuel in non-road vehicles (mobile machinery)	149,448
	Process emission (non-combustion emissions from the use of asphalt)	Asphalt use	14 (considered negligible)
	Blasting	ANFO and Dynamite use	15,832
Scope 2			40,399
	Electricity Indirect GHG Emissions	Electricity use	40,399
Not included in Scopes			691,093
	Land Clearance	Vegetation Loss/Land-use category change	691,093
Total GHG emissions During Construction Phase (42 months)			1,019,554 tons CO₂-e
Annualised GHG emissions (12 months)			291,301 tons CO₂-e/year

7.3.3.2. Operation Phase

GHG sources for the operation phase of the Project are (i) natural gas/coal consumption for heating purposes in the gars/stations (Scope 1), and (ii) electricity consumption by the HSR operation and in the gars/stations (Scope 2). Natural gas/coal consumption for heating purposes in the gars/stations and electricity consumption in the gars/stations are considered negligible compared to the electricity consumption by the HSR operation.

Two different approaches were used in assessing the GHG emissions due to operation of the HSR:

- Estimation based on number of daily trips.
- Estimation based on total estimated number of passengers per year (first year and ultimate year).

Based on the above approaches, four (4) scenarios were assessed as detailed below.

Additionally, a no-HSR scenario was also assessed taking into account the total GHG emissions that would result based on alternative means of transportation (conventional train, air transportation and road transportation by bus and private car). The results present the avoided GHG emissions due to the HSR operation.

Climate Change Risk Assessment for the operational phase of the Project as per EP4 is also conducted.

7.3.3.2.1. Scope 2: Electricity Indirect GHG Emissions

The electricity indirect GHG emissions for the operation phase of the Project were calculated using the estimated amount of yearly electricity consumption by electric railway operations. The annual electricity consumption of Siemens model trains was calculated based on the electricity consumption of Siemens trains per km which is 11.02 kWh/km as provided by the Contractor based on data from TCDD.

Two different approaches were used in assessing the GHG emissions due to operation of the HSR:

- Estimation based on number of daily trips.
- Estimation based on total estimated number of passengers per year.

Based on the above approaches, four (4) scenarios were assessed as below:

Scenario 1 – calculations were made based on daily trip number, which is taken as 10 (5+5), same with the Ankara-Istanbul HSR, which is currently in operation (<https://www.tcddtasimacilik.gov.tr/yht/ankara-istanbul-ankara-yuksekk-hizli-tren/>).

Scenario 2 – calculations were made based on the daily trip number, which is reported 60 as in the national EIA Report of the Project. It is not clear to which year this daily trip corresponds to, but it is assumed as for the last year of operations.

Scenario 3 – calculations were made based on the official annual passenger number forecast during the operation of the HSR as given in Chapter 1 of this ESIA Report. For the first year of operations, the annual passenger number is estimated as 6 million.

The number of daily trips is calculated as 28 using the number of passengers in one HSR trip along Ankara-Istanbul HSR route, which was calculated as 580 from the Turkish Court of Accounts Audit Report (Ministry of Transport and Infrastructure Turkish Court of Accounts – 2018 Audit Report) (see Table 7-21 for the calculation details).

Scenario 4 – calculations were made based on the official annual passenger number forecast during the operation of the HSR as given in Chapter 1 of this ESIA Report. For year 2052, the annual passenger number is estimated as 14.1 million.

The number of daily trips is calculated as 67 using the number of passengers in one HSR trip along Ankara-Istanbul HSR route, which was calculated as 580 from the Turkish Court of Accounts Audit Report (Ministry of Transport and Infrastructure Turkish Court of Accounts – 2018 Audit Report) (see Table 7-21 for the calculation details).

The GHG emissions calculated based on the above scenarios for the operation phase of the Project is given in Table 7-20 below.

Table 7-20 GHG Emissions from Electricity Consumed during Operation Phase

Scenario	Electricity consumption (kWh/km)	Number of train services per day in both directions (daily trips)	Daily electricity consumption along Ankara - Izmir route (MWh)	Annual electricity consumption along Ankara - Izmir route (MWh)	Ton CO2e/year ^(*)
Scenario 1	11.02	10	56	20,433	14,289
Scenario 2	11.02	60	335.9	122,600	85,734
Scenario 3	11.02	28	158.7	57,912	40,498
Scenario 4	11.02	67	373.9	136,473	95,436

(*) Calculations were made based on the Turkish National Electricity Grid Emission Factor calculated by the Ministry of Energy and Natural Resources for 2018, which is 0.6993 tCO2/MWh.

As given above, based on the official annual passenger number forecast during the operation of the HSR, in the first year of operations the GHG emissions are calculated as **40,498 tons CO2-e/year** (Scenario 3) and for the year 2052 as **95,436 tons CO2-e/year** (Scenario 4).

According to EP4, the Clients/Project owners are required to report publicly on an annual basis on GHG emission levels (combined Scope 1 and Scope 2 emissions) and GHG efficiency ratio³¹, as appropriate, during the operational phase for Projects emitting over 100,000 tons of CO2-e annually. Furthermore, the Clients will be encouraged to report publicly on Projects emitting over 25,000 tons.

No-HSR Scenario

A no-HSR scenario was also assessed considering the total GHG emissions that would result based on alternative means of transportation (conventional railway, air transportation and road transportation by bus and private car). The results present the avoided GHG emissions due to the HSR operation.

As abovementioned, based on the official annual passenger number forecast during the operation of the HSR as given in Chapter 1 of this ESIA Report, the annual passenger number for the first year of operations is estimated as 6 million.

This section presents the amount of GHG emissions that could occur if these 6 million passengers prefer alternative transportation means (conventional train, air transportation and road transportation by bus and private car) along Ankara-Izmir route. Load transportation was not included in the calculations, as the transportation type will be clarified after the ongoing discussions.

³¹ As appropriate, organisations should consider providing related, generally accepted industry-specific GHG efficiency ratios. For industries with high energy consumption, metrics related to emissions intensity are important to provide. For example, emissions per unit of economic output (e.g., unit of production, number of employees, or value-added) are widely used (TCFD Implementation Annex, June 2017, p. 17).

The following were estimated:

- I. the amount of GHG emissions from the transportation of 6 million passengers by Ankara-Izmir HSR
- II. the amount of GHG emissions from the transportation of 6 million passengers by alternative transportation means along Ankara-Izmir route (No-HSR Scenario)

Based on the above estimations, the avoided emissions are calculated as the difference between the emissions from the use of Ankara-Izmir HSR and the emissions in “No-HSR scenario”.

The amount of GHG emissions from the transportation of 6 million passengers in the first year of operation by Ankara-Izmir HSR is given in Table 7-21 below.

Table 7-21 GHG Emissions from the use of AIHSR along Ankara-Izmir Route (First Year of Operations)

Transportation type	Total Number of Passengers	Electricity consumption of a HSR (kWh/km)	Total distance along Ankara-Izmir HSR route (km)	Number of trips in one year ^(a)	Annual electricity consumption along Ankara - Izmir route (MWh)	Emission factor for 2018 ^(b) (tCO ₂ /MWh)	Ton CO ₂ e/year
HSR	6,000,000	11.02	508	10,345	57,912	0.6993	40,497.86

(a) Number of trips in one year along Ankara–Izmir HSR route was calculated using the number of passengers in one HSR trip along Ankara-Istanbul HSR route, which was calculated as 580 from the Turkish Court of Accounts Audit Report (Ministry of Transport and Infrastructure Turkish Court of Accounts - 2018 Audit Report)

(b) Turkish National Electricity Grid Emission Factor calculated by the Ministry of Energy and Natural Resources for 2018 is 0.6993 tCO₂/MWh

In “No-HSR Scenario” the amount of GHG emissions from the transportation of 6 million passengers by alternative transportation means (except AIHSR) have been calculated. The distribution of passenger transportation modes in Turkey is given in Table 7-22 below.

Table 7-22. Distribution of Passenger Transportation Modes in Turkey in 2018

Passenger Transportation Modes ^(a)	Percentages (%) of Use of Passenger Transportation Modes in Turkey in 2018 ^(b) (based on passenger-km)	Distribution of 6 million passengers based on the percentages
Road	89	5,340,000 (Number of passengers using private car and bus were calculated as 4,163,200 and 1,174,800, respectively, based on the percentages calculated from Highway Transportation Statistics 2019 ^(c))
Railway	1.4	84,000
Airway	9.6	576,000

(a) Maritime transportation percentage is excluded as there is no seaway transportation along Ankara-Izmir route

(b) Environmental Indicators, MoEU, 2020 (<https://cevreselgostergeler.csb.gov.tr/ulastirma-turlerine-gore-tasinan-yolcu-ve-yuk-miktari-i-85789>)

(c) Circulation of Vehicles and Passengers on Motorways, State Roads and Provincial Roads in 2019, Highway Transportation Statistics 2019, General Directorate of Highways
(<https://www.kgm.gov.tr/SiteCollectionDocuments/KGMdocuments/Yayinlar/YayinPdf/KarayoluUlasimIstatistikleri2019.pdf>)

Based on the distribution of passengers as per use of different transportation modes as tabulated above, the amount of GHG emissions from the transportation of 6 million passengers by other transportation means alternative to HSR along Ankara-Izmir route are calculated as below in Table 7-23, Table 7-24, and Table 7-25. The same calculation is also conducted for the year 2052 with 14.1 million passengers and the avoided emissions for that year is also given below in the summary table (Table 7-26).

Table 7-23 GHG emissions from the use of private car and bus in “No-HSR scenario” as alternative transportation mode along Ankara – Izmir route (for the 1st year of operations)

Alternative Transportation Mode	Number of trips in one year	Fuel type	Percentage of vehicle type ^(c)	Number of trips based on vehicle type in one year	Fuel use in one trip (L) ^(d)	Fuel use in one year (L)	Heating Value ^(e) (TJ/Gg) for LPG (MJ/m3)	Emission factor ^(g) (kg/TJ)	ton	Global Warming Potential (GWP) IPCC 2014 Global Warming Potential	ton CO2e	total ton CO2e	total ton CO2e	
Private Car	2,082,600 ^(a)	Gasoline	0.25	520,650	45.24	23,554,206	44.30	CO2	69,300.00	54,233.38	1.00	54,233.38	55,498.75	213,154.10
								CH4	3.80	2.97	28.00	83.27		
								N2O	5.70	4.46	265.00	1,182.10		
		LPG	0.37	770,562	64.96	50,055,708	25,220 ^(f)	CO2	63,100.00	79,657.75	1.00	79,657.75	81,916.19	
								CH4	62.00	78.27	28.00	2,191.53		
								N2O	0.20	0.25	265.00	66.91		
		Diesel	0.38	791,388	34.80	27,540,302	43.00	CO2	74,100.00	74,588.92	1.00	74,588.92	75,739.16	
								CH4	3.90	3.93	28.00	109.92		
								N2O	3.90	3.93	265.00	1,040.32		
Bus	33,566 ^(b)	Diesel	-	33,566	203.58	6,833,308	43.00	CO2	74,100.00	18,507.02	1.00	18,507.02	18,792.42	
								CH4	3.90	0.97	28.00	27.27		
								N2O	3.90	0.97	265.00	258.12		

(a) Number of trips in one year by a private car was calculated using the average occupancy of a private car as 40%, corresponding to 2 passengers per car.

(b) Number of trips in one year by a bus was calculated assuming a total capacity of a typical intercity coach in Turkey as 50 passengers. Average occupancy for the bus was taken as 70%, which corresponds to 35 passengers per bus per trip

(c) 37% of registered passenger cars in Turkey use LPG, 25% use gasoline and the remaining 38% use diesel fuel (TUIK - Distribution of cars registered to the traffic according to fuel type, 2004 – 2021)

(d) Fuel use amount in one trip was calculated using fuel consumption amounts (liters/km) for different type of mobile sources (the amounts were calculated from GHG Protocol – Cross Sector Tools - GHG Emissions from Transport or Mobile Sources)

(e) 2006 IPCC Guidelines for National Greenhouse Gas Inventories

(f) Heating value for LPG is from “IPCC Special Report on Carbon Dioxide Capture and Storage, IPCC, 2005, https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_annex1-1.pdf)

(g) 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Table 7-24 GHG emissions from the use of conventional train in “No-HSR scenario” as alternative transportation mode along Ankara – Izmir route (for the 1st year of operations)

Alternative Transportation Mode	Number of trips in one year ^(a)	Fuel consumption amount ^(b) (liters/train-km)	Length of the Ankara-Izmir railway (km)	Fuel use in one year (L)	Heating Value ^(c) (TJ/Gg)	Emission factor ^(c) (kg/TJ)	ton	Global Warming Potential (GWP) IPCC 2014 Global Warming Potential	ton CO2e	total ton CO2e
Conventional train	323	3.40	825	906,231	43.00	CO2	74,100.00	2,454.39	1.00	2,454.39
						CH4	3.90	0.13	28.00	3.62
						N2O	3.90	0.13	265.00	34.23

(a) Number of trips in one year was calculated assuming average occupancy of 260 passengers per train set for conventional trains (calculated from 2018 TCDD railway statistics, <https://www.tcddtasimacilik.gov.tr/uploads/images/Strateji/TCDD-T-2018-istatistik-yilligi-ozet.pdf>)

(b) Izmir Mavi Tren operates along the route Ankara-Eskisehir-Kutahya-Balikesir-Manisa-Izmir (Basmene) and the line is 825 km long. Izmir Mavi Tren is powered by a combination of electric and diesel locomotives. As the number of diesel locos are much more than the electrical locos, the fuel consumption amount of diesel was used as a basis. Conventional train fuel consumption value was obtained as 3 L/train-km based on 2018 TCDD railway statistics (<https://www.tcddtasimacilik.gov.tr/uploads/images/Strateji/TCDD-T-2018-istatistik-yilligi-ozet.pdf>)

(c) 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Table 7-25 GHG emissions from the use of passenger aircraft in “No-HSR scenario” as alternative transportation mode along Ankara – Izmir route (for the 1st year of operations)

Alternative Transportation Mode	Flight distance between Ankara - Izmir (km)	Aircraft Fuel Burn/Trip (kg) ^(a)	Constant ^(b)	CO2 produced/trip (ton)	Number of trips in one year ^(c)	ton CO2e
Aircraft	541	3,352.60	3.16	10.59	3,600	38,139.18

(a) Calculated using ICAO Carbon Emissions Calculator, <https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx>. The air crafts used in Ankara - Izmir route were listed as 320, 738, 73H

(b) Constant represents the number of tons of CO2 produced by burning a ton of aviation fuel (https://www.icao.int/environmental-protection/CarbonOffset/Documents/Methodology%20ICAO%20Carbon%20Calculator_v11-2018.pdf)

(c) Number of trips in one year was calculated using average occupancy of an airplane (85%) which corresponds to 160 passengers (Boeing 737 800 - maximum passenger of the airplane is 189 passengers)

The GHG emissions from the use of HSR and other transportation vehicles alternative to HSR are shown in Table 7-26 below for the first year of operations (6 million passengers) and year 2052 (14.1 million passengers).

The “avoided emissions” as a result of the use of Ankara-Izmir HSR were quantified comparing the estimated amount of GHG emissions from the use of alternative transportation modes along Ankara-Izmir route.

Table 7-26. GHG Emissions from the Use of HSR and the Other Alternative Transportation Means

Projection Scenario	Transportation Vehicles along Ankara-Izmir route		GHG emissions (x1,000 ton CO2e/year)	Total GHG emissions (x1,000 ton CO2e/year)	Avoided emissions (x1,000 ton CO2e/year)
First Year of Operation (6 million passengers)	Ankara-Izmir HSR	HSR	40.5	40.5	232.1 (based on 6 million people travelling)
	No-HSR Scenario Alternative Transportation Means	Private car	213.2	272.6	
		Bus	18.8		
		Conventional train	2.5		
		Aircraft	38.1		
Year 2052 Projection (14.1 million passengers)	Ankara-Izmir HSR	HSR	95.4	95.4	547 (based on 14.1 million people travelling)
	No-HSR Scenario Alternative Transportation Means	Private car	502.3	642.4	
		Bus	44.3		
		Conventional train	5.9		
		Aircraft	89.9		

7.3.3.2.2. Climate Change Risk Assessment

For the operation phase of the Project, EP4 requires a Climate Change Risk Assessment (CCRA):

- For all Category A and, as appropriate, Category B Projects, CCRA will include consideration of relevant physical risks as defined by the Task Force on Climate-related Financial Disclosures (TCFD).
- For all Projects, in all locations, when combined Scope 1 and Scope 2 Emissions are expected to be more than 100,000 tons of CO2-e annually. Consideration must be given to relevant Climate Transition Risks (as defined by the TCFD) and an alternatives analysis completed which evaluates lower GHG intensive alternatives.

The Recommendations of the TCFD divides climate-related risks into two categories. These are:

- risks which relate to the physical impacts of climate change (Physical Risks); and
- risks which relate to the transition to a lower-carbon economy (Transition Risks).

As detailed above, the HSR Project contributes to the avoidance of GHG emissions compared to alternative modes of transportation.

Based on the official annual passenger number forecast during the operation of the HSR, in the first year of operations the GHG emissions are calculated as 40,498 tons CO2-e/year and for the year 2052 as 95,436 tons CO2-e/year.

As the GHG emissions of the Project during operation phase is expected to be less than 100,000 tons of CO2-e annually, the climate transition risks are not assessed. As per the alternative analysis, as given in details under the “no-HSR scenario”, the HSR Project helps avoid GHG emissions compared to the alternative modes of operation.

The AIHSR Project is not reliant on a resource that could be impacted by climate change, like water or changes to land use. As stated by the TCFD Recommendations “physical risks resulting from climate change can be event driven (acute) or longer-term shifts (chronic) in climate patterns”.

Acute physical risks could be increased frequency and severity of wildfires, flooding and storms/cyclones and heatwaves.

Chronic physical risks could be changes in precipitation patterns resulting in drought or water stress, rising mean temperatures and sea level rise (i.e. in coastal zones, designated flood zones, areas vulnerable to storm surge).

Based on the current climate conditions, wildfires (acute risk) and flooding (acute risk) are considered as the potential physical risks at the Project location. Along the Project route, there are designated flood zones which are accepted as geographically at-risk areas (chronic risk).

According to the expropriation plans of the Project, the Ankara-Izmir HSR route crosses forest parcels in Afyonkarahisar, Usak and Manisa provinces (see Chapter 5 on Land Use and Geology). Forest fire statistics in Afyonkarahisar, Usak and Manisa provinces are given in Table 7-27 below.

Table 7-27. Forest Fire Statistics

Years		Afyonkarahisar	Usak	Manisa	Turkey
2015	No. of Forest Fires	6	9	88	2.150
	Area (ha)	3	11	80	3.219
2016	No. of Forest Fires	34	20	122	3.188
	Area (ha)	21	24	110	9.156
2017	No. of Forest Fires	13	10	67	2.411
	Area (ha)	4	7	235	11.993
2018	No. of Forest Fires	14	5	98	2.167
	Area (ha)	12	4	96	5.644
2019	No. of Forest Fires	17	5	93	2.688
	Area (ha)	101	6	45	11.332

Source: Ministry of Agriculture and Forestry, General Directorate of Forestry, Yearly Official Statistics

(<https://www.oqm.gov.tr/tr/ormanlarimiz/resmi-istatistikler>)

The Ministry of Transportation and Infrastructure (MoTI) publishes transportation safety statistics, including railway transportation. According to the transportation accident statistics for the railways between the years 2015 and 2020, the number of accidents caused by fire is 0.

The number of flood incidents in provinces crossed by the Project are summarized in Table 7-28 below:

Table 7-28. Number of Flood Incidents in Provinces crossed by the Project

Province	In the 1950–2019 period	In 2019
Ankara	154	6
Eskisehir	45	19
Afyonkarahisar	130	33
Kutahya	26	1
Usak	8	1
Manisa	48	7
Izmir	63	15
Turkey	7,014	499

Source: Ministry of Interior, Disaster and Emergency Management Presidency (AFAD), 2019 Overview of Disaster Management and Natural Disaster Statistics (https://www.afad.gov.tr/kurumlar/afad.gov.tr/e_Kutuphane/Kurumsal-Raporlar/Afet-Istatistikleri-2020-web.pdf).

Flood Management Plans have been prepared by the Ministry of Agriculture and Forestry – Directorate General of Water Management for the four (4) basins the Project is crossing through, namely Sakarya, Akarcay, Buyuk Menderes and Gediz Basins (<https://www.tarimorman.gov.tr/SYGM/Sayfalar/Detay.aspx?Sayfald=53>). At the basin level, flood risk assessments have been carried out taking into account numerous factors including potential climate change impacts as well. The map of historical floods in Turkey³² across the river basins is given in Figure 7-39 below.

³² Source: Flood Management in Turkey (2015), Ministry of Agriculture and Forestry – Directorate General of Water Management

(<https://www.tarimorman.gov.tr/SYGM/Belgeler/Ta%C5%9Fk%C4%B1n%20Dairesi%20Sunum/Flood%20Management%20in%20Turkey.pdf>).

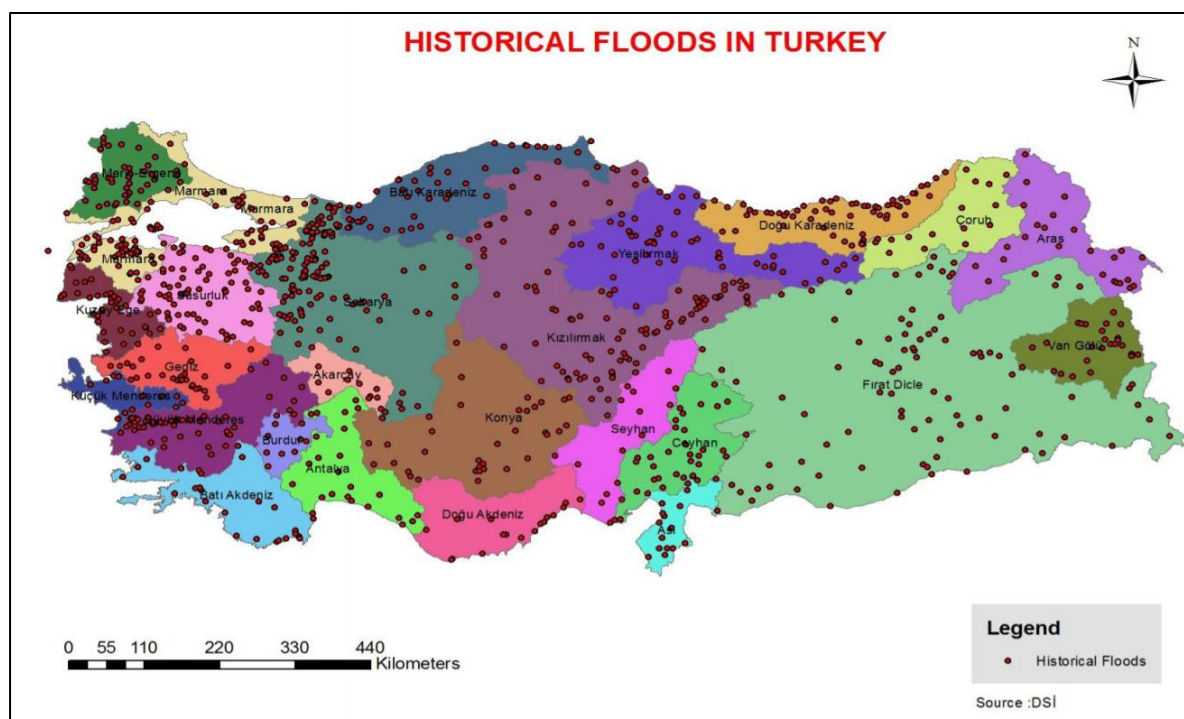


Figure 7-39. Historical Floods in Turkey

A general assessment of the flood map of Turkey (1950–2019 period) indicates that the risk of flood increases as moving from west to the east and from the south to north of Turkey (Ministry of Interior, Disaster and Emergency Management Presidency, 2019 – Overview of Disaster Management and Natural Disaster Statistics). Amongst the

provinces crossed by the Project, Afyonkarahisar Province is more vulnerable to climate change in terms of flood incidents. The number of flood incidents in Afyonkarahisar in 1950–2019 period is reported as 130, corresponding to 1.9% of the total number of flood incidents in Turkey in the same period.

The potential impacts on the Project that could stem from the identified potential physical risks are considered to be damage to assets, loss of operation, delays for customers, increased operating costs, and impact on the surrounding business, environment, and communities. The Project design includes engineering structures (e.g. viaducts, culverts, bridges, tunnels) and these structures will be designed as per the Technical Specifications of AYGM for Infrastructure Works and other applicable standards including flood risks. To this end, the potential physical climate impacts are not considered to affect the operation of the Project.

The Employer/Operator will develop and implement an Emergency Preparedness and Response Plan (EPRP) for the operation phase with special measures - e.g. crews, equipment- considered for the tunnels, bridges and viaducts to provide easy access to the HSR route, as required by the national EIA Report as well as fire safety measures including monitoring of right-of-way vegetation according to fire risk, planting and management of fire-resistant species within, and adjacent to, rights-of-way, as recommended by the GIIP.

According to the Recommendations of the TCFD, efforts to mitigate and adapt to climate change produce opportunities for organizations. The adoption of low-emission energy sources is one of the climate-related opportunities defined by the TCFD. The climate-related opportunity and the potential financial impacts of Ankara-Izmir HSR Project are shown in Table 7-29 below.

Table 7-29. Project Specific Climate-Related Opportunities and Potential Financial Impacts

Climate-Related Opportunities	Potential Financial Impacts
Use of lower-emission sources of energy	<ul style="list-style-type: none"> • Reduced exposure to future fossil fuel price increases • Reduced exposure to GHG emissions and therefore less sensitivity to changes in cost of carbon • Returns on investment in low-emission technology • Increased capital availability (e.g., as more investors favour lower-emissions producers) • Reputational benefits resulting in increased demand for goods/services

According to the International Energy Agency (IEA)³³, to meet global emission-reduction goals, countries will need to transition a major percentage of their energy generation to low emission alternatives. Turkey has been a member of the OECD since 1961 and of the IEA since 1974. IEA recommends Turkey to develop a cross-governmental road map to reduce oil consumption by strengthening demand-reduction and fuel switching policies in the transport sector, including the promotion of electric vehicles (IEA Energy Policy Review of Turkey, 2021, <https://www.iea.org/events/turkey-2021-energy-policy-review/>).

Turkey signed the Paris Agreement on 22 April 2016 but has not ratified the Agreement yet. The evaluation process for its ratification is in process. However, in accordance with the decisions 1/CP.19 and 1/CP.20, Turkey's Intended Nationally Determined Contribution (INDC) to the Paris Agreement was submitted to the UNFCCC on 30 September 2015. Turkey declared its intention to achieve "up to 21% reduction in GHG emissions from the Business-as-Usual level by 2030". Realizing HSR projects is one of the transportation policies identified in the INDC.

Turkey supports its INDC through a national climate change policy which includes:

- National Development Plan
- National Strategy on Climate Change
- National Action Plan on Climate Change
- National Strategy on Industry
- Strategy on Energy Efficiency
- National Strategy and Action Plan on Recycling
- National Legislation on Monitoring, Reporting and Verification of GHG emissions
- National Smart Transportation Systems Strategy Document (2014-2023) and its Action Plan (2014-2016)

Positive alignments related with railway investments in the national climate change policy are shown in Table 7-30 below.

³³ International Energy Agency (IEA), established in November 1974 within the framework of the Organization for Economic Co-operation and Development (OECD) to implement an international energy programme, works with governments and industry to shape a secure and sustainable energy future. According to IEA in 2019, rail services consumed 0.6 million barrels per day of oil (0.6% of global oil use), around 280 TWh of electricity (1.2% of global consumption) and were responsible for about 0.3% of direct CO₂ emissions. Due the low energy and CO₂ intensities of rail transport, promoting rail use is a promising strategy to enhance energy security and reduce GHG emissions. Shifting passenger and freight transport activity from more intensive modes such as private cars, trucks and airplanes to rail would substantially reduce net energy use and GHG emissions.

Table 7-30. Positive Alignments related with Railway Investments in terms of Climate Change Policy

National Climate Change Policy 11th National Development Plan 2019-2023 https://www.sbb.gov.tr/wp-content/uploads/2020/06/Eleventh-Development-Plan-2019-2023.pdf	Articles related with railways Rapid and high speed train lines under construction will be completed in order to create a more balanced modal split and increase passenger comfort. Table 7-31 shows the situation in 2018 and the target for 2023 according to the railway investment and development objectives. Table 7-31 Railway investment and Development Objectives <table><tr><th></th><th>2018</th><th>2023</th></tr><tr><td>Length of Rapid and High Speed Train Lines (km, cumulative)</td><td>1,213</td><td>5,595</td></tr><tr><td>Share of Railway Passenger Transportation in Total (in modes of national territorial transport, %)</td><td>1.3</td><td>3.8</td></tr><tr><td>Share of Double-Track Railway Length in Total Main Line (%)</td><td>12.4</td><td>26.3</td></tr></table>		2018	2023	Length of Rapid and High Speed Train Lines (km, cumulative)	1,213	5,595	Share of Railway Passenger Transportation in Total (in modes of national territorial transport, %)	1.3	3.8	Share of Double-Track Railway Length in Total Main Line (%)	12.4	26.3
	2018	2023											
Length of Rapid and High Speed Train Lines (km, cumulative)	1,213	5,595											
Share of Railway Passenger Transportation in Total (in modes of national territorial transport, %)	1.3	3.8											
Share of Double-Track Railway Length in Total Main Line (%)	12.4	26.3											
MoEU Climate Change Strategy 2010-2023 https://iklim.csb.gov.tr/strateji-belgeleri-i-305	Plans will be developed to increase the share and load factor of railways, seaways and airways in freight and passenger road transport (as a medium term strategy). The share of railways and seaways in freight and passenger transportation, which is currently 2%, will be increased, and airway transportation shall be supported (as a long term strategy).												
MoEU Climate Change Action Plan 2011-2023 https://iklim.csb.gov.tr/eylem-planlari-i-306	One of the objectives is increasing the share of railroads in freight transportation (which was 5% in 2009) to 15% and in passenger transportation (which was 2% in 2009) to 10% by 2023												

The potential Project impacts, proposed mitigation measures and residual impact significances are summarised in Table 7-32.

Table 7-32. Impacts, Proposed Mitigation Measures and Residual Impacts (Air Quality and GHG Emissions)

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Emissions to air due to construction activities	<ul style="list-style-type: none"> Land preparation and construction 	Residential Receptors: A-02 (Yenice) A-03 (Turktaciri) A-06 (Yuregil) A-09 (Erenler) A-10 (Balmahmut) A-11 (Duzagac) A-12 (Guney) A-15 (Salihli) A-16 (Urganli) A-17 (Cikrikci) A-18 (Turgutlu)	Local	High	Short term Reversible	Short-term	Intermittent	High	High	Major	<ul style="list-style-type: none"> During the days of unfavourable meteorological conditions (e.g. extreme wind conditions, stagnant air flow conditions) preventing emission distribution, construction and material extraction works will be suspended temporarily and/or production amounts will be reduced (e.g. amount of material extracted at the quarries/borrow sites) at residential receptors with high impact magnitude. Project-specific Air Quality and GHG Management Plan will be implemented by the Contractor and subcontractors (through contractual requirements). 	Minor to Moderate
		A-05 (Emirinkoyu) A-07 (Bayat) A-13 (Banaz) A-14 (Dombayli) A-20 (Manisa) A-22 (Caltildere)	Local	Medium	Short term Reversible	Short-term	Intermittent	Medium	High	Major	<ul style="list-style-type: none"> All Project personnel including direct and contracted workers will be trained on the implementation of Air Quality and GHG Management Plan. Dust suppression methods such as water spraying will be applied at dust generating areas (e.g. quarry access roads) especially during dry weather conditions. Water spraying frequency will be increased during dry periods and upon receipt of valid dust-related complaints from the nearby communities, as necessary. 	Minor
		A-08 (Seydiler) A-21 (Degirmendere)	Local	Low	Short term Reversible	Short-term	Intermittent	Low	High	Moderate	<ul style="list-style-type: none"> Dust suppression methods such as water spraying will be applied at dust generating areas (e.g. quarry access roads) especially during dry weather conditions. Water spraying frequency will be increased during dry periods and upon receipt of valid dust-related complaints from the nearby communities, as necessary. Access roads both to accommodation camp sites, construction sites and quarries/borrow sites will be upgraded, where necessary and feasible. The Contractor will avoid passage of construction traffic through the settlements, whenever alternative roads are present. Where passage through existing settlements is unavoidable, Contractor will take all necessary measures (i.e. speed limits) to prevent/minimise transportation related emissions and inform the communities about the activities and schedule. The Contractor will enforce speed limits for the Project vehicles that will transport construction materials/equipment along the existing main access road. Construction vehicles/equipment will be prevented from idling and running unnecessarily (to be covered in the ESMS 	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<p>trainings and refreshed through daily toolbox trainings).</p> <ul style="list-style-type: none"> Loading and unloading of material will be carried out without scattering to the extent possible. Trucks carrying fine material (excavated soil, filling material etc.) to be covered with tarpaulin where operations are held near residential areas. Conveyors of crushing screening plant and concrete batching plant to be enclosed where operations are held near residential areas. Generator working hours will be recorded. Excavated soils will be stockpiled (as necessary) at designated areas. Loose materials will be properly covered, or top layers will be kept moist on dry periods. Upper layers of the excavated material stored will be kept at a humidity level of about 10%. As part of the internal audit system to be developed and implemented by the Contractor, documentation on regular maintenance of vehicles/equipment to be used in the Project (by Contractor and subcontractors) will be checked; where necessary plans/actions will be developed and enforced. Air quality monitoring will be carried out as per the Air Quality and GHG Management Plan throughout the construction phase. Project-specific Stakeholder Engagement Plan (SEP) will be implemented to inform the local communities about the activities (e.g. activities that have high potential for dust generation and duration of activities) and address any air quality-related grievance and plan/take corrective actions, where necessary. 	
Impacts related to GHG emissions (Scope 1 and Scope 2)	Land preparation and construction	Local climate	Wide	Low	Long-term reversible	Short term	Continuous	Low	High	Moderate	<ul style="list-style-type: none"> Air Quality and GHG Management Plan will be developed and implemented. For the management of GHGs, related authorities and stakeholder will be cooperated where necessary/requested. All Project personnel including direct and contracted workers will be trained on the implementation of Air Quality and GHG Management Plan. Trainings will cover practices for reducing unnecessary equipment idling time and unnecessary operator moves/behaviours that increase fuel consumption. Maintenance of machinery/equipment will be conducted properly. GHG calculations will be periodically updated by the Contractor during the construction phase based on the actual construction 	Moderate
	Operation	Local/regional climate	Wide	Low	Long-term reversible	Long term	Continuous	Low	High	Moderate		Moderate (beneficial compared to other transportation means, e.g. air and road)

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			
										<div>machinery and vehicles involved in the activities, fuel consumption records, electricity consumed at the facilities, etc.</div> <ul style="list-style-type: none">For operation phase, GHG emissions (combined Scope 1 and Scope 2) over 100,000 tons of CO2-e annually will be publicly disclosed.	

8. WATER AND WASTEWATER MANAGEMENT

This Chapter discusses water supply, water use and management of wastewater generated throughout the Project.

The following main data sources have been used to compile this Chapter:

- Provincial Environmental Status Reports of MoEU for 2019
- National Water Plan, Ministry of Agriculture and Forestry (2019)
- Gediz River Basin Management Plan, Ministry of Agriculture and Forestry (2019)
- Buyuk Menderes River Basin Management Plan, Ministry of Agriculture and Forestry (2019)
- Domestic water use statistics published by Turkish Statistical Institute (TurkStat) for 2018 (published once in every two years)
- Sectoral Water Allocation Plan Preparation Project for Akarcay River Basin, Ministry of Agriculture and Forestry (2018)
- Sakarya River Basin Protection Action Plan, Ministry of Forestry and Water Affairs (2013)
- Gediz River Basin Protection Action Plan, Ministry of Forestry and Water Affairs (2013)
- Buyuk Menderes River Basin Protection Action Plan, Ministry of Environment and Forestry (2011)
- List of Facilities of the Regional Directorates, General Directorate of State Hydraulic Works (DSI) (<https://www.dsi.gov.tr/Sayfa/Detay/717>)
- National Environmental Impact Report (EIA) Report of 2006
- Websites of the following municipalities:
 - Afyonkarahisar Municipality (<https://www.afyon.bel.tr/Default.aspx>)
 - Ankara Metropolitan Municipality (<https://www.ankara.bel.tr/>)
 - Eskisehir Metropolitan Municipality (<https://www.eskisehir.bel.tr/ebb.php#>)
 - Izmir Metropolitan Municipality (<https://www.izmir.bel.tr/>)
 - Kutahya Municipality (<https://www.kutahya.bel.tr/>)
 - Manisa Metropolitan Municipality (<https://www.manisa.bel.tr/>)
 - Usak Municipality (<https://www.usak.bel.tr/>)

8.1. Project Standards

The Water Pollution Control Regulation (WPCR) is the key legislation establishing the legal and technical principles to prevent water pollution. There are other regulations and communiques in place for the protection of surface water and groundwater resources and management of wastewater, which will be applicable to the Project.

As such, the Project will comply with the requirements of the following applicable national legislation:

- Regulation Concerning Protection of Groundwater against Pollution and Deterioration
- Regulation Concerning Water Intended for Human Consumption (RCWIHC)
- Regulation on Control of Pollution Caused by Hazardous Substances in the Aquatic Environment and Its Surroundings
- Regulation on Monitoring of Surface Water and Groundwater
- Regulation on Septic Pit Opening at Locations where Sewer Construction is not Feasible
- Regulation on Surface Water Quality (RSWQ)
- Urban Wastewater Treatment Regulation

In addition to the national legislation, applicable requirements of the following international standards and GIIP will also be complied with:

- IFC PS3 on Resource Efficiency and Pollution Prevention
- General and industry-specific World Bank Group (WBG) Environmental, Health And Safety (EHS) Guidelines

The WPCR requires industrial facilities having a worker population:

- Less than 84 to collect their sanitary (domestic) wastewater in non-leaking septic tanks³⁴, which will be disposed of to the wastewater infrastructure by means of sewage trucks.
- Between 84 - 2,000 to manage their domestic wastewaters through treatment and/or other disposal methods to be approved by the Provincial Directorate of Environment and Urbanisation (PDoEU) to meet the discharge limits defined in Table 21.1 of the WPCR for their sanitary wastewater discharges to the receiving environment.

The WBG General EHS Guidelines, Section 1.3 "Wastewater and Ambient Water Quality" specifies the indicative values for treated sanitary sewage discharges³⁵.

The Project Standards for the treated domestic wastewater discharges are shown in Table 8-1. Based on the applicable national and international standards, the stringent limit values will be taken into consideration in the management of sanitary wastewater.

³⁴ The non-leaking septic tanks are to be constructed in line with the specifications defined in the Regulation on the Septic Pits to be Opened at Locations where Sewer Construction is not Feasible.

³⁵ As per WBG General EHS Guidelines, recommended sanitary wastewater management strategies include; if sewage from the industrial facility is to be discharged to surface water, treatment to meet national or local standards for sanitary wastewater discharges or, in their absence, the indicative guideline values applicable to sanitary wastewater discharges (as shown in Table 1.3.1 of the WBG General EHS Guidelines).

Table 8-1. Project Standards for the Treated Sanitary Wastewater Discharge to Receiving Environment

Parameter	WPCR Table 21.1		WBG General EHS Guidelines (Table 1.3.1)	Project Standards (24 hours composite) (*)
	2 hr Composite Sample Limit	4 hr Composite Sample Limit		
BOD (mg/L)	50	45	30	30
COD (mg/L)	180	120	125	120
Total Suspended Solids (mg/L)	70	45	50	45
pH	6-9	6-9	6-9	6-9
Total Nitrogen (mg/L)	-	-	10	10
Total Phosphorus (mg/L)	-	-	2	2
Oil and Grease (mg/L)	-	-	10	10
Total Coliform Bacteria (Most Probable Number/100 ml)	-	-	400	400

(*) Effluents from highly variable processes may need to be sampled more frequently or through composite methods. Grab samples or, if automated equipment permits, composite samples may offer more insight on average concentrations of pollutants over a 24-hour period. Composite samplers may not be appropriate where analytes of concern are short-lived (e.g., quickly degraded or volatile) (WBG, 2007).

Classification of the surface water quality will be done based on the threshold values provided in Annex-5, Table 2 of the RSWQ. Relevant parameters and threshold values for each water quality class are listed in Table 8-2.

Table 8-2. RSWQ Inland Surface Waters Quality Criteria

Parameters	Unit	Water Quality as per RSWQ (Annex-5, Table 2)			
		Class I	Class II	Class III	Class IV
Ammonium Nitrogen	mg/L	< 0.2	1	2	> 2
Biochemical Oxygen Demand (BOD)	mg/L	< 4	8	20	> 20
Dissolved Oxygen	mg/L	> 8	6	3	< 3
Fluoride	µg/L	≤ 1000	1500	2000	> 2000
Orthophosphate Phosphorus	mg/L	< 0.05	0.16	0.65	> 0.65
Conductivity	µS/cm	< 400	1000	3000	> 3000
Chemical Oxygen Demand (COD)	mg/L	< 25	50	70	> 70
Manganese	µg/L	≤ 100	500	3000	> 3000
Nitrate Nitrogen	mg/L	< 3	10	20	> 20
pH	-	6-9	6-9	6-9	6-9
Colour (436 nm)	m ⁻¹	≤ 1.5	3	4.3	> 4.3
Colour (525 nm)	m ⁻¹	≤ 1.2	2.4	3.7	> 3.7
Colour (620 nm)	m ⁻¹	≤ 0.8	1.7	2.5	> 2.5
Selenium	µg/L	≤ 10	15	20	> 20
Sulphur	µg/L	≤ 2	5	10	> 10
Total Nitrogen	mg/L	< 3.5	11.5	25	> 25
Total Phosphorous	mg/L	< 0.08	0.2	0.8	> 0.8
Total Kjeldahl Nitrogen	mg/L	< 0.5	1.5	5	> 5
Oil-Grease	mg/L	< 0.2	0.3	0.5	> 0.5

8.2. Baseline Conditions

Turkey has been divided into 25 river basins (hydrological river basins) as demonstrated in Figure 8-1. Among these, the Project route passes through the four river basins listed in Table 8-3, where the management of surface water resources will be essential in terms of hydrology and water quality.

Table 8-3. River Basins Crossed by the Project

Section	Description	Crossed River Basins
Section 1	Polatli-Afyon	Sakarya River Basin Akarcay River Basin
Section 2	Afyon-Banaz (including Hatipler passage)	Akarcay River Basin Sakarya River Basin Buyuk Menderes River Basin
Section 3	Banaz-Salihli	Buyuk Menderes River Basin Gediz River Basin
Section 4	Salihli-Menemen	Gediz River Basin

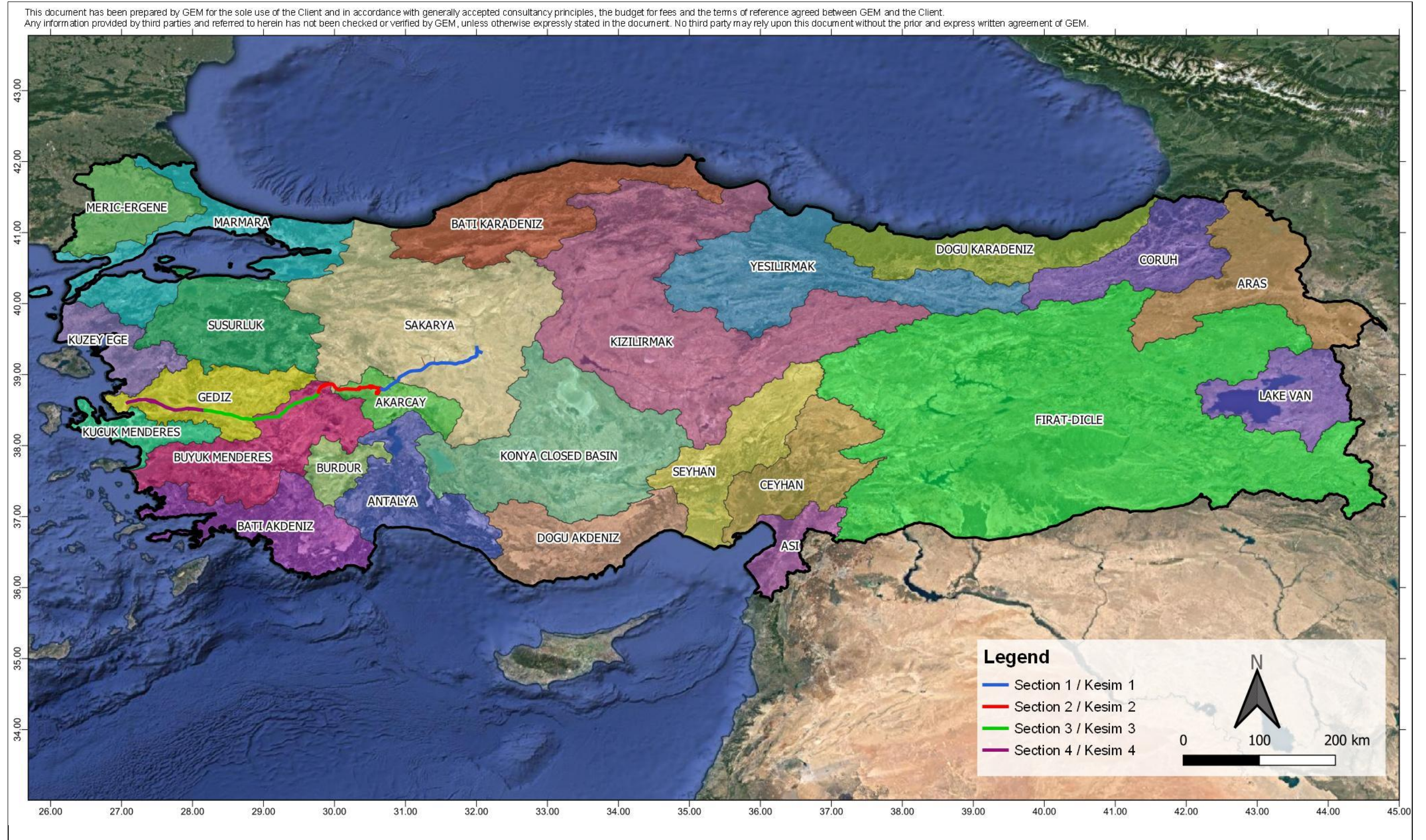


Figure 8-1. River Basins the Project Crosses

8.2.1. Surface Water Resources

Figure 8-2 to Figure 8-5 provides maps of the surface water resources in the vicinity of each section of full Project route. Section 8.2.1 to Section 8.2.1.3 provide baseline information on surface water resources including rivers and streams, natural lakes, dams and ponds. Baseline water quality sampling was conducted as part of the ESIA studies are given in Section 8.2.1.4.

8.2.1.1. Rivers and Creeks

Sakarya River and Gediz River are the major surface water resources in the vicinity of the Project route. All other rivers and creeks are tributaries of these rivers.

The rivers and creeks in the vicinity of the Project and the corresponding river basins are listed in Table 8-4. The river and creek crossings are provided by means of relevant engineering structures (e.g. viaducts, culverts, and bridges, as appropriate), as indicated in the last column of the table.

Table 8-4. Rivers/Creeks in the Vicinity of the Project

Section	Name of the River/Creek	Railway KM	Intersection with the Railway	River Basin	Corresponding Engineering Structure
Section 1	Sakarya River	6+500	Yes	Sakarya	Viaduct
	Sakarya River	41+100	Yes	Sakarya	Viaduct
	Sakarya River	51+300	Yes	Sakarya	Culvert
	Kapakliozu Creek	64+550	Yes	Sakarya	Culvert
	Pinarbasi Creek	66+400	Yes	Sakarya	Bridge
	Drying Canal	89+000	Yes	Sakarya	Bridge
	Sakarya River	100+500	Yes	Sakarya	Bridge
	Avsar Creek	139+700	Yes	Akarcay	Bridge
	Iscehisar Creek	140+850	Yes	Akarcay	Bridge
Section 2	Aksu Creek	160+400	Yes	Akarcay	Bridge
	Irrigation Channel	163+100	Yes	Akarcay	Bridge
	Aksu Creek	169+000	Yes	Akarcay	Bridge
	Drying Canal	179+900	Yes	Akarcay	Bridge
	Unknown Creek	192+800	Yes	Akarcay	Viaduct
	Hamamderesi Creek	222+100	Yes	Buyuk Menderes	Viaduct
Section 3	Hamamderesi Creek	279+600	Yes	Buyuk Menderes	Viaduct
	Banaz Creek	284+700	Yes	Buyuk Menderes	Bridge
	Banaz River/ Degirmenderesi Creek	321+200	Yes	Buyuk Menderes	Culvert
	Kocadere Creek	359+000	Yes	Buyuk Menderes	Viaduct
	Alasehir Creek	424+000	No	Gediz	Culvert
	Gediz River	432+400	Yes	Gediz	Culvert
Section 4	Gediz River	440+000	Yes	Gediz	Bridge
	Gediz River's Tributaries	450+000	Yes	Gediz	Bridge
	Kelebek Creek	459+000	Yes	Gediz	Bridge
	Kelebek Creek	462+350	Yes	Gediz	Bridge
	Kelebek Creek	466+500	Yes	Gediz	Culvert
	Nif Creek	472+400	Yes	Gediz	Overpass
	Nif Creek	484+100	Yes	Gediz	Viaduct
	Gediz River's Tributaries	490+600	Yes	Gediz	Bridge
	Gediz River's Tributaries	539+100	Yes	Gediz	Bridge

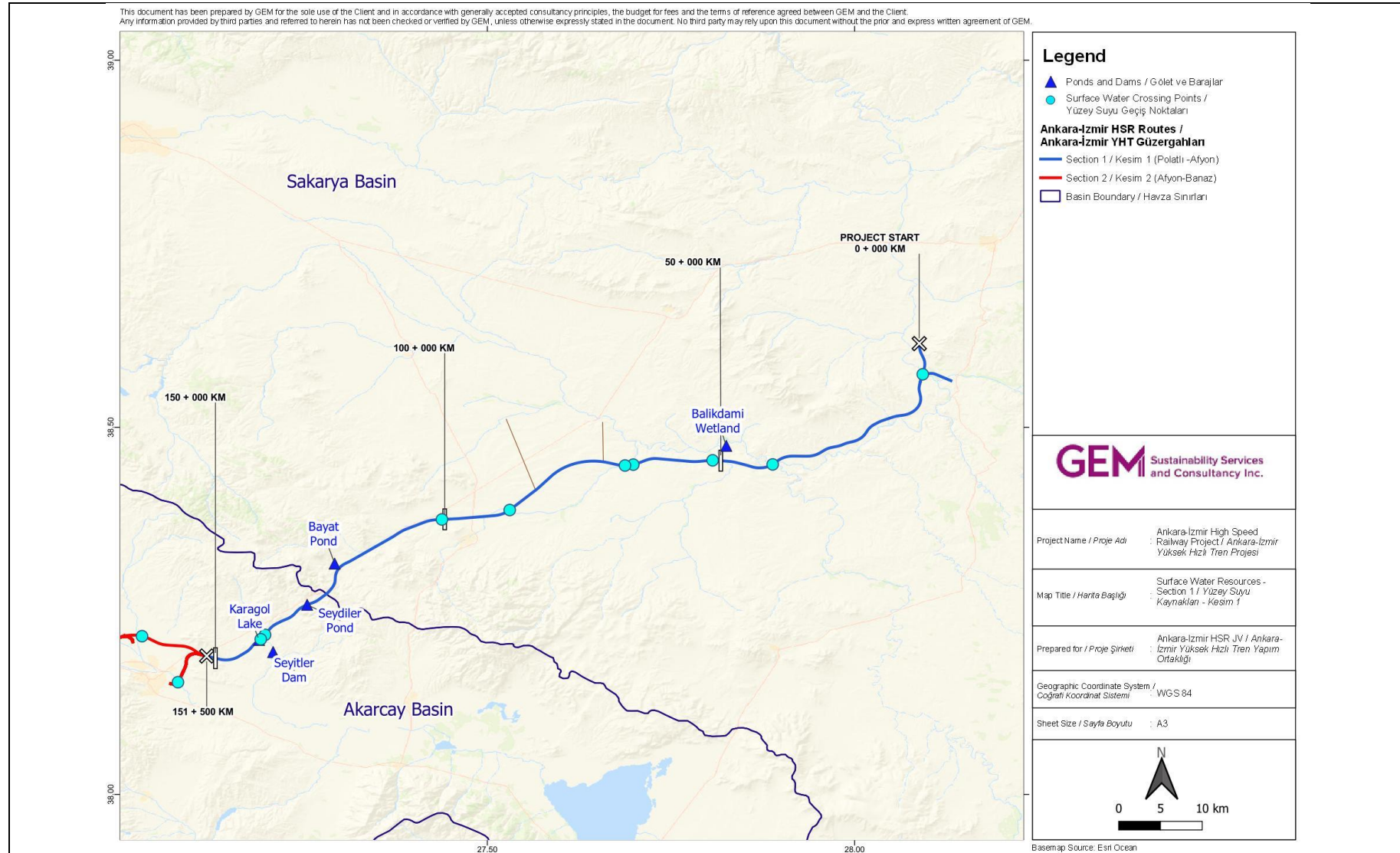


Figure 8-2. Surface Water Resources in Section 1

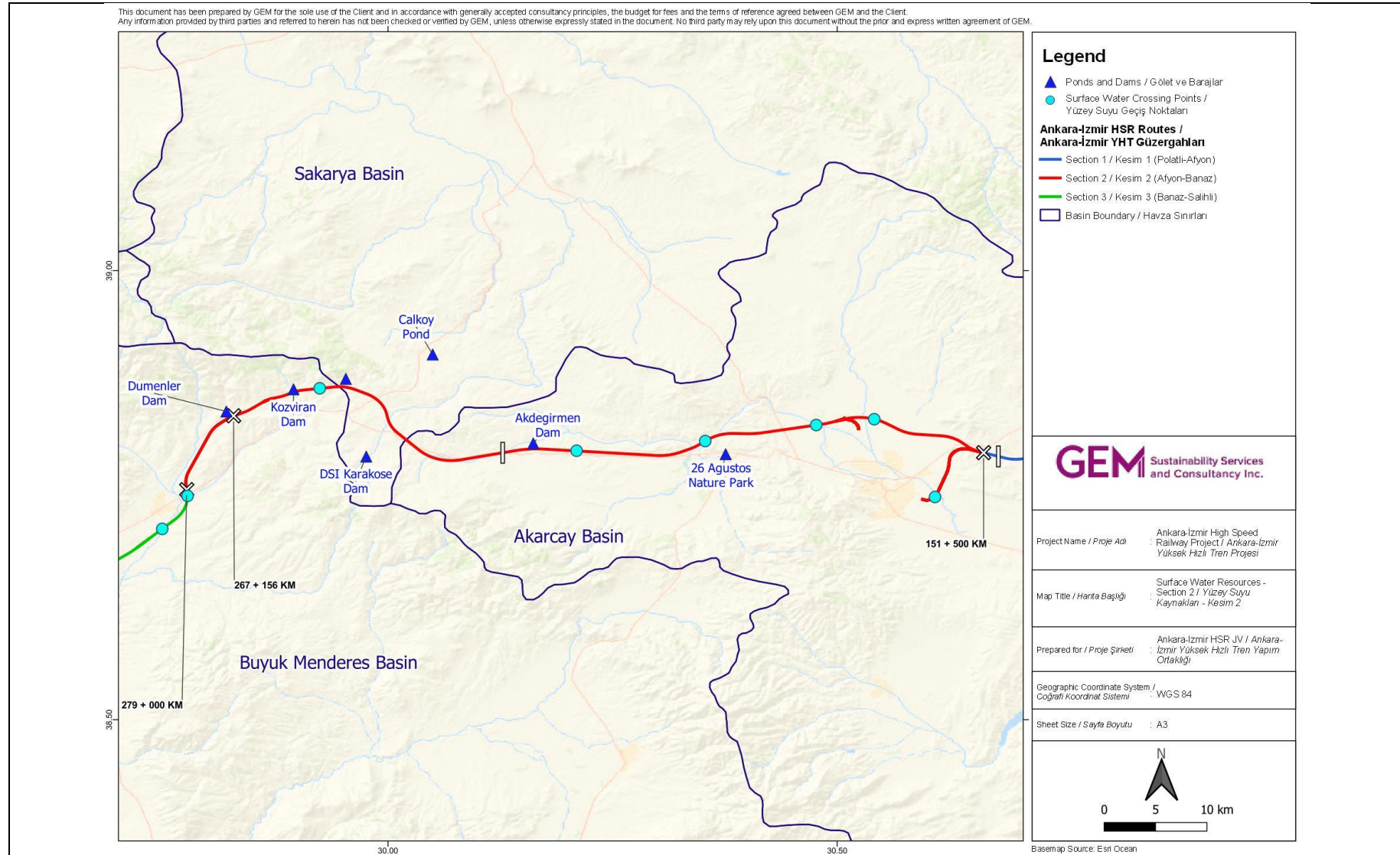


Figure 8-3. Surface Water Resources in Section 2

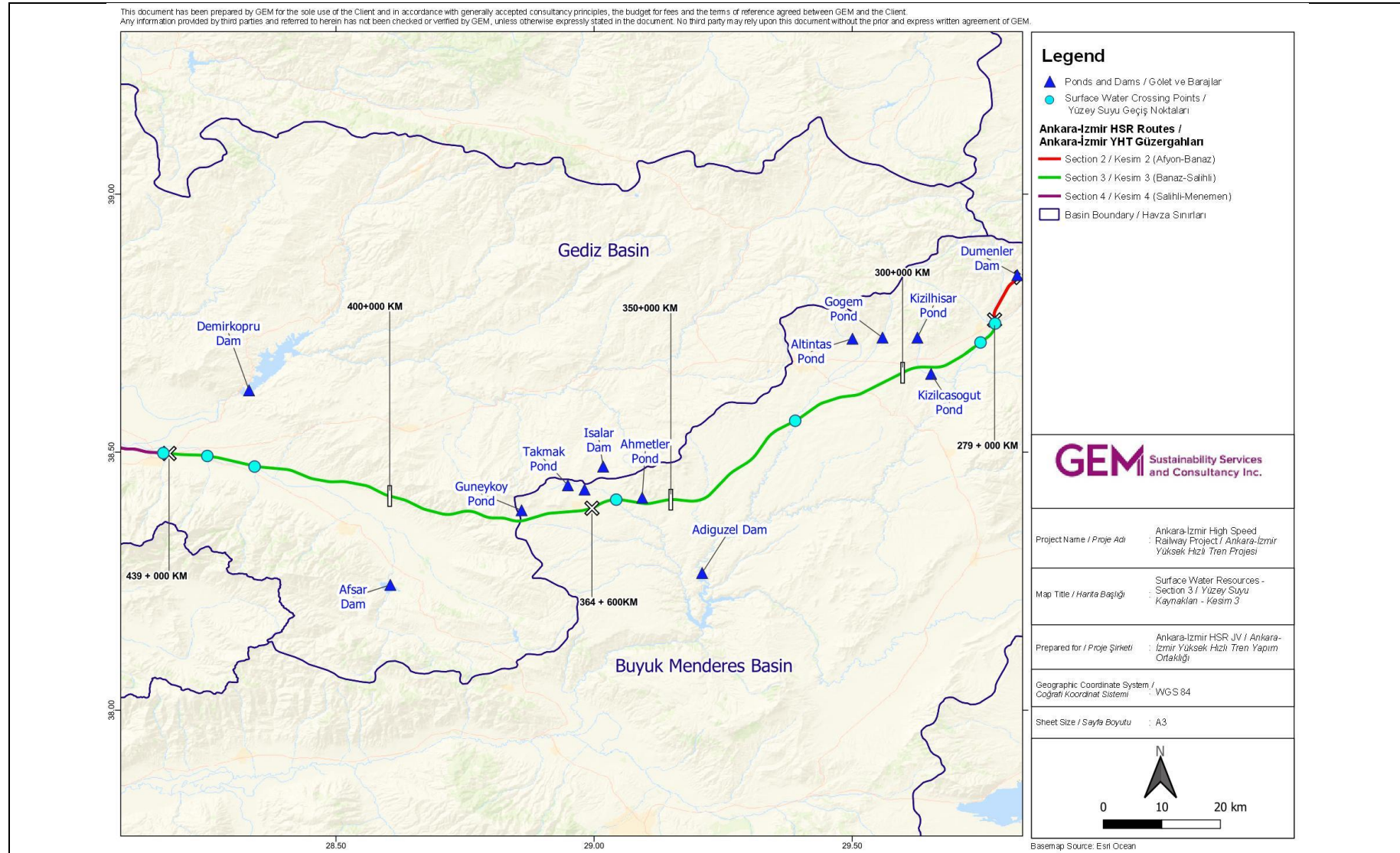


Figure 8-4. Surface Water Resources in Section 3

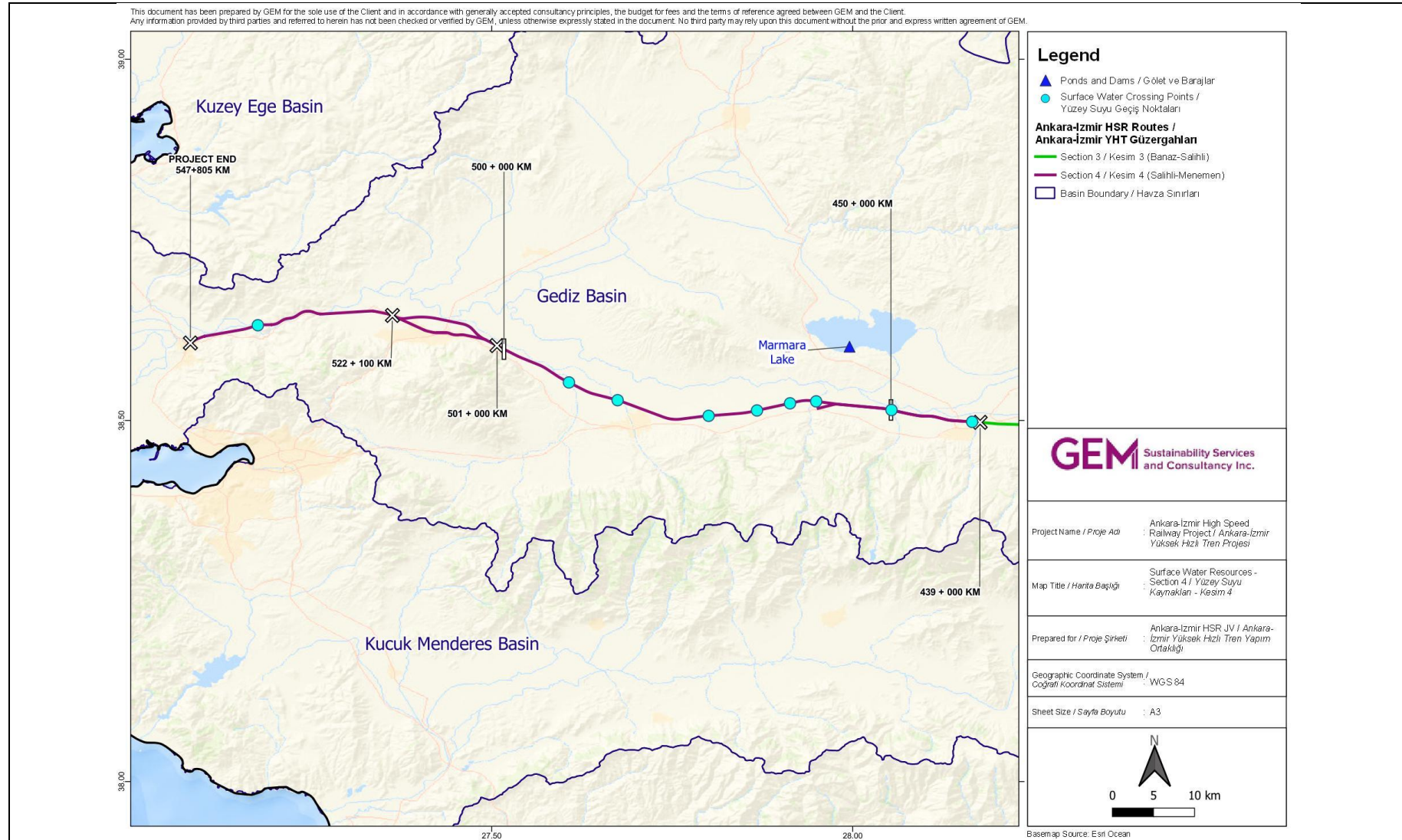


Figure 8-5. Surface Water Resources in Section 4

The perennial surface water resources located in the vicinity of the quarries (within 1,000 m distance to the license boundary) are listed in Table 8-5. The open pit locations within the quarry licenses will further be identified based on the results of the ongoing material tests. Thus, the distance between the surface water resources and the quarry operation sites may be higher than the distances presented in the table.

Table 8-5. Surface Water Resources in the Vicinity of the Quarries

Facility Name	Past Production Status	Resource	Province	District	Closest Settlement	Closest Surface Water Resource	Distance of the Surface Water Resource to the License Boundary of the Quarry (m)	Direction of the Surface Water Resource wrt the Quarry
Section 1								
36- Turktaciri	No previous production	Limestone	Ankara	Polatli	Turktaciri	Sakarya River	250	W
78 - Tabaklar	Previous production done	Limestone	Afyon karahisar	Emirdag	Tabaklar	Tabaklar Creek	200	N
82 - Emirin Koyu	No previous production	Basalt	Afyon karahisar	Emirdag	Emirin Koyu	Tabaklar Creek	400	NE
94 - Bayat	Previous production done	Limestone	Afyon karahisar	Bayat	Bayat	Bayat Creek	600	SE
Section 4								
235 – Cikrikci (*)	Previous production done	Andesite	Manisa	Turgutlu	Cikrikci	Karacali Creek	0	W/SW
263- Degirmendere	No previous production	Basalt	Izmir	Menemen	Kir	Gediz River	50	NW

(*) It should be noted that Cikrikci Quarry has in place EIA not required Decision secured from the PDoEU, which is based on, inter alia, the positive opinion issued by the State Hydraulic Works of Turkey (Decision Date: 3 April 2018; Decision No: 233613). The positive opinion letter identifies the measures required to be taken during the material extraction operations in this area.

The planned location of Sigircik camp site has a distance of 600 m to the Sakarya River tributary, which is flowing in the east direction and 950 m distance to another tributary of Sakarya River, which is flowing in the northwest direction. There is no other major water resource in the vicinity (within 1,000 m distance) of other camp sites of the Contractor.

The perennial surface water resources located in the vicinity of the stations (within 1,000 m distance) are listed in Table 8-6.

Table 8-6. Surface Water Resources in the Vicinity of the Stations

Section	Stations	Type	KM Start	KM End	Closest Surface Water Resource	Distance of the Surface Water Resource to the Station (m)	Direction of the Surface Water Resource wrt the Station
Section 1	Emirdag	Station	93+349.91	94+805.09	Bucak Creek	0 (*)	E
Section 2	Afyon	Gar	168+971.94	170+402.09	Akarcay	0 (**)	E
Section 4	Salihli	Station	440+077.18	441+851.31	Alasehir Creek	0 (***)	W
Section 4	Manisa	Gar	506+587.00	507+837.94	Kemalpasa Creek	260	N

(*) Crossed by Bayat-1 Bridge.

(**) Crossed by Aksu Bridge.

(***) Crossed by Bridge 1.

In addition to the rivers and creeks listed above, there may be other seasonal rivers/creeks in the vicinity of Project facilities. Those resources will be considered by the Contractor during the siting of the Project facilities and management measures for the protection of the quality of the resources will be developed and implemented during the construction phase.

8.2.1.2. Natural Lakes

Table 8-7 shows the natural lakes in the vicinity of the Project route. Balikdami Nationally Important Wetland is both a legally protected area and a key biodiversity area (KBA). Information on the biodiversity value of this site and relevant assessments are presented in Chapter 10 on Biodiversity.

Table 8-7. Natural Lakes in the Vicinity of the Project

Section	Name of the Lake	Railway KM	Closest Distance to the Railway (km)	Distance to the Closest Quarry/Borrow Site (km)	River Basin
Section 1	Balikdami	49+500	3.4	6.7 (Borrow Site No.59-9)	Sakarya
Section 1	Karagol Lake	141+000	0.1	2.1 (Geceler Quarry)	Akarcay
Section 2	26 Agustos Natural Park	180+100	2.6	4.1 (Borrow Site 138-15)	Akarcay
Section 4	Lake Marmara	457+200	8.2	-	Gediz

8.2.1.3. Dams and Ponds

Table 8-8 lists the dams and ponds in the wider area (within 20 km distance from the railway axis) of the Project route.

Table 8-8. Dams and Ponds in the Vicinity of the Project

Section	Name of the Dam/Pond	Railway KM	Closest Distance to HSR (km)	River Basin	Purpose
Section 1	Bayat Pond	120+000	1.0	Sakarya	Irrigation
	Seydiler Pond (*)	130+350	0.0	Akarcay	Irrigation
	Seyitler Dam	142+400	2.7	Akarcay	Irrigation; Flood protection
Section 2	Akdegirmen Dam	197+000	0.5	Akarcay	Drinking water Flood protection
	Calkoy Pond	217+000	7.0	Sakarya	-
	Unknown Pond	219+600	0.8	Sakarya	-
	Karakose Dam	221+800	4.2	Sakarya	Irrigation
	Kozviran Dam	224+500	0.3	Buyuk Menderes	Irrigation
	Dumenler Dam/Pond	268+300	0.7	Buyuk Menderes	-
	Kizilcasogut Pond	294+400	1.1	Buyuk Menderes	Irrigation
Section 3	Kizilhisar Pond	297+000	6.3	Buyuk Menderes	-
	Gogem Pond	299+500	8.0	Buyuk Menderes	Irrigation
	Altintas Pond	302+700	10.5	Buyuk Menderes	Irrigation
	Adiguzel Dam	345+500	18.0	Buyuk Menderes	Energy production Flood protection Irrigation
	Ahmetler Pond	355+000	1.2	Buyuk Menderes	Irrigation
	Isalar Dam	360+100	6.8	Gediz River	Irrigation
	Unknown Pond	362+600	4.0	Buyuk Menderes	-
	Takmak Pond	367+000	5.6	Buyuk Menderes	Drinking water Irrigation
	Guneykoy Pond	375+400	2.2	Buyuk Menderes	Irrigation
Section 4	Afsar Dam	391+500	17.0	Gediz	Drinking water Flood protection, Irrigation
	Demirkopru Dam	429+500	14.0	Gediz	Energy production Flood protection Irrigation

(*) Crossed by DSI Golet-2 Viaduct between KMs 130+263 – 130+423.

Source: Relevant River Basin Management/Action Plans; Ministry of Agriculture and Forestry, State Water Affairs (DSI), 2nd (Izmir), 3rd (Eskisehir), 5th (Ankara), 18th (Isparta) and 21st (Aydin) Regional Directorates of DSI, Facilities

8.2.1.4. Surface Water Quality

For the characterisation of the baseline water quality of the major surface water resources along the railway route, a water quality sampling program was conducted as part of the ESIA. Surface water quality sampling locations are listed in Table 8-9 and sampling locations are shown on the map presented in Figure 8-6.

Table 8-9. Surface Water Quality Sampling Locations

Section	Surface Water Body	Station ID	Railway KM
Section 1	Sakarya River	SW-01	6+500
	Sakarya River	SW-02	41+100
	Sakarya River	SW-03	51+300
	Kapakliozu Creek	SW-04	66+300
	Sakarya River	SW-05	100+500
	Sakarya River	SW-06	115+200
	Seydiler Pond	SW-07	130+350
	Iscehisar Creek	SW-08	140+850
Section 2	Aksu Creek	SW-09	163+100
	Drying Canal	SW-10	179+500
	Drying Canal	SW-11	200+000
	Unknown Creek	SW-12	217+500
Section 3	Hamamderesi Creek	SW-13	279+500
	Banaz River/ Degirmenderesi Creek	SW-14	321+200
	Gediz River	SW-15	438+900
Section 4	Gediz River's Tributaries	SW-16	450+000
	Kelebek Creek	SW-17	459+100
	Nif Creek	SW-18	472+900
	Nif Creek	SW-19	484+100
	Gediz River's Tributaries	SW-20	531+400

Sampling locations were selected on the perennial rivers/ streams that are close to the Project route. Particularly, streams/rivers that feed important surface water bodies (natural lakes, dam reservoirs, etc.) or are potentially used by the local communities were prioritised. It was aimed that the selected sampling locations are distributed in a way to represent the surface water quality along the entire Project route. Sampling measurements and laboratory analysis for baseline surface water quality have been carried out by an accredited laboratory. Surface water quality analysis results conducted at the selected locations are shown in Table 8-10.

Surface water quality is regulated by the RSWQ, which sets water quality criteria of Inland Surface Water Resources (Annex-5, Table 2). Regulation stipulates that a water resource can only be classified into one of the four classes (Class I to Class IV; Class IV being the worst water quality class) when measured values for all parameters comply with the defining water class. Accordingly, the lowest water quality class identified for one parameter determines the water quality class of the subject water resource, even though other parameters might indicate higher classes.

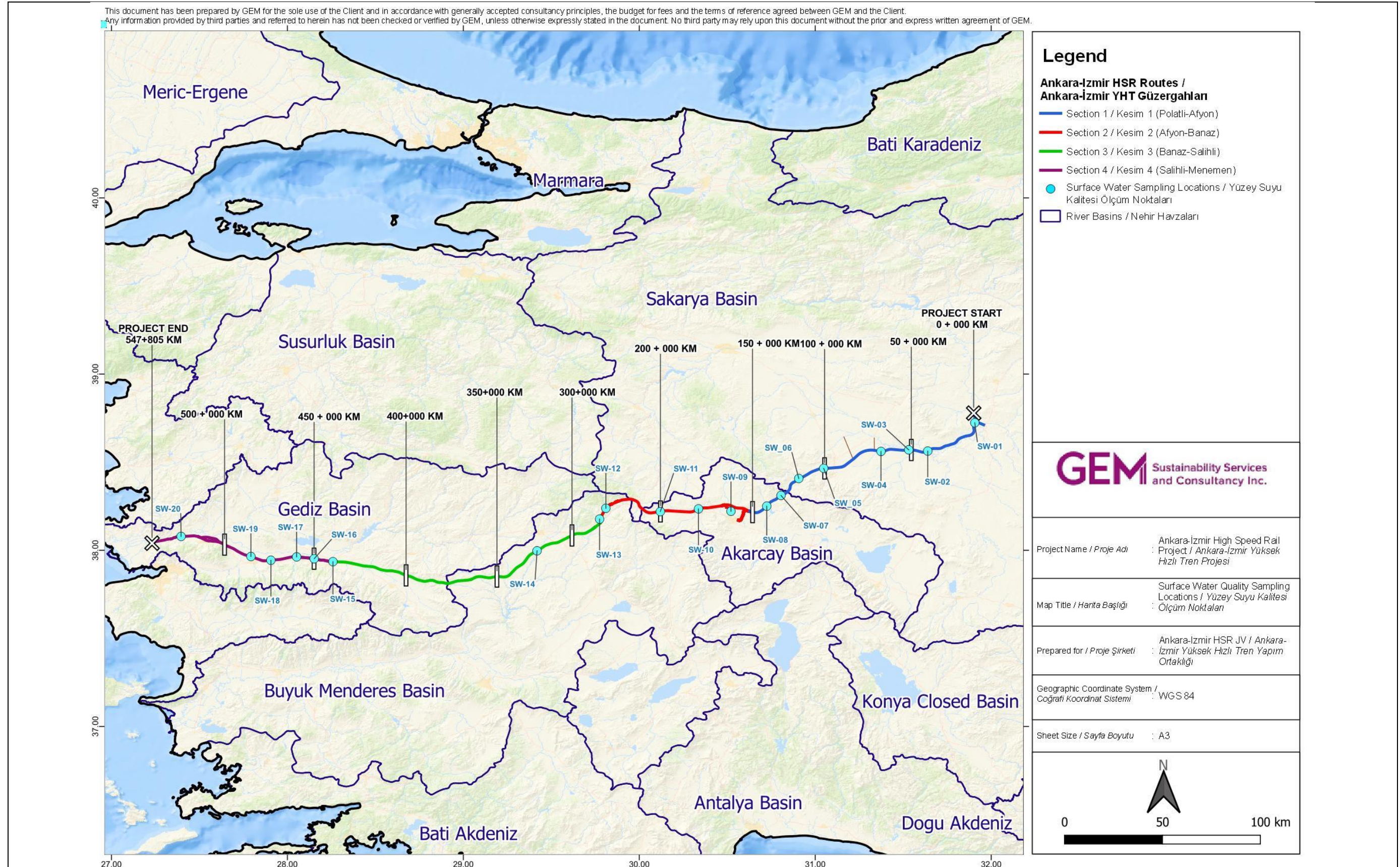


Figure 8-6. Surface Water Quality Sampling Locations

Table 8-10. Surface Water Quality Analysis Results

Parameters	Unit	Water Quality as per RSWQ (Annex-5, Table 2)				SW-01	SW-02	SW-03	SW-04	SW-05 ⁽¹⁾	SW-06	SW-07	SW-08 ⁽²⁾	SW-09 ⁽³⁾	SW-10	SW-11	SW-12	SW-13	SW-14 ⁽⁴⁾	SW-15	SW-16	SW-17	SW-18	SW-19 ⁽⁵⁾	SW-20 ⁽⁶⁾
		Class I	Class II	Class III	Class IV																				
Ammonium Nitrogen	mg/L	< 0.2	1	2	> 2	<0.01	<0.01	<0.01	<0.01	5.60	2.16	0.12	10.0	<0.01	2.59	0.18	0.12	0.19	48.0	<0.01	0.25	<0.01	<0.01	0.70	0.19
Biochemical Oxygen Demand (BOD)	mg/L	< 4	8	20	> 20	<4	<4	<4	<4	40	7	8	116	49	9	<4	18	<4	760	11	8	10	12	30	28
Dissolved Oxygen	mg/L	> 8	6	3	< 3	9.00	9.09	10.10	9.01	8.12	8.15	9.00	2.05	12.49	5.87	8.66	9.04	10.04	0.40	11.30	10.70	10.57	10.34	8.16	9.66
Fluoride	µg/L	≤ 1000	1500	2000	> 2000	560	870	930	650	650	630	490	770	1,710	270	280	450	260	480	<100	200	<100	340	<100	<100
Orthophosphate Phosphorus	mg/L	< 0.05	0.16	0.65	> 0.65	<0.01	<0.01	<0.01	<0.01	0.15	0.51	<0.01	1.18	0.52	0.52	<0.01	0.73	<0.01	0.46	<0.01	<0.01	<0.01	<0.01	<0.01	0.26
Conductivity	µS/cm	< 400	1000	3000	> 3000	1,189	1,158	1,209	1,294	735	771	500	1,117	2,600	530	677	1,059	549	6,030	105	320	282	358	398	184
Chemical Oxygen Demand (COD)	mg/L	< 25	50	70	> 70	12	13	<10	17	144	24	29	390	176	32	13	63	16	2,710	40	27	33	44	105	103
Manganese	µg/L	≤ 100	500	3000	> 3000	<1	<1	<1	<1	190	86	17	227	3	<1	<1	4	<1	108	6	<1	<1	12	79	52
Nitrate Nitrogen	mg/L	< 3	10	20	> 20	0.34	0.22	0.36	<0.10	<0.10	1.53	<0.10	<0.10	0.28	0.41	0.47	0.21	0.15	<0.10	0.73	0.63	1.15	0.38	<0.10	0.52
pH	-	6-9	6-9	6-9	6-9	8.26	8.22	7.70	8.27	8.57	7.56	8.26	7.49	8.99	7.58	7.85	7.77	7.93	6.98	7.85	7.95	7.60	7.40	6.95	7.61
Colour (436 nm)	m ⁻¹	≤ 1.5	3	4.3	> 4.3	<0.5	<0.5	<0.5	<0.5	2.16	<0.5	<0.5	0.96	2.1	1.6	<0.5	0.6	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	0.5	0.9
Colour (525 nm)	m ⁻¹	≤ 1.2	2.4	3.7	> 3.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Colour (620 nm)	m ⁻¹	≤ 0.8	1.7	2.5	> 2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Selenium	µg/L	≤ 10	15	20	> 20	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	10	<5	<5	<5	<5	<5	
Sulphur	µg/L	≤ 2	5	10	> 10	<2	<2	<2	<2	<2	<2	<2	1,700	<2	<2	<2	<2	<2	18,000	<2	<2	<2	<2	<2	
Total Nitrogen	mg/L	< 3.5	11.5	25	> 25	0.74	0.61	0.59	0.47	15.04	6.44	1.03	49.10	5.40	5.74	1.03	4.66	1.02	114.20	1.38	1.09	1.49	0.88	4.02	4.64
Total Phosphorous	mg/L	< 0.08	0.2	0.8	> 0.8	0.04	0.10	0.06	0.03	1.05	0.66	0.07	2.98	1.40	0.66	0.08	0.95	0.13	7.17	0.27	0.12	0.09	0.12	0.62	1.11
Total Kjeldahl Nitrogen	mg/L	< 0.5	1.5	5	> 5	0.39	0.38	0.22	0.47	15.0	4.50	1.02	49.10	5.12	5.30	0.53	4.39	0.86	114.20	0.65	0.46	0.34	0.45	4.02	4.11
Oil-Grease	mg/L	< 0.2	0.3	0.5	> 0.5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	23	<10	<10	<10	<10	<10	
Water Quality Class						Class III	Class III	Class III	Class III	Class IV	Class IV	Class II	Class IV	Class IV	Class IV	Class II	Class IV	Class II	Class IV	Class III	Class II	Class III	Class III	Class IV	Class IV

⁽¹⁾ Sampling location is closed to Tabaklar settlement. Field sampling team of the accredited laboratory team noted stagnant water conditions at this sampling location.

⁽²⁾ Sampling location is located close to Iscehisar, which is the centre for regional marble industry activities.

⁽³⁾ Sampling location is close to the organised industry zone in Afyonkarahisar.

⁽⁴⁾ Field sampling team of the accredited laboratory noted that the water sample collected at this sampling location had colour and odour.

⁽⁵⁾ Sampling location is located close to Turgutlu district centre. Field sampling team of the accredited laboratory noted that the water sample collected at this sampling location had odour.

⁽⁶⁾ Sampling location is located close to university campus.

8.2.2. Groundwater Resources

Table 8-11 show the groundwater reserves in the river basins along the Project route.

Table 8-11. Groundwater Reserves of the River Basins Crossed by the Project

River Basin	Groundwater Reserves of River Basins (hm ³ /year)
Sakarya River Basin	2,192.0
Akarcay River Basin	187.6
Buyuk Menderes River Basin	1,045.4
Gediz River Basin	555.0

Source: Buyuk Menderes River Basin Management Plan, Ministry of Agriculture and Forestry (2019), Sakarya River Basin Protection Action Plan, Ministry of Forestry and Water Affairs (2013).

As per the information provided in the national EIA Report of 2006, groundwater levels and formations were identified and evaluated as part of the geological and geotechnical surveys so as to feed the engineering design and construction works. To this end, drilling works and geophysical measurements were conducted, as necessary.

As reported in the national EIA of 2006, the groundwater table is usually very deep along the entire Project route. On the other hand, at certain locations, it is observed that the groundwater table is much closer to the surface. A summary of the groundwater conditions along the entire route is provided below:

- Part of the Polatli-Afyonkarahisar section (Section 1) passes through Celtik Plains, where Sakarya River forms a meander and agricultural fields are irrigated. These alluvial plains that also store some small and big rocks, has an overall poor texture, in some places with thicker and badly grown vegetation. The various species of trees and the vegetation available on the side of the stream shows that there is always water available in the basin to a certain extent. It can be said that this water passes through the alluvial deposits underneath and is kept in semi-permeable or impervious parts of the soil. It is possible to note that the main water source of the basin is Sakarya River and its' tributaries. Water seepage, showing seasonal variations, is regarded as another water source.
- The groundwater table is usually very deep along Afyonkarahisar-Menemen part of the railway route (Section 2, Section 3 and Section 4). On the other hand, at certain locations, it is observed that the groundwater table is much closer to the surface. As reported in the national EIA of 2006;
 - KM: 194+000 – 209+000: The groundwater table is at the same level with the surface or at 1-2 meters.
 - KM: 209+000 – 215+000: The groundwater table is predicted to be deep.
 - KM: 215+000 – 219+000: The groundwater table is predicted to be at 2-4 meters.
 - KM: 219+000 – 237+000: The groundwater table is predicted to be quite deep but it is possible that the groundwater table might be very close to the surface level along the streams.
 - KM: 237+000 – 246+000: The groundwater table is at 1-4 meters.
 - KM: 246+000 – 412+000: It is envisaged that between the groundwater is deep, but closer to streams, the groundwater is thought to be very close to the surface level, or at the surface level.
 - KM: 412+000 – 531+000: The part of the route passing through Alasehir, Salihli, Turgutlu, Manisa and Menemen plains corresponds to alluvial deposits that hold groundwater. Depth of the groundwater changes from 2-15 meters. At certain locations, the groundwater table is very close to the surface level, or at the surface level, where it is used for irrigation purposes.
 - KM 531+000 – 548+000: The route corresponds to mountainous areas, where the groundwater table level is predicted to be very deep.

The groundwater table in the current situation will be further identified based on the drilling program to be implemented by the Contractor, as detailed in Chapter 5.

8.3. Impact Assessment and Management

During the construction phase, water will be used for domestic purposes by the Project personnel at the work and accommodation sites, and for concrete production and dust suppression at concrete plants, asphalt plant, crushing facilities, quarries and their access roads.

The earthworks, construction and material extraction activities to be conducted during the land preparation and construction phase may lead to the following potential impacts:

- Domestic wastewater generation
- Wastewater generation at the concrete plants
- Degradation of surface water quality (due to earthworks, construction activities and material extraction at the quarries and borrow sites that cause erosion and transportation of sediments, or due to uncontrolled leakage/spill of chemicals, etc.)
- Impact on groundwater resources due to water extraction for domestic purposes at the camp sites or excavation works at the railway construction sites, quarries or borrow sites

The Contractor (through ERG Construction as the lead member of the JV companies) has in place a Water and Wastewater Management Plan developed for the construction of a large-scale motorway project in Turkey. This plan is to be revised and adapted to the Ankara-Izmir HSR Project and implemented within the scope of Project land preparation and construction activities.

During the operation phase, water will be used for domestic purposes by the passengers using the HSR services and the stations/gars and Project personnel working at the HSR operation, stations/gars, and other O&M facilities. Water use by the passengers and the Project personnel will result in domestic wastewater generation within the HSRs and at those facilities. Detailed planning of the HSR operations, O&M works and the workforce requirements (direct and contracted) at each operational facility and the water supply sources will be done by the Employer and the Operator in due course based on their applicable standards/requirements and specifications.

In addition, as informed by IFC EHS Guidelines on Railways;

- Maintenance and refurbishment of the trains and equipment typically involves a high-pressure water wash, which may contain residues from transported materials, paint, oil and grease, and other contaminants.
- Caustic solutions are often used to remove grease and dirt from axles and other metal parts.
- Acids and caustics may also be used for rust removal. Coolants are usually water-based with corrosion inhibitor additives.

The operation phase Water and Wastewater Management Plan will be developed and implemented by the Employer/Operator.

Water Use, Wastewater Generation and Management

Drinking water for Project personnel will be either supplied as bottled water or from other available permitted resources (e.g. groundwater wells) after ensuring compliance with applicable drinking water quality standards, where necessary through adequate level of treatment. The evaluation of resources to be used by the Contractor at each site is ongoing as of Q2 2021.

Water required for construction works (for dust suppression, concrete production, preparation of fill materials, etc.) is planned to be supplied from groundwater wells in line with the groundwater utilisation permits to be obtained from DSI or purchased from nearby settlements by means of water tankers. Indicative water use requirements of the construction sites/processes are presented in Table 8-12.

Table 8-12. Indicative Water Use for the Construction Sites and Processes

Construction Site/Process	Estimated Daily Water Consumption (m3/day)
Railway and engineering structure construction	50
Dust suppression at the quarries and access roads (average)	200
Crushing screening facility	50
Total	300

The construction activities will involve use of hazardous substances potentially at the maintenance areas, workshops, facility sites, etc. Fuel will be transported across the work sites and/or stored within the camp and facility sites. All necessary measures will be in place to avoid potential spills/leakages and associated impacts on the water resources.

Dust will be suppressed at construction/work sites, quarries, material borrow sites and access roads by using water trucks during dry periods. Since the water to be applied on ground for dust suppression will evaporate, no wastewater will be generated as a result of this operation.

Domestic Wastewater Generation during the Construction and Operation Phases

Domestic wastewater will be produced as a result of water use by the Project personnel. According to the data published by TurkStat for 2018, the average domestic water consumption rate in Turkey is 224 L/day per capita. It is assumed that all the domestic water to be used by the Project personnel will be converted to domestic wastewater. Table 8-13 shows the estimated domestic wastewater generation rates for the Project.

Table 8-13. Estimated Daily Wastewater Generation from the Project

Project Directorates	Sections	Corresponding Province	Estimated Number of Personnel to be Employed (Contractor and Subcontractor)	Estimated Volume of Wastewater Generation (m ³ /day)
General Project Management (*)		Afyonkarahisar	135	30.2
1st Regional Project Management	Polatli-Afyon (KM 0+000-75+000)	Ankara- Eskisehir, Afyonkarahisar	2,727	610.8
2nd Regional Project Management	Polatli-Afyon (KM 76+000-150+000)	Afyonkarahisar	3,133	701.8
3rd Regional Project Management	Afyon-Banaz	Afyonkarahisar, Usak	3,969	889.1
4th Regional Project Management	Banaz-Salihli	Usak, Manisa	1,400	313.6
5th Regional Project Management	Salihli-Menemen	Manisa, Izmir	3,415	765.0
Total			14,778	3,310.5

Source: TurkStat Statistics on Municipal Water Use, <http://www.tuikweb.tuik.gov.tr/>, February 2021.

(*) General Project Management is planned to be based in Sinanpasa (Dogus) Camp Site located at KM 190+000.

Domestic wastewater to be generated by the Project workforce will be managed by means of package domestic wastewater treatment plants to be established at the construction camp sites and/or non-leaking septic tanks at work sites (e.g. quarries, concrete plants, etc.) where the number of personnel is relatively low (84 or lower). As necessary, mobile WCs will also be provided at remote works sites. Wastewater collected in septic tanks or the tanks of the mobile WCs will be transported to the package wastewater treatment plants of the construction camp sites or disposed of by the sewage trucks of the related municipalities in line with the protocols to be executed.

Domestic wastewater to be produced at the quarries, borrow sites, etc. will be collected in septic tanks/mobile WCs and removed by the vacuum trucks of the related municipalities/firms in sufficient frequencies in accordance with the agreements/protocols to be made.

During the operation phase of the Project, domestic wastewater will be generated mainly within the high-speed trains and at the Operator's offices, HSR control centre (in Izmir), other operational facilities including stations/gars,

operation and maintenance facilities of the Operator. Detailed planning of the operation and maintenance works, workforce requirements (direct and contracted) and wastewater management methods (e.g. wastewater treatment plant/unit, connection to sewerage in line with the permits to be obtained from related authorities) at each operational facility will be done by the Employer and the Operator in due course based on their applicable standards/requirements and specifications.

Treated wastewater discharges of the Project will comply with the Project standards given in Table 8-1. Treated wastewaters will be discharged to the nearest surface waters in line with the environmental permit to be secured from the MoEU/PDoEU (see Figure 2-4 in Chapter 2 for the regulatory process as per the Regulation on Environmental Permits and Licenses).

Wastewater to be Produced at Concrete Plants during the Construction Phase

Concrete plants to be established for construction works are listed in Section 1.4.7.3.

Water requirement for concrete production is estimated to be 300 m³ per concrete plant.

Wastewater to be produced at the concrete plants due to washing of pumps and transmixers will be collected in sedimentation ponds. Following the settling of suspended solids, water will be recirculated to concrete production process to minimise need for fresh water make up. To this end, as required, technical compliance reports will be prepared and approval will be obtained from the related Provincial Directorates of the MoEU. Accordingly, there will be no wastewater discharge from the concrete plants to the receiving environment.

Wastewater to Generation due be Maintenance, Refurbishment and Cleaning Operations during the Operation Phase

Wastewater to be generated due to maintenance, refurbishment and cleaning operations to be conducted for the trains and equipment may contain residues from transported materials, paint, oil and grease, and other contaminants and require pH adjustment due to use of caustic or acidic solutions used for different purposes. Types of materials to be used in such operations will be determined by the Employer and the Operator during the construction phase based on their applicable standards/requirements and specifications. Wastewater management methods appropriate for the characteristics of the wastewater to be produced will be determined and implemented by the Employer and the Operator to ensure that management of wastewaters during the operation phase will be in line with the Project Standards.

The operation phase Water and Wastewater Management Plan will be developed and implemented by the Employer/Operator.

Impact on Surface Water Flow

The railway parts to be constructed on existing surface water bodies (e.g. rivers, creeks) or irrigation channels may act as barriers blocking flow of water within the drainage area starting from the construction phase. Section 1.4.2 describes the engineering structures (e.g. viaducts, culverts, bridges) to be constructed to ensure uninterrupted flow of water.

Impact on Groundwater

Excavation depths along the HSR route will vary depending on the topographical and hydrogeological conditions. The Contractor estimates an average excavation depth of 8 metres. The current level of groundwater table will be further identified based on the drilling program to be implemented by the Contractor, as detailed in Chapter 5 on Land Use and Geology. At locations where the excavations works will reach the groundwater level, the Contractor will take necessary design and construction measures (e.g. soil improvement, use of geotextiles and geomembranes, measures against subsidence). During tunnel boring/excavations, there is potential for groundwater intrusion depending on the groundwater level at the planned tunnel locations, which will be managed through relevant drainage measures in line with GIIPs.

The extraction activities at the quarry and borrow sites will be conducted above the groundwater table.

Potential accidental spills of hazardous materials such as fuel, oils, lubricants and cement may cause impact on groundwater quality, if not responded adequately through an Emergency Preparedness and Response Plan (EPRP).

Where blasting is used, there is a potential for nitrate and ammonia residues in the groundwater that is to be managed through appropriate blasting design and procedures, including ensuring the correct burning of explosives.

Use of groundwater for water supply purposes during the operation phase will be evaluated and decided by the Employer/Operator in due course.

The potential impacts of the Project, significance of the impacts prior to mitigation, proposed mitigation measures and the significance of residual impact are summarised in Table 8-14.

Table 8-14. Impacts, Proposed Mitigation Measures and Residual Impacts (Water and Wastewater Management)

Impact Description	Project Phase	Receptor	Impact Magnitude				Frequency	Overall Magnitude	Sensitivity/Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration						
Impact on the quality of surface water resources due to Project activities	<ul style="list-style-type: none"> Land Preparation and Construction 	<p>Surface water resources (see Table 8-4 for the rivers/creeks crossed by the HSR through Engineering Structures)</p> <p>(see Table 8-5 for the surface water resources in the vicinity of the quarries)</p>	Restricted to Local	Low to Medium	Short term reversible	Short term	Intermittent	Low to Medium	Low to High	Low to Major	<ul style="list-style-type: none"> Project-specific Water and Wastewater Management Plan will be developed and implemented by the Contractor and the subcontractors (through contractual requirements) to minimise water use and wastewater generation. The Water and Wastewater Management Plan will identify the discharge locations as per the environmental permits to be secured from the related authorities and monitoring stations to be selected in line with the requirements of the IFC General EHS Guidelines. The surface water quality sampling locations will be the basis of the surface water quality monitoring (i.e. quarterly during the construction phase) to be conducted during the construction phase. Exact locations will be identified in the Plan in consideration of the locations where the Project facilities (e.g. construction camp sites) will be placed. Project-specific Waste Management Plan, Hazardous Materials Management Plan, EPRP will be developed and implemented by the Contractor and the subcontractors (through contractual requirements) to avoid/minimise impacts on the quality of water resources. Training on the implementation of the Project-specific Water and Wastewater Management Plan, Waste Management Plan, Hazardous Materials Management Plan, EPRP will be provided to all direct and contracted Project personnel as part of the induction (refresher trainings will be planned, as required). Domestic wastewater to be generated by the Project workforce will be treated at the package domestic wastewater treatment plant to be installed at the construction camp sites or collected in non-leaking septic tanks for further disposal. The permitting requirements (i.e. environmental permit) for treated domestic wastewater discharges will be fulfilled in line with the applicable national legislation. Domestic wastewater in septic tanks/mobile WCs will be disposed of by means of vacuum trucks as per the agreements/protocols to be executed with the related municipalities/licensed companies. Hazardous materials will be managed (e.g. stored in designated areas as per SDS requirements, provision of spill kits, absorbent pads/sands for management of accidental spillages etc.) in line with the Hazardous Materials Management Plan to be developed and implemented. Sedimentation ponds will be constructed at concrete plants to settle the wastewater and recirculate it to process to minimise fresh water use and avoid wastewater discharge into environment. As required, technical compliance reports will be prepared and approval will be obtained from the related Provincial Directorates of the MoEU for the reuse of wastewater in the concrete plants. Pumps and transmixers will be washed only at the concrete plants. Concrete slurry will not be discharged into environment. Project-specific Water and Wastewater Management Plan will be reviewed at least annually and updated as necessary. As per the Technical Specifications of AYGM for Infrastructure Works, required facilities (e.g. drainage and diversion ditches, water collection sumps/ponds, cofferdams, channels) will be designed and constructed to ensure control and diversion of the surface runoff flowing into and accumulating at the work sites. Design capacity of these facilities will be sufficient to ensure avoidance of impacts on work sites and adjacent parcels. Sand filters will be provided depending on the soil characteristics of the work sites. Site-specific conditions will be taken into consideration in the design and construction of the surface water management facilities. 	Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<ul style="list-style-type: none"> Temporary sediment traps will be installed and sedimentation basins will be provided for the collection and sedimentation of silty water arising from excavation sites, as required. 	
	<ul style="list-style-type: none"> Operation 	Surface water resources (in case of discharge) (see Table 1-15 for the surface water resources in the vicinity of the stations)	Local	Low to Medium	Short term reversible	Short term	Intermittent	Low to Medium	Low to High	Low to Major	<ul style="list-style-type: none"> The operation phase Water and Wastewater Management Plan will be developed and implemented by the Employer/Operator. Detailed planning of the operation and maintenance works, workforce requirements (direct and contracted) and wastewater management methods (e.g. wastewater treatment plant/unit, connection to sewerage) at each operational facility will be done by the Employer and the Operator in due course based on their applicable standards/requirements and specifications. Types of materials to be used in maintenance, refurbishment and cleaning operations will be determined by the Employer and the Operator during the construction phase based on their applicable standards/requirements and specifications. Wastewater management methods appropriate for the characteristics of the wastewater to be produced will be determined and implemented by the Employer and the Operator. 	Negligible
Impact on surface water flow due to barrier effect of railway corridor	<ul style="list-style-type: none"> Land Preparation and Construction 	Surface water resources	Wide	High	Irreversible	Long term	Continuous	High	Low to High	Major	<ul style="list-style-type: none"> Engineering structures (e.g. viaducts, culverts, bridges) to be constructed to ensure continuity flow of water are given in Section 1.4.2. Design of the engineering structures will be compliant with the Technical Specifications of AYGM for Infrastructure Works and other applicable standards. 	Negligible to Minor
Impact on groundwater resources due to excavations, quarry operations, tunnel works, etc.	<ul style="list-style-type: none"> Land Preparation and Construction 	Groundwater resources	Restricted to local	Low to Medium	Medium term reversible	Short term	Intermittent or Continuous	Low to Medium	Low to High	Low to Major	<ul style="list-style-type: none"> As per the Technical Specifications of AYGM for Infrastructure Works, groundwater level will be monitored to keep the work sites dry, by using piezometers where required. If water is accumulated in the excavation sites, it will be collected in sumps At locations where the construction works will reach the groundwater level, the Contractor will take necessary design and construction measures (e.g. soil improvement, use of geotextiles and geomembranes, measures against subsidence). Tunnel construction sites will be provided with adequate drainage system and water isolation will be ensured by using of geotextile and geomembrane materials as per the Tunnel Construction Method Statement of TCDD and Technical Specifications of AYGM for Infrastructure Works. Water to be collected by means of the drainage system will be diverted to natural drainage system. Groundwater utilisation permits for the use of groundwater for drinking water purposes and construction activities will be secured from the related authorities. Potential impacts of blasting on groundwater quality will be managed through appropriate blasting design and procedures, including ensuring the correct burning of explosives. Sufficient distance (foreseen as minimum 10 metres; exact distance to be identified by the Contractor during the pre-construction field surveys) will be maintained between the Karacali Creek and the operation area of the Cikrikci Quarry to avoid any impact on the surface water resource stemming from the quarry activities. The quarry operation activities planned by the Contractor will not be conducted below the creek elevation and groundwater level and will not interfere with the creek bed. The waste rock and other wastes produced during the operations will not be discharged to the creek bed. Interception channels will be built to divert the surface runoff to natural drainage without contacting the quarry operation area. Temporary waste storage areas and hazardous material storage areas will be checked on a daily basis to ensure that there is no spill/leakage and waste management practices do not pose any risk on the quality of surface or groundwater resources. 	Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<ul style="list-style-type: none">Project-specific SEP will be implemented to address any water-related grievance (related to water quality or quantity) and plan/take corrective actions, where necessary.	
Impact on groundwater resources due to accidental/unintended spills/leakages	<ul style="list-style-type: none">Land Preparation and ConstructionOperation	Groundwater resources	Restricted to local	Low to High	Short term reversible	Short term	One-off/ Rare	Low to High	Low to High	Minor to Major	<ul style="list-style-type: none">All chemical/hazardous material storage tanks, waste oil barrels and liquid waste tanks/containers will be provided with secondary containment as per WBG General EHS Guidelines, keeping absorbent pads or materials next to storage areas and keeping drums and containers containing fuel, oil or other chemicals in a containment with a capacity of up to 110% of the volume of material stored.Hazardous materials will be managed (e.g. stored in designated areas as per SDS requirements, provision of spill kits, absorbent pads/sands for management of accidental spillages etc.) in line with the Hazardous Materials Management Plan to be developed and implemented.Generators will be equipped with drip trays to be checked regularly.Project-specific EPRP will be developed and implemented by the Contractors and the subcontractors (through contractual requirements) for the construction phase.Project-specific EPRP will be developed and implemented by the Employer/Operator for the operation phase.	Negligible

9. WASTE MANAGEMENT

This Chapter discusses waste generation during the land preparation and construction, and operation phases of the Project and identifies mitigation measures for the potential impacts stemming from on-site waste generation.

The following main data sources have been used to compile this Chapter:

- Provincial Environmental Status Reports of Ministry of Environment and Urbanisation (MoEU) for 2019
- Information on licensed waste facilities along the Project route based on the websites of the MoEU, Provincial Directorates of Environment and Urbanisation (PDoEUs) and the related municipalities
- Waste statistics for 2018 published by Turkish Statistical Institute (TurkStat) (published once in two years)

9.1. Project Standards

The Regulation on Waste Management is the key legislation setting out the framework for management of waste in Turkey in alignment with the European Union (EU) Waste Framework Directive (2008/98/EC). Complementary to the Regulation on Waste Management, there are other regulations, communiques and circulars in place for the management of specific waste types. Legislation that will be applicable to the management of wastes within the scope of the Project is listed below:

- Regulation on Mining Wastes
- Regulation on the Control of End-of-Life Vehicles
- Regulation on the Control of Excavation Soil, Construction and Demolition Waste
- Regulation on the Control of Medical Wastes
- Regulation on the Control of Packaging Wastes
- Regulation on the Control of Waste Batteries and Accumulators
- Regulation on the Control of Waste Electrical and Electronic Equipment
- Regulation on the Control of Waste Tires
- Regulation on the Control of Waste Vegetable Oils
- Regulation on the Landfill of Wastes
- Regulation on the Management of Waste Oils
- Regulation on Zero Waste
- Communique on Recovery of Some Non-Hazardous Wastes
- Communique on Transportation of Waste by Highway
- Circular on COVID-19 Measures for the Waste Management of Single Use Masks, Gloves and Other Personal Hygiene Materials

In addition to the national waste management legislation, the relevant requirements of IFC PS3 on Resource Efficiency and Pollution Prevention, general and industry-specific World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines and other available Good International Industry Practices (GIIPs) will also be applicable to the Project.

9.2. Baseline Conditions

The daily average municipal waste generation for the provinces located on the Project route are presented in Table 9-1.

Table 9-1. Municipal Waste Generation Statistics for 2018

Province	Waste Generation (tons/day)			Waste Generation (kg/day/person)		
	Domestic (Non-recyclable) (*)	Recyclable (*)	Total	Domestic (Non-recyclable) (*)	Recyclable (*)	Total
Ankara	4,519.48	1,936.92	6,456.41	0.826	0.354	1.18
Eskisehir	636.29	272.70	908.99	0.735	0.315	1.05
Afyonkarahisar	394.34	169.00	563.34	0.721	0.309	1.03
Kutahya	307.23	131.67	438.90	0.693	0.297	0.99
Usak	278.79	119.48	398.27	0.987	0.423	1.41
Manisa	1231.66	527.85	1759.51	0.875	0.375	1.25
Izmir	4,089.71	1,752.73	5,842.44	0.952	0.408	1.36
Total (Provinces)	11,457.50	4,910.35	16,367.86			
Turkey	61,771.11	26,473.33	88,244.44	0.812	0.348	1.16

Source: TurkStat. Municipality Waste Statistics for 2018.

(<https://tuikweb.tuik.gov.tr/PreTabloArama.do?metod=search&araType=vt>)

(*) Recyclable and non-recyclable wastes have been calculated based on the Environmental Indicators published by MoEU, which states that 30% of generated municipal waste (by weight) consists of packaging waste (MoEU, 2015. <https://cevreselgostergerler.csb.gov.tr/ambalaj-atiklari-i-85757>).

The existing licensed waste management infrastructure including landfills³⁶ and other recycling/recovery facilities along the Project route is given in Table 9-2.

Table 9-2. Licensed Landfills and Waste Management Facilities along the Project Route

Facility Type	Province (*)						
	Ankara	Eskisehir	Afyon karahisar	Kutahya	Usak	Manisa	Izmir
Class I Landfill (Hazardous Waste) (**)	1	0	0	0	0	2	1
Class II Landfill (Municipal Waste and Non-hazardous Waste)	2	1	1	1	1	1	2
Packaging Waste Collection, Separation and Recycling Facilities	14	25	5	30	18	57	169
Hazardous Waste Recovery Facilities	17	5	0	2	3	13	39
Non-Hazardous Waste Recovery Facility	34	26	19	11	65	71	176
Waste Oil Recovery Facility	0	0	0	0	1	0	3
Vegetable Waste Oil Recovery Facility	0	0	0	0	0	0	2
Waste Battery and Accumulator Recovery Facility	0	2	0	1	0	0	2
End-of-Life Tire Recovery Facility	0	2	0	0	1	0	3
Medical Waste Sterilisation Facility	0	1	1	1	0	1	0
Waste Electrical and Electronic Equipment Processing Facility	9	5	0	1	0	7	0

Source: (*) Provincial Environmental Status Reports for 2019, Wastes – Results and Evaluation Table, MoEU, 2020 (<https://ced.csb.gov.tr/2019-yili-il-cevre-durum-raporlar-i-98681>).

(**) <https://eizin.cevre.gov.tr/Rapor/BelgeArama.aspx>, MoEU, 2021.

³⁶ The Regulation on Landfill of Waste categorises landfills into three classes as Class I Landfills designed for the disposal of hazardous wastes, Class II Landfills designed for the disposal of non-hazardous wastes (including municipal wastes) and Class III Landfills designed for the disposal of inert wastes.

9.3. Impact Assessment and Management

Different types of hazardous and non-hazardous waste (especially domestic) will be generated as a result of land preparation and construction, and operation activities of the Project.

The generated waste will be managed in line with the mitigation hierarchy and as per the Project Standards to avoid/minimise potential impacts on the environment and community health and safety. The Project will comply with the requirements of the national waste management legislation as well as international standards including IFC PS3 and applicable WBG EHS Guidelines and GIIPs.

The Contractor (through ERG Construction as one of the JV companies) has in place a Waste Management Plan developed for the construction of a large-scale motorway project in Turkey. This plan is to be revised and adapted to the Ankara-Izmir HSR Project and implemented within the scope of Project land preparation and construction activities.

The operation phase Waste Management Plan will be developed and implemented by the Employer/Operator.

Waste Types

The types of waste anticipated to be generated during the land preparation and construction, and operation phases of the Project are listed below:

- Municipal solid wastes (non-hazardous) including the packaging (recyclable) wastes (not contaminated with hazardous substances) and COVID-19 related wastes
- Excavation and construction waste (only during the land preparation and construction phase)
- Hazardous and special waste
- Treatment/septic tank sludge (non-hazardous)

Municipal Solid Wastes (Non-hazardous)

Municipal solid wastes will be generated by the Project personnel (direct and contracted) at the construction camp sites, facility sites (e.g. quarry sites, material borrow sites, concrete plants, etc.) and other temporary work sites along the HSR route during the construction phase.

Table 9-3 shows the amount of waste estimated to be produced at each Project Management site during the peak construction phase, where the construction camp sites, facility sites and temporary work sites will be located. This includes the non-hazardous packaging wastes including paper and cardboard, plastic, metallic and glass packaging waste.

Table 9-3. Municipal Waste Generation Estimation for the Project

Project Management	Section under the Responsibility of the Management	Corresponding Province	Total Number of Personnel (Direct and Contracted)	Approximate Amount of Municipal Solid Waste Anticipated to be Generated during the Peak Construction Phase (ton/day) (**)
General Project Management (*)		Afyonkarahisar	135	0.16
1 st Regional Project Management	Polatli-Afyon	Ankara- Eskisehir, Afyonkarahisar	2,727	3.16
2 nd Regional Project Management	Polatli-Afyon	Afyonkarahisar	3,133	3.63
3 rd Regional Project Management	Afyon-Banaz	Afyonkarahisar, Usak	3,969	4.60
4 th Regional Project Management	Banaz-Salihli	Usak, Manisa	1,400	1.62
5 th Regional Project Management	Salihli-Menemen	Manisa, Izmir	3,415	3.96
Total			14,778	17.14

Source: Contractor, December 2020. Project Information Note.

(*) General Project Management is planned to be based in Sinanpasa (Dogus) Camp Site located at KM 190+000.

(**) Based on an assumption that the daily municipal waste generation rate will be 1.16 kg per person, which is the average waste generation rate for Turkey.

During the COVID-19 pandemic, the use of masks, gloves and other personal hygiene materials by the Project personnel and visitors will result in production of additional waste amounts at the office and work sites, cafeterias, accommodation facilities, etc., which are to be managed as per MoEU Circular entitled 'COVID-19 Measures for the Waste Management of Single Use Masks, Gloves and Other Personal Hygiene Materials' (Circular Date: 7 April 2020; Circular No. 2020/12). These wastes will be delivered to the municipality to be managed under 'other' municipal waste category.

During the operation phase of the Project, non-hazardous municipal solid waste will be generated mainly within the high-speed trains and at the Operator's offices, HSR control centre (in Izmir), other operational facilities including stations/gars, operation and maintenance facilities of the Operator. These municipal solid wastes will include recyclable wastes to be produced at the retail facilities, common passenger areas, etc. that will be located at the stations/gars.

Hazardous and special wastes (e.g. waste oil, lubricants, waste metals/steel/concrete from rail maintenance/potential upgrade works) will also be produced during the operation phase at the maintenance sites and facilities and other operational facilities as relevant. These wastes typically include solids from mechanical cleaning of rail cars; paint chips and sandblast grit; waste paint; spent solvent and solvent sludges (from painting and cleaning); sludge from cleaning and wastewater treatment; waste oil, hydraulic and other fluids; waste metals/steel/concrete from rail maintenance/potential upgrade works; spent locomotive and signal batteries; and spent brake shoes. Hazardous wastes may also be generated/released in case of accidents, which will be responded through the Emergency Preparedness and Response Plan (EPRP).

Detailed planning of the operation and maintenance works and the workforce requirements (direct and contracted) at each operational facility will be done by the Employer and the Operator in due course based on their applicable standards/requirements and specifications.

Excavated Materials and Construction Wastes (During Construction Phase only)

For the route parts, for which infrastructure works are under the responsibility of the Contractor, the infrastructure works of the Project started in the past and carried out by other contractors up until 2018. There is no ongoing construction works along the route, except Section 3 and parts of Section 4 (initial part of the section between KM 439+000-456+500 and Manisa-Menemen part between KM 522+100-547+805) which are being conducted by other contractors.

As of December 2020, the amount of progress achieved for the estimated excavation and fill works is presented in Table 9-4.

Table 9-4. Progress of Excavation and Fill Amounts

Section	Description	Approximate Excavation and Fill Volumes (million m ³)					
		Total		Completed by the Previous Contractors		To be Completed by the Contractor	
		Excavation	Fill	Excavation	Fill	Excavation	Fill
Section 1	Polatli-Afyon	32.6	16.6	27.4	6.3	5.2	10.3
Section 2	Afyon-Banaz	11.6	10.5	8.1	1.7	3.5	8.8
Section 4 (*)	Salihli-Manisa	0.1	5.5	0.0	0.0	0.1	5.5
Total		44.3	32.6	35.5	8.0	8.80	24.6

Source: Contractor, February 2021. Cut and Fill Volumes for the Project.

(*) Infrastructure works for Section 3 (Banaz-Salihli) and part of Section 4 (initial part of Salihli-Manisa between KM 439+000 and 456+500 and Manisa-Menemen section between KM 522+100 and 547+805) are not within the scope of Contractor. Data for Hatipler Passage is not included in this table as the expropriation plans for this part will be reprepared due to route relocation.

To the extent feasible, the excavated materials will be reused in the filling operations. The remaining portion, which is not suitable for reuse in fill operations, will be disposed of at licensed excavated material storage sites within the expropriation corridor of the railway. If proper storage sites cannot be designated within the expropriation corridor, the Contractor will identify parcels, for which usage rights will be obtained from the respective right holders as per the requirements of the applicable legislation (e.g. private parcels will be purchased or rented based on mutual agreements).

Construction waste to be produced will include scrap metal, timber, cement waste, wooden pallets, etc., which will be reused where possible or as appropriate recycled/recovered/disposed of at licensed facilities, as described below in Table 9-5.

There are buildings within the expropriation corridor of the Project as identified in Chapter 11 on Socio-economy. As a result of the demolition of the present buildings, construction and demolition waste will also be produced.

Hazardous and Special³⁷ Wastes

During the land preparation and construction phase of the Project, various hazardous and special wastes will be generated as a result of the activities/works involving use of fuels, chemicals, oils, solvents, etc. (e.g. operation and maintenance of construction equipment and machinery, laboratory operations, quarry and plant operations, concrete and asphalt production, other materials contaminated with hazardous substances).

As per the Regulation on Waste Management, the wastes marked with an asterisk (*) in the list of wastes provided in Annex-4 of the Regulation shall be considered as hazardous waste. The wastes marked with an (A) sign in the list of wastes, regardless of the concentration of hazardous substances (as indicated in Annex 3/B of the Regulation), are classified as hazardous waste. Hazardous property of the wastes marked with an (M) sign shall be identified.

The hazardous and special waste types anticipated to be generated during the construction phase include, but not limited to:

- Used batteries and accumulators;
- Waste tires;
- Contaminated packaging material;
- Metal waste contaminated with hazardous materials;
- Medical waste;
- Waste oil.

Hazardous and special wastes are required to be properly managed in line with relevant regulations to avoid potential impacts on both environmental receptors (soil, surface, and groundwater) and health of the local communities and the Project personnel.

Treatment Plant/Septic Tank Sludge (Non-hazardous)

The operation of domestic wastewater treatment plants at the camp sites and storage of domestic wastewater in septic tanks will result in the generation of treatment plant/septic tank sludge, which will further be managed as stipulated by the Regulation on Waste Management.

The potential impacts of the Project, significance of the impacts prior to mitigation, proposed mitigation measures and the significance of residual impact are summarised in Table 9-5.

³⁷ "Special Waste" terminology is used by the MoEU for waste accumulators and batteries, waste vegetable oils, waste oils, waste tires, waste electrical and electronic equipment and end-of-life vehicles. Special waste could be classified either as hazardous or non-hazardous. It should be noted that specific regulations are in place for special wastes as given under the Project Standards.

Table 9-5. Impacts, Proposed Mitigation Measures and Residual Impacts (Waste Management)

Impact Description	Project Phase	Receptor	Extent		Impact Magnitude		Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
					Reversibility	Duration						
Additional load on the local/regional infrastructure for the management of hazardous and non-hazardous wastes (e.g. sanitary landfills, licensed reuse/recovery facilities, etc.)	<ul style="list-style-type: none"> Land Preparation and Construction Operation 	<ul style="list-style-type: none"> Local/regional waste management infrastructure 	Local to Wide (depending on the location of the disposal site)	Negligible	Short term reversible to irreversible (i.e. for disposal at sanitary landfills)	Short term to Long term	Continuous	Negligible	Low	Negligible to Minor	<ul style="list-style-type: none"> Project-specific Waste Management Plan for the construction phase will be developed by the Contractor and implemented by the Contractor and subcontractor personnel (through contractual requirements) to avoid or minimise (when avoidance is not possible) the amount of waste to be generated as a result of the construction activities. Project-specific Waste Management Plan for the operation phase will be developed and implemented by the Employer/Operator. This plan will be in line with the Project Standards, reflecting regulatory requirements of the waste management legislation in force throughout the operation phase as well as applicable GIIP. Waste reuse/recycling/recovery/disposal agreements with the Municipality and licensed recovery/disposal firms will be executed for the management of hazardous and non-hazardous waste. The building demolition works during the construction phase will be conducted in line with the requirements of the Regulation on Waste Management and Regulation on the Control of Excavation Soil, Construction and Demolition Waste, the Regulation on Health and Safety Measures in Working with Asbestos, Regulation on the Assessment and Management of Air Quality and Regulation on Assessment and Management of Environmental Noise. To this end, specific requirements defined for the demolition works, including occupational health and safety measures to be taken for the protection of employee health and safety, measures against dust and noise generation, management of hazardous demolition wastes will be fulfilled. 	Negligible
Potential impacts due to storage of excess excavated materials, which are not used within construction/fill works	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Soil, surface water and groundwater environments Ecosystem Project personnel 	Restricted to Local	Low to Medium	Irreversible	Long term	Continuous	Medium to High	Low to Medium (depending on the characteristics of the storage areas to be designated)	Minor to Moderate	<ul style="list-style-type: none"> Project-specific Waste Management Plan will be developed by the Contractor and implemented by the Contractor and subcontractor personnel (through contractual requirements) to avoid or minimise (when avoidance is not possible) the amount of waste to be generated as a result of the Project activities. The amount of excavated material to be reused in the filling works will be maximised. If proper storage sites cannot be designated within the expropriation corridor, the Contractor will identify parcels, for which usage rights will be obtained from the respective right holders as per the requirements of the applicable legislation. The following criteria will be considered in the selection of excavated material storage sites that will be located out of the expropriation corridor: <ul style="list-style-type: none"> Distance to settlement areas and residential buildings will be considered. Parcels that are not used for agricultural or grazing purposes will be prioritised. Parcels that are not suitable for future agricultural purposes (e.g. parcels with high slope, stony parcels) <p>The E&S studies to be performed prior to entry to off-site excavated material storage sites are described in Chapter 3 on Project Alternatives and Chapter 18 on ESMS.</p>	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude					Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration							
Potential impacts of on-site hazardous and non-hazardous waste on environmental resources and human receptors, if not managed properly	<ul style="list-style-type: none">Land Preparation and ConstructionOperation	<ul style="list-style-type: none">Soil, surface water and groundwater environmentsEcosystemProject personnel	Restricted to Local	Low	Short term reversible	Short to medium term	Intermittent	Low to Medium	Low to High	Minor to Moderate	<ul style="list-style-type: none">Project-specific Waste Management Plan for the construction phase will be developed by the Contractor and implemented by the Contractor and subcontractor personnel (through contractual requirements) to avoid or minimise (when avoidance is not possible) the amount of waste to be generated as a result of the Project activities.Project-specific Waste Management Plan for the operation phase will be developed and implemented by the Employer/Operator. The operation phase Waste Management Plan will promote and ensure waste recycling through placement of labelled waste containers in passenger terminals for recyclable including metals, glass, paper, and plastics. Food establishments at the stations/gars will be required to segregate compostable and other food waste for recycling. Train operators and cleaning contractors will be required to segregate waste in the trains by separating the collection of recyclables including papers, plastic, and metallic containers.Training on the implementation of the Project-specific Waste Management Plan will be provided to all direct and contracted Project personnel as part of the induction (refresher trainings will be planned, as required) during the construction and operation phases of the Project.Waste segregation and storage at temporary waste storage areas will be managed according to the standards specified by the related legislations and GIIP.Temporary waste storage areas with adequate capacity will be provided at each camp, facility and work sites and as required at operational facilities.Wastes will be classified and labelled according to their waste codes.Hazardous wastes and non-hazardous wastes will be collected and stored separately.The waste storage areas will be fenced, gated and the entrance doors will be kept locked. The keys will be kept by authorised personnel.The contact information of the personnel in charge of the waste storage area and warning signs will be posted at the temporary storage areas.Reinforced concrete or similar impermeable materials will be used on floors of temporary waste storage waste areas to prevent soil and groundwater contamination.Adequate drainage system will be provided to collect any leakages.Secondary containment will be provided for liquid wastes in line with the legislation.Periodic visual checks will be conducted to identify any leakages/spillages or emergencies.Waste/used explosives (during the construction phase) will be stored separately in waste storage areas.Removal of wastes will be ensured in appropriate frequencies so that storage capacities at the temporary waste storage areas/storage compartments are observed.Industrial Waste Management Plans for all waste generated camp and facility sites (including hazardous and non-hazardous waste) will be submitted to the relevant PDoEU as per the format defined by the MoEU.	Negligible	

Impact Description	Project Phase	Receptor	Impact Magnitude		Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude						
									<ul style="list-style-type: none">• Temporary Waste Storage Permit will be obtained from the related PDoEU for temporary waste storage sites at construction camp sites/facilities generating hazardous waste of more than 1,000 kg per month.• Hazardous Materials and Hazardous Waste Compulsory Liability Insurance will be executed as per the relevant provisions of the Regulation on Waste Management for the hazardous waste temporary storage areas/containers regardless of the amount of hazardous waste stored.• Hazardous wastes (except medical waste) will be temporarily stored at the waste storage areas for a maximum duration of 6 months and non-hazardous waste for a maximum duration of one year.• Official waste declarations for all waste generated camp and facility sites will be submitted to the online system of MoEU, starting from January each year until the March at least. Copies of the annual waste declaration forms and national waste transport forms will be kept onsite for 5 years. As per the MoEU Circular entitled 'COVID-19 Measures for the Waste Management of Single Use Masks, Gloves and Other Personal Hygiene Materials';<ul style="list-style-type: none">– Masks, gloves and other personal hygiene material wastes generated at the offices, dormitories and work sites will be collected separately.– Waste bins will be placed at the entrances and exits of the office buildings, dormitories, cafeterias and at common areas across the accommodation facilities and work sites.– The waste bins will be labelled explicitly.– Waste bags will not be mixed with other wastes and the waste bags will be transported to a designated temporary storage area by securing them in a second bag via tightly closing.– The wastes will be kept at designated temporary storage areas out of reach of other people and animals for at least 72 hours and then will be delivered to the municipality to be managed under 'other' domestic waste category.– The temporary waste storage areas will be kept closed at all times and secured appropriately.– The wastes generated in potential site quarantine/isolation units and at the site infirmaries will be managed as 'medical waste' and wastes generated from these areas will not be mixed with other wastes.• Regular monitoring of the waste management practices of the direct and contracted Project employees will be conducted by means of document review (e.g. permits, waste reuse/recycling/disposal agreements) and visual checks at the work sites.• Project-specific Waste Management Plan will be reviewed annually and updated as necessary.	

10. BIODIVERSITY

This Chapter provides description of the biodiversity features of the Project Area including identification and assessment of critical habitat as per IFC PS6 and Guidance Note 6 (June 2019).

10.1. Project Standards

The legal framework on biodiversity conservation and assessment applicable to the Project is given below.

Framework	Legislation, Guidelines and Standards
International Conventions and Protocols (ratified by Turkey)	<ul style="list-style-type: none"> UN Convention on Biological Diversity (CBD) and the Cartagena Protocol on Biosafety (ratified in 1997) The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) (ratified in 1984) The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (ratified in 1996) The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) (ratified in 1994) The Convention Concerning the Protection of World Cultural and Natural Heritage (UNESCO World Heritage Convention) (ratified in 1983) Convention to Combat Desertification (ratified in 1998) International Treaty on Plant Genetic Resources for Food and Agriculture (ratified in 2007) European Landscape Convention (ratified in 2003) Convention on the Conservation of Migratory Species of Wild Animals (CMS) / Agreement on the Conservation of Populations of European Bats (EUROBATS) (<i>Turkey is not a party</i>) CBD – Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets
Main National Laws and Regulations	<ul style="list-style-type: none"> Law on National Parks Law on Environment Law on Terrestrial Hunting Law on Forests Law on Protection of Animals Law on Water Products Law on Agriculture Law on Veterinary Services, Plant Health, Food and Feed Law on the Protection of Breeder's Rights for New Plant Varieties Seed Law Law on the Conservation of Cultural and Natural Assets Regulation on the Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Regulation on the Preservation of Wetlands Bylaw on Fisheries Regulation on the Collection, Storage and Use of Plant Genetic Resources 2020-2021 Hunting Season Decision No. 19 of Central Hunting Commission
Main National Strategy Documents	<ul style="list-style-type: none"> 11th Development Plan (2019-2023) National Biodiversity Action Plan (2018-2028) EU Integrated Environment Strategy (2007-2023) Action Plan for Lakes and Wetlands (2017-2023)
National Guidelines	<p><u>Protected Areas</u></p> <ul style="list-style-type: none"> Important Bird Areas (IBAs) of Turkey (Magnin and Yazar, 1997) Key Biodiversity Areas (KBAs) of Turkey (Eken et al., 2006) 122 Important Plant Areas (IPA) of Turkey (Ozhatay et al., 2008) <p><u>Flora</u></p> <ul style="list-style-type: none"> Flora of Turkey and East Aegean Islands (Davis, 1965-1988) Turkish Plant Names (Baytop, 1994) Red Data Book of Turkish Plants (Ekim et al., 2000) <p><u>Fauna</u></p> <ul style="list-style-type: none"> Pocket Book of Birds of Turkey (Kiziroğlu, İ., 2009) General and Turkish Zoogeography (Demirsoy, 2002) Red Book of Butterflies in Turkey (Karaçetin & Welch, 2011)
International Standards and Guidelines	<ul style="list-style-type: none"> IFC PS6 (2012) and Guidance Note (June 2019) on Biodiversity Conservation and Sustainable Management of Living Natural Resources EU Habitats Directive (92/43/EEC) and EU Birds Directive (2009/147/EC)

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)

Bern Convention, entered into force in 1982, aims to ensure conservation of wild flora and fauna species and their habitats. Special attention is given to endangered and vulnerable species, including endangered and vulnerable migratory species specified in appendices as given below:

Appendix No	Content
I	Strictly protected flora species
II	Strictly protected fauna species
III	Protected fauna species
IV	Prohibited means and methods of killing, capture and other forms of exploitation

The Convention has been ratified by 51 Parties including Turkey in 1984.

The Parties to the Convention undertake to take all appropriate measures to ensure the conservation of the habitats of the wild flora and fauna species. Such measures should be included in the Parties planning and development policies and pollution control, with particular attention to the conservation of wild flora and fauna. The Parties undertake to promote education and disseminate general information concerning the need to conserve species of wild flora and fauna and their habitats.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES, entered into force in 1975, aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Currently there are 183 Parties to the Convention.

Roughly 5,800 species of animals and 30,000 species of plants are protected by CITES against over-exploitation through international trade. They are listed in the three CITES Appendices. The species are grouped in the Appendices according to how threatened they are by international trade as given below.

Appendix No	Explanation
I	Include all species threatened with extinction which are or may be affected by trade. Trade in specimens of these species must be subject to particularly strict regulation in order not to endanger further their survival and must only be authorised in exceptional circumstances.
II	Include: <ul style="list-style-type: none"> (a) all species which although not necessarily now threatened with extinction may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with their survival; and (b) other species which must be subject to regulation in order that trade in specimens of certain species referred to in (a) may be brought under effective control.
III	Include all species which any Party identifies as being subject to regulation within its jurisdiction for the purpose of preventing or restricting exploitation, and as needing the co-operation of other Parties in the control of trade.

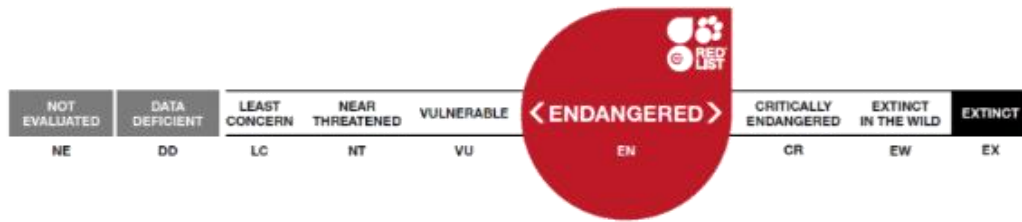
IUCN Red List of Threatened Species

The International Union for Conservation of Nature (IUCN) is a membership Union uniquely composed of both government and civil society organisations. It provides public, private, and non-governmental organisations with the knowledge and tools that enable human progress, economic development, and nature conservation to take place together.

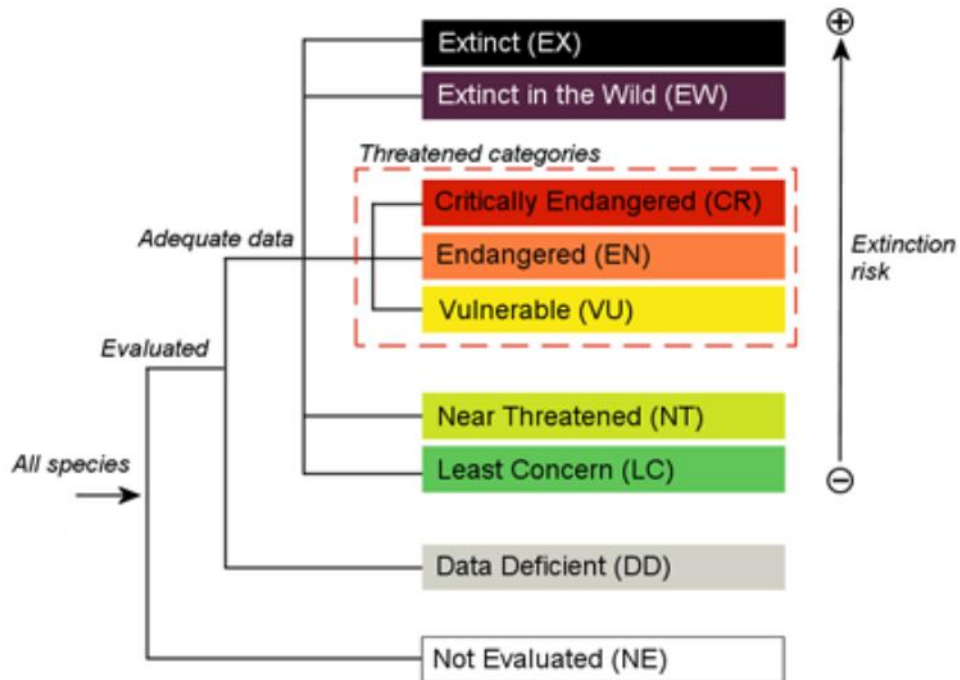
The IUCN Red List of Threatened Species is the world's most comprehensive inventory of the global conservation status of plant and animal species. It uses a set of quantitative criteria to evaluate the extinction risk of thousands of species. These criteria are relevant to most species and all regions of the world.

The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. The general aim of the system is to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk.

The **IUCN Red List Categories**³⁸ define the extinction risk of species assessed; nine categories extend from NE (Not Evaluated) to EX (Extinct) as given below:



Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) species are defined as “threatened categories” as highlighted below³⁹:



³⁸ IUCN Website: <https://www.iucn.org/resources/conservation-tools/iucn-red-list-threatened-species>

³⁹ IUCN. (2012). IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp.

10.2. Baseline Conditions

The baseline biodiversity features of the Project Area including habitat and vegetation composition, terrestrial flora/fauna and aquatic species are described in detail in this section.

The AIHSR Project has been developed as four (4) sections connecting Ankara to Izmir:

- The construction works of Section 1 and Section 2 initially started between 2012 and 2016. Afterwards, in 2018, the construction (infrastructure) works of the contractors in these sections were suspended. Back that time, as also identified during the ESIA field surveys, some of the engineering structures (bridges, viaducts, tunnels, culverts) have already been constructed (please see Table 10-15 for site photos).
- As of Q2 2021, the construction works in Section 3a, Section 3b, Section 4a (initial part of Salihli-Manisa between KM 439+000 and 456+500) and Section 4d (Manisa-Menemen section between KM 522+100 and 547+805) are still in progress under the responsibility of other contractors previously contracted by the TCDD.

As per the Construction Contract, the scope of works of the Contractor cover the (i) completion of the incomplete infrastructure works in Section 1, Section 2 and Section 4 including tunnels, bridges, viaducts and culverts; and (ii) 100% of the superstructure, electrification and signalling works over the full railway alignment from Section 1 to Section 4.

The overall progress of the physical works in the sections at which the remaining infrastructure works will be completed by the Contractor is summarised below based on the data compiled by the Contractor as of December 2020⁴⁰:

- Section 1 (Polatli-Afyonkarahisar) – 65.2% (Excavation Progress – 68.7%)
- Section 2 (Afyonkarahisar-Banaz) – 31.8% (Excavation Progress – 70.0%)
- Section 3 (Banaz-Salihli)
 - Section 3a (Banaz-Esme) – 27.4% (Excavation Progress – 49.6%)
 - Section 3b (Esme-Salihli) – 27.4% (Excavation Progress – 78.8%)
- Section 4 (Salihli-Menemen) (Excavation Progress – 9.0%)
 - Section 4a-4b-4c (Salihli-Manisa) – 5.2%
 - Section 4d (Manisa-Menemen) – 30.0%

Besides the HSR, the Project components include the engineering structures comprising viaducts, tunnels, culverts, underpasses, overpasses and bridges, electrification and telecommunication infrastructures, railway stations and sidings, excavated material storage areas as well as temporary facilities including the construction camp sites, quarries and material borrow sites, and concrete plants.

The contractors for the ongoing infrastructure works of Sections 3a, 3b, 4a and 4d are contractually required to comply with the national legislation.

Prior to start of superstructure works in Section 3a, 3b, 4a and 4d (at the time these sections of the Project will be handed over to the Contractor for the superstructure works), any outstanding/ongoing/retrospective issues, impacts, risks and/or grievances in Sections 3a, 3b, 4a and 4d related to management of biodiversity features by other contractors (see Chapter 1 for the definition of other contractors) that completed the infrastructures works in these sections will be assessed by an E&S Audit to be carried out by the Contractor.

⁴⁰ The infrastructure works by other contractors have been progressing at Section 3a, Section 3b, Section 4a, and Section 4d at the time this data was compiled (December 2020). Official data reflecting the latest status of physical works was not available to the Contractor at the time of compilation of this ESIA Report. Thus, the level of physical works is at a more advanced level as of Q2 2021. Based on the analysis of satellite image and the site observations of the Contractor, it is estimated that the land disturbance has taken place at a level of around 80% in Section 3a. Further verification of Employer is required for the identification of current progress levels at each Project subsection.

10.2.1. Biodiversity Study Area

As detailed in the respective chapters of this ESIA Report, the areal extent of the Project can be summarised as below:

- The width of the platform carrying the two HSR lines is 14.5 m.
- The direct Project footprint within which land clearance, earthworks, ground disturbing activities and superstructure works will be carried out is within the expropriation corridor which is 30 to 100 m corridor along the railway alignment. Therefore, direct impacts on habitats and vegetation and flora/fauna elements will take place within 100 m corridor at maximum.
- The Project will have in place associated/off-site facilities such as construction camp sites, quarries and material borrow sites, concrete plants, excavated material storage sites and above ground facilities of the electricity transmission infrastructure. As detailed in Chapter 1 of this ESIA Report, some of these temporary facilities are already in place and others will be established within the scope of the Project depending on the final technical requirements. More than half of the designated quarries and material borrow sites have had previous production. The Contractor is also in the process of evaluating alternative quarry sites that may be required/used during the Project construction works. The final sites to be used will be selected following the completion of the ongoing material testing process and confirmation of the reserve status at each site (in terms of quantity and quality).
- The camp sites are planned to be situated preferentially within the expropriation corridor of the railway. Location of subcontractor construction camp sites (main and lower tier) will further be identified upon selection of subcontractors.

In light of the above, in case of a potential land use requirement outside the expropriation corridor (for camp sites, excavated material storage areas etc.) that could take place during Project execution, a buffer zone of 50 m is considered at each side of the 100 m expropriation corridor. Thus, for the management of impacts on habitats and flora/fauna features, including the direct footprint and potential secondary/indirect impacts an ecological corridor of 200 m along the railway alignment is considered.

Along the railway alignment, the Biodiversity Study Area for the baseline assessment of habitat and vegetation including the floral/faunal composition at the Project Area has been selected as a 500 m corridor. The biodiversity field survey locations along the linear alignment have been identified by qualified biodiversity experts at the Gap Analysis and Scoping Phase of the ESIA study as discussed in Section 10.2.4 on Biodiversity Field Surveys.

This 500 m corridor along the railway alignment is the Biodiversity Area of Influence (AoI) beyond which no direct or indirect impacts (due to air emissions, noise, vibration etc.) on biodiversity elements and ecosystem services due to Project activities is foreseen. This ecological corridor along the railway alignment has been considered to represent an area within which the biological communities have more in common with each other than they might do with those outside the boundary.

The air quality and noise modelling for the worst-case scenario have been studied within a 1,000 m corridor and the results have revealed that the applicable limits have been achieved within 500 m corridor. This said, it should be noted that, implementation of the mitigation measures devised for air quality and noise management within this 500 m corridor will avoid and minimise impacts on human receptors and biodiversity elements. Similarly, mitigation measures to be implemented for topsoil management, wastewater/waste management, hazardous materials management and erosion control within this 500 m corridor will ensure direct impacts on terrestrial and aquatic ecosystems are avoided and minimised.

It should be noted that the construction moves along the alignment and the pace of the construction works will depend on the already existing status of the on-site works and therefore the extent and duration of the impact will vary depending on the Project status.

Quarries (basalt, andesite, and limestone) and material borrow sites will be used during the construction phase of the Project to extract the materials required for the construction activities. The quarries will be operated by the Contractor during the construction phase of the Project by using open-pit mining method. Blasting operations will be conducted at the quarries, as required. The quarries (except the andesite quarries) will be equipped with crushers, concrete plants, and plant mix base (PMT) facilities. The air quality and noise modelling for the worst-

case scenario have been studied for the quarries as well to identify the spatial extent of potential impacts on sensitive receptors.

The Biodiversity Study Area for the quarries are taken as their license areas. The operational activities of quarries are carried out in a limited area within their license area. It should be noted that, for quarries where previous production has been carried out, parts of the license area may hold species of conservation importance such as clusters of endemic flora species and/or nests of fauna species which might be directly and/or indirectly impacted by the quarry operations. For quarries where previous production has not been carried out, the whole license area could be represented by a sensitive natural habitat.

For the purpose of Critical Habitat assessment as presented in Section 10.2.9, an ecologically appropriate Area of Analysis (Project Area) have been identified to determine the presence of critical habitat for each species with regular occurrence in the Project's Aol. Taking into account both the railway alignment and the quarry locations (including alternative locations), this area of analysis has been identified to include both terrestrial and aquatic ecosystems and all overlapping legally protected and internationally recognised areas.

10.2.2. Overview of National Biodiversity Context

Turkey displays the character of a small continent in terms of the biological diversity it hosts. Three phytogeographical regions (reflecting relationships between the distribution of plant species and geographical characteristics in the world) out of 37 identified in the world do overlap in Turkey, namely Euro-Siberian, Mediterranean and Irano-Turanian phytogeographical regions as given below⁴¹.

Ankara-Izmir HSR Project overlaps with the Mediterranean and Irano-Turanian phytogeographical regions.

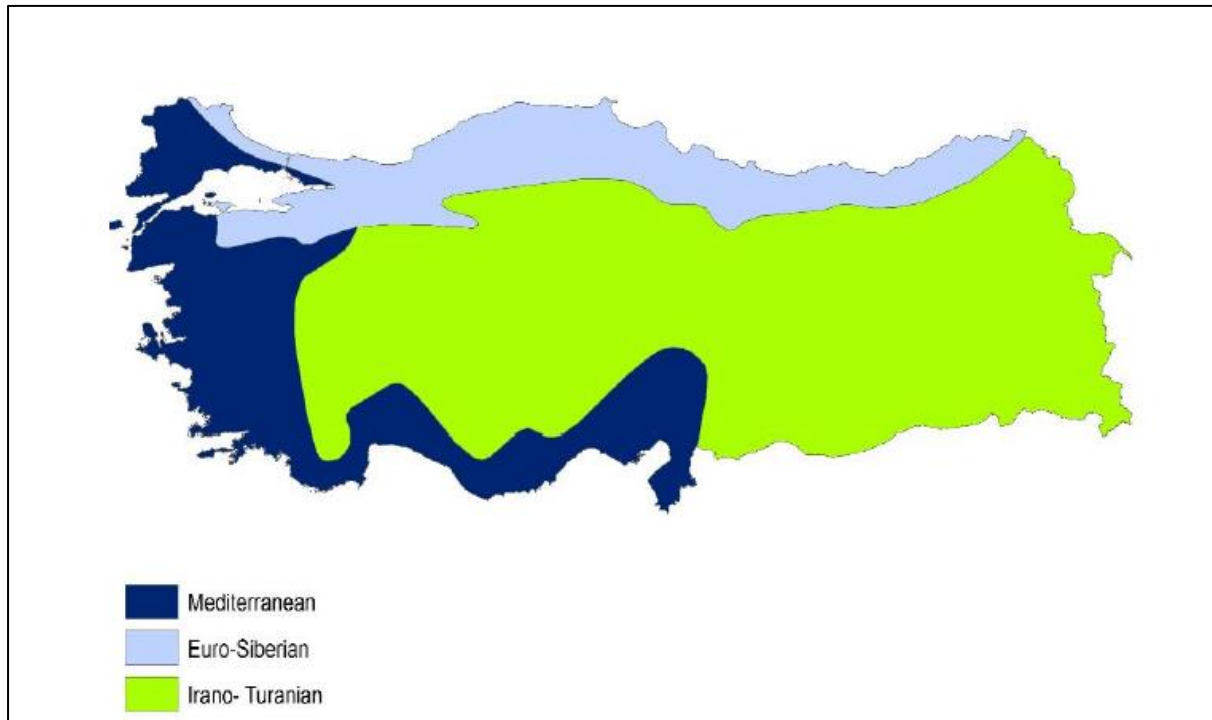


Figure 10-1. Phytogeographical Regions in Turkey

There exist 34 biodiversity hotspots identified in the world to represent sites hosting exceptional concentration of richness, exceptional concentrations of narrow endemics and also face exceptional degrees of threat (Mittermeier et al., 2004). Over 50% of the world's plant species and 42% of all terrestrial vertebrate species are endemic to these 34 hotspots.

⁴¹ Performing a Review of the Natural Resources and Biodiversity Sector in Turkey, Nature Conservation Center/Doğa Koruma Merkezi (DKM), June 2016.

Other than South Africa and China, Turkey is the only country in the world, which hosts 3 hotspots in its territory. These hotspots are also identified in parallel to the phytogeographical regions of the country, namely the Mediterranean, Caucasus and Irano-Anatolian Hotspots.

The overlap of three phytogeographical regions leads to the remarkably high biodiversity the country hosts:

- There are approximately 10,000 plant species distributing in Turkey of which 30% are endemic to the country.
- Turkey's highly complex geography and the separation between rivers by mountainous areas have also resulted in high endemism and genetic diversity among freshwater taxa, e.g. a big proportion of the approximately 250 freshwater fish species identified in Turkey are endemic to the country (approx. 26%), and even locally to the aquatic systems they occur.
- Being located at the cross-section of major bird migration routes as presented below, Turkey is a key-country for many bird species with nearly 480 bird species present in the country.

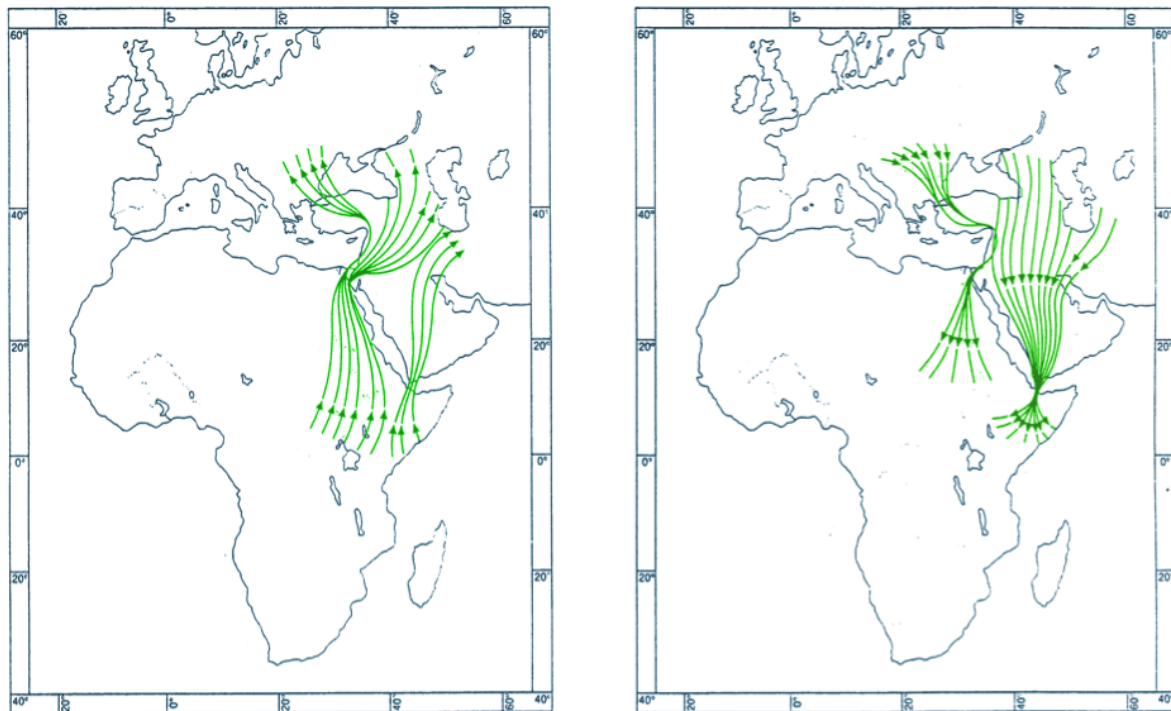


Figure 10-2. Bird Migration Routes passing through Turkey

- The herpetofauna of Turkey is very rich in comparison to European countries; almost 130 reptile species and more than 30 amphibian species do occur in Turkey with a high rate of endemism (up to 20% for amphibian and up to 13% for reptile species).
- Furthermore, 255 Important Bird Areas (IBA; Eken et al., 2006), 305 Key Biodiversity Areas (KBAs; Eken et al., 2006), 122 Important Plant Areas (IPAs; Özhatay et al., 2003) and 65 Prime Butterfly Areas (PBAs; Karaçetin et al., 2011) have so far been identified in Turkey reflecting the high biodiversity value of the country.
- KBAs and IBAs in Turkey are presented below. Section 10.2.2 presents the overlap of Ankara-Izmir HSR Project with the KBAs.

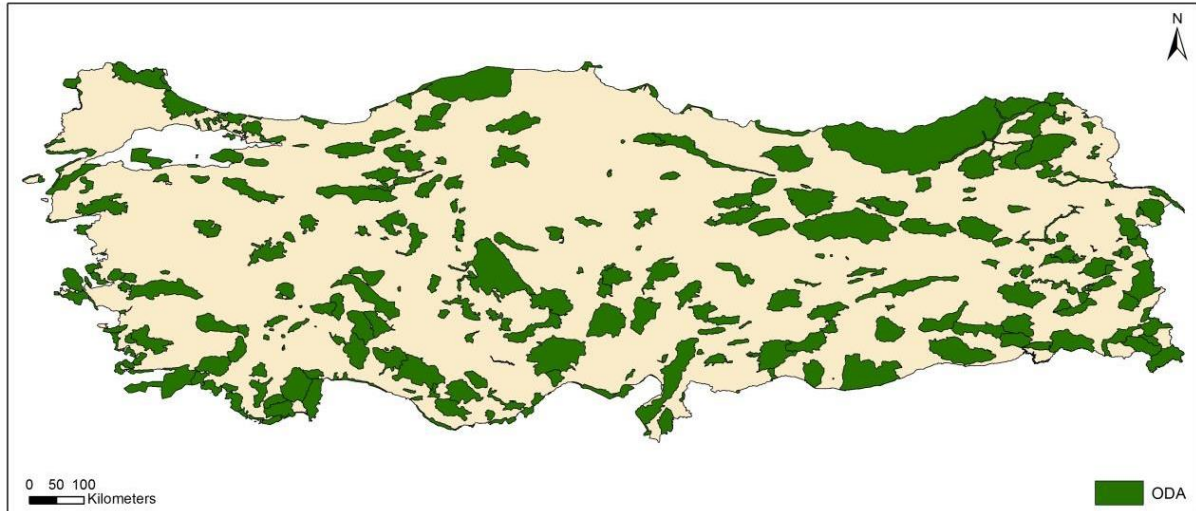


Figure 10-3. Key Biodiversity Areas (KBAs) in Turkey

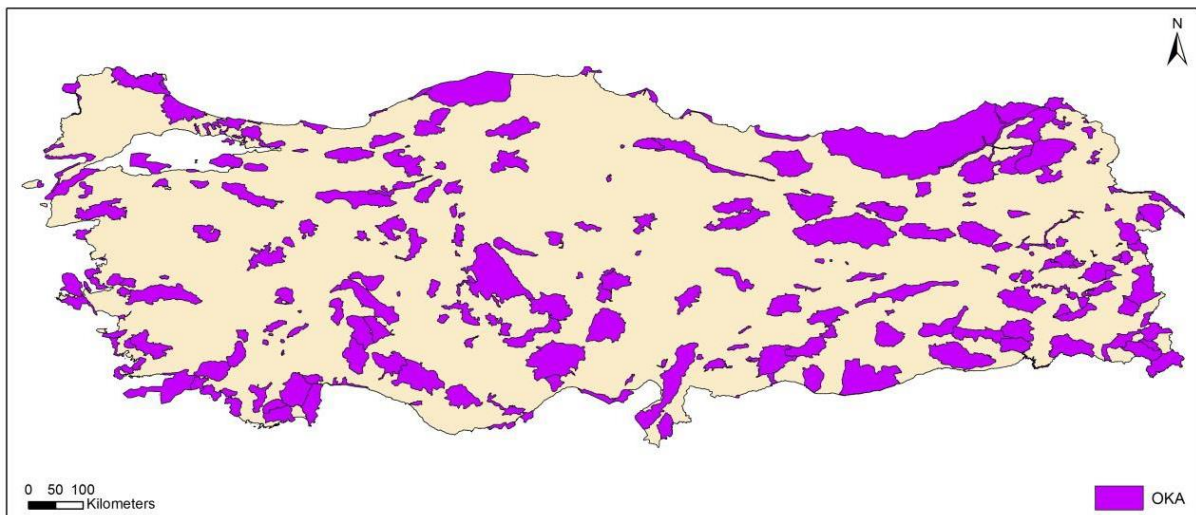


Figure 10-4. Important Bird Areas (IBAs) in Turkey

The Anatolian Biogeographical Region is unique in the Palearctic realm, with high plant and butterfly species richness and populations of globally threatened birds, mammals and herptiles (amphibians and reptiles). It is a place of diverse land-use practices, dating back to the earliest farming practices in the world. Among 10,930 species of vascular plants, birds, butterflies, mammals and herptiles distributed in Turkey, 1,130 species were identified to be living predominantly in steppic environments and being classified either as threatened, near threatened or data deficient at the national level, if not globally⁴².

⁴² Ambarlı, D., Zeydanlı, U.S., Balkız, Ö. *et al.* An overview of biodiversity and conservation status of steppes of the Anatolian Biogeographical Region. *Biodivers Conserv* **25**, 2491–2519 (2016). <https://doi.org/10.1007/s10531-016-1172-0>.

10.2.3. Legally Protected and Internationally Recognised Areas

The IUCN define "Protected Area" as "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values".

As defined in IFC PS6, the internationally recognised areas are exclusively defined as UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas (KBAs), and wetlands designated under the Convention on Wetlands of International Importance (the Ramsar Convention).

As defined by the IUCN, KBAs are "sites contributing significantly to the global persistence of biodiversity", in terrestrial, freshwater, and marine ecosystems. The Global Standard for the Identification of KBAs (IUCN 2016) sets out globally agreed criteria for the identification of KBAs worldwide. The KBA Standard establishes a consultative, science-based process for KBA identification, founded on the consistent application of global criteria with quantitative thresholds that have been developed through an extensive consultation exercise spanning several years. Sites qualify as global KBAs if they meet one or more of 11 criteria, clustered into five categories: threatened biodiversity; geographically restricted biodiversity; ecological integrity; biological processes; and, irreplaceability. The KBA criteria can be applied to species and ecosystems in terrestrial, inland water and marine environments. Although not all KBA criteria may be relevant to all elements of biodiversity, the thresholds associated with each of the criteria may be applied across all taxonomic groups (other than micro-organisms) and ecosystems.

Doga Dernegi, partner of BirdLife International in Turkey, initiated a comprehensive study on KBAs in Turkey analysing a total of 472 sites from different regions. An inventory was published in 2006, which defines each site in terms of its outstanding characteristics and provides a detailed list of species and their global and regional threat statuses (Eken et al., 2006).

The railway alignment passes through and nearby several legally protected areas and KBAs as listed in Table 10-1 and Table 10-2, respectively.

It should be noted that prior to entry to any legally protected area, necessary approvals from the conservation authorities need to be in place including measures that will be implemented during the land preparation and construction phases. As the Project activities had started in the past by previous contractors, especially the status at the already impacted areas, if any, is important to identify. There could also be cases where the legally protected areas have been given the respective designation recently.

The 2006 EIA Report of the AIHSR Project includes only the following legally protected areas:

- Afyon-Iscehisar Natural Site at KM 131+600 – KM 131+900 in Section 1 (indicated as KM 131+000-KM 133+000 in the national EIA Report)
- Baskomutan Historical National Park at KM 217+900 – KM 219+300 in Section 2 (indicated as KM 250+000 in the national EIA Report)

The railway alignment with respect to the legally protected areas and KBAs are presented for each section of the Project in Figure 10-5, Figure 10-6, Figure 10-7 and Figure 10-8, respectively.

Table 10-1. Legally Protected Areas along the Railway Alignment

Name	Category	Distance to the Railway Route (km)	Length of Overlap (km)
Section 1			
Sakarya National Park	National Park	1.68	N/A
Eskisehir Sivrihisar Balikdami	Wildlife Habitat Improvement Area	0.48	N/A
Balikdami Nationally Important Wetland	Nationally Important Wetland	0.00	14.55 km between KM 45+250 – KM 59+800
Balikdami Natural Site	Natural Site	0.00	0.60 km between KM 51+100 – KM 51+700
Yedikapi Nature Park	Nature Park	13.40	N/A

Sulun Ruins and Yedikapılar Cliffs (<i>Sülünün Öreni ve Yedikapılar Kaya Yerleşimi</i>)	Natural Site	12.27	N/A
Afyon-Iscehisar Natural Site	Natural Site	0.00	0.30 km between KM 131+600 – KM 131+900
Iscehisar Lake (Kocagol)	Natural Site	0.07	N/A
Dandindere	Nature Protection Area	23.27	N/A
Baskomutan Historical National Park -1	National Park	9.9	N/A
Section 2			
Baskomutan Historical National Park -2	National Park	9.9	N/A
Cirit Cliffs	Natural Site	6.89	N/A
Sarikiz Cliffs	Natural Site	7.6	N/A
Karahisar Castle	Natural Site	8.53	N/A
Frig Valley	Natural Site	17.9	N/A
Gazlıgol Hot Springs	Natural Site	11.37	N/A
Erkmen Nature Park	Nature Park	8.24	N/A
Omer-Gecek	Natural Site	0.77	N/A
26 Agustos Nature Park	Nature Park	2.2	N/A
Baskomutan Historical National Park -3	National Park	0.00	5.90 km between KM 217+900 – KM 223+800
Section 3			
Gogem Zafer	Nature Park	7.3	N/A
Ulubey Canyon Pepouza Ancient City and Clandas Bridge Natural Site	Natural Site	18.31	N/A
Ulubey Canyon	Nature Park	5.9	N/A
Kemiklitepe Fossil Beds Natural Site	Natural Site	0.26	N/A
Kula Volcanic Geopark	Natural Site	16.83	N/A
Itecik Lalesi	Nature Protection Area	12.55	N/A
Section 4			
Marmara Lake	Nationally Important Wetland	3.3	N/A
Spil Mountain	National Park	0.70	N/A
Mesir Nature Park	Nature Park	3.28	N/A
Spil Mountain Natural Site	Natural Site	0.92	N/A
Sureyya Natural Park	Nature Park	6.22	N/A
Yamanlar Mountain	National Park	7.7	N/A
Izmir-Karagol National Park	National Park	8.25	N/A
Toptepe Natural Site	Natural Site	1.53	N/A

Table 10-2. Internationally Recognised Areas along the Railway Alignment

Name	Category	Distance to the Railway Route (km)	Length of Overlap (km)
Section 1			
Polatli – Tigem	KBA	0.00	2.45 km between KM 1+350 – KM 3+800
Acikir Steppes	KBA	2.79	N/A
Balikdami	KBA-IBA	0.00	3.35 km between KM 48+550 – KM 51+900
Aliken	KBA-IBA	6.63	N/A
Section 2			
Murat Mountain	KBA-IBA	0.00	5.00 km between KM 219+550 – KM 224+550
Section 3			

Murat Mountain	KBA-IBA	1.00	N/A
Boz Mountains	KBA	0.00	8.70 km between KM 427+000 – KM 435+700
Section 4			
Boz Mountains	KBA	0.88	N/A
Marmara Lake	KBA-IBA	8.19	N/A
Spil Mountain	KBA	0.45	N/A
Yamanlar Mountain	KBA	0.00	15.40 km between KM 529+300 – KM 544+700

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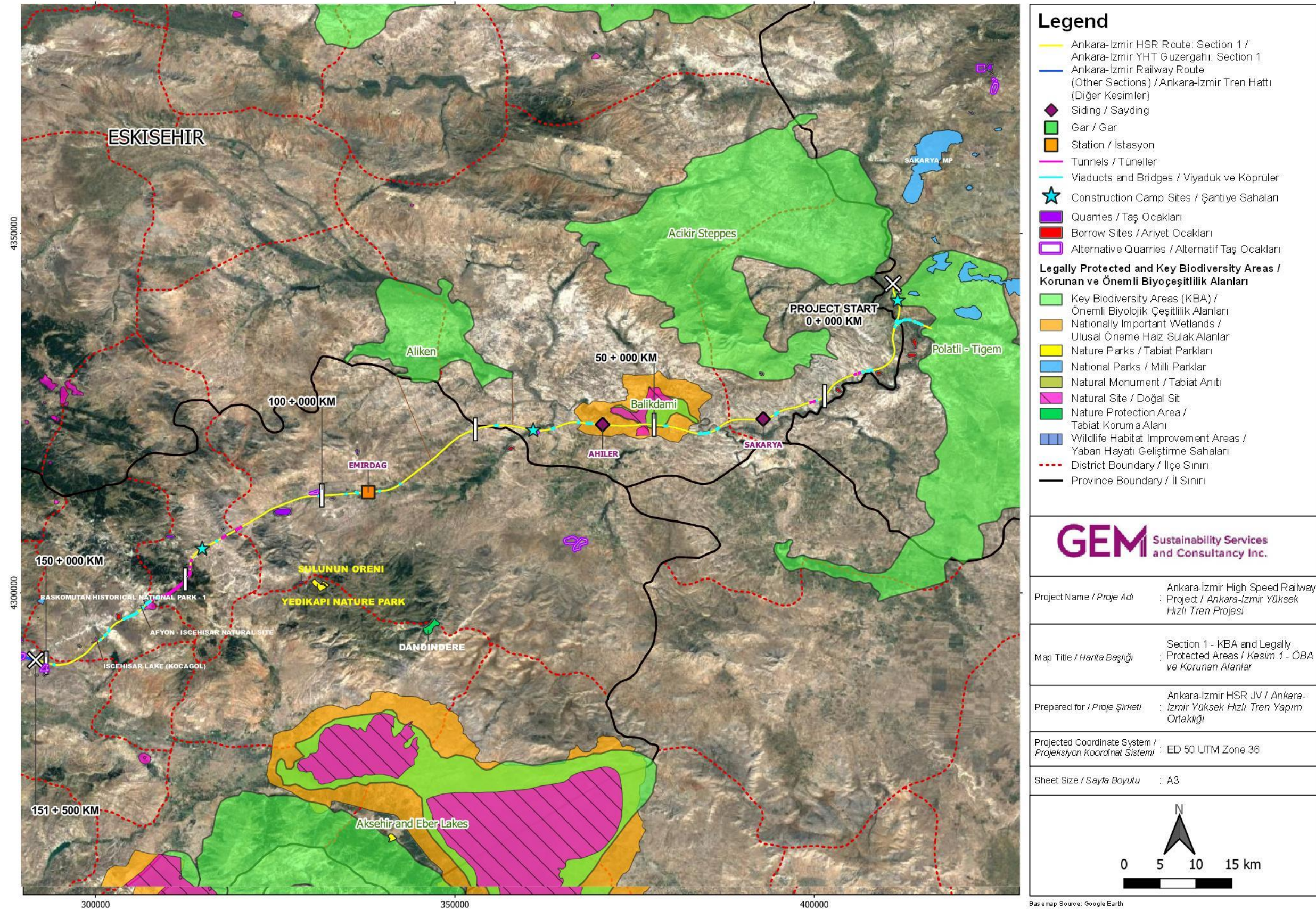


Figure 10-5. Section 1 – Legally Protected Areas and KBAs

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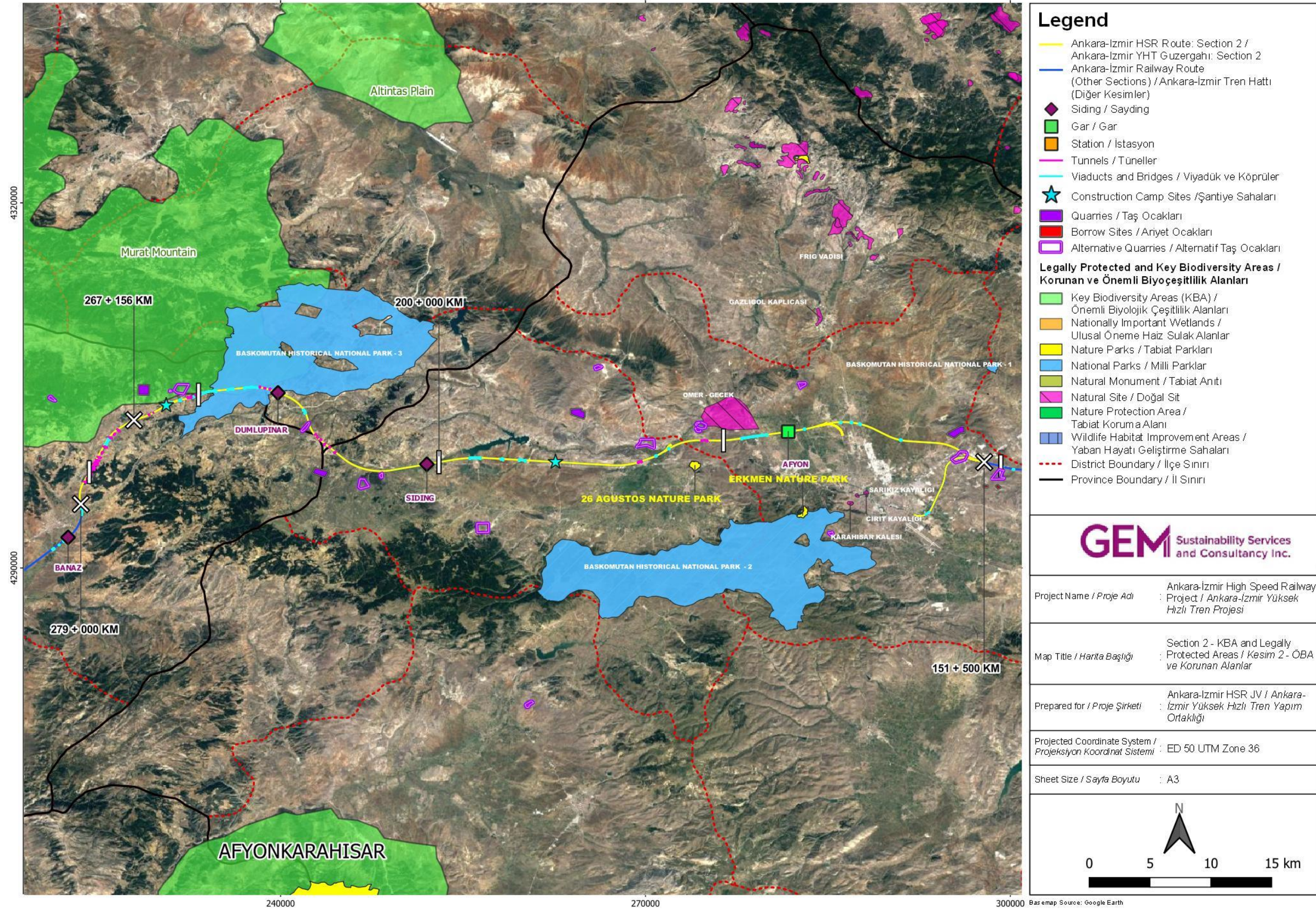


Figure 10-6. Section 2 – Legally Protected Areas and KBAs

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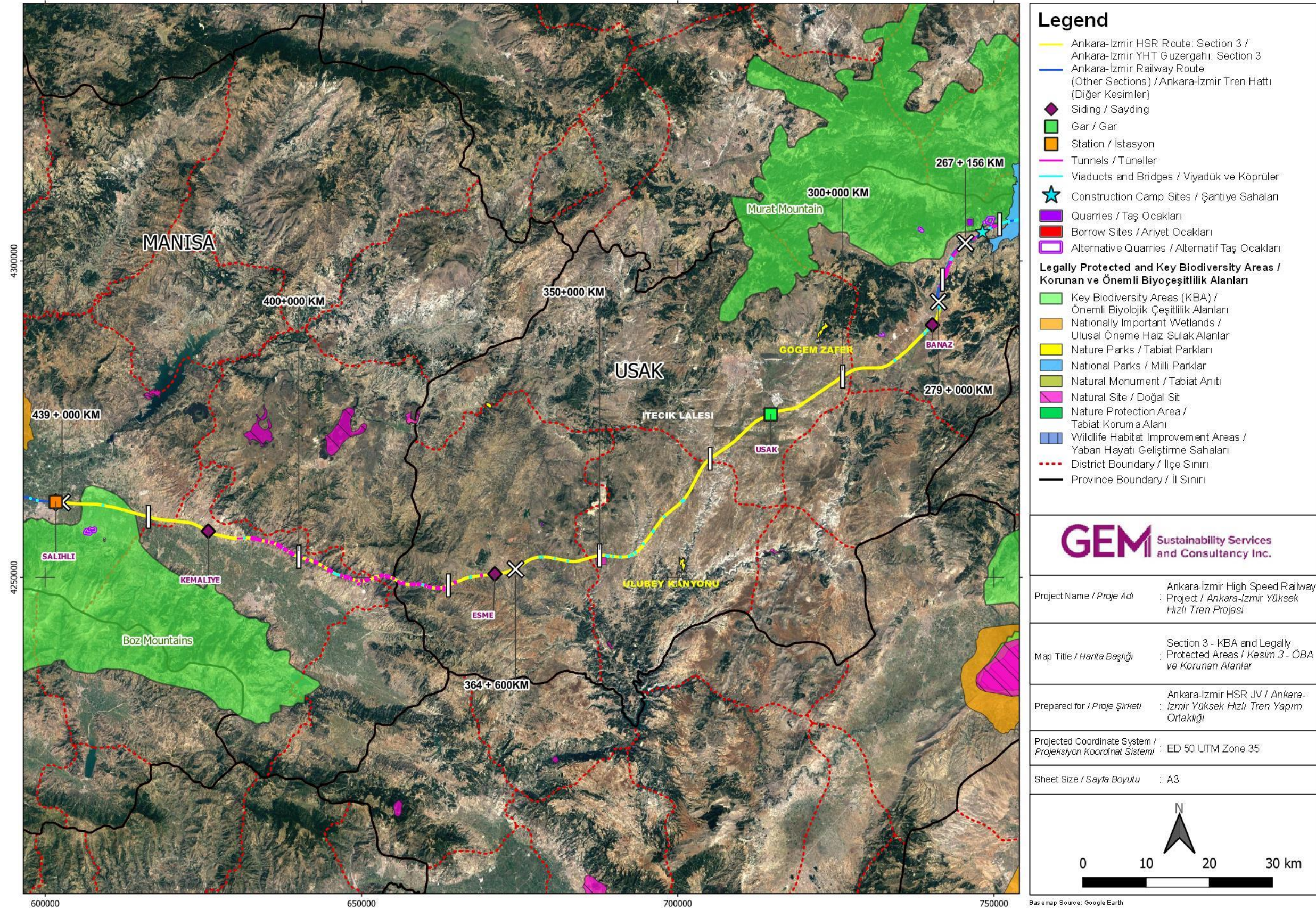


Figure 10-7. Section 3 – Legally Protected Areas and KBAs

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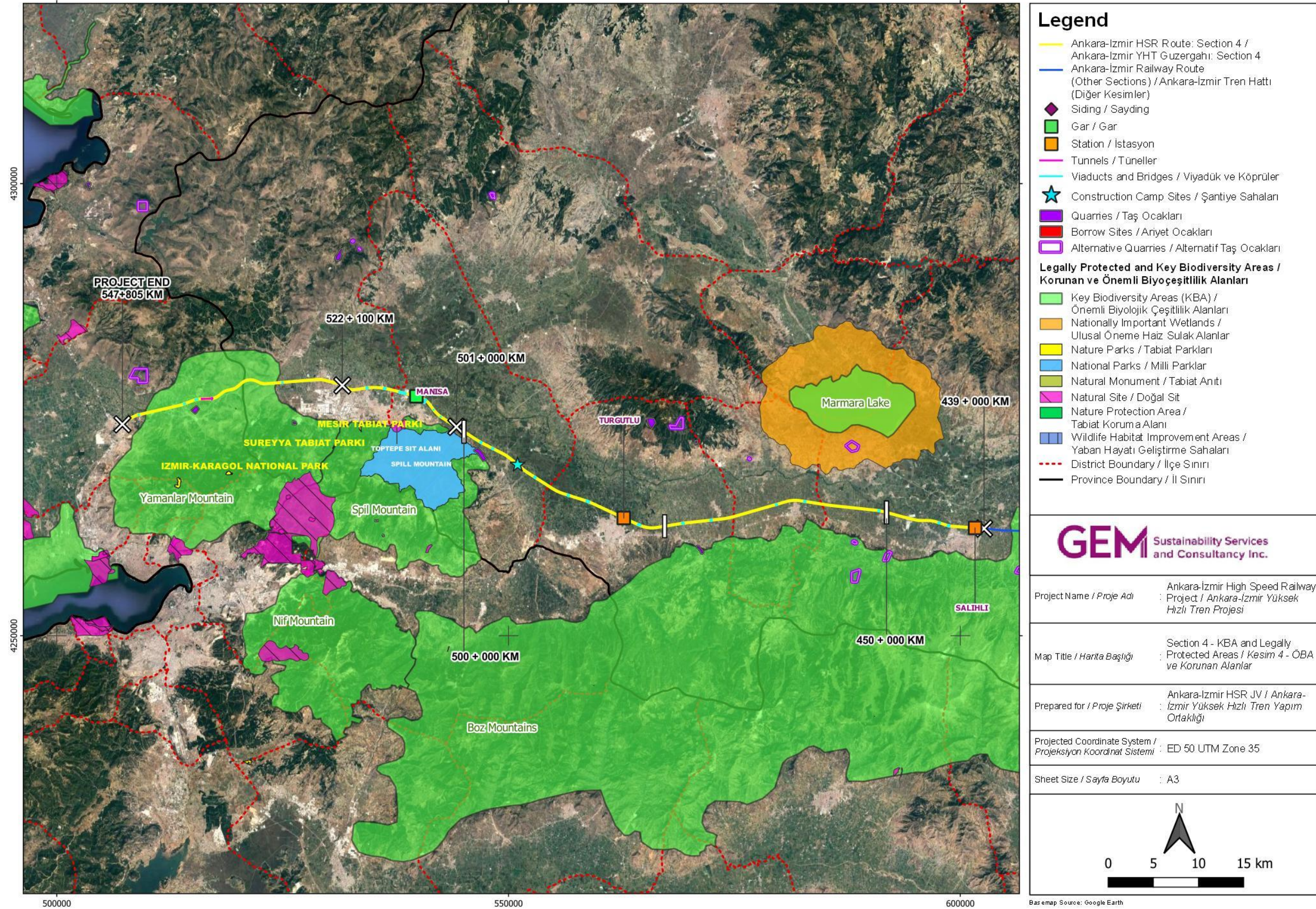


Figure 10-8. Section 4 – Legally Protected Areas and KBAs

10.2.3.1. Railway Alignment Overlapping with Legally Protected and Internationally Recognised Areas

As given in Table 10-1, the railway alignment overlaps with four (4) legally protected areas, namely:

- Balikdami Nationally Important Wetland (Section 1)
- Balikdami Natural Site (Section 1)
- Afyon-Iscehisar Natural Site (Section 1)
- Baskomutan Historical National Park-3 (Section 2)

Information on these legally protected areas is summarised in Table 10-3, Table 10-4 and Table 10-5.

Amongst the overlapping legally protected areas, **Balikdami Nationally Important Wetland** in Section 1 is the most important one in terms of the biodiversity elements. As summarised below, this wetland was registered in February 2019. A Management Plan was prepared for this wetland in June 2019; however, it was not publicly available at the time of compilation of this ESIA Report.

In Turkey, there are in total 86 wetlands at the time of compilation of this ESIA Report: 14 Ramsar sites, 59 Nationally Important Wetlands and 13 Locally Important Wetlands⁴³.

Table 10-3. Balikdami Nationally Important Wetland (Section 1)

Item	Balikdami Nationally Important Wetland (Section 1)
Protection Status	Nationally Important Wetland (in Turkish: Ulusal Öneme Haiz Sulak Alan)
Registry Date	07.02.2019
Total Registered Area	14,147.00 ha
Wetland Area	1,047.00 ha
Location	Eskisehir Province, Sivrihisar District Sakarya Basin
Management Plan	In place – dated 26.06.2019
Ecosystem Services	Provisioning – water supply, grazing and fishing Regulating – flood control, pollution control, regulating the water regime (water storage, groundwater recharge) Cultural Services – recreation and tourism (nature observation – birds, plants and butterflies; aquaculture fishing, land hunting) Supporting Services – not applicable

Source: Ministry of Agriculture and Forestry, Directorate General of Nature Protection and Natural Parks, National Wetland Inventory Management Information System (<https://saybis.tarimorman.gov.tr/>).

As this is a legally protected area, the Project will have in place official authorizations by the conservation authorities including respective management measures to be implemented during the construction works. The academicians have visited the area during field surveys and have observed that the railway crosses at the southern tip of the wetland area where it passes through the temporary wetland section and the creeks that is connected to the wetland. This area supports water birds and provides feeding, sheltering, and breeding grounds for water birds. Due to the low flow rate at the area, it is covered with reeds which provide suitable habitat for fish to lay their eggs. Thus, there is rich fish abundance and diversity and for that reason is termed as “balikdami” by the local people. A view of Balikdami Nationally Important Wetland is given in Figure 10-9.

⁴³ Source: Ministry of Agriculture and Forestry, Directorate General of Nature Protection and National Parks (<https://www.tarimorman.gov.tr/DKMP/Menu/31/Sulak-Alanlar>)



Figure 10-9. Balıkdami Nationally Important Wetland⁴⁴

The species qualifying Balıkdami Nationally Important Wetland is given below.

Table 10-4. Species Qualifying Balıkdami Nationally Important Wetland

Taxon Name	IUCN Red List of Threatened Species (*)	Endemism	Invasive Species
Flora			
<i>Acantholimon anatolicum</i>	CR	Yes	No
<i>Scabiosa hololeuca</i>	EN	Yes	No
<i>Thymus leucostomus</i>	VU	Yes	No
<i>Acantholimon gemicianum</i>	CR	Local	No
<i>Acantholimon riyatguellii</i>	CR	Local	No
Birds			
<i>Tachybaptus ruficollis</i> (Little Grebe)	LC	No	No
<i>Egretta garzetta</i> (Little Egret)	LC	No	No
<i>Ardea purpurea</i> (Purple Heron)	LC	No	No
<i>Ardeola ralloides</i> (Squacco Heron)	LC	No	No
<i>Ardea cinerea</i> (Grey Heron)	LC	No	No
<i>Ciconia ciconia</i> (White Stork)	LC	No	No
<i>Plegadis falcinellus</i> (Glossy Ibis)	LC	No	No
<i>Tadorna ferruginea</i> (Ruddy Shelduck)	LC	No	No
<i>Anas querquedula</i> (Garganey)	LC	No	No
<i>Buteo rufinus</i> (Long-legged Buzzard)	LC	No	No
<i>Circus aeruginosus</i> (Western Marsh-harrier)	LC	No	No
<i>Falco tinnunculus</i> (Common Kestrel)	LC	No	No
<i>Fulica atra</i> (Common Coot)	LC	No	No
<i>Gallinula chloropus</i> (Common Moorhen)	LC	No	No
<i>Himantopus himantopus</i> (Black-winged Stilt)	LC	No	No

⁴⁴ Source: AIHSR Project Hydrobiology Report by Prof. Dr. Aydın Akbulut (February 2021).

Taxon Name	IUCN Red List of Threatened Species (*)	Endemism	Invasive Species
<i>Vanellus vanellus</i> (Northern Lapwing)	NT (*)	No	No
<i>Tringa totanus</i> (Common Redshank)	LC	No	No
<i>Philomachus pugnax</i> (Ruff)	LC	No	No
<i>Columba livia</i> (Rock Dove)	LC	No	No
<i>Alcedo atthis</i> (Common Kingfisher)	LC	No	No
<i>Merops apiaster</i> (European Bee-eater)	LC	No	No
<i>Upupa epops</i> (Common Hoopoe)	LC	No	No
<i>Galerida cristata</i> (Crested Lark)	LC	No	No
<i>Hirundo rustica</i> (Barn Swallow)	LC	No	No
<i>Motacilla alba</i> (White Wagtail)	LC	No	No
<i>Acrocephalus scirpaceus</i> (Common Reedwarbler)	LC	No	No
<i>Lanius collurio</i> (Red-backed Shrike)	LC	No	No
<i>Lanius minor</i> (Lesser Grey Shrike)	LC	No	No
<i>Pica pica</i> (Eurasian Magpie)	LC	No	No
<i>Corvus frugilegus</i> (Rook)	LC	No	No
<i>Sturnus vulgaris</i> (Common Starling)	LC	No	No
<i>Passer domesticus</i> (House Sparrow)	LC	No	No
<i>Passer montanus</i> (Eurasian Tree Sparrow)	LC	No	No
Mammals			
<i>Vulpes vulpes</i> (Red Fox)	LC	No	No
<i>Felis chaus</i> (Jungle Cat)	LC	No	No
<i>Meles meles</i> (Eurasian Badger)	LC	No	No
<i>Sus scrofa</i> (Wild Boar)	LC	No	Local
<i>Sciurus anomalus</i> (Caucasian Squirrel)	LC	Yes	No
<i>Spermophilus xanthoprimum</i> (Anatolian Ground Squirrel)	NT	Yes	No
<i>Erinaceus concolor</i> (Southern White-breasted Hedgehog)	LC	No	No
<i>Lepus europaeus</i> (European Hare)	LC	No	No
Reptiles			
<i>Natrix natrix</i> (Grass Snake)	LC	No	No
<i>Lacerta viridis</i>	LC	No	No
<i>Lacerta trilineata</i>	LC	No	No
<i>Testudo graeca</i> (Common Tortoise)	VU	No	No
Fish			
<i>Cyprinus carpio</i>	VU	No	No
<i>Scardinius erythrophthalmus</i> (Rudd)	LC	No	No
<i>Barbus barbus</i> (Barbel)	LC	No	No
<i>Alburnus alburnus</i> (Bleak)	LC	No	No
<i>Silurus glanis</i> (Wels Catfish)	LC	No	No
<i>Esox lucius</i> (Northern Pike)	LC	No	No
Amphibians			
<i>Pelobates syriacus</i> (Syrian Spadefoot)	LC	No	No
<i>Pelophylax ridibundus</i> (Marsh Frog)	LC	No	No
<i>Bufo bufo</i> (Common Toad)	LC	No	No

(*) Conservation status updates made from the IUCN Red List of Threatened Species at <https://www.iucnredlist.org/>. For flora species, the IUCN categories are as per National Red List (Red Data Book of Turkish Plants – Ekim et al., 2000).

Source: Ministry of Agriculture and Forestry, Directorate General of Nature Protection and Natural Parks, National Wetland Inventory Management Information System (<https://saybis.tarimorman.gov.tr/>).

The other legally protected areas overlapping with the railway alignment is given below.

Table 10-5. Legally Protected Areas Overlapping with the Railway Alignment

Item	Balıkdami Natural Site (Section 1)	Afyon-Iscehisar Natural Site (Section 1)	Baskomutan Historical National Park-3 (Section 2) (*)
Protection Status	Natural Site – Qualified Natural Protection Area (in Turkish: Doğal Sit – Nitelikli Doğal Koruma Alanı)	Natural Site – Qualified Natural Protection Area (in Turkish: Doğal Sit – Nitelikli Doğal Koruma Alanı)	National Park
Decision No.	N/A	365	N/A
Decision Date	Registered as 2 nd degree natural site in 1980	06.07.2018	08.11.1981
Specific Restrictions	N/A	Resolution No. 109 on Protection and Usage Conditions of Natural Sites (Official Gazette 07.12.2019, No30971) (in Turkish: 109 sayılı Doğal Sit Alanları Koruma ve Kullanma Koşulları İlke Kararı)	N/A

Source: Ministry of Environment and Urbanization, Directorate General of Conservation of Natural Assets, TVKBS – Conservation of Natural Assets Information System (last accessed on 10 February 2021, <http://tvksays.csb.gov.tr/>)

(*) <http://baskomutan.tabiat.gov.tr/>

Baskomutan Historical National Park 3 in Section 2 is a historically important national park, and the area will be crossed by engineering structures (viaducts/bridges) as shown in Figure 10-11. The Historical National Park is not considered an important area in terms of biodiversity features of conservation importance by the academicians.

As given in Table 10-2, the railway alignment overlaps with four (4) internationally recognised biodiversity areas in Sections 1, 2 and 4, namely:

- Polatli-Tigem KBA (Section 1)
- Balıkdami KBA-IBA (Section 1)
- Murat Mountain KBA-IBA (Section 2)
- Yamanlar Mountain KBA (Section 4)

Information on these internationally recognised biodiversity areas is summarised in Table 10-6.

Table 10-6. Internationally Recognised Areas Overlapping with the Railway Alignment

Item	Polatli-Tigem KBA (Section 1)	Balıkdami KBA-IBA (Section 1)	Murat Mountain KBA- IBA (Section 2)	Yamanlar Mountain KBA (Section 4)
Protection Status	N/A	Natural Site, Wildlife Development Area	N/A	N/A
Location	See Figure 10-5	See Figure 10-5	See Figure 10-6	See Figure 10-8
Elevation	740 m – 1,112 m	800 m – 900 m	750 m – 2,309 m	10 m – 1,114 m
Surface Area	84,521 ha	3,297 ha	130,863 ha	36,227 ha
Qualifying Species	See Table 10-7	See Table 10-8	See Table 10-9	See Table 10-10

The flora and fauna species qualifying the overlapping KBAs along the railway alignment are given in Table 10-7 to Table 10-10.

Table 10-7. Polatlı-TİGEM KBA Qualifying Species

Taxon Name	IUCN Red List of Threatened Species (*)	National Red List
Birds		
<i>Falco naumanni</i> (Lesser Kestrel)	LC*	LC
<i>Otis tarda</i> (Great Bustard)	VU*	VU
Reptiles		
<i>Emys orbicularis</i> (European Pond Turtle)	NT	NT
<i>Montivipera xanthina</i>	LC*	LC
Fish		
<i>Aphanius villwocki</i> (Sakarya Killifish)	LC*	-
<i>Aspius aspius</i>	DD	-

(*) Conservation status updates made from the IUCN Red List of Threatened Species at <https://www.iucnredlist.org/>.

Source: Kurt, B. 2006. Polatlı-TİGEM (ORT006), 42 – 43 (Cilt 2). Türkiye'nin Önemli Doğa Alanları. Doğa Derneği, Ankara (<https://www.dogaderneği.org/polatli-tigem/>).

Table 10-8. Balıkdami KBA Qualifying Species

Taxon Name	IUCN Red List of Threatened Species (*)	National Red List
Birds		
<i>Acrocephalus melanopogon</i> (Moustached Warbler)	LC	LC
<i>Ardeola ralloides</i> (Squacco Heron)	LC	LC
<i>Botaurus stellaris</i> (Eurasian Bittern)	LC	LC
<i>Chlidonias niger</i> (Black Tern)	LC	LC
<i>Ciconia ciconia</i> (White Stork)	LC	LC
<i>Circus aeruginosus</i> (Western Marsh-harrier)	LC	LC
<i>Circus pygargus</i> (Montagu's Harrier)	LC	LC
<i>Egretta garzetta</i> (Little Egret)	LC	LC
<i>Falco naumanni</i> (Lesser Kestrel)	LC (*)	LC
<i>Grus grus</i> (Common Crane)	LC	(EN)
<i>Himantopus himantopus</i> (Black-winged Stilt)	LC	LC
<i>Nycticorax nycticorax</i> (Black-crowned Night-heron)	LC	LC
<i>Plegadis falcinellus</i> (Glossy Ibis)	LC	LC
<i>Tadorna ferruginea</i> (Ruddy Shelduck)	LC	(LC)

(*) Conservation status updates made from the IUCN Red List of Threatened Species at <https://www.iucnredlist.org/>.

Source: Demirci, B. 2006. Balıkdami (ORT004), 38 – 39 (Cilt 2). Türkiye'nin Önemli Doğa Alanları. Doğa Derneği, Ankara (<https://www.dogaderneği.org/balikdami/>).

Table 10-9. Murat Mountain KBA Qualifying Species

Taxon Name	IUCN Red List of Threatened Species (*)	National Red List
Flora		
<i>Alchemilla hirsutiflora</i>	-	VU
<i>Allium huber-morathii</i>	-	LC
<i>Alyssum davisianum</i>	-	CR
<i>Arum balansanum</i>	-	VU
<i>Astragalus gaeobotrys</i>	-	EN
<i>Astragalus paecilanthus</i>	-	-
<i>Bolanthus spargulifolius</i>	-	VU
<i>Centraurea aphrodisea</i>	-	VU
<i>Crenosciadium siifolium</i>	-	EN
<i>Crocus flavus</i> ssp. <i>dissectus</i>	-	VU
<i>Hesperiz kotschy</i>	-	VU
<i>Iris purpleobracteata</i>	-	NT
<i>Muscari latifolium</i>	-	LC

Taxon Name	IUCN Red List of Threatened Species (*)	National Red List
<i>Papaver strictum</i>	-	NT
<i>Prometheum muratdagense</i>	-	EN
<i>Pyrus anatolica</i>	NT	EN
<i>Rumex alympicus</i>	-	DD
<i>Saponaria pamphylica</i>	-	LC
<i>Senecio olympicus</i>	-	NT
<i>Sideritis tmolea</i>	-	NT
<i>Stenotaenia macrocarpa</i>	-	-
<i>Verbascum coronopifolium</i>	-	EN
<i>Verbascum phrygium</i>	-	NT
<i>Verbascum stenostachyum</i>	-	NT
<i>Zingeria verticillata</i>	-	VU
Birds		
<i>Aegypius monachus</i> (Cinereous Vulture)	NT	LC
<i>Aquila chrysaetos</i> (Golden Eagle)	LC	LC
<i>Buteo rufinus</i> (Long-legged Buzzard)	LC	(NT)
<i>Caprimulgus europaeus</i> (European Nightjar)	LC	LC
<i>Dendrocopos medius</i>	LC	LC
<i>Emberiza hortulana</i> (Ortolan Bunting)	LC	LC
<i>Gypaetus barbatus</i> (Bearded Vulture)	NT*	VU
<i>Lanius collurio</i> (Red-backed Shrike)	LC	LC
Butterflies		
<i>Archon apollinus</i> (False Apollo)	NT*	EN
<i>Euphydryas orientalis</i> (Steppe Fritillary)	DD*	CR

(*) Conservation status updates made from the IUCN Red List of Threatened Species at <https://www.iucnredlist.org/>.

Source: Kurt, B. 2006. Murat Dagı (EGE029), 234 – 237 (Cilt 1). Türkiye'nin Önemli Doğa Alanları. Doğa Derneği, Ankara (<https://www.dogadernegi.org/murat-dagi/>).

Table 10-10. Yamanlar Mountain KBA Qualifying Species

Taxon Name	IUCN Red List of Threatened Species (*)	National Red List
Flora		
<i>Allium albotunicatum</i> ssp. <i>Albotunicatum</i>	-	VU
<i>Haplophyllum megalanthum</i>	-	EN
<i>Tripleurospermum hygrophilum</i>	-	EN
Birds		
<i>Dendrocopos medius</i> (Middle Spotted Woodpecker)	LC	LC
<i>Emberiza cineracea</i> (Cinereous Bunting)	NT	(NT)
<i>Hippolais olivetorum</i> (Olive-tree Warbler)	LC	LC
<i>Lanius nubicus</i> (Masked Shrike)	LC	LC
Mammals		
<i>Hyaena hyaena</i> (Striped Hyaena)	NT	(EN)
<i>Miniopterus schreibersii</i> (Schreiber's Bent-winged Bat)	VU*	NT
<i>Myotis capaccinii</i> (Long-fingered Bat)	VU	LC
<i>Rhinolophus euryale</i> (Mediterranean Horseshoe Bat)	NT*	VU
<i>Rhinolophus ferrumequinum</i> (Greater Horseshoe Bat)	LC*	NT
Amphibians		
<i>Triturus karelinii</i>	LC	LC
Reptiles		
<i>Montivipera xanthina</i>	LC*	LC
<i>Testudo graeca</i> (Common Tortoise)	VU	NT
<i>Zamenis situla</i>	LC*	LC
Fish		

Taxon Name	IUCN Red List of Threatened Species (*)	National Red List
<i>Capoeta bergamae</i> (Aegean Scraper)	NT*	VU
<i>Chondrostoma holmwoodii</i> (Eastern Aegean nase)	VU	DD

(*) Conservation status updates made from the IUCN Red List of Threatened Species at <https://www.iucnredlist.org/>.

Source: Lise, Y. 2006. Yamanlar Dagi (EGE014), 198 – 199 (Cilt 1). Türkiye'nin Önemli Doğa Alanları. Doğa Derneği, Ankara (<https://www.dogadernegi.org/yamanlar-dagi/>).

10.2.3.2. Quarries Overlapping with Legally Protected and Internationally Recognised Areas

The existing quarries of the Project overlapping with the legally protected areas and KBAs are presented in Table 10-11.

Table 10-11. Quarries Overlapping with Legally Protected and Internationally Recognised Areas

Type of Area	Overlapping Quarry	Railway KM	Province	District
Legally Protected Areas				
Spil Mountain National Park	239-A-Cobanisa	497+600	Manisa	Sehzadeler
	238-Ansizca-1	499+000	Izmir	Kemalpasa
	245-Gurle	527+700	Manisa	Yunusemre
	263-Degirmendere (*)	539+500	Izmir	Menemen
Internationally Recognised Areas				
Polatli – Tigem KBA	29-Yenice (*)	2+050	Ankara	Polatli
Murat Mountain KBA - IBA	197-Dumenkoyu	231+000	Usak	Banaz
Boz Mountains KBA	235-Cikrikci	472+000	Manisa	Turgutlu
Acikir Steppes KBA	40-Kayakent (*)	31+200	Eskisehir	Gunyuzu
Spil Mountain KBA	238-Ansizca-1	499+000	Izmir	Kemalpasa
	245-Gurle	527+700	Manisa	Yunusemre
	263-Degirmendere	539+500	Izmir	Menemen
(*) Quarries visited as part of the biodiversity field study conducted in January 2021. Please refer to Section 10.2.4 on Biodiversity Field Surveys.				

In addition to internationally recognised biodiversity areas overlapping through the railway alignment, the existing quarries overlap with two internationally recognised biodiversity areas and one legally protected area given in Table 10-11, namely:

- Acikir Steppes KBA (Section 1)
- Spil Mountain KBA (Section 4)
- Spil Mountain National Park (Section 4)

Information on the internationally recognised biodiversity areas is summarised below.

Table 10-12. Quarries Overlapping with Internationally Recognised Areas

Item	Acikir Steppes KBA (Section 1)	Spil Mountain KBA (Section 4)
Protection Status	N/A	National Park, Archaeological Site
Location	See Figure 10-5	See Figure 10-8
Elevation	650 m – 1,819 m	50 m – 1,513 m
Surface Area	98,439 ha	26,449 ha
Qualifying Species	See Table 10-13	See Table 10-14

The flora and fauna species qualifying the overlapping KBAs with the existing quarries are given in Table 10-13 and Table 10-14.

Table 10-13. Acikir Steppes KBA Qualifying Species

Taxon Name	IUCN Red List of Threatened Species (*)	National Red List
Flora		
<i>Achillea gypsicola</i>	-	VU
<i>Achillea ketenoglui</i>	-	-
<i>Achillea monocephala</i>	-	EN
<i>Aethionema dumanii</i>	-	NT
<i>Aethionema turcicum</i>	-	NT
<i>Alyssum niveum</i>	-	EN
<i>Astragalus andrasovszkyi</i>	-	-
<i>Astragalus kochakii</i>	-	VU
<i>Astragalus physodes ssp. Acikirensis</i>	-	EN
<i>Astragalus turcicus</i>	-	VU
<i>Cyathobasis fruticulosa</i>	-	VU
<i>Gypsophila parva</i>	-	LC
<i>Matthiola anchoniifolia</i>	-	NT
<i>Muscari sivrihisardaghlarensis</i>	-	-
<i>Onobrychis paucijuga</i>	-	VU
<i>Salvia aytachii</i>	-	VU
<i>Scabiosa pseudograminifolia</i>	-	NT
<i>Sideritis gulendamae</i>	-	EN
<i>Thesium scabriflorum</i>	-	VU
Birds		
<i>Anthus campestris</i> (Tawny Pipit)	LC	LC
<i>Calandrella brachydactyla</i> (Greater Short-toed Lark)	LC	LC
<i>Falco naumanni</i> (Lesser Kestrel)	LC*	LC
<i>Lanius minor</i> (Lesser Grey Shrike)	LC	LC
<i>Melanocorypha calandra</i> (Calandra Lark)	LC	LC
<i>Neophron percnopterus</i> (Egyptian Vulture)	EN*	EN
<i>Pterocles orientalis</i> (Black-bellied Sandgrouse)	LC	LC
Fish		
<i>Aspius aspius</i>	DD	-

(*) Conservation status updates made from the IUCN Red List of Threatened Species at <https://www.iucnredlist.org/>.

Source: Kurt, B. 2006. Acikir Bozkirlari (ORT003), 36 – 37 (Cilt 2). Türkiye'nin Önemli Doğa Alanları. Doğa Derneği, Ankara (<https://www.dogaderneği.org/acikir-bozkirlari/>).

Table 10-14. Spil Mountain KBA Qualifying Species

Taxon Name	IUCN Red List of Threatened Species (*)	National Red List
Flora		
<i>Anthriscus tenerrima</i>	-	VU
<i>Arenaria sipylea</i>	-	EN
<i>Asperula lilaciflora ssp. lilaciflora</i>	-	NT
<i>Asperula nitida ssp. hirtella</i>	-	NT
<i>Bromus sipyleus</i>	-	EN
<i>Centaurea sipylea</i>	-	EN
<i>Cirsium sipyleum</i>	-	NT
<i>Echinophora trichophylla</i>	-	NT
<i>Haplophyllum megalanthum</i>	-	EN
<i>Hesperis balansae ssp. balansae</i>	-	EN
<i>Satureja parnassica ssp. sipylea</i>	-	NT

Taxon Name	IUCN Red List of Threatened Species (*)	National Red List
<i>Silena sipylea</i>	-	VU
<i>Tragopogon subacaulis</i>	-	EN
Birds		
<i>Emberiza hortulana</i> (Ortolan Bunting)	LC	LC
<i>Falco peregrinus</i> (Peregrine Falcon)	LC	LC
<i>Lanius collurio</i> (Red-backed Shrike)	LC	LC
<i>Sitta krueperi</i> (Krueper's Nuthatch)	LC*	(NT)
Amphibians		
<i>Triturus karelinii</i>	LC	LC
Reptiles		
<i>Zamenis situla</i>	LC*	LC
Butterflies		
<i>Glaucopsyche alexis</i>	-	LC
<i>Pseudophilotes vicrama</i> (Eastern Baton Blue)	-	LC
<i>Thymelicus acteon</i>	-	LC

(*) Conservation status updates made from the IUCN Red List of Threatened Species at <https://www.iucnredlist.org/>.

Source: Akyildiz, D., Bozdoğan, M., Lise, Y. 2006. Spil Dagi (EGE023), 218 – 219 (Cilt 1). Türkiye'nin Önemli Doğa Alanları. Doğa Derneği, Ankara (<https://www.dogadernegi.org/spil-dagi/>).

10.2.4. Biodiversity Field Surveys

The biodiversity study area for terrestrial flora/fauna and aquatic species have been selected to encompass the railway alignment and its vicinity and the quarry locations.

As described in previous chapters of this ESIA Report, the infrastructure works of Sections 3a, 3b, 4a, and 4d are not within the scope of the Contractor. Thus, as all the earthworks and ground disturbing activities will be carried out by other construction contractors, mitigation of any potential impacts on biodiversity elements at those parts of the AIHSR Project will be the responsibility of the other contractors. At the time the survey planning was made, the academicians included Section 1, Section 2, and full Section 4 into their site programme and thus identified the specific survey locations accordingly. Only Section 3 was not visited by the academicians. This said, desktop assessment of legally protected and internationally recognised areas, habitat distribution, local and regional endemic flora species presumed to be present in Section 3 is also provided to the extent information is available.

It should be noted that the field study was conducted at the end of January 2021 due to the Project timeline so as to form the initial biodiversity baseline dataset with the aim of updating the findings in spring/summer season.

The following senior biodiversity experts designed and conducted the field study:

- Flora – Prof. Dr. Hayri Duman
- Fauna – Prof. Dr. Mustafa Sözen
- Avifauna – Prof. Dr. Zafer Ayaş
- Aquatic – Prof. Dr. Aydın Akbulut

During the Scoping Phase of the ESIA Study, the biodiversity experts have identified the field survey locations taking into account the different habitat types expected along the railway alignment, location of the quarries and the proximity to/overlap with protected areas. For the terrestrial field surveys, 34 survey locations representing 12 different EUNIS habitats have been selected. For the aquatic field surveys, 24 survey locations were identified representative of water crossings (rivers/streams/creeks) along the railway alignment. The railway passes through four (4) river basins. The survey locations are shown in Figure 10-10 for Section 1, Figure 10-11 for Section 2 and Figure 10-12 for Section 4. It should be noted that back that time the alternative quarries as detailed in Chapter 3 ("Project Alternatives") of this ESIA Report were not known and thus were not scoped in the biodiversity field survey programme. At the time the biodiversity field survey was designed within the Gap and Scoping Phase of the ESIA

study, in total 30 quarries were being planned to be used by the Project amongst which 17 were identified not to have any previous production.

Any new facilities (e.g. quarries) to be included within the Project will require identification of potential site-specific E&S impacts and management measures including field surveys to be conducted for biodiversity prior to entry into such new areas.

The survey locations were grouped into three categories:

- R – Locations on the railway alignment (22 stations in total)
- Q – Locations at the quarries (12 stations in total)
- F – Locations at the aquatic ecosystems (24 stations in total)

The field survey programme is designed as follows:

- Section 1 includes the survey locations R1 to R12, Q1 to Q8 and F1 to F9.
- Section 2 includes the survey locations R13 to R19, Q9 to Q11 and F10 to F15.
- Section 4 includes the survey locations R20 to R22, Q12 and F16 to F24.

The selected field survey locations are further described as summarised in Table 10-15 including photos taken during the field study conducted end of January 2021. Due to the weather conditions during the field surveys, amongst the identified survey stations only Q11 was not accessible due to snow coverage.

At each 34 survey location (coded as R and Q as described above), the flora field surveys were carried out within 250 m on each side of the railway axis (within a corridor of 500 m) encompassing areas that will be directly affected by the Project activities. For the quarries, an area of 500 m x 500 m was studied. Up to 1 hour of time is spent at each survey location. As a normal practice, species that cannot be identified directly in the field are transferred to herbarium for further analysis.

The terrestrial fauna studies were carried out at 34 survey locations (coded as R and Q as described above). At each survey location, an area of about 500-meter diameter was surveyed at least 45 minutes to determine the presence of fauna groups at the survey station. The faunal composition at the Project Area and its vicinity have been identified through direct observation, animal traces, animal tracks, burrows, animal droppings, food remains, animal calls etc. Previous field experiences at the vicinity of the Project Area and literature data were also used to identify fauna species presumed to be present at the Project Area.

The avifauna studies were carried out at all the 58 survey locations (coded as R, Q, and F as described above). Line transect method was used within the 500 m study area corridor for 45-60 min along the alignment, point count method was used at four different locations at each quarry location with the use of binoculars, monocular telescopes were used. The presence of each avifauna species at the 58 stations have been further grouped as direct observation or presumed presence based on literature-habitat preference.

The aquatic biodiversity studies were carried out at 24 survey locations. As part of the aquatic biodiversity studies, algae, zooplanktons, benthic organisms, and fish species were identified at the Project Area through sampling activities at each survey location (using plankton scoop of 55 micrometer pore opening kept horizontally for 5 min along water flow direction and sampled within 250 cc plastic cup and planktons fixed to the sediments/rocks/plants have been sampled through surface removal – all further tested at the laboratory, dredging with standard bottom scoop for benthic organisms – the bottom of the survey location dredged with the scoop for 5 min and the samples were kept in 80% alcohol to be further analysed at the laboratory via binocular microscopes, electro shocker for fish species).

The habitat and vegetation characteristics of the Project Area is given in Section 10.2.5 and the species directly observed and presumed to be present at the Project Area are given in Section 10.2.6. As the railway alignment and quarries overlap with several legally protected areas and KBAs, status of the species identified during the January 2021 biodiversity field surveys have been checked whether they are amongst KBA qualifying species to ensure potential impacts at the wider extent beyond the Project Area are appropriately managed. It should be noted that the field study was conducted at the end of January 2021 due to the Project timeline so as to form the initial biodiversity baseline dataset with the aim of updating the findings in spring/summer season.

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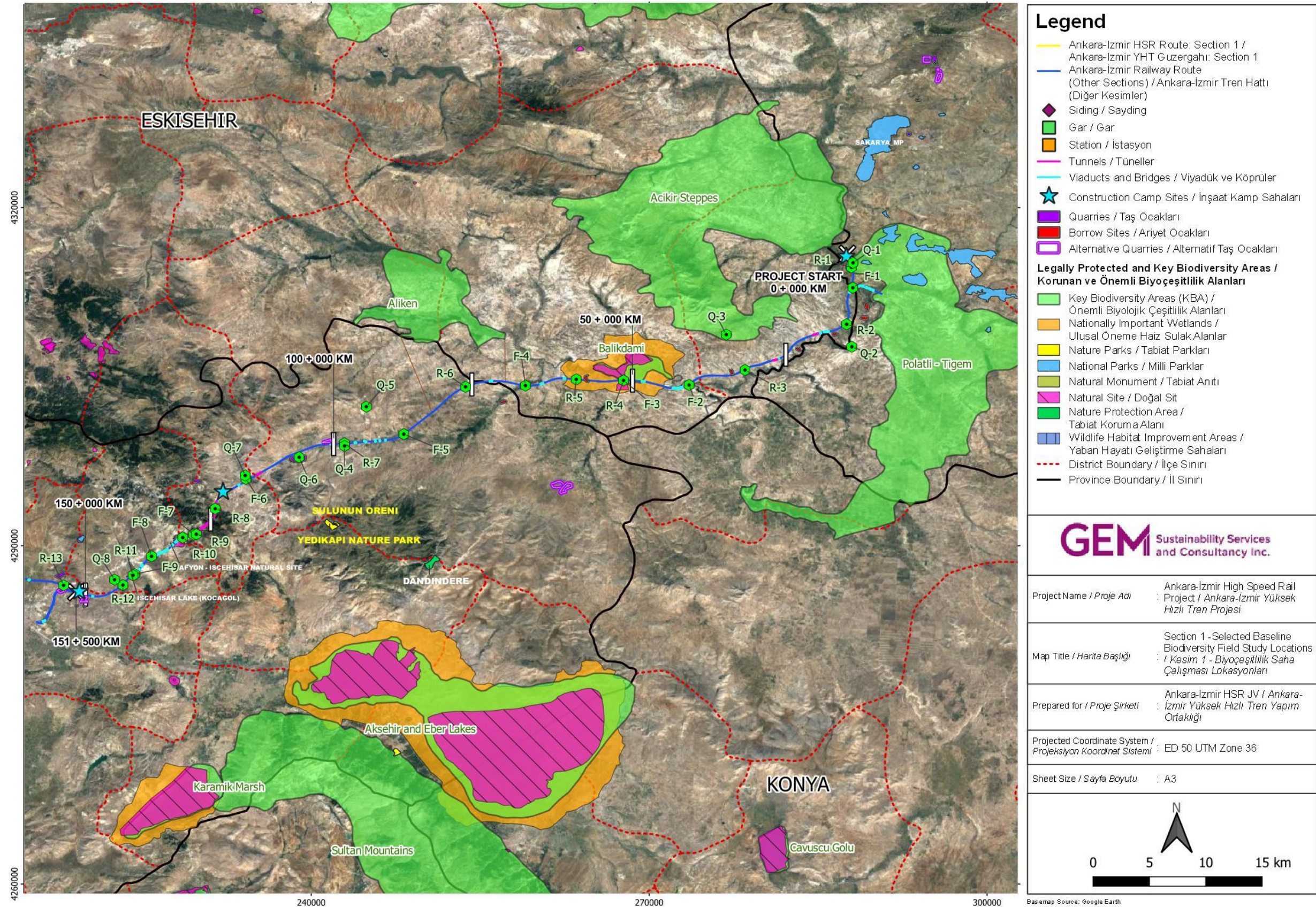


Figure 10-10. Section 1 – Selected Baseline Biodiversity Field Study Locations

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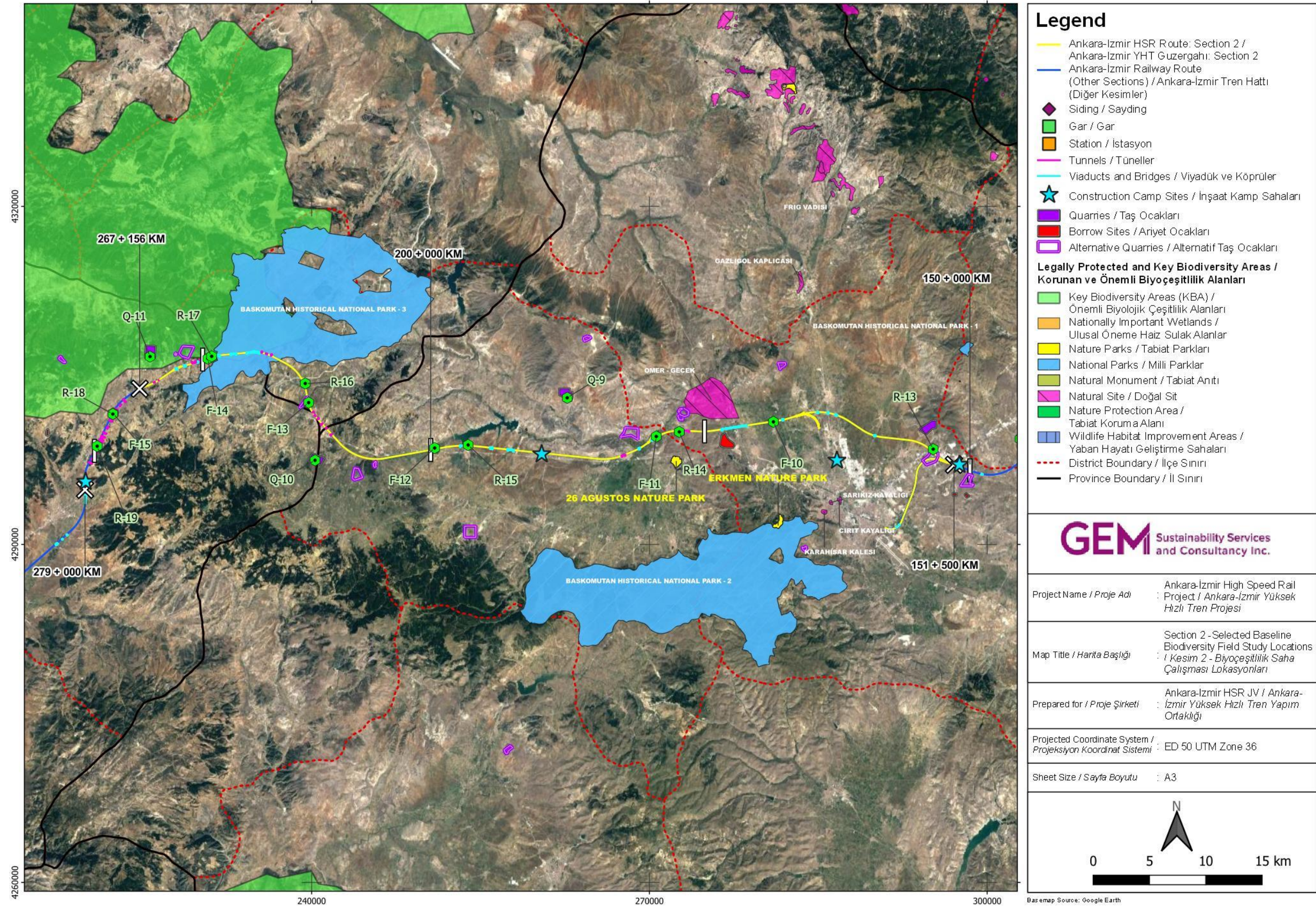


Figure 10-11. Section 2 – Selected Baseline Biodiversity Field Study Locations

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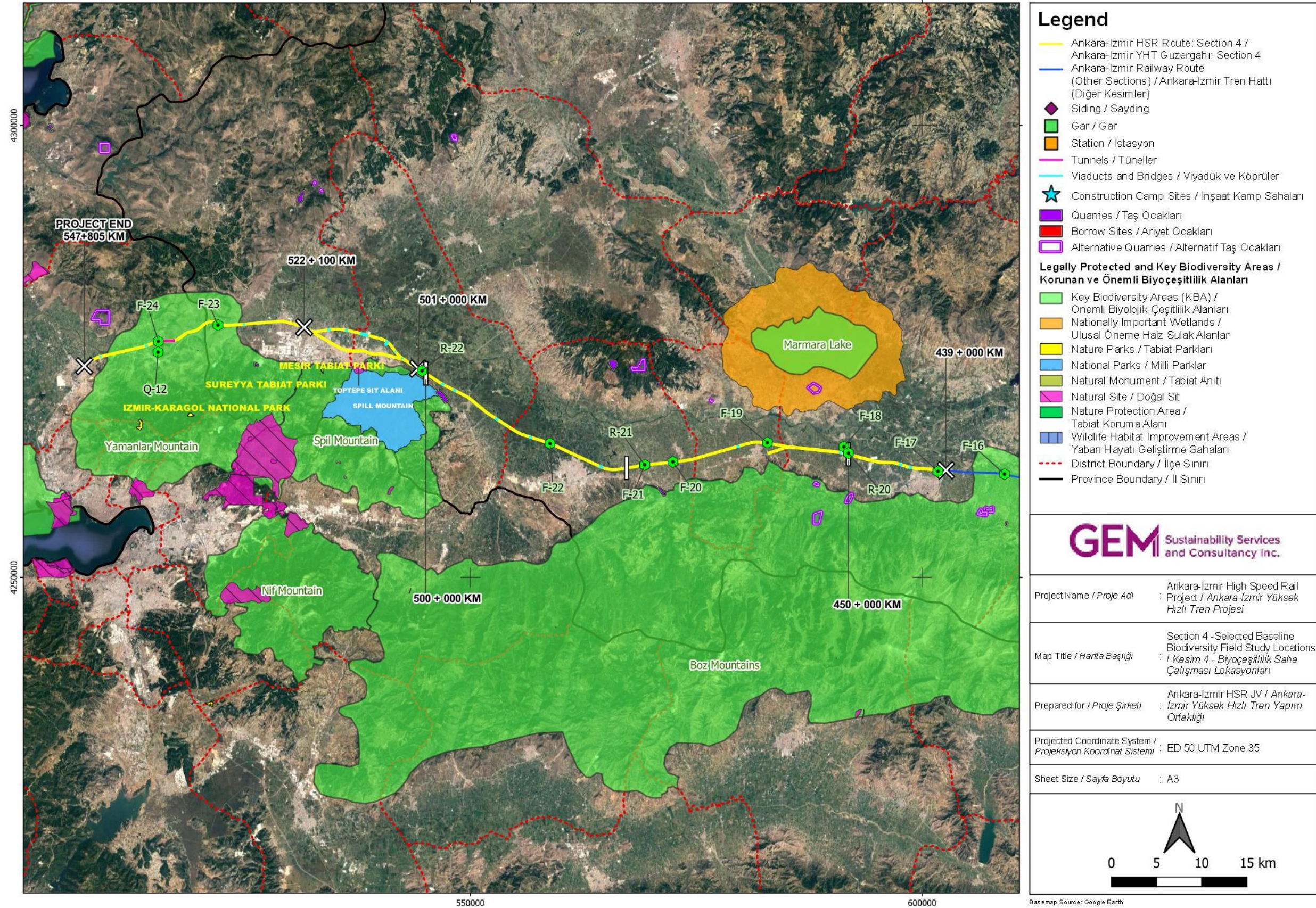







Figure 10-12. Section 4 – Selected Baseline Biodiversity Field Study Locations





Table 10-15. Terrestrial Flora and Fauna and Aquatic Field Survey Locations⁴⁵





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
R1 Yenice Village (Polatli-Tigem KBA) 2+000.00 – 3+000.00 E1.2: Perennial calcareous grassland and basic steppes Elevation: 770 m	 <p>Perennial calcareous steppes</p>  <p>Satellite Image of Station No. R1</p>	R1 Yenice Village (Polatli-Tigem KBA) 2+000.00 – 3+000.00 E1.2: Perennial calcareous grassland and basic steppes Elevation: 770 m	 <p>General Overview of Railway Route at Station No. R1</p>  <p>Current Railway Next to the Planned HSR Line at Station No. R1</p>





⁴⁵ All photos taken by Prof. Dr. Hayri Duman, Prof. Dr. Zafer Ayaş, Prof. Dr. Aydın Akbulut and Prof. Dr. Mustafa Sözen during the ESIA baseline field surveys in January 2021.

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
<p>Q1</p> <p>Yenice (Polatli-Tigem KBA)</p> <p>H3.6: Weathered rock and outcrop habitats</p> <p>J3.2: Active opencast mineral extraction sites, including quarries</p> <p>Elevation: 790 m</p>	 <p>General View of the Quarry</p>  <p>General View of Q1</p>	<p>F1</p> <p>Gumusyaka Village</p> <p>(Sakarya River in Sakarya River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>Majority of the river crossing works have been observed to be completed.</u></p>	 <p>General View of F1</p>  <p>Aquatic Sampling at F1</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
<p>R2 Kabakkoy</p> <p>E1.00: Gypsum steppes</p> <p>Elevation: 775 m</p>	 <p>Gypsum steppes</p>  <p>Culvert Structures at Station No. R2</p>	<p>R3 Cakmakkoy</p> <p>E1.00: Gypsum steppes</p> <p>Elevation: 815 m</p> <p>Viaducts to be finished at the area will provide continuity of the habitat for fauna elements.</p>	 <p>Gypsum steppes</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
<p>Q2</p> <p>Turktaciri</p> <p>H3.6: Weathered rock and outcrop habitats</p> <p>Elevation: 770 m</p>	 <p>General View of the Quarry</p>	<p>Q3</p> <p>Kayakent</p> <p>(Acikir Steppes KBA)</p> <p>E1.2: Perennial calcareous grassland and basic steppes</p> <p>Elevation: 1,150 m</p>	 <p>General View of the Quarry</p>
<p>F2</p> <p>Ilyaspasa Village</p> <p>(Sakarya River in Sakarya River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>River crossing works have been observed to be completed.</u></p>	 <p>General View of F2</p>	<p>R4</p> <p>Ilyas Pasa Village</p> <p>Balikdami</p> <p>Balikdami Nationally Important Wetland</p> <p>Balikdami Wildlife Development Area</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Salix</i></p> <p>I1.2: Mixed crops of market gardens and horticulture</p> <p>Elevation: 830 m</p>	 <p>Riparian and gallery woodland</p>


Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
	 <p>Aquatic Sampling at F2</p>		 <p>General View of R4</p>
<p>F3</p> <p>Balikdami Wildlife Habitat Improvement Area</p> <p>(Goksu Stream in Sakarya River Basin)</p> <p>Balikdami Nationally Important Wetland</p> <p>Balikdami Wildlife Development Area</p> <p>C1.1: Permanent oligotrophic lakes, ponds and pools</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p>I1.2: Mixed crops of market gardens and horticulture</p>	 <p>General View of F3</p>	<p>R5</p> <p>Buhara Village</p> <p>Balikdami Nationally Important Wetland</p> <p>E1.00: Gypsum steppes</p> <p>Elevation: 850 m</p>	 <p>An excavation area for viaduct construction at Station No. R5</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
	 <p>Aquatic Sampling at F3</p>		 <p>General View of R5</p>
<p>F4</p> <p>Sigircik Village (Pinarbasi Creek in Sakarya River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>The works for river crossing have been started.</u></p>	 <p>General View of F4</p>	<p>R6</p> <p>Eskiakören Village</p> <p>E1.00: Gypsum steppes</p> <p>Elevation: 895 m</p>	 <p>General View of Station No. R6</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
	 <p>Aquatic Sampling at F4</p>		 <p>View from Station No. R6 of past construction activity where excavation material stored without topsoil removal</p>
<p>F5</p> <p>Turkmenakoren Village</p> <p>(Turkmenoba Creek in Sakarya River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>The works for river crossing was about to be finalised. During the sampling period the creek was heavily polluted (potentially due to wastewater discharges nearby).</u></p>	 <p>General View of F5</p>	<p>R7</p> <p>Tabaklar Village</p> <p>E1.2: Perennial calcareous grassland and basic steppes</p> <p>Elevation: 944 m</p>	 <p>Perennial calcareous steppes</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
	 <p>Aquatic Sampling at F5</p>		 <p>General Overview of Station No. R7</p>
<p>R7</p> <p>Tabaklar Village</p> <p>E1.2: Perennial calcareous grassland and basic steppes</p> <p>Elevation: 944 m</p>	 <p>View from Station No. R7 of past construction activity where filling was made without topsoil removal</p>	<p>R7</p> <p>Tabaklar Village</p> <p>E1.2: Perennial calcareous grassland and basic steppes</p> <p>Elevation: 944 m</p>	 <p>Culvert Structure at Station No. R7</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
Q4 Tabaklar Village E1.2: Perennial calcareous grassland and basic steppes Elevation: 965 m	 <p>General View of the Quarry</p>	Q5 Alibeyce H3.6: Weathered rock and outcrop habitats J3.2: Active opencast mineral extraction sites, including quarries Elevation: 1,025 m	 <p>General View of the Quarry</p>
Q6 Emirinkoyu G3.9: Coniferous woodland dominated by <i>Juniperus</i> Elevation: 1,035 m	 <p>General View of the Quarry Area</p>	Q7 Bayat G1.7: Thermophilous deciduous woodland J3.2: Active opencast mineral extraction sites, including quarries Elevation: 1,075 m	 <p>General View of the Quarry</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
	 <p>Natural Forest at Q6</p>		 <p>General View of Q7</p>
<p>F6</p> <p>Bayat Town (East)</p> <p>(Bayat Creek in Sakarya River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>The HSR route passes close by to this area. This said, there will be no construction works to be carried out on this creek and its vicinity.</u></p> <p><u>This creek dries in the summer season.</u></p> <p><u>Bayat waste disposal area is located just next to the sampling point.</u></p>	 <p>General View of F6</p>	<p>R8</p> <p>Bayat</p> <p>G3.F: Highly artificial coniferous plantations (<i>Cedrus libani</i>)</p>	 <p><i>Cedrus libani</i> plantation</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
	 <p>Aquatic Sampling at F6</p>		 <p>General View of Station No. R8 (Tunnel Entrance/Exit)</p>
<p>R9</p> <p>Sagirli</p> <p>G1.7: Thermophilous deciduous woodland</p> <p>Elevation: 1,270 m</p>	 <p>Thermophilous deciduous woodland</p>	<p>F7</p> <p>Sagirli Village (Seydiler Creek in Akarcay River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>The HSR route passes close by to this area. This said, there will be no construction works to be carried out on this creek and its vicinity.</u></p>	 <p>General View of F7</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
	 <p>General View of Station No. R9 (tunnel entrance/exit structure provides habitat continuity)</p>		 <p>Aquatic Sampling on F7</p>
<p>R10</p> <p>Seydiler</p> <p>G1.7: Thermophilous deciduous woodland</p> <p>C1.1: Permanent oligotrophic lakes, ponds, and pools</p> <p>Elevation: 1,270 m</p>	 <p>Thermophilous deciduous woodland</p>	<p>F8</p> <p>Seydiler Town (West)</p> <p>(Seydiler Creek in Akarcay River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>The HSR route passes close by to this area. This said, there will be no construction works to be carried out on this creek and its vicinity.</u></p>	 <p>General View of F8</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
	 <p>General View of Viaduct by the Lake and Tunnel Entrance at Station No. R10 (providing habitat continuity)</p>		 <p>Aquatic Sampling at F8</p>
<p>R11</p> <p>Karagol</p> <p>C3.2: Water-fringing reedbeds and tall helophytes other than canes</p> <p>I1.2: Mixed crops of market gardens and horticulture</p> <p>Elevation: 1,058 m</p>	 <p>Water-fringing reedbeds</p>	<p>F9</p> <p>Iscehisar Town (South) – Karagol</p> <p>(Iscehisar Creek in Akarcay River Basin)</p> <p>C3.2: Water-fringing reedbeds and tall helophytes other than canes</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>The construction works to pass through the creek have been completed.</u></p>	 <p>General View of F9</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
	 <p>General View of Station No. R11</p>		 <p>Aquatic Sampling at F9</p>
<p>Q8</p> <p>Gebeceler</p> <p>E1.2: Perennial calcareous grassland and basic steppes</p> <p>Elevation: 1,060 m</p>	 <p>General View of the Quarry</p>	<p>R12</p> <p>Gebeceler</p> <p>E1.2: Perennial calcareous grassland and basic steppes</p> <p>Elevation: 1,080 m</p>	 <p>Perennial calcareous steppes</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
R12 Gebeceler E1.2: Perennial calcareous grassland and basic steppes Elevation: 1,080 m	 <p>General View of Station No. R12</p>	R13 Susuz G3.F: Highly artificial coniferous plantations (<i>Cedrus libani</i>) Elevation: 1,085 m	 <p>Pinus-Cedrus plantation</p>
F10 Ismail Village (North) (Akarcay River in Akarcay River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i> <u>The construction works to pass through the creek have been observed to be completed to a certain extent.</u>	 <p>General View of F10</p>	F10 Ismail Village (North) (Akarcay River in Akarcay River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i> <u>The construction works to pass through the creek have been observed to be completed to a certain extent.</u>	 <p>Aquatic Sampling at F10</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
<p>R14</p> <p>Koprulu</p> <p>E1.2: Perennial calcareous steppes</p> <p>Elevation: 1,075 m</p>	 <p>Perennial calcareous steppes</p>	<p>F11</p> <p>Koprulu Village</p> <p>(Aksu Creek in Akarcay River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>The construction works to pass through the creek have been observed to be completed to a certain extent.</u></p>	 <p>General View of F11</p>
<p>F11</p> <p>Koprulu Village</p> <p>(Aksu Creek in Akarcay River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>The construction works to pass through the creek have been observed to be completed to a certain extent.</u></p>	 <p>Aquatic Sampling at F11</p>	<p>Q9</p> <p>Ayvali</p> <p>E1.2: Perennial calcareous grassland and basic steppes</p> <p>J3.2: Active opencast mineral extraction sites, including quarries</p> <p>Elevation: 1,205 m</p>	 <p>General View of the Area</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
Q9 Ayvali E1.2: Perennial calcareous grassland and basic steppes J3.2: Active opencast mineral extraction sites, including quarries Elevation: 1,205 m	 <p>General View of Q9</p>	R15 Duzagac E3.3: Sub-Mediterranean humid meadows G1.1: Riparian and gallery woodland, with dominant <i>Salix</i> I1.2: Mixed crops of market gardens and horticulture Elevation: 1,125 m	 <p>General View of Station No. R15 (the viaduct will provide habitat continuity)</p>
R15 Duzagac E3.3: Sub-Mediterranean humid meadows G1.1: Riparian and gallery woodland, with dominant <i>Salix</i> I1.2: Mixed crops of market gardens and horticulture Elevation: 1,125 m	 <p>General View of R15</p>	F12 Duzagac Town (West) (Aksu Creek in Akarcay River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i> <u>The construction works to pass through the creek have been observed to be completed to a certain extent.</u>	 <p>General View of F12</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
<p>F12</p> <p>Duzagac Town (West)</p> <p>(Aksu Creek in Akarcay River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>The construction works to pass through the creek have been observed to be completed to a certain extent.</u></p>	 <p>Aquatic Sampling at F12</p>	<p>Q10</p> <p>Elvanpasa</p> <p>H3.6: Weathered rock and outcrop habitats</p> <p>Elevation: 1,416 m</p>	 <p>General View of the Quarry</p>
<p>F13</p> <p>Ciftlik Village</p> <p>(Kokar Creek in Sakarya River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>It was observed that the construction works to pass through the creek have been mostly completed.</u></p>	 <p>General View of F13</p>	<p>F13</p> <p>Ciftlik Village</p> <p>(Kokar Creek in Sakarya River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p><u>It was observed that the construction works to pass through the creek have been mostly completed.</u></p>	 <p>Aquatic Sampling at F13</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
<p>R16</p> <p>Dumlupinar</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Salix</i></p> <p>Elevation: 1,215 m</p>	 <p>General View of Station No. R16</p>	<p>R17</p> <p>Dumlupinar Halaclar</p> <p>Murat Mountain KBA</p> <p>G3.5: <i>Pinus nigra</i> woodland</p> <p>Elevation: 1,140 m</p>	 <p>Pinus Nigra Forest (this area is be crossed with a tunnel)</p>
<p>F14</p> <p>Halaclar Village (Dar Dere in Buyuk Menderes River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p> <p>C1.1: Permanent oligotrophic lakes</p> <p><u>No water flow was observed during the field study (potentially due to water retained at the Banaz Kozviran Pond to the upstream of this point). No riparian vegetation is present at this station.</u></p>	 <p>General View of F14</p>	<p>R18</p> <p>Alaba Village</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Salix</i></p> <p>Elevation: 1,015 m</p>	 <p>Riparian and gallery woodland</p>





Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
F15 Alaba Village (Yagmur Creek in Buyuk Menderes River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i> <u>During the field survey the water flow was very low. It is an intermittent creek which becomes dry during summer season. In terms of aquatic biota, during the field survey, conditions leading to the dominance of green algae was observed.</u>	 <p>Aquatic Sampling at F15</p>	R19 Hatipler Village G3.5: <i>Pinus nigra</i> woodland Elevation: 1,030 m	 <p>Pinus Nigra Forest (this area will be passed by tunnels)</p>
F16 Durasilli Village (Alasehir Creek in Gediz River Basin) KBA G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>General View of F16</p>	F16 Durasilli Village (Alasehir Creek in Gediz River Basin) KBA G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>Aquatic Sampling at F16</p>



Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
<p>F17</p> <p>Salihli Districtz</p> <p>(Salihli Creek in Gediz River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p>	 <p>General View of F17</p>	<p>F17</p> <p>Salihli Districtz</p> <p>(Salihli Creek in Gediz River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p>	 <p>Aquatic Sampling at F17</p>
<p>F18</p> <p>Ahmetli District (North)</p> <p>(Gokkoy Creek in Gediz River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p>	 <p>General View of F18</p>	<p>F18</p> <p>Ahmetli District (North)</p> <p>(Gokkoy Creek in Gediz River Basin)</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p>	 <p>Aquatic Sampling at F18</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
F19 Yeniköy Village (Ahmetli Creek in Gediz River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>General View of F19</p>	F19 Yeniköy Village (Ahmetli Creek in Gediz River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>Aquatic Sampling at F19</p>
F20 Kapancı Village (Akcapinar Creek in Gediz River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>General View of F20</p>	F20 Kapancı Village (Akcapinar Creek in Gediz River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>Aquatic Sampling at F20</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
R20 Kapanci G1.1: Riparian and gallery woodland, with dominant <i>Salix</i> FB.4: Vineyards G1.D: Fruit and nut tree orchards G2.9: Evergreen orchards and groves Elevation: 83 m	 <p>Riparian and gallery woodland</p>	R20 Kapanci G1.1: Riparian and gallery woodland, with dominant <i>Salix</i> FB.4: Vineyards G1.D: Fruit and nut tree orchards G2.9: Evergreen orchards and groves Elevation: 83 m	 <p>General View of Station No. R20</p>
Q12 Menemen Degirmendere (Yamanlar Mountain KBA) F5.2: Maquis H3.2: Basic and ultrabasic inland cliffs Elevation: 20 m	 <p>General View of the Quarry</p>	Q12 Menemen Degirmendere (Yamanlar Mountain KBA) F5.2: Maquis H3.2: Basic and ultrabasic inland cliffs Elevation: 20 m	 <p>General View of Q12</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
R21 Derbent G1.1: Riparian and gallery woodland, with dominant <i>Salix</i> FB.4: Vineyards G1.D: Fruit and nut tree orchards G2.9: Evergreen orchards and groves Elevation: 70 m	 <p>Riparian and gallery woodland</p>	R21 Derbent G1.1: Riparian and gallery woodland, with dominant <i>Salix</i> FB.4: Vineyards G1.D: Fruit and nut tree orchards G2.9: Evergreen orchards and groves Elevation: 70 m	 <p>General View of Station No. R21</p>
F21 Derbent Village (Cikrikci Creek in Gediz River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>General View of F21</p>	F21 Derbent Village (Cikrikci Creek in Gediz River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>Aquatic Sampling at F21</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
F22 Turgutlu District (North) (Turgutlu Creek in Gediz River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>General View of F22</p>	F22 Turgutlu District (North) (Turgutlu Creek in Gediz River Basin) G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>	 <p>Aquatic Sampling at F22</p>
R22 Manisa Province G1.1: Riparian and gallery woodland, with dominant <i>Salix</i> FB.4: Vineyards G1.D: Fruit and nut tree orchards G2.9: Evergreen orchards and groves Elevation: 32 m	 <p>Riparian and gallery woodland</p>	R22 Manisa Province G1.1: Riparian and gallery woodland, with dominant <i>Salix</i> FB.4: Vineyards G1.D: Fruit and nut tree orchards G2.9: Evergreen orchards and groves Elevation: 32 m	 <p>General View of Station No. R22</p>

Station No.	General View of Survey Locations	Station No.	General View of Survey Locations
<p>F23</p> <p>Manisa Province (West)</p> <p>(Gediz River in Gediz River Basin)</p> <p>KBA</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p>	 <p>General View of F23</p>	<p>F23</p> <p>Manisa Province (West)</p> <p>(Gediz River in Gediz River Basin)</p> <p>KBA</p> <p>G1.1: Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p>	 <p>Aquatic Sampling at F23</p>

10.2.5. Habitats Audit

Based on the biodiversity field study, the Project Area (the railway alignment and the quarries visited) is defined by the following EUNIS habitats as further described in Table 10-16:

Natural Habitats⁴⁶:



1. EUNIS Habitat C1.1: Permanent oligotrophic lakes, ponds, and pools
2. EUNIS Habitat C3.2: Water-fringing reedbeds and tall helophytes other than canes
3. EUNIS Habitat E1.2: Perennial calcareous grassland and basic steppes
4. EUNIS Habitat E1.00: Gypsum steppes
5. EUNIS Habitat E3.3: Sub-Mediterranean humid meadows
6. EUNIS Habitat F5.2: Maquis
7. EUNIS Habitat G1.1: Riparian and gallery woodland, with dominant *Alnus*, *Betula*, *Populus* or *Salix*
8. EUNIS Habitat G1.7: Thermophilous deciduous woodland
9. EUNIS Habitat G3.5: *Pinus nigra* woodland
10. EUNIS Habitat G3.9: Coniferous woodland dominated by *Juniperus*
11. EUNIS Habitat H3.2: Basic and ultrabasic inland cliffs
12. EUNIS Habitat H3.6: Weathered rock and outcrop habitats



Modified Habitats:



1. EUNIS Habitat FB.4: Vineyards
2. EUNIS Habitat G1.D: Fruit and nut tree orchards
3. EUNIS Habitat G2.9: Evergreen orchards and groves
4. EUNIS Habitat G3.F: Highly artificial coniferous plantations (*Cedrus libani*)
5. EUNIS Habitat I1.2: Mixed crops of market gardens and horticulture
6. EUNIS Habitat J3.2: Active opencast mineral extraction sites, including quarries



⁴⁶ Gypsum Steppe is listed as a priority habitat under Annex I to the EU Habitats Directive and EUNIS Habitat G3.9: Coniferous woodland dominated by *Juniperus* is listed in Annex I to the EU Habitats Directive.



Table 10-16. Habitat Classification and Vegetation Characteristics at the Project Area



EUNIS Habitat Code	EUNIS Habitat Description and Characteristics of the Project Area	Field Study Photos
C1.1 – Permanent oligotrophic lakes, ponds, and pools	<p>Waterbodies with a low nutrient (nitrogen and phosphorus) content, mostly acid (pH 4-6). Includes oligotrophic waters of medium or high pH, e.g. calcareous and basic unpolluted nutrient-poor lakes and pools, which are rare in much of Europe and noted as a habitat of charophytes (C1.14). Excludes peaty, dystrophic waters (C1.4). Because of the low nutrient status, beds of vascular plants, including [<i>Callitriche</i>] spp., [<i>Potamogeton</i>] spp. and isoetids [<i>Isoto-Nanojuncetea</i>] are often sparse and open.</p> <p>This habitat is only observed close to Seydiler village to the south of Afyon Koroglu Beli. It is an artificial pond.</p>	
C3.2 Water-fringing reedbeds and tall helophytes other than canes	<p>Water-fringing stands of tall vegetation by lakes (including brackish lakes), rivers and brooks, usually species-poor and often dominated by one species. Includes stands of [<i>Carex</i>] spp., [<i>Cladium mariscus</i>], [<i>Equisetum fluviatile</i>], [<i>Glyceria maxima</i>], [<i>Hippuris vulgaris</i>], [<i>Phragmites australis</i>], [<i>Sagittaria sagittifolia</i>], [<i>Schoenoplectus</i>] spp., [<i>Sparganium</i>] spp. and [<i>Typha</i>] spp. Excludes terrestrialised reed and sedge beds which are not at the water's edge (D5.1, D5.2).</p> <p>This habitat is observed at Karagol in Afyon province. The water level is very low and the characteristic species is <i>Phragmites australis</i>.</p>	



EUNIS Habitat Code	EUNIS Habitat Description and Characteristics of the Project Area	Field Study Photos
<p>E1.2</p> <p>Perennial calcareous grassland and basic steppes</p>	<p>Steppes of the Anatolian Plateau, of Transcaucasia, of the eastern cis-Caucasian hills of Daghestan and the Terek basin, of the Iranian Plateau, the Kopet Dag, the Pamir-Alai, the extreme western Tien-Shan, around the rim of the Ferghana basin and along the spur of the Karatau, and of northern Mesopotamia.</p> <p>This habitat is observed at several locations of the railway alignment and also at some quarry locations. The characteristic species of the habitat are <i>Astragalus acicularis</i>, <i>Astragalus microcephalus</i>, <i>Astragalus condensatus</i>, <i>Euphorbia macroclada</i>, <i>Bromus tomentellus</i>, <i>Koeleria cristata</i>, <i>Centaurea virgata</i>, <i>Artemisia austriaca</i>, <i>Phlomis armeniaca</i>, <i>Salvia cryptantha</i>, <i>Poa bulbosa</i>. Ten endemic species are observed at this habitat including one regional endemic species (<i>Paronychia dudleyi</i>).</p>	
<p>E1.00</p> <p>Gypsum steppes</p>	<p>EUNIS Code not yet assigned to this habitat.</p> <p>Amongst the natural habitats, the Gypsum Steppe habitat observed at KM 13+400- KM 76+700 in Section 1 is considered as a sensitive habitat as it includes six local endemic species (<i>Glaucium secmenii</i>, <i>Alyssum niveum</i>, <i>Cephalaria aytachii</i>, <i>Verbascum gypsicola</i>, <i>Marrubium zeydanlii</i>, <i>Acantholimon gemicianum</i>) and six regional endemic species (<i>Scabiosa hololeuca</i>, <i>Achillea ketenoglui</i>, <i>Scutellaria yildirimlii</i>, <i>Sideritis gulendamii</i>, <i>Salvia aytachii</i>, <i>Thymus leucostomus</i> var. <i>argilleceus</i>) directly observed at the Project Area. It is listed as a priority habitat under Annex I of the EU Habitats Directive. It is not a continuous habitat. The characteristics of the habitat is that it includes varying proportions of gypsum and marn and observed as off-white.</p>	



EUNIS Habitat Code	EUNIS Habitat Description and Characteristics of the Project Area	Field Study Photos
E3.3 Sub-Mediterranean humid meadows	<p>Humid meadows rich in clover ([<i>Trifolium</i>] spp.) of sub- and supramediterranean regions remote from Atlantic influence, in particular, of the Balkan peninsula, of the Apennines and of Mediterranean Anatolia, mostly developed above the lowlands but below the montane level.</p> <p>This habitat is not commonly observed at the Project Area. The characteristic species of the habitat are <i>Dipsacus laciniatus</i>, <i>Lotus corniculatus</i>, <i>Medicago sativa</i> and <i>Cichorium intybus</i>.</p>	
F5.2 Maquis	<p>Evergreen sclerophyllous or lauriphyllous shrub vegetation, with a more or less closed canopy structure, and with few annuals, some geophytes and often scattered trees, some of which may be in shrub form. Unlike arborescent matorral, maquis is typically dominated by species that do not have the potential to grow into tall trees. In high maquis these may be [<i>Arbutus</i>] spp., [<i>Erica arborea</i>], [<i>Erica scoparia</i>], [<i>Juniperus oxycedrus</i>], [<i>Phillyrea</i>] spp. In low maquis, [<i>Cistus</i>] spp., [<i>Erica</i>] spp., [<i>Genista</i>] spp., [<i>Lavandula</i>] spp. may predominate.</p> <p>This habitat is observed only at quarry location Q12. The dominant species of the habitat are <i>Quercus coccifera</i>, <i>Phillyrea latifolia</i>, <i>Olea europaea</i> and <i>Paliurus spinachristii</i>. The regional endemic species (<i>Verbascum antinori</i> and <i>Centaurea polyclada</i>) are observed at this habitat.</p>	



EUNIS Habitat Code	EUNIS Habitat Description and Characteristics of the Project Area	Field Study Photos
<p>FB.4</p> <p>Vineyards</p>	<p>Plantations of grapevine [<i>Vitis vinifera</i>].</p> <p>Represents the modified habitat of grapevine plantations observed in Salihli-Menemen section of the Project route.</p>	
<p>G1.1</p> <p>Riparian and gallery woodland, with dominant <i>Alnus</i>, <i>Betula</i>, <i>Populus</i> or <i>Salix</i></p>	<p>Riparian woods of the boreal, boreo-nemoral, nemoral and submediterranean and steppe zones, with one or few dominant species, typically [<i>Alnus</i>], [<i>Betula</i>], [<i>Populus</i>] or [<i>Salix</i>]. Includes woods dominated by narrow-leaved willows [<i>Salix alba</i>], [<i>Salix elaeagnos</i>], [<i>Salix purpurea</i>], [<i>Salix viminalis</i>] in all zones including the mediterranean. Excludes riverine scrub of broad-leaved willows, e.g. [<i>Salix aurita</i>], [<i>Salix cinerea</i>], [<i>Salix pentandra</i>] (F9.1).</p> <p>This habitat is observed along the creeks and streams on the railway alignment. The characteristic species of the habitat is <i>Salix alba</i>. The dominant species of the habitat are <i>Salix alba</i>, <i>Rubus sanctus</i>, <i>Rosa canina</i>, <i>Conium maculatum</i>, <i>Dipsacus laciniatus</i>, <i>Phragmites australis</i>, <i>Arundo donax</i>.</p>	

EUNIS Habitat Code	EUNIS Habitat Description and Characteristics of the Project Area	Field Study Photos
G1.7 Thermophilous deciduous woodland	<p>Forests or woods of submediterranean climate regions and supramediterranean altitudinal levels, and of western Eurasian steppe and substeppe zones, dominated by deciduous or semideciduous thermophilous [<i>Quercus</i>] species or by other southern trees such as [<i>Carpinus orientalis</i>], [<i>Castanea sativa</i>] or [<i>Ostrya carpinifolia</i>]. Thermophilous deciduous trees may, under local microclimatic or edaphic conditions, replace the evergreen oak forests in mesomediterranean or thermomediterranean areas, and occur locally to the north in central and western Europe.</p> <p>This habitat is observed at Afyon Bayat-Seydiler section. The area where this habitat is observed is mostly passed through tunnels. The dominant species of the habitat are <i>Quercus pubescens</i>, <i>Quercus cerris</i>, <i>Quercus trojana</i>.</p>	
G1.D Fruit and nut tree orchards	<p>Stands of trees cultivated for fruit or flower production, providing permanent tree cover once mature. Extensively cultivated and old orchards are habitats supporting rich flora and fauna.</p> <p>This habitat (plum, peach, pear) is observed at Salihli-Menemen section of the Project.</p>	

EUNIS Habitat Code	EUNIS Habitat Description and Characteristics of the Project Area	Field Study Photos
<p>G2.9</p> <p>Evergreen orchards and groves</p>	<p>In Europe these are mostly olives and citrus.</p> <p>This habitat (olives) is observed at Salihli-Menemen section of the Project.</p>	
<p>G3.5</p> <p><i>Pinus nigra</i> woodland</p>	<p>Forests dominated by pines of the [<i>Pinus nigra</i>] group.</p> <p>This habitat is observed at Usak Banaz-Kutahya Dumlupinar section of the Project. The areas where <i>Pinus nigra</i> woodland habitat is observed is passed through tunnels.</p>	

EUNIS Habitat Code	EUNIS Habitat Description and Characteristics of the Project Area	Field Study Photos
<p>G3.9</p> <p>Coniferous woodland dominated by <i>Cupressaceae</i> or <i>Taxaceae</i></p>	<p>Woods dominated by [<i>Cupressus sempervirens</i>], [<i>Juniperus</i>] spp. or [<i>Taxus baccata</i>] of the nemoral and Mediterranean mountains and hills.</p> <p>This habitat is observed only at around Afyon Bayat and at quarry location Q6 around Emirinkoyu village. The Juniper forest observed at Q6 is at climax. This habitat is listed in Annex I of the EU Habitats Directive.</p>	
<p>G3.F</p> <p>Highly artificial coniferous plantations</p>	<p>Plantations of exotic conifers or of European conifers out of their natural range, or of native species planted in clearly unnatural stands, typically as monocultures in situations where other species would naturally dominate.</p> <p>Modified habitat of <i>Cedrus libani</i> and <i>Pinus nigra</i> plantations observed mostly within Afyon province along the HSR alignment.</p>	

EUNIS Habitat Code	EUNIS Habitat Description and Characteristics of the Project Area	Field Study Photos
H3.2 Basic and ultrabasic inland cliffs	<p>Dry, calcareous inland cliffs. Specific plant associations colonize montane and Mediterranean cliffs. Most of the subdivisions refer to them. Northern lowland cliffs usually support fragments of other less specialised communities.</p> <p>This habitat type is encountered only at the quarry area nominated as Station No. Q12 in the vicinity of Menemen. The characteristic flora species of this habitat are <i>Polypodium vulgare</i>, <i>Asplenium ceterach</i>, <i>Origanum onites</i> and <i>Umblicus horizontalis</i>.</p>	
H3.6 Weathered rock and outcrop habitats	<p>Rocks and outcrops colonized by pioneer communities, especially of [Crassulaceae]. The substrates are mostly siliceous, occurring in the alpine or montane levels of higher mountains of the nemoral zone. The communities are dominated by succulent [Sempervivum arachnoideum ssp. arachnoideum], [Sempervivum arachnoideum ssp. tomentosum], [Sempervivum montanum ssp. montanum], [Sempervivum montanum ssp. stiriaticum], [Sempervivum wulfenii], [Jovibarba arenaria], [Sedum montanum], [Sedum anglicum ssp. pyrenaicum], [Sedum sexangulare], [Sedum album], [Sedum annuum], [Saxifraga aspera], accompanied by [Silene rupestris], [Scleranthus polycarpus], [Veronica fruticans], [Thymus praecox ssp. polytrichus], [Viola tricolor ssp. saxatilis], by small crucifers, lichens and mosses.</p> <p>This habitat type is mostly encountered at areas where quarries will be operated. The vegetation cover is below 30%. The endemic flora species <i>Inula anatolica</i>, <i>Satureja wiedemanniana</i> and <i>Salvia cadmica</i> are the characteristics of this habitat.</p>	

EUNIS Habitat Code	EUNIS Habitat Description and Characteristics of the Project Area	Field Study Photos
<p>I1.2</p> <p>Mixed crops of market gardens and horticulture</p>	<p>Intensive cultivation of vegetables, flowers, small fruits, usually in alternating strips of different crops. Includes allotments and small-scale market gardens.</p> <p>This habitat type is mostly encountered between Polatli-Banaz. Mostly wheat cultivation is practiced within this habitat.</p>	
<p>J3.2</p> <p>Active opencast mineral extraction sites, including quarries</p>	<p>Areas used for open-sky mining and quarrying activities and presently in operation.</p> <p>This habitat type represents the active quarry areas.</p>	

An important part of the HSR route consists of dry and irrigated agricultural fields. For this reason, the natural habitats along the railway alignment are not continuous and observed intermittently. It should be noted that the construction activities along the railway alignment have already been started in the past by other contractors. As can be seen from the site photos taken at the field survey locations as given in Table 10-15, the construction works are quite advanced at certain locations including engineering structures such as viaducts and tunnels being built which will provide habitat continuity for fauna elements.

Amongst the natural habitats, the Gypsum Steppe habitat observed at KM 13+400-KM 76+700 in Section 1 is considered as a sensitive habitat as it includes the majority of the endemic flora species (six local endemic and six regional endemic) directly observed at the Project Area as listed in Section 10.2.6.1. It is listed as a priority habitat under Annex I of the EU Habitats Directive. Another sensitive natural habitat is the Maquis habitat observed at quarry location Q12 in Section 4 falling within the boundaries of Yamanlar Mountain KBA. Even in late January, one (1) local endemic species (*Verbascum antinori*) and one (1) regional endemic species (*Centaurea polyclada*) were observed at this area.

The natural habitat "Coniferous woodland dominated by *Juniperus*" is observed within the direct Project footprint only at quarry location Q6 in Section 1. This habitat is listed in Annex I of the EU Habitats Directive. As described in Section 10.2.3.1, the railway alignment overlaps with Balıkdami Nationally Important Wetland in Section 1. The habitat maps of the Project are given from Figure 10-13 to Figure 10-21.

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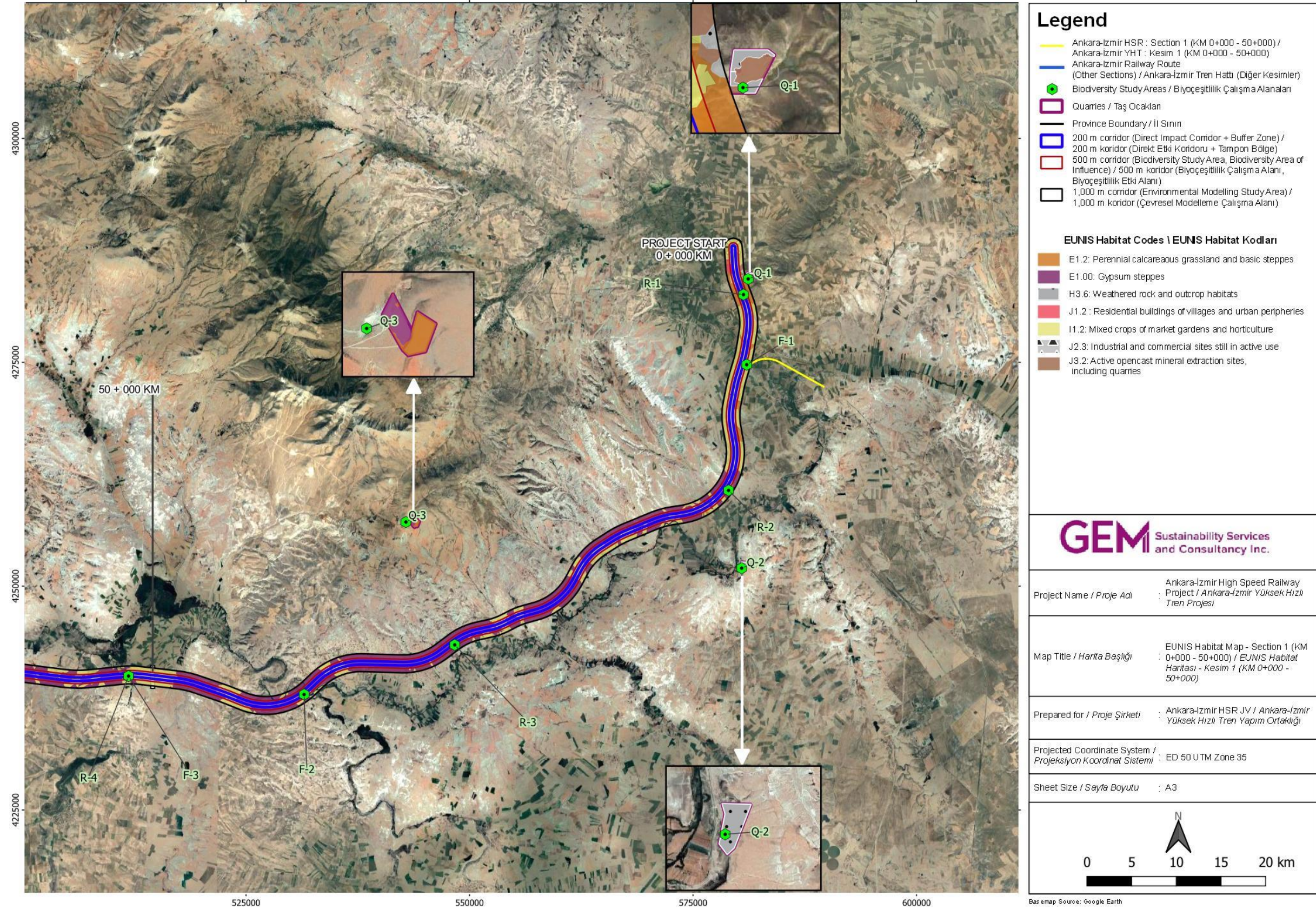


Figure 10-13. EUNIS Habitat Map – Section 1 (KM 0+000-KM 50+000)

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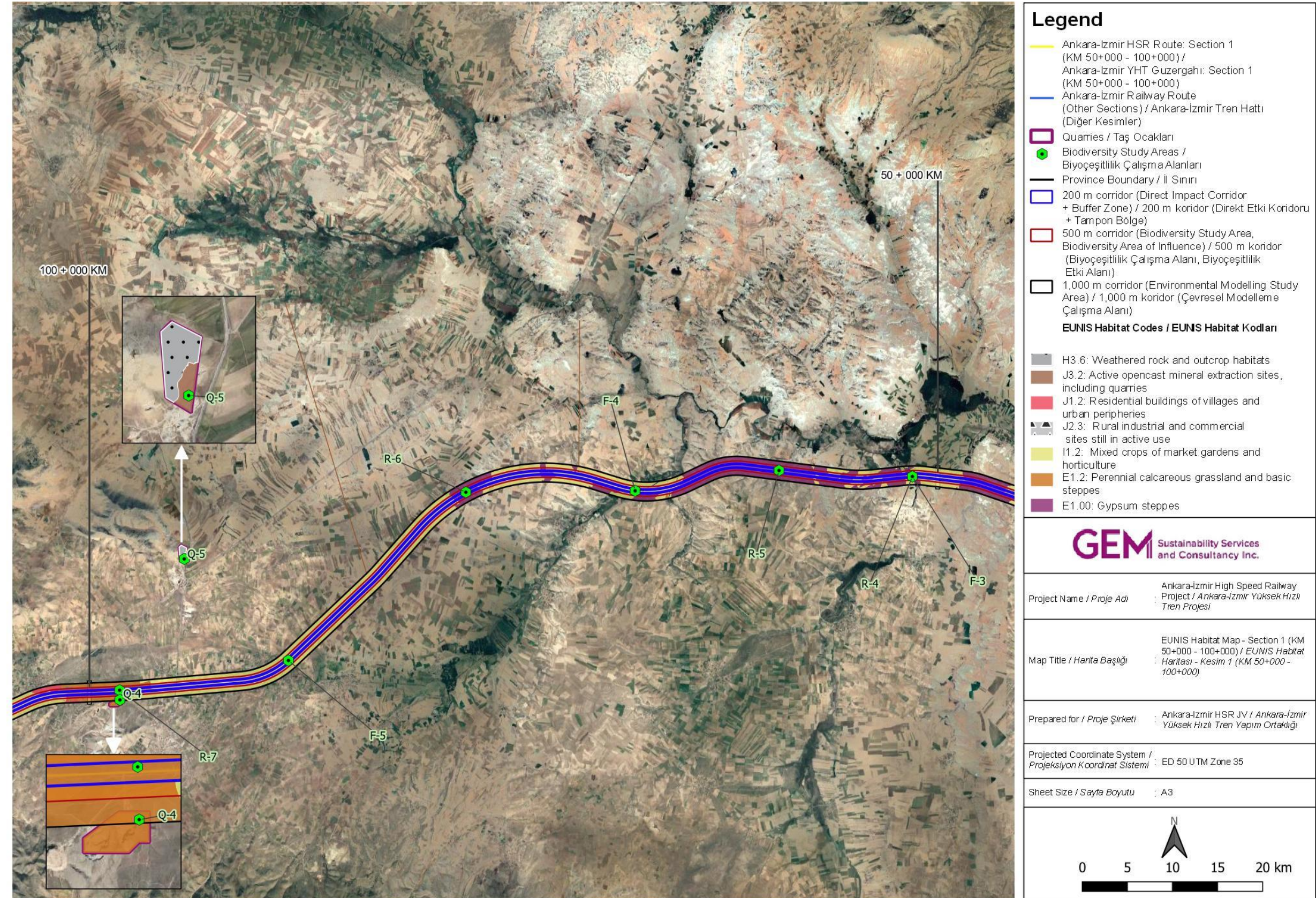


Figure 10-14. EUNIS Habitat Map – Section 1 (KM 50+000-KM 100+000)

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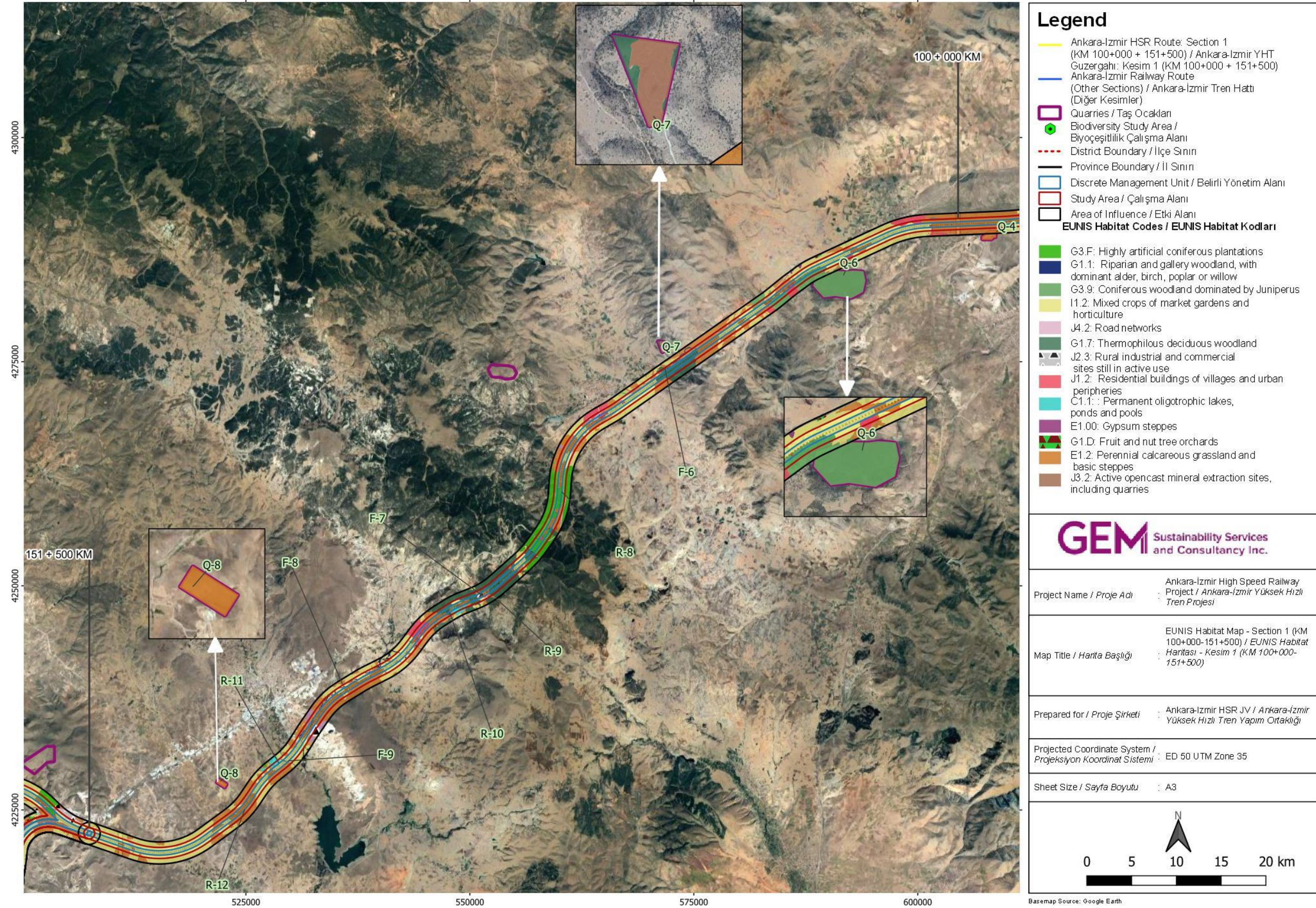


Figure 10-15. EUNIS Habitat Map – Section 1 (KM 100+000-KM 151+500)

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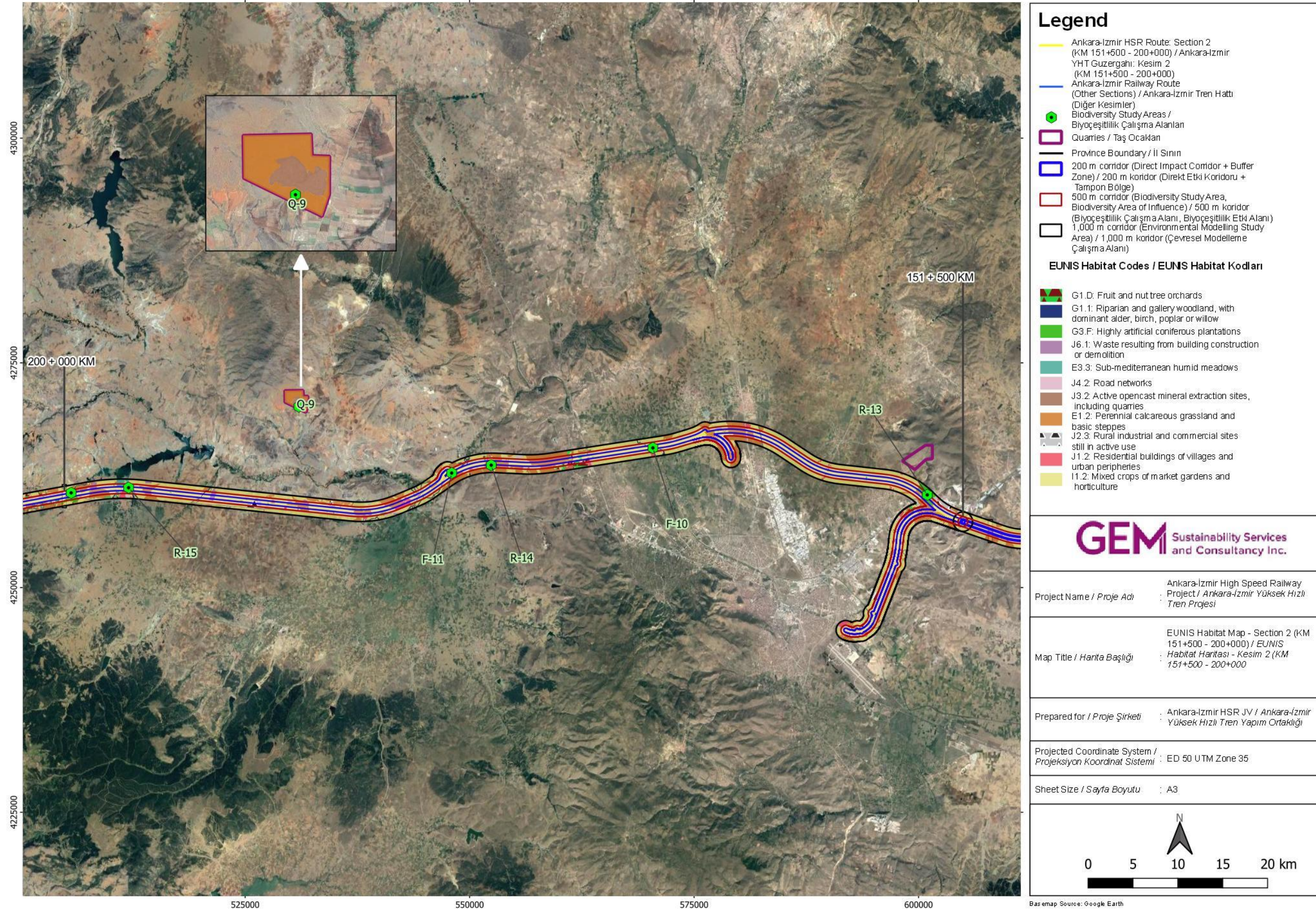


Figure 10-16. EUNIS Habitat Map – Section 2 (KM 151+500-KM 200+000)

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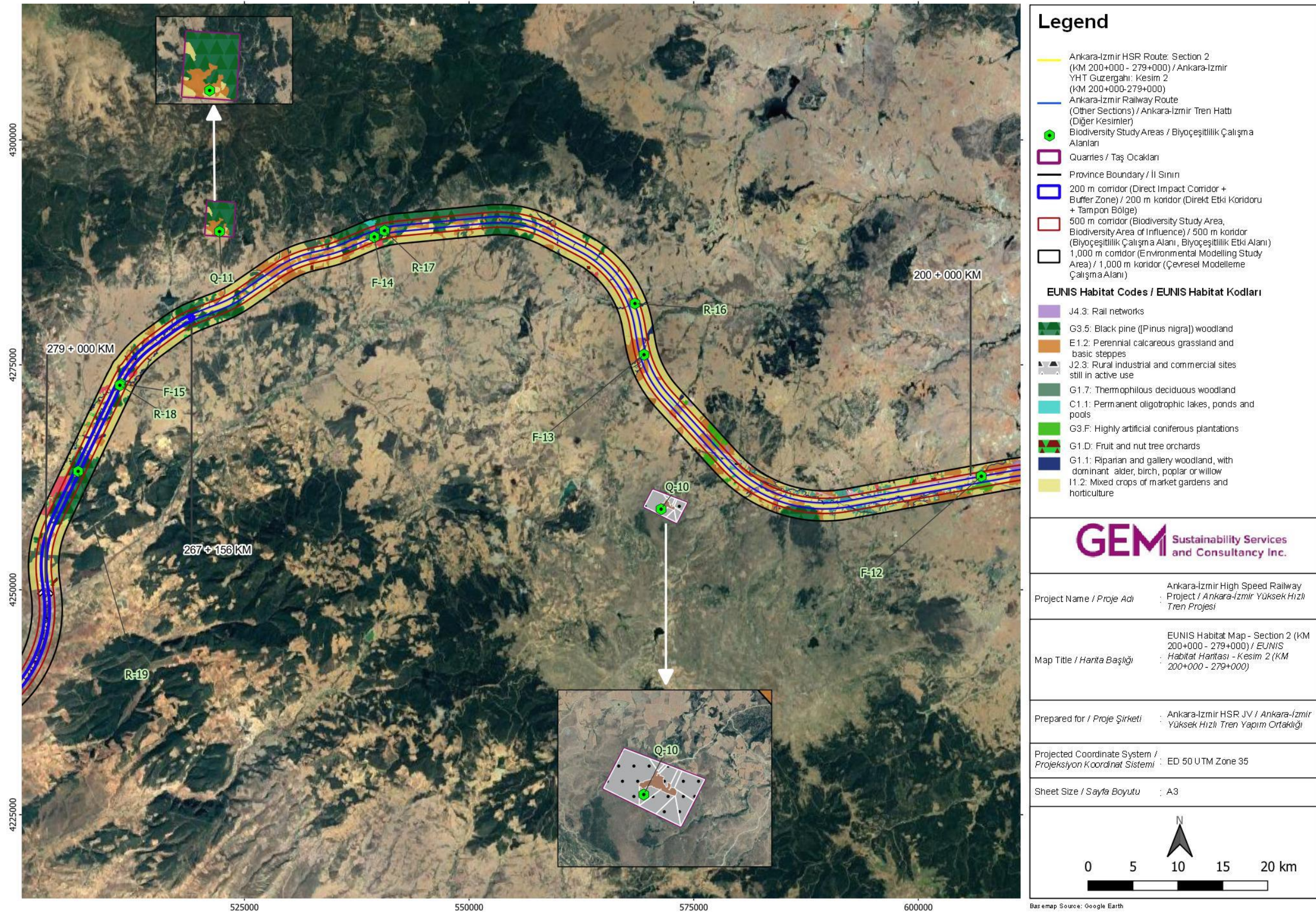


Figure 10-17. EUNIS Habitat Map – Section 2 (KM 200+000-KM 279+000)

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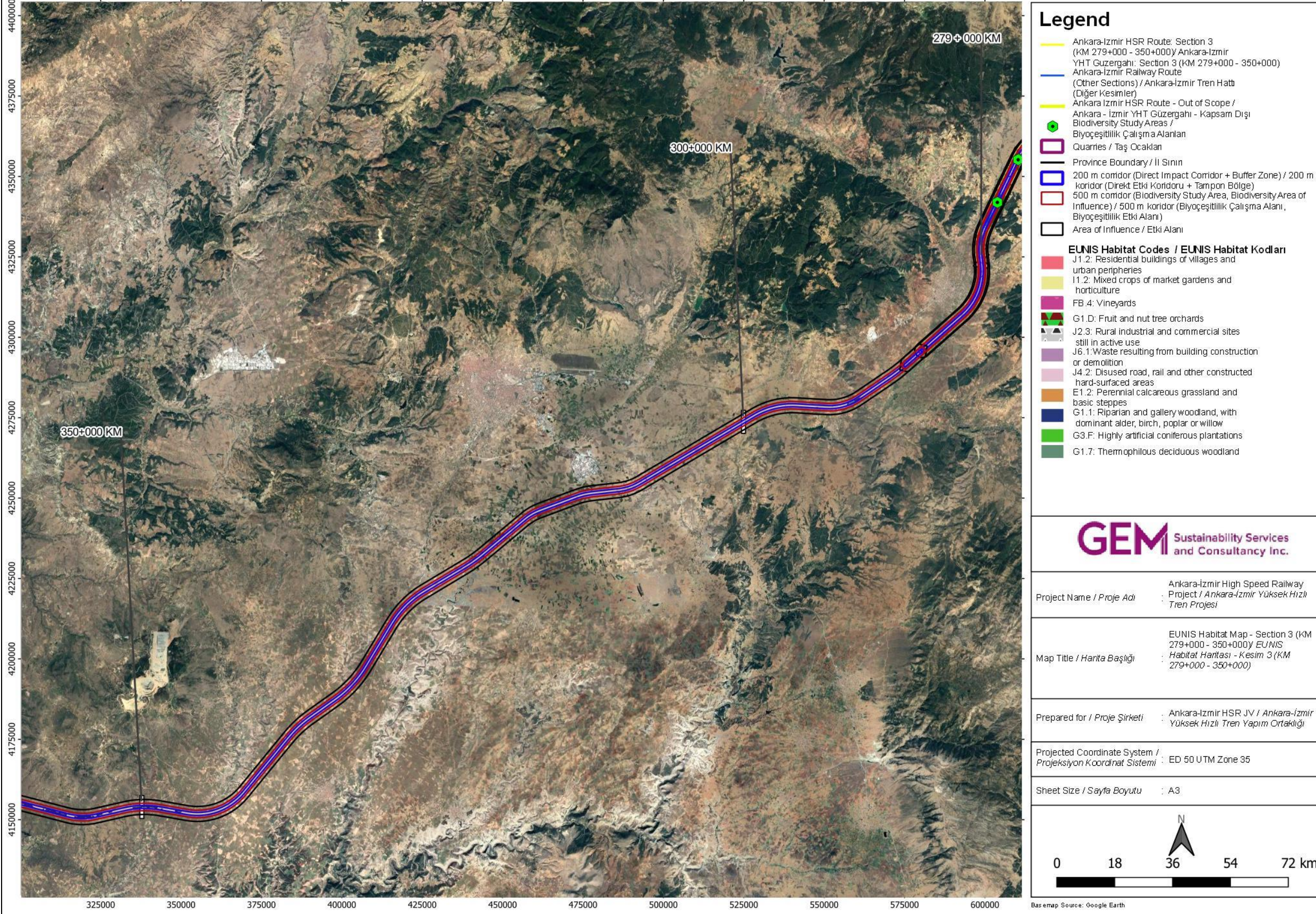


Figure 10-18. EUNIS Habitat Map – Section 3 (KM 279+000-KM 350+000)

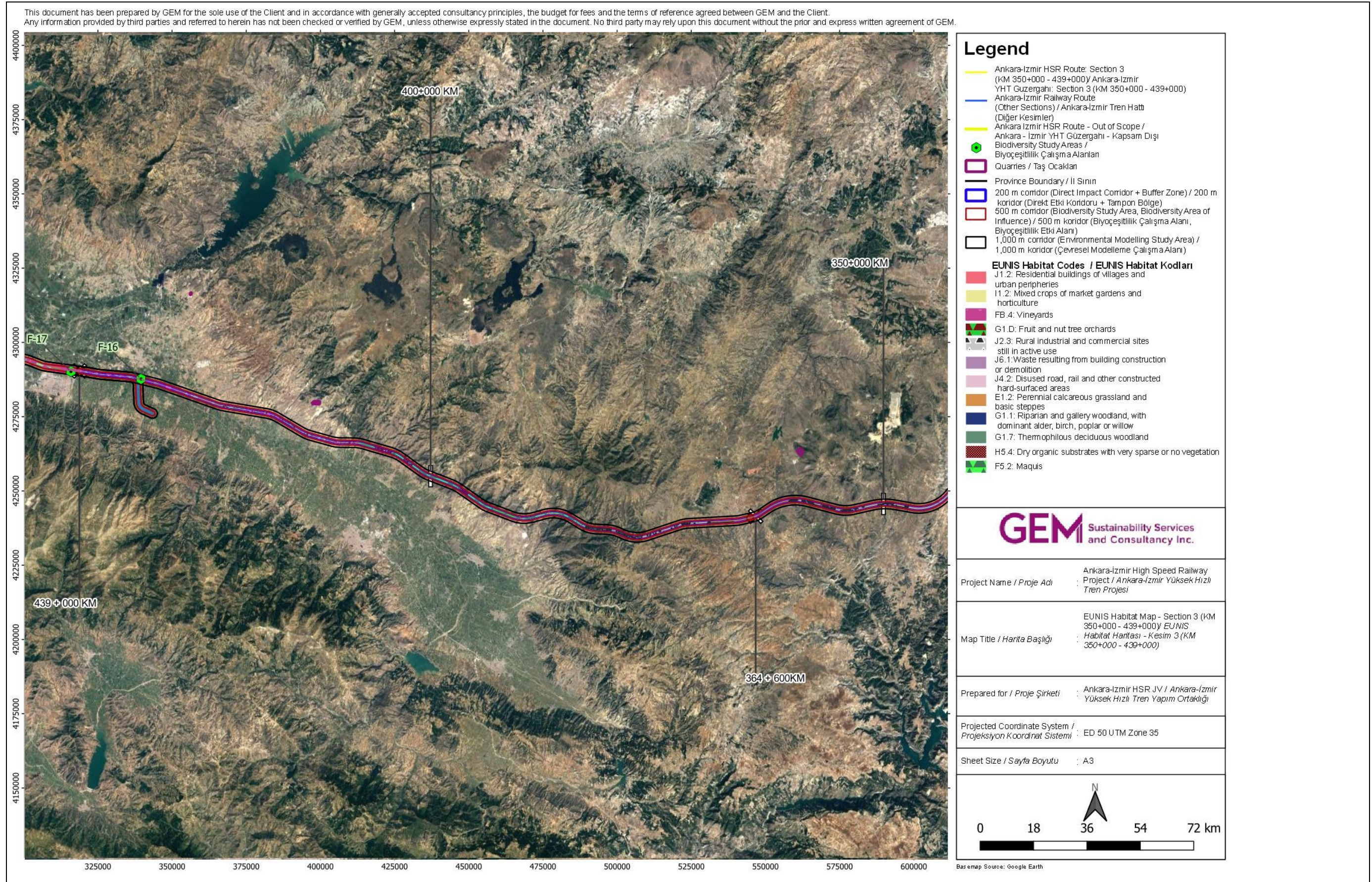


Figure 10-19. EUNIS Habitat Map – Section 3 (KM 350+000-KM 439+000)

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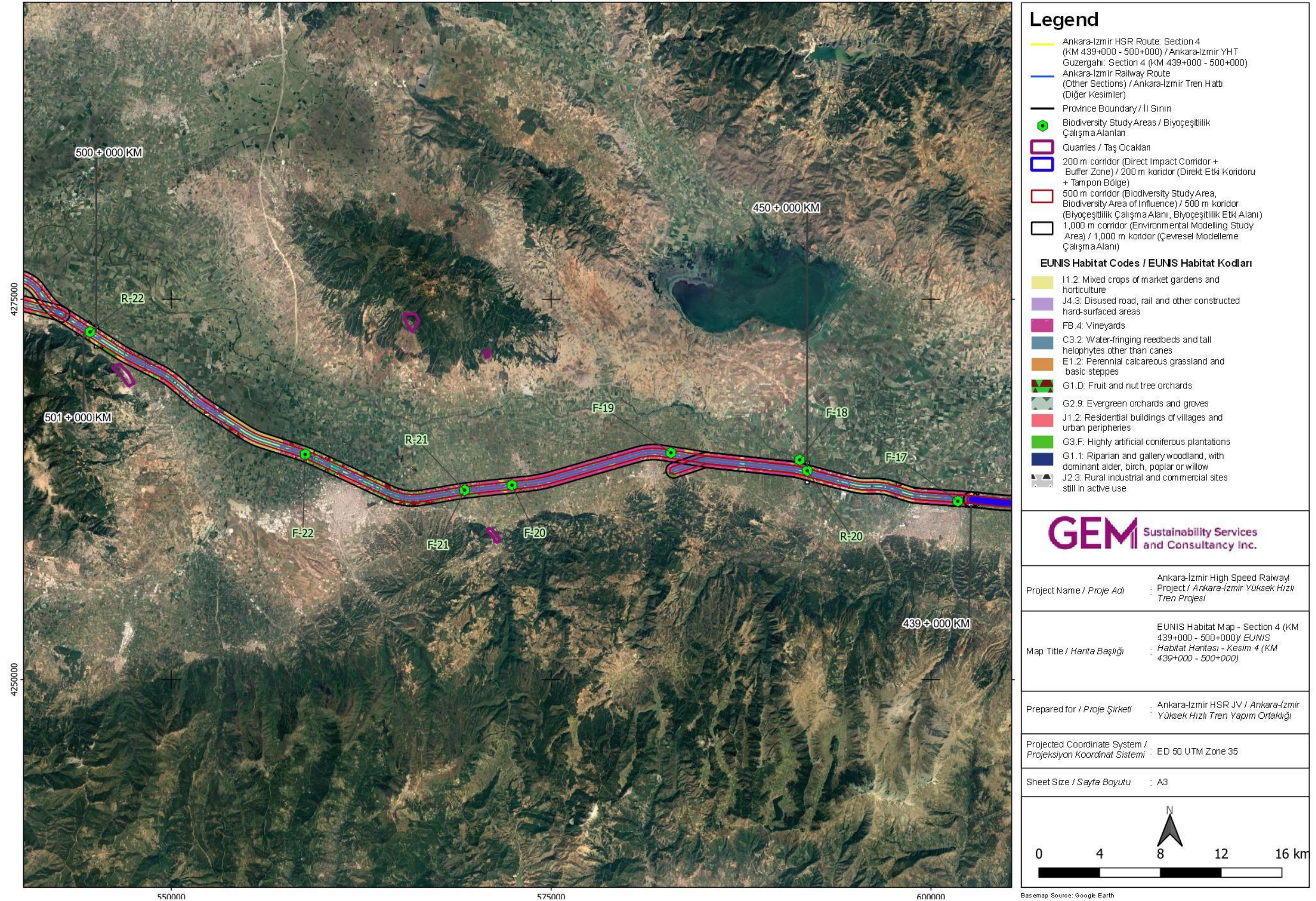


Figure 10-20. EUNIS Habitat Map – Section 4 (KM 439+000-KM 500+000)

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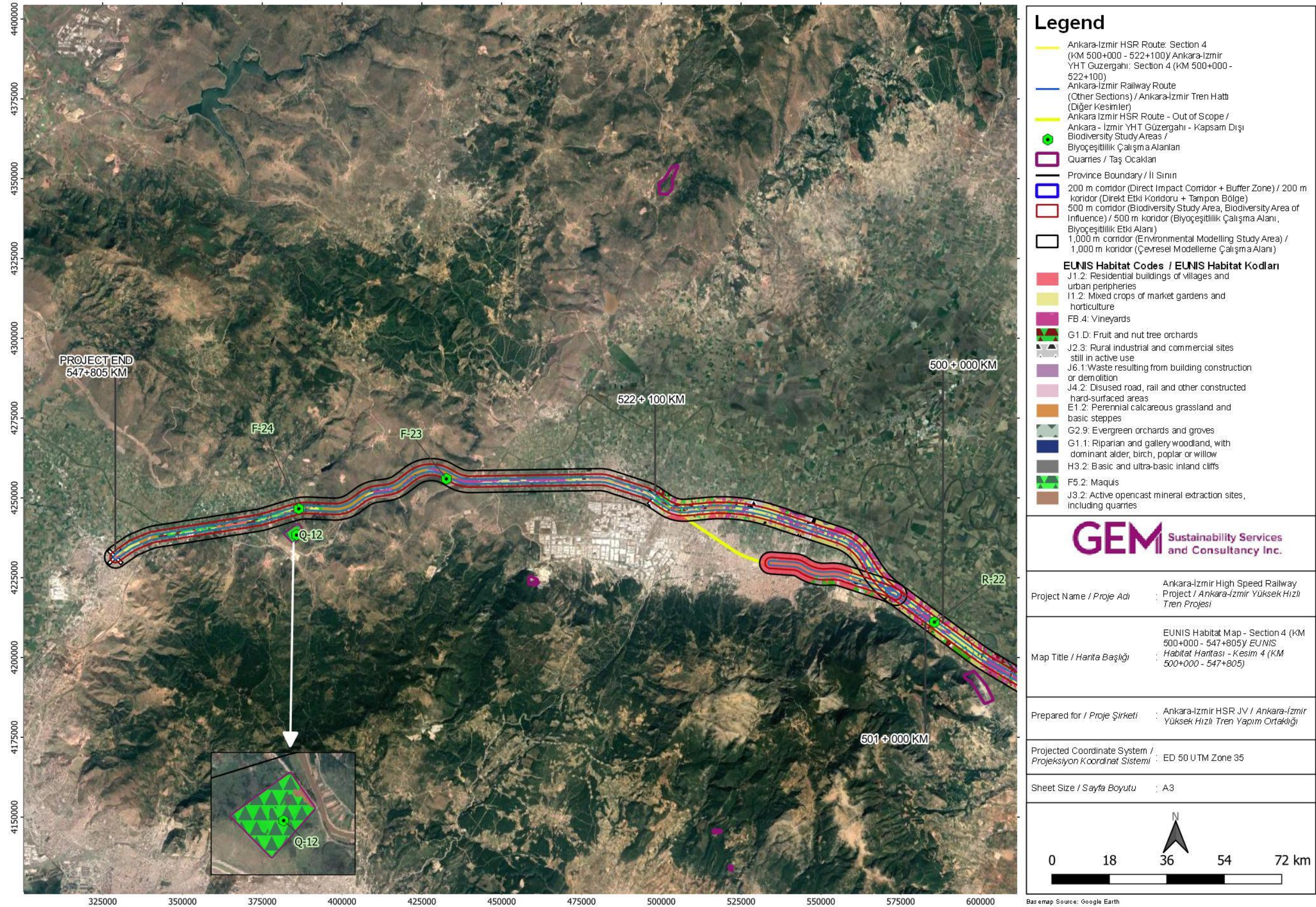


Figure 10-21. EUNIS Habitat Map – Section 4 (KM 500+000-KM 522+100)

For the full railway alignment in Section 1, Section 2, Section 3, and Section 4, the habitat distribution within the 200 m corridor is given in Table 10-17. As can be seen from the results:

- Approximately 23% by area of the full alignment is represented by natural habitats and 77% by modified habitats. Amongst the natural habitats, the dominant ones are with 13% EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes) and 7% EUNIS Habitat E1.00 (Gypsum steppes). These habitats are known to sustain the majority of the flora species of conservation importance (see Table 10-19) including local and regional endemic flora species as shown in Figure 10-22.
- In Section 1, within the 200 m corridor, 46% by area is represented by natural habitats and 54% by modified habitats. Amongst the natural habitats in Section 1, the dominant ones are with 27% EUNIS Habitat E1.00 (Gypsum steppes) and 15% EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes).
- In Section 2, within the 200 m corridor, 34% by area is represented by natural habitats and 66% by modified habitats. Amongst the natural habitats in Section 2, the dominant ones are 19% EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes) and 11% EUNIS Habitat G3.5 (*Pinus nigra* woodland).
- In Section 3, within the 200 m corridor, 21% by area is represented by natural habitats and 79% by modified habitats. Amongst the natural habitats in Section 3, the dominant ones are 7% EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes) and 6% EUNIS Habitat F5.2 (Maquis).
- In Section 4, within the 200 m corridor, 15% by area is represented by natural habitats and 85% by modified habitats. The majority natural habitat in Section 4 is EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes).

Table 10-17. Habitat Distribution along the Railway Alignment

Habitat Type	Total Habitat Distribution in 200m corridor		Habitat Distribution in Section 1 (200m corridor)		Habitat Distribution in Section 2 (200m corridor)		Habitat Distribution in Section 3 (200m corridor)		Habitat Distribution in Section 4 (200m corridor)	
	ha	%	ha	%	ha	%	ha	%	ha	%
Natural Habitats										
C1.1: Permanent oligotrophic lakes, ponds, and pools	3.38	0.03	1.98	0.07	1.40	0.08	0.00	0.00	0.00	0.00
C3.2: Water-fringing reedbeds and tall helophytes other than canes	12.11	0.10	0.67	0.02	1.05	0.06	3.45	0.06	6.94	0.31
E1.2: Perennial calcareous grassland and basic steppes	1517.98	12.68	455.29	15.06	347.43	19.21	395.33	7.05	319.92	14.35
E1.00: Gypsum steppes	807.84	6.75	807.84	26.72	0.00	0.00	0.00	0.00	0.00	0.00
E3.3: Sub-Mediterranean humid meadows	2.92	0.02	0.00	0.00	2.92	0.16	0.00	0.00	0.00	0.00
F5.2: Maquis	347.24	2.90	0.00	0.00	0.00	0.00	347.24	6.20	0.00	0.00
G1.1: Riparian and gallery woodland, with dominant <i>Salix</i>	55.61	0.46	4.03	0.13	31.29	1.73	6.407	0.11	13.89	0.62
G1.7: Thermophilous deciduous woodland	350.14	2.93	103.56	3.42	30.14	1.67	216.44	3.86	0.00	0.00
H3.2: Basic and ultrabasic inland cliffs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G3.5: <i>Pinus nigra</i> woodland	197.41	1.65	0.00	0.00	197.41	10.92	0.00	0.00	0.00	0.00
G3.9: Coniferous woodland dominated by <i>Juniperus</i>	17.27	0.14	17.27	0.57	0.00	0.00	0.00	0.00	0.00	0.00
H5.4: Dry organic substrates with very sparse or no vegetation	67.15	0.00	0.00	0.00	0.00	0.00	67.15	1.20	0.00	0.00
H3.6: Weathered rock and outcrop habitats	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Natural Habitats	2683.78	22.42	1390.65	45.99	611.63	33.82	1036.02	18.49	340.75	15.29
Modified Habitats										
FB.4: Vineyards	1037.87	8.67	0.00	0.00	0.00	0.00	242.11	4.32	795.76	35.70
G2.9: Evergreen orchards and groves	64.52	0.54	0.00	0.00	0.00	0.00	0.00	0.00	64.52	2.89
I1.2: Mixed crops of market gardens and horticulture	7715.29	64.46	1590.25	52.59	1172.68	64.84	4203.236	75.01	749.12	33.61
G3.F: Highly artificial coniferous plantations (<i>Cedrus libani</i>)	112.66	0.94	42.38	1.40	15.49	0.86	45.03	0.80	9.76	0.44
G1.D: Fruit and nut tree orchards	355.69	2.97	0.58	0.02	8.77	0.48	77.23	1.38	269.11	12.07
J3.2: Active opencast mineral extraction sites, including quarries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Modified Habitats	9286.02	77.58	1633.21	54.01	1196.94	66.18	4567.61	81.51	1888.27	84.71
TOTAL (natural + modified)	11969.80	100.00	3023.86	100.00	1808.57	100.00	5603.62	100.00	2229.01	100.00

10.2.6. Species Audit

This section presents the field survey findings of directly observed and presumed present species identified under flora, fauna, avifauna and aquatic biodiversity studies. It should be noted that the field study was conducted at the end of January 2021 due to the Project timeline so as to form the initial biodiversity baseline dataset with the aim of updating the findings in spring/summer season.

10.2.6.1. Flora Studies

At each survey location, the flora field surveys were carried out within 250 m on each side of the railway axis (within a corridor of 500 m) encompassing areas that will be directly affected by the Project activities. For the quarries, an area of 500 m x 500 m was studied. Up to 1 hour of time is spent at each survey location. As a normal practice, species that cannot be identified directly in the field are transferred to herbarium for further analysis.

The railway alignment between Ankara-Banaz falls within Irano-Turanian floristic region and Salihli-Menemen within Mediterranean floristic region. As a result of the field surveys, through direct observation, 313 flora species have been identified falling under 65 different families as given in Table 10-18. The identification of the flora species was carried out by using "Flora of Turkey and the East Aegean Islands (Davis, 1965-1988)" as the reference. The table also provides the categories as per the CITES and Bern Conventions and the IUCN Red List categories as reassessed according to the Red Data Book of Turkish Plants (Ekim *et al.*, 2000).

The following species have been identified as species of conservation importance during the field surveys:

- Six (6) Local endemic species: *Glaucium secmenii*, *Alyssum niveum*, *Cephalaria aytachii*, *Verbascum gypsicola*, *Marrubium zeydanlii*, *Acantholimon gemicianum*.
- Nine (9) Regional endemic species: *Scabiosa hololeuca*, *Paronychia dudleyi*, *Achillea ketenoglui*, *Centaurea polyclada*, *Verbascum antinori*, *Scutellaria yildirimlii*, *Sideritis gulendamii*, *Salvia aytachii*, *Thymus leucostomus* var. *argilleceus*.
- 28 Widespread endemic species: *Alyssum pateri* subsp. *pateri*, *Gypsophila eriocalyx*, *Gypsophila sphaeocephala* var. *cappadocica*, *Rhamnus thymifolius*, *Genista aucheri*, *Astragalus acicularis*, *Astragalus lydius*, *Astragalus vulneraria*, *Astragalus oxytropifolius*, *Bupleurum sulphureum*, *Inula anatolica*, *Helichrysum noeanum*, *Helichrysum arenarium* subsp. *aucheri*, *Anthemis pauciloba* var. *pauciloba*, *Ptilostemon afer* subsp. *eburneus*, *Jurinea pontica*, *Cousinia stapfiana*, *Cirsium sipyleum*, *Campanula argaea*, *Campanula lyrata* subsp. *lyrata*, *Verbascum vulcanicum*, *Stachys cretica* subsp. *smyrnaea*, *Nepeta congesta* var. *congesta*, *Salvia cadmica*, *Salvia cryptantha*, *Salvia wiedemannii*, *Satureja wiedemanniana*, *Phlomis armeniaca*.
- One (1) not endemic but rare species: *Noaea minuta*.

The relative abundances of the species are given in Table 10-18 as assessed by Prof. Dr. Hayri Duman including the habitat types where they have been observed.

The photos of the above species as taken at the Project Area are given below. The exact locations where the above species have been identified are given in Table 10-19.

The maps showing the species locations are given in Figure 10-22 for Section 1, Figure 10-23 for Section 2 and Figure 10-24 for Section 4.

The geographical distribution of these species within Turkey is given in Figure 10-25. As per IFC PS6 definition, for flora species, restricted-range species are defined as those species that have an extent of occurrence (EOO) less than 50,000 square kilometers (km²). Taking into account the geographical distribution, all the local endemic flora species are considered to have an EOO less than 50,000 km² and thus are restricted range flora species.

The favourable seed collection and flowering periods are also shown in Table 10-20.

The following flora species that qualify Balikdami Nationally Important Wetland (please see Table 10-4 for the full list) are presumed to be present at the Project Area:

- *Acantholimon anatolicum* (CR, regional endemic)
- *Acantholimon riyatguellii* (CR, local endemic)

As explained in Chapter 1 of this ESIA Report, Section 3 of the Project was not part of the ESIA baseline study at the time the site surveys were conducted. This said, based on the extensive previous site experience in the vicinity of the Project Area, the senior flora expert identified the following nationally listed CR and EN flora species as presumed to be present in Section 3 of the Project:

- *Ferula anatolica* Boiss. (CR, local endemic)
- *Pyrus anatolica* Browicz (EN, local endemic)
- *Bolanthus huber-morathii* C.Simon (EN, regional endemic)
- *Verbascum luciliae* (Boiss.) Kuntze (EN, regional endemic)
- *Cyclamen mirabile* Hildebr. (EN, regional endemic)
- *Ebenus plumosa* Boiss. & Bal. var. *plumosa* (EN, regional endemic)



Acantholimon gemicianum (Local Endemic)



Achillea ketenoglu (Regional Endemic)



Alyssum niveum (Local Endemic)



Anthemis pauciloba var. *pauciloba* (Endemic)



Astragalus oxytropifolius (Endemic)



Campanula argaea (Endemic)



Centaurea polyclada (Regional Endemic)



Cephalaria aytachii (Regional Endemic)



Inula anatolica (Endemic)



Marrubium zeydanlii (Local Endemic)



Marrubium zeydanlii Population (near R5)



Paronychia dudleyi (Regional Endemic)



Salvia aytachii (Regional Endemic)



Salvia cadmica (Endemic)



Satureja wiedemanniana (Endemic)



Scutellaria yildirimlii (Regional Endemic)



Sideritis gulendamii (Regional Endemic)



Verbascum antinori (Regional Endemic)



Verbascum gypsicola (Local Endemic)

Table 10-18. Flora Species Identified at the Project Area

Family	No	Taxon Name	Phytogeographic Region	Endemism		IUC N	BER N	CITES			Habitat Type (*)													Relative Abundance (**)				
				Regional	Widespread			App 1	App 2	App 3	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5
PTERIDOPHYTA																												
EQUISETACEAE	1	<i>Equisetum arvense</i> L.	Widespread																x							x		
CYSTOPTERIDACEAE	2	<i>Cystopteris fragilis</i> (L.) Bernh.	Widespread																					x		x		
ASPLENIACEAE		<i>Asplenium trichomanes</i> L.	Widespread																					x		x		
	3	<i>Asplenium onopteris</i> L.	Widespread																					x		x		
	4	<i>Asplenium ceterach</i> L.	Widespread																					x		x		
POLYPODIACEAE	5	<i>Polypodium vulgare</i> L.	Widespread																					x		x		
MAGNOLIOPHYTA																												
GYMNOSPERMAE																												
EPHEDRACEAE	6	<i>Ephedra foeminea</i> Forssk.	Mediterranean																									
	7	<i>Ephedra major</i> Host	Mediterranean									x	x	x											x	x		x
PINACEAE	8	<i>Cedrus libani</i> A. Rich	Plantation															x									x	
	9	<i>Pinus nigra</i> J.F. Arnold subsp. <i>pallasiana</i> (Lamb.) Holmboe var. <i>pallasiana</i>	Widespread															x										x
CUPRESSACEAE	10	<i>Juniperus oxycedrus</i> L. subsp. <i>oxycedrus</i>	Widespread									x				x	x	x								x		
	11	<i>Juniperus excelsa</i> M. Bieb.	Widespread									x			x		x											x
ANGIOSPERMAE																												
DICOTYLEDONES																												
RANUNCULACEAE	12	<i>Ranunculus arvensis</i> L.	Mediterranean										x	x											x			
	13	<i>Ranunculus trichophyllus</i> Chaix	Widespread																x							x		
	14	<i>Ranunculus constantinopoliatanus</i> (DC.) d'Urv.	Widespread												x											x		
	15	<i>Ranunculus repens</i> L.	Widespread												x											x		
	16	<i>Clematis cirrhosa</i> L.	Mediterranean																							x		
	17	<i>Nigella segetalis</i> Bieb.	Widespread											x												x		
	18	<i>Consolida hellespontica</i> (Boiss.) Chater	Widespread											x												x		
	19	<i>Adonis flammea</i> Jacq.	Widespread											x												x		
BERBERIDACEAE	20	<i>Berberis crataegina</i> DC.	Widespread									x														x		
PAPAVERACEAE	21	<i>Papaver rhoeas</i> L.	Widespread											x												x		
	22	<i>Roemeria hybrida</i> (L.) DC.	Widespread											x												x		
	23	<i>Glaucium secmenii</i> Yydirımlı	Iran-Turan	x		CR						x													x			
BRASSICACEAE	24	<i>Thlaspi perfoliatum</i> L.	Widespread																						x			
	25	<i>Cardaria draba</i> (L.) Desv. Subsp. <i>draba</i>	Widespread																							x		
	26	<i>Nasturtium officinale</i> R.Br.	Widespread																							x		
	27	<i>Raphanus raphanistrum</i> L.	Widespread																							x		
	28	<i>Camelina rumelica</i> Vel.	Widespread																							x		
	29	<i>Capsella bursa-pastoris</i> (L.) Medik.	Widespread																							x		
	30	<i>Lepidium perfoliatum</i> L.	Widespread																							x		
	31	<i>Alyssum pateri</i> Nyar. Subsp. <i>pateri</i>	Iran-Turan		x	LC						x														x		
	32	<i>Alyssum niveum</i> Dudley	Iran-Turan	x		CR							x													x		
	33	<i>Descurainia sophia</i> (L.) Webb ex Prantl	Widespread																						x		x	
	34	<i>Matthiola tricuspidata</i> (L.) R. Br.	Mediterranean												x											x		
	35	<i>Aubrieta canascens</i> (Boiss.) Bornm. Subsp. <i>macrostyla</i> Cullen & Hub.-Mor.	Widespread									x														x		
	36	<i>Erysimum crassipes</i> Fisch. & Mey.	Widespread											x												x		
	37	<i>Sinapis arvensis</i> L.	Widespread																						x			x
	38	<i>Sisymbrium loeselii</i> L.	Widespread										x	x												x		
RESEDACEAE	39	<i>Reseda lutea</i> L. var. <i>lutea</i>	Widespread										x	x												x		
CISTACEAE	40	<i>Helianthemum ledifolium</i> (L.) Miller var. <i>ledifolium</i>	Widespread											x												x		
	41	<i>Cistus laurifolius</i> L.	Mediterranean														x	x										x
CARYOPHYLLACEAE	42	<i>Holosteum umbellatum</i> L. var. <i>Umbellatum</i>	Widespread											x												x		
	43	<i>Stelleria media</i> (L.) Vill. Subsp. <i>media</i>	Widespread																							x		
	44	<i>Dianthus zonatus</i> Fenzl var. <i>zonatus</i>	Widespread									x	x	x												x		
	45	<i>Silene otites</i> (L.) Wibel	Widespread											x												x		
	46	<i>Silene supina</i> Bieb. Subsp. <i>pruinosa</i> (Boiss.) Chowdh.	Widespread											x												x		
	47	<i>Arenaria serpyllifolia</i> L.	Widespread											x	x											x		
	48	<i>Minuartia hamata</i> (Hauskn.) Mattf.	Widespread											x	x											x		
	49	<i>Bufonia tenuifolia</i> L.	Widespread																							x		
	50	<i>Gypsophila eriocalyx</i> Boiss.	Iran-Turan		x	LC							x															x
	51	<i>Gypsophila spharocephala</i> Fenzl ex Tchiht. Var. <i>cappadocica</i>	Iran-Turan		x	LC							x													x		
ILLECEBRACEAE	52	<i>Paronychia dudleyi</i> Chaudhri	Iran-Turan	x		VU														x						x		
CHENOPODIACEAE	53	<i>Noaea mucronata</i> (Forssk.) Aschers. & Schweinf. Subsp. <i>mucronata</i>	Widespread										x			x										x		
	54	<i>Noaea minuta</i> Boiss. & Bal.	Iran-Turan			VU							x													x		

Family	No	Taxon Name	Phytogeographic Region	Endemism		IUC N	BER N	CITES				Habitat Type (*)													Relative Abundance (**)				
				Regional	Widespread			App1	App 1	App 2	App 3	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5
	55	<i>Krascheninnikovia ceratoides</i> (L.) Güldenst.	Widespread										x												x				
	56	<i>Kochia prostrata</i> (L.) Schrad.	Widespread										x												x				
	57	<i>Camphorosma monspeliaca</i> L. subsp. <i>monspeliaca</i>	Widespread															x								x			
RHAMNACEAE	58	<i>Rhamnus thymifolia</i> Bornm.	Mediterranean		x	LC						x		x											x				
	59	<i>Paliurus spina-christi</i> Miller	Widespread																		x					x			
TAMARICACEAE	60	<i>Tamarix smymensis</i> Bunge	Widespread												x											x			
	61	<i>Reaumuria alternifolia</i> (Lab.) Britten	Iran-Turan										x													x			
MALVACEAE	62	<i>Malva sylvestris</i> L.	Widespread												x											x			
	63	<i>Malva neglecta</i> Wallr.	Widespread												x											x			
	64	<i>Alcea pallida</i> Waldst. & Kit.	Widespread									x		x							x					x			
GERANIACEAE	65	<i>Erodium hoefftianum</i> C.A. Meyer	Widespread											x										x					
ZYGOPHYLLACEAE	66	<i>Peganum harmala</i> L.	Widespread									x		x												x			
POLYGONACEAE	67	<i>Rumex crispus</i> L.	Widespread												x										x				
	68	<i>Rumex pulcher</i> L.	Widespread												x											x			
ANACARDIACEAE	69	<i>Pistacia terebinthus</i> L. subsp. <i>palaestina</i> (Boiss.) Engler	Mediterranean									x												x					
VITACEAE	70	<i>Vitis vinifera</i> L.	Cultivated																				x						x
FABACEAE	71	<i>Medicago minima</i> L. var. <i>minima</i>	Widespread																						x				
	72	<i>Medicago sativa</i> L. subsp. <i>sativa</i>	Widespread																						x				
	73	<i>Lotus corniculatus</i> L. var. <i>corniculatus</i>	Widespread												x					x					x				
	74	<i>Calicotome villosa</i> (Poiret) Link	Mediterranean																			x				x			
	75	<i>Spartium junceum</i> L.	Mediterranean																			x				x			
	76	<i>Vicia cracca</i> L. subsp. <i>stenophylla</i> Vel.	Widespread																	x					x				
	77	<i>Trifolium stellatum</i> L. var. <i>stellatum</i>	Widespread																	x					x				
	78	<i>Trifolium campestre</i> Schreb.	Widespread																	x					x				
	79	<i>Coronilla varia</i> L. subsp. <i>varia</i>	Widespread																	x					x				
	80	<i>Lathyrus aphaca</i> L.	Widespread																	x					x				
	81	<i>Trigonella monantha</i> C.A. Meyer subsp. <i>monantha</i>	Iran-Turan											x						x					x				
	82	<i>Genista aucheri</i> Boiss.	Iran-Turan		x	LC							x												x				
	83	<i>Astragalus acicularis</i> Bunge	Iran-Turan		x	LC								x														x	
	84	<i>Astragalus lydius</i> Boiss.	Iran-Turan		x	LC										x									x				
	85	<i>Astragalus vulneraria</i> DC.	Widespread		x	LC								x											x				
	86	<i>Astragalus angustifolius</i> Lam. subsp. <i>pungens</i> (Willd.) Hayek	Widespread											x											x				
	87	<i>Astragalus condensatus</i> Ledeb.	Iran-Turan											x						x						x			
	88	<i>Astragalus microcephalus</i> Willd.	Iran-Turan											x												x			
	89	<i>Astragalus oxytropifolius</i> Boiss.	Iran-Turan		x	LC						x													x				
	90	<i>Alhagi pseudoalhagi</i> (Bieb.) Desv.	Iran-Turan											x											x				
	91	<i>Hedysarum varium</i> Willd.	Iran-Turan																	x					x				
	92	<i>Pisum sativum</i> L.	Widespread																	x					x				
	93	<i>Onobrychis armena</i> Boiss. et Huet.	Widespread											x						x					x				
LYTHRACEAE	94	<i>Lythrum salicaria</i> L.	European-Siberian												x										x				
ROSACEAE	95	<i>Pyrus elaeagnifolia</i> Pallas subsp. <i>elaeagnifolia</i>	Widespread																		x				x				
	96	<i>Pyrus communis</i> L. subsp. <i>sativa</i> (DC.) Hegi	Cultivated																				x						x
	97	<i>Amygdalus webbii</i> Spach	Mediterranean									x									x		x		x				
	98	<i>Spiraea crenata</i> L.	Widespread									x													x				
	99	<i>Sarcopoterium spinosum</i> (L.) Spach	Mediterranean																	x									
	100	<i>Prunus x domestica</i> L.	Cultivated																				x						x
	101	<i>Persica vulgaris</i> Miller	Cultivated																										x
	102	<i>Potentilla recta</i> L.	Widespread											x										x					
	103	<i>Sanguisorba minor</i> Scop. Subsp. <i>muricata</i> (Spach)Brig	Widespread											x						x					x				
	104	<i>Cerasus incana</i> (Pallas) Spach var. <i>incana</i>	Iran-Turan									x		x											x				
	105	<i>Crataegus orientalis</i> Pallas ex Bieb. Var. <i>orientalis</i>	Widespread											x											x				
	106	<i>Prunus divaricata</i> Ledeb. subsp. <i>divaricata</i>	Widespread									x													x				
	107	<i>Rubus sanctus</i> Schreber	Widespread												x										x				
	108	<i>Rosa canina</i> L.	Widespread									x								x						x			
PUNICACEAE	109	<i>Punica granatum</i> L.	Cultivated																				x						x
APIACEAE	110	<i>Eryngium campestre</i> L. var. <i>virens</i> (Link) Weins	Widespread									x	x	x						x						x			
	111	<i>Scandix iberica</i> Bieb.	Widespread										x	x															
	112	<i>Tordylium apulum</i> L.	Mediterranean																		x								
	113	<i>Daucus carota</i> L.	Widespread													x										x			
	114	<i>Bupleurum sulphureum</i> Boiss. & Bal.	Iran-Turan		x	LC										x									x				
	115	<i>Johrenia tortuosa</i> (Fisch. & Mey.) Chamberlain	Widespread									x													x				
	116	<i>Echinophora tournefortii</i> Jaub. & Spach	Iran-Turan									x	x	x											x				
	117	<i>Echinophora tenuifolia</i> L. subsp. <i>sibthorpiana</i> (Guss.) Tutin	Iran-Turan											x											x				
	118	<i>Malabaila secacul</i> Banks & Sol.	Widespread										x	x											x				
	119	<i>Conium maculatum</i> L.	Widespread												x										x				
	120	<i>Bifora radians</i> Bieb.	Widespread											x											x				

Family	No	Taxon Name	Phytogeographic Region	Endemism		IUC N	BER N	CITES	Habitat Type (*)													Relative Abundance (**)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
				Regional	Widespread				App1	App 2	App 3	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
CRASSULACEAE	121	<i>Astrodaucus orientalis</i> (L.) Drude	Iran-Turan																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

Family	No	Taxon Name	Phytogeographic Region	Endemism		IUC N	BER N	CITES	Habitat Type (*)													Relative Abundance (**)							
				Regional	Widespread				App 1	App 2	App 3	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5
	186	<i>Lappula barbata</i> (Bieb.) Gürke	Iran-Turan											x											x				
	187	<i>Buglossoides arvensis</i> (L.) Johnston	Mediterranean												x										x				
	188	<i>Moltkia coerulea</i> (Willd.) Lehm.	Iran-Turan											x	x										x				
	189	<i>Arnebia densiflora</i> (Nordm.) Ledeb.	Iran-Turan												x										x				
	190	<i>Onosma tauricum</i> Pallas ex Willd. Var. <i>tauricum</i>	Widespread										x		x										x				
	191	<i>Echium italicum</i> L.	Mediterranean																						x				
	192	<i>Anchusa azurea</i> Miller var. <i>azurea</i>	Widespread																						x				
	193	<i>Anchusa leptophylla</i> Roemer & Schultes subsp. <i>leptophylla</i>	Widespread												x										x				
	194	<i>Alkanna orientalis</i> (L.) Boiss. var. <i>orientalis</i>	Iran-Turan													x									x				
SOLANACEAE	195	<i>Datura stramonium</i> L.	Widespread													x									x				
SCROPHULARIACEAE	196	<i>Veronica grisebachii</i> S.M. Walters	Mediterranean													x									x				
	197	<i>Veronica anagallis-aquatica</i> L.	Widespread														x								x				
	198	<i>Scrophularia lucida</i> L.	Mediterranean										x												x				
	199	<i>Digitalis ferruginea</i> L. subsp. <i>ferruginea</i>	European-Siberian										x												x				
	200	<i>Verbascum antinori</i> Boiss. & Heldr.	Mediterranean	x			VU																				x		
	201	<i>Verbascum vulcanicum</i> Boiss. & Heldr. var. <i>vulcanicum</i>	Iran-Turan		x		LC						x												x				
	202	<i>Verbascum gypsicola</i> Vural & Aydoğdu	Iran-Turan	x			CR							x											x				
	203	<i>Verbascum glomeratum</i> Boiss.	Iran-Turan												x										x				
	204	<i>Verbascum cheiranthifolium</i> Boiss. var. <i>cheiranthifolium</i>	Widespread												x										x				
	205	<i>Bunaea trifida</i> (Vahl) C.A. Meyer	Iran-Turan												x	x									x				
CONVOLVULACEAE	206	<i>Convolvulus arvensis</i> L.	Widespread														x								x				
	207	<i>Convolvulus compactus</i> L.	Widespread												x										x				
OROBANCHACEAE	208	<i>Orobancha anatolica</i> Boiss. & Reut.	Widespread													x									x				
GLOBULARIACEAE	209	<i>Globularia orientalis</i> L.	Iran-Turan										x	x	x										x				
VEBENACEAE	210	<i>Vitex agnus-castus</i> L.	Mediterranean														x								x				
LAMIACEAE	211	<i>Melissa officinalis</i> L. subsp. <i>officinalis</i>	Widespread														x								x				
	212	<i>Acinos rotundifolius</i> Pers.	Widespread													x									x				
	213	<i>Scutellaria orientalis</i> L. subsp. <i>pinnatifida</i> Edmondson	Widespread													x									x				
	214	<i>Scutellaria yildirimlii</i> Çiçek & Yaprak	Iran-Turan	x			VU								x										x				
	215	<i>Teucrium polium</i> L.	Widespread										x		x										x				
	216	<i>Ballota acetabulosa</i> (L.) Benth	Mediterranean																						x				
	217	<i>Marrubium parviflorum</i> Fisch. & meyer. Var. <i>parviflorum</i>	Iran-Turan													x									x				
	218	<i>Marrubium zeydanlii</i> Aytaç, Kaptaner & Ertuğrul	Iran-Turan	x			CR								x										x				
	219	<i>Origanum onites</i> L.	Mediterranean																										
	220	<i>Sideritis montana</i> L. subsp. <i>montana</i>	Mediterranean													x									x				
	221	<i>Sideritis montana</i> L. subsp. <i>remota</i> (d'Urv.) P.W. Ball ex Heywood	Mediterranean													x									x				
	222	<i>Sideritis gulendamii</i> H. Duman & Karavel.	Iran-Turan	x			VU								x										x				
	223	<i>Stachys cretica</i> L. subsp. <i>smyrnaea</i> Rech fil.	Mediterranean		x		LC																		x				
	224	<i>Stachys lavandulifolia</i> Vahl var. <i>lavandulifolia</i>	Iran-Turan													x									x				
	225	<i>Nepeta congesta</i> Fisch. & Mey. Var. <i>congesta</i>	Widespread		x		LC									x									x				
	226	<i>Nepeta nuda</i> L. subsp. <i>nuda</i>	Widespread										x												x				
	227	<i>Salvia tomentosa</i> Miller	Mediterranean																								x		
	228	<i>Salvia virgata</i> Jacq.	Iran-Turan																						x				
	229	<i>Salvia cadmica</i> Boiss.	Widespread		x		LC						x												x				
	230	<i>Salvia cryptantha</i> Montbret & Aucher ex Benth	Iran-Turan		x		LC						x	x	x			x								x			
	231	<i>Salvia aytachii</i> Vural & Adıgüzel	Iran-Turan	x			VU							x											x				
	232	<i>Salvia wiedemannii</i> Boiss.	Iran-Turan		x		LC																			x			
	233	<i>Thymus sipyleus</i> Boiss. subsp. <i>rosulans</i> (borbas) Jalas	Widespread										x	x	x		x	x	x								x		
	234	<i>Thymus leucostomus</i> Hausskn. & Velen. Var. <i>argilleus</i> Jalas	Iran-Turan	x			VU							x											x				
	235	<i>Satureja wiedemanniana</i> (Lallem.) Velen.	Iran-Turan		x		LC						x												x				
	236	<i>Lamium amplexicaule</i> L.	European-Siberian													x									x				
	237	<i>Ziziphora tenuior</i> L.	Iran-Turan												x										x				
	238	<i>Phlomis armeniaca</i> Willd.	Iran-Turan		x		LC								x			x									x		
PLANTAGINACEAE	239	<i>Plantago lanceolata</i> L.	Widespread													x									x				
PLUMBAGINACEAE	240	<i>Acantholimon ulicinum</i> (Willd. ex Schultes) Boiss. subsp. <i>ulicinum</i> var. <i>ulicinum</i>	Mediterranean											x											x				
	241	<i>Acantholimon gemicianum</i> Kaptaner İğci, Körüklü & Aytaç	Iran-Turan	x			CR								x												x		
	242	<i>Acantholimon acerosum</i> (Willd.) Boiss. var. <i>acerosum</i>	Iran-Turan													x									x				
ELAEAGNACEAE	243	<i>Elaeagnus angustifolia</i> L.	Mediterranean																										

Family	No	Taxon Name	Phytogeographic Region	Endemism		IUC N	BER N	CITES				Habitat Type (*)													Relative Abundance (**)				
				Regional	Widespread			App1	App 1	App 2	App 3	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5
FAGACEAE	249	<i>Quercus ithaburensis</i> Decne subsp. <i>macrolepis</i> (Kotschy) Hedge & Yalt.	Mediterranean														x					x						x	
	250	<i>Quecus trojana</i> P.B.Webb	Mediterranean														x										x		
	251	<i>Quercus coccifera</i> L.	Mediterranean														x					x					x		
	252	<i>Quercus cerris</i> L. var. <i>cerris</i>	Widespread														x				x						x		
	253	<i>Quercus pubescens</i> Willd.	Widespread														x				x						x		
	254	<i>Quercus infectoria</i> Olivier subsp. <i>boissieri</i> (Reuter) O. Schwarz	Widespread																		x						x		
PLATANACEAE	255	<i>Platanus orientalis</i> L.	Widespread												x												x		
SALICACEAE	256	<i>Salix alba</i> L.	European-Siberian												x													x	
	257	<i>Populus x canadensis</i> Moench	Plantation												x												x		
URTICACEAE	258	<i>Urtica dioica</i> L.	European-Siberian												x												x		
RUBIACEAE	259	<i>Galium incanum</i> Sm. subsp. <i>incanum</i>	Mediterranean										x													x			
	260	<i>Cruciata taurica</i> (Pallas ex Willd.) Ehrend.	Iran-Turan											x												x			
MONOCOTYLEDONE S																													
LILIACEAE	261	<i>Allium scorodoprasum</i> L. subsp. <i>rotundum</i> (L.) Stearn	Mediterranean											x										x					
	262	<i>Colchicum triphyllum</i> G. Kuntze	Mediterranean										x	x											x				
	263	<i>Allium guttatum</i> Steven subsp. <i>guttatum</i>	Widespread									x														x			
	264	<i>Merendera attica</i> (Spruner) Boiss. & Spruner	Iran-Turan											x			x									x			
	265	<i>Scilla autumnalis</i> L.	Mediterranean														x					x				x			
	266	<i>Ornithogalum sphaerocarpum</i> Kerner	Widespread											x												x			
	267	<i>Ruscus aculeatus</i> L. var. <i>angustifolius</i> Boiss.	Widespread																			x					x		
	268	<i>Smilax aspera</i> L.	Widespread																			x				x			
	269	<i>Asphodelus aestivus</i> Brot.	Mediterranean																			x				x			
IRIDACEAE	270	<i>Crocus chrysanthus</i> (Herbert) Herbert	Widespread													x										x			
TYPHACEAE	271	<i>Typha latifolia</i> L.	Widespread												x											x			
	272	<i>Typha angustifolia</i> L.	Widespread												x											x			
JUNCACEAE	273	<i>Juncus heldreichianus</i> Marsson ex Parl. subsp. <i>heldreichianus</i>	East Mediterranean												x											x			
	274	<i>Juncus effusus</i> L.	Widespread												x											x			
	275	<i>Juncus gerardi</i> Loisel. Subsp. <i>gerardi</i>	Widespread																		x					x			
CYPERACEAE	276	<i>Cyperus longus</i> L.	Widespread												x											x			
	277	<i>Bolboschoenus maritimus</i> (L.) Palla var. <i>maritimus</i>	Widespread												x											x			
	278	<i>Carex stenophylla</i> Wahlenb. Subsp. <i>stenophylloides</i> (V. Krecz.) Egorova	Iran-Turan												x											x			
	279	<i>Schoenus nigricans</i> L.	Widespread												x											x			
POACEAE	280	<i>Poa bulbosa</i> L.	Widespread									x	x	x												x			
	281	<i>Poa trivialis</i> L.	Widespread												x											x			
	282	<i>Bromus tomentellus</i> Boiss	Iran-Turan												x											x			
	283	<i>Bromus japonicus</i> Thunb. subsp. <i>japonicus</i>	Widespread												x											x			
	284	<i>Bromus intermedius</i> Guss.	Widespread											x												x			
	285	<i>Stipa holosericea</i> Trin.	Iran-Turan											x												x			
	286	<i>Stipa lessingiana</i> Trin. & Rupr.	Widespread											x												x			
	287	<i>Stipa bromoides</i> (L.) Dörfel	Mediterranean																		x						x		
	288	<i>Echinaria capitata</i> (L.) Desf.	Widespread												x											x			
	289	<i>Lolium perenne</i> L.	European-Siberian												x											x			
	290	<i>Avena sterilis</i> L. subsp. <i>sterilis</i>	Widespread												x											x			
	291	<i>Aegilops biuncialis</i> Vis.	Iran-Turan												x											x			
	292	<i>Dactylis glomerata</i> L. subsp. <i>hispanica</i> (Roth) Nyman	Mediterranean												x	x		x				x				x			
	293	<i>Saccharum ravenne</i> (L.) Murray	Widespread													x										x			
	294	<i>Sorghum halepense</i> (L.) Pers. Var. <i>halepense</i>	Widespread													x										x			
	295	<i>Arundo donax</i> L.	Widespread													x												x	
	296	<i>Phragmites australis</i> (Cav.) Trin. ex Steudel	European-Siberian													x			x									x	
	297	<i>Catabrosa aquatica</i> (L.) P. Beauv.	Widespread																	x						x			
	298	<i>Koeleria cristata</i> (L.) Pers.	Widespread												x											x			
	299	<i>Triticum aestivum</i> L.	Cultivated																					x		x			x
	300	<i>Secale cereale</i> L.	Cultivated												x											x			
	301	<i>Hordeum murinum</i> L. subsp. <i>glaucum</i> (Steudel) Tzvelev	Widespread													x										x			
	302	<i>Hordeum bulbosum</i> L.	Widespread													x		x				x				x			
	303	<i>Eremopyrum bonaepartis</i> (Sprengel) Nevski subsp. <i>hirsutum</i> (Bertol.) Melderis	Widespread											x	x											x			
	304	<i>Piptatherum miliaceum</i> (L.) Cosson subsp. <i>thomasi</i> (Duby) Freitag	Widespread																			x				x			
	305	<i>Calamagrostis pseudophragmites</i> (Haller fil.) Koeler	European-Siberian													x											x		
	306	<i>Cynodon dactylon</i> (L.) Pers. var. <i>dactylon</i>	Widespread													x		x			x							x	
	307	<i>Festuca valesiaca</i> Schleicher ex Gaudin	Widespread												x												x		
	308	<i>Elymus hispidus</i> (Opiz) Melderis subsp. <i>barbulatus</i> (Schur) Melderis	Widespread										x							x							x		

Family	No	Taxon Name	Phytogeographic Region	Endemism		IUC N	BER N	CITES				Habitat Type (*)													Relative Abundance (**)				
				Regional	Widespread			App1	App 1	App 2	App 3	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5
	309	<i>Taeniatherum caput-medusae</i> (L.) Nevski subsp. <i>crinitum</i> (Schreber) Melderis	Iran-Turan											x											x				
	310	<i>Agrostis stolonifera</i> L.	European-Siberian												x										x				
	311	<i>Alopecurus myosuroides</i> Hudson var. <i>myosuroides</i>	European-Siberian												x										x				
	312	<i>Alopecurus arundinaceus</i> Poiret	European-Siberian												x										x				
	313	<i>Puccinellia distans</i> (Jacq.) Parl. Subsp. <i>distans</i>	Widespread																x						x				

(*) Habitat Type: (1) EUNIS Habitat H3.6: Weathered rock and outcrop habitats

(2) EUNIS Habitat E1.00: Gypsum steppes

(3) EUNIS Habitat E1.2: Perennial calcareous steppes

(4) EUNIS Habitat G1.1: Riparian and gallery woodland, with dominant *Salix*

(5) EUNIS Habitat G3.9: Coniferous woodland dominated by *Juniperus*

(6) EUNIS Habitat G1.7: Thermophilous deciduous woodland

(7) EUNIS Habitat G3.F: Highly artificial coniferous plantations (*Cedrus libani*)

(8) EUNIS Habitat C3.2: Water-fringing reedbeds and tall helophytes other than canes

(9) EUNIS Habitat E3.3: Sub-Mediterranean humid meadows

(10) EUNIS Habitat G3.5: *Pinus nigra* woodland

(11) EUNIS Habitat F5.2: Maquis

(12) EUNIS Habitat H3.2: Basic and ultrabasic inland cliffs

(13) EUNIS Habitat G1.D: Fruit and nut tree orchards

(**) Relative Abundance: (1) Very rare, (2) Rare, (3) Moderately rare, (4) Abundant, (5) Very abundant

Table 10-19. Flora Species of Importance Identified at the Project Area

No.	Taxon Name	IUCN National Red List	Endemism	KBA Qualifying Species (Yes/No)	Coordinates (at which the Species Observed to be Spread)	Station
1	<i>Glaucium secmenii</i>	CR	Local	No	36S 398424-4337862	R3
2	<i>Alyssum niveum</i>	CR	Local	Yes (Acikir Steppes KBA)	36S 413795-4346576	R2
3	<i>Cephalaria aytachii</i>	CR	Local	No	36S 413795-4346576 36S 372944-4336336	R2 R5
4	<i>Verbascum gypsicola</i>	CR	Local	No	36S 398424-4337862	R3
5	<i>Marrubium zeydanlii</i> (recently identified species, as reported by Prof. Dr. Duman it is in the process of registration)	CR	Local	No	36S 372944-4336336	R5
6	<i>Acantholimon gemicianum</i>	CR	Local	Qualifying species of Balıkdami Nationally Important Wetland (see Table 10-4)	36S 372944-4336336	R5
7	<i>Scabiosa hololeuca</i>	EN	Regional	Qualifying species of Balıkdami Nationally Important Wetland (see Table 10-4)	36S 372944-4336336	R5
8	<i>Paronychia dudleyi</i>	VU	Regional	No	35S 741894-4297203 36S 272615-4299842 36S 331404-4322127	R19 R14 Q6
9	<i>Achillea ketenoglui</i>	VU	Regional	Yes (Acikir Steppes KBA)	36S 398424-4337862	R3
10	<i>Centaurea polyclada</i>	VU	Regional	No	36S 515496-4274995	Q12
11	<i>Verbascum antinori</i>	VU	Regional	No	36S 515496-4274995	Q12
12	<i>Scutellaria yildirimlii</i>	VU	Regional	No	36S 413795-4346576 36S 356584-4335217 36S 372944-4336336	R2 R6 R5
13	<i>Sideritis gulendamii</i>	VU	Regional	No	36S 413795-4346576 36S 372944-4336336	R2 R5
14	<i>Salvia aytachii</i>	VU	Regional	Yes (Acikir Steppes KBA)	36S 413795-4346576	R2
15	<i>Thymus leucostomus</i> var. <i>argilleceus</i>	VU	Regional	Qualifying species of Balıkdami Nationally Important Wetland (see Table 10-4)	36S 398424-4337862	R3
16	<i>Noaea minuta</i>	VU	Not endemic but rare	No	36S 356584-4335217	R6
17	<i>Alyssum pateri</i> subsp. <i>pateri</i>	LC	Widespread	No	36S 414998-4358333	Q1
18	<i>Gypsophila eriocalyx</i>	LC	Widespread	No	36S 413795-4346576 36S 398424-4337862	R2 R3
19	<i>Gypsophila sphaerocephala</i> subsp. <i>cappadocica</i>	LC	Widespread	No	36S 372944-4336336	R5

No.	Taxon Name	IUCN National Red List	Endemism	KBA Qualifying Species (Yes/No)	Coordinates (at which the Species Observed to be Spread)	Station
20	<i>Rhamnus thymifolius</i>	LC	Widespread	No	36S 414657-4342057 36S 341595-4331744	Q2 Q5
21	<i>Genista aucheri</i>	LC	Widespread	No	36S 413795-4346576	R2
22	<i>Astragalus acicularis</i>	LC	Widespread	No	36S 356584-4335217	R6
23	<i>Astragalus lydius</i>	LC	Widespread	No	36S 323198-4138676	Q7
24	<i>Astragalus vulneraria</i>	LC	Widespread	No	36S 302762-4299174	Q8
25	<i>Astragalus oxytropifolius</i>	LC	Widespread	No	36S 414998-4358333	Q1
26	<i>Bupleurum sulphureum</i>	LC	Widespread	No	36S 331404-4322127	Q6
27	<i>Inula anatolica</i>	LC	Widespread	No	36S 414998-4358333 36S 414657-4342057 36S 323198-4138676	Q1 Q2 Q7
28	<i>Helichrysum noeanum</i>	LC	Widespread	No	36S 398424-4337862	R3
29	<i>Helichrysum arenarium</i> subsp. <i>aucheri</i>	LC	Widespread	No	36S 323198-4138676	Q7
30	<i>Anthemis pauciloba</i> var. <i>pauciloba</i>	LC	Widespread	No	36S 413795-4346576 36S 372944-4336336	R2 R5
31	<i>Ptilostemon afer</i> subsp. <i>eburneus</i>	LC	Widespread	No	36S 323198-4138676	Q7
32	<i>Jurinea pontica</i>	LC	Widespread	No	36S 295334-4297831	R13
33	<i>Cousinia stapfiana</i>	LC	Widespread	No	36S 413795-4346576 36S 396022-4344977	R2 Q3
34	<i>Cirsium sipyleum</i>	LC	Widespread	Yes (Spil Mountain KBA)	36S 2400441-4297572	Q10
35	<i>Campanula argaea</i>	LC	Widespread	No	36S 302762-4299174	Q8
36	<i>Campanula lyrata</i> subsp. <i>lyrata</i>	LC	Widespread	No	36S 515496-4274995	Q12
37	<i>Verbascum vulcanicum</i>	LC	Widespread	No	36S 414998-4358333	Q1
38	<i>Stachys cretica</i> subsp. <i>smyrnaea</i>	LC	Widespread	No	36S 515496-4274995	Q12
39	<i>Nepeta congesta</i> var. <i>congesta</i>	LC	Widespread	No	36S 396022-4344977	Q3
40	<i>Salvia cadmica</i>	LC	Widespread	No	36S 414998-4358333	Q1
41	<i>Salvia wiedemannii</i>	LC	Widespread	No	36S 413795-4346576 36S 398424-4337862	R2 R3
42	<i>Salvia cryptantha</i>	LC	Widespread	No	36S 262767-4302969 36S 295334-4297831	Q9 R13
43	<i>Satureja wiedemanniana</i>	LC	Widespread	No	36S 414998-4358333 36S 414657-4342057 36S 372944-4336336	Q1 Q2 R5
44	<i>Phlomis armeniaca</i>	LC	Widespread	No	36S 262767-4302969 36S 272615-4299842 36S 295334-4297831 36S 302762-4299174 36S 304312-4298308	Q9 R14 R13 Q8 R12

The location of the flora species of importance identified at the Project Area as summarised above are presented in the maps given in Figure 10-22, Figure 10-23 and Figure 10-24. The distribution of the local/regional endemic and not endemic but rare flora species listed above (first 16 species in the above table except No. 5 as it is a recently identified species and as reported by Prof. Dr. Duman it is in the process of registration) in Turkey is given in Figure 10-25.

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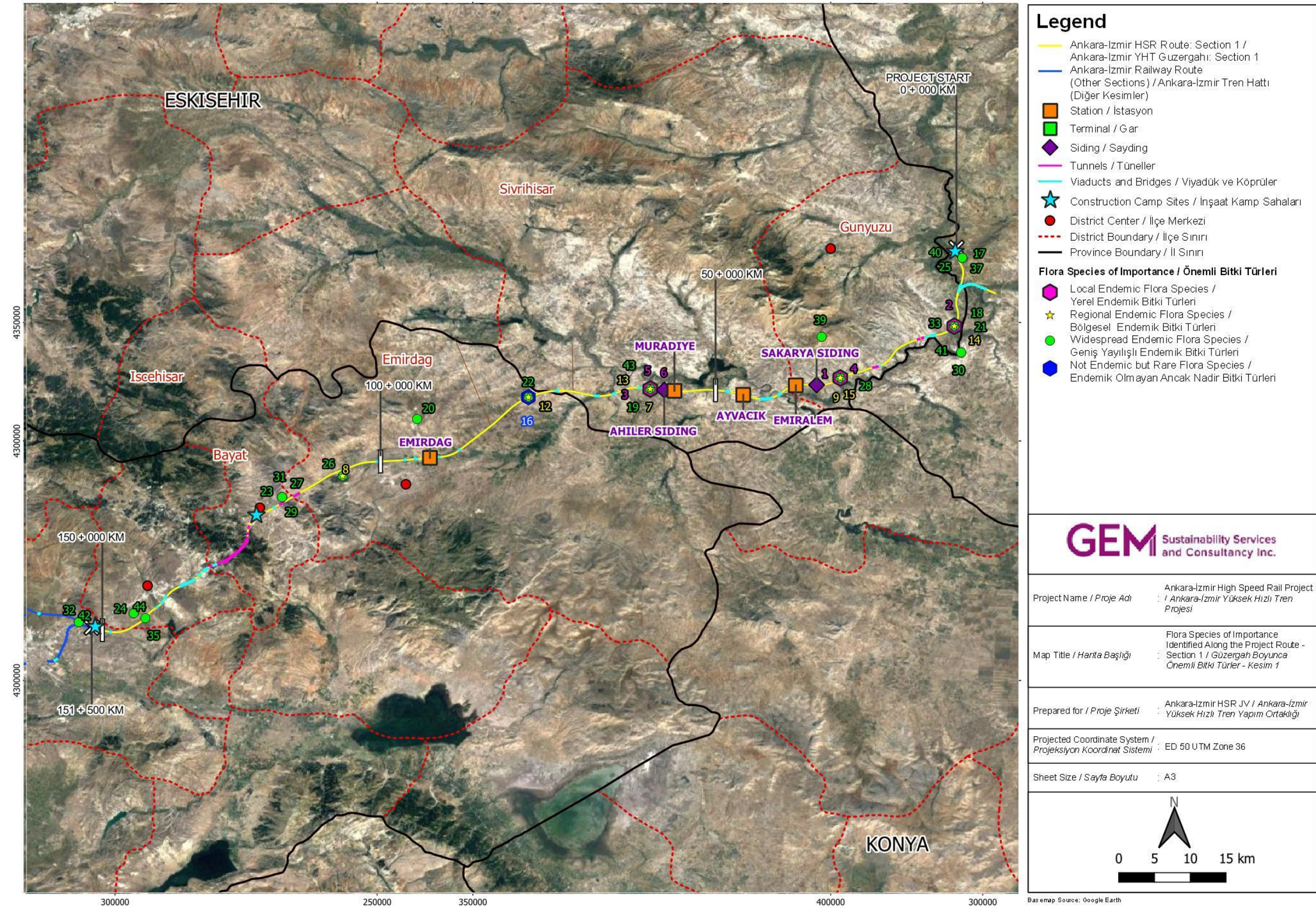


Figure 10-22. Section 1 – Flora Species of Importance Identified Along the Project Route

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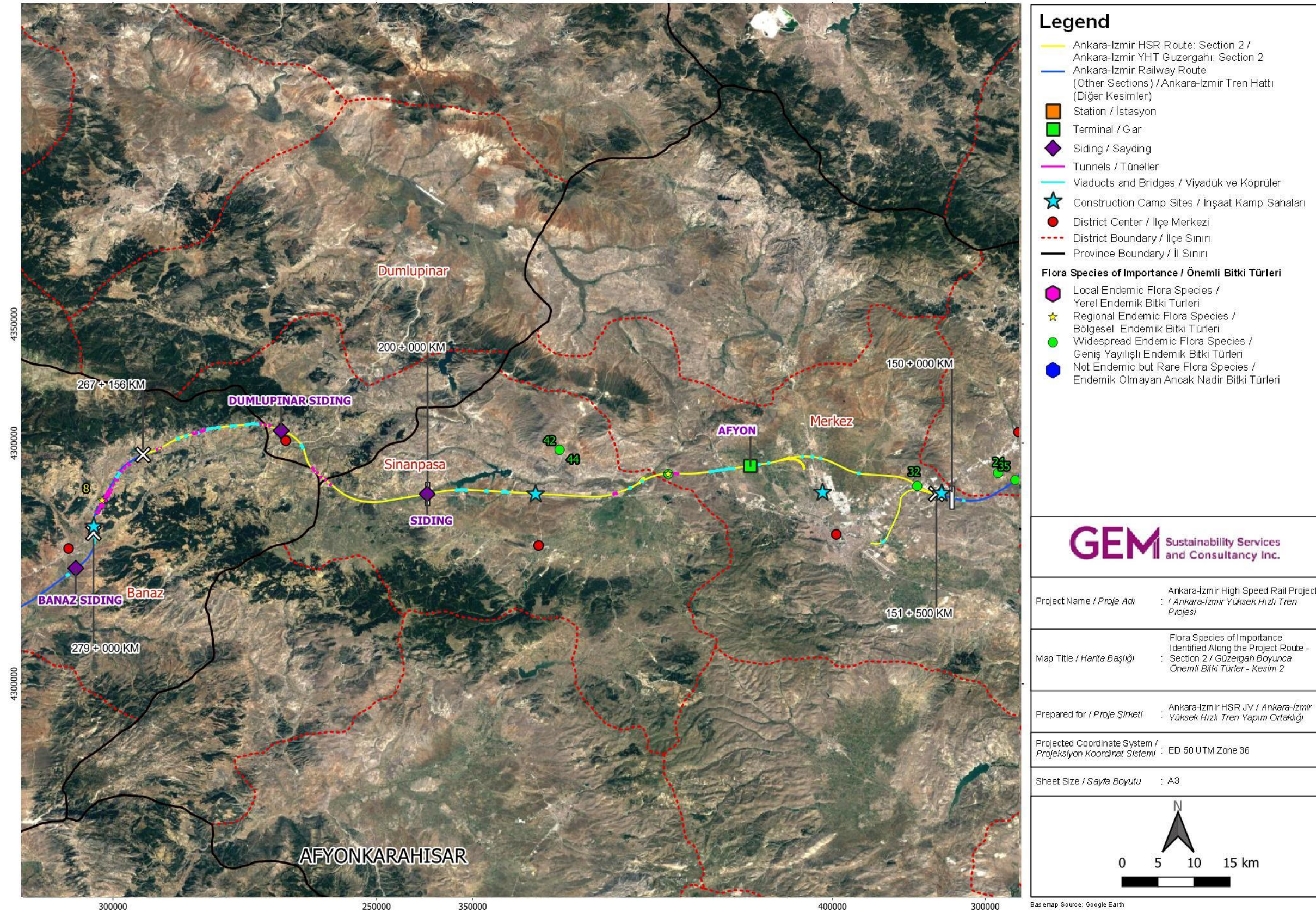


Figure 10-23. Section 2 – Flora Species of Importance Identified Along the Project Route

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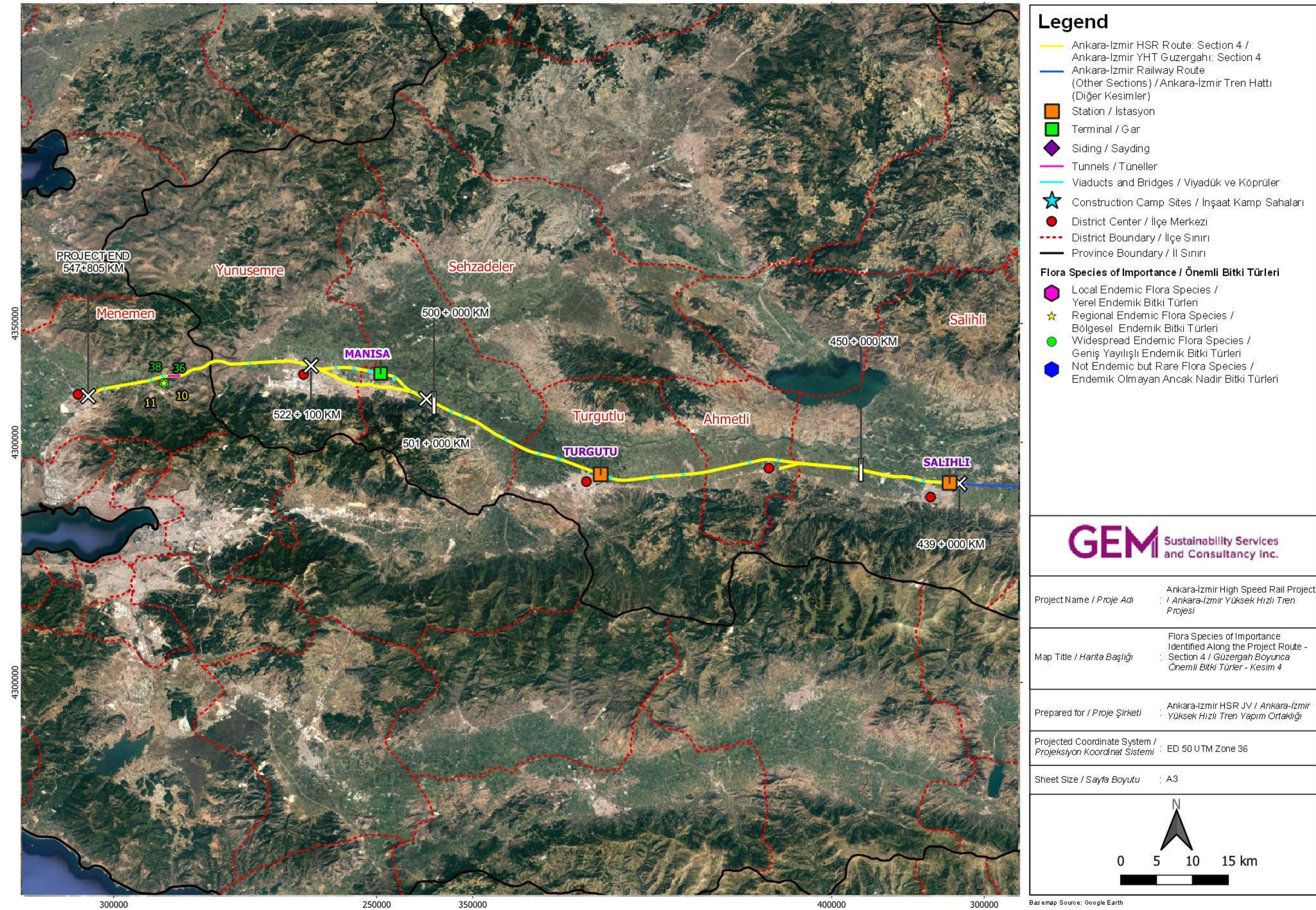
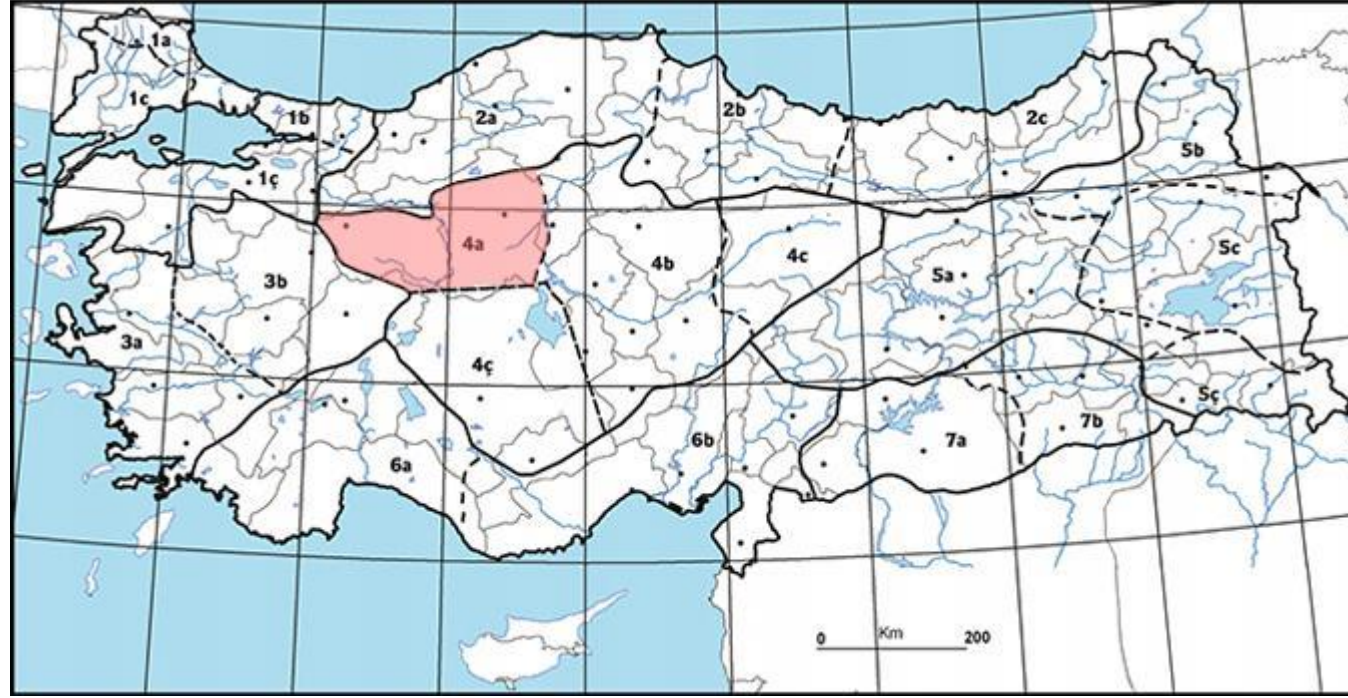
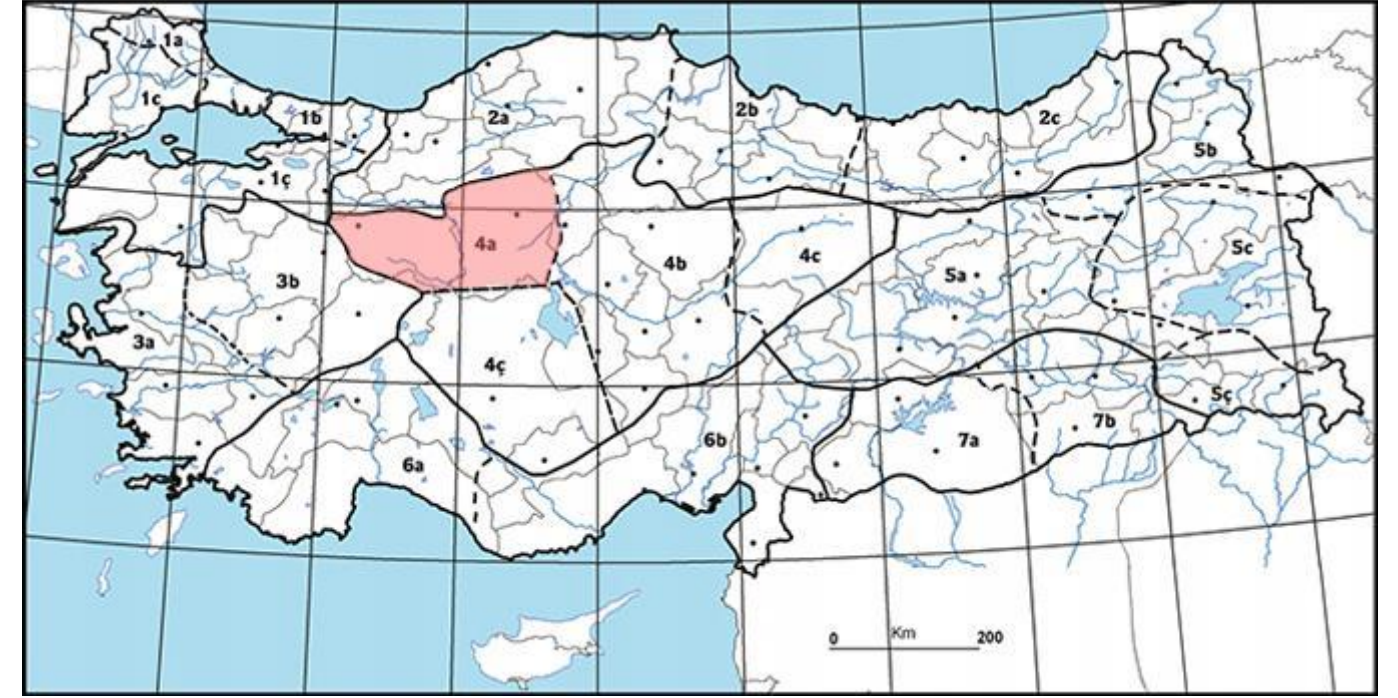


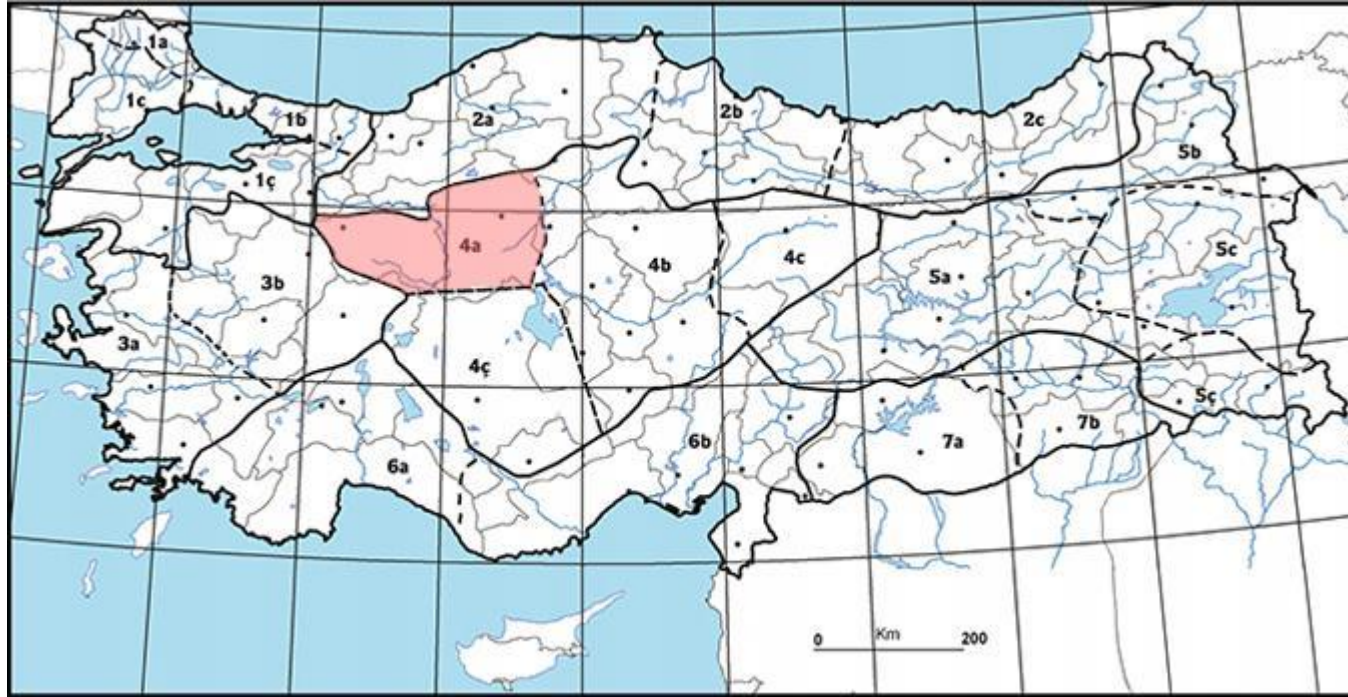
Figure 10-24. Section 4 – Flora Species of Importance Identified Along the Project Route



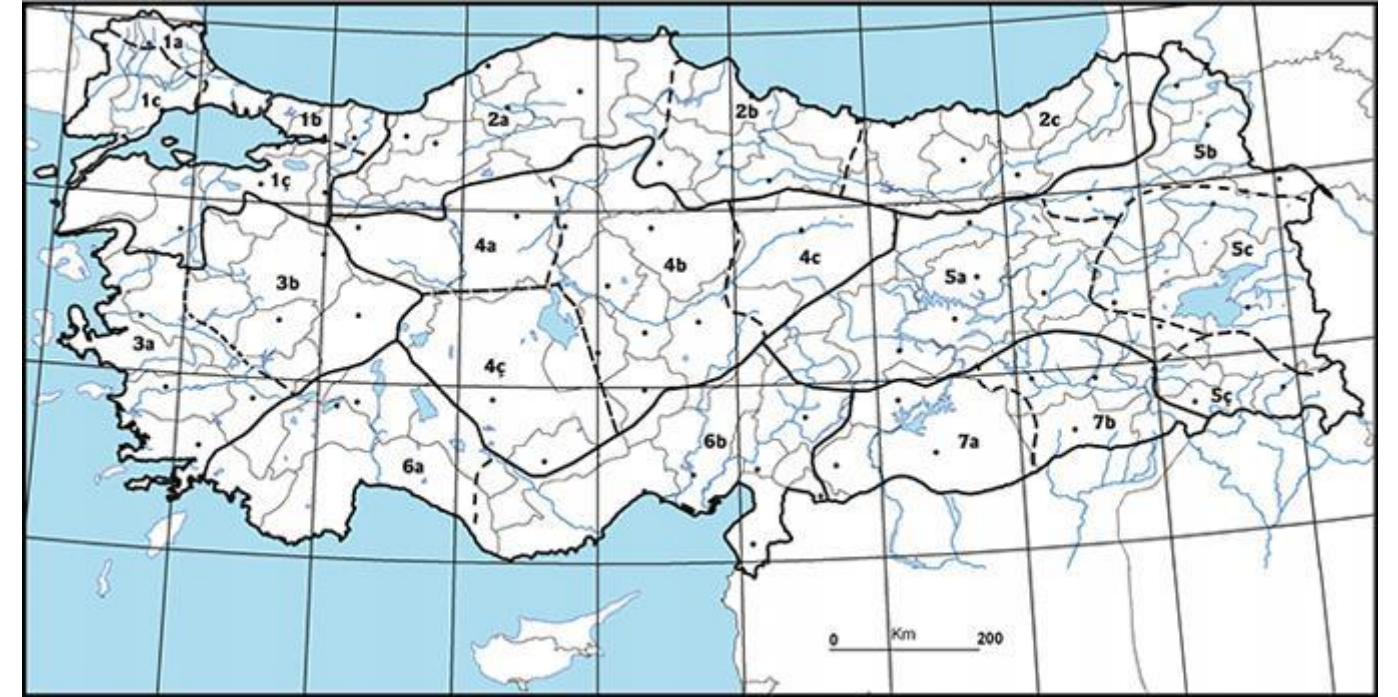
Alyssum niveum (IUCN National Red List: CR, local endemic)



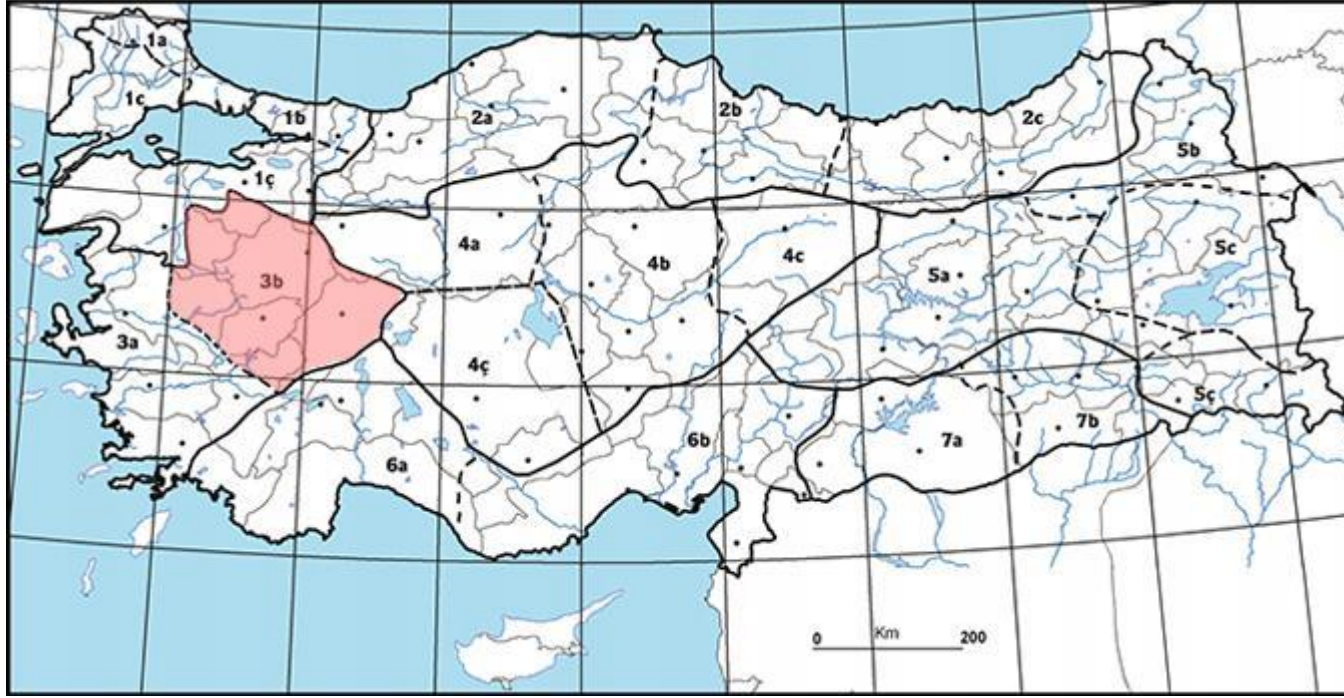
Cephalaria aytachii (IUCN National Red List: CR, local endemic)



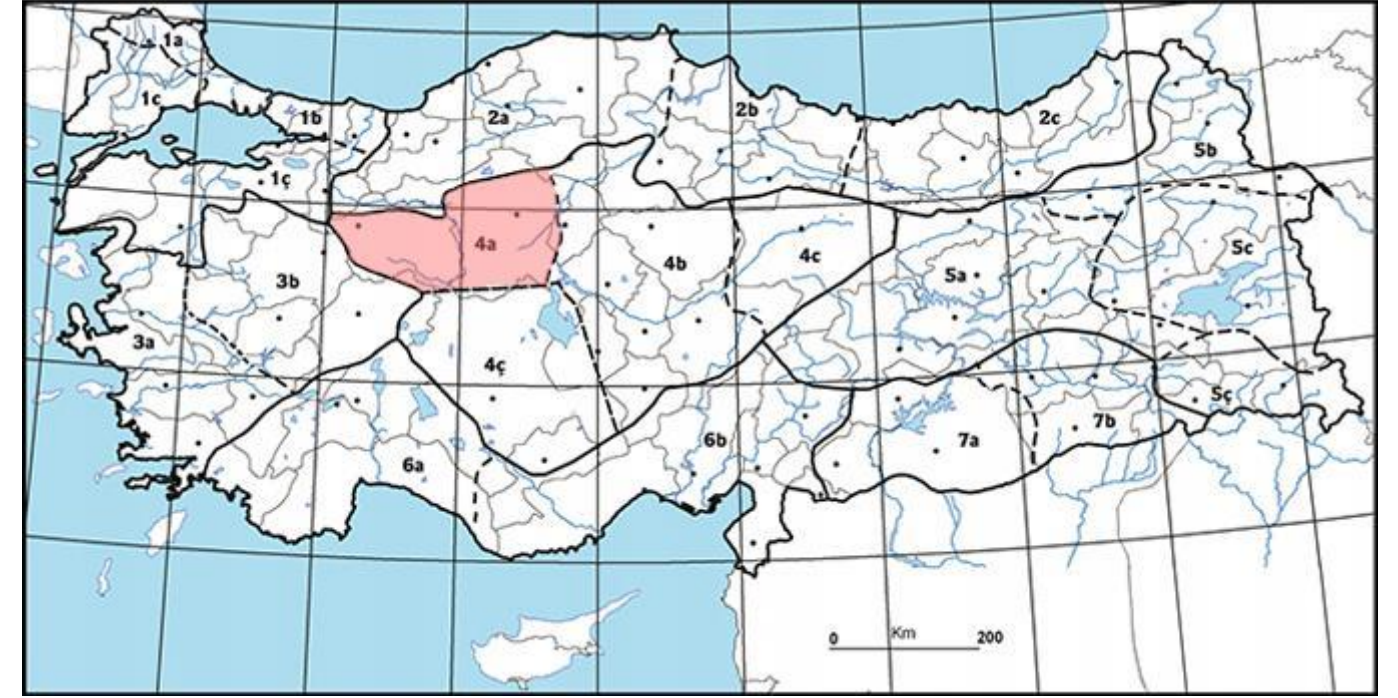
Verbascum gypsicola (IUCN National Red List: CR, local endemic)



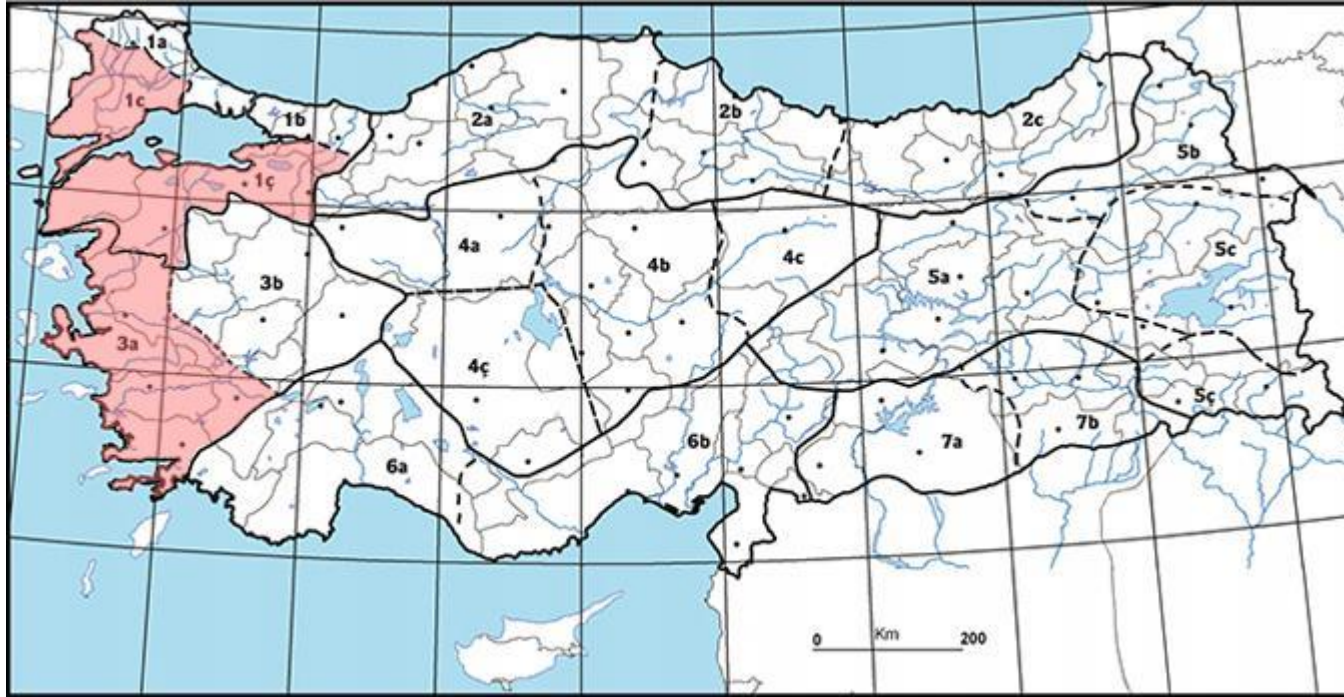
Acantholimon gemicianum (IUCN National Red List: CR, local endemic)



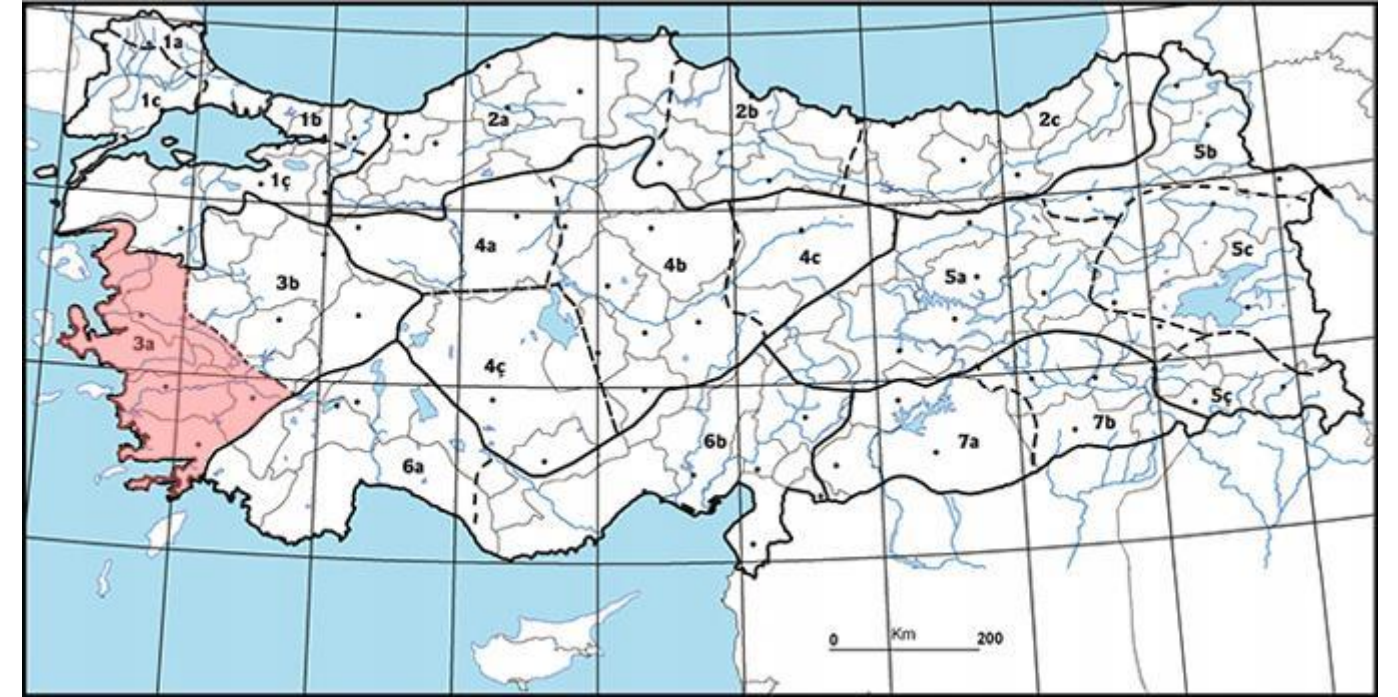
Scabiosa hololeuca (IUCN National Red List: EN, regional endemic)



Achillea ketenoglui (IUCN National Red List: VU, regional endemic)



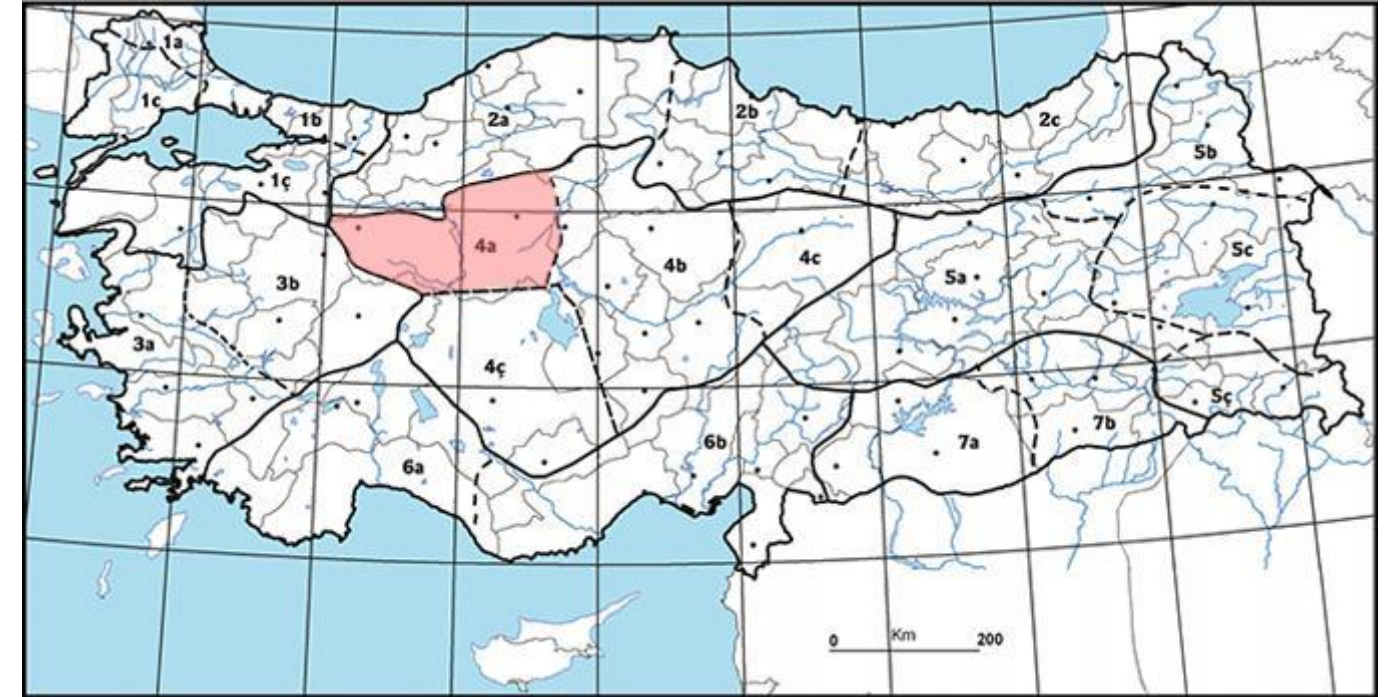
Centaurea polyclada (IUCN National Red List: VU, regional endemic)



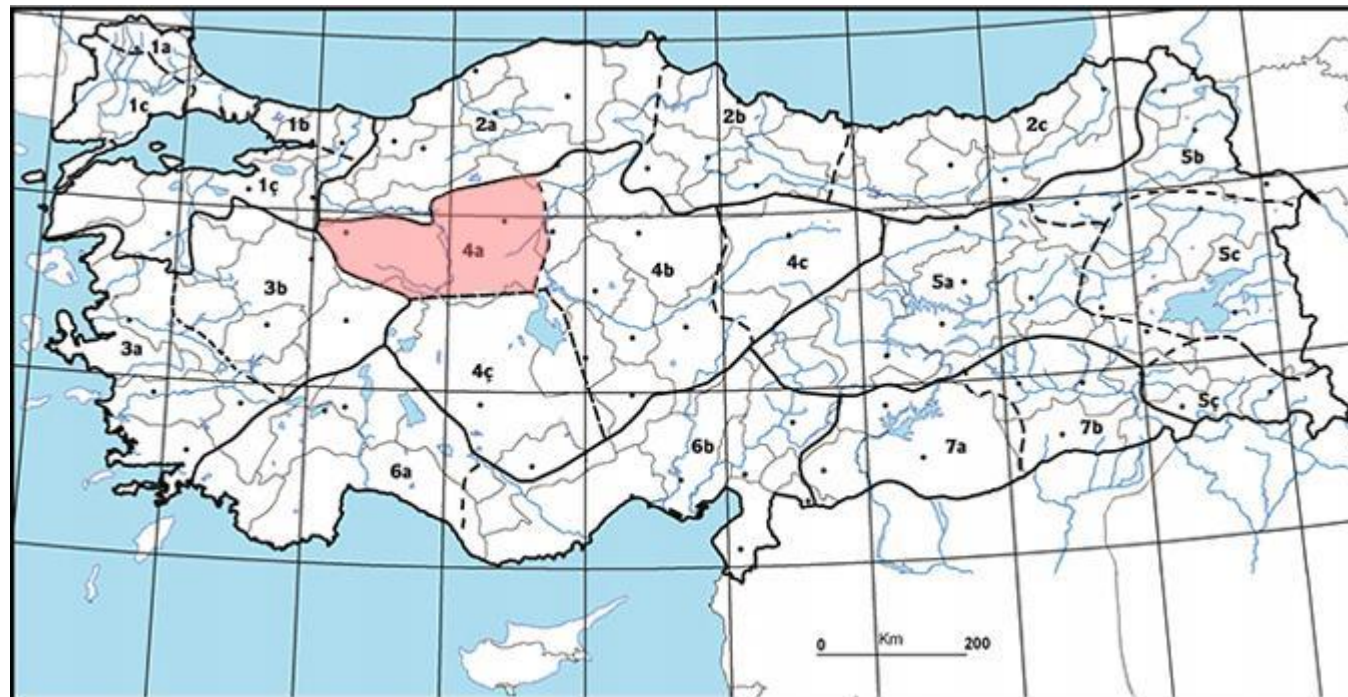
Verbascum antinori (IUCN National Red List: VU, regional endemic)



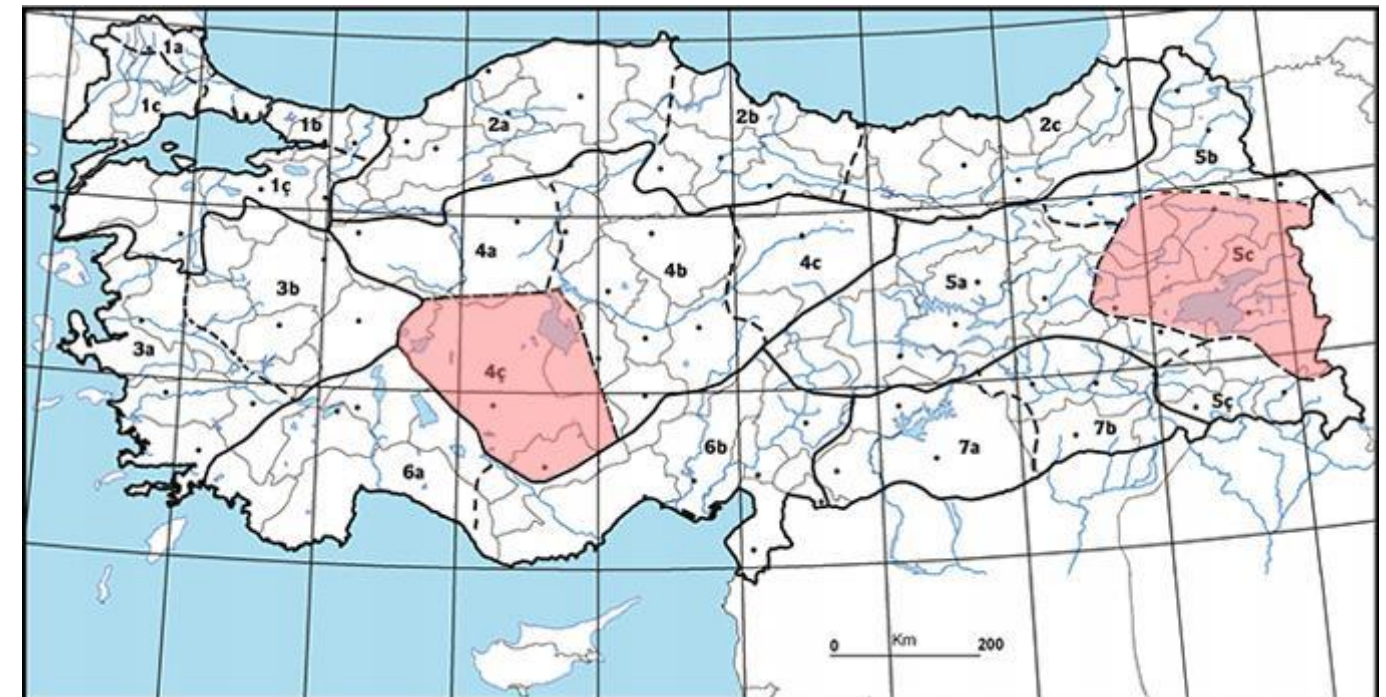
Scutellaria yildirimlii (IUCN National Red List: VU, regional endemic)



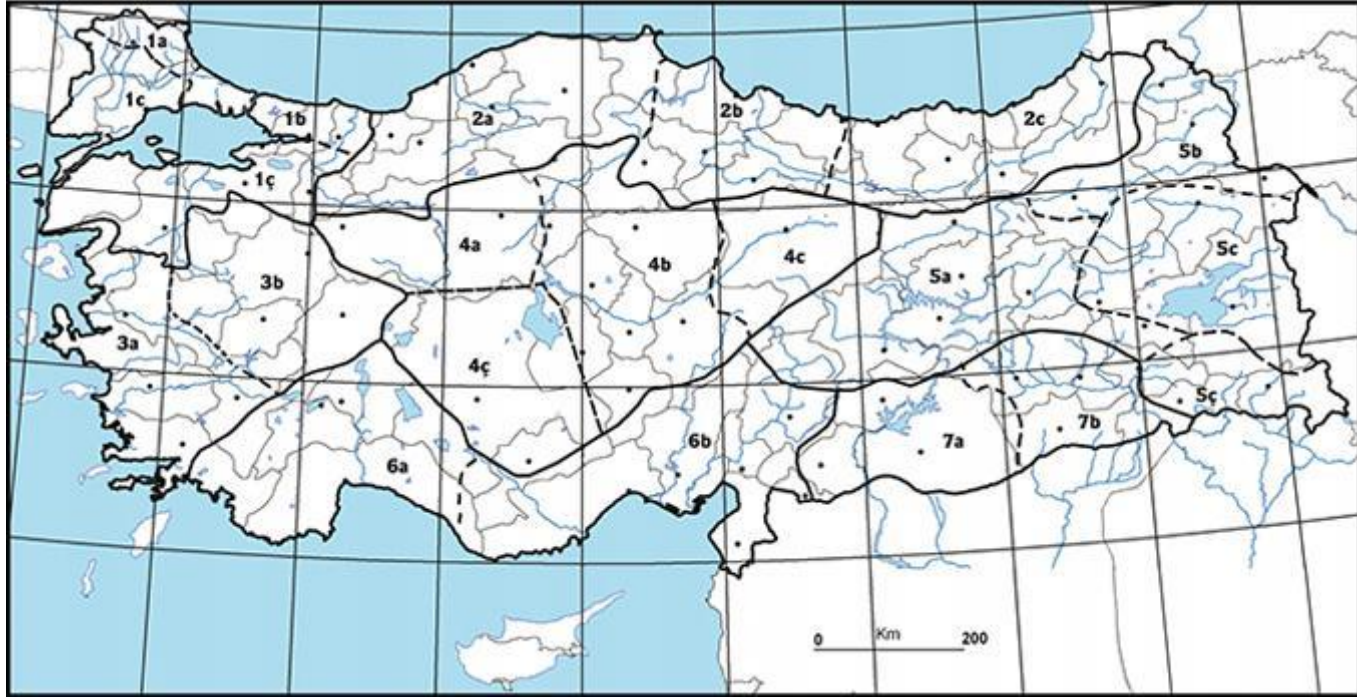
Sideritis gulendamii (IUCN National Red List: VU, regional endemic)



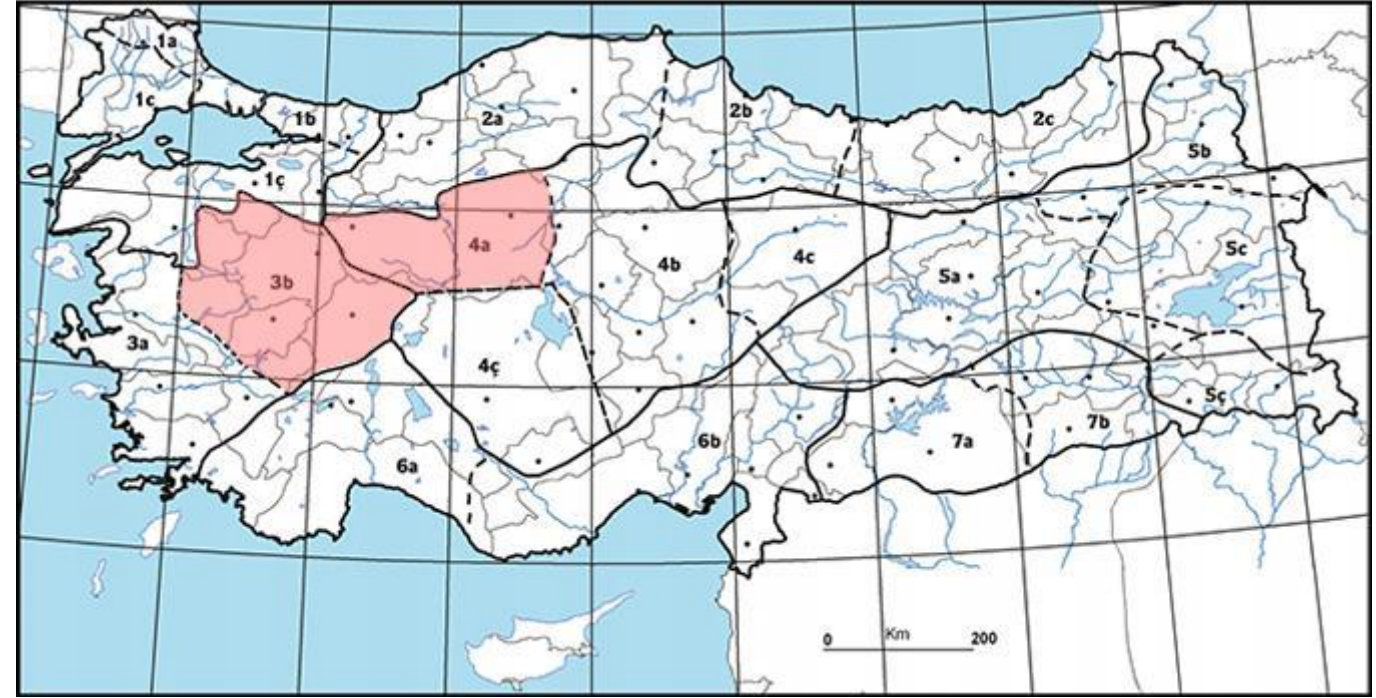
Salvia aytachii (IUCN National Red List: VU, regional endemic)



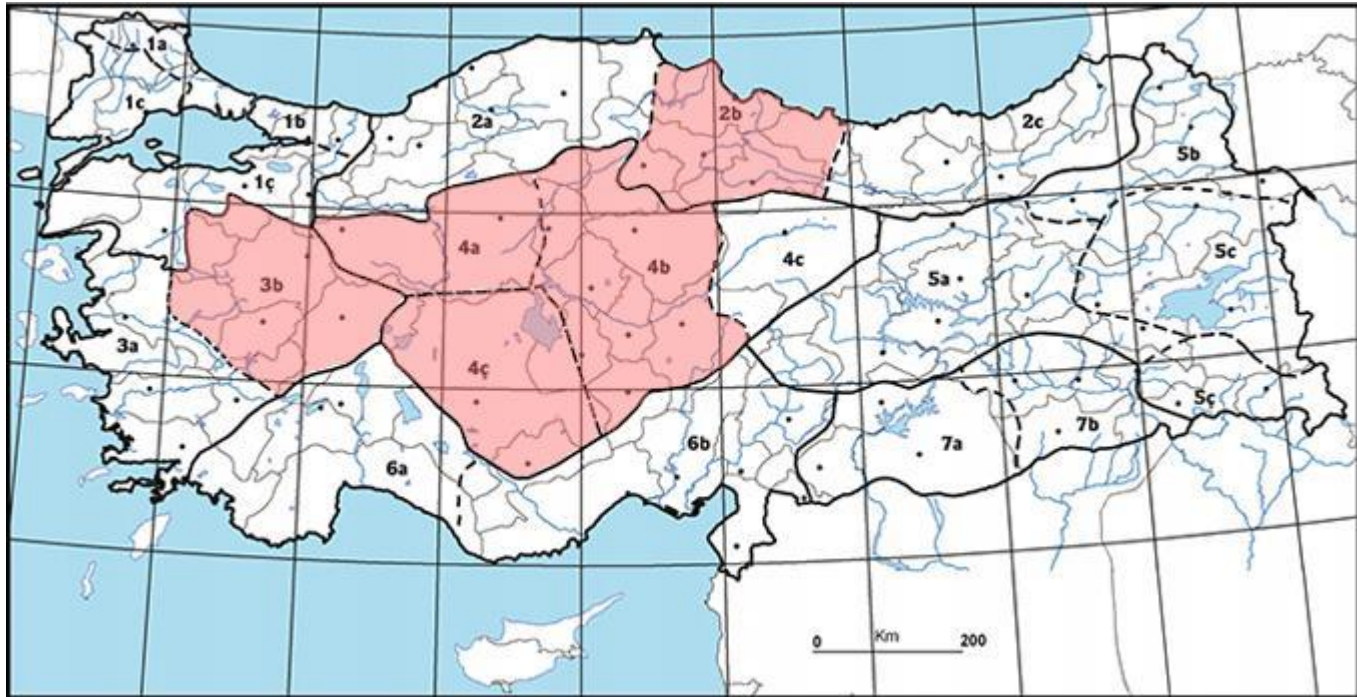
Noaea minuta (IUCN National Red List: VU, not endemic but rare)



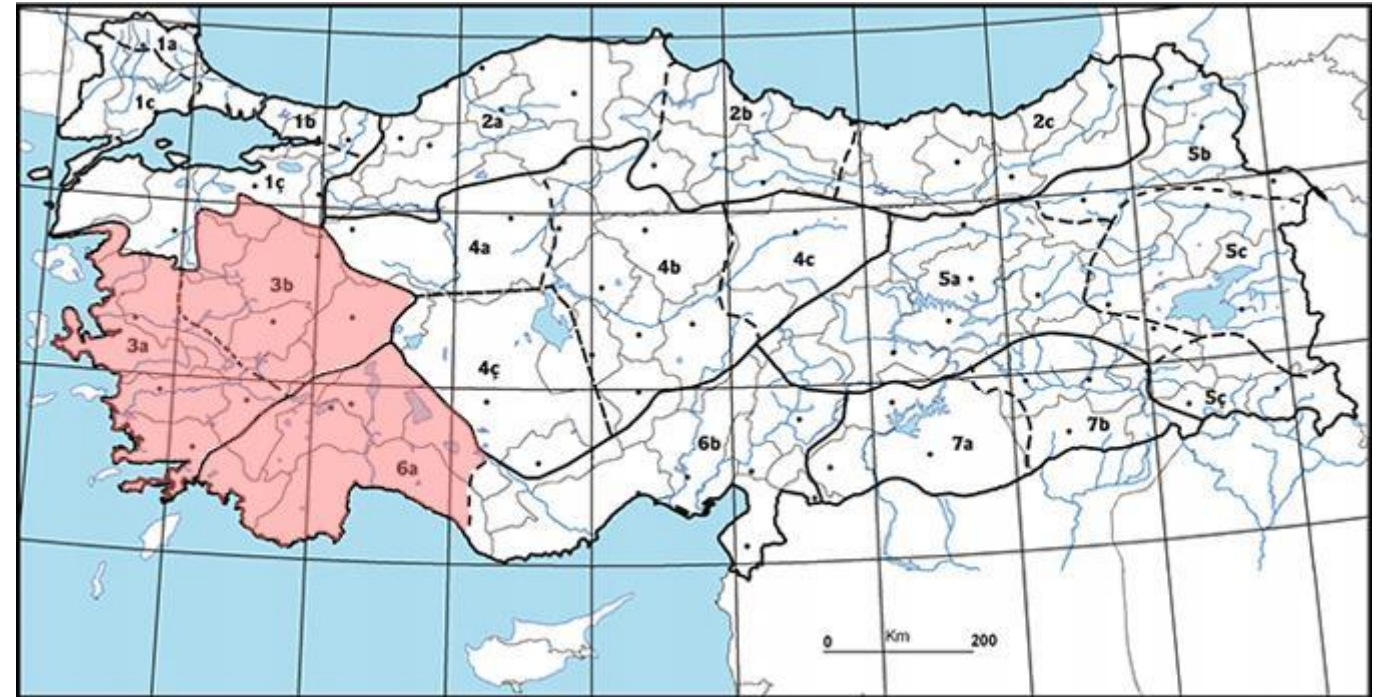
Glaucium secmenii (IUCN National Red List: CR, local endemic)



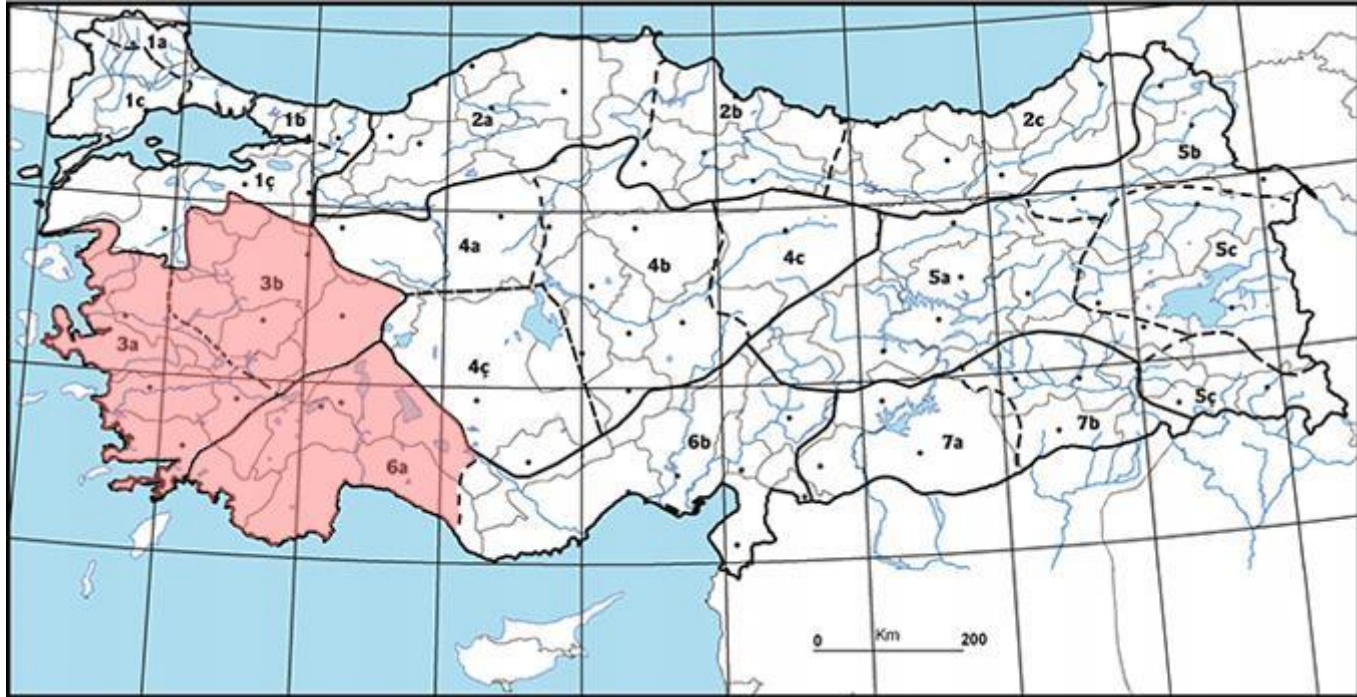
Paronychia dudleyi (IUCN National Red List: VU, regional endemic)



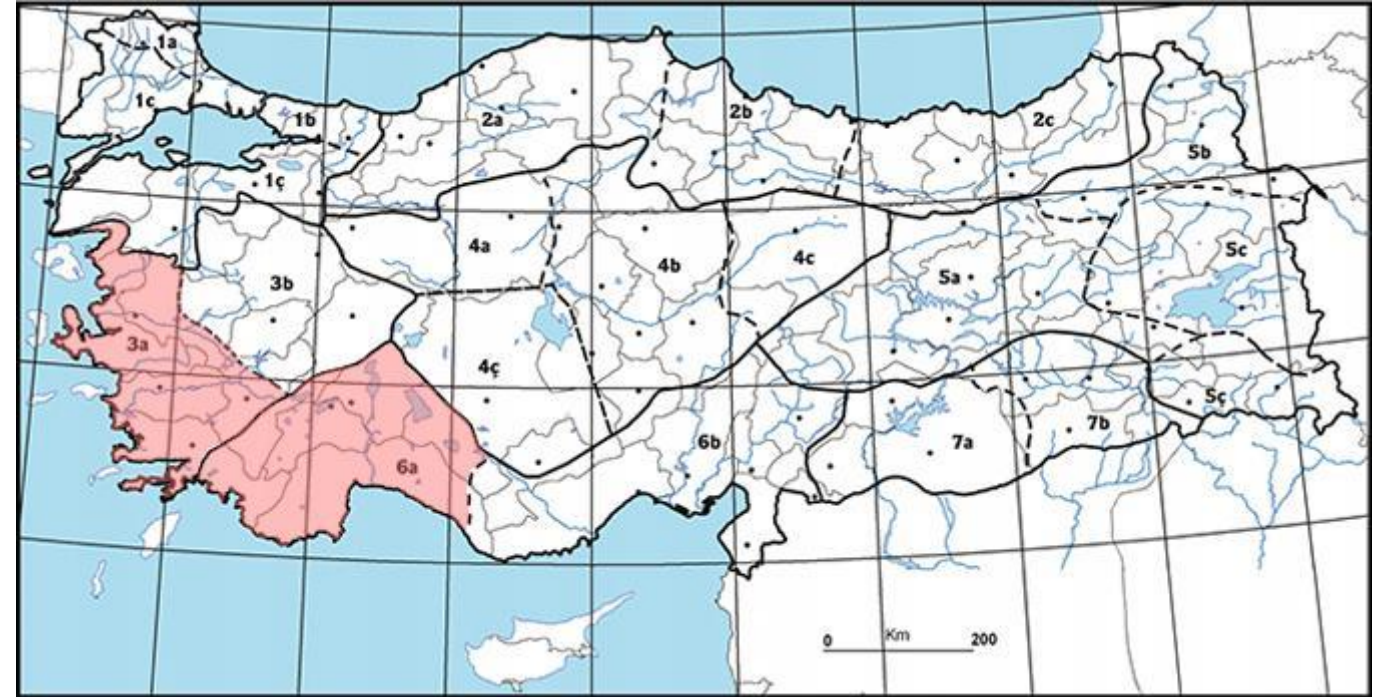
Thymus leucostomus var. *argilleceus* (IUCN National Red List: VU, regional endemic)



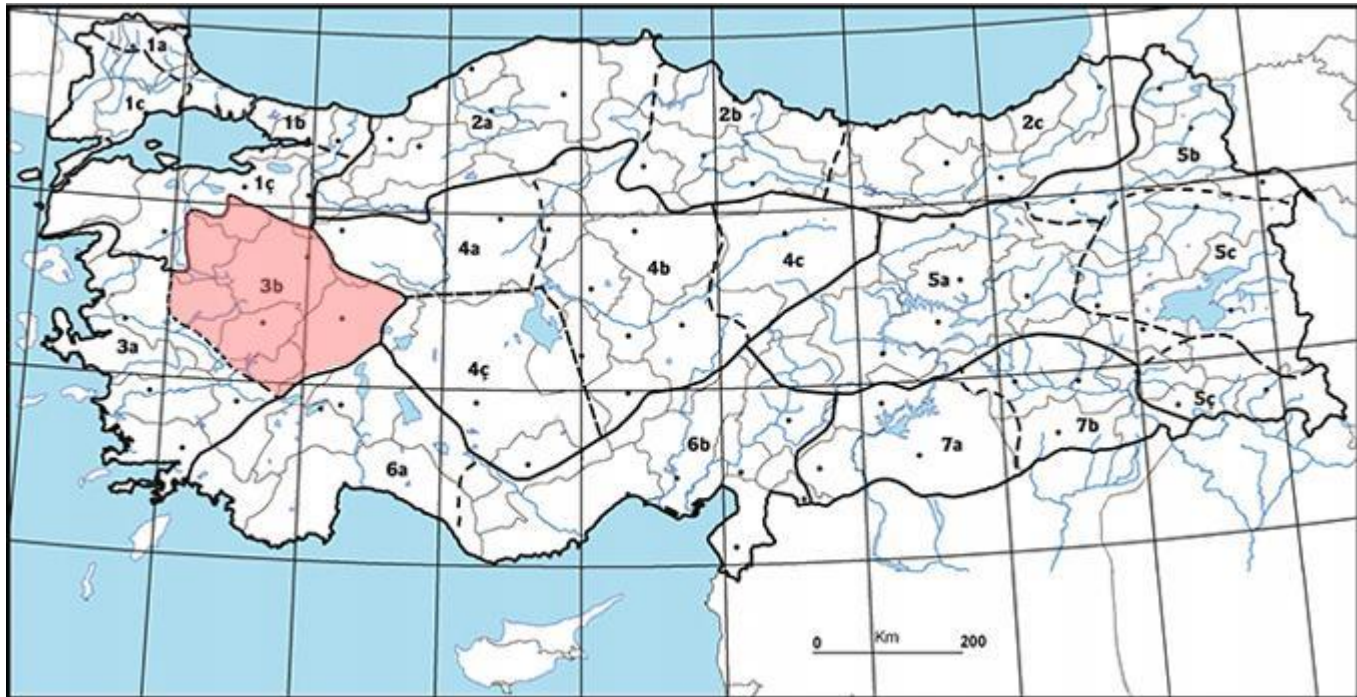
Pseudophleum gibbum (Boiss.) Doğan (IUCN National Red List: VU, regional endemic)



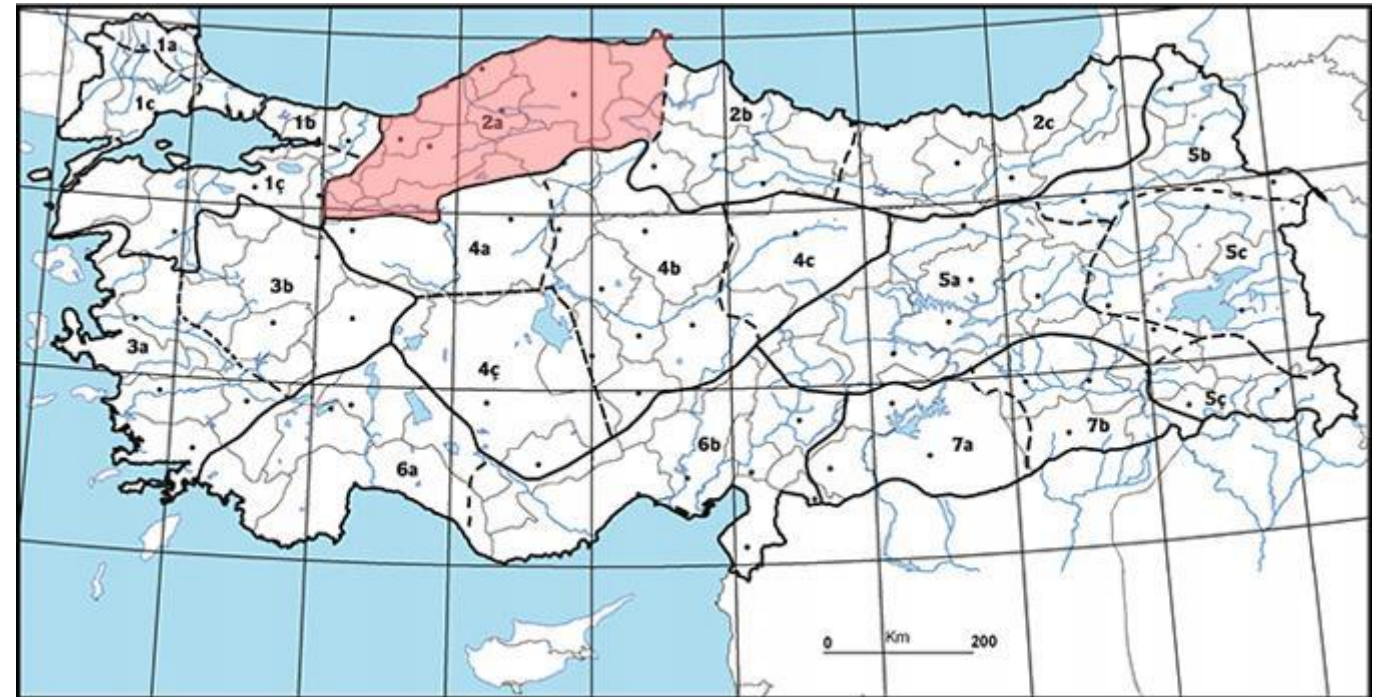
Verbascum luciliae (Boiss.) Kuntze (IUCN National Red List: EN, regional endemic)



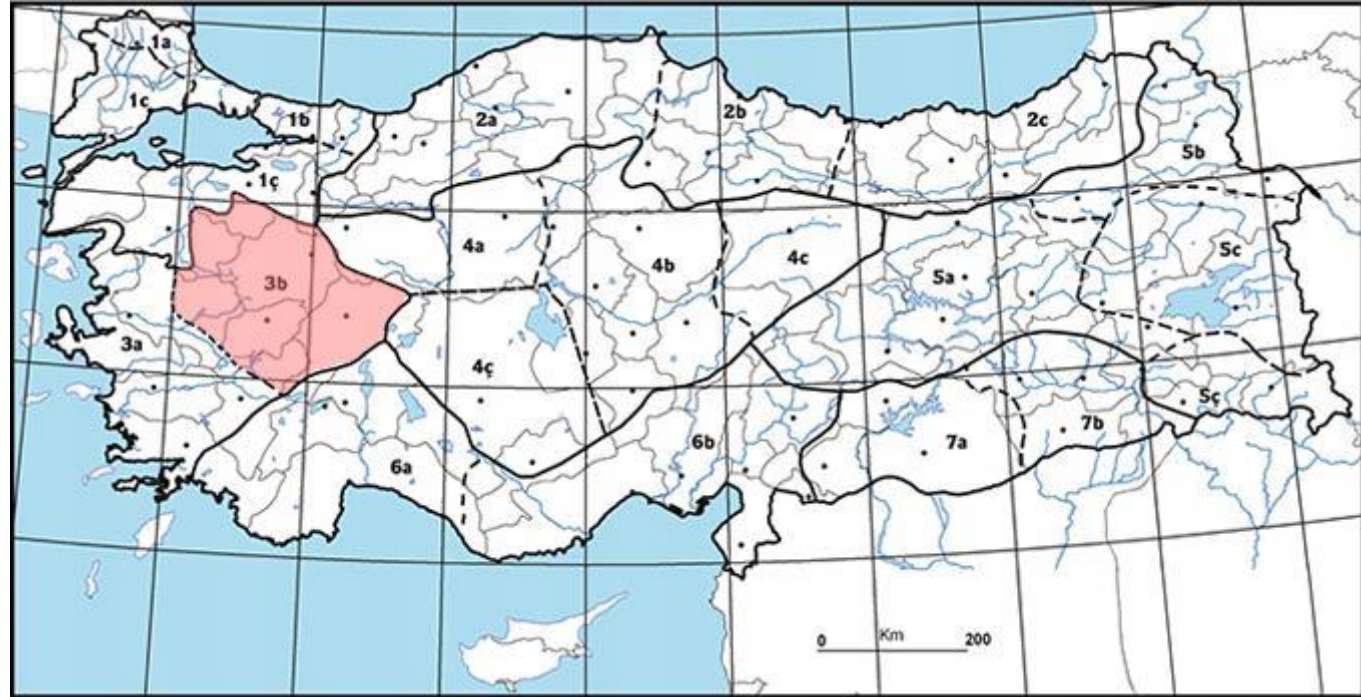
Cyclamen mirabile Hildebr. (IUCN National Red List: EN, regional endemic)



Ebenus plumosa Boiss. & Bal. var. *plumosa* (IUCN National Red List: EN, regional endemic)



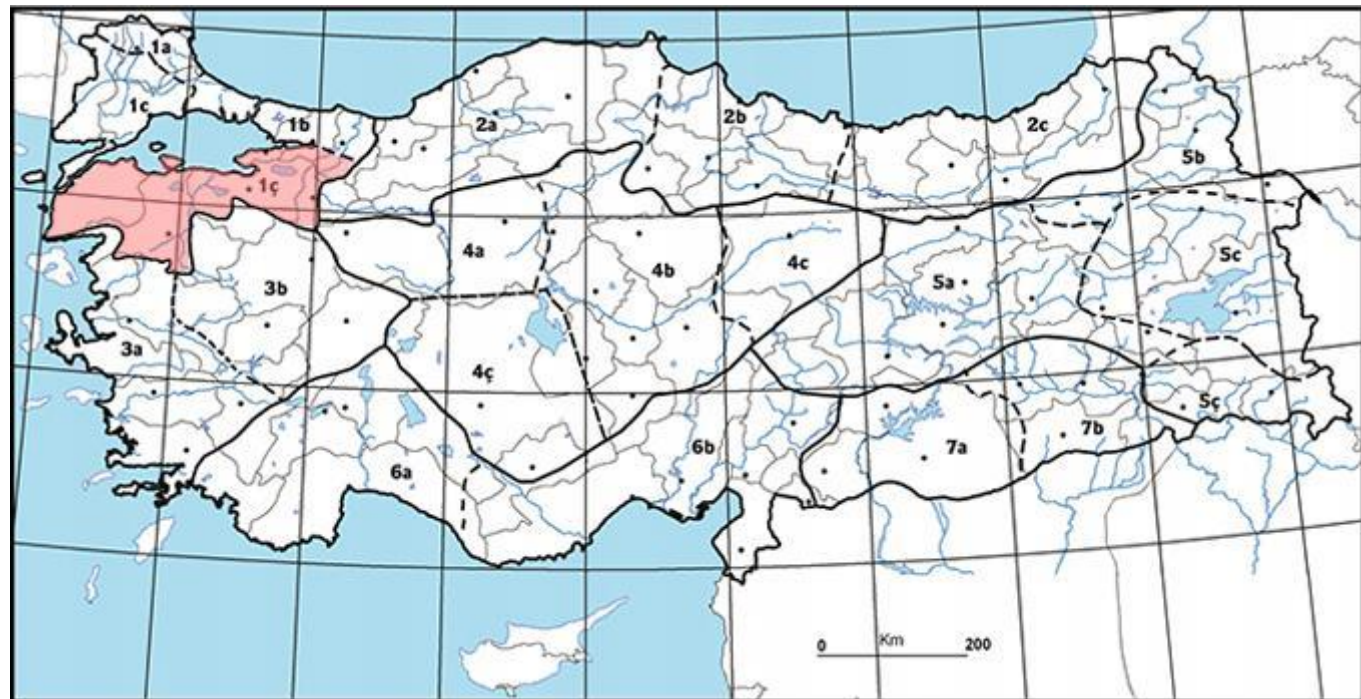
Acantholimon anatolicum (IUCN National Red List: CR, regional endemic, Balıkdami Nationally Important Wetland qualifying species)



Pyrus anatolica Browicz (IUCN National Red List: EN, local endemic)



Ferula anatolica Boiss. (IUCN National Red List: CR, local endemic)



Bolanthus huber-morathii C.Simon (IUCN National Red List: EN, regional endemic)

Figure 10-25. Distribution of Local and Regional Endemic Flora Species in Turkey⁴⁷

⁴⁷ Source: Bizim Bitkiler, <https://bizimbitkiler.org.tr/yeni/demos/technical/>.

Table 10-20. Local and Regional Endemic Flora Species – Seed Collection, Plantation and Flowering Periods

Taxon Name	Seed Collection Period	Seed Plantation Period	Flowering Period
Local and Regional Endemic Species			
1 <i>Glaucium secmenii</i> (seed)	July	October - November	May-June
2 <i>Alyssum niveum</i> (seed)	July	October - November	May-June
3 <i>Cephalaria aytachii</i> (seed)	August - September	October - November	June-July
4 <i>Verbascum gypsicola</i> (seed)	August	October - November	May-June
5 <i>Scutellaria yildirimlii</i> (seed)	July - August	October - November	June-July
6 <i>Marrubium zeydanlii</i> (seed)	August - September	October - November	June-July
7 <i>Sideritis gulendamii</i> (seed)	July - August	October - November	June-July
8 <i>Salvia aytachii</i> (seed)	July - August	October - November	June-July
9 <i>Thymus leucostomus</i> var. <i>argilleceus</i> (seed)	July - August	October - November	June-July
10 <i>Acantholimon gemicianum</i> (seed)	July - August	October - November	June-July
11 <i>Verbascum antinori</i> (seed)	July - August	October - November	May
12 <i>Centaurea polyclada</i> (seed)	July - August	October - November	May
13 <i>Paronychia dudleyi</i> (seed)	July - August	October - November	June-July
14 <i>Scabiosa hololeuca</i> (seed)	July - August	October - November	June-July
15 <i>Achillea ketenoglui</i> (seed)	July - August	October - November	May-July

10.2.6.2. Fauna Studies

The terrestrial fauna studies were carried out at 34 survey locations:

- R – Locations on the railway alignment (22 stations in total)
- Q – Locations at the quarries (12 stations in total)

At each location, an area of about 500-meter diameter was surveyed at least 45 minutes to determine the presence of fauna groups at the survey station. The faunal composition at the Project Area and its vicinity have been identified through direct observation, animal traces, animal tracks, burrows, animal droppings, food remains, animal calls etc. Previous field experiences at the vicinity of the Project Area and literature data were also used to identify fauna species presumed to be present at the Project Area.

10.2.6.2.1. Amphibians

Amphibians are water-dependent species. Though some spend most of their life on land, they eventually return into water to breed. There are some permanent water bodies along the railway route such as ponds and dam lakes and some small creeks through which the railway will cross. As described in Section 10.2.4, in total 24 aquatic survey points were identified along the railway route.

Since the survey time was in winter, any amphibian specimen could not be directly observed during the field survey. The presumed present nine (9) amphibian species at the Project Area are given in Table 10-21. In terms of conservation statuses:

- These species are not endemic and not listed in threatened categories of the IUCN.
- Four (4) of the presumed present amphibian species are listed in Bern Convention Appendix-II (Strictly protected fauna species) and the remaining five (5) presumed present species are in Appendix-III (Protected fauna species).

- One (1) presumed present species is listed in EU Habitats Directive Annex V, one (1) presumed present species is listed in Annex II and four (4) presumed present species in Annex IV.

Table 10-21. Amphibian Species Presumed to be Present at the Project Area

ORDER, Family, <i>Species</i>		English Name	IUCN	BERN	CITES	EU Habitat Directives	Stations where the species are presumed to be present
ANURA							
Bufonidae							
1	<i>Bufo viridis</i>	Green Toad	LC	App-II	-	Ann-IV-	All
2	<i>Bufo bufo</i>	Common toad	LC	App-III	-	-	All
Hylidae							
3	<i>Hyla orientalis</i>	Green Frog	LC	App-II	-	Ann-IV-	F1-24
Pelobatidae							
4	<i>Pelobates syriacus</i>	Syrian spadefoot	LC	App-II	-	Ann-II, Ann-IV	F16-24
Ranidae							
5	<i>Pelophylax ridibundus</i>	Marsh frog	LC	App-III	-	Ann-V-	F1-15
6	<i>Pelophylax bedriagae</i>	Levant water frog	LC	App-III	-	-	F16-24
7	<i>Rana macrocnemis</i>	Long-legged Wood Frog	LC	App-III	-	-	F6-15
URODELA							
Salamandridae							
8	<i>Triturus ivanbureschi</i>	Balkan-Anatolian Crested Newt	LC	App-II		Ann-IV-	F16-24
9	<i>Lissotriton schmidtleri</i>	Schmidtler's Smoot Newt	NE	App-III	-	-	F16-24

10.2.6.2.2. Reptiles

As the baseline survey study was conducted in wintertime, no reptile species were directly observed during the field survey. Taking into account the Project location, general habitat types and preferences, general distribution of species in Turkey, literature data and previous experiences of the academicians in the vicinity of the Project Area, a total of 28 reptile species are listed as presumed present at the Project Area as given in Table 10-22.

Amongst these species, in terms of conservation statuses:

- One (1) presumed present reptile species is endemic (*Anatololacerta anatolica*). This species is endemic to Turkey and distributes mostly in Aegean region up to western part of central Anatolia in Turkey (see Figure 10-26). Its preferred habitat type is rocky areas with trees and bushes close to water sources. This species is presumed to be present at Q9, Q10, Q11 and Q12.
- One (1) presumed present reptile species (*Testudo graeca*) is categorised as Vulnerable (VU) as per the IUCN. This species is very common and widespread in Turkey and can be present basically at each survey point.
- 12 presumed present reptile species are listed in Bern Convention Appendix-II (Strictly protected fauna species) and 16 presumed present reptile species in Appendix-III (Protected fauna species).
- 12 presumed present reptile species are listed in EU Habitats Directive Annex IV (animal and plant species of community interest in need of strict protection) and three (3) presumed present reptile species are listed in Annex II (animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures).

Table 10-22. Reptile Species Presumed to be Present at the Project Area

ORDER, Family, Species	English Name	IUCN	BERN	CITES	EU Habitats Directive	Endemic	Stations where the species presumed to be present
TESTUDINES							
Testudinidae							
1 <i>Testudo graeca</i>	Mediterranean Spur-thighed Tortoise	VU	App-II	-	Ann-II, IV		All
Emydidae							
2 <i>Emys orbicularis</i>	European pond turtle	NT	App-II	-	Ann-II, IV		All F Stations
Geoemydidae							
3 <i>Muremys rivulata</i>	Western caspian turtle	-	App-III	-	-		All F Stations
SQUAMATA							
SAURIA (Lizard)							
Gekkonidae							
4 <i>Hemidactylus turcicus</i>	Turkish Gecko	LC	App-III	-	-		Q12
Agamidae							
5 <i>Stellagama stellio</i>	Starred Agama	LC	App-III	-	Ann-II		Q12
Anguidae							
6 <i>Pseudopus apodus</i>	European glass lizard	LC	App-II	-	Ann-IV		R20-22, Q12
Scincidae							
7 <i>Ablepharus kitaibelii</i>	Snake-eyed skink	LC	App-II	-	-		All
8 <i>Eumeces schneideri</i>	Schneider's Skink	LC	App-III	-	-		Q12
9 <i>Heremites auratus</i>	Levant Skink	LC	App-III	-	-		All
10 <i>Anatololacerta anatolica</i>	Anatolian Rock Lizard	LC	App-III	-	-	ENDEMIC	Q9, Q10, Q11, Q12
11 <i>Lacerta diplochondrodes</i>	Rhodos green lizard	NE	App-III	-	-		All
12 <i>Parvilacerta parva</i>	Dwarf Lizard	LC	App-II	-	-		R1-7,11-19, Q1-11
13 <i>Ophisops elegans</i>	Snake-eyed lizard	LC	App-II	-	Ann-IV		All
14 <i>Podarcis muralis</i>	Common wall lizard	LC	App-II	-	Ann-IV		Q12
SQUAMATA							
SERPENTES (Snakes)							
Boidae							
15 <i>Eryx jaculus</i>	Sand Boa	LC	App-III	-	Ann-IV		R20-22, Q12
Colubridae							
16 <i>Dolichophis caspius</i>	Caspian whip snake	LC	App-III	-	Ann-IV		All
17 <i>Eirenis modestus</i>	Ring-headed dwarf snake	LC	App-III	-	-		All
18 <i>Elaphe sauromates</i>	Blotched snake	LC	App-III	-	-		All

ORDER, Family, Species	English Name	IUCN	BERN	CITES	EU Habitats Directive	Endemic	Stations where the species presumed to be present
19 <i>Hemorrhois nummifer</i>	Coin-market Snake	LC	App-III	-	Ann-IV		R20-22, Q12
20 <i>Malpolon insignitus</i>	Eastern montpellier snake	LC	App-III	-	-		R20-22, Q12
21 <i>Platyceps najadum</i>	Dahl's whip snake	LC	App-II	-	Ann-IV		R20-22, Q12
22 <i>Platyceps collaris</i>	Red whip snake	LC	App-III	-	-		R20-22, Q12
23 <i>Telescopus fallax</i>	Soosan snake	LC	App-II	-	-		All
24 <i>Zamenis situlus</i>	European ratsnake	LC	App-II	-	Ann-IV		R20-22, Q12
25 <i>Natrix natrix</i>	Grass snake	LC	App-III	-	-		All
26 <i>Natrix tessellata</i>	Dice snake	LC	App-II	-	Ann-IV		All F Stations
Typhlopidae							
27 <i>Xerotyphlops vermicularis</i>	Worm snake	LC	App-III	-	-		All
Viperidae							
28 <i>Montivipera xanthina</i>	Turkish viper	LC	App-II	-	Ann-IV		Q1-12



Figure 10-26. Distribution of Endemic Reptile Species *Anatololacerta anatolica* in Turkey (Baran et al. 2021)

10.2.6.2.3. Mammals

As the baseline survey study was conducted in wintertime, very few mammal species were directly observed during the field survey. For example, a European Hare was observed at Q5 site, and a Red Fox was observed at Q9 site. Additionally, burrows and footprints of some mammals were observed during the field surveys as given in Figure 10-27 and Figure 10-28.

Taking into account the Project location, general habitat types, general distribution of species in Turkey, literature data and previous experiences of the academicians in the vicinity of the Project Area, a total of 61 mammal species are listed as presumed present at the Project Area as given in Table 10-23.

Amongst these species, in terms of conservation statuses:

- One (1) of the presumed present mammal species is endemic (*Microtus anatolicus*).
- Three (3) of the presumed present mammal species (*Rhinolophus mehelyi*, *Myotis capaccinii*, *Vormela peregusna*) are categorised as Vulnerable (VU) as per the IUCN.
- 26 out of the 61 presumed present mammal species are listed in Bern Convention Appendix-II (Strictly protected fauna species) and five (5) presumed present species in Appendix-III (Protected fauna species). 30 presumed present mammal species have not been listed by Bern Convention.
- Two (2) presumed present mammal species are listed in CITES Appendix-I (species under the threat of extinction), three (3) presumed present mammal species are listed in Appendix-II (species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled) and 32 presumed present mammal species are listed in Appendix-III (includes species, for which other parties of CITES is applied for assistance in controlling trade and which are conserved at least in one country).
- 13 presumed present mammal species are listed in EU Habitats Directive Annex II (animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures), seven (7) presumed present mammal species are listed in Annex IV (animal and plant species of community interest in need of strict protection), and two (2) presumed present mammal species in Annex V (animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures).
- According to the Central Hunting Commission (CHC) Decision for 2020-2021 season, two (2) presumed present mammal species are listed in Annex-I (list of game animals protected by CHC), and three (3) presumed present mammal species in Annex-II (list of game animals whose hunting is allowed for certain periods of 2020-2021 season).

Table 10-23. Mammal Species Presumed to be Present at the Project Area

ORDER, -idae:	English	IUCN	BERN	CITES	MAK	EU Habitats Directive	Endemic	Stations where the species presumed to be present
EULIPOTYPHLA								
Erinaceidae								
1	<i>Erinaceus concolor</i>	Southern, white-breasted hedgehog	LC	App-III				All
Soricidae								
2	<i>Crocidura leucodon</i>	Bicolored shrew	LC	App-III				All
3	<i>Crocidura gueldenstaedti</i>	Güldenstaedt's white-toothed shrew	NE	App-III				All
4	<i>Neomys milleri</i>	Mediterranean Water Shrew	NE	App-III				R20, 21, 22, Q12
5	<i>Suncus etruscus</i>	Etruscan Shrew	LC	App-III				R20, 21, 22, Q12
CHIROPTERA								
Miniopteridae								
6	<i>Miniopterus schreibersii</i>	Common bent-wing bat	NT	App-II				All
Rhinolophidae								
7	<i>Rhinolophus blasii</i>	Blasius's horseshoe bat	LC	App-II		Ann-II		R22, Q12
8	<i>Rhinolophus euryale</i>	Mediterranean horseshoe bat	NT	App-II		Ann-II		R20, 21, 22, Q12
9	<i>Rhinolophus mehelyi</i>	Mehely's horseshoe bat	VU	App-II		Ann-II		All
10	<i>Rhinolophus ferrumequinum</i>	Greater horseshoe bat	LC	App-II		Ann-II		All
11	<i>Rhinolophus hipposideros</i>	Lesser horseshoe bat	LC	App-II		Ann-II		All
Vespertilionidae								
12	<i>Eptesicus serotinus</i>	Serotine bat	LC	App-II				All
13	<i>Eptesicus anatolicus</i>	Anatolian Serotine	NE	App-II				R20, 21, 22, Q12
14	<i>Hypsugo savii</i>	Savi's pipistrelle	LC	App-II				All
15	<i>Myotis blythi</i>	Lesser mouse-eared bat	LC	App-II		Ann-II		All
16	<i>Myotis capaccinii</i>	Long-fingered bat	VU	App-II		Ann-II		R20, 21, 22, Q12
17	<i>Myotis emarginatus</i>	Geoffroy's bat	LC	App-II		Ann-II		R20, 21, 22, Q12
18	<i>Myotis myotis</i>	Greater mouse-eared bat	LC	App-II		Ann-II		All
19	<i>Myotis mystacinus</i>	Whiskered bat	LC	App-II				All
20	<i>Pipistrellus kuhlii</i>	Kuhl's pipistrelle	LC	App-II				R20, 21, 22, Q12

ORDER, -idae: Family, Species	English	IUCN	BERN	CITES	MAK	EU Habitats Directive	Endemic	Stations where the species presumed to be present
21 <i>Pipistrellus nathusii</i>	Nathusius's pipistrelle	LC	App-II					R20, 21, 22, Q12
22 <i>Pipistrellus pipistrellus</i>	Common pipistrelle	LC	App-III					All
23 <i>Pipistrellus pygmaeus</i>	Soprano pipistrelle	LC	App-II					R20, 21, 22, Q12
24 <i>Plecotus macrobullaris</i>	Alpine Long-eared Bat	LC	App-II					R1-19, Q1-11
Molossidae								
25 <i>Tadarida teniotis</i>								R22, Q12
LAGOMORPHA								
Leporidae								
26 <i>Lepus europaeus</i>	European hare	LC			Ann-II			All
Cricetidae								
27 <i>Arvicola amphibius</i>	European water vole	LC						R4
28 <i>Cricetulus migratorius</i>	Grey dwarf hamster	LC						All
29 <i>Microtus hartingi</i>	Harting's vole	LC						R1-7, 11-16, 18, 20-22, Q1-5, 7-12
30 <i>Microtus mystacinus</i>	Southern vole	LC						R1-7, 11-16, 18, 20-22, Q1-5, 7-12
31 <i>Microtus anatolicus</i>	Anatolian vole	DD					ENDEMIC	Q1-5, R1-7
32 <i>Chionomys nivalis</i>	European Snow Vole	LC						Q10
33 <i>Mesocricetus brabdti</i>	Brandt's Hamster	NT						Q1-5, 7-9 R1-7, 11-15
Gliridae								
34 <i>Dryomys nitedula</i>	Forest Dormouse	LC				Ann-IV		Q2, 6, 7, 11, 12 R8-10, 17, 19-22
Muridae								
35 <i>Apodemus flavicollis</i>	Yellow-necked Mouse	LC						All
36 <i>Apodemus mystacinus</i>	Eastern Broad-toothed Field Mouse	LC						Q1-12, R8-10, 13, 17, 19
37 <i>Apodemus witherbyi</i>	Steppe Field Mouse	LC						All
38 <i>Mus domesticus</i>	House Mouse	LC						R2,4,7,18,20-22
39 <i>Mus macedonicus</i>	Macedonian mouse	LC						All
40 <i>Rattus norvegicus</i>	Brown rat	LC						R4,11,15,20-22
41 <i>Rattus rattus</i>	Black rat	LC						R2,4,7,18,20-22
42 <i>Meriones tristrami</i>	Tristram's Jird	LC						Q1-5, 7-12 R1-7,11-16,18

ORDER, -idae: Family, Species	English	IUCN	BERN	CITES	MAK	EU Habitats Directive	Endemic	Stations where the species presumed to be present
Sciuridae								
43 <i>Sciurus anomalus</i>	Caucasian Squirrel	LC	App-II			Ann-IV		Q6,7, R8-10, 17-22
44 <i>Spermophilus xanthoprymnus</i>	Asia Minor Ground Squirrel	NT				-		R2,5,6,7, Q4
Spalacidae								
45 <i>Nannospalax xanthodon</i>	Anatolian Blind Mole-rat	DD						Q1-5, 7-11, R1-7, 11-16, 18-22
Dipodidae								
46 <i>Scarturus williamsi</i>	William's Jerboa	LC				-		Q1-5, 7-9 R1-7, 11-15
Hstiridae								
47 <i>Hystrix indica</i>	Indian Crested Porcupine	NT	App-II	App-I				Q12, R20-22
CARNIVORA								
Canidae								
48 <i>Canis aureus</i>	Golden jackal	LC		App-III	Ann- II	Ann-V		Q9-12, R14-22
49 <i>Canis lupus</i>	Gray wolf	LC	App-II	App-II		Ann-IV		Q1-11, R1-19
50 <i>Vulpes vulpes</i>	Red wolf	LC		App-III	Ann- II			All
51 <i>Felis chaus</i>	Jungle Cat	LC						R4,11,20, Q12
52 <i>Felis silvestris</i>	Wild cat	LC	App-II			Ann-IV		
53 <i>Lynx lynx</i>	Eurasian Lynx	LC	App- III	-	-	Annex-IV & Annex- II		Q1-12, R1-3,8-10,17,19
54 <i>Caracal caracal</i>	Caracal	LC	App-II	App-I				Q12
Mustelidae								
55 <i>Lutra lutra</i>	Eurasian otter	NT	App-II	App-I		Ann-II, IV		All F Stations, R4,10,11,14-17, 20, Q12
56 <i>Martes foina</i>	Beech marten	LC	App- III	App-III	Ann- II			All
57 <i>Meles meles</i>	European badger	LC	App- III		Ann- I			All
58 <i>Mustela nivalis</i>	Least weasel	LC	App- III		Ann- I			All
59 <i>Vormela peregusna</i>	Marbled polecat	VU	App-II					R1-7, 11-16, 18, 20- 22, Q2,10,11,12
CETARTIODACTYLA								
Cervidae								
60 <i>Cervus elaphus</i>	Red deer	LC	App-II	App-II		Ann-II, IV		R7, Q11
Suidae								
61 <i>Sus scrofa</i>	Wild boar	LC	App- III	App-II				All

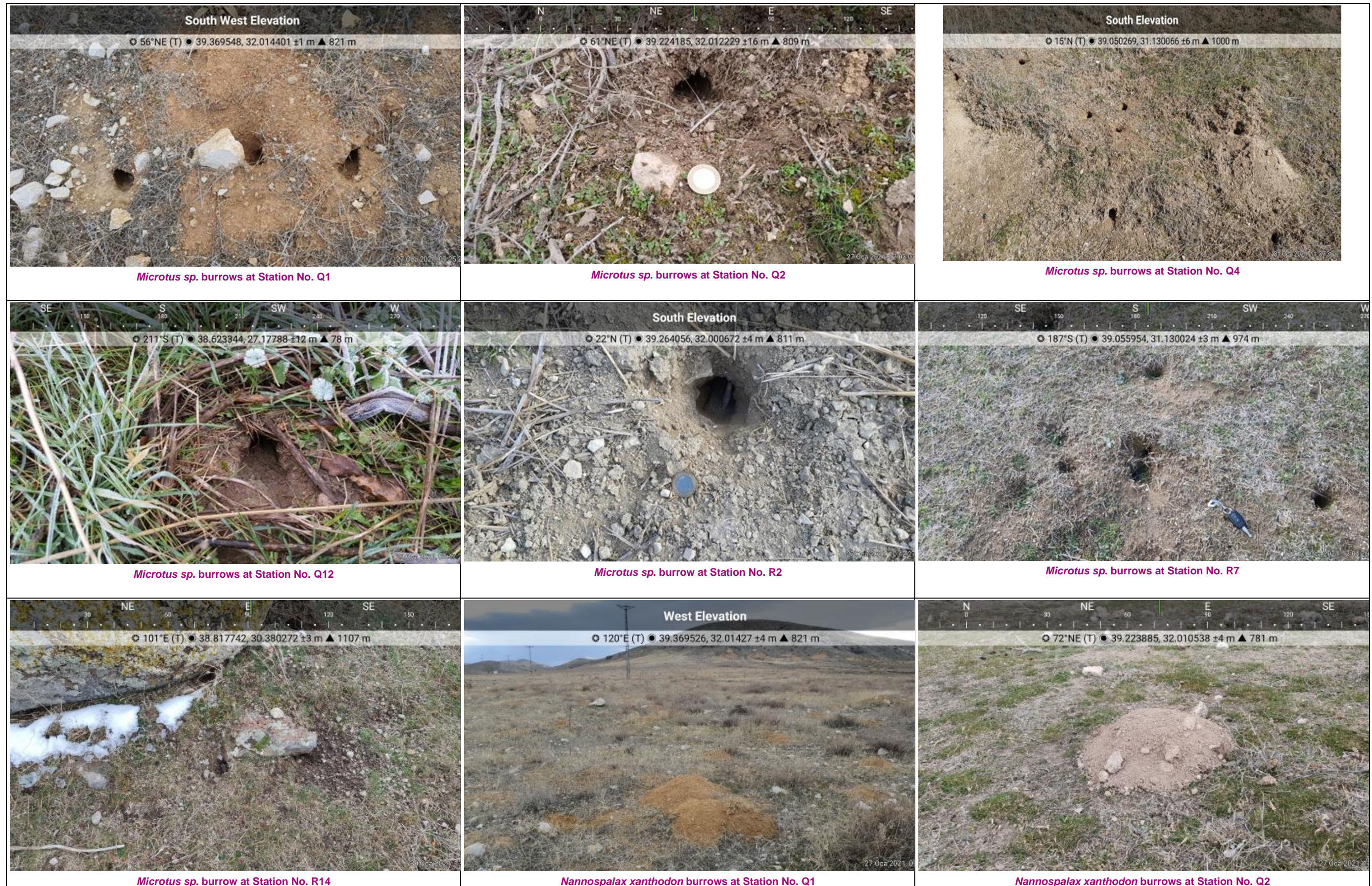


Figure 10-27. Burrows of Mammals Observed during the Field Study



Figure 10-28. Burrows of Mammals Observed during the Field Study

10.2.6.3. Avifauna Studies

The avifauna studies were carried out at all the 58 survey locations:

- R – Locations on the railway alignment (22 stations in total)
- Q – Locations at the quarries (12 stations in total)
- F – Locations at the aquatic ecosystems (24 stations in total)

Line transect method within the 500 m study area corridor for 45-60 min along the alignment, point count method at four different locations at each quarry location with the use of binoculars, monocular telescopes were used. In total, 126 avifauna species are presumed to be present at the Project Area as given in Table 10-24.

Amongst the presumed present species, Egyptian Vulture is categorised as Endangered (EN) as per the IUCN and Turtle Dove as Vulnerable (VU). These species are shown below.



Neophron percnopterus (Egyptian Vulture) (IUCN Category: EN)



Streptopelia turtur (Turtle dove) (IUCN Category: VU)

The presence of each avifauna species at the 58 stations have been further grouped as direct observation or presumed presence based on literature-habitat (L-H) preference. The results are presented for Survey Point #1 to Survey Point #24 in Table 10-25, for Survey Point #25 to Survey Point #44 in Table 10-26 and for Survey Point #45 to Survey Point #58 in Table 10-27. The directly observed avifauna species are presented with observed numbers (highlighted in green).

Amongst the 58 survey stations, the following 10 have been considered as important areas for bird species due to potential use of the sites as feeding, breeding and sheltering grounds:

1. Station No. R3 (Survey Point No. 5, EUNIS Habitat E1.00 – Gypsum steppes) (gypsum steppe habitats with rocky elevations are highly suitable breeding sites for Egyptian Vulture, this species uses similar habitats in this region as feeding and sheltering areas)
2. Station No. Q3 (Survey Point No. 7, EUNIS Habitat E1.2 – Perennial calcareous grassland and basic steppes, Acikir Steppes KBA) (steppe habitats with rocky elevations are highly suitable breeding sites for Egyptian Vulture, this species uses similar habitats in this region as feeding and sheltering areas)
3. Station No. R4 (Survey Point No. 9, EUNIS Habitat G1.1 – Riparian and gallery woodland, with dominant *Salix*, EUNIS Habitat I1.2 – Mixed crops of market gardens and horticulture) (KM 50-KM 52) (this point is at a distance of 300 m to Balıkdami Nationally Important Wetland)
4. Station No. F3 (Survey Point No. 10, EUNIS Habitat C1.1 – Permanent oligotrophic lakes, ponds, and pools, EUNIS Habitat G1.1 – Riparian and gallery woodland, with dominant *Salix*, EUNIS Habitat I1.2 – Mixed crops of market gardens and horticulture) (KM 52-KM 55) (this point is at a distance of 700 m to Balıkdami Nationally Important Wetland)
5. Station No. Q6 (Survey Point No. 18, EUNIS Habitat Code G3.9 – Coniferous woodland dominated by *Juniperus*) (natural Juniper forest – important breeding, feeding and sheltering habitat for many bird species including Turtle Dove categorised as VU by the IUCN)
6. Station No. R11 (Survey Point No. 26, EUNIS Habitat C3.2 – Water-fringing reedbeds and tall helophytes other than canes, EUNIS Habitat I1.2 – Mixed crops of market gardens and horticulture) (KM 139-KM 141) (the railway alignment passes adjacent to the south of Karagöl – a permanent wetland of 1 km², this area is the only habitat for water bird species in the region, serves as breeding-feeding habitat in spring/summer and wintering area in autumn/winter) – the infrastructure works have been observed to be completed at this location
7. Station No. F9 (Survey Point No. 27, EUNIS Habitat C3.2 – Water-fringing reedbeds and tall helophytes other than canes, EUNIS Habitat G1.1 – Riparian and gallery woodland, with dominant *Salix*) (KM 139-KM 140) (the railway alignment passes through the continuous water system Iscehisar Creek, this creek forms a wetland to the southeast of Karagöl, this creek and the wetland is an important area for water birds in the region, serves as breeding-feeding habitat in spring/summer and wintering area in autumn/winter) – the infrastructure works have been observed to be completed at this location
8. Station No. R15 (Survey Point No. 35, EUNIS Habitat Code E3.3 – Sub-Mediterranean humid meadows, EUNIS Habitat G1.1 – Riparian and gallery woodland, with dominant *Salix*, EUNIS Habitat I1.2 – Mixed crops of market gardens and horticulture) (KM 196-KM 197) (the railway alignment passes through a viaduct at north of Duzagac, below the viaduct is Duzagac Creek and a delta and wetland formed by this creek, the area is used by the water birds) – the infrastructure works have been observed to be completed at this location
9. Station No. R19 (Survey Point No. 45, EUNIS Habitat Code G3.5 – *Pinus nigra* woodland) (KM 273-KM 275) (*Pinus nigra* woodland)
10. Station No. F22 (Survey Point No. 54, EUNIS Habitat G1.1 – Riparian and gallery woodland, with dominant *Salix*) (KM 484-KM 485) (the railway alignment passes through continuous water system Turgutlu Stream, habitat for water birds)

Table 10-24. Avifauna Species Presumed to be Present at the Project Area

No.	Scientific Name	IUCN	BERN	CITES	EU Birds Directive	Turkish Red List	Status (*)	CHC 2020-2021
1	<i>Tachybaptus ruficollis</i>	LC	App-II			A.3.1	Y	
2	<i>Podiceps cristatus</i>	LC	App-III			A.5	Y	
3	<i>Phalacrocorax carbo</i>	LC	App-III			A.3	Y	App-I
4	<i>Botaurus stellaris</i>	LC	App-II		Ann-I	A.2	Y	
5	<i>Ixobrychus minutus</i>	LC	App-II		Ann-I	A.2	Y	
6	<i>Ardeola ralloides</i>	LC	App-II		Ann-I	A.3	Y	
7	<i>Egretta garzetta</i>	LC	App-II		Ann-I	A.3.1	Y	
8	<i>Ardea alba</i>	LC	App-II		Ann-I	A.3	Y	
9	<i>Ardea cinerea</i>	LC	App-III			A.3.1	Y	App-I
10	<i>Ardea purpurea</i>	LC	App-II		Ann-I	A.2	Y	
11	<i>Ciconia ciconia</i>	LC	App-II		Ann-I	A.3.1	G	
12	<i>Anser anser</i>	LC	App-III		Ann-II-A Ann-III-B	A.4	Y	App-II
13	<i>Tadorna ferruginea</i>	LC	App-II		Ann-I	A.4	Y	
14	<i>Mareca strepera</i>	LC	App-III		Ann-II-A	A.4	Y	App-II
15	<i>Anas crecca</i>	LC	App-III		Ann-II-A Ann-III-B	A.5	Y	App-II
16	<i>Anas platyrhynchos</i>	LC	App-III		Ann-II-A, Ann-III-A	A.5	Y	App-II
17	<i>Anas acuta</i>	LC	App-III		Ann-II-A, Ann-III-B	A.5	Y	App-II
18	<i>Spatula querquedula</i>	LC	App-III		Ann-II-A	A.4	Y	App-II
19	<i>Spatula clypeata</i>	LC	App-III		Ann-II-A, Ann-III-B	A.4	Y	App-I
20	<i>Netta rufina</i>	LC	App-III		Ann-II-B	A.5	Y	App-II
21	<i>Milvus migrans</i>	LC	App-II		Ann-I	A.3	Y	
22	<i>Haliaeetus albicilla</i>	LC	App-II	App-I		A.1.2	Y	
23	<i>Neophron percnopterus</i>	EN	App-II		Ann-I	A.3	Y	
24	<i>Circaetus gallicus</i>	LC	App-II		Ann-I	A.4	Y	
25	<i>Circus aeruginosus</i>	LC	App-II		Ann-I	A.3	Y	
26	<i>Accipiter nisus</i>	LC	App-II		Ann-I	A.3	Y	
27	<i>Buteo buteo</i>	LC	App-II			A.3	Y	
28	<i>Buteo rufinus</i>	LC	App-II		Ann-I	A.3	Y	
29	<i>Pandion haliaetus</i>	LC	App-II		Ann-I	A.1.2	Y	
30	<i>Falco naumanni</i>	LC	App-II		Ann-I	A.2	Y	
31	<i>Falco tinnunculus</i>	LC	App-II			A.2	Y	
32	<i>Alectoris chukar</i>	LC	App-III		Ann-II-B	A.2	Y	App-II
33	<i>Rallus aquaticus</i>	LC	App-III		Ann-II-B	A.3	Y	App-I
34	<i>Gallinula chloropus</i>	LC	App-III		Ann-II-B	A.3.1	Y	App-I
35	<i>Fulica atra</i>	LC	App-III		Ann-II-A, Ann-III-B	A.5	Y	App-II
36	<i>Charadrius alexandrinus</i>	LC	App-II		Ann-I	A.4	Y	
37	<i>Vanellus vanellus</i>	NT	App-III		Ann-II-B	A.5	Y	App-I
38	<i>Calidris pugnax</i>	LC	App-III		Ann-II-B	B.4	T, K	App-I
39	<i>Gallinago gallinago</i>	LC	App-III		Ann-II-A, Ann-III-B	B.3.1	K	App-II
40	<i>Tringa totanus</i>	LC	App-III		Ann-II-B	A.4	Y	App-I
41	<i>Tringa ochropus</i>	LC	App-II			B.2	K, T	
42	<i>Actitis hypoleucos</i>	LC	App-III			A.3	G	
43	<i>Larus ridibundus</i>	LC	App-III		Ann-II-B	A.5	Y	App-I
44	<i>Larus michahellis</i>	LC	App-III			A.4	Y	App-I
45	<i>Sterna hirundo</i>	LC	App-II		Ann-I	A.3	Y	

No.	Scientific Name	IUCN	BERN	CITES	EU Birds Directive	Turkish Red List	Status (*)	CHC 2020-2021
46	<i>Sterna albifrons</i>	LC	App-II		Ann-I	A.3.1	G	
47	<i>Chlidonias hybridus</i>	LC	App-II		Ann-I	A.4	Y	
48	<i>Chlidonias niger</i>	LC	App-II		Ann-I	A.3	Y	
49	<i>Chlidonias leucopterus</i>	LC	App-II			A.4	Y	
50	<i>Columba livia</i>	LC	App-III		Ann-II-A	A.5	Y	App-II
51	<i>Streptopelia decaocto</i>	LC	App-III		Ann-II-B	A.5	Y	App-I
52	<i>Streptopelia turtur</i>	VU	App-III		Ann-II-B	A.3.1	G	App-II
53	<i>Cuculus canorus</i>	LC	App-III			A.2	G	
54	<i>Athene noctua</i>	LC	App-II			A.2	Y	
55	<i>Asio otus</i>	LC	App-II			A.2	Y	
56	<i>Apus apus</i>	LC	App-III			A.3.1	G	
57	<i>Alcedo atthis</i>	LC	App-II		Ann-I	A.2	Y	
58	<i>Merops apiaster</i>	LC	App-II			A.3.1	G	
59	<i>Upupa epops</i>	LC	App-II			A.2	G	
60	<i>Dendrocopos major</i>	LC	App-II		Ann-I	A.3	Y	
61	<i>Dendrocopos syriacus</i>	LC	App-II		Ann-I	A.2	Y	
62	<i>Galerida cristata</i>	LC	App-III			A.3	Y	App-I
63	<i>Lullula arborea</i>	LC	App-III		Ann-I	A.3	Y	App-I
64	<i>Hirundo rupestris</i>	LC	App-II			A.5	G	
65	<i>Hirundo rustica</i>	LC	App-II			A.5	G	
66	<i>Delichon urbicum</i>	LC	App-II			A.3	G	
67	<i>Anthus campestris</i>	LC	App-II		Ann-I	A.2	G	
68	<i>Anthus pratensis</i>	NT	App-II			A.3	G	
69	<i>Motacilla flava</i>	LC	App-II			A.3.1	G	
70	<i>Motacilla alba</i>	LC	App-II			A.3.1	Y	
71	<i>Troglodytes troglodytes</i>	LC	App-II		Ann-I	A.1.2	Y	
72	<i>Erithacus rubecula</i>	LC	App-II			A.3	Y	
73	<i>Luscinia megarhynchos</i>	LC	App-II			A.2	G	
74	<i>Phoenicurus ochruros</i>	LC	App-II			A.2	R	
75	<i>Phoenicurus phoenicurus</i>	LC	App-II			A.3	Y	
76	<i>Saxicola torquata</i>	LC	App-II			A.3	Y	
77	<i>Oenanthe isabellina</i>	LC	App-II			A.3	Y	App-I
78	<i>Oenanthe oenanthe</i>	LC	App-II			A.3	G	App-I
79	<i>Turdus merula</i>	LC	App-III		Ann-II-B	A.3	Y	App-II
80	<i>Turdus pilaris</i>	LC	App-III		Ann-II-B	B.2	K	App-I
81	<i>Turdus philomelos</i>	LC	App-III		Ann-II-B	A.2	Y	App-II
82	<i>Turdus iliacus</i>	NT	App-III		Ann-II-B	B.2	K	App-I
83	<i>Turdus viscivorus</i>	LC	App-III		Ann-II-B	A.2	Y	App-I
84	<i>Cettia cetti</i>	LC	App-III			A.2	Y	
85	<i>Acrocephalus scirpaceus</i>	LC	App-III			A.2	G	
86	<i>Acrocephalus arundinaceus</i>	LC	App-III			A.3	G	
87	<i>Hippolais olivetorum</i>	LC	App-III		Ann-I	A.2	G	
88	<i>Sylvia conspicillata</i>	LC	App-II			A.2	R	
89	<i>Sylvia melanocephala</i>	LC	App-II			A.3	Y	
90	<i>Sylvia rueppelli</i>	LC	App-II		Ann-I	A.2	G	
91	<i>Sylvia atricapilla</i>	LC	App-II			A.2	G	
92	<i>Phylloscopus collybita</i>	LC	App-II			A.3.1	Y	
93	<i>Regulus regulus</i>	LC	App-II			A.1.2	Y	
94	<i>Regulus ignicapillus</i>	LC	App-II			A.2	Y	
95	<i>Muscicapa striata</i>	LC	App-II			A.3	G	
96	<i>Aegithalos caudatus</i>	LC	App-III			A.2	Y	App-I
97	<i>Parus ater</i>	LC	App-II		Ann-I	A.3	Y	
98	<i>Parus caeruleus</i>	LC	App-II			A.2	Y	

No.	Scientific Name	IUCN	BERN	CITES	EU Birds Directive	Turkish Red List	Status (*)	CHC 2020-2021
99	<i>Parus major</i>	LC	App-II			A.3.1	Y	
100	<i>Sitta neumayer</i>	LC	App-II			A.2	Y	
101	<i>Certhia familiaris</i>	LC	App-II			A.1.2	Y	
102	<i>Certhia brachydactyla</i>	LC	App-II		Ann-I	A.1.2	Y	
103	<i>Oriolus oriolus</i>	LC	App-II			A.2	G	
104	<i>Lanius collurio</i>	LC	App-II			A.2	G	App-I
105	<i>Lanius senator</i>	LC	App-II			A.2	Y	
106	<i>Garrulus glandarius</i>	LC	-			A.3.1	Y	App-II
107	<i>Pica pica</i>	LC	-			A.5	Y	App-II
108	<i>Corvus monedula</i>	LC	-			A.5	Y	App-II
109	<i>Corvus frugilegus</i>	LC	-			A.5	Y	App-II
110	<i>Corvus cornix</i>	LC	-			A.5	Y	App-II
111	<i>Corvus corax</i>	LC	App-III			A.5	Y	App-I
112	<i>Sturnus vulgaris</i>	LC	-			A.5	Y	App-I
113	<i>Passer domesticus</i>	LC	-			A.5	Y	App-II
114	<i>Passer montanus</i>	LC	App-III			A.3	Y	App-I
115	<i>Petronia petronia</i>	LC	App-II			A.3	Y	
116	<i>Fringilla coelebs</i>	LC	App-III			A.4	Y	App-I
117	<i>Serinus serinus</i>	LC	App-II			A.3	Y	
118	<i>Carduelis chloris</i>	LC	App-II			A.3	Y	
119	<i>Carduelis carduelis</i>	LC	App-II			A.3.1	Y	
120	<i>Carduelis cannabina</i>	LC	App-II			A.3	Y	
121	<i>Emberiza cirrus</i>	LC	App-II			A.2	Y	
122	<i>Emberiza cia</i>	LC	App-II			A.2	Y	
123	<i>Emberiza hortulana</i>	LC	App-III			A.3	G	App-I
124	<i>Emberiza schoeniclus</i>	LC	App-II			A.3	Y	
125	<i>Emberiza melanocephala</i>	LC	App-II			A.4	G	
126	<i>Miliaria calandra</i>	LC	App-III			A.4	Y	App-I

(*) **K:** Wintering bird species, wintering regularly

G: Migrating bird species, migrating regularly and seasonally between breeding and wintering areas

Y: Resident and breeding bird species, breeds regularly

T: Migrating bird species, migrating as transit and they can be observed in a short time at the migration seasons

V: Vagrant, observed as accidentally or randomly

Turkish Red List of Bird Species (Kızıroğlu, İ., 2009. The Pocket Book for Birds of Türkiye)

A.1.2. (CR) Critically endangered and breeding species in Turkey

A.2. (EN) Endangered and breeding species in Turkey

A.3. (VU) Vulnerable and breeding species in Turkey

A.3.1. (D) Declining, vulnerable and breeding species in Turkey

A.4. (NT) Near threatened. Breeding species do not face to risk now but are likely to qualify for threatened category

A.5. (LC) Least Concern, Breeding species that are widespread in Turkey

B.2. (EN) Endangered and non-breeding species in Turkey

B.4. (NT) Near threatened, non-breeding species do not face to risk now but are likely to qualify for threatened category

Table 10-25. Avifauna Species Presumed to be Present at the Project Area (Survey Point #1 to Survey Point #24)

No.	Species	Survey Point No. and Station No.																							
		1 R1 2-3 km	2 Q1 3 km	3 F1 6-7 km	4 R2 13-14 km	5 R3 32-33 km	6 Q2 13 km	7 Q3 32 km	8 F2 41-42 km	9 R4 51-52 km	10 F3 51-52 km	11 R5 58-59 km	12 F4 65-66 km	13 R6 75-76 km	14 F5 88-89 km	15 R7 98-99 km	16 Q4 98 km	17 Q5 97 km	18 Q6 105 km	19 Q7 115 km	20 F6 115-116 km	21 R8 122-123 km	22 R9 127-128 km	23 F7 128-129 km	24 R10 131-132 km
1	<i>Tachybaptus ruficollis</i>									2	L-H														
2	<i>Podiceps cristatus</i>									L-H	L-H														
3	<i>Phalacrocorax carbo</i>									5	2														
4	<i>Botaurus stellaris</i>									L-H	L-H														
5	<i>Ixobrychus minutus</i>									L-H	L-H														
6	<i>Ardeola ralloides</i>									L-H	L-H														
7	<i>Egretta garzetta</i>									L-H	L-H														
8	<i>Ardea alba</i>									L-H	L-H														
9	<i>Ardea cinerea</i>			L-H			L-H		L-H	L-H	L-H		L-H			L-H	L-H	L-H						L-H	
10	<i>Ardea purpurea</i>									L-H	L-H														
11	<i>Ciconia ciconia</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H			L-H			L-H	
12	<i>Anser anser</i>									L-H	L-H														
13	<i>Tadorna ferruginea</i>			L-H					L-H	75	3		L-H												
14	<i>Mareca strepera</i>									L-H	L-H														
15	<i>Anas crecca</i>									50	L-H														
16	<i>Anas platyrhynchos</i>									45	2														
17	<i>Anas acuta</i>									L-H	L-H														
18	<i>Spatula querquedula</i>									L-H	L-H														
19	<i>Spatula clypeata</i>									L-H	L-H														
20	<i>Netta rufina</i>									12	5														
21	<i>Milvus migrans</i>									L-H	L-H														
22	<i>Haliaeetus albicilla</i>									L-H	L-H														
23	<i>Neophron percnopterus</i>					L-H		L-H		L-H	L-H														
24	<i>Circus gallicus</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H			L-H	L-H		L-H
25	<i>Circus aeruginosus</i>								L-H	1	1														
26	<i>Accipiter nisus</i>	1		1	L-H	L-H		L-H	1	L-H	L-H	L-H	1	L-H	1					L-H	L-H			L-H	
27	<i>Buteo buteo</i>	1	L-H	1	1	1	1	2	1	3	4	1	1	1	1	1	1	1	1	1	1	L-H	L-H	L-H	
28	<i>Buteo rufinus</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	2	1	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H	L-H
29	<i>Pandion haliaetus</i>									L-H	L-H														
30	<i>Falco naumanni</i>					L-H		L-H		L-H	L-H														
31	<i>Falco tinnunculus</i>	1	L-H	1	1	L-H		L-H	1	1	1	L-H	1	L-H	L-H				L-H	L-H	L-H	L-H	L-H	L-H	L-H
32	<i>Alectoris chukar</i>	L-H	L-H	L-H	L-H		L-H		L-H			L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H	
33	<i>Rallus aquaticus</i>									L-H	L-H														
34	<i>Gallinula chloropus</i>			L-H			L-H		L-H	17	3		L-H		L-H	L-H	L-H	L-H			L-H			L-H	
35	<i>Fulica atra</i>									>250	5														
36	<i>Charadrius alexandrinus</i>									L-H	L-H														
37	<i>Vanellus vanellus</i>									L-H	L-H														
38	<i>Calidris pugnax</i>									L-H	L-H														
39	<i>Gallinago gallinago</i>									L-H	L-H														
40	<i>Tringa totanus</i>									L-H	L-H														
41	<i>Tringa ochropus</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H							
42	<i>Actitis hypoleucos</i>			L-H					L-H	L-H	L-H		L-H		L-H						L-H			L-H	
43	<i>Larus ridibundus</i>									L-H	L-H														
44	<i>Larus michahellis</i>									L-H	L-H														
45	<i>Sterna hirundo</i>									L-H	L-H														
46	<i>Sterna albifrons</i>									L-H	L-H														
47	<i>Chlidonias hybridus</i>									L-H	L-H														
48	<i>Chlidonias niger</i>									L-H	L-H														
49	<i>Chlidonias leucopterus</i>									L-H	L-H														
50	<i>Columba livia</i>	2		L-H	6		L-H		L-H	12	9	5	L-H	1	L-H	L-H	L-H	L-H	6	L-H	L-H	6	L-H	L-H	2
51	<i>Streptopelia decaocto</i>	1		L-H	2		L-H		L-H	8	1	2	L-H	L-H	L-H	L-H	L-H	L-H	7	L-H	L-H		L-H	L-H	
52	<i>Streptopelia turtur</i>									L-H	L-H							L-H				L-H	L-H		L-H
53	<i>Cuculus canorus</i>									L-H	L-H							L-H				L-H	L-H		L-H
54	<i>Athene noctua</i>									L-H	L-H							L-H				L-H	L-H		
55	<i>Asio otus</i>									L-H	L-H							L-H				L-H	L-H		
56	<i>Apus apus</i>									L-H	L-H							L-H				L-H	L-H		
57	<i>Alcedo atthis</i>									1	1														
58	<i>Merops apiaster</i>	L-H		L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H			L-H	
59	<i>Upupa epops</i>									L-H	L-H								L-H			L-H	L-H		
60	<i>Dendrocopos major</i>																		L-H			L-H	L-H		

No.	Species	Survey Point No. and Station No.																							
		1 R1 2-3 km	2 Q1 3 km	3 F1 6-7 km	4 R2 13-14 km	5 R3 32-33 km	6 Q2 13 km	7 Q3 32 km	8 F2 41-42 km	9 R4 51-52 km	10 F3 51-52 km	11 R5 58-59 km	12 F4 65-66 km	13 R6 75-76 km	14 F5 88-89 km	15 R7 98-99 km	16 Q4 98 km	17 Q5 97 km	18 Q6 105 km	19 Q7 115 km	20 F6 115-116 km	21 R8 122-123 km	22 R9 127-128 km	23 F7 128-129 km	24 R10 131-132 km
61	<i>Dendrocopos syriacus</i>									L-H	L-H								L-H			L-H	L-H		
62	<i>Galerida cristata</i>	2	L-H	1	2		1		1	L-H	L-H	2	1	2	1	L-H			L-H	L-H		L-H	L-H	L-H	L-H
63	<i>Lullula arborea</i>	L-H	L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H
64	<i>Hirundo rupestris</i>	L-H	L-H	L-H	L-H		L-H		L-H			L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H			L-H	
65	<i>Hirundo rustica</i>	L-H		L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	L-H
66	<i>Delichon urbicum</i>	L-H			L-H					L-H	L-H	L-H		L-H											
67	<i>Anthus campestris</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	L-H
68	<i>Anthus pratensis</i>	L-H	L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H			L-H	
69	<i>Motacilla flava</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H			L-H			L-H	
70	<i>Motacilla alba</i>	L-H		L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	
71	<i>Troglodytes troglodytes</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H			L-H			L-H	
72	<i>Erithacus rubecula</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	5		L-H	1	2	L-H	1
73	<i>Luscinia megarhynchos</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H			L-H			L-H	
74	<i>Phoenicurus ochruros</i>	L-H		L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H	L-H	L-H	L-H	
75	<i>Phoenicurus phoenicurus</i>	L-H		L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	
76	<i>Saxicola torquata</i>	L-H	L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H			L-H	
77	<i>Oenanthe isabellina</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H			L-H	
78	<i>Oenanthe oenanthe</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H			L-H	
79	<i>Turdus merula</i>									L-H	L-H								6			3	1		
80	<i>Turdus pilaris</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H	
81	<i>Turdus philomelos</i>																		L-H						
82	<i>Turdus iliacus</i>																		L-H						
83	<i>Turdus viscivorus</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H	
84	<i>Cettia cetti</i>									L-H	L-H														
85	<i>Acrocephalus scirpaceus</i>									L-H															
86	<i>Acrocephalus arundinaceus</i>																								
87	<i>Hippolais olivetorum</i>																								
88	<i>Sylvia conspicillata</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	
89	<i>Sylvia melanocephala</i>			L-H			L-H		L-H				L-H		L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	
90	<i>Sylvia rueppelli</i>																		L-H			L-H	L-H	L-H	
91	<i>Sylvia atricapilla</i>									L-H	L-H								L-H			L-H	L-H		
92	<i>Phylloscopus collybita</i>	L-H		L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	
93	<i>Regulus regulus</i>																		L-H			L-H	L-H		
94	<i>Regulus ignicapillus</i>																		L-H			L-H	L-H		
95	<i>Muscicapa striata</i>									L-H	L-H								L-H			L-H	L-H		L-H
96	<i>Aegithalos caudatus</i>									L-H	L-H								L-H			L-H	L-H		
97	<i>Parus ater</i>																		L-H			L-H	L-H		L-H
98	<i>Parus caeruleus</i>									L-H	L-H								L-H			L-H	L-H		L-H
99	<i>Parus major</i>			L-H			L-H		L-H				L-H		L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	L-H
100	<i>Sitta neumayer</i>		L-H			L-H		L-H																	
101	<i>Certhia familiaris</i>			L-H			L-H		L-H				L-H		L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	
102	<i>Certhia brachydactyla</i>			L-H			L-H		L-H				L-H		L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	
103	<i>Oriolus oriolus</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	
104	<i>Lanius collurio</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	L-H
105	<i>Lanius senator</i>																								
106	<i>Garrulus glandarius</i>			L-H			L-H		L-H	1	L-H		L-H		L-H	L-H	L-H	L-H	3		L-H	2	1	1	1
107	<i>Pica pica</i>	3	1	1	4	2	1	2	1	20	12	2	1	2	1	2	L-H	2	6	L-H	L-H			L-H	
108	<i>Corvus monedula</i>	L-H		L-H	L-H	7	L-H		L-H	10	5	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H			L-H	
109	<i>Corvus frugilegus</i>	L-H		L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H			L-H	
110	<i>Corvus cornix</i>	L-H		L-H	L-H	1	L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	9	L-H	L-H			L-H	
111	<i>Corvus corax</i>	L-H		L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H
112	<i>Sturnus vulgaris</i>	25	5	11	25	13	11	8	11	>1000	>1000	30	11	50	11	3	5	8	32	10	11			15	
113	<i>Passer domesticus</i>	3		2	1		2		2	15	21	3	2	5	2	4	7	5	2	L-H	8	L-H	L-H	4	L-H
114	<i>Passer montanus</i>	L-H		L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H			L-H	L-H
115	<i>Petronia petronia</i>	L-H			L-H	L-H						L-H		L-H								L-H	L-H	L-H	L-H
116	<i>Fringilla coelebs</i>	2		1	4		1		1	12	7	2	1	1	1	L-H	L-H	L-H	15		1	2	3	1	2
117	<i>Serinus serinus</i>									L-H	L-H														
118	<i>Carduelis chloris</i>																		L-H			L-H	L-H		L-H
119	<i>Carduelis carduelis</i>	11	L-H	3	22	18	13	9	2	20	50	12	2	3	2	20	10	5	22	14	12			9	
120	<i>Carduelis cannabina</i>	4	L-H	2	12	7	8	5	1	15	30	10	1	L-H	1	L-H	L-H	L-H	L-H	5	10			5	

No.	Species	Survey Point No. and Station No.																							
		1 R1 2-3 km	2 Q1 3 km	3 F1 6-7 km	4 R2 13-14 km	5 R3 32-33 km	6 Q2 13 km	7 Q3 32 km	8 F2 41-42 km	9 R4 51-52 km	10 F3 51-52 km	11 R5 58-59 km	12 F4 65-66 km	13 R6 75-76 km	14 F5 88-89 km	15 R7 98-99 km	16 Q4 98 km	17 Q5 97 km	18 Q6 105 km	19 Q7 115 km	20 F6 115-116 km	21 R8 122-123 km	22 R9 127-128 km	23 F7 128-129 km	24 R10 131-132 km
121	<i>Emberiza cirlus</i>			L-H			L-H		L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H		L-H	L-H		L-H	L-H
122	<i>Emberiza cia</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H			L-H	
123	<i>Emberiza hortulana</i>	L-H	L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H			L-H			L-H	
124	<i>Emberiza schoeniclus</i>									L-H	L-H														
125	<i>Emberiza melanocephala</i>	L-H	L-H	L-H	L-H		L-H		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H			L-H	
126	<i>Miliaria calandra</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H			L-H	

L-H: Literature-habitat preference

Table 10-26. Avifauna Species Presumed to be Present at the Project Area (Survey Point #25 to Survey Point #44)

No.	Species	Survey Point No. and Station No.																			
		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
		F8	R11	F9	Q8	R12	R13	F10	R14	Q9	F11	R15	Q10	F12	F13	R16	R17	F14	Q11	R18	F15
		135-136 km	139-142 km	141-142 km	143 km	143-144 km	154-155 km	169-170 km	176-177 km	187 km	178-179 km	196-197 km	208 km	198-199 km	213-214 km	214-215 km	232-233 km	233-234 km	237 km	271-272 km	271-272 km
1	<i>Tachybaptus ruficollis</i>		7	L-H								L-H						4			
2	<i>Podiceps cristatus</i>		L-H	L-H								L-H									
3	<i>Phalacrocorax carbo</i>		L-H	L-H								L-H									
4	<i>Botaurus stellaris</i>		L-H	L-H																	
5	<i>Ixobrychus minutus</i>		L-H	L-H																	
6	<i>Ardeola ralloides</i>		L-H	L-H								L-H									
7	<i>Egretta garzetta</i>		L-H	L-H								L-H									
8	<i>Ardea alba</i>		L-H	L-H								L-H									
9	<i>Ardea cinerea</i>		3	1				L-H				3									
10	<i>Ardea purpurea</i>		L-H	L-H																	
11	<i>Ciconia ciconia</i>	L-H	L-H	L-H				L-H			L-H	L-H		L-H	L-H					L-H	L-H
12	<i>Anser anser</i>		L-H	L-H								L-H									
13	<i>Tadorna ferruginea</i>		2	2								15									
14	<i>Mareca strepera</i>																				
15	<i>Anas crecca</i>		2	L-H								30									
16	<i>Anas platyrhynchos</i>		L-H	L-H								25									
17	<i>Anas acuta</i>																				
18	<i>Spatula querquedula</i>																				
19	<i>Spatula clypeata</i>																				
20	<i>Netta rufina</i>																				
21	<i>Milvus migrans</i>																				
22	<i>Haliaeetus albicilla</i>																				
23	<i>Neophron percnopterus</i>																				
24	<i>Circaetus gallicus</i>		L-H	L-H		L-H	L-H	L-H	L-H		L-H	L-H		L-H	L-H	L-H				L-H	L-H
25	<i>Circus aeruginosus</i>		L-H	L-H								L-H									
26	<i>Accipiter nisus</i>	L-H			L-H	L-H	L-H	L-H	L-H	1	L-H		L-H	L-H	L-H	L-H				L-H	L-H
27	<i>Buteo buteo</i>	1	2	1	1	1	1	1	L-H	1	1	4	L-H	L-H	1	L-H	L-H	L-H		L-H	1
28	<i>Buteo rufinus</i>	L-H	L-H	L-H	L-H	L-H	2	1	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H				1	L-H
29	<i>Pandion haliaetus</i>																				
30	<i>Falco naumanni</i>		L-H	L-H								L-H									
31	<i>Falco tinnunculus</i>	L-H			L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H
32	<i>Alectoris chukar</i>																L-H	L-H			
33	<i>Rallus aquaticus</i>		L-H	L-H								L-H									
34	<i>Gallinula chloropus</i>	L-H	L-H	L-H				L-H			L-H	L-H		L-H	L-H					L-H	L-H
35	<i>Fulica atra</i>		L-H	L-H								L-H									
36	<i>Charadrius alexandrinus</i>		L-H	L-H								L-H									
37	<i>Vanellus vanellus</i>		L-H	L-H								L-H									
38	<i>Calidris pugnax</i>		L-H	L-H								L-H									
39	<i>Gallinago gallinago</i>		L-H	L-H								L-H									
40	<i>Tringa totanus</i>		L-H	L-H								L-H									
41	<i>Tringa ochropus</i>		L-H	L-H								L-H									
42	<i>Actitis hypoleucos</i>	L-H	L-H	1				L-H			L-H	L-H		L-H	L-H			L-H		L-H	L-H
43	<i>Larus ridibundus</i>		L-H	L-H								L-H									
44	<i>Larus michahellis</i>																				
45	<i>Sterna hirundo</i>																				
46	<i>Sterna albifrons</i>																				
47	<i>Chlidonias hybridus</i>																				
48	<i>Chlidonias niger</i>																				

No.	Species	Survey Point No. and Station No.																			
		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
		F8	R11	F9	Q8	R12	R13	F10	R14	Q9	F11	R15	Q10	F12	F13	R16	R17	F14	Q11	R18	F15
		135-136 km	139-142 km	141-142 km	143 km	143-144 km	154-155 km	169-170 km	176-177 km	187 km	178-179 km	196-197 km	208 km	198-199 km	213-214 km	214-215 km	232-233 km	233-234 km	237 km	271-272 km	271-272 km
49	<i>Chlidonias leucopterus</i>																				
50	<i>Columba livia</i>	L-H	L-H	L-H	L-H	L-H	12	3	5	L-H	2	L-H	L-H	L-H	2	5	L-H	11		3	2
51	<i>Streptopelia decaocto</i>	L-H	L-H	L-H	L-H	L-H	3	2	L-H	L-H	4	L-H	L-H	4	L-H	L-H	L-H	5		L-H	L-H
52	<i>Streptopelia turtur</i>																				
53	<i>Cuculus canorus</i>																				
54	<i>Athene noctua</i>																				
55	<i>Asio otus</i>																				
56	<i>Apus apus</i>																				
57	<i>Alcedo atthis</i>		L-H	L-H								L-H									
58	<i>Merops apiaster</i>				L-H	L-H	L-H	L-H			L-H			L-H	L-H					L-H	L-H
59	<i>Upupa epops</i>																				
60	<i>Dendrocopos major</i>																L-H	L-H			
61	<i>Dendrocopos syriacus</i>																L-H	L-H			
62	<i>Galerida cristata</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H
63	<i>Lullula arborea</i>	L-H			L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H
64	<i>Hirundo rupestris</i>																L-H	L-H			
65	<i>Hirundo rustica</i>	L-H	L-H	L-H			L-H	L-H			L-H	L-H		L-H	L-H		L-H	L-H		L-H	L-H
66	<i>Delichon urbicum</i>		L-H	L-H			L-H					L-H									
67	<i>Anthus campestris</i>	L-H	L-H	L-H			L-H	L-H			L-H	L-H					L-H	L-H			
68	<i>Anthus pratensis</i>	L-H	L-H	L-H				L-H			L-H	L-H					L-H	L-H			
69	<i>Motacilla flava</i>	L-H	L-H	L-H				L-H			L-H	L-H		L-H	L-H		L-H	L-H		L-H	L-H
70	<i>Motacilla alba</i>	L-H	L-H	L-H				L-H			L-H	L-H		L-H	L-H		L-H	L-H		L-H	L-H
71	<i>Troglodytes troglodytes</i>	L-H						L-H			L-H						L-H	L-H			
72	<i>Erithacus rubecula</i>	L-H	L-H	L-H			L-H	L-H			L-H	L-H		L-H	L-H		L-H	L-H		L-H	L-H
73	<i>Luscinia megarhynchos</i>	L-H	L-H	L-H				L-H			L-H	L-H		L-H	L-H		L-H	L-H		L-H	L-H
74	<i>Phoenicurus ochruros</i>						L-H	L-H			L-H			L-H	L-H		L-H	L-H		L-H	L-H
75	<i>Phoenicurus phoenicurus</i>							L-H			L-H			L-H	L-H		L-H	L-H		L-H	L-H
76	<i>Saxicola torquata</i>							L-H			L-H			L-H	L-H		L-H	L-H		L-H	L-H
77	<i>Oenanthe isabellina</i>		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H				L-H	L-H
78	<i>Oenanthe oenanthe</i>				L-H	L-H	L-H		L-H	L-H			L-H			L-H					
79	<i>Turdus merula</i>							L-H			L-H			L-H	L-H		1	2		L-H	L-H
80	<i>Turdus pilaris</i>	L-H			L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H
81	<i>Turdus philomelos</i>																				
82	<i>Turdus iliacus</i>																				
83	<i>Turdus viscivorus</i>	L-H			L-H	L-H	L-H	L-H			L-H			L-H	L-H		L-H	L-H		L-H	L-H
84	<i>Cettia cetti</i>																				
85	<i>Acrocephalus scirpaceus</i>																				
86	<i>Acrocephalus arundinaceus</i>		L-H	L-H								L-H									
87	<i>Hippolais olivetorum</i>																				
88	<i>Sylvia conspicillata</i>	L-H															L-H	L-H			
89	<i>Sylvia melanocephala</i>	L-H															L-H	L-H			
90	<i>Sylvia rueppelli</i>																L-H	L-H			
91	<i>Sylvia atricapilla</i>																L-H	L-H			
92	<i>Phylloscopus collybita</i>	L-H	L-H	L-H				L-H			L-H	L-H		L-H	L-H		L-H	L-H		L-H	L-H
93	<i>Regulus regulus</i>																L-H	L-H			
94	<i>Regulus ignicapillus</i>																L-H	L-H			
95	<i>Muscicapa striata</i>																L-H	L-H			
96	<i>Aegithalos caudatus</i>		L-H	L-H								L-H					L-H	L-H			
97	<i>Parus ater</i>																L-H	L-H			
98	<i>Parus caeruleus</i>																L-H	L-H			

No.	Species	Survey Point No. and Station No.																			
		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
		F8	R11	F9	Q8	R12	R13	F10	R14	Q9	F11	R15	Q10	F12	F13	R16	R17	F14	Q11	R18	F15
		135-136 km	139-142 km	141-142 km	143 km	143-144 km	154-155 km	169-170 km	176-177 km	187 km	178-179 km	196-197 km	208 km	198-199 km	213-214 km	214-215 km	232-233 km	233-234 km	237 km	271-272 km	271-272 km
99	<i>Parus major</i>	L-H					L-H	L-H			L-H			L-H	L-H		L-H	L-H		L-H	L-H
100	<i>Sitta neumayer</i>																L-H	L-H			
101	<i>Certhia familiaris</i>																L-H	L-H			
102	<i>Certhia brachydactyla</i>							L-H			L-H			L-H	L-H		L-H	L-H		L-H	L-H
103	<i>Oriolus oriolus</i>	L-H	L-H	L-H				L-H			L-H	L-H		L-H	L-H		L-H	L-H		L-H	L-H
104	<i>Lanius collurio</i>	L-H					L-H	L-H	L-H		L-H			L-H	L-H	L-H	L-H	L-H		L-H	L-H
105	<i>Lanius senator</i>																				
106	<i>Garrulus glandarius</i>	L-H						L-H			L-H			L-H	L-H		3	3		L-H	L-H
107	<i>Pica pica</i>	L-H	2	6	L-H	L-H	L-H	2	3	2	3	4	1	4	1	2	2	4		L-H	1
108	<i>Corvus monedula</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H
109	<i>Corvus frugilegus</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H
110	<i>Corvus cornix</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H
111	<i>Corvus corax</i>	L-H			L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H
112	<i>Sturnus vulgaris</i>	11	32	40	20	12	3	17	3	30	2	40	L-H	13	25	3	6	6		12	25
113	<i>Passer domesticus</i>	8	1	5	L-H	L-H	L-H	6	L-H	L-H	2	8	L-H	6	2	L-H	5	5		5	2
114	<i>Passer montanus</i>	L-H			L-H	L-H	L-H	L-H	L-H		L-H			L-H	L-H	L-H	L-H	L-H		L-H	L-H
115	<i>Petronia petronia</i>																				
116	<i>Fringilla coelebs</i>	1					1		1		L-H	1		L-H	L-H	1	2	14		L-H	L-H
117	<i>Serinus serinus</i>																				
118	<i>Carduelis chloris</i>																				
119	<i>Carduelis carduelis</i>	12	L-H	L-H	8	2	4	20	4	L-H	6	12	L-H	16	22	15	1	4		3	22
120	<i>Carduelis cannabina</i>	10			2	3	7	L-H	7	L-H	8	4	L-H	10	5	10	1	2		L-H	5
121	<i>Emberiza cirrus</i>	L-H						L-H			L-H			L-H	L-H		L-H	L-H		L-H	L-H
122	<i>Emberiza cia</i>									L-H			L-H				L-H	L-H			
123	<i>Emberiza hortulana</i>							L-H			L-H						L-H	L-H			
124	<i>Emberiza schoeniclus</i>		L-H	L-H								L-H									
125	<i>Emberiza melanocephala</i>	L-H	L-H	L-H			L-H	L-H	L-H		L-H	L-H				L-H	L-H	L-H		L-H	L-H
126	<i>Miliaria calandra</i>	L-H	L-H	L-H	L-H	L-H		L-H			L-H	L-H		L-H	L-H		L-H	L-H		L-H	L-H

L-H: Literature-habitat preference

Table 10-27. Avifauna Species Presumed to be Present at the Project Area (Survey Point #45 to Survey Point #58)

No.	Species	Survey Point No. and Station No.													
		45	46	47	48	49	50	51	52	53	54	55	56	57	58
		R19 273-275 km	F16 432-433 km	F17 439-440 km	F18 459-460 km	F19 469-470 km	F20 448-449 km	R20 448-449 km	R21 472-473 km	F21 472-473 km	F22 484-485 km	R22 500-501 km	F23 531-532 km	F24 539-540 km	Q12 539 km
1	<i>Tachybaptus ruficollis</i>														
2	<i>Podiceps cristatus</i>														
3	<i>Phalacrocorax carbo</i>		2	L-H							2			L-H	
4	<i>Botaurus stellaris</i>														
5	<i>Ixobrychus minutus</i>		L-H								L-H				
6	<i>Ardeola ralloides</i>														
7	<i>Egretta garzetta</i>														
8	<i>Ardea alba</i>														
9	<i>Ardea cinerea</i>		L-H	L-H			L-H				2			L-H	
10	<i>Ardea purpurea</i>														
11	<i>Ciconia ciconia</i>										L-H				
12	<i>Anser anser</i>														
13	<i>Tadorna ferruginea</i>														
14	<i>Mareca strepera</i>														
15	<i>Anas crecca</i>										L-H				
16	<i>Anas platyrhynchos</i>										L-H				
17	<i>Anas acuta</i>														
18	<i>Spatula querquedula</i>														
19	<i>Spatula clypeata</i>														
20	<i>Netta rufina</i>														
21	<i>Milvus migrans</i>														
22	<i>Haliaeetus albicilla</i>														
23	<i>Neophron percnopterus</i>														
24	<i>Circus gallicus</i>		L-H												L-H
25	<i>Circus aeruginosus</i>										1				
26	<i>Accipiter nisus</i>										1				
27	<i>Buteo buteo</i>	1	1	1	L-H	L-H	1	1	L-H	L-H	1	1	L-H	1	2
28	<i>Buteo rufinus</i>		1	L-H	L-H	L-H	L-H	L-H	2	L-H	L-H	L-H	L-H	L-H	
29	<i>Pandion haliaetus</i>														
30	<i>Falco naumanni</i>														
31	<i>Falco tinnunculus</i>	L-H													
32	<i>Alectoris chukar</i>														
33	<i>Rallus aquaticus</i>														
34	<i>Gallinula chloropus</i>		1	2	L-H	L-H	L-H			L-H	2		L-H	2	
35	<i>Fulica atra</i>										1				
36	<i>Charadrius alexandrinus</i>										L-H				
37	<i>Vanellus vanellus</i>										L-H				
38	<i>Calidris pugnax</i>														
39	<i>Gallinago gallinago</i>										L-H				
40	<i>Tringa totanus</i>										L-H				
41	<i>Tringa ochropus</i>										L-H				
42	<i>Actitis hypoleucos</i>		L-H	L-H	L-H	L-H	L-H			L-H	1		L-H	L-H	
43	<i>Larus ridibundus</i>		L-H								5				
44	<i>Larus michahellis</i>		L-H	L-H						L-H	11			L-H	22
45	<i>Sterna hirundo</i>														
46	<i>Sterna albifrons</i>														
47	<i>Chlidonias hybridus</i>														
48	<i>Chlidonias niger</i>														

No.	Species	Survey Point No. and Station No.													
		45	46	47	48	49	50	51	52	53	54	55	56	57	58
		R19 273-275 km	F16 432-433 km	F17 439-440 km	F18 459-460 km	F19 469-470 km	F20 448-449 km	R20 448-449 km	R21 472-473 km	F21 472-473 km	F22 484-485 km	R22 500-501 km	F23 531-532 km	F24 539-540 km	Q12 539 km
49	<i>Chlidonias leucopterus</i>														
50	<i>Columba livia</i>	3	4	2	L-H	L-H	L-H	L-H	L-H	L-H	8	7	L-H	2	20
51	<i>Streptopelia decaocto</i>	2	1	2	L-H	L-H	L-H	L-H	L-H	L-H	2	L-H	L-H	2	7
52	<i>Streptopelia turtur</i>	L-H													
53	<i>Cuculus canorus</i>	L-H													L-H
54	<i>Athene noctua</i>	L-H									L-H				
55	<i>Asio otus</i>	L-H													
56	<i>Apus apus</i>	L-H													
57	<i>Alcedo atthis</i>		1								1				
58	<i>Merops apiaster</i>										L-H				
59	<i>Upupa epops</i>	L-H													L-H
60	<i>Dendrocopos major</i>	L-H													
61	<i>Dendrocopos syriacus</i>	L-H	1								L-H				
62	<i>Galerida cristata</i>	L-H	1								L-H				L-H
63	<i>Lullula arborea</i>	L-H													L-H
64	<i>Hirundo rupestris</i>														
65	<i>Hirundo rustica</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	
66	<i>Delichon urbicum</i>		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	
67	<i>Anthus campestris</i>	L-H													L-H
68	<i>Anthus pratensis</i>		L-H								L-H				L-H
69	<i>Motacilla flava</i>		L-H								L-H				
70	<i>Motacilla alba</i>	L-H	L-H	L-H	L-H	L-H	L-H			L-H	L-H		L-H	L-H	L-H
71	<i>Troglodytes troglodytes</i>		L-H								L-H				
72	<i>Erithacus rubecula</i>	2	L-H								1				
73	<i>Luscinia megarhynchos</i>		L-H								L-H				
74	<i>Phoenicurus ochruros</i>	L-H													
75	<i>Phoenicurus phoenicurus</i>	L-H													
76	<i>Saxicola torquata</i>										L-H				
77	<i>Oenanthe isabellina</i>														L-H
78	<i>Oenanthe oenanthe</i>														
79	<i>Turdus merula</i>	1	L-H								3				L-H
80	<i>Turdus pilaris</i>														
81	<i>Turdus philomelos</i>	L-H													
82	<i>Turdus iliacus</i>	L-H													
83	<i>Turdus viscivorus</i>	L-H	L-H												
84	<i>Cettia cetti</i>										L-H				
85	<i>Acrocephalus scirpaceus</i>		L-H								1				
86	<i>Acrocephalus arundinaceus</i>		L-H								L-H				
87	<i>Hippolais olivetorum</i>		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H
88	<i>Sylvia conspicillata</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	
89	<i>Sylvia melanocephala</i>	L-H	L-H												
90	<i>Sylvia rueppelli</i>	L-H													
91	<i>Sylvia atricapilla</i>	L-H													
92	<i>Phylloscopus collybita</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	
93	<i>Regulus regulus</i>	L-H													
94	<i>Regulus ignicapillus</i>	L-H													
95	<i>Muscicapa striata</i>	L-H									L-H				
96	<i>Aegithalos caudatus</i>	L-H	L-H								L-H				
97	<i>Parus ater</i>	L-H													
98	<i>Parus caeruleus</i>	L-H	L-H												

No.	Species	Survey Point No. and Station No.													
		45	46	47	48	49	50	51	52	53	54	55	56	57	58
		R19 273-275 km	F16 432-433 km	F17 439-440 km	F18 459-460 km	F19 469-470 km	F20 448-449 km	R20 448-449 km	R21 472-473 km	F21 472-473 km	F22 484-485 km	R22 500-501 km	F23 531-532 km	F24 539-540 km	Q12 539 km
99	<i>Parus major</i>	L-H	L-H								L-H				
100	<i>Sitta neumayer</i>														
101	<i>Certhia familiaris</i>	L-H	L-H												
102	<i>Certhia brachydactyla</i>	L-H	L-H												
103	<i>Oriolus oriolus</i>	L-H	L-H								L-H				
104	<i>Lanius collurio</i>	L-H									L-H				L-H
105	<i>Lanius senator</i>										L-H				L-H
106	<i>Garrulus glandarius</i>	1	1								1				1
107	<i>Pica pica</i>	4	2	3	L-H	L-H	L-H	L-H	L-H	1	2	L-H	L-H	3	5
108	<i>Corvus monedula</i>		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	9
109	<i>Corvus frugilegus</i>		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H		L-H	L-H	L-H	
110	<i>Corvus cornix</i>	2	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	3	L-H	L-H	L-H	18
111	<i>Corvus corax</i>	L-H													
112	<i>Sturnus vulgaris</i>	11	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	2	L-H	L-H	L-H	2
113	<i>Passer domesticus</i>	5	3	2	L-H	1	4	8	L-H	4	4	L-H	1	2	6
114	<i>Passer montanus</i>		L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	2	L-H	L-H	L-H	L-H
115	<i>Petronia petronia</i>														
116	<i>Fringilla coelebs</i>	17	L-H								3				
117	<i>Serinus serinus</i>														
118	<i>Carduelis chloris</i>	L-H													
119	<i>Carduelis carduelis</i>	7	L-H	L-H	L-H	5	3	5	L-H	L-H	12	L-H	5	L-H	14
120	<i>Carduelis cannabina</i>	L-H									L-H				
121	<i>Emberiza cirrus</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	
122	<i>Emberiza cia</i>														L-H
123	<i>Emberiza hortulana</i>														L-H
124	<i>Emberiza schoeniclus</i>		L-H								L-H				
125	<i>Emberiza melanocephala</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H
126	<i>Miliaria calandra</i>	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H	L-H

L-H: Literature-habitat preference

10.2.6.4. Aquatic Biodiversity Studies

The aquatic biodiversity studies were carried out at 24 survey locations as presented in Figure 10-29. As can be seen, the railway alignment passes through four (4) river basins. The general view of the aquatic survey locations is given in Table 10-15.

Amongst the survey locations only at F14 no water flow was observed during the field study and thus no aquatic sampling was made.

As part of the aquatic biodiversity studies, algae, zooplanktons, benthic organisms, and fish species were identified at the Project Area through sampling activities at each survey location (using plankton scoop of 55 micrometer pore opening kept horizontally for 5 min along water flow direction and sampled within 250 cc plastic cup and planktons fixed to the sediments/rocks/plants have been sampled through surface removal – all further tested at the laboratory, dredging with standard bottom scoop for benthic organisms – the bottom of the survey location dredged with the scoop for 5 min and the samples were kept in 80% alcohol to be further analysed at the laboratory via binocular microscopes, electro shocker for fish species).

The summary of algae species identified and presumed to be present at the survey stations is presented in Table 10-28 as per each river basin. None of the algae species identified within each taxon are endemic or rare or require special protection measures.

Table 10-28. Algae Species Presumed to be Present at the Project Area

Taxon	Sakarya Basin	Akarçay Basin	B. Menderes Basin	Gediz Basin
Bacillariophyta	120	114	73	108
Charophyta	14	5	8	10
Chlorophyta	70	37	44	41
Cryptophyta	10	8	3	4
Cyanobacteria	35	17	14	22
Miozoa	12	6	5	4
Ochrophyta	10	5	5	9
Euglenozoa	21	10	13	10
Total	292	202	165	208

The summary of zooplanktonic species identified and presumed to be present at the survey stations is presented in Table 10-29 as per each river basin. None of the zooplanktonic species identified within each taxon are endemic or rare or require special protection measures.

Table 10-29. Zooplanktonic Organisms Presumed to be Present at the Project Area

Taxon	Sakarya Basin	Akarçay Basin	B. Menderes Basin	Gediz Basin
Rotifera	28	20	16	25
Cladocera	3	2	1	4
Copepoda	2	1	1	3
Total	33	23	18	32

The summary of benthic species identified and presumed to be present at the survey stations is presented in Table 10-30 as per each river basin. None of the benthic species identified within each taxon are endemic or rare or require special protection measures.

Table 10-30. Benthic Organisms Presumed to be Present at the Project Area

Taxon	Sakarya Basin	Akarçay Basin	B. Menderes Basin	Gediz Basin
Mollusca	30	12	6	10
Annelida	35	6	6	12
Platyhelminthes	1	1		1
Arthropoda	65	55	39	57
Total	131	74	51	80

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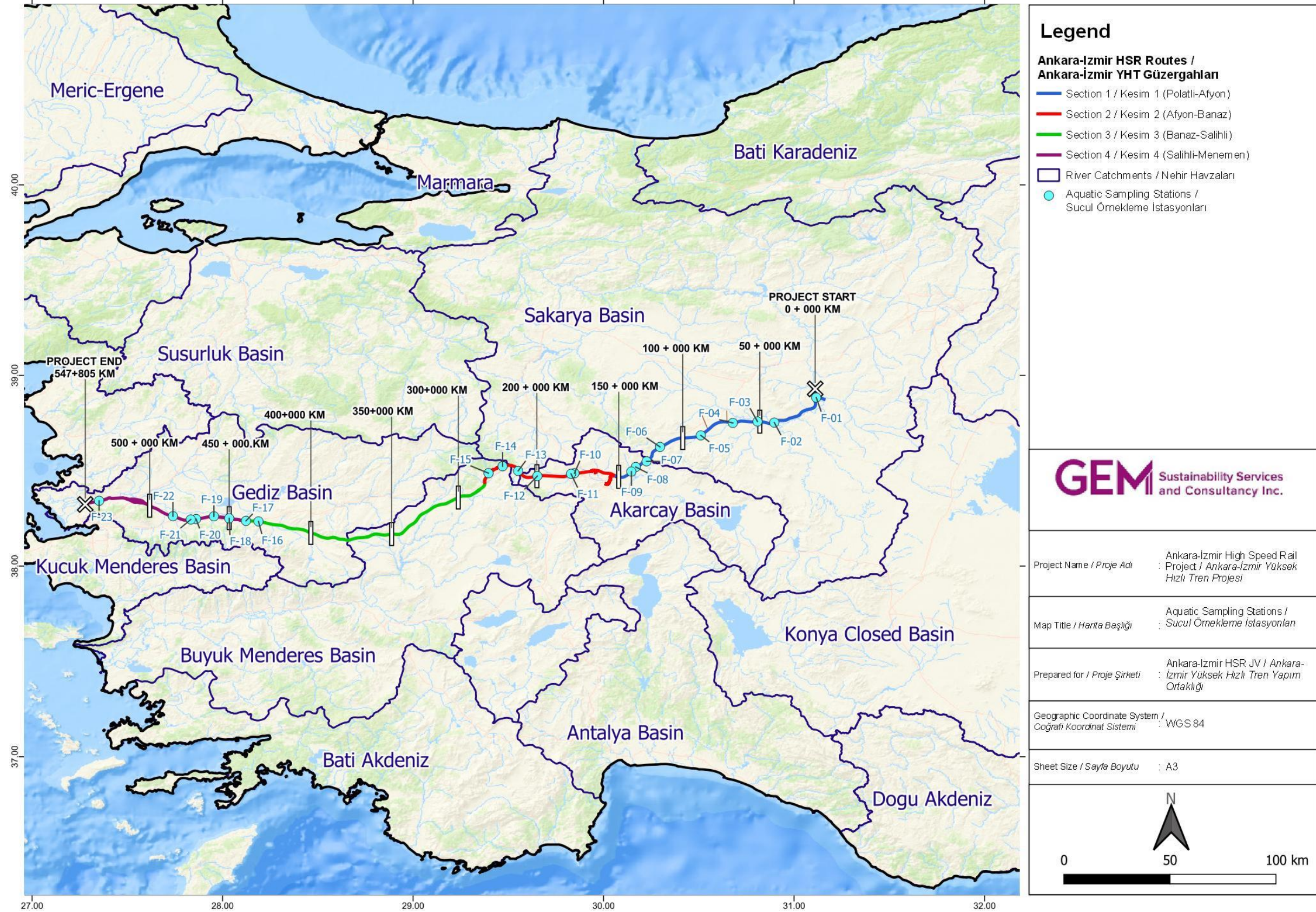


Figure 10-29. Aquatic Stations and the River Basins Along the Railway Alignment

The summary of fish species directly observed and presumed to be present at each river basin and the survey stations is presented in Table 10-31.

Table 10-31. Fish Species at each River Basin and Survey Station

River Basin	Station No.	Station Name	Number of Fish Species per Station				Number of Fish Species per River Basin
			ESIA Field Survey	Previous Field Surveys	Literature	Total Number of Fish Species	
Sakarya Basin	F1	Sakarya River	13	3	10	26	28
	F2	Sakarya River	13	3	10	26	
	F3	Goksu Stream	5	-	3	8	
	F4	Pinarbasi Stream	3	-	1	4	
	F5	Turkmenoba Stream	-	-	-	-	
	F6	Bayat Stream	-	-	-	-	
	F7	Seydiler Creek	-	-	-	-	
Akarcay Basin	F8	Seydiler Creek	-	-	-	-	8
	F9	Iscehisar Creek	1	-	1	2	
	F10	Akarcay	-	-	-	-	
	F11	Aksu Creek	2	-	5	7	
	F12	Aksu Creek	1	-	4	5	
	F13	Kokar Creek	1	-	2	3	
Buyuk Menderes Basin	F14	Dar Dere Creek	-	-	-	-	--
	F15	Yagmur Creek	-	-	-	-	
Gediz Basin	F16	Alasehir Creek	-	-	-	-	19
	F17	Salihli Creek	-	-	-	-	
	F18	Gokkoy Creek	1	-	2	3	
	F19	Ahmetli Creek	-	-	-	-	
	F20	Akcapinar Creek	-	-	-	-	
	F21	Cikrikci Creek	-	-	-	-	
	F22	Turgutlu Creek	-	-	-	-	
	F23	Gediz River	5	5	9	19	

The species-specific data at each survey station is presented in Table 10-32 including information on conservation status. The fish species directly observed at the Project Area are given in Figure 10-30.

Table 10-32. Summary of Aquatic Field Survey Results for Fish Species

Station No.			Sakarya Basin						Akarcay Basin						B. Menderes Basin		Gediz Basin								Introduced	Native	Endemic	BERN	IUCN ERL	CITES		
			F1	F2	F3	F4	F5	F6	F13	F7	F8	F9	F10	F11	F12	F14	F15	F16	F17	F18	F19	F20	F21	F22							F23	
Scientific Name	Family	Common Name																														
Anguilla anguilla	Anguillidae	European eel																														
Atherina boyeri	Atherinidae	Big-scale sand-smelt	*	*																												
Cobitis simplicispina	Cobitidae	Galatian Spined Loach	*	*	*																											
Cobitis kurui	Cobitidae	Kuru Loacah																														
Oxynoemacheilus angorae	Balitoridae	Sakarya loach	*	*	*	*																										
Oxynoemacheilus banarescui	Balitoridae	Paphlagonian Loach	*	*																												
Oxynoemacheilus simavicus	Balitoridae	Simav Loach																														
Seminemacheilus lendlii	Balitoridae	Northern Pond Loach	*	*																												
Alburnoides sp.	Cyprinidae																															
Alburnoides fasciatus	Cyprinidae	Schneider	*	*	*	*																										
Alburnus nasreddini	Cyprinidae	Central Anatolian bleak																														
Alburnus escherichii	Cyprinidae	Sakarya Bleak	*	*	*	*	*																									
Alburnus battalgilae	Cyprinidae	Gediz shemaya																														
Scardinius erythrophthalmus	Cyprinidae	Rudd	*	*																												
Ladigesocypris mermere	Cyprinidae																															
Luciobarbus lydianus	Cyprinidae	Lydian barbel																														
Barbus lacerta	Cyprinidae	Lizard barbel	*	*																												
Barbus pergamonensis	Cyprinidae																															
Barbus tauricus	Cyprinidae	Crimean barbel			*																											
Barbus escherichii	Cyprinidae	Ankara barbell	*	*	*	*																										
Rhodeus amarus	Cyprinidae	European Bitterling																														
Vimba vimba	Cyprinidae	Vimba Bream																														
Capoeta baliki	Cyprinidae	Siraz	*	*																												
Capoeta sieboldii	Cyprinidae	Nipple-lip scraper	*	*																												
Capoeta tinca	Cyprinidae	Fourbarbel Scraper	*	*																												
Capoeta bergamae	Cyprinidae	Aegean Scraper																														
Carassius gibelio	Cyprinidae	Prussian carp	*	*																												
Chondrostoma angorense	Cyprinidae	Black Sea nase	*	*																												
Chondrostoma meandrense	Cyprinidae	Isikli nase																														
Chondrostoma holmwoodii	Cyprinidae	Eastern Aegean nase																														
Cyprinus carpio	Cyprinidae	Common Carp	*	*																												
Pseudophoxinus maeandricus	Cyprinidae	Sandikli spring minnow																														
Squalius fellowesii	Cyprinidae	Aegean chub																														
Squalius pursakensis	Cyprinidae	Tatlisu kefali	*	*	*	*																										
Squalius cephalus	Cyprinidae	Chub																														
Pseudorasbora parva	Cyprinidae	Topmouth gudgeon	*	*																												
Tinca tinca	Cyprinidae	Tench		*																												
Aphanius villwocki	Cyprinodontidae	Sakarya Killifish	*	*	*																											
Esox lucius	Esocidae	Pike	*	*																												
Gambusia holbrooki	Poeciliidae	Mosquito Aquatic_	*	*																												
Silurus glanis	Siluridae	Wels	*	*																												
Clarias gariepinus	Siluridae	African Catfish	*	*																												
Proterorhinus marmoratus	Gobiidae	Tubenose Goby	*	*																												
Knipowitschia mermere	Gobiidae	Gediz dwarf goby																														
Gobio sakaryaensis	Gobiidae	Sakarya Gudgeon	*	*																												
Sander lucioperca	Percidae	Pikeperch	*	*																												

*	Fish species directly observed in this study
*	Species observed in previous studies
*	Literature information
*	No fish species observed at this station
*	No water flow observed at this station during the study



Cobitis simplicispina



Oxynoemacheilus angorae



Oxynoemacheilus banarescui



Alburnoides fasciatus



Alburnus escherichii



Barbus escherichii



Capoeta tinca



Capoeta bergamae



Carassius gibelio



Chondrostoma holmwoodii



Cyprinus carpio



Squalius pursakensis



Squalius fellowesii



Pseudorasbora parva



Esox Lucius



Gambusia holbrooki

Figure 10-30. Fish Species Directly Observed at the Project Area

10.2.6.5. Species of Conservation Importance

The “Species of Conservation Importance” have been identified through screening the conservation status of the terrestrial flora/fauna and aquatic species identified at the Project Area and its vicinity. The species falling under at least one of the below categories are considered as “Species of Conservation Importance”:

- Local and regional endemic⁴⁸ flora species
- Not endemic but rare flora species
- Endemic terrestrial fauna species
- Endemic fish species
- Fauna species falling under Annex II and/or Annex IV of the EU Habitats Directive⁴⁹
- Fauna species identified to have nests within the Project Area
- Bird species falling under Annex I of the EU Birds Directive⁵⁰
- Species falling under “threatened categories” (VU – Vulnerable or EN – Endangered or CR – Critically Endangered) under the IUCN Red List (Global or National)
- KBA qualifying species

The species screened as per the above criteria are given in Table 10-33.

It should be noted that explicit reference is provided for species that have been “directly observed” during the field surveys and those that have been listed as “presumed to be present” based solely on literature data/habitat preference/previous site experience of the expert.

⁴⁸ Endemic – “restricted to a particular area: used to describe a species or organism that is confined to a particular geographical region, for example, an island or river basin.” There are three categories of endemism: wide-spread endemic, regional endemic and local endemic. Regional endemic species show distribution in a specific region of a country (e.g. Mediterranean Region in Turkey).

⁴⁹ **EU Habitats Directive Annex II species** (about 900): core areas of their habitat are designated as Sites of Community importance (SCIs) and included in the Natura 2000 network. These sites must be managed in accordance with the ecological needs of the species.

EU Habitats Directive Annex IV species (over 400, including many Annex II species): a strict protection regime must be applied across their entire natural range within the EU, both within and outside Natura 2000 sites.

⁵⁰ **EU Birds Directive Annex 1:** 194 species and sub-species are particularly threatened. Member States must designate Special Protection Areas (SPAs) for their survival and all migratory bird species.

Table 10-33. Species of Conservation Importance

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
Local Endemic Flora Species	<i>Glaucium secmenii</i>	Field Observation	IUCN Category: CR
	<i>Alyssum niveum</i>	Field Observation	IUCN Category: CR KBA Qualifying Species (Acikir Steppes)
	<i>Cephalaria aytachii</i>	Field Observation	IUCN Category: CR
	<i>Verbascum gypsicola</i>	Field Observation	IUCN Category: CR
	<i>Marrubium zeydanlii</i>	Field Observation	IUCN Category: CR
	<i>Acantholimon gemicianum</i>	Field Observation	IUCN Category: CR Balikdami Wetland Qualifying Species
Regional Endemic Flora Species	<i>Scabiosa hololeuca</i>	Field Observation	IUCN Category: EN Balikdami Wetland Qualifying Species
	<i>Paronychia dudleyi</i>	Field Observation	IUCN Category: VU
	<i>Achillea ketenoglu</i>	Field Observation	IUCN Category: VU KBA Qualifying Species (Acikir Steppes)
	<i>Centaurea polyclada</i>	Field Observation	IUCN Category: VU
	<i>Verbascum antinori</i>	Field Observation	IUCN Category: VU
	<i>Scutellaria yildirimlii</i>	Field Observation	IUCN Category: VU
	<i>Sideritis gulendamii</i>	Field Observation	IUCN Category: VU
	<i>Salvia aytachii</i>	Field Observation	IUCN Category: VU KBA Qualifying Species (Acikir Steppes)
	<i>Thymus leucostomus</i> var. <i>argilleceus</i>	Field Observation	IUCN Category: VU
Not Endemic but Rare Flora Species	<i>Noaea minuta</i>	Field Observation	IUCN Category: VU
Endemic Terrestrial Fauna Species	<i>Anatololacerta anatolica</i>	Presumed to be Present	IUCN Category: LC BERN: App-III
	<i>Microtus anatolicus</i>	Presumed to be Present/Field Observation	IUCN Category: DD Native
Endemic Fish Species	<i>Anguilla Anguilla</i>	Presumed to be Present	IUCN Category: CR Native
	<i>Cobitis simplicispina</i>	Field Observation	IUCN Category: LC Native
	<i>Cobitis kurui</i>	Presumed to be Present	IUCN Category: LC Native
	<i>Oxynoemacheilus angorae</i>	Field Observation	IUCN Category: LC

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
			Native
	<i>Oxynoemacheilus banarescui</i>	Field Observation	IUCN Category: NT Native
	<i>Oxynoemacheilus simavicus</i>	Presumed to be Present	IUCN Category: CR Native
	<i>Seminemacheilus lendlii</i>	Previous Field Observation	IUCN Category: VU Native
	<i>Alburnus nasreddini</i>	Presumed to be Present	IUCN Category: CR Native
	<i>Alburnus escherichii</i>	Field Observation	IUCN Category: LC Native
	<i>Alburnus battalgilae</i>	Presumed to be Present	IUCN Category: VU Native
	<i>Ladigesocypris mermere</i>	Presumed to be Present	IUCN Category: DD Native
	<i>Luciobarbus lydianus</i>	Presumed to be Present	IUCN Category: LC Native
	<i>Barbus escherichii</i>	Field Observation	IUCN Category: LC Native
	<i>Capoeta baliki</i>	Presumed to be Present	IUCN Category: LC Native
	<i>Capoeta sieboldii</i>	Presumed to be Present	IUCN Category: LC Native
	<i>Capoeta tinca</i>	Field Observation	IUCN Category: LC Native
	<i>Capoeta bergamae</i>	Field Observation	IUCN Category: NT Native KBA Qualifying Species (Yamanlar Mountain)
	<i>Chondrostoma angorense</i>	Previous Field Observation	IUCN Category: LC Native
	<i>Chondrostoma meandrense</i>	Previous Field Observation	IUCN Category: VU Native
	<i>Chondrostoma holmwoodii</i>	Field Observation	IUCN Category: VU Native KBA Qualifying Species (Yamanlar Mountain)

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
	<i>Pseudophoxinus maeandricus</i>	Presumed to be Present	IUCN Category: CR Native
	<i>Squalius fellowesii</i>	Field Observation	IUCN Category: LC Native
	<i>Squalius pursakensis</i>	Field Observation	IUCN Category: LC Native
	<i>Aphanius villwocki</i>	Presumed to be Present	IUCN Category: LC Native KBA Qualifying Species (Polatli-Tigem)
	<i>Knipowitschia mermere</i>	Presumed to be Present	IUCN Category: VU Native
	<i>Gobio sakaryaensis</i>	Presumed to be Present	IUCN Category: LC Native
Fauna species falling under Annex II and/or Annex IV of the EU Habitats Directive	<i>Bufo viridis</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Hyla orientalis</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Pelobates syriacus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Balikdami Wetland Qualifying Species
	<i>Triturus ivanbureschi</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Testudo graeca</i>	Presumed to be Present	IUCN Category: VU BERN: App-II Balikdami Wetland Qualifying Species KBA Qualifying Species (Yamanlar Mountain)
	<i>Emys orbicularis</i>	Presumed to be Present	IUCN Category: NT BERN: App-II KBA Qualifying Species (Polatli Tigem)
	<i>Stellagama stellio</i>	Presumed to be Present	IUCN Category: LC BERN: App-III
	<i>Pseudopus apodus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Ophisops elegans</i>	Presumed to be Present	IUCN Category: LC BERN: App-II

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
	<i>Podarcis muralis</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Eryx jaculus</i>	Presumed to be Present	IUCN Category: LC BERN: App-III
	<i>Dolichophis caspius</i>	Presumed to be Present	IUCN Category: LC BERN: App-III
	<i>Hemorrhois nummifer</i>	Presumed to be Present	IUCN Category: LC BERN: App-III
	<i>Platycephalus najadum</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Zamenis situlus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Natrix tessellata</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Montivipera xanthina</i>	Presumed to be Present	IUCN Category: LC BERN: App-II KBA Qualifying Species (Polatli Tigem) KBA Qualifying Species (Yamanlar Mountain)
	<i>Rhinolophus blasii</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Rhinolophus euryale</i>	Presumed to be Present	IUCN Category: NT BERN: App-II KBA Qualifying Species (Yamanlar Mountain)
	<i>Rhinolophus mehelyi</i>	Presumed to be Present	IUCN Category: VU BERN: App-II
	<i>Rhinolophus ferrumequinum</i>	Presumed to be Present	IUCN Category: LC BERN: App-II KBA Qualifying Species (Yamanlar Mountain)
	<i>Rhinolophus hipposideros</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Myotis blythii</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Myotis capaccinii</i>	Presumed to be Present	IUCN Category: VU BERN: App-II KBA Qualifying Species (Yamanlar Mountain)

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
	<i>Myotis emarginatus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Myotis myotis</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Dryomys nitedula</i>	Presumed to be Present	IUCN Category: LC
	<i>Sciurus anomalus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Balikdami Wetland Qualifying Species
	<i>Hystrix indica</i>	Presumed to be Present	IUCN Category: NT BERN: App-II CITES: App-I
	<i>Felis silvestris</i>	Presumed to be Present	IUCN Category: LC BERN: App-II
	<i>Lynx lynx</i>	Presumed to be Present	IUCN Category: LC BERN: App-III
	<i>Lutra lutra</i>	Presumed to be Present	IUCN Category: NT BERN: App-II CITES: App-I
	<i>Cervus elaphus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II CITES: App-II
Fauna species identified to have nests within the Project Area	<i>Microtus</i> sp. (<i>Microtus hartingi</i> , <i>Microtus mystacinus</i> and <i>Microtus anatolicus</i> (*))	Field Observation	IUCN Category: LC IUCN Category: DD (*)
	<i>Nannospalax xanthodon</i>	Field Observation	IUCN Category: DD
	<i>Spermophilus xanthoprymnus</i>	Field Observation	IUCN Category: NT Balikdami Wetland Qualifying Species
Annex I of the EU Birds Directive	<i>Botaurus stellaris</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.2 Status: Y (Resident)
	<i>Ixobrychus minutus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.2 Status: Y (Resident)
	<i>Ardeola raloides</i>	Presumed to be Present	IUCN Category: LC

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
			BERN: App-II Turkish Red List: A.3 Status: Y (Resident) KBA Qualifying Species (Balikdami) Balikdami Wetland Qualifying Species
	<i>Egretta garzetta</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.3.1 Status: Y (Resident) KBA Qualifying Species (Balikdami) Balikdami Wetland Qualifying Species
	<i>Ardea alba</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.3 Status: Y (Resident)
	<i>Ardea purpurea</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.2 Status: Y (Resident) Balikdami Wetland Qualifying Species
	<i>Ciconia ciconia</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.3.1 Status: G (Migratory) KBA Qualifying Species (Balikdami) Balikdami Wetland Qualifying Species
	<i>Tadorna ferruginea</i>	Field Observation (97 individuals in 5 stations) – See from Table 10-25 to Table 10-27.	IUCN Category: LC BERN: App-II Turkish Red List: A.4 Status: Y (Resident) Balikdami Wetland Qualifying Species
	<i>Milvus migrans</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.3 Status: Y (Resident)

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
	<i>Neophron percnopterus</i>	Presumed to be Present	IUCN Category: EN BERN: App-II Turkish Red List: A.3 Status: Y (Resident) KBA Qualifying Species (Acikir Steppes)
	<i>Circaetus gallicus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.4 Status: Y (Resident)
	<i>Circus aeruginosus</i>	Field Observation (3 individuals in 3 stations) – See from Table 10-25 to Table 10-27.	IUCN Category: LC BERN: App-II Turkish Red List: A.3 Status: Y (Resident) KBA Qualifying Species (Balikdami) Balikdami Wetland Qualifying Species
	<i>Accipiter nisus</i>	Field Observation (7 individuals in 7 stations) – See from Table 10-25 to Table 10-27.	IUCN Category: LC BERN: App-II Turkish Red List: A.3 Status: Y (Resident)
	<i>Buteo rufinus</i>	Field Observation (10 individuals in 7 stations) – See from Table 10-25 to Table 10-27.	IUCN Category: LC BERN: App-II Turkish Red List: A.3 Status: Y (Resident) KBA Qualifying Species (Murat Mountain) Balikdami Wetland Qualifying Species
	<i>Pandion haliaetus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.1.2 Status: Y (Resident)
	<i>Falco naumanni</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.2 Status: Y (Resident) KBA Qualifying Species (Polatli Tigem) KBA Qualifying Species (Balikdami)

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
			KBA Qualifying Species (Acikir Steppes)
	<i>Charadrius alexandrinus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.4 Status: Y (Resident)
	<i>Sterna hirundo</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.3 Status: Y (Resident)
	<i>Sterna albifrons</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.3.1 Status: G (Migratory)
	<i>Chlidonias hybridus</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.4 Status: Y (Resident)
	<i>Chlidonias niger</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.3 Status: Y (Resident)
			KBA Qualifying Species (Balikdami)
	<i>Alcedo atthis</i>	Field Observation (4 individuals in 4 stations) – See from Table 10-25 to Table 10-27..	IUCN Category: LC BERN: App-II Turkish Red List: A.2 Status: Y (Resident)
			Balikdami Wetland Qualifying Species
	<i>Dendrocopos major</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.3 Status: Y (Resident)
	<i>Dendrocopos syriacus</i>	Field Observation (1 individuals in 1 stations) – See from Table 10-25 to Table 10-27.	IUCN Category: LC BERN: App-II Turkish Red List: A.2 Status: Y (Resident)

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
	<i>Lullula arborea</i>	Presumed to be Present	IUCN Category: LC BERN: App-III Turkish Red List: A.3 Status: Y (Resident)
	<i>Anthus campestris</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.2 Status: G (Migratory) KBA Qualifying Species (Acikir Steppes)
	<i>Troglodytes troglodytes</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.1.2 Status: Y (Resident)
	<i>Hippolais olivetorum</i>	Presumed to be Present	IUCN Category: LC BERN: App-III Turkish Red List: A.2 Status: G (Migratory) KBA Qualifying Species (Yamanlar Mountain)
	<i>Sylvia rueppelli</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.2 Status: G (Migratory)
	<i>Parus ater</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.3 Status: Y (Resident)
	<i>Certhia brachydactyla</i>	Presumed to be Present	IUCN Category: LC BERN: App-II Turkish Red List: A.1.2 Status: Y (Resident)
Species falling under “threatened categories” (VU – Vulnerable or EN – Endangered or CR – Critically	Flora species falling under this category are given above in this table either as local or regional endemic or not endemic but rare species	Field Observation	See above

Screening Category	Species Identified	Registry Type (Field Observation/Literature Data)	Conservation Status
Endangered) under the IUCN Red List (Global or National)	<i>Vormela peregusna</i> (Fauna – Mammal)	Presumed to be Present	IUCN Category: VU BERN: App-II
	<i>Barbus pergamonensis</i> (Aquatic – Fish)	Presumed to be Present (Previous Field Observation by the expert academician)	IUCN Category: EN Native
	<i>Barbus tauricus</i> (Aquatic – Fish)	Presumed to be Present	IUCN Category: VU Native
	<i>Cyprinus carpio</i> (Aquatic – Fish)	Field Observation	IUCN Category: VU Native Balikdami Wetland Qualifying Species
KBA Qualifying Species	<p>All KBA Qualifying Species identified in above Section 10.2.2 – Please see list of qualifying species in:</p> <p>Table 10-7 for Polatli-TIGEM KBA</p> <p>Table 10-8 for Balikdami KBA</p> <p>Table 10-9 for Murat Mountain KBA</p> <p>Table 10-10 for Yamanlar Mountain KBA</p> <p>Table 10-13 for Acikir Steppes KBA</p> <p>Table 10-14 for Spil Mountain KBA</p>	Field Observation/Presumed to be Present	-

10.2.7. Invasive Alien Species

An alien species is a species introduced outside its natural past or present distribution; if this species becomes problematic, it is termed an invasive alien species (IAS). The Convention on Biological Biodiversity defines invasive species as alien species which threaten ecosystems, habitats, or other species by causing economic or environmental damages via its establishment and invasion. Non-native species that pose a risk of spreading quickly can create significant environmental and socio-economic impacts (for example, crop pests, disease vectors, new predators). Invasive plants are often called weeds, whilst invasive animals are commonly referred to as pests. Invasive species can also include Living Modified Organisms (Genetically Modified Organisms), which do not naturally occur anywhere.

IAS are the most common threat to amphibians, reptiles, and mammals on the IUCN Red List; they may lead to changes in the structure and composition of ecosystems detrimentally affecting ecosystem services, human economy and wellbeing. IAS are such a problem that Aichi Biodiversity Target 9 and one clause of UN Sustainable Development Goal 15 – Life on Land specifically address the issue.

The movement of people and goods around the world increases the opportunity for introduction of IAS. Turkey is home to 14 of the worst alien species, which are listed in the 100 of the World's Worst Invasive Alien Species, published by the IUCN. The 14 of the worst alien species found in Turkey are as follows⁵¹: Eastern American mosquito fish (*Gambusia holbrooki*), Warty Comb Jelly or Sea Walnut (*Mnemiopsis leidyi*), Veined Rapa Whelk (*Rapana venosa*), The Prussian carp or silver Prussian Carp (*Carassius gibelio*), Zebra Mussel (*Dreissena polymorpha*), Water Hyacinth (*Eichornia crassipes*), Killer Algae (*Caulerpa taxifolia*), Rainbow Trout (*Oncorhynchus mykiss*), The Crucian Carp (*Carassius Carassius*), Mozambique tilapia (*Oreochromis mossambicus*), Nutria (*Myocastor coypus*), Red-eared Slider (*Trachemys scripta elegans*), Ship Rat (*Rattus Rattus*) and African Sharptooth Catfish (*Clarias gariepinus*).

The IUCN SSC Invasive Species Specialist Group (ISSG) aim to reduce threats to ecosystems and their native species by increasing awareness of ways to prevent, control or eradicate IAS.

The IUCN has developed knowledge platforms on invasive species:

- The Global Invasive Species Database (GISD) (<http://www.iucngisd.org/gisd/>)
- The Global Register of Introduced and Invasive Species (GRIIS) (<http://www.griis.org>)

The GRIIS platform includes approximately 700 entries for species in Turkey and categorises the origin of the species as alien, native/alien or cryogenic/uncertain. It should be noted that not all species entered to GRIIS have been verified. This said, the academicians that undertook the 2021 baseline field surveys have not reported presence of any IAS within the Project Area apart from the directly observed three (3) introduced/invasive fish species: Prussian Carp (*Carassius gibelio*), Eastern American mosquito fish⁵² (*Gambusia holbrooki*), and Topmouth gudgeon (*Pseudorasbora parva*) as given in Table 10-32.

The potential pathways for introduction of IAS that could be relevant to the Project include movement of goods and habitat restoration and landscaping activities. IAS have an adverse effect on biological diversity, ecosystem functioning, socio-economic values and/or human health in invaded regions. Taking into account that along the HSR alignment there are agricultural and pasture lands and also natural habitats, the invasive flora species which are widespread in Turkey and could be observed along the Project route⁵³ are Black Locust (*Robinia pseudoacacia*) and Tree of Heaven/Chinese sumac (*Ailanthus altissima*).

*Robinia pseudoacacia*⁵⁴ is a leguminous deciduous tree commonly found in disturbed areas such as old fields, degraded woods, forest edges, and roadsides, but it poses the greatest threat to dry and sand prairies and oak savannas. *R. pseudoacacia* has been planted on reclaimed land to control erosion and has been used for

⁵¹ Addressing of Invasive Alien Species Threats in Terrestrial Areas and Inland Waters in Turkey (TERIAS) Project (<http://teriasturk.org/invasive-alien-species/>).

⁵² It is one of the target species under the TERIAS Project: <http://teriasturk.org/eastern-american-mosquito-fish/>.

⁵³ Türkiye'deki En Tehlikeli İstilacı Yabancı Türler ve Türkiye'deki Zehirli Denizel Yabancı Türler Raporu, Ekim 2018, 2. Basım (URL: https://www.istilacilar.org/PDF/IAS_TR_b_edit_v4_updated.pdf).

⁵⁴ Global Invasive Species Database: <http://www.iucngisd.org/gisd/speciesname/Robinia+pseudoacacia>.

ornamental purposes. It reproduces vigorously by root suckering and stump sprouting to form groves of trees interconnected by a common root system. Once introduced, *R. pseudoacacia* expands readily into areas where their shade reduces competition from other (sun-loving) plants. Dense clones of *R. pseudoacacia* create shaded islands with little ground vegetation. Lack of ground fuel limits the use of fire in natural disturbance regimes. The large, fragrant blossoms of *R. pseudoacacia* compete with native plants for pollinating bees.

Ailanthus altissima establishes itself readily on disturbed sites, such as railroad embankments, highway medians, fencerows, and roadsides. In naturally forested areas, *A. altissima* may become established in areas disturbed by storms or infestations. *A. altissima* has the ability to grow in poor soils and under stressful environmental conditions. It grows in full sun and thrives in poor growing conditions. Germination rates are high, provided soil has adequate moisture. It is well adapted to heavy clays and other soils with low nutrient and oxygen content. *Ailanthus altissima* is well adapted to heavy clays and other soils with few nutrients. *Ailanthus altissima* is a very aggressive plant, a prolific seed producer (up to 350,000 seeds in a year), grows rapidly, and can overrun native vegetation. It also produces toxins that prevent the establishment of other plant species. The root system is aggressive enough to cause damage to sewers and foundations. The outcomes of spread include reduction in native biodiversity and socio-economic including damage to agriculture, human health, human nuisance, and damage to infrastructure⁵⁵.

The presence of IAS will be monitored during construction works and measures will be in place (including appropriate eradication program if spread of IAS is observed) to mitigate potential impacts on habitats and species.

10.2.8. Ecosystem Services

Ecosystem services are the benefits that people, including businesses, derive from ecosystems. Ecosystem services are indeed services because there is an identified (human) beneficiary (that is, the user). Ecosystem services are related to biophysical processes in the environment, but until there is a person or group of persons benefiting from the process, it is not a service. The beneficiary might be on the local, regional, or even global scale. Ecosystem services are organised into four types: (i) provisioning services, which are the products people obtain from ecosystems (such as food, timber, medicines, fiber, and fresh water); (ii) regulating services, which are the benefits people obtain from the regulation of ecosystem processes (such as climate regulation, disease control, erosion prevention, water flow regulation, and protection from natural hazards); (iii) cultural services, which are the nonmaterial benefits people obtain from ecosystems (such as recreation, spiritual values, and aesthetic enjoyment); and (iv) supporting services, which are the natural processes that maintain the other services (such as primary production, nutrient and water cycles).

Related to the AIHSR Project the following ecosystem services are identified:

Provisioning Services:

- Agricultural areas and fruit orchards provide food to and support livelihood of the local people.
- Wetlands and water bodies provide feeding and breeding grounds for fauna elements (birds, amphibians and mammals) and the flora species at these areas also provide feeding ground for cattle and sheep.
- Gypsum steppe habitats are the richest in terms of flora diversity. They also play crucial role for grazing activities.
- Running and still water bodies provide water for agricultural activities, for animals and also regulate the water regime in the region.

Regulating Services:

- The vegetative cover and forests are carbon sinks.
- The vegetative cover help control erosion and subsequent potential flooding.
- The vegetative cover reduces sediment transport to water bodies and transport rainwater to underground through infiltration.

⁵⁵ Global Invasive Species Database: <http://www.iucngisd.org/gisd/species.php?sc=319#>

Supporting Services:

- The natural habitats support continuity and sustainability of species of conservation importance including endemic flora and fauna species.

As defined in IFC PS6, priority ecosystem services are two-fold: (i) those services on which project operations are most likely to have an impact and, therefore, which result in adverse impacts to Affected Communities; and/or (ii) those services on which the project is directly dependent for its operations (e.g., water). When Affected Communities are likely to be impacted, they should participate in the determination of priority ecosystem services in accordance with the stakeholder engagement process as defined in IFC PS1.

Ecosystem services is a transdisciplinary topic. The requirements in IFC PS6 for ecosystem services are applicable only when the client has “direct management control or significant influence” over such services. Therefore, ecosystem services whose beneficiaries are at the global scale, and sometimes the regional scale, are not covered under IFC PS6.

For the purposes of IFC PS 6 implementation, ecosystem services are categorized as two types:

Type I: Provisioning, regulating, cultural and supporting ecosystem services, over which the client has direct management control or significant influence, and where impacts on such services may adversely affect communities.

Type II: Provisioning, regulating, cultural and supporting ecosystem services, over which the client has direct management control or significant influence, and on which the project directly depends for its operations.

Chapter 11 of this ESIA Report on Socio-economy presents how the local populations benefit from the ecosystem services. The Project passes through 7 provinces and there are in total 207 Project Affected Settlements (PASs).

The permanent and temporary land use requirements of the Project (e.g. agricultural lands, pasture lands, forest lands) are described in Chapter 5 of this ESIA Report on Land Use and Geology.

As given in Chapter 11, the total area within the expropriation corridor of the Project sums up to 3,556.50 ha. Approximately 63% (2,247.45 ha) of the land (in terms of area) and %76 (8,647 parcels) of the parcels (in terms of parcel numbers) acquired/will be acquired within the expropriation corridor of the Project is classified as privately-owned, which are assumed to be utilised mainly for agricultural purposes. The details of the settlements along the HSR alignment with affected agricultural lands, pasture lands and forest parcels within the expropriation corridor are given in Chapter 11.

As can be seen in Table 10-17, the vineyards (EUNIS Habitat FB.4) and evergreen orchards and groves (EUNIS Habitat G2.9) are present in Section 4. As previously indicated, agricultural areas are distributed (EUNIS I1.2) along the HSR alignment, spread between the natural habitats.

The household surveys conducted with the Projected Affected People (PAPs) revealed the following information on use of ecosystem services:

- The PAPs benefit from the forest to take the following products: cone, mushrooms, wood, herbs, daisy, and thyme.
- The most produced agricultural products in the PASs are wheat, barley, corn, sugar beet, feed crops, poppy, and grape.
- Fishing has not been reported by any of the PAPs amongst livelihood activities.
- In nine (9) PASs, beehive-owner households were identified.

For the AIHSR Project, for the purposes of PS6 implementation, “Type I – Provisioning (agricultural areas and fruit orchards)” ecosystem services are determined to be priority ecosystem services. For the management of economic displacement impacts of the Project-related land acquisition, Resettlement Action Plan (RAP), including the livelihood restoration measures, will be implemented in line with IFC PS5.

The mitigation measures to be implemented as part of biodiversity conservation and livelihood restoration will mitigate potential Project impacts on ecosystem services.

10.2.9. Preliminary Critical Habitat Assessment

A preliminary Critical Habitat Assessment is discussed below based on available data to date that include the result of one field campaign. A final and more comprehensive Critical Habitat Assessment will be prepared as a separate document, including also the results of the second field campaign, to confirm the presence and distribution of Critical Habitats and Natural Habitats within the study areas according to IFC PS6 and relevant Guidance Note 6 (June 2019).

IFC Guidance Note 6 (GN54, June 2019) highlights that the Projects located within internationally and/or nationally recognised areas of high biodiversity value such as KBAs may require a Critical Habitat Assessment (CHA). IFC PS6 defines critical habitats as areas with high biodiversity value, including:

1. habitat of significant importance to Critically Endangered and/or Endangered species (Criterion 1);
2. habitat of significant importance to endemic and/or restricted-range species (Criterion 2);
3. habitat supporting globally significant concentrations of migratory species and/or congregatory species (Criterion 3);
4. highly threatened and/or unique ecosystems (Criterion 4); and/or
5. areas associated with key evolutionary processes (Criterion 5).

Numerical thresholds have been defined for the first four critical habitat criteria. For Criterion 5, there are no numerical thresholds. Best available scientific information and expert opinion should be used to guide decision-making with respect to the relative “criticality” of a habitat in these cases.

In light of the findings of the biodiversity baseline studies conducted at the Project Area and its vicinity, a preliminary critical habitat assessment is conducted as below using the numerical thresholds identified as per IFC PS6 Guidance Note (June 2019) to identify the biodiversity elements to potentially trigger CH.

It should be noted that, the presence of flora/fauna species that qualify for CH in the identified in the Project Area does not necessarily mean that the Project will impact them. Potential project impacts could range from being negligible to short-term and readily avoidable to long-term and significant. Furthermore, not all CH-qualifying species within the Project Area will be at equal risk of Project impacts.

The summary of the CHA is provided in Section 10.2.9.6.

10.2.9.1. Criterion 1 –Critically Endangered (CR) and Endangered (EN) Species

As per IFC PS6 Guidance Note (June 2019), the thresholds for Criterion 1 are defined as follows:

- (a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species ($\geq 0.5\%$ of the global population AND ≥ 5 reproductive units of a CR or EN species).
- (b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a).
- (c) As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.

The biodiversity field survey conducted in Q1 2021 revealed confirmed and potential presence of CR and EN flora and fauna species along the railway alignment and at the quarry locations. These species are screened considering the CH thresholds as described below.

10.2.9.1.1. CR Flora Species (Directly Observed)

Amongst the flora species directly observed during the site surveys, six (6) are listed as **CR** as per the IUCN National Red List:

- *Glaucium secmenii* (observed at survey location R3 in Section 1 between KM 25+000-KM 50+000)
- *Alyssum niveum* (observed at survey location R2 in Section 1 between KM 0+000-KM 25+000)
- *Cephalaria aytachii* (observed at survey location R2 in Section 1 between KM 0+000-KM 25+000 and at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balikdami Nationally Important Wetland)
- *Verbascum gypsicola* (observed at survey location R3 in Section 1 between KM 25+000-KM 50+000)
- *Marrubium zeydanlii* (observed at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balikdami Nationally Important Wetland)
- *Acantholimon gemicianum* (observed at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balikdami Nationally Important Wetland and amongst qualifying species of this wetland)

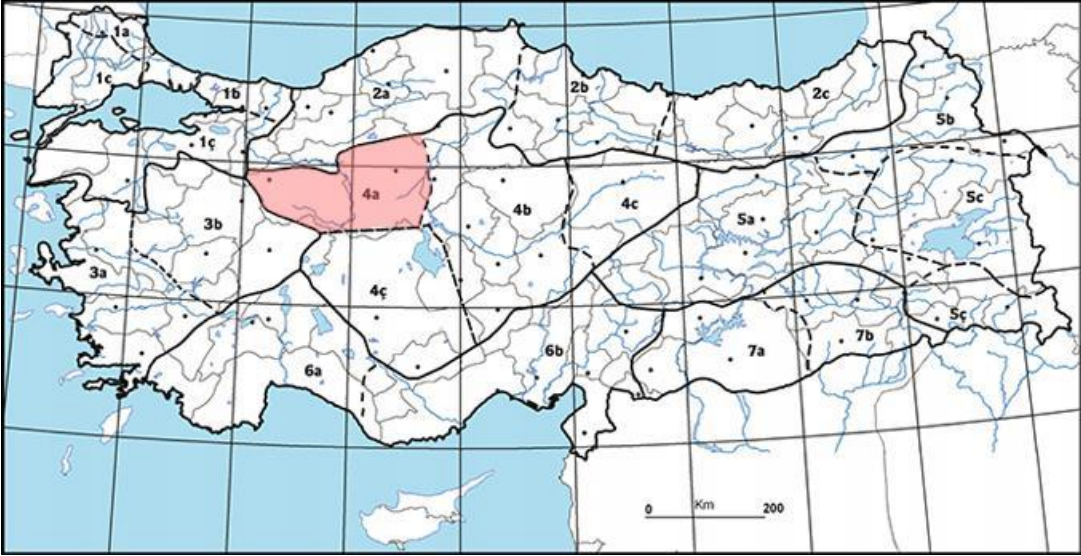
All the above species are observed in Gypsum Steppe habitat in Section 1, and all are also classified as local endemic. It should be noted that, at Section 1 of the rail alignment, the construction activities (e.g. land clearance, excavation, ground disturbance) have already taken place before year 2018 along the expropriation corridor and thus impacts on these flora species along the alignment have already taken place.

The Gypsum Steppe habitat is observed only in Section 1 of the rail alignment, the area covered by Gypsum Steppe habitat:

- Within the Project Area is ca. 187,000.00 ha
- Within the 200 m corridor (including all permanent and temporary Project components) along the rail alignment is ca. 808.0 ha

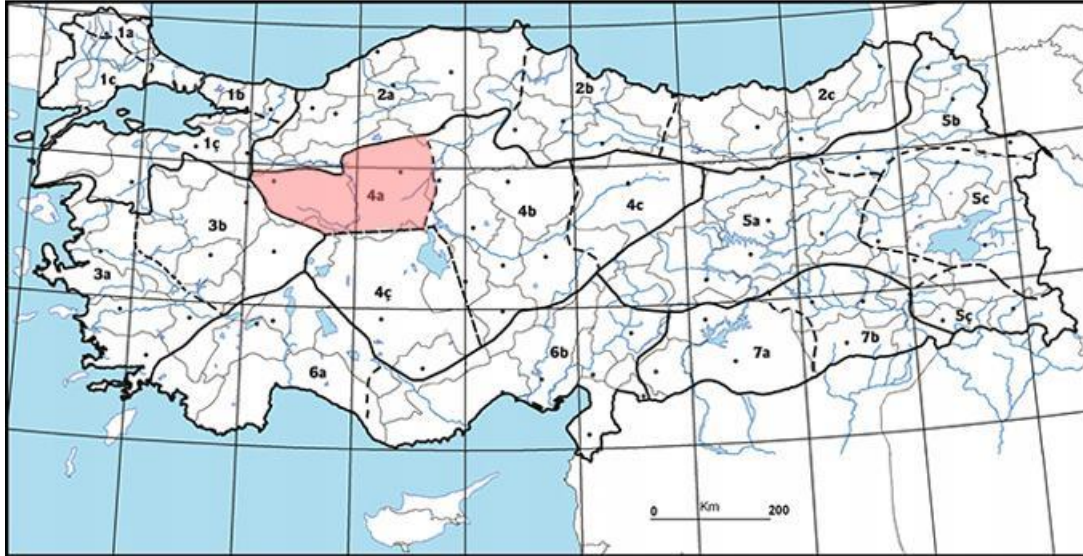
The species population information at the national level is not available. This said, publicly available information on geographical distribution of these species within Turkey is given below together with information on the ecology as provided by Prof. Dr. Duman. It should be noted that, these local endemic species – as reported by the flora expert – have been discovered in the recent years (except *Alyssum niveum*) and *Marrubium zeydanlii* is in the process of registration at the time of compilation of this Report.

As per the assessment of Prof. Dr. Hayri Duman, the Project Area is considered to contain important concentrations of the above nationally listed CR flora species and thus trigger Criterion 1(c). Therefore, the above flora species are considered as CH-qualifying species with confirmed presence within the Project Area.

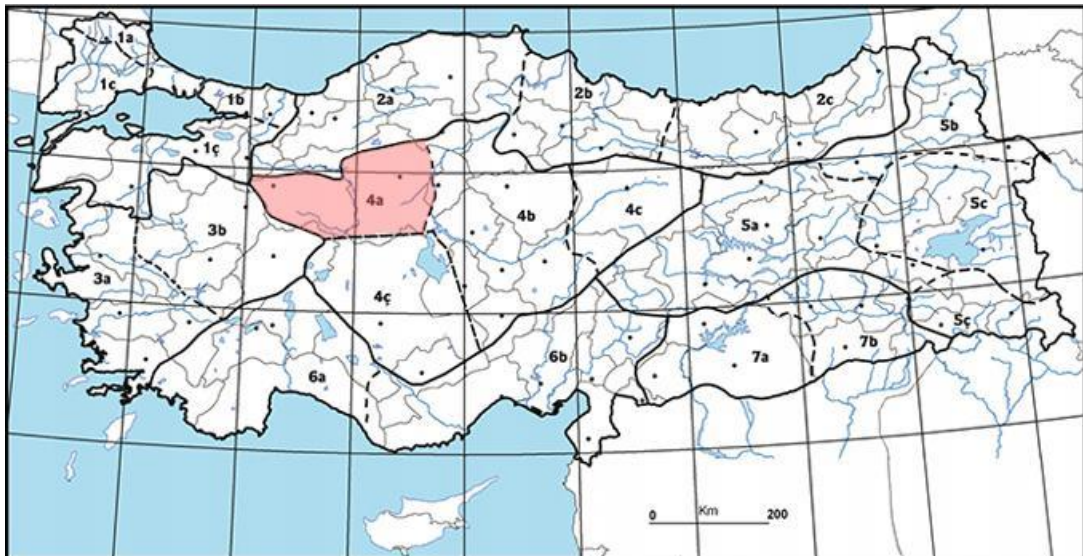
No	Species Ecology and Distribution in Turkey ⁵⁶
Flora	
1	<p><i>Glaucium secmenii</i></p> <p>Conservation status: Local endemic (<u>geographical distribution in Turkey not publicly available</u>)</p> <p>Phytogeographic Region: Irano-Turan</p> <p>Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Papaveraceae, Genus: Glaucium</p> <p>Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Very rare</p> <p>Seed Collection Period: July, Seed Plantation Period: October-November, Flowering Period: May-June</p>
2	<p><i>Alyssum niveum</i></p> <p>Conservation status: Local endemic, Acikir Steppes KBA qualifying species</p> <p>Phytogeographic Region: Irano-Turan</p> <p>Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Brassicaceae, Genus: Alyssum</p> <p>Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Rare</p> <p>Seed Collection Period: July, Seed Plantation Period: October-November, Flowering Period: May-June</p>
	
3	<p><i>Cephalaria aytachii</i></p> <p>Conservation status: Local endemic</p> <p>Phytogeographic Region: Irano-Turan</p> <p>Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Caprifoliaceae, Genus: Cephalaria</p> <p>Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Very rare</p> <p>Seed Collection Period: August-September, Seed Plantation Period: Oct-November, Flowering Period: June-July</p>

⁵⁶ Source: Bizim Bitkiler, <https://bizimbitkiler.org.tr/yeni/demos/technical/>.

No Species Ecology and Distribution in Turkey⁵⁶



- 4 *Verbascum gypsicola*
Conservation status: Local endemic
Phytogeographic Region: Iran-Turan
Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Scrophulariaceae, Genus: Verbascum
Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Rare
Seed Collection Period: August, Seed Plantation Period: October-November, Flowering Period: May-June



- 5 *Marrubium zeydanlii*
Conservation status: Local endemic (recently identified species, as reported by Prof. Dr. Duman it is in the process of registration)
Phytogeographic Region: Irano-Turan
Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Rare
Seed Collection Period: August-September, Seed Plantation Period: Oct-November, Flowering Period: June-July

- 6 *Acantholimon gemicianum*
Conservation status: Local endemic, qualifying species of Balıkdami Nationally Important Wetland (geographical distribution in Turkey not publicly available)
Phytogeographic Region: Irano-Turan
Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Plumbaginaceae, Genus: Acantholimon
Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Moderately rare
Seed Collection Period: July-August, Seed Plantation Period: October-November, Flowering Period: June-July

10.2.9.1.2. CR Flora Species (Presumed Present)

The following flora species that qualify Balıkdami Nationally Important Wetland (please see Table 10-4 for the full list) are nationally listed as **CR** and presumed to be present at the Project Area:

- *Acantholimon anatolicum* (regional endemic)
- *Acantholimon riyatquelii* (local endemic)

The above flora species is observed in Gypsum Steppe habitat in Section 1 and is also classified as local and regional endemic. The species population information at the national level is not available. This said, publicly available information on geographical distribution of the species within Turkey is given below.

As the species are amongst that qualify Balıkdami Nationally Important Wetland, the Project Area is considered to contain important concentrations of the above nationally listed CR flora species and thus trigger Criterion 1(c). Therefore, the above flora species are considered as CH-qualifying species with **unconfirmed but presumed presence** within the Project Area.

As explained in Chapter 1 of this ESIA Report, Section 3 of the Project was not part of the ESIA baseline study at the time the site surveys were conducted. This said, based on the extensive previous site experience in the vicinity of the Project Area, the senior flora expert identified the following nationally listed **CR** flora species as presumed to be present in Section 3 of the Project:

- *Ferula anatolica* Boiss. (CR, local endemic)

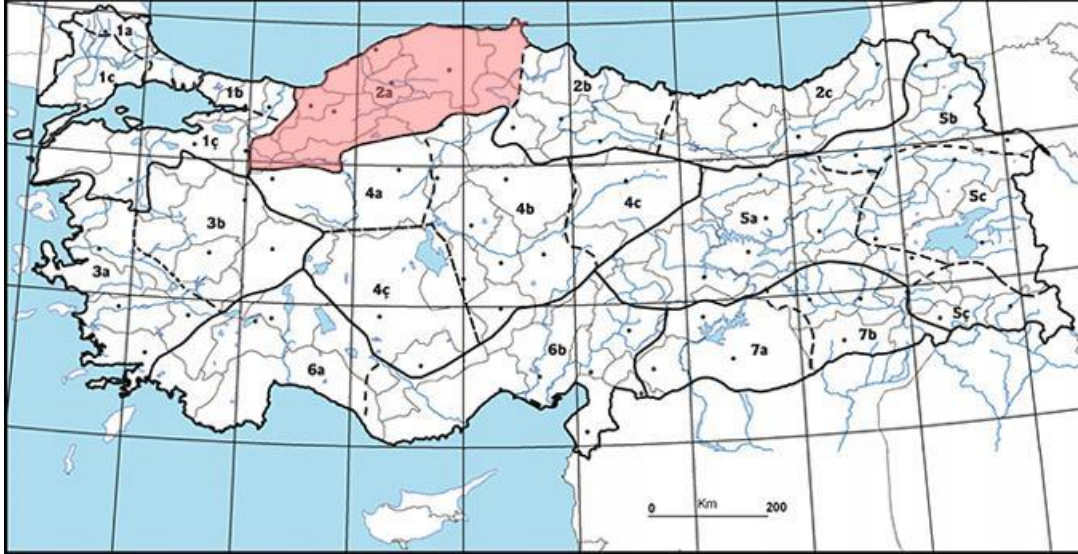
The above flora species is also classified as local endemic. The species population information at the national level is not available. This said, publicly available information on geographical distribution of the species within Turkey is given below.

As per the assessment of Prof. Dr. Hayri Duman, the Project Area is considered to contain important concentrations of the above nationally listed CR flora species and thus trigger Criterion 1(c). Therefore, the above flora species are considered as CH-qualifying species with **unconfirmed but presumed presence** within the Project Area.

No	Species Ecology and Distribution in Turkey ⁵⁷
Flora	
1	<p><i>Acantholimon anatolicum</i></p> <p>Conservation status: Regional endemic, qualifying species of Balıkdami Nationally Important Wetland</p> <p>Phytogeographic Region: Irano-Turan</p> <p>Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Plumbaginaceae, Genus: Acantholimon</p> <p>Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Rare</p> <p>Seed Collection Period: September, Seed Plantation Period: November, Flowering Period: July-August</p>

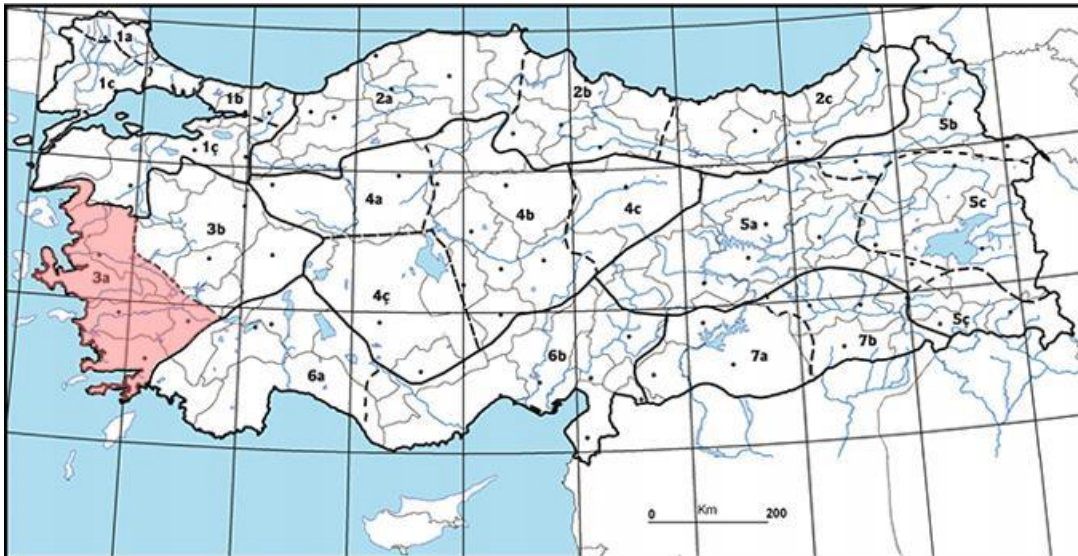
⁵⁷ Source: Bizim Bitkiler, <https://bizimbitkiler.org.tr/yeni/demos/technical/>.

No Species Ecology and Distribution in Turkey⁵⁷



- 2 *Acantholimon riyatguelii*
 Conservation status: Local endemic, qualifying species of Balıkdami Nationally Important Wetland (geographical distribution in Turkey not publicly available)
 Phytogeographic Region: Irano-Turan
 Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Plumbaginaceae, Genus: Acantholimon
 Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Rare
 Seed Collection Period: September, Seed Plantation Period: November, Flowering Period: July-August

- 3 *Ferula anatolica* Boiss
 Conservation status: Local endemic, presumed present in Section 3
 Phytogeographic Region: Mediterranean
 Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Apiaceae, Genus: Ferula
 Habitat Type: Thermophilous deciduous woodland, Relative Abundance: Very rare
 Seed Collection Period: July-August, Seed Plantation Period: November, Flowering Period: June-July

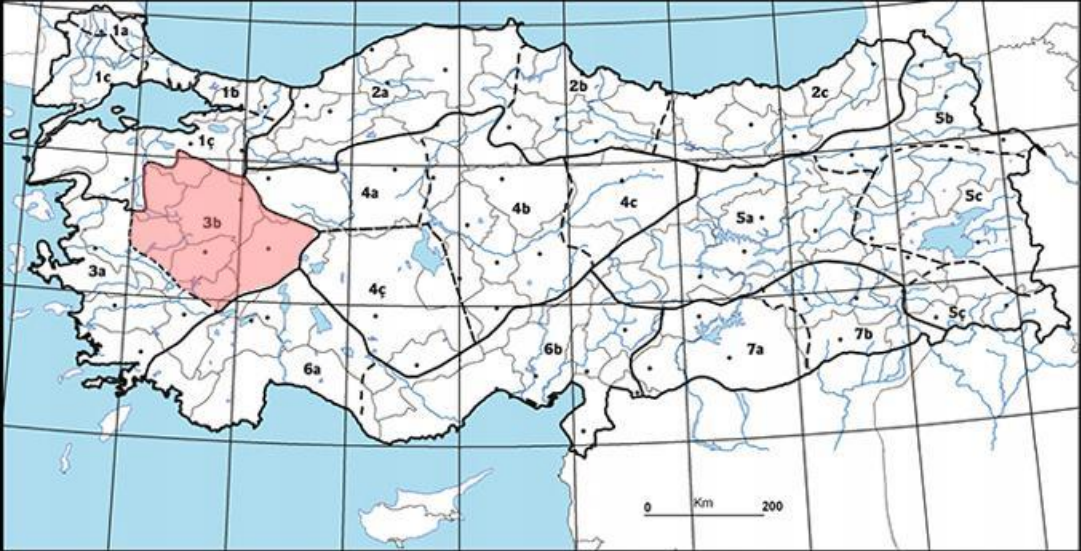


10.2.9.1.3.EN Flora Species (Directly Observed)

Amongst the flora species directly observed during the site surveys, one (1) is listed as **EN** as per the IUCN National Red List:

- *Scabiosa hololeuca* (observed at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balıkdami Nationally Important Wetland and amongst qualifying species of this wetland)

The above flora species is observed at Gypsum Steppe habitat in Section 1 and is also classified as regional endemic. The species population information at the national level is not available. This said, publicly available information on geographical distribution of the species within Turkey is given below.

No	Species Ecology and Distribution in Turkey ⁵⁸
Flora	
1	<p><i>Scabiosa hololeuca</i></p> <p>Conservation status: Regional endemic, qualifying species of Balıkdami Nationally Important Wetland</p> <p>Phytogeographic Region: Irano-Turan</p> <p>Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Caprifoliaceae, Genus: Scabiosa</p> <p>Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Very rare</p> <p>Seed Collection Period: July-August, Seed Plantation Period: October-November, Flowering Period: June-July</p> 

As per the assessment of Prof. Dr. Hayri Duman, the Project Area is considered to contain important concentrations of the above nationally listed EN flora species and thus trigger Criterion 1(c). Therefore, the above flora species is considered as CH-qualifying species with confirmed presence within the Project Area.

10.2.9.1.4.EN Flora Species (Presumed Present)

As explained in Chapter 1 of this ESIA Report, Section 3 of the Project was not part of the ESIA baseline study at the time the site surveys were conducted. This said, based on the extensive previous site experience in the vicinity of the Project Area, the senior flora expert identified the following nationally listed **EN** flora species as presumed to be present in Section 3 of the Project:

- *Pyrus anatolica* Browicz (EN, local endemic)
- *Bolanthus huber-morathii* C.Simon (EN, regional endemic)

⁵⁸ Source: Bizim Bitkiler, <https://bizimbitkiler.org.tr/yeni/demos/technical/>.

- *Verbascum luciliae* (Boiss.) Kuntze (EN, regional endemic)
- *Cyclamen mirabile* Hildebr. (EN, regional endemic)
- *Ebenus plumosa* Boiss. & Bal. var. *plumosa* (EN, regional endemic)

Although the species population information at the national level is not available, as per the assessment of Prof. Dr. Hayri Duman, the Project Area is considered to contain important concentrations of the above nationally listed **EN** flora species to trigger Criterion 1(c). Therefore, the above flora species are considered as CH-qualifying species with **unconfirmed but presumed presence** within the Project Area.

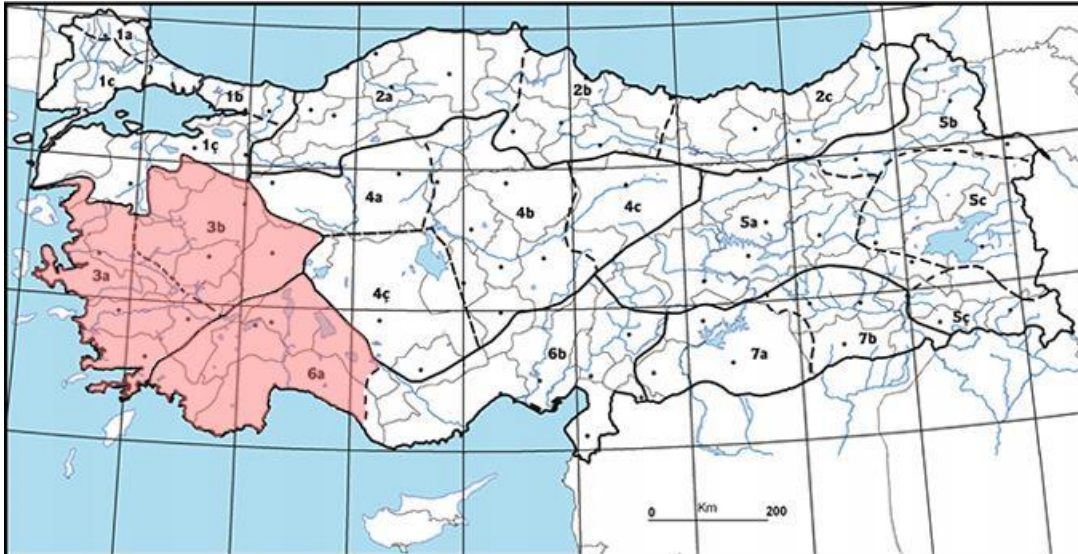
No	Species Ecology and Distribution in Turkey ⁵⁹
Flora	
1	<p><i>Pyrus anatolica</i> Browicz</p> <p>Conservation status: Local endemic, Murat Mountain KBA qualifying species, <u>presumed present in Section 3</u></p> <p>Phytogeographic Region: Mediterranean</p> <p>Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Rosaceae, Genus: Pyrus</p> <p>Habitat Type: Thermophilous deciduous woodland, Relative Abundance: Very rare</p> <p>Seed Collection Period: November, Seed Plantation Period: November, Flowering Period: May-June</p> 
2	<p><i>Bolanthus huber-morathii</i> C.Simon</p> <p>Conservation status: Regional endemic, <u>presumed present in Section 3</u></p> <p>Phytogeographic Region: Mediterranean</p> <p>Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Caryophyllaceae, Genus: Bolanthus</p> <p>Habitat Type: Maquis, Relative Abundance: Rare</p> <p>Seed Collection Period: July, Seed Plantation Period: November, Flowering Period: May-June</p>

⁵⁹ Source: Bizim Bitkiler, <https://bizimbitkiler.org.tr/yeni/demos/technical/>.

No Species Ecology and Distribution in Turkey⁵⁹

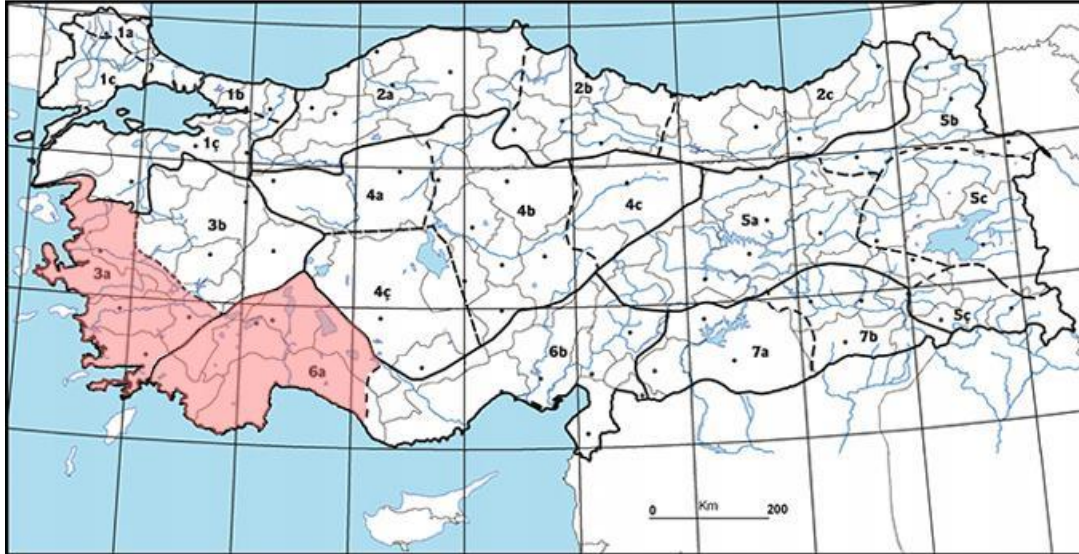


- 3 *Verbascum luciliae* (Boiss.) Kuntze
Conservation status: Regional endemic, presumed present in Section 3
Phytogeographic Region: Mediterranean
Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Scrophulariaceae, Genus: Verbascum
Habitat Type: Weathered rock and outcrop habitats, Relative Abundance: Rare
Seed Collection Period: July-August, Seed Plantation Period: November, Flowering Period: May-June

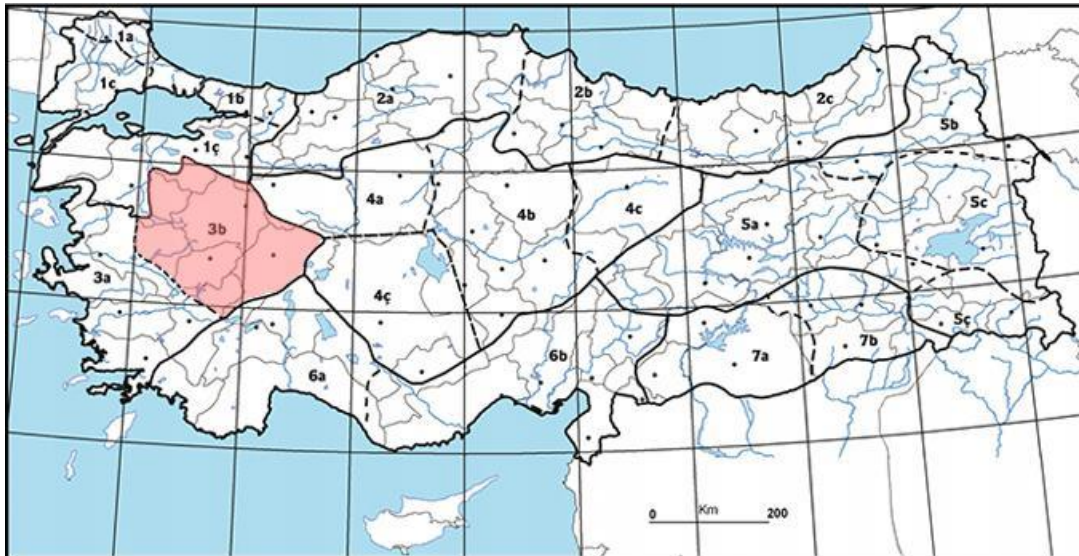


- 4 *Cyclamen mirabile* Hildebr
Conservation status: Regional endemic, presumed present in Section 3
Phytogeographic Region: Mediterranean
Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Primulaceae, Genus: Cyclamen
Habitat Type: Maquis, Relative Abundance: Moderately rare
Seed Collection Period: March, Seed Plantation Period: November, Flowering Period: October-November

No Species Ecology and Distribution in Turkey⁵⁹



- 5 *Ebenus plumosa* Boiss. & Bal. var. *plumosa*
 Conservation status: Regional endemic, presumed present in Section 3
 Phytogeographic Region: Mediterranean
 Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Fabaceae, Genus: Ebenus
 Habitat Type: Perennial calcareous grassland and basic steppes, Relative Abundance: Rare
 Seed Collection Period: May-June, Seed Plantation Period: November, Flowering Period: May-June



10.2.9.1.5. Terrestrial Fauna – EN Avifauna Species (Presumed Present)

Amongst the avifauna species presumed to be present at the Project Area, one (1) is listed as **EN** as per the IUCN Global Red List:

- *Neophron percnopterus* (Egyptian Vulture)

As reported by the IUCN in their latest assessment of August 2019⁶⁰, this long-lived species qualifies as EN owing to a recent and extremely rapid population decline in India, presumably resulting from poisoning by the veterinary drug diclofenac, combined with severe long-term declines in Europe and West Africa, plus continuing declines through much of the rest of its African range.

In Europe, the breeding population is estimated to number 3,000-4,700 breeding pairs, equating to 6,000-9,400 mature individuals. Europe forms 25-49% of the global range, so a very preliminary estimate of the global population size is 18,000-57,000 individuals, roughly equivalent to 12,000-38,000 mature individuals, although further validation of this estimate is needed. The species is declining in virtually all parts of its range, apparently for a number of different reasons. In India, it has declined by > 90% in the last decade; European populations have declined by 50-79% over the last three generations. Western, eastern and southern African populations also appear to have declined significantly, as do Arabian populations.

This species typically nests on ledges or in caves on cliffs, crags and rocky outcrops, but occasionally also in large trees, buildings (mainly in India), electricity pylons and exceptionally on the ground. It forages in lowland and montane regions over open, often arid, country, and also scavenges at human settlements. It has a broad diet including carrion, tortoises, organic waste, insects, young vertebrates, eggs and even faeces. Usually solitary, individuals congregate at feeding sites, such as rubbish tips, or vulture restaurants (i.e. supplementary feeding stations), and form roosts of non-breeding birds.

Northern breeders conduct long-distance intercontinental migrations, flying over land and often utilising the narrowest part of the Strait of Gibraltar or the Bosphorus and Dardanelles on their way to Africa.

As reported by the Nature Association (Doga Dernegi), the Turkish partner of BirdLife International, the 2013 Turkish population estimate of Egyptian Vulture has been reported as 1,000-2,000 pairs (Vultures of Turkey, Nature Association, September 2015)⁶¹. The species is reported to be distributed within Central Anatolia and Eastern Anatolia. It is reported that the breeding population is surprisingly high in Central Anatolia especially in Ankara and its vicinity due to the presence of calcareous cliffs and mohair goat farming spread across steppe habitat.

The global distribution map of the species is given below. As can be seen, the Central Anatolia towards the Aegean Region includes breeding areas.

As reported by the IUCN, this species faces a number of threats across its range. Disturbance, lead poisoning (from ammunition used in hunting game), direct and secondary poisoning, electrocution (by powerlines), collisions with wind turbines, reduced food availability and habitat change are currently impacting upon European populations, with juveniles showing higher declines and mainland populations showing higher rates of juvenile mortality than island populations.

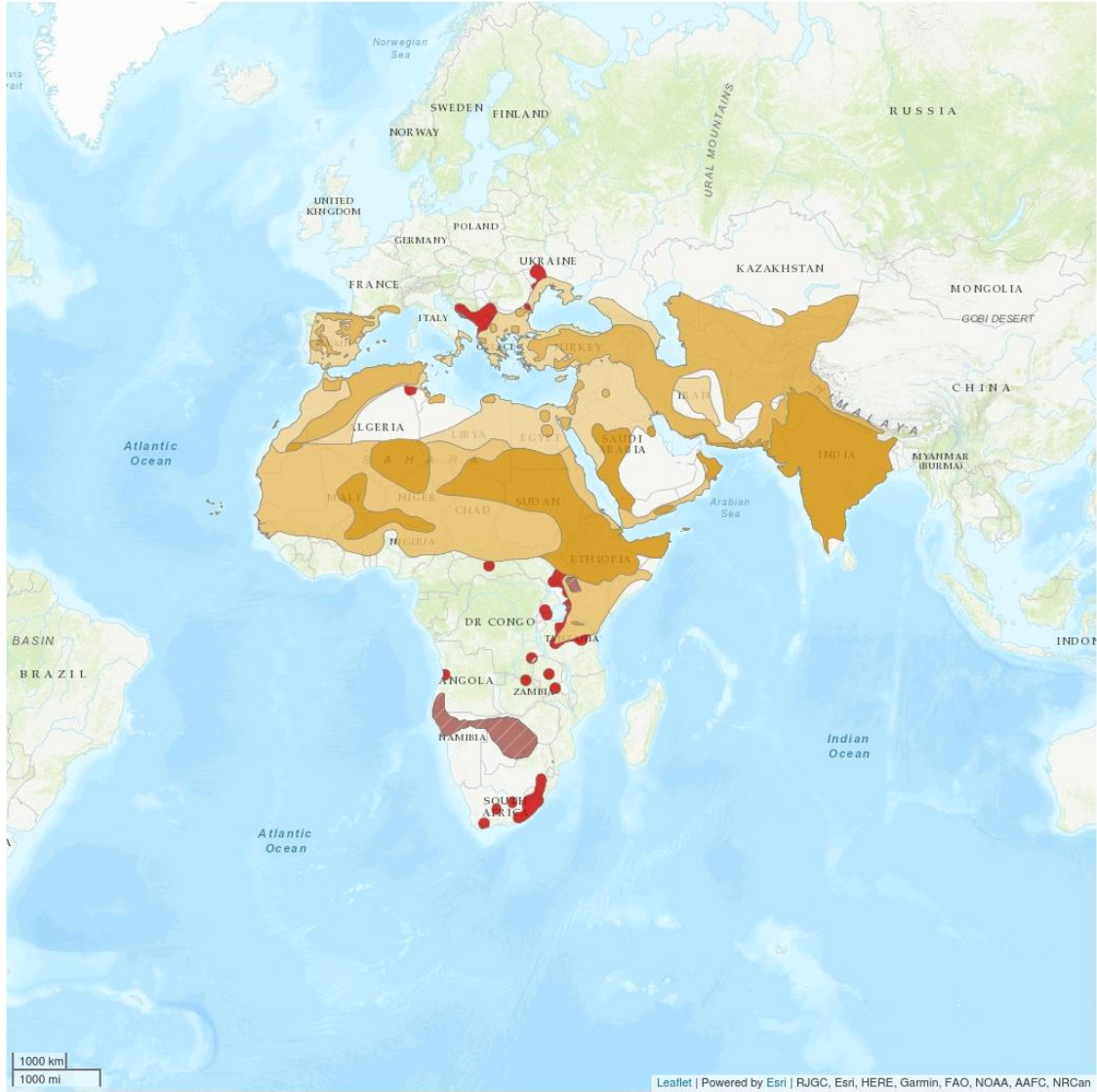
The Project Area overlaps with breeding grounds within Central Anatolia towards Aegean Region. The Turkish population estimate in 2013 has been reported as 1,000-2,000 pairs. The global population estimate is roughly equal to 12,000-38,000 mature individuals which means more than 15% of the global population is observed in Turkey. Therefore, the Project Area is considered to potentially contain important concentrations of the above listed EN avifauna species to trigger Criterion 1(a) and/or 1(c). Thus, the species is considered as potential CH trigger with **unconfirmed but presumed presence** within the Project Area.

⁶⁰ BirdLife International. 2019. *Neophron percnopterus*. *The IUCN Red List of Threatened Species* 2019: e.T22695180A154895845. <https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T22695180A154895845.en>.

⁶¹Source: <https://www.dogadernegi.org/wp-content/uploads/2015/09/T%C3%BCKrivenin-Akbabalar%C4%B1.pdf>.

Distribution Map

Neophron percnopterus



Legend

- EXTANT (RESIDENT)
- EXTANT (BREEDING)
- EXTANT (NON-BREEDING)
- EXTANT (PASSAGE)
- POSSIBLY EXTINCT
- EXTINCT

Compiled by:

BirdLife International and Handbook of the Birds of the World (2019)
2019



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

10.2.9.1.6. Aquatic Fauna – CR Fish Species (Presumed Present)

Amongst the fish species presumed to be present at the Project Area, four (4) are listed as **CR** as per the IUCN Global and/or European Red List:

- *Anguilla anguilla* (native) (IUCN Global and European Red List)
- *Oxynoemacheilus simavicus* (native, endemic) (IUCN Global Red List)
- *Alburnus nasreddini* (native, endemic) (IUCN Global Red List)
- *Pseudophoxinus maeandricus* (native, endemic) (IUCN Global Red List)

The habitat and ecology of the above species are summarised below including the latest distribution maps as provided by the IUCN.

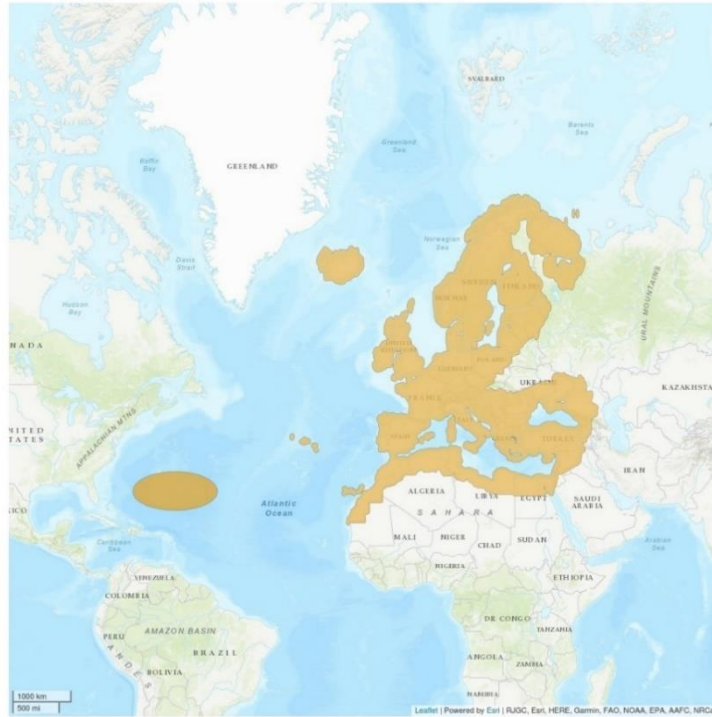
The Project Area is considered to contain important concentrations of the above listed CR fish species to trigger Criterion 1(a) and/or 1(c). Thus, the species are considered as CH-qualifying species with **unconfirmed but presumed presence** within the Project Area.

No	Species Ecology and Distribution in Turkey
Fish	
1	<p><i>Anguilla Anguilla</i> (European eel) (native, Gediz Basin) IUCN Assessment Date: 7 Nov 2018 (Pike, C., Crook, V., Gollock, M. 2020. <i>Anguilla anguilla</i>. <i>The IUCN Red List of Threatened Species</i> 2020: e.T60344A152845178. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T60344A152845178.en.)</p> <p><u>Habitat and Ecology:</u> The species is found in a range of habitats from small streams to large rivers and lakes, and in estuaries, lagoons, and coastal waters (ICES 2015). It also occupies open ocean areas during migrations but is rarely observed in this habitat. Under natural conditions, it only occurs in water bodies that are connected to the sea; it is stocked elsewhere. <i>Anguilla anguilla</i> occurs in most inland waters of Europe and is distributed from North Cape in northern Norway, southwards along the coast of Europe, all coasts of the Mediterranean and on the North African coast (Schmidt 1909, Dekker 2003b).</p> <p>The Eel Regulation (EC Regulation 1100/2007; EU 2007) is an EU-wide recovery plan for the European Eel, adopted in 2007. As instructed by the regulation, EU member states have been developing and implementing Eel Management Plans (EMPs) with the objective to “reduce anthropogenic mortalities so as to permit with high probability the escapement to the sea of at least 40% of the silver eel biomass relative to the best estimate of escapement that would have existed if no anthropogenic influences had impacted the stock.” (EU 2007). Member States are responsible for implementing measures to achieve their targets, and most actions have focused on commercial and recreational fisheries, followed by hydropower-pumping station obstacles, and measures on habitat, restocking, and predator control (ICES 2013b, European Commission 2020a).</p> <p><u>The Turkish population of the species and the distribution across different river basins is not known.</u></p>

No Species Ecology and Distribution in Turkey

Distribution Map

Anguilla anguilla



Legend
 ■ EXTANT (BREEDING)
 ■ EXTANT (NON-BREEDING)

Compiled by:
 Anguillid Eel Specialist Group (AESG) 2020



- 2** *Oxynoemacheilus simavicus* (native, endemic, Gediz Basin)
 IUCN Assessment Date: 31 Jan 2006 (Crivelli, A.J. 2006. *Oxynoemacheilus simavica*. The IUCN Red List of Threatened Species 2006: e.T61347A12465793. <https://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T61347A12465793.en>.)

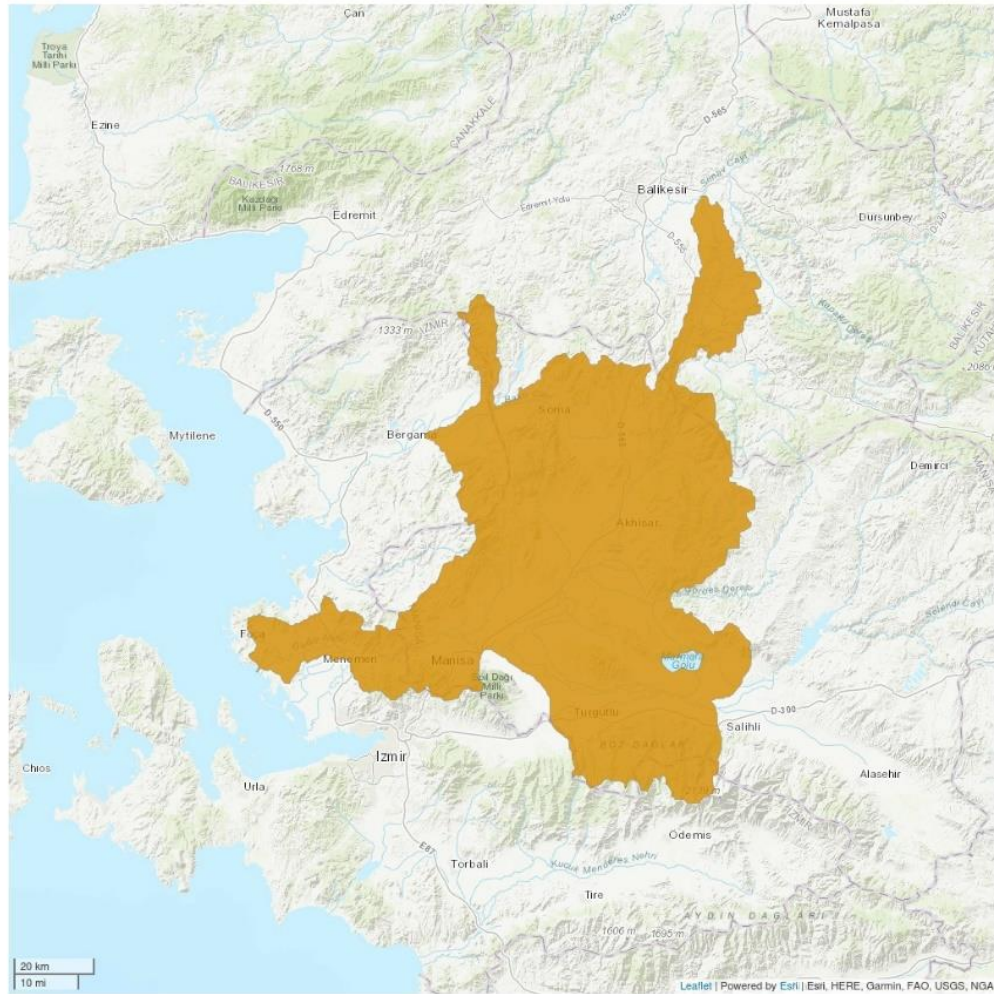
Habitat and Ecology:

The species is restricted to the Simav stream, a tributary of the Gediz River in western Anatolia, Turkey. Extent of occurrence is less than 100 km² and area of occupancy is less than 10 km². Habitat quality continues to decline, mainly as a result of pollution.

No Species Ecology and Distribution in Turkey

Distribution Map

Oxynoemacheilus simavicus



Legend

■ EXTANT (RESIDENT)

Compiled by:

Mediterranean Endemic Freshwater Fish Red List Workshop, Malaga, Spain, Dec. 2004 (2004) 2006



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

- 3** *Alburnus nasreddini* (Central Anatolian bleak) (native, endemic, Akarçay Basin)
IUCN Assessment Date: 29 Jan 2013 (Freyhof, J. 2014. *Alburnus nasreddini*. The IUCN Red List of Threatened Species 2014: e.T19018610A19222793. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19018610A19222793.en>.)

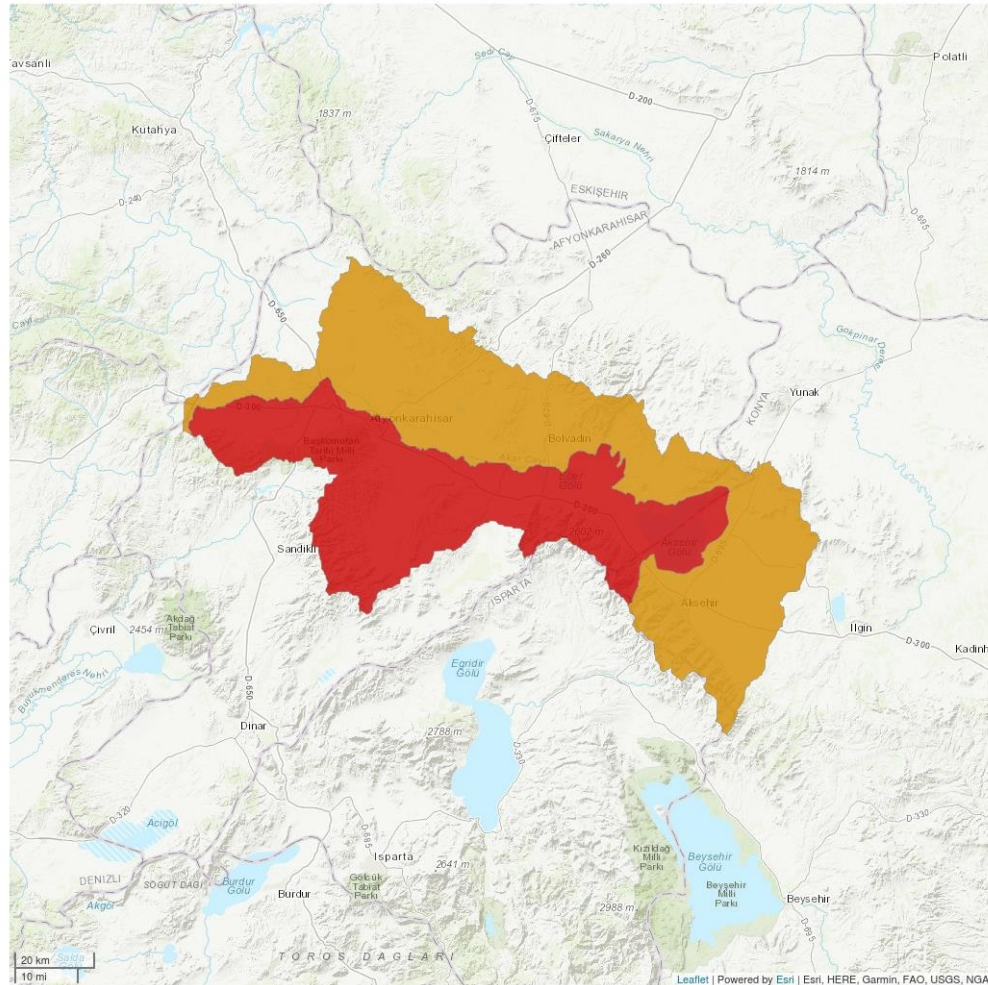
Habitat and Ecology:

This species was present in two large lakes from where it has vanished due to pollution and desiccation of the lakes. It is now only known from one lake tributary (estimated at 10 km long). Massive water abstraction has reduced the lake levels drastically and heavy pollution has made them to an uninhabitable place for fishes. Estimated Area of Occupancy (AOO) is 20 km². Estimated Extent of Occurrence (EOO) is 20-100 km².

No Species Ecology and Distribution in Turkey

Distribution Map

Alburnus nasreddini



Legend

- EXTANT (RESIDENT)
- EXTINCT

Compiled by:

IUCN (International Union for Conservation of Nature) 2014



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

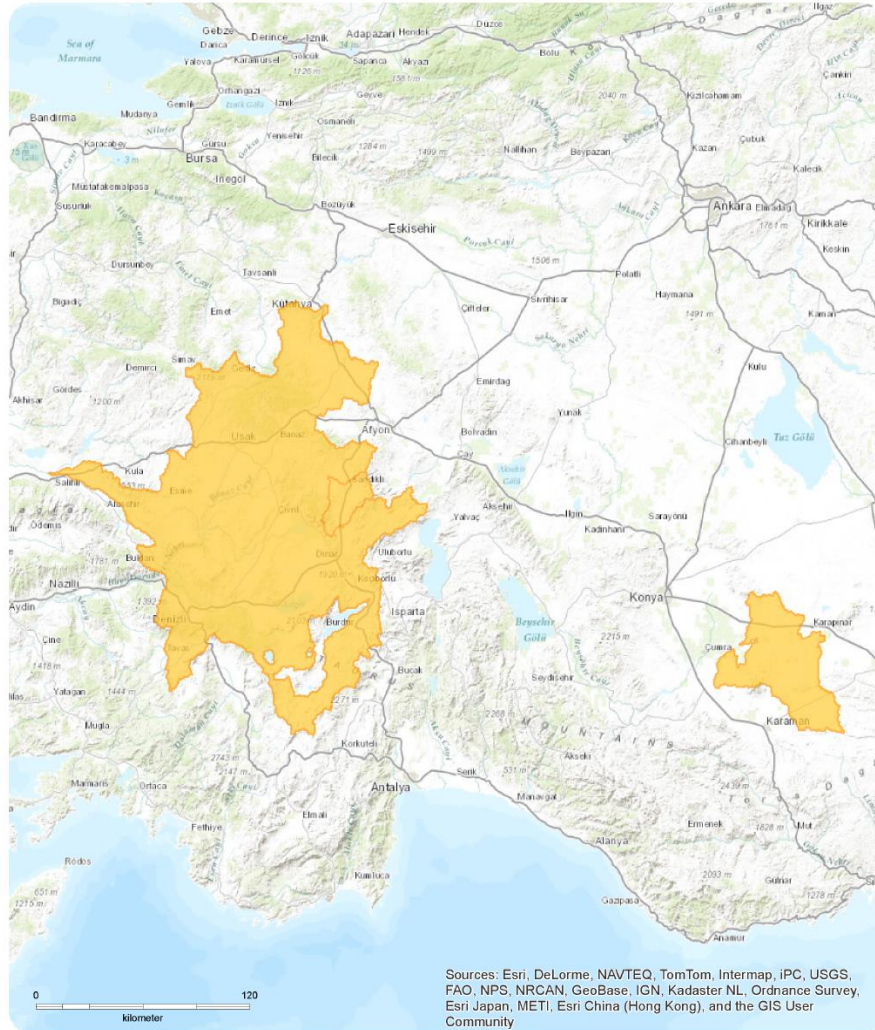
- 4 *Pseudophoxinus maeandricus* (native, endemic, Buyuk Menderes Basin)
IUCN Assessment Date: 8 Mar 2013 (Freyhof, J. 2014. *Pseudophoxinus maeandricus*. The IUCN Red List of Threatened Species 2014: e.T61349A19010083. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T61349A19010083.en>.)

Habitat and Ecology:

Streams and marshes among dense vegetation. This species is known from Karadirek Stream (25 km) near Sandikli, an isolated basin which flows underground to Isikli Spring and Hotamis Lake basin, Turkey. The Hotamis population was extirpated more than 10 years ago due to the draining of the marshes. Water abstraction, water retention by dams, pollution and reduced rainfall induced by climate change are major threats affecting this species

No Species Ecology and Distribution in Turkey

in Karadirek stream. The species has an extent of occurrence (EOO) of no more than 50 km² and is found in one location (based on water abstraction).



Pseudophoxinus maeandricus

Range

Extant

Compiled by:
Mediterranean Endemic
Freshwater Fish Red List
Workshop, Malaga, Spain, Dec.
2004 (2004)



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.




10.2.9.1.7. Aquatic Fauna – EN Fish Species (Presumed Present)

Amongst the fish species presumed to be present at the Project Area, one (1) is listed as **EN** as per the IUCN European Red List (LC as per IUCN Global):

- *Barbus pergamonensis* (native, not endemic)

The habitat and ecology of the above species is summarised below including the latest distribution maps as provided by the IUCN. The Project Area is considered to contain important concentrations of the above listed EN fish species to trigger Criterion 1(a) and/or 1(c). Thus, the species is considered as CH-qualifying species with **unconfirmed but presumed presence** within the Project Area.

No	Species Ecology and Distribution in Turkey
Fish	
1	<p><i>Barbus pergamonensis</i> (native, not endemic) IUCN Assessment Date: 5 Mar 2010 (Freyhof, J. & Kottelat, M. 2008. <i>Barbus pergamonensis</i>. The IUCN Red List of Threatened Species 2008: e.T135588A4153948. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T135588A4153948.en.)</p> <p><u>Habitat and Ecology:</u> Greece: Lesbos Island, stream Evergetoulas. Turkey: Rivers on the western coast (Aegean drainage) from Bakir to Buyuk Menderes. This species has a very restricted range within Europe. The species is impacted by pollution from industry, agriculture and domestic sources. Water abstraction and drought, which is predicted to be increasing in severity with climate change, are also potential threats. The species has an EOO of less than 5,000 km2 and is found in less than 5 locations in Europe.</p> <p>Distribution Map <i>Barbus pergamonensis</i></p>  <p>Legend ■ EXTANT (RESIDENT) ■ PROBABLY EXTANT (RESIDENT)</p> <p>Compiled by: IUCN (International Union for Conservation of Nature) 2008</p> <p>Least Concern</p> <p>The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.</p>

10.2.9.1.8. Aquatic Fauna – VU Fish Species (Directly Observed and Presumed Present)

As per IFC PS6 Guidance Note (June 2019), the threshold for Criterion 1(b) is defined as follows:

(b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a).

Amongst the fish species listed as VU as per the IUCN Global Red List, the Project Area is considered to support globally important concentrations of the following species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a). Therefore, the below fish species are considered to potentially trigger CH:

- *Chondrostoma holmwoodii* (native, endemic, observed in the current study in Gediz Basin)
- *Seminemacheilus lendlii* (native, endemic, presumed presence in Sakarya Basin)
- *Alburnus battalgilae* (native, endemic, presumed presence Gediz Basin)
- *Chondrostoma meandrense* (native, endemic, observed in previous studies in Gediz Basin)
- *Knipowitschia mermere* (native, endemic, presumed presence Gediz Basin)

The habitat and ecology of the above species is summarised below including the latest distribution maps as provided by the IUCN.

No Species Ecology and Distribution in Turkey

Fish

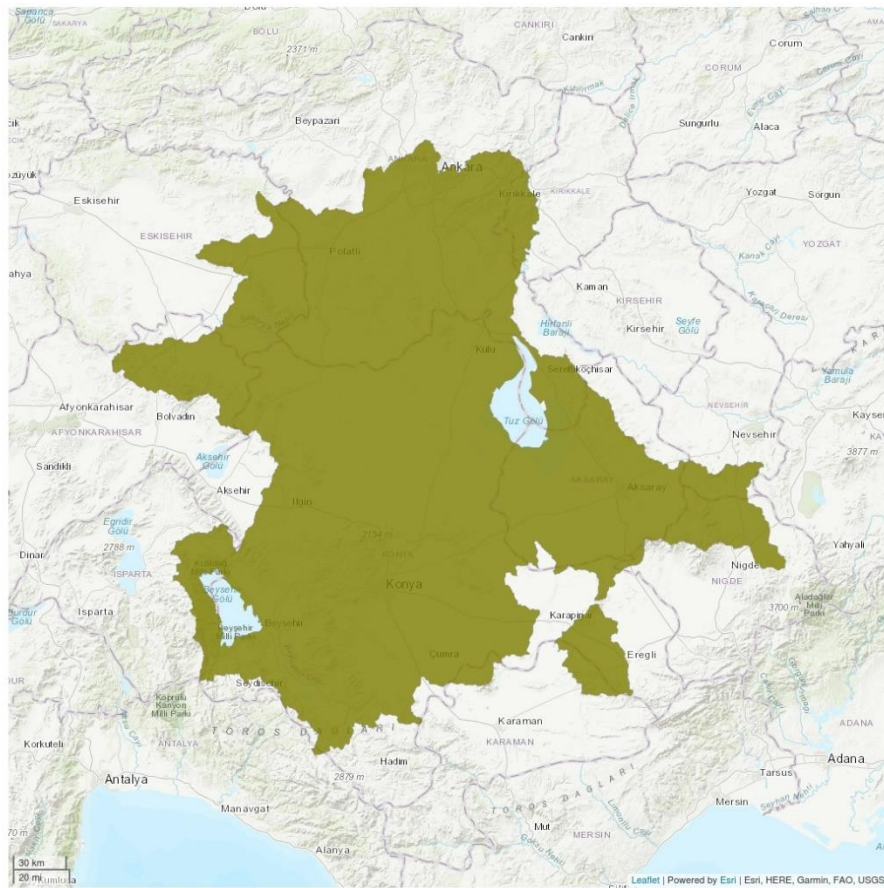
- 1 *Seminemacheilus lendlii* (Northern pond loach) (native, endemic, presumed presence in Sakarya Basin)
IUCN Assessment Date: 23 Jan 2013 (Freyhof, J. 2014. *Seminemacheilus lendlii*. The IUCN Red List of Threatened Species 2014: e.T39289A19007036. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T39289A19007036.en.>)

Habitat and Ecology:

Inhabits marshes, lakes, springs and streams sections with standing waters and dense vegetation. This species was widespread across Central Anatolia (Turkey), but it is now only known from isolated springs and tributaries to Lake Tuz, former Lake Sugla, and eastern Lake Beyşehir. It is impacted by the desiccation of Central Anatolia due to water abstraction and the construction of reservoirs. Furthermore, climate change models predict reduced rainfall in the area. Several marshes inhabited by this species have been completely or partly lost during the last few decades, and many huge lacustrine populations are now restricted to small springs and streams due to water abstraction. The species is still widespread, and its area of occupancy (AOO) is more than 2,000 km². However, based on the reduction in range and habitat availability, population decline over the past 10 years for this species is inferred to be at least 30%.

Distribution Map

Seminemacheilus lendlii



Legend

PROBABLY EXTANT (RESIDENT)

Compiled by:

IUCN (International Union for Conservation of Nature) 2014

NOT EVALUATED DATA DEFICIENT LEAST CONCERN NEAR THREATENED **VULNERABLE** ENDANGERED CRITICALLY ENDANGERED EXTINCT IN THE WILD EXTINCT



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.



No Species Ecology and Distribution in Turkey

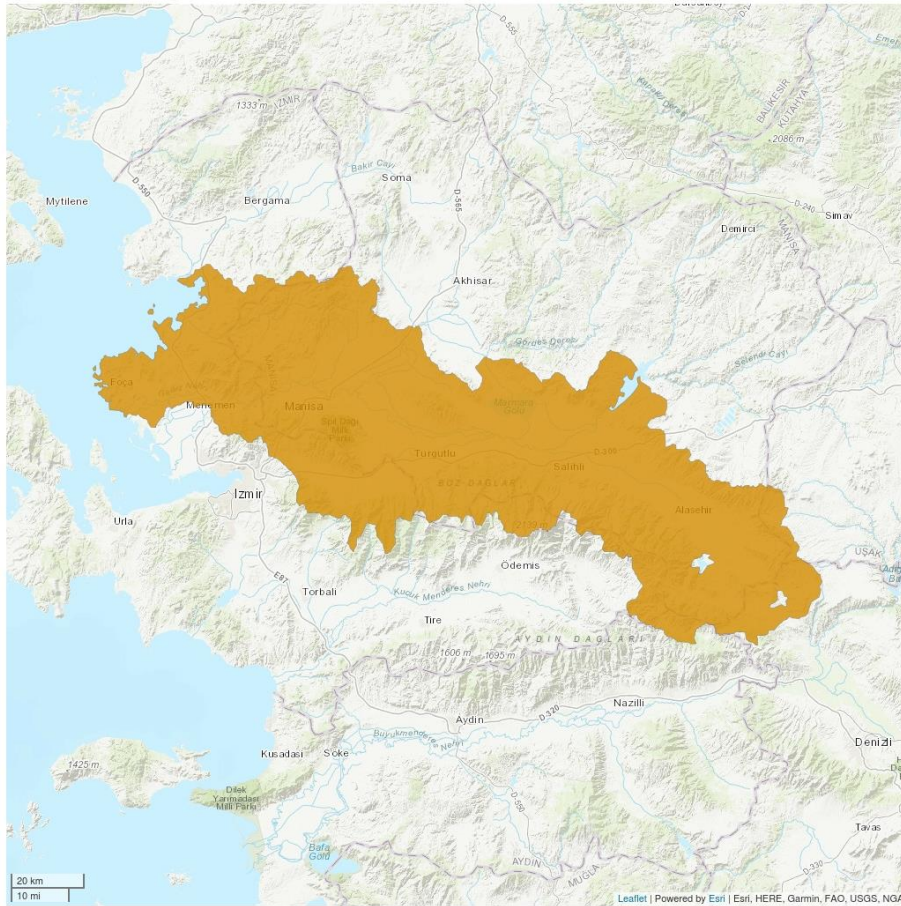
- 2 *Alburnus battalgilae* (Gediz shemaya) (native, endemic, presumed presence Gediz Basin)
IUCN Assessment Date: 28 Jan 2013 (Freyhof, J. 2014. *Alburnus battalgilae*. The IUCN Red List of Threatened Species 2014: e.T19018275A19222753. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19018275A19222753.en>.)

Habitat and Ecology:

Streams and rivers with standing or moderately fast flowing water. Also in lakes and reservoirs. Spawns in fast flowing water on submerged plants or on gravel. Lake populations migrate into in-flowing streams and rivers to spawn. This species is endemic to the lower Gediz and Koca drainage, Turkey. The species has disappeared from large areas of the Gediz drainage and is now only known to occur in between 5 and 10 tributaries of the lower Gediz (a total of about 80 km of stream length). The Koca drainage is small (20 km in length). The species has a total area of occupancy (AOO) estimated at 200 km². In the lower Gediz drainage and in Koca drainage, water is abstracted in large amounts, and pollution from agriculture is a serious threat. The species is found in between six and 11 locations based on water abstraction (surface) as the major threat, therefore the species is assessed as Vulnerable.

Distribution Map

Alburnus battalgilae



Legend

EXTANT (RESIDENT)

Compiled by:

IUCN (International Union for Conservation of Nature) 2014



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

- 3 *Chondrostoma meandrense* (Isikli nase) (native, endemic, observed in previous studies in Gediz Basin)

No Species Ecology and Distribution in Turkey

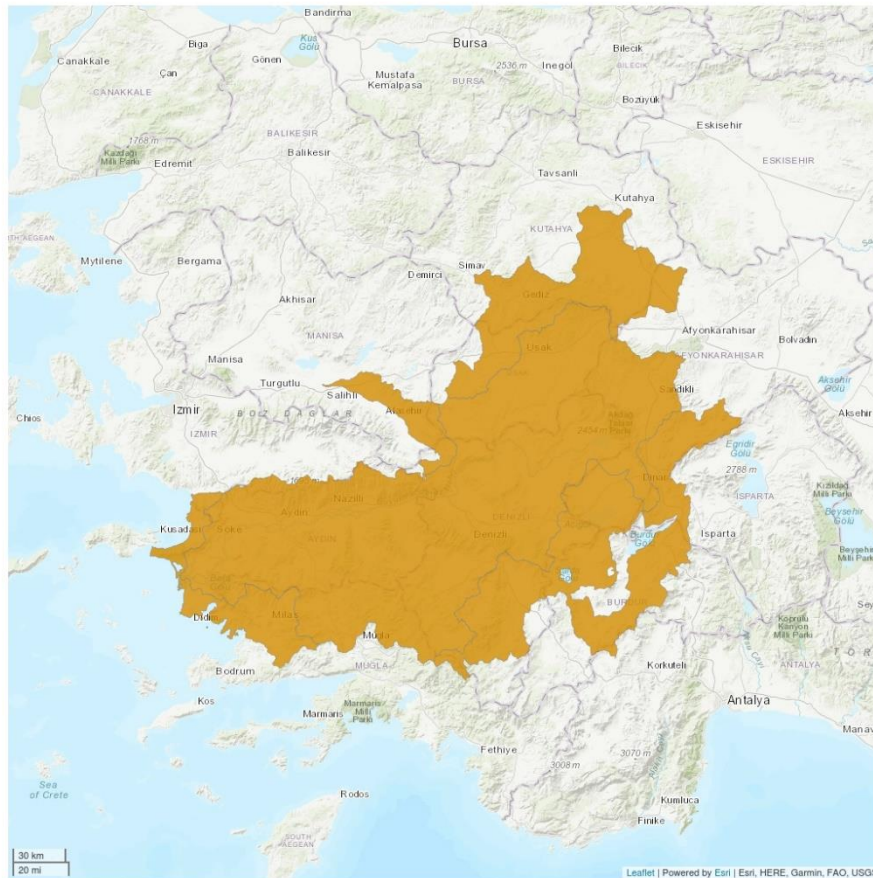
IUCN Assessment Date: 13 Mar 2013 (Freyhof, J. 2014. *Chondrostoma meandrense*. The IUCN Red List of Threatened Species 2014: e.T61191A19009010. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T61191A19009010.en>.)

Habitat and Ecology:

Medium sized streams and springs to large rivers with rocky or gravel substrate and swift to moderately fast current. This species is restricted to the Büyük Menderes drainage (estimated 25,000 km² basin area) where it is most abundant in Lake Işıklı basin. Water pollution from agriculture and surface and ground water extraction along the floodplain and industrial pollution in the lower floodplain are the major threats to this species, which also suffers from many dam constructions in the upper catchment and will be impacted by a reduction in rainfall due to climate change. The species is estimated to occur in fewer than 10 locations based on the major threat of water abstraction (the species mostly occurs in the middle and lower reaches of the river). Its extent of occurrence (EOO) is less than 20,000 km² and area of occupancy (AOO) is less than 2,000 km². No data are available on population trends. Believed to be declining as a result of many threats in the area.

Distribution Map

Chondrostoma meandrense



Legend
■ EXTANT (RESIDENT)

Compiled by:
Mediterranean Endemic Freshwater Fish Red List Workshop, Malaga,
Spain, Dec. 2004 (2004) 2014



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

No Species Ecology and Distribution in Turkey

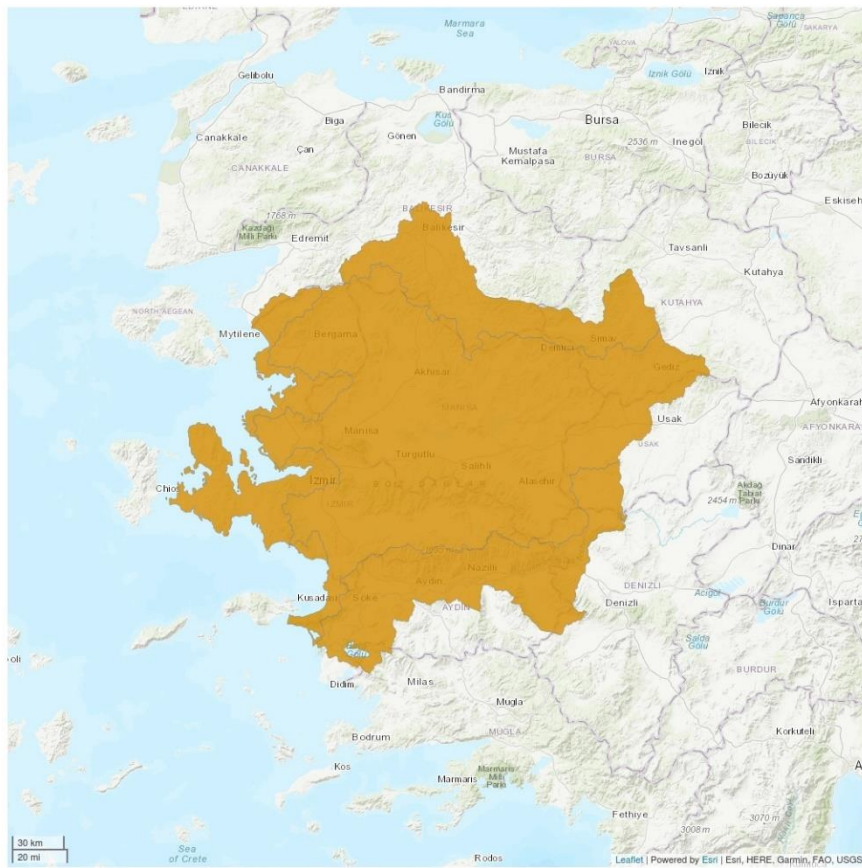
IUCN Assessment Date: 5 Mar 2013 (Freyhof, J. 2014. *Chondrostoma holmwoodii*. The IUCN Red List of Threatened Species 2014: e.T4787A19006425. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T4787A19006425.en>.)

Habitat and Ecology:

Medium sized streams to large rivers with rocky or gravel substrate and swift to moderately fast current. This species is known from the Kucuk Menderes, Tahtali (Izmir), Gediz and Bakir drainages in Western Anatolia, Turkey. It is believed to have vanished from Kuçuk Menderes drainage more than 10 years ago due to massive levels of water abstraction. While this species still has a relatively wide range, threats (water extraction and pollution) are very intense in the area and the species only occurs in a few sites that have enough water between dams and polluted areas, giving the species an estimated area of occupancy (AOO) of 600 km² (it occurs in an estimated 300 km of stream length). It is expected to exist in more than five but less than 10 independent subpopulations (which are treated as locations based on the threat of water abstraction). It is also believed to still be declining due to the intense threats. While there is no information on rate of population decline, it is suspected that over the past 10 years it has declined by at least 30% (but less than 50%). No data are available on population trends. It is believed to be declining due to many threats across its range.

Distribution Map

Chondrostoma holmwoodii



Legend
■ EXTANT (RESIDENT)

Compiled by:
Mediterranean Endemic Freshwater Fish Red List Workshop, Malaga,
Spain, Dec. 2004 (2004) 2014



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.



No Species Ecology and Distribution in Turkey

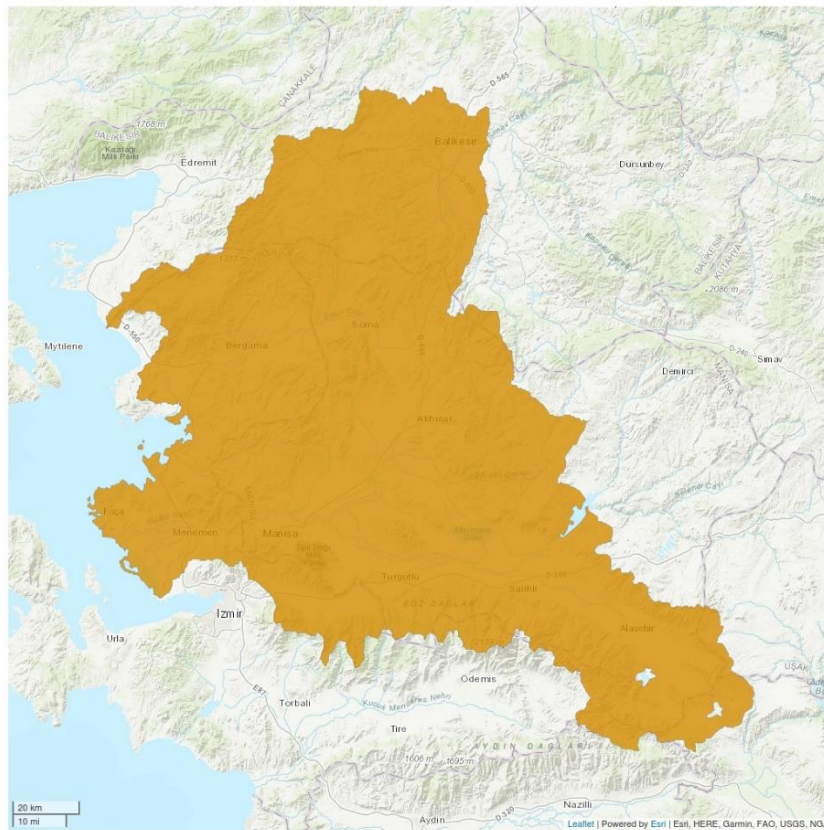
- 5 *Knipowitschia mermere* (Gediz dwarf goby) (native, endemic, presumed presence Gediz Basin)
IUCN Assessment Date: 13 Mar 2013 (Freyhof, J. 2014. *Knipowitschia mermere*. *The IUCN Red List of Threatened Species* 2014: e.T60824A19008530. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T60824A19008530.en>.)

Habitat and Ecology:

Inhabits lakes, reservoirs, standing or slowly flowing canals, and the lower sections of streams and river sections. This species is known from Lake Marmara and lower part of Gediz basin. It is also in the lower Madra river and most likely is more widely distributed between these sites in the rivers of the northern and central Aegean Sea in Anatolia. It has experienced large declines (which are still ongoing) due to massive water pollution in major rivers. It is known from more than five but less than 10 locations (based on pollution as the major threat), and its area of occupancy (AOO), based on the length of inhabited rivers, is estimated to be less than 2,000 km². There are no data available on population trends. It is declining in parts of its range as in Lake Marmara, which is slowly drying out, and in other slowly flowing streams. It is believed to have strongly declined and is now largely extirpated in Gediz river and most likely in Bakir river (not recorded yet) due to massive pollution of these rivers. In the past, it seems to have been able to build up huge populations in the reservoirs in Gediz drainage which might at least partly balance the losses in the natural habitats. The current trend is therefore believed to be decreasing due to the actual losses in the natural habitats.

Distribution Map

Knipowitschia mermere



Legend
■ EXTANT (RESIDENT)

Compiled by:
IUCN (International Union for Conservation of Nature) 2014



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.



10.2.9.2. Criterion 2 – Endemic and Restricted-range Species

The term endemic is defined as restricted range. Restricted range refers to a limited extent of occurrence (EOO).

- For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometers (km²).
- For marine systems, restricted-range species are provisionally being considered those with an EOO of less than 100,000 km².
- For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart).

As per IFC PS6 Guidance Note (June 2019), the threshold for Criterion 2 is defined as follows:

- Areas that regularly hold $\geq 10\%$ of the global population size AND ≥ 10 reproductive units of a species.

The biodiversity field survey conducted in Q1 2021 revealed confirmed and potential presence of endemic and restricted range flora/fauna species along the railway alignment and at the quarry locations. These species are screened considering the CH threshold as described below.

10.2.9.2.1. Flora Species (Directly Observed and Presumed Present)

Amongst the flora species directly observed during the site surveys, six (6) are listed as **local endemic**:

- *Glaucium secmenii* (observed at survey location R3 in Section 1 between KM 25+000-KM 50+000)
- *Alyssum niveum* (observed at survey location R2 in Section 1 between KM 0+000-KM 25+000)
- *Cephalaria aytachii* (observed at survey location R2 in Section 1 between KM 0+000-KM 25+000 and at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balıkdami Nationally Important Wetland)
- *Verbascum gypsicola* (observed at survey location R3 in Section 1 between KM 25+000-KM 50+000)
- *Marrubium zeydanlii* (observed at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balıkdami Nationally Important Wetland)
- *Acantholimon gemicianum* (observed at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balıkdami Nationally Important Wetland and amongst qualifying species of this wetland)

All the above species are observed in Gypsum Steppe habitat in Section 1, and all are also classified as CR as per the National Red List. It should be noted that, at Section 1 of the rail alignment, the construction activities (e.g. land clearance, excavation, ground disturbance) have already taken place before year 2018 along the expropriation corridor and thus impacts on these flora species along the alignment have already taken place. The species population information at the national level is not available. This said, publicly available information on geographical distribution of these species within Turkey is given above under Criterion 1 as all are also classified as CR.

These local endemic flora species are considered to have an EOO less than 50,000 km² and thus are restricted range flora species. Considering the geographical extent of these species, the Project Area is considered to trigger threshold for Criterion 2. Therefore, the above flora species are considered as CH-qualifying species with confirmed presence within the Project Area.

The following flora species presumed to be present at the Project Area are **local endemic** species:

- *Acantholimon riyatguelii* (CR, local endemic, Balıkdami Nationally Important Wetland qualifying species)

- *Ferula anatolica* Boiss. (CR, local endemic, presumed presence in Section 3)
- *Pyrus anatolica* Browicz (EN, local endemic, presumed presence in Section 3)

These local endemic flora species are considered to have an EOO less than 50,000 km² and thus are considered as restricted range flora species. Considering the geographical extent of these species, the Project Area is considered to trigger threshold for Criterion 2. Therefore, the above flora species are considered as CH-qualifying species with **unconfirmed but presumed presence** within the Project Area.

Amongst the **regional endemic** flora species directly observed during the site surveys, considering their reported geographical distribution as provided in Figure 10-25, the following are considered to potentially have an EOO less than 50,000 km² and thus could be considered as restricted range flora species:

- *Salvia aytachii* (IUCN National Red List: VU)
- *Sideritis gulendamii* (IUCN National Red List: VU)
- *Scutellaria yildirimlii* (IUCN National Red List: VU)
- *Verbascum antinori* (IUCN National Red List: VU)
- *Achillea ketenoglui* (IUCN National Red List: VU)
- *Scabiosa hololeuca* (IUCN National Red List: EN)

No	Species Ecology and Distribution in Turkey ⁶²
Flora	
1	<p><i>Salvia aytachii</i></p> <p>Conservation status: Regional endemic, Acikir Steppes KBA qualifying species</p> <p>Phytogeographic Region: Irano-Turan</p> <p>Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Lamiaceae, Genus: Salvia</p> <p>Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Rare</p> <p>Seed Collection Period: July-August, Seed Plantation Period: October-November, Flowering Period: June-July</p> 
2	<p><i>Sideritis gulendamii</i></p> <p>Conservation status: Regional endemic</p> <p>Phytogeographic Region: Irano-Turan</p>

⁶² Source: Bizim Bitkiler, <https://bizimbitkiler.org.tr/yeni/demos/technical/>.

No Species Ecology and Distribution in Turkey⁶²

Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Lamiaceae, Genus: Salvia

Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Rare

Seed Collection Period: July-August, Seed Plantation Period: October-November, Flowering Period: June-July



3 Scutellaria yildirimlii

Conservation status: Regional endemic

Phytogeographic Region: Irano-Turan

Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Lamiaceae, Genus: Scutellaria

Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Rare

Seed Collection Period: July-August, Seed Plantation Period: October-November, Flowering Period: June-July



4 Verbascum antinori

Conservation status: Regional endemic

Phytogeographic Region: Mediterranean

Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Scrophulariaceae, Genus: Verbascum

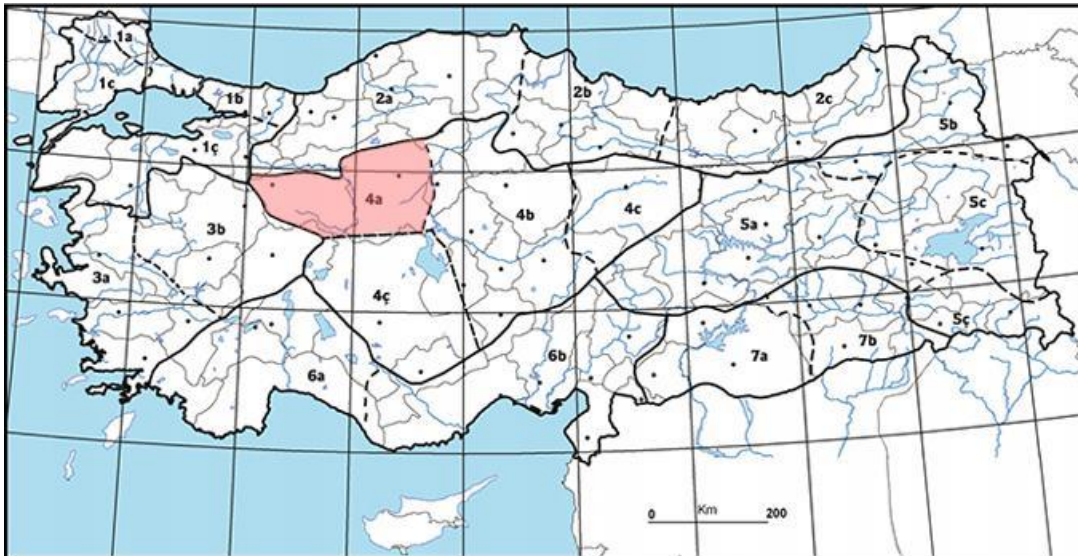
Habitat Type: Maquis, Relative Abundance: Moderately rare

Seed Collection Period: July-August, Seed Plantation Period: October-November, Flowering Period: May

No Species Ecology and Distribution in Turkey⁶²



- 5 *Achillea ketenoglui*
Conservation status: Regional endemic, Acikir Steppes KBA qualifying species
Phytogeographic Region: Iran-Turan
Divisio: Magnoliophyta, Subclassis: Magnoliidae, Familia: Asteraceae, Genus: Achillea
Habitat Type: Gypsum Steppe Habitat, Relative Abundance: Rare
Seed Collection Period: July-August, Seed Plantation Period: October-November, Flowering Period: May-July



- 6 *Scabiosa hololeuca* – Please see assessment under Criterion 1

For the abovementioned directly observed regional endemic species, the Project Area is considered to **potentially trigger** threshold for Criterion 2. Thus, these species are considered as potential CH-qualifying species with confirmed presence within the Project Area.

The following regional endemic flora species that qualify Balikdami Nationally Important Wetland is reported to be geographically distributed in Western Black Sea Region as provided in Figure 10-25:

- *Acantholimon anatolicum* (regional endemic)

Taking into account the geographical distribution, the Project Area is not considered to potentially trigger threshold for Criterion 2 for the above species but trigger only Criterion 1(c).

As explained in Chapter 1 of this ESIA Report, Section 3 of the Project was not part of the ESIA baseline study at the time the site surveys were conducted. This said, based on the extensive previous site experience in the vicinity of the Project Area, the senior flora expert identified the following local and regional endemic flora species as presumed to be present in Section 3 of the Project.

Taking into account the geographical distribution of the species within Turkey as presented in Figure 10-25, the following species are considered to potentially have an EOO less than 50,000 km² and thus could be considered as restricted range flora species:

- *Ferula anatolica* Boiss. (CR, local endemic)
- *Pyrus anatolica* Browicz (EN, local endemic)
- *Ebenus plumosa* Boiss. & Bal. var. *plumosa* (EN, regional endemic)

For the above local and regional endemic flora species, the Project Area is considered to **potentially trigger** threshold for Criterion 2. Thus, these species are considered as potential CH-qualifying species with **unconfirmed but presumed presence** within the Project Area.

10.2.9.2.2. Terrestrial Fauna Species (Presumed Present)

Amongst the fauna species presumed to be present at the Project Area, the below two (2) are **endemic**:

- *Anatololacerta anatolica* (Anatolian Rock Lizard)
- *Microtus anatolicus* (Anatolian Vole)

The reptile species *Anatololacerta anatolica* (Anatolian Rock Lizard) is endemic to Turkey and distributes mostly in Aegean region up to western part of central Anatolia in Turkey (see Figure 10-31).

This species is present in western Anatolia in the region north of the Buyuk Menderes River in Turkey and the island of Samos in Greece. It occurs from sea level up to 1,600 m asl. It is a common species and is associated with rocky areas in open woodland and Mediterranean forest. It can also occur in degraded forest that has been grazed by cattle.

Its preferred habitat type is rocky areas with trees and bushes close to water sources. This species is presumed to be present at the survey locations Q9, Q10, Q11 in Section 2 and Q12 in Section 4 of the Project.



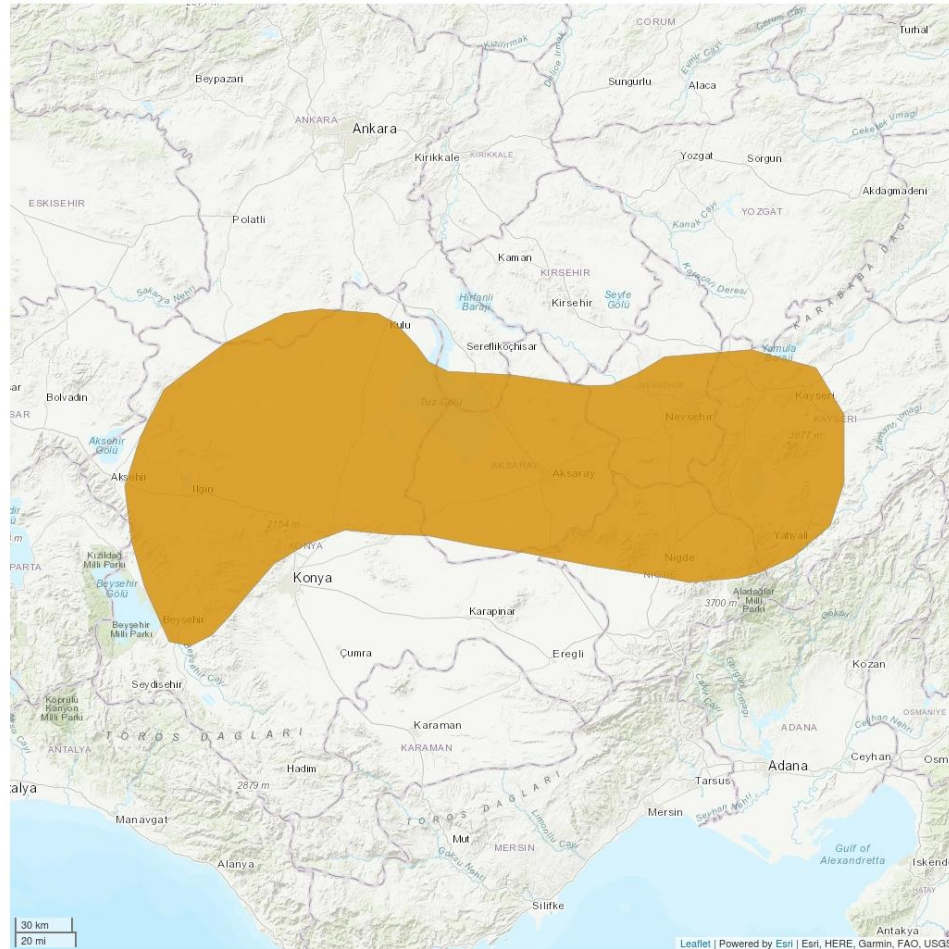
Figure 10-31. Distribution of Endemic Reptile Species *Anatololacerta anatolica* in Turkey (Baran et al. 2021)

Microtus anatolicus (Anatolian Vole) is endemic to Turkey and distributed mostly in the steppes of Central Anatolia Region⁶³. Its distribution limits are poorly known, but it appears to be restricted to southern parts of central Anatolia as given below.

This species is found in areas with dry alkaline soil vegetated sparsely with halophytic plants. It can also be found in areas of sugar beet agriculture during the harvest season only (at other times of the year the species is absent from sugar beet fields). As reported by the IUCN, this species lives in small colonies and the current population trend is unknown.

Distribution Map

Microtus anatolicus

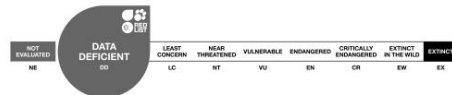


Legend

EXTANT (RESIDENT)

Compiled by:

IUCN (International Union for Conservation of Nature) 2008



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

⁶³ Yigit, N., Kryštufek, B. & Kefelioglu, H. 2008. *Microtus anatolicus*. The IUCN Red List of Threatened Species 2008: e.T136237A4263837. <https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T136237A4263837.en>. Downloaded on 30 May 2021.

As reported in Table 10-23, it is presumed to be present in Section 1 at survey locations from R1 to R7 (KM 0+000 to KM 100+000) and quarry locations Q1 to Q5 (KM 0+000 to KM 100+000). As provided in the site photos given in Figure 10-27, burrows potentially belonging to this species have been observed during the site survey.

For terrestrial vertebrates, restricted-range species are defined as those species that have an EOO less than 50,000 km². Taking into account the geographical distribution of the species, both are not considered as restricted range fauna species. Thus, the Project Area is not considered to potentially trigger threshold for Criterion 2 for the above species.

10.2.9.2.3. Aquatic Fauna – Endemic Fish Species (Directly Observed)

Amongst the fish species directly observed at the Project Area, the below ten (10) are listed as endemic:

- (1) *Cobitis simplicispina*
- (2) *Oxynoemacheilus angorae*
- (3) *Oxynoemacheilus banarescui*
- (4) *Alburnus escherichii*
- (5) *Barbus escherichii*
- (6) *Capoeta tinca*
- (7) *Capoeta bergamae*
- (8) *Chondrostoma holmwoodii*
- (9) *Squalius fellowesii*
- (10) *Squalius pursakensis*

The information on habitat and ecology and the distribution of the above listed species in Turkey is given below.

For Criterion 2, the term endemic is defined as restricted range and restricted range refers to a limited extent of occurrence (EOO). For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart).

Based on the information provided below and as per the assessment of Prof. Dr. Aydin Akbulut, besides *Chondrostoma holmwoodii*, none of the above endemic fish species are considered to trigger Criterion 2 and thus qualify as CH.

Amongst the above group of directly observed endemic fish species, only *Chondrostoma holmwoodii* is considered a CH-qualifying species with confirmed presence within the Project Area.

No Species Ecology and Distribution in Turkey

Fish

- 1 *Cobitis simplicispina* (Galatian Spined Loach) (native, endemic, observed in the current study in Sakarya Basin)
IUCN Assessment Date: 5 Feb 2014 (Freyhof, J. 2014. *Cobitis simplicispina*. The IUCN Red List of Threatened Species 2014: e.T19085613A19222998. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19085613A19222998.en>.)

Habitat and Ecology:

Streams with still to moderately flowing clear water and mud or sand bottom. Also in lakes and reservoirs. Despite ongoing threats, the species is still widespread and locally abundant and seems not to qualify for a threat category. This species is widespread in Turkey; Sakarya and Kizilirmak drainages and endorheic basins of Lakes Eber, Akşehir and Ilgin in Central Anatolia. Widespread but seems to be restricted to few sites within the large distribution area. Locally abundant even in heavily modified habitats. Most likely, the population trend is stable or slowly declining. Has almost vanished from Lakes Eber and Akşehir as these lakes have almost dried out and are heavily polluted.

Distribution Map



Cobitis simplicispina

Range

Probably Extant

Compiled by:



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© The IUCN Red List of Threatened Species: *Cobitis simplicispina* – published in 2014.
<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19085613A19222998.en>

No Species Ecology and Distribution in Turkey

- 2 *Oxynoemacheilus angorae* (Sakarya loach) (native, endemic, observed in the current study in Sakarya and Akarcay Basins)

IUCN Assessment Date: 9 Jan 2013 (Freyhof, J. 2014. *Oxynoemacheilus angorae*. The IUCN Red List of Threatened Species 2014: e.T14493A19849461. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T14493A19849461.en>.)

Habitat and Ecology:

Inhabit a wide range of habitats from fast running mountain streams and shores of large rivers to muddy lakes with dense vegetation. Only moderately rheophilic avoiding very fast currents. Spawns for the first time usually at 1 year; most individuals spawn 1–2 seasons. Multiple spawner. Feeds on relative large benthic invertebrates. Tolerant to moderate organic pollution and stream canalisation. This species is endemic to Marmara and Black Sea basin from Simav east to Kizilirmak drainages and in endorheic drainage basins of Lakes Ilgin, Eber and Akşehir. Parts of the populations have been strongly impacted and many are even extirpated by ongoing threats. This situation will be even worse in the future. However, this species is so widespread that this does not qualify for a threat category and it is therefore assessed as Least Concern.

No Species Ecology and Distribution in Turkey

Distribution Map



Oxynoemacheilus angorae

Range

Probably Extant

Compiled by:
IUCN (International Union for
Conservation of Nature)



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© The IUCN Red List of Threatened Species: *Oxynoemacheilus angorae* – published in 2014.
<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T14493A19849461.en>

- 3 *Oxynoemacheilus banarescui* (Paphlagonian Loach) (native, endemic, observed in the current study in Sakarya Basin)

IUCN Assessment Date: 9 January 2013 (Freyhof, J. 2014. *Oxynoemacheilus banarescui*. *The IUCN Red List of Threatened Species* 2014: e.T19385139A19849370. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19385139A19849370.en>.)

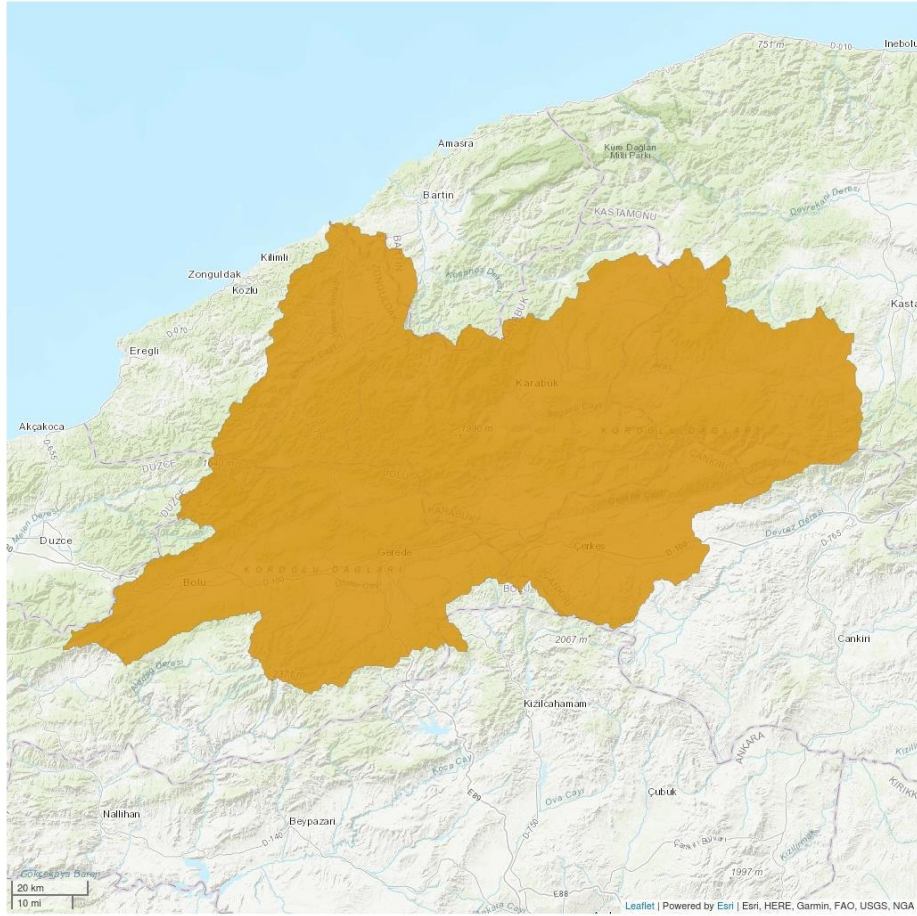
Habitat and Ecology:

Fast flowing streams and rivers with gravel or rocky substrate. This species is only known from the Filyos catchment (with an estimated extent of occurrence (EOO) of less than 20,000 km²) where it is abundant in many streams and rivers. The species is being impacted by the construction of dams (as it will not live in reservoirs) but it is not expected to decline fast enough to qualify for a threatened category at present. Based on the nature of the impact of the dams, the species is also known from many locations (greater than 10). It is assessed as Near Threatened as it is close to meeting Vulnerable under criterion B1. This species is endemic to Turkey, Filyos (Mengen) drainage in the central Black Sea basin.

No Species Ecology and Distribution in Turkey

Distribution Map

Oxynoemacheilus banarensi



Legend

■ EXTANT (RESIDENT)

Compiled by:

IUCN (International Union for Conservation of Nature) 2014



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.



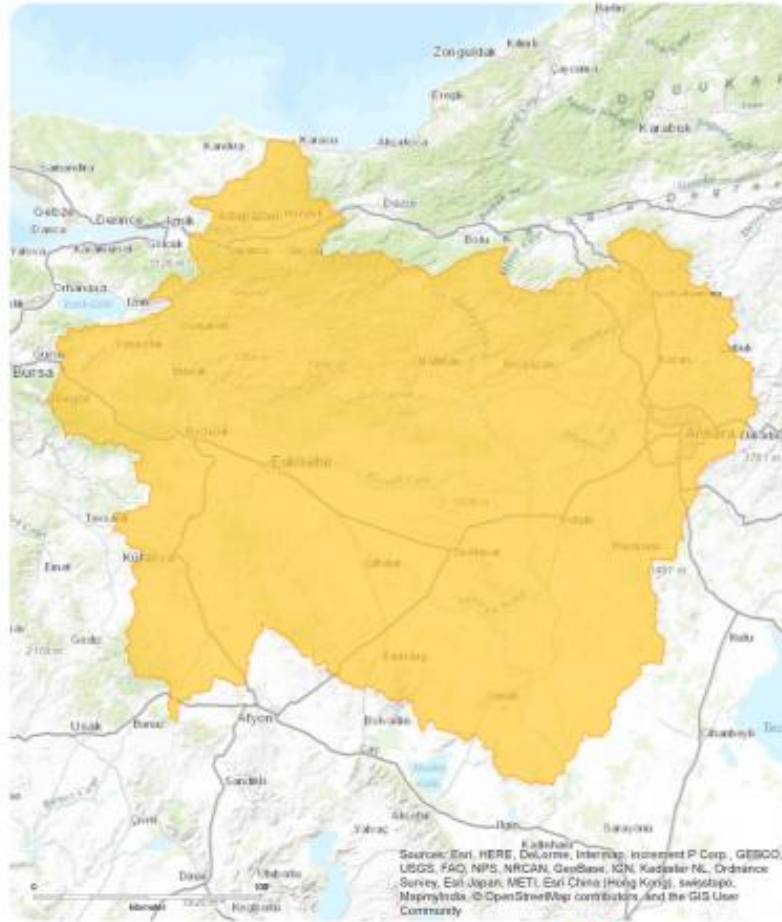
- 4 *Alburnus escherichii* (Sakarya bleak) (native, endemic, observed in the current study in Sakarya Basin)
IUCN Assessment Date: 28 Jan 2013 (Freyhof, J. 2014. *Alburnus escherichii*. The IUCN Red List of Threatened Species 2014: e.T19018485A19222778. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19018485A19222778.en>.)

Habitat and Ecology:

Inhabits a wide range of stream and river habitats including lakes and reservoirs. Lacustrine populations migrate to inflowing rivers or streams to spawn. This species is endemic to Turkey, Sakarya drainage. Introduced in Lake Beyşehir basin in Central Anatolia, Manavgat river in Mediterranean basin and most likely elsewhere. Very widespread and usually abundant in all kinds of habitats in Sakarya drainage. This species seems to be able to cope with most threats in the area. Most likely its population trend is stable. This species is very widespread and especially tolerant against most threats and is therefore assessed as LC.

No Species Ecology and Distribution in Turkey

Distribution Map



Alburnus escherichii

Range

Extant

Compiled by:
IUCN (International Union for
Conservation of Nature)



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© The IUCN Red List of Threatened Species: *Alburnus escherichii* – published in 2014.
<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19018485A1922778.en>

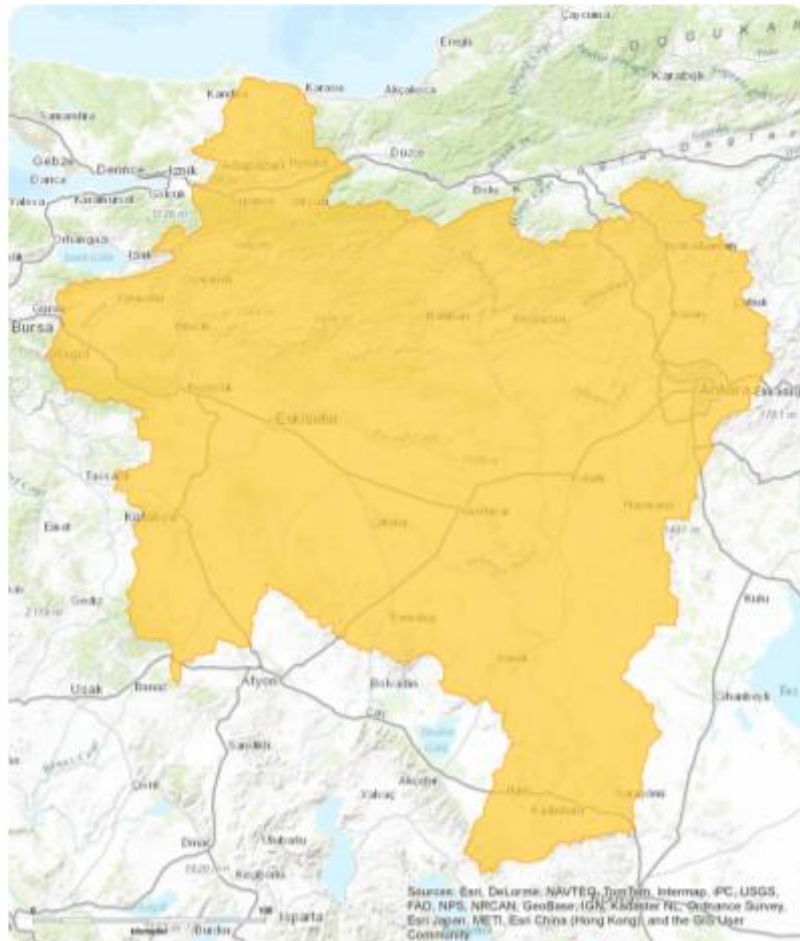
- 5 *Barbus escherichii* (Sakarya barbell) (native, endemic, observed in the current study in Sakarya Basin)
IUCN Assessment Date: 30 Jan 2013 (Freyhof, J. 2014. *Barbus escherichii*. The IUCN Red List of Threatened Species 2014: e.T19887669A43096089. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19887669A43096089.en>.)

Habitat and Ecology:

Large rivers to medium sized streams with gravel bottom. Spawns in riffles and rapids. Inhabits also reservoirs from which it migrates to inflowing streams or rivers to spawn. This species is endemic to Turkey, Sakarya drainage. While it is widespread and often abundant within its distribution range, the many threats in the area suggest at least a small decline. While there are many threats in the area affecting this species, it seems that these have not and will not lead to a decline matching with any of the threat criteria or with NT. The species is therefore assessed as LC.

No Species Ecology and Distribution in Turkey

Distribution Map



Barbus escherichii

Range

Extant

Compiled by:
IUCN (International Union for
Conservation of Nature)



The boundaries of the range shown on this map are not official boundaries, boundaries in general by IUCN.

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<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19027398A19222903.en>

- 6 *Capoeta tinca* (Fourbarbel scraper) (native, endemic, observed in the current study and in literature in Sakarya Basin)
IUCN Assessment Date: 18 Mar 2013 (Freyhof, J. 2014. *Capoeta tinca*. The IUCN Red List of Threatened Species 2014: e.T19027398A19222903. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19027398A19222903.en>.)

Habitat and Ecology:

Inhabits a wide range of habitats ranging from large lakes, rivers and streams to reservoirs. This species is endemic to Turkey, Southern tributaries of Marmara Sea from Lake Iznik basin west to Simav drainage. While there are many threats in the area and the species is suspected to decline slowly, it has still many independent populations and most likely the decline is not large enough to qualify this species for NT or any of the threat categories. It is therefore assessed as LC.

No Species Ecology and Distribution in Turkey

Distribution Map



Capoeta tinca

Range

Extant

Compiled by:



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or approval by IUCN.

© The IUCN Red List of Threatened Species: *Capoeta tinca* – published in 2014.
<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19027398A19222903.en>

- 7 *Capoeta bergamae* (Aegean scraper) (native, endemic, observed in the current study in Gediz Basin)
IUCN Assessment Date: 02 Feb 2013 (Freyhof, J. 2014. *Capoeta bergamae*. *The IUCN Red List of Threatened Species* 2014: e.T60399A19007393. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T60399A19007393.en>.)

Habitat and Ecology:

Inhabits a wide range of rivers and streams with clean, at least seasonally running water. This species is known from the Bakacak river on Biga peninsula, south to Dalaman river, Turkey. Massive pollution of rivers and streams, water abstraction, and water retention by dams are the most important threats to this species and it has been extirpated in many areas. It is suspected that the species has declined by almost 30% over the past 10 years. Its range is large range: extent of occurrence (EOO) and area of occupancy (AOO) are significantly higher than the thresholds for

No Species Ecology and Distribution in Turkey

Vulnerable under criterion B. Also there are many more than 10 independent populations (locations) as the species is still found in many tributaries to rivers (especially in the northern part of its range). It is assessed as Near Threatened based on a suspected decline of almost 30% over the last 10 years (nearly meets Vulnerable under criterion A2).

Distribution Map

Capoeta bergamae



Legend

■ EXTANT (RESIDENT)

Compiled by:

Mediterranean Endemic Freshwater Fish Red List Workshop, Malaga, Spain, Dec. 2004 (2004) 2014



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

8 *Chondrostoma holmwoodii*

Please see assessment under Criterion 1.

9 *Squalius fellowesii* (Aegean chub) (native, endemic, observed in the current study in Gediz Basin)

IUCN Assessment Date: 11 Mar 2013 (Freyhof, J. 2014. *Squalius fellowesii*. The IUCN Red List of Threatened Species 2014: e.T19451307A19849380. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19451307A19849380.en>.)

Habitat and Ecology:

Inhabits a wide range of streams and rivers and including lakes and reservoirs from which it migrates to inflowing streams to spawn. This species is widespread in the Aegean basin of Anatolia, Turkey. Known from Eşen, Dalaman,

No Species Ecology and Distribution in Turkey

Büyük Menderes, Gediz, Bakır and Madra drainages. A widespread species that is locally impacted but these threats are not thought to cause the species to qualify for a threatened or Near Threatened category. It is therefore assessed as LC.

Distribution Map



Squalius fellowesii

Range

Probably Extant

Compiled by:
IUCN (International Union for
Conservation of Nature)



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or approval by IUCN.

© The IUCN Red List of Threatened Species: *Squalius fellowesii* – published in 2014.
<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19451307A19849380.en>

- 10 *Squalius pursakensis* (Sakarya Chub) (native, endemic, observed in the current study in Sakarya Basin)
IUCN Assessment Date: 11 Mar 2013 (Freyhof, J. 2014. *Squalius pursakensis*. The IUCN Red List of Threatened Species 2014: e.T19452314A19848657. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19452314A19848657.en>.)

Habitat and Ecology:

Inhabits a very wide range of habitats from small streams to large rivers, lakes and reservoirs. The species is endemic to the Sakarya drainage, which flows to the Black Sea, Turkey. While there are many threats in the area (dams and pollution) none seem to be strong enough to seriously impact this species. The species occurs in many more than 10 independent sites (locations) and its population may be stable or if declining is doing so very slowly. It is therefore assessed as LC.

No Species Ecology and Distribution in Turkey

Distribution Map



Squalius pursakensis

Range

Probably Extant

Compiled by:
IUCN (International Union for
Conservation of Nature)



The boundaries and names shown and the designations used on this map do not imply any official endorsement, approval or opinion by IUCN.

© The IUCN Red List of Threatened Species: *Squalius pursakensis* – published in 2014.
<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19452314A19848657.en>

10.2.9.2.4. Aquatic Fauna – Endemic Fish Species (Presumed Present)

Amongst the fish species presumed to be present at the Project Area, the below fifteen (15) are listed as endemic:

- (1) *Cobitis kurui*
- (2) *Oxynoemacheilus simavicus*
- (3) *Seminemacheilus lendlii*
- (4) *Alburnus nasreddini*
- (5) *Alburnus battalgilae*
- (6) *Ladigesocypris mermere*
- (7) *Luciobarbus lydianus*
- (8) *Capoeta baliki*
- (9) *Capoeta sieboldii*
- (10) *Chondrostoma angorense*
- (11) *Chondrostoma meandrense*
- (12) *Pseudophoxinus maeandricus*
- (13) *Aphanius villwocki*
- (14) *Knipowitschia mermere*
- (15) *Gobio sakaryaensis*

The information on habitat and ecology and the distribution of the above listed species in Turkey is given below. For Criterion 2, the term endemic is defined as restricted range and restricted range refers to a limited extent of occurrence (EOO). For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart).

Based on the information provided below and as per the assessment of Prof. Dr. Aydin Akbulut, the following presumed present endemic fish species are considered to trigger Criterion 2 and thus qualify as CH with unconfirmed but presumed presence within the Project Area:

- (1) *Oxynoemacheilus simavicus*
- (2) *Seminemacheilus lendlii*
- (3) *Alburnus nasreddini*
- (4) *Alburnus battalgilae*
- (5) *Chondrostoma meandrense*
- (6) *Pseudophoxinus maeandricus*
- (7) *Aphanius villwocki*
- (8) *Knipowitschia mermere*
- (9) *Gobio sakaryaensis*

No Species Ecology and Distribution in Turkey

Fish

- 1 *Cobitis kurui* (Kuru loach) (native, endemic, presumed to be present in the Gediz Basin, according to literature)
IUCN Assessment Date: 31 Jan 2006 (Erk'akan, F. & Karataş, A. . 2006. *Cobitis kurui*. *The IUCN Red List of Threatened Species* 2006: e.T60734A12402234. <https://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T60734A12402234.en>.)

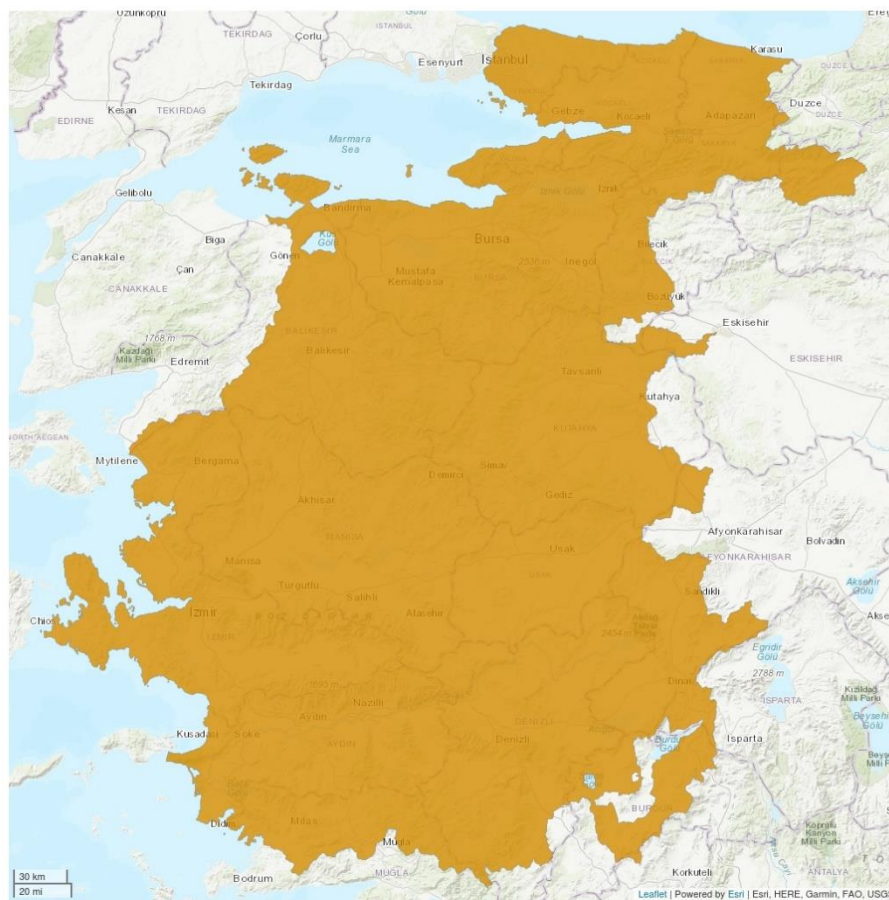
Habitat and Ecology:

A riverine species. *C. kurui* is restricted to western Anatolia streams and rivers down to the Menderes river, Turkey.

This species has a relatively wide distribution in Turkey and is abundant. Pollution and introduced species are threats causing some population decline, but this is not believed to be serious at present. Currently Least Concern.

Distribution Map

Cobitis kurui



Legend
■ EXTANT (RESIDENT)

Compiled by:
Mediterranean Endemic Freshwater Fish Red List Workshop, Malaga,
Spain, Dec. 2004 (2004) 2006



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

- 2 *Oxynoemacheilus simavicus* – Please see assessment under Criterion 1
- 3 *Seminemacheilus lendlii* – Please see assessment under Criterion 1
- 4 *Alburnus nasreddini* – Please see assessment under Criterion 1
- 5 *Alburnus battalgilae* – Please see assessment under Criterion 1
- 6 *Ladigesocypris mermere* (native, endemic, presumed to be present in the Gediz Basin, according to literature)

No Species Ecology and Distribution in Turkey

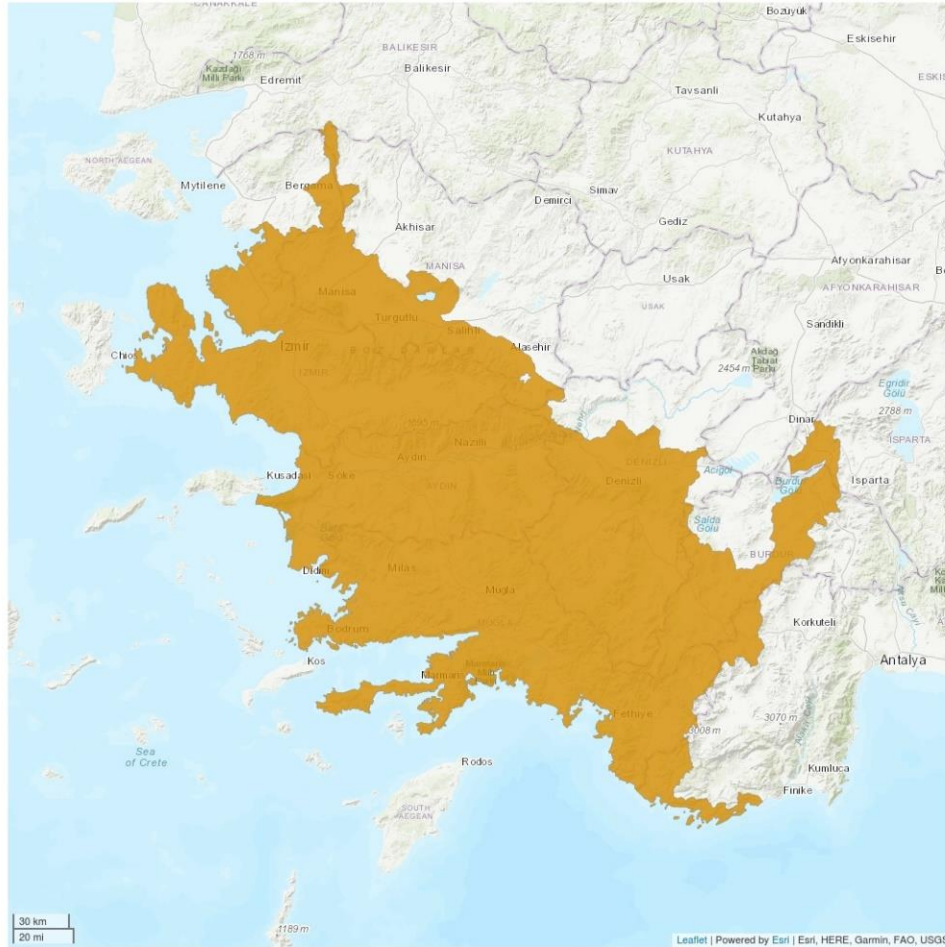
IUCN Assessment Date: 31 Jan 2006 (Crivelli, A.J. 2006. *Ladigesocypris mermere*. *The IUCN Red List of Threatened Species* 2006: e.T61384A12469960. <https://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T61384A12469960.en>.)

Habitat and Ecology:

The taxonomy of this fish is very uncertain and there are poor data available on its distribution and abundance. Known only from a few specimens collected from one locality. No data on population size or trends. Data Deficient.

Distribution Map

Ladigesocypris mermere

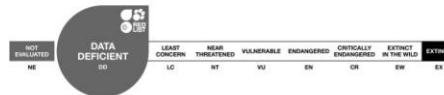


Legend

■ EXTANT (RESIDENT)

Compiled by:

Mediterranean Endemic Freshwater Fish Red List Workshop, Malaga, Spain, Dec. 2004 (2004) 2006



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

7 *Luciobarbus lydianus* (Lydian barbel) (native, endemic, presumed to be present in the Gediz Basin, according to literature)

IUCN Assessment Date: 18 Mar 2013 (Freyhof, J. 2014. *Luciobarbus lydianus*. *The IUCN Red List of Threatened Species* 2014: e.T19383301A19848647. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19383301A19848647.en>.)

No Species Ecology and Distribution in Turkey

Habitat and Ecology:

Large to medium sized streams and rivers with moderate current. Also inhabits reservoirs from which it is believed to migrate to inflowing streams to spawn. Known from Bakacak stream on Biga Peninsula west to Çanakkale and south to Gediz, Turkey. Known from Bakacak stream on Biga Peninsula west to Çanakkale and south to Gediz, Turkey. Widespread and locally abundant, this species is believed to be slowly declining due to pollution and water abstraction, however not at a rate that would qualify the species for a threatened category or Near Threatened. The species is assessed as Least Concern.

Distribution Map

Luciobarbus lydianus



Legend

EXTANT (RESIDENT)

Compiled by:

IUCN (International Union for Conservation of Nature) 2014



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

- 8 *Capoeta baliki* (Siraz) (native, endemic, presumed to be present in the Sakarya Basin, according to literature)
IUCN Assessment Date: 02 Feb 2013 (Freyhof, J. 2014. *Capoeta baliki*. *The IUCN Red List of Threatened Species* 2014: e.T19024691A19222843. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19024691A19222843.en>.)

Habitat and Ecology:

No Species Ecology and Distribution in Turkey

Very ubiquitous inhabitant of a wide range of water bodies at least temporarily connected to running waters as springs, streams, rivers and cold headwaters down to lakes, reservoirs and large rivers. This species is endemic From Sakarya to Yeşilirmak drainage, Turkey. The species is known from many rivers and streams and is often very abundant. While there are many threats within its range, none seems to affect the species enough to result in a population decline strong enough to meet any of the thresholds for a threatened category or NT. It therefore assessed as LC.

Distribution Map



Capoeta baliki

Range

Probably Extant

Compiled by:
IUCN (International Union for
Conservation of Nature)



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© The IUCN Red List of Threatened Species: *Capoeta baliki* – published in 2014.
<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19024691A19222843.en>

- 9 *Capoeta sieboldii* (Nipple-lip scraper) (native, endemic, presumed to be present in the Sakarya Basin, according to literature)
IUCN Assessment Date: 17 Feb 2013 (Freyhof, J. 2014. *Capoeta sieboldii*. The IUCN Red List of Threatened Species 2014: e.T19026443A19222898. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19026443A19222898.en>.)

No Species Ecology and Distribution in Turkey

Habitat and Ecology:

Inhabits a wide range of rivers and larger streams. Also inhabits reservoirs, from which it migrates to rivers and streams to spawn. This species is endemic to Sakarya east at least to Yeşilirmak, Turkey, eastern border of not clear. This species is very widespread and inhabits a very wide range of habitats at least seasonally connected to rivers or streams. It is expected to decline slowly but not to a level that would allow an assessment as NT or any threat category. It is therefore assessed as LC.

Distribution Map



Capoeta sieboldii

Range

Probably Extant

Compiled by:
IUCN (International Union for
Conservation of Nature)



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© The IUCN Red List of Threatened Species: *Capoeta sieboldii* – published in 2014.
<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19026443A19222898.en>

- 10 *Chondrostoma angorense* (Black sea nose) (native, endemic, observed in the previous studies in Sakarya Basin)
IUCN Assessment Date: 26 Feb 2013 (Freyhof, J. 2014. *Chondrostoma angorense*. *The IUCN Red List of Threatened Species* 2014: e.T19083537A19222928. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19083537A19222928.en>.)

Habitat and Ecology:

No Species Ecology and Distribution in Turkey

Inhabits moderately to fast-flowing large to medium sized rivers with rock or gravel bottom. This species is endemic to Sakarya and Kizilirmak drainages in northern Anatolia, Turkey. While the species is believed to be declining due to past and ongoing hydropower exploitation of its rivers, it still occurs in many more than 10 populations and is not expected to decline fast enough to qualify for a threat category or NT. It is therefore assessed as LC.

Distribution Map



Chondrostoma angorense

Range

Probably Extant

Compiled by:
IUCN (International Union for
Conservation of Nature)



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or approval by IUCN

© The IUCN Red List of Threatened Species: *Chondrostoma angorense* – published in 2014.
<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19083537A19222928.en>

- | | |
|----|--|
| 11 | <i>Chondrostoma meandrense</i> – Please see assessment under Criterion 1 |
| 12 | <i>Pseudophoxinus maeandricus</i> – Please see assessment under Criterion 1 |
| 13 | <i>Aphanius villwocki</i> (Sakarya Killifish) (native, endemic, <u>presumed to be present in the Sakarya and Akarcay Basins, according to literature</u>) |

No Species Ecology and Distribution in Turkey

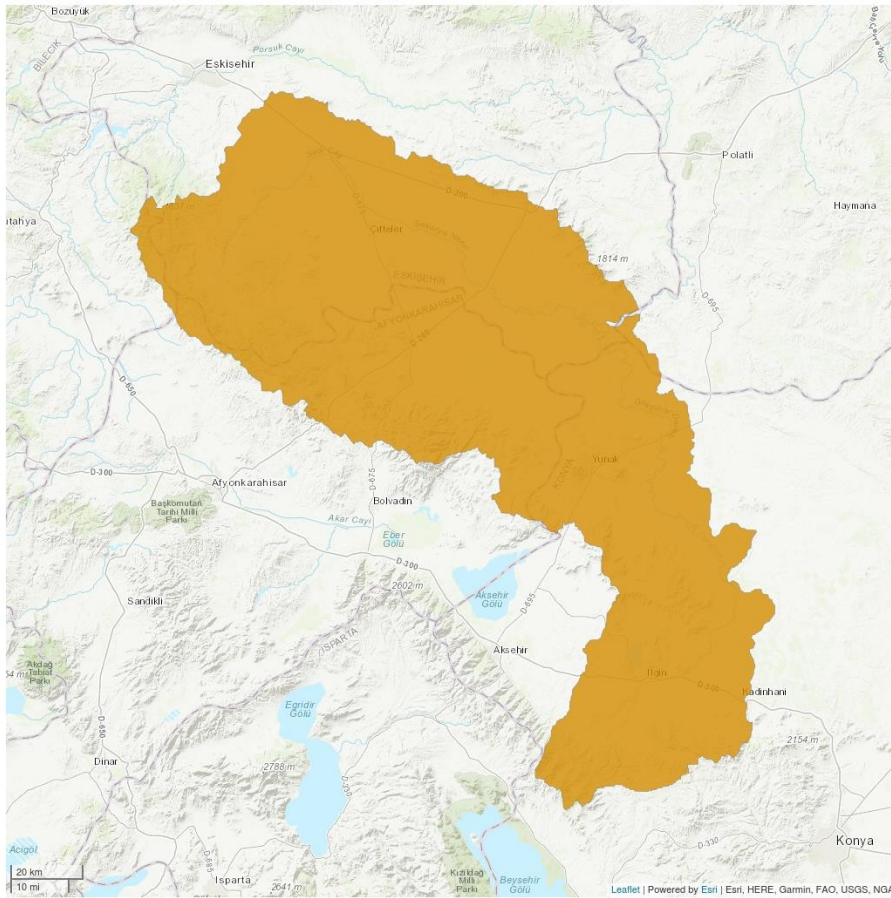
IUCN Assessment Date: 18 Mar 2013 (Freyhof, J. 2014. *Aphanius villwocki*. *The IUCN Red List of Threatened Species* 2014: e.T19513595A19849296. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19513595A19849296.en>.)

Habitat and Ecology:

Inhabits lakes, springs and slowly flowing streams with dense vegetation. Restricted to upper Sakarya river basin, upstream of the junction with the Porsuk River. The species was not found in the Porsuk River or lower Sakarya rivers. Also, in Lake Cavuscu/Ilgın. A relatively widespread species which is believed to occur in more than 10 independent sites (locations based on threats of water abstraction & dams) and while the population has declined, it is not believed to have declined fast enough to qualify for NT or a threat category. It is therefore assessed as LC.

Distribution Map

Aphanius villwocki



Legend

■ EXTANT (RESIDENT)

Compiled by:

IUCN (International Union for Conservation of Nature) 2014



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

14 *Knipowitschia mermere* – Please see assessment under Criterion 1

15 *Gobio sakaryaensis* (Sakarya Gudgeon) (native, endemic, presumed to be present in the Sakarya Basin, according to literature)

IUCN Assessment Date: 04 Mar 2013 (Freyhof, J. 2014. *Gobio sakaryaensis*. *The IUCN Red List of Threatened Species* 2014: e.T19513617A19849385. <https://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19513617A19849385.en>.)

No Species Ecology and Distribution in Turkey

Habitat and Ecology:

Small to medium sized lowland and hill streams with moderate fast flowing water, sand and gravel bottom and pool riffle structure. This species is endemic to Sakarya and Yenice drainages, Turkey. This species is widespread in Sakarya and Yenice drainages and occurs in many more than 10 independent populations. While it is expected to slowly decline in many places, this decline is not expected to be fast enough to qualify the species for Threatened or Near Threatened. It is therefore assessed as Least Concern.

Distribution Map



Gobio sakaryaensis

Range
 Probably Extant

Compiled by:
IUCN (International Union for
Conservation of Nature)



This distribution is shown as a series of dots and the distribution used on this map is not necessarily official endorsement, acceptance or approval by IUCN.

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<http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T19513617A19849385.en>

10.2.9.3. Criterion 3 – Migratory and Congregatory Species

Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem). Congregatory species are defined as species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis.

The thresholds for Criterion 3 are the following:

(a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.

(b) Areas that predictably support ≥ 10 percent of the global population of a species during periods of environmental stress.

10.2.9.3.1. Directly Observed Migratory Bird Species

During the field surveys, the following two (2) migratory bird species were directly observed at the Project Area:

- *Actitis hypoleucos* (IUCN Global Least Concern, observed at aquatic survey locations F9 in Section 1 in the vicinity of Afyon-Iscehisar Natural Site and F22 in Section 4)
- *Acrocephalus scirpaceus* (IUCN Global Least Concern, observed at aquatic survey location F22 in Section 4)

Actitis hypoleucos

This species is a full migrant, migrating at night overland on a broad front across both deserts and mountains. As per the latest available assessment⁶⁴ of October 2016, the global population is estimated to number c.2,600,000-3,200,000 individuals. The European population is estimated at 794,000-1,460,000 pairs, which equates to 1,590,000-2,920,000 mature individuals. The overall population trend is decreasing, although some populations may be stable, and others have unknown trends. The European population declined moderately between 1980 and 2013.

The distribution map of the species is presented below as given in the IUCN (<https://www.iucnredlist.org/species/22693264/86678952>). The Project Area is not considered to trigger threshold for Criterion 3 for this species.



⁶⁴ Source: BirdLife International. 2016. *Actitis hypoleucos*. *The IUCN Red List of Threatened Species* 2016: e.T22693264A86678952. <https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22693264A86678952.en>.

Acrocephalus scirpaceus

In Europe, the breeding population is estimated to number 2,120,000-3,880,000 pairs, which equates to 4,240,000-7,760,000 mature individuals. Europe forms c.35% of the global range, so a very preliminary estimate of the global population size is 12,100,000-22,200,000 mature individuals, although further validation of this estimate is needed.

Acrocephalus scirpaceus is also one of the bird species qualifying Balikdami Nationally Important Wetland (please see Table 10-4 for the list of qualifying species).

This species breeds mainly in mature beds of reed (*Phragmites*) on the shores of lakes and fish ponds, and along rivers and ditches and locally, breeds in willow bushes in marshland, in reeds on edges of brackish lakes, exceptionally in corn fields. It also forages in adjacent herbaceous vegetation, scrub and low trees, such as willows (*Salix*). On the non-breeding grounds and on migration it uses reeds, thickets and tall grass, often along river courses and near lakeshores but also away from water in secondary bush, acacia (*Acacia*) and Lantana scrub, forest edge and garden hedges. In western and central Europe, breeding occurs from May to July or August, and in north-west Africa it breeds in April-July.

The distribution map of the species is presented below as given in the IUCN (<https://www.iucnredlist.org/species/22714722/155436305>). Taking into account the global population, the Project Area is not considered to trigger threshold for Criterion 3 for this species.



10.2.9.3.2. Presumed Present Migratory Bird Species

As reported by the avifauna expert, the following 24 migratory bird species are presumed to be present at the Project Area based on habitat preference, literature information and previous experience of the expert at the wider area:

- (1) *Ciconia Ciconia* (species qualifying Balikdami Nationally Important Wetland)
- (2) *Sterna albifrons*
- (3) *Streptopelia turtur*
- (4) *Cuculus canorus*
- (5) *Apus apus*

- (6) *Merops apiaster* (species qualifying Balikdami Nationally Important Wetland)
- (7) *Upupa epops* (species qualifying Balikdami Nationally Important Wetland)
- (8) *Hirundo rupestris*
- (9) *Hirundo rustica* (species qualifying Balikdami Nationally Important Wetland)
- (10) *Delichon urbicum*
- (11) *Anthus campestris*
- (12) *Anthus pratensis*
- (13) *Motacilla flava*
- (14) *Luscinia megarhynchos*
- (15) *Oenanthe oenanthe*
- (16) *Acrocephalus arundinaceus*
- (17) *Hippolais olivetorum*
- (18) *Sylvia rueppelli*
- (19) *Sylvia atricapilla*
- (20) *Muscicapa striata*
- (21) *Oriolus oriolus*
- (22) *Lanius collurio* (species qualifying Balikdami Nationally Important Wetland)
- (23) *Emberiza hortulana*
- (24) *Emberiza melanocephala*

Taking into account the reported global populations and geographical distributions, the Project Area is not considered to trigger threshold for Criterion 3 for the above species.

10.2.9.4. Criterion 4 – Highly Threatened or Unique Ecosystems

The ecosystems listed in the IUCN Red List of Ecosystems or where formal IUCN assessments have not been performed, assessments using systematic methods at the national/regional level, carried out by governmental bodies, recognised academic institutions and/or other relevant qualified organisations (including internationally recognised NGOs) may be used.

The thresholds for Criterion 4 are:

- (a) Areas representing $\geq 5\%$ of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.
- (b) Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.

There are no IUCN Red List of Ecosystems within the Project Area and wider region.

The following three (3) natural habitats overlapping with the Project have been considered to be of high priority for conservation taking into account their national protection levels and/or listing within EU Habitats Directive:

- The Gypsum Steppe habitat observed at KM 13+400-KM 76+700 in Section 1 is considered as a sensitive habitat as it includes the majority of the endemic flora species (six local endemic and six regional endemic) directly observed at the Project Area as previously discussed. It is listed as a priority habitat under Annex I to the EU Habitats Directive.
- The legally protected Balıkdami Nationally Important Wetland in Section 1 overlaps with the railway alignment for 14.55 km between KM 45+250 – KM 59+800. The railway alignment passes through the southern tip of the registered area (14,147.00 ha) avoiding the lake section as can be seen in Figure 10-34 (please see Table 10-3 for details on the protected area, the wetland area is less than 10% of the total registered area). This wetland is represented by Gypsum Steppe habitat.
- The natural habitat “Coniferous woodland dominated by *Juniperus*” is observed at the Project footprint only at quarry location Q6 in Section 1. The Project design avoided overlap of the railway alignment with this habitat in the vicinity of Q6 (please refer to Figure 10-36). This habitat is listed in Annex I of the EU Habitats Directive.

In the wider region, within the Project Area, the areas designated as “natural site” by the national conservation authorities have been considered to potentially trigger Criterion 4. Amongst these, the ones in close proximity to the Project alignment are Işehisar Lake, Marmara Lake Nationally Important Wetland and Spil Mountain Natural Site. The KBAs within the Project Area are not considered to trigger the thresholds under Criterion 4.

The maquis habitat observed within Section 3 and Section 4 of the Project has the potential to hold local/regional endemic flora species and therefore are considered as natural critical habitat as they are natural habitats supporting populations of CH-qualifying flora species.

None of the modified habitats within the Project Area are evaluated to trigger Criterion 4 and qualify as CH.

The natural habitats, modified habitats, and critical natural habitats within the Project Area is presented in Figure 10-32. The above listed natural habitats to potentially trigger Criterion 4 are all mapped as critical natural habitat.

10.2.9.5. Criterion 5 – Key Evolutionary Processes

For Criterion 5, there are no numerical thresholds. Best available scientific information and expert opinion should be used to guide decision-making with respect to the relative “criticality” of a habitat in these cases.

The Gypsum Steppe habitat observed at KM 13+400-KM 76+700 in Section 1 is considered as a sensitive habitat with its unique soil type maintaining the majority of the endemic flora species (six local endemic and six regional endemic) directly observed at the Project Area. Therefore, it is considered to fall under Criterion 5.

10.2.9.6. Summary of Critical Habitat Assessment

A summary of the CH-qualifying species within the Project Area is given below. It should be noted that the presence of species that qualify for CH in the Project Area does not necessarily mean that the Project will impact them. The overall impacts on the species can range from negligible to temporary to those that are significant depending on the specific circumstances.

The biodiversity features for which CH is designated are further assessed as summarised in Table 10-34.

In line with IFC PS6, a Project Biodiversity Action Plan (BAP) will be designed to achieve net gain of biodiversity values for which the CH is designated. Through implementation of BAP, the Project will achieve no net loss, and if possible, net gain of CH qualifying biodiversity features and demonstrate this through robust monitoring using metrics and adaptive management approach.

Table 10-34. Summary of Critical Habitat (CH) Qualifying and Potential CH Trigger Species as per IFC PS6 Guidance Note (2019)

No	Species	IUCN National Red List Status	Conservation Status	Presence in Area of Analysis (Field Observation/Literature)	Geographic Location (confirmed or potential presence)	IFC PS6 Critical Habitat Criteria
Flora						
1	<i>Glaucium secmenii</i>	CR	Local endemic	Field Observation (Section 1)	Observed at survey location R3 in Section 1 between KM 25+000-KM 50+000	Criterion 1(c), Criterion 2
2	<i>Alyssum niveum</i>	CR	Local endemic, Acikir Steppes KBA qualifying species	Field Observation (Section 1)	Observed at survey location R2 in Section 1 between KM 0+000-KM 25+000	Criterion 1(c), Criterion 2
3	<i>Cephalaria aytachii</i>	CR	Local endemic	Field Observation (Section 1)	Observed at survey location R2 in Section 1 between KM 0+000-KM 25+000 and at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balikdami Nationally Important Wetland	Criterion 1(c), Criterion 2
4	<i>Verbascum gypsicola</i>	CR	Local endemic	Field Observation (Section 1)	Observed at survey location R3 in Section 1 between KM 25+000-KM 50+000	Criterion 1(c), Criterion 2
5	<i>Marrubium zeydanlii</i>	CR	Local endemic	Field Observation (Section 1)	Observed at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balikdami Nationally Important Wetland	Criterion 1(c), Criterion 2
6	<i>Acantholimon gemicianum</i>	CR	Local endemic, qualifying species of Balikdami Nationally Important Wetland	Field Observation (Section 1)	Observed at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balikdami Nationally Important Wetland	Criterion 1(c), Criterion 2
7	<i>Scabiosa hololeuca</i>	EN	Regional endemic, qualifying species of Balikdami Nationally Important Wetland	Field Observation (Section 1)	Observed at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balikdami Nationally Important Wetland	Criterion 1(c), Criterion 2
8	<i>Acantholimon anatolicum</i>	CR	Regional endemic, qualifying species of Balikdami Nationally Important Wetland	Literature (Section 1)	Unconfirmed presence during Jan 2021 surveys but presumed presence in Section 1 at Balikdami Nationally Important Wetland	Criterion 1(c)
9	<i>Acantholimon riyatguellii</i>	CR	Local endemic, qualifying species of Balikdami Nationally Important Wetland	Literature (Section 1)	Unconfirmed presence during Jan 2021 surveys but presumed presence in Section 1 at Balikdami Nationally Important Wetland	Criterion 1(c), Criterion 2
10	<i>Ferula anatolica</i> Boiss.	CR	Local endemic	Literature/Flora expert opinion (Section 3)	Presumed present in Section 3	Criterion 1(c), Criterion 2
11	<i>Pyrus anatolica</i> Browicz	EN	Local endemic, Murat Mountain KBA qualifying species	Literature/Flora expert opinion (Section 3)	Presumed present in Section 3	Criterion 1(c), Criterion 2
12	<i>Bolanthus huber-morathii</i> Simon	EN	Regional endemic	Literature/Flora expert opinion (Section 3)	Presumed present in Section 3	Criterion 1(c)

No	Species	IUCN National Red List Status	Conservation Status	Presence in Area of Analysis (Field Observation/Literature)	Geographic Location (confirmed or potential presence)	IFC PS6 Critical Habitat Criteria
13	<i>Verbascum luciliae</i> (Boiss.) Kuntze	EN	Regional endemic	Literature/Flora expert opinion (Section 3)	Presumed present in Section 3	Criterion 1(c)
14	<i>Cyclamen mirabile</i> Hildebr.	EN	Regional endemic	Literature/Flora expert opinion (Section 3)	Presumed present in Section 3	Criterion 1(c)
15	<i>Ebenus plumosa</i> Boiss. & Bal. var. <i>plumosa</i>	EN	Regional endemic	Literature/Flora expert opinion (Section 3)	Presumed present in Section 3	Criterion 1(c), Criterion 2
16	<i>Salvia aytachii</i>	VU	Regional endemic, Acikir Steppes KBA qualifying species	Field Observation (Section 1)	Observed at survey location R2 in Section 1 between KM 0+000-KM 25+000	Criterion 2
17	<i>Sideritis gulendamii</i>	VU	Regional endemic	Field Observation (Section 1)	Observed at survey location R2 in Section 1 between KM 0+000-KM 25+000 and at survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balikdami Nationally Important Wetland	Criterion 2
18	<i>Scutellaria yildirimlii</i>	VU	Regional endemic	Field Observation (Section 1)	Observed at survey location R2 in Section 1 between KM 0+000-KM 25+000, survey location R5 in Section 1 between KM 50+000-KM 75+000 within the boundaries of Balikdami Nationally Important Wetland and survey location R6 in Section 1 between KM 75+000-KM 100+000.	Criterion 2
19	<i>Verbascum antinori</i>	VU	Regional endemic	Field Observation (Section 4)	Observed at survey location Q12 in Section 4 within maquis habitat (quarry Q12 located in Yamanlar Mountain KBA)	Criterion 2
20	<i>Achillea ketenoglui</i>	VU	Regional endemic, Acikir Steppes KBA qualifying species	Field Observation (Section 1)	Observed at survey location R3 in Section 1 between KM 25+000-KM 50+000	Criterion 2
Avifauna						
1	<i>Neophron percnopterus</i> (Egyptian Vulture)	EN	Acikir Steppes KBA qualifying species, EU Birds Directive Annex I, Bern Convention Appendix II	Literature/Expert opinion (Section 1)	Presumed present within the Project Area. Distribution map as per latest IUCN data is given above.	Criterion 1(a), 1(c)
Fish						
1	<i>Anguilla anguilla</i>	CR	CITES Appendix II	Literature	Presumed present within the Project Area. Distribution map as per latest IUCN data is given above.	Criterion 1(c)
2	<i>Oxynoemacheilus simavicus</i>	CR	Endemic, native	Literature	Presumed present within the Project Area. Distribution map as per latest IUCN data is given above.	Criterion 1(a), 1(c), Criterion 2

No	Species	IUCN National Red List Status	Conservation Status	Presence in Area of Analysis (Field Observation/Literature)	Geographic Location (confirmed or potential presence)	IFC PS6 Critical Habitat Criteria
3	<i>Alburnus nasreddini</i>	CR	Endemic, native	Literature	Presumed present within the Project Area. Distribution map as per latest IUCN data is given above.	Criterion 1(c) Criterion 2
4	<i>Pseudophoxinus maeandricus</i>	CR	Endemic, native	Literature	Presumed present within the Project Area. Distribution map as per latest IUCN data is given above.	Criterion 1(c) Criterion 2
5	<i>Barbus pergamonensis</i>	EN	Native	Previous Field Observation	Observed in the previous studies within the Project Area (in Gediz Basin).	Criterion 1(c)
6	<i>Seminemacheilus lendlii</i>	VU	Endemic, native	Previous Field Observation	Observed in the previous studies within the Project Area (in Sakarya Basin).	Criterion 1(c) Criterion 2
7	<i>Alburnus battalgilae</i>	VU	Endemic, native	Literature	Presumed present within the Project Area. Distribution map as per latest IUCN data is given above.	Criterion 1(c) Criterion 2
8	<i>Chondrostoma meandrense</i>	VU	Endemic, native	Previous Field Observation	Observed in the previous studies within the Project Area (in Gediz Basin).	Criterion 1(c) Criterion 2
9	<i>Chondrostoma holmwoodii</i>	VU	Endemic, native	Field Observation	Observed in the current study within the Project Area (in Gediz Basin).	Criterion 1(c) Criterion 2
10	<i>Knipowitschia mermere</i>	VU	Endemic, native	Literature	Presumed present within the Project Area. Distribution map as per latest IUCN data is given above.	Criterion 1(c) Criterion 2
11	<i>Aphanius villwocki</i>	LC	Endemic, native	Literature	Presumed present within the Project Area. Distribution map as per latest IUCN data is given above.	Criterion 2
12	<i>Gobio sakaryaensis</i>	LC	Endemic, native	Literature	Presumed present within the Project Area. Distribution map as per latest IUCN data is given above.	Criterion 2

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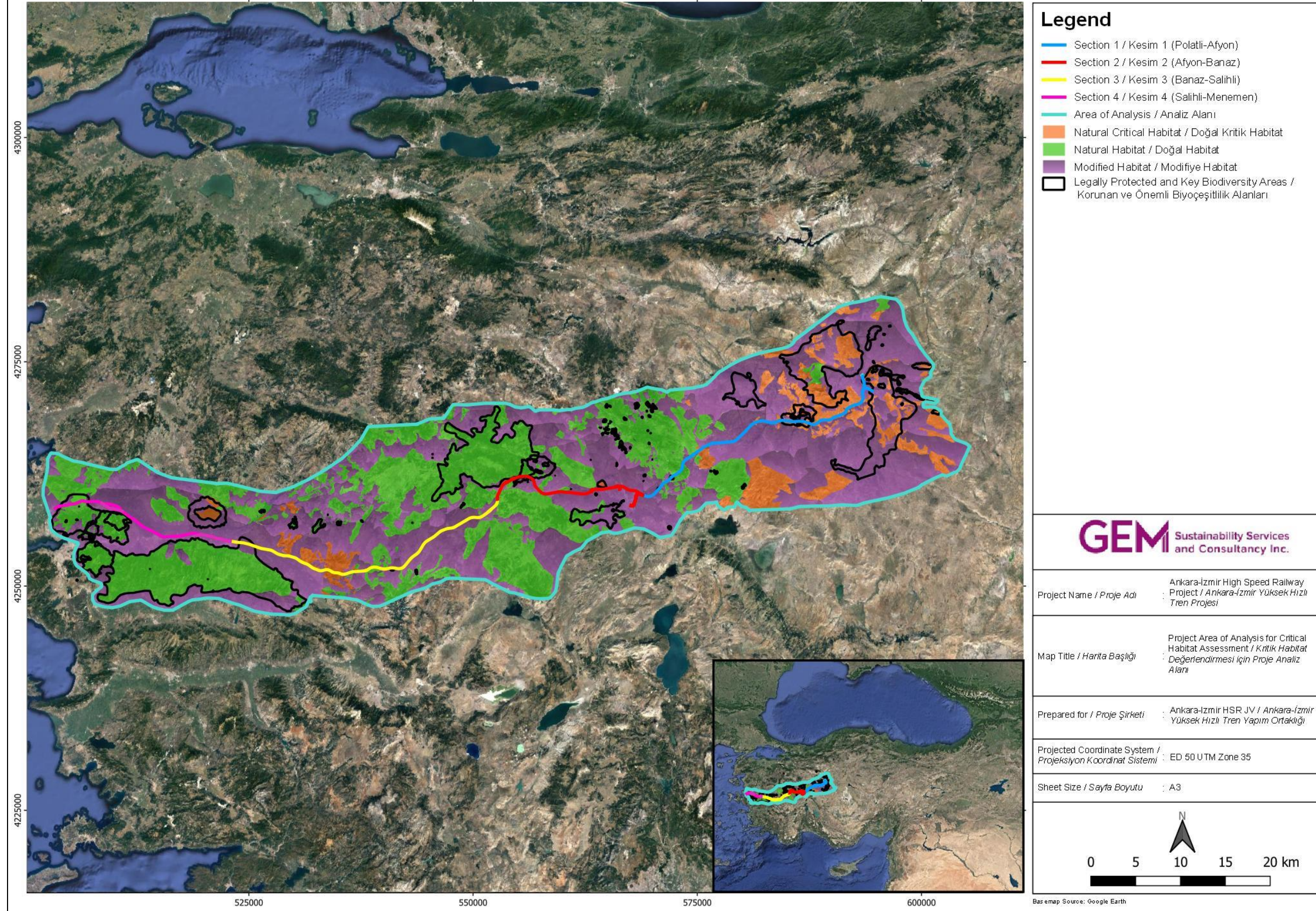


Figure 10-32. Project Area for Critical Habitat Assessment

10.3. Impact Assessment and Management

This section of the ESIA Report assesses the potential impacts of the Project on biodiversity features in accordance with the ESIA Methodology.

During the Scoping Phase of the ESIA Study, the biodiversity experts have identified the field survey locations as detailed above in respective sections. It should be noted that back that time the alternative quarries as detailed in Chapter 3 ("Project Alternatives") of this ESIA Report were not known and thus were not scoped in the biodiversity field survey programme.

Any new facilities (e.g. quarries) to be included within the Project will require identification of potential site-specific E&S impacts and management measures including field surveys to be conducted for biodiversity prior to entry into such new areas.

The potential impacts of railways on biodiversity stem from habitat fragmentation and potential exclusion of species from their habitats, mortality of fauna elements, species invasions, and potential environmental disturbances such as noise and vibration.

10.3.1. Pre-ESIA Phase Avoidance Measures Embedded in the Project Design

The Project design seeks to minimise physical impacts on both local populations and natural habitats. The Project design includes numerous engineering structures along the railway alignment to minimize habitat fragmentation and maximise the availability of animal crossings through integration of bridges, culverts, and tunnels as summarized below. As can be seen from the list, the majority of the construction works have already been started in the past as can also be seen from site photos presented previously. The detailed list of each engineering structure per section summarised below is given in Chapter 1 of this ESIA Report.

Table 10-35. Engineering Structures Providing Habitat Continuity (as of January 2021)

Type of Engineering Structure	Total	Construction not Started	Construction Suspended	Construction Completed
Section 1 (Polatli-Afyon)				
Culvert	188	82	5	101
Underpass	78	31	2	45
Overpass	33	21	11	1
Bridge	32	16	9	7
Viaduct	19	2	5	12
On-Off Tunnel	2			2
Tunnel	10	2	6	2
Section 2 (Afyon-Banaz)				
Culvert	115	71	2	42
Underpass	48	27	3	18
Overpass	23	18	5	
Bridge	8	6	2	
Viaduct	11	6	5	
On-Off Tunnel				
Tunnel	14	7	6	1
Section 4 (Salihli-Manisa)				
Culvert	126	126	0	0
Underpass	48	48	0	0
Overpass	40	40	0	0
Bridge	21	21	0	0
Viaduct	1	1	0	0
On-Off Tunnel				
Tunnel				

It is important to note that some fauna species will use certain engineering structures and not the others. This will be monitored starting from the construction phase and assessed on a case-by-case basis to ensure permeability of the habitat to possibly impacted fauna species to avoid indirect loss of habitat and fragmentation due to avoidance of infrastructure by terrestrial fauna elements. During the fauna monitoring studies, if for certain fauna elements the HSR alignment is detected to not provide adequate permeability, then specific measures such as habitat management and new engineering structures will be considered.

At locations where rail crossings of watercourses were unavoidable, to maintain water flow and continuity of aquatic ecosystem, bridges and open-bottom culverts have been integrated into the design as can be seen in site photos presented in Table 10-15. At the river crossings, habitat management measures will be implemented to ensure erosion does not take place, soil protection measures are in place and natural vegetation is used for rehabilitation purposes.

The Project, to the extent possible, minimises overlap with areas of potential biodiversity importance. For example, in Section 1 of the AIHSR, whilst crossing Balikdami Nationally Important Wetland, the railway alignment passes through the southern tip of the registered area (14,147.00 ha) avoiding the lake section (the wetland area is less than 10% of the total registered area) and viaducts and bridges have also been embedded in the design as shown in Figure 10-34.

In Section 1 of the AIHSR Project, the railway alignment passes through Afyon-Iscehisar Natural Site as presented in Figure 10-35. As can be seen from the figure, the railway alignment is designed so as to minimise the overlap with the natural site and engineering structures (viaducts/bridges) have been embedded into the Project design so as to avoid and minimise impacts on the protected area and the habitat features. The survey locations at and in the vicinity of this Natural Site is given in Figure 10-10. Close to this site is another natural site, Iscehisar Lake (survey location R10), and the general view of the constructed viaduct above the lake and the tunnel entrance towards Afyon-Iscehisar Natural Site is shown below.



Figure 10-33. Iscehisar Lake in the Vicinity of Afyon-Iscehisar Natural Site in Section 1

As previously described, the natural habitat Juniper woodland (EUNIS G3.9 – Coniferous woodland dominated by *Juniperus*) is listed in Annex I to the EU Habitats Directive and considered to trigger CH Criterion 4. This natural critical habitat is observed within the direct Project footprint only at quarry location Q6 (“82-Emirinkoyu” quarry) at KM 105+000.00 in Section 1. As shown in Figure 10-36, the design of the railway alignment has minimised impact on this habitat through micro siting and avoiding a passage through this woodland. In line with the mitigation hierarchy, this ESIA study recommends avoidance of any impact on quarry location Q6 (“82-Emirinkoyu” quarry) through delisting it from the potential quarry alternatives.

The Project design seeks to minimise physical impacts on both local populations and natural habitats. A very good example of this is observed at Hatipler Relocation in Section 2 where physical impacts on buildings have been minimised and the potential impacts of the relocated alignment on *Pinus nigra* woodland (natural habitat) (which represents approximately 11% of the habitat within Section 2 as given in Table 10-17) have been managed through addition of 6 tunnels (with a total length of 4,330 m, tunnel entrance and exit marked as pink within the figure) and 1 viaduct (with a length of 560 m) where *Pinus nigra* woodland is crossed so as to avoid habitat fragmentation and ensure availability of animal crossings as presented in Figure 10-37.

The HSR overlap with Murat Mountain KBA-IBA is given in Figure 10-6 and as can be seen from the figure the overlap is minimal and passed through with engineering structures (viaducts/bridges). The survey locations (R-17, F-14, Q-11) at and in the vicinity of Murat Mountain KBA-IBA is given in Figure 10-11 and photos available in Table 10-15. The engineering structures designed to avoid impacts on natural woodlands at R-17 and F-14 (located at approximately KM 230+000.00) and its vicinity is presented in Figure 10-38.

The biodiversity management strategy of the Project is to be built upon the country specific and regional biodiversity context evaluated together with the Project specific retrospective, ongoing and future impacts that could be permanent when associated to construction of permanent project structures and components, and temporary when associated to temporary facilities such as camp areas, material/waste storage areas, etc.

It is worthwhile to note that the Ankara-Afyon-Izmir conventional train line is in operation and extends along Ankara-Izmir HSR Project alignment. Therefore, the Project related monitoring and management approach has to take into account the existing Projects within the area defined in the scope of the Cumulative Impact Assessment (CIA) (please see Chapter 15 of the ESIA Report) in developing conservation efforts for habitat fragmentation, fauna mobility and species conservation in aquatic and terrestrial ecosystems.

The feasibility and sustainability of any biodiversity conservation effort should take into account the existing and reasonably foreseeable future developments in the vicinity of the Ankara-Izmir HSR Project such as the Ankara-Izmir Motorway, the Afyonkarahisar-Antalya-Alanya Motorway, and the Kisladağ Gold Mine (within Section 3 of Ankara-Izmir HSR) to name a few.

At the national level, conservation Projects have been in place led by related government authorities and also key biodiversity stakeholders such as Nature Conservation Centre (Doga Koruma Merkezi – DKM) together with national and international conservation ecologists. Regional knowledge on conservation efforts led by these organisations is vital for the design of habitat- and species-specific biodiversity conservation measures within the Project BMP/BAP to ensure achievement of quantifiable no net loss and net gain biodiversity targets.

To this end, the Project BMP/BAP development and review processes will include engagement with key biodiversity stakeholders including but not limited to related national authorities, conservation ecologists at the Nature Conservation Centre (Doga Koruma Merkezi – DKM) and universities.

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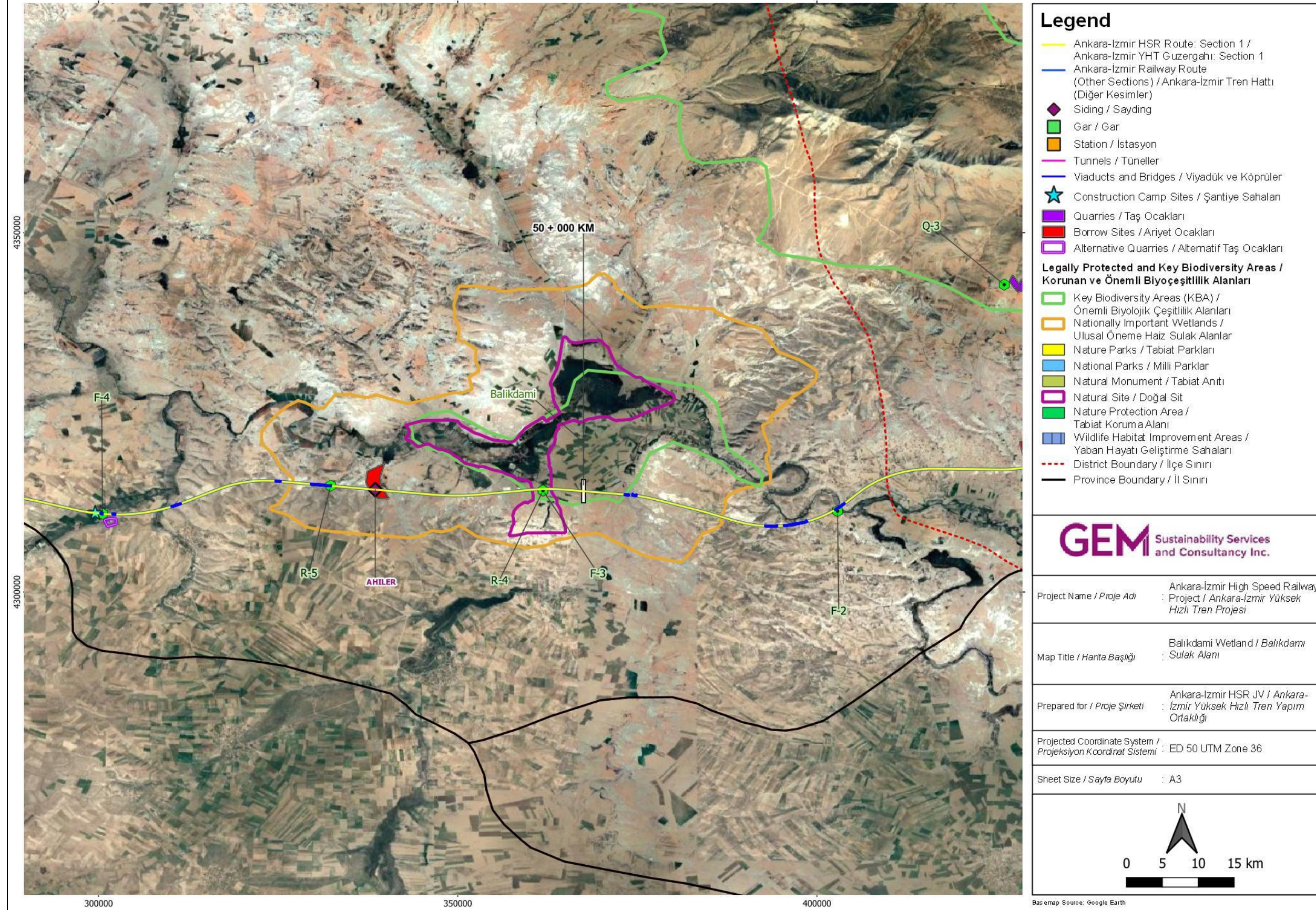


Figure 10-34. Railway Alignment through Balıkdami Nationally Important Wetland, Balıkdami Natural Site and Balıkdami KBA-IBA in Section 1

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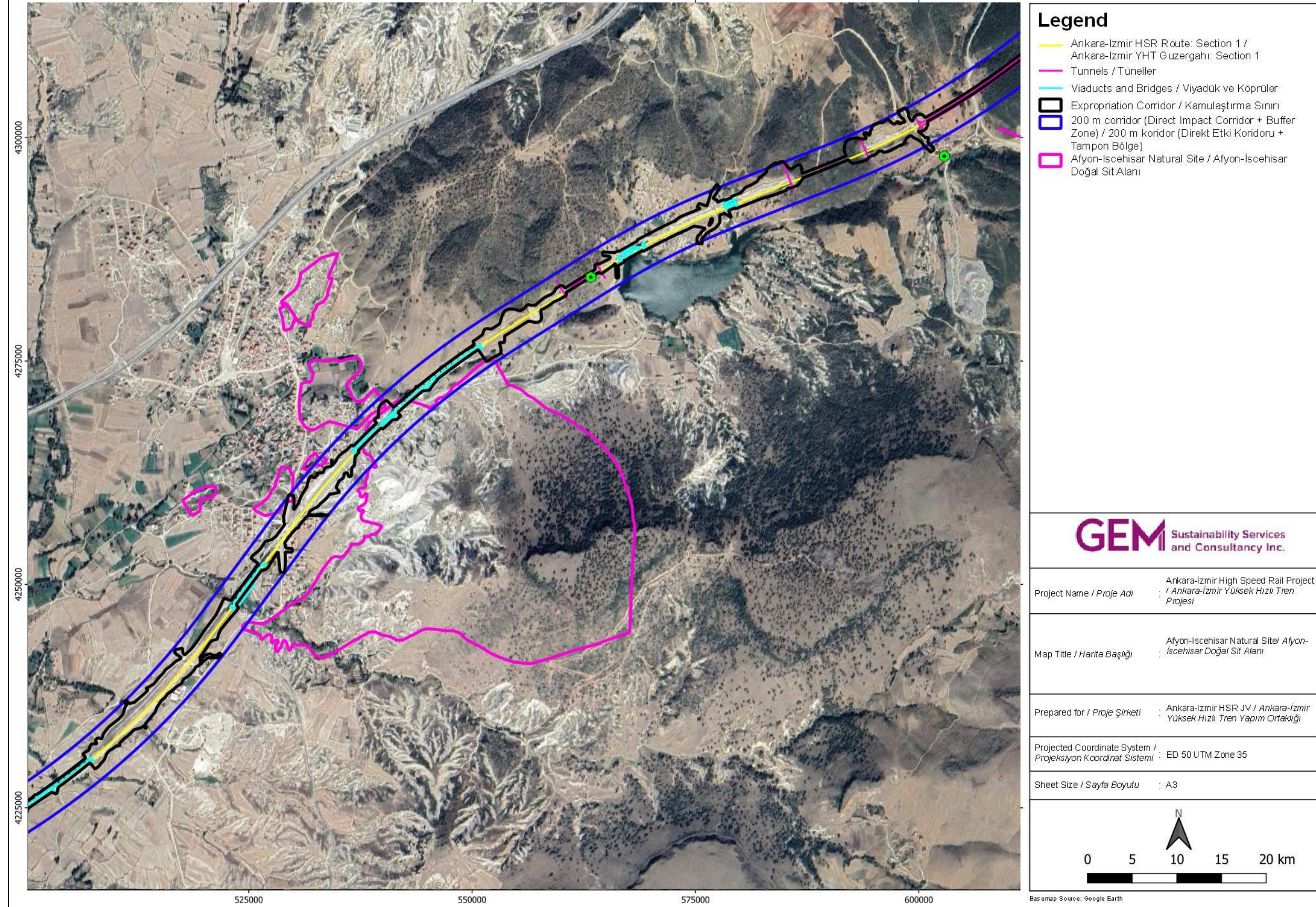


Figure 10-35. Railway Alignment through Iscehisar Lake (Natural Site) and Afyon-Iscehisar Natural Site in Section 1

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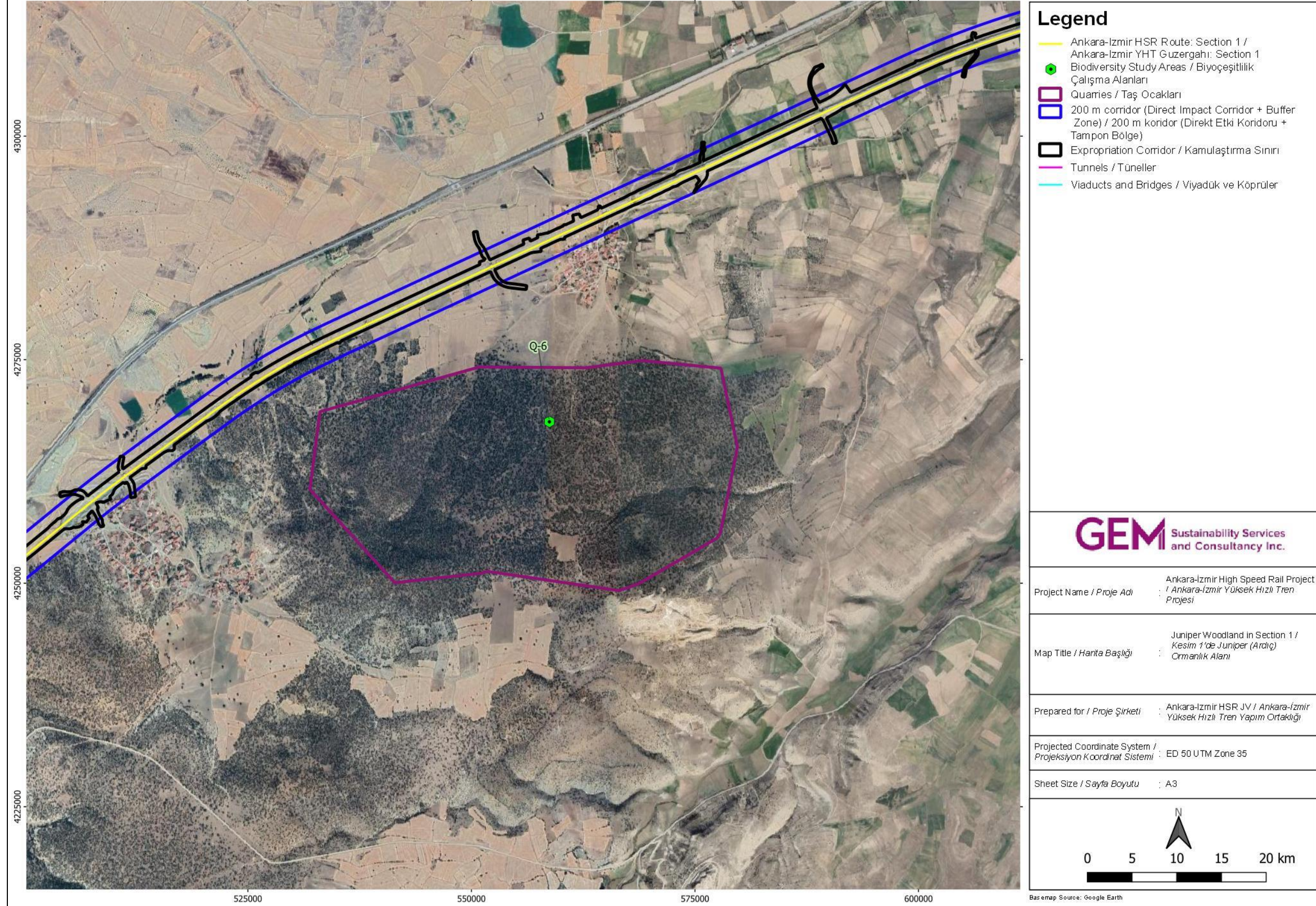


Figure 10-36. Juniper Woodland at KM 105+000.00 in Section 1

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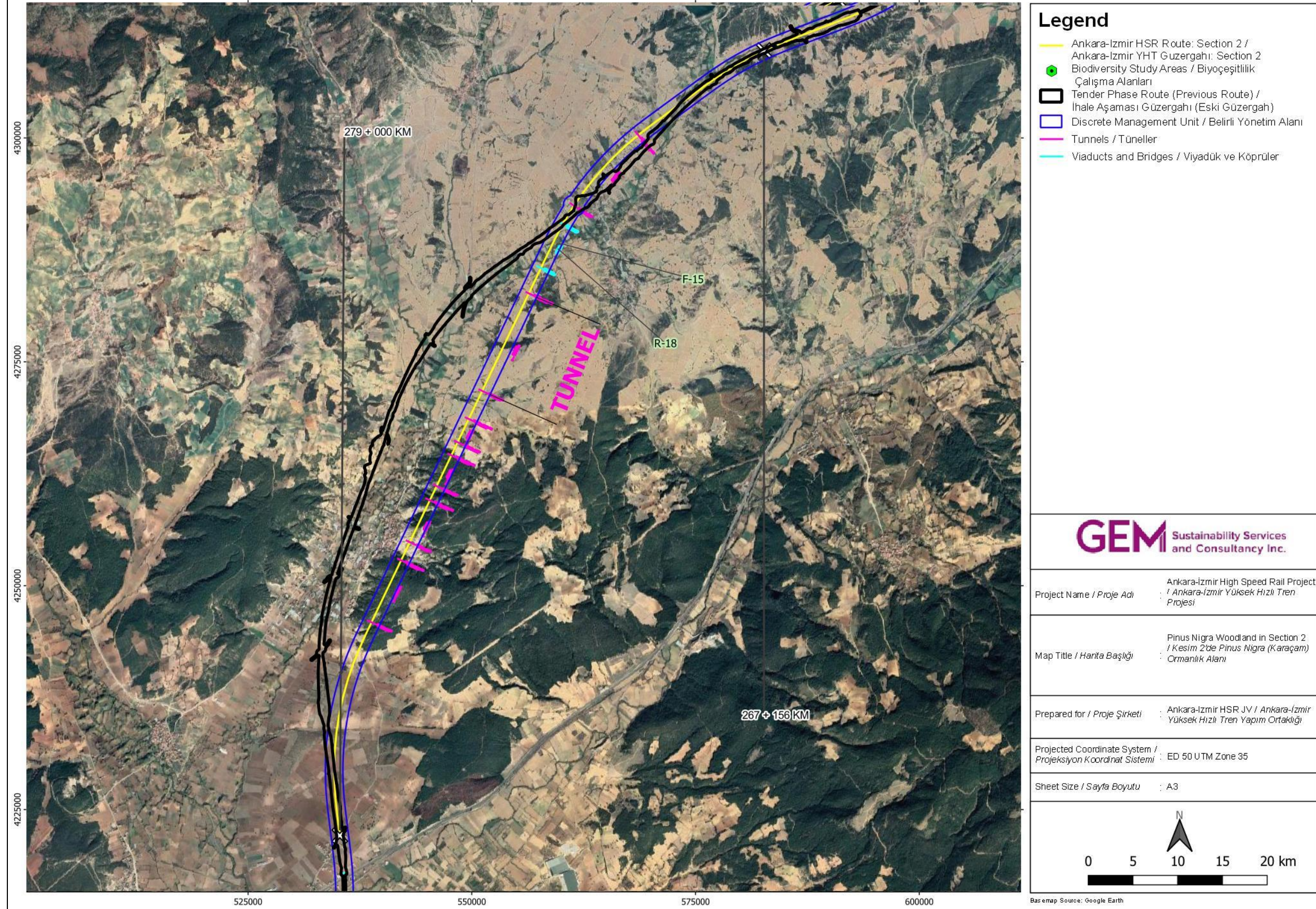


Figure 10-37. *Pinus nigra* Woodland at Hatipler Passage in Section 2

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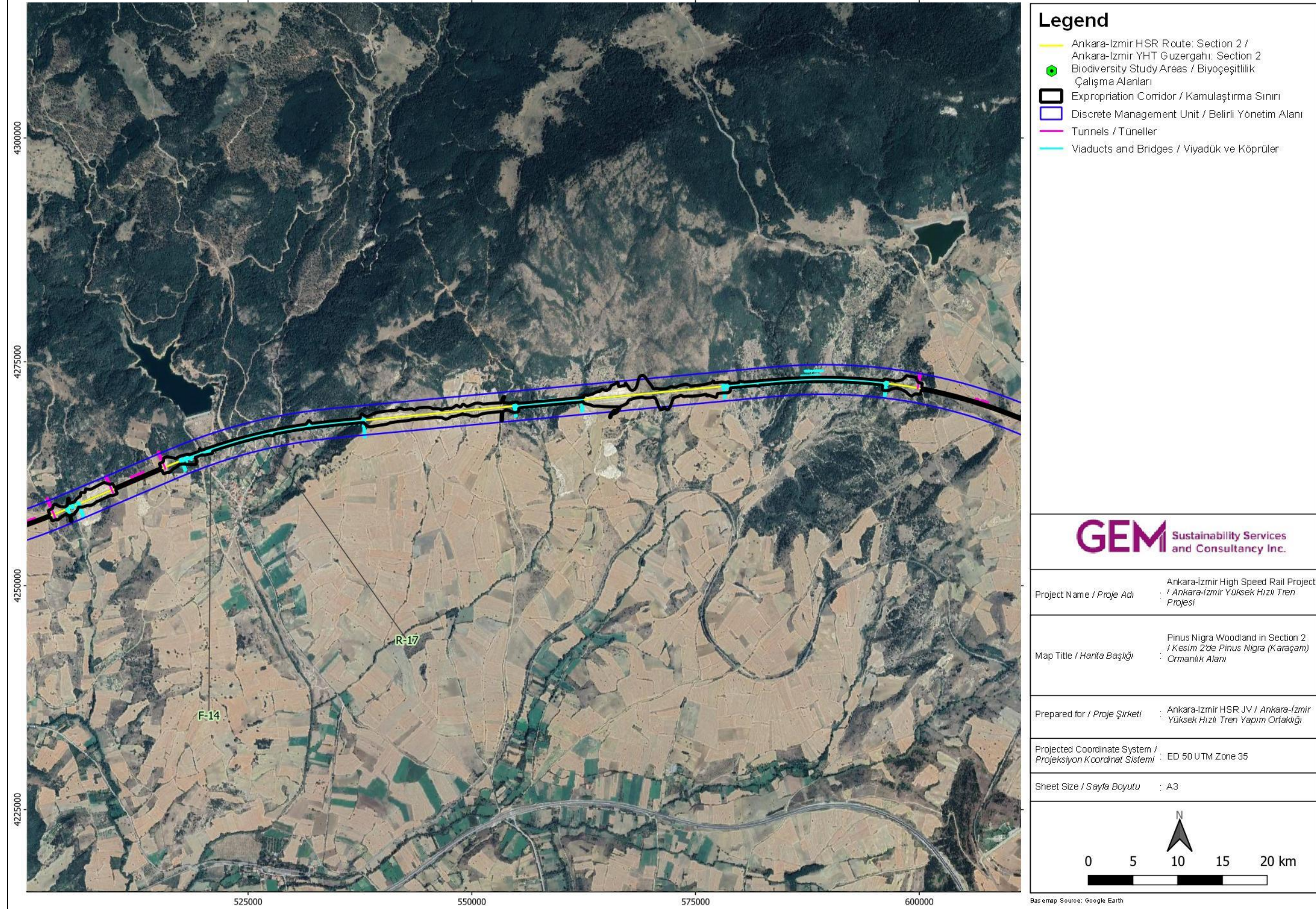


Figure 10-38. *Pinus nigra* Woodland in Section 2 at Murat Mountain KBA Overlap

10.3.2. Sensitivity of the Components

For the purposes of the impact assessment, the sensitivity of the specific receptors is assigned as given in Table 10-37.

Table 10-36. Criteria for Sensitivity of Receptors

Biodiversity Feature	Sensitivity	Rationale
Legally Protected Areas Overlapping with the Railway Alignment and the Quarries		
Balikdami Nationally Important Wetland (Section 1)	High	Overlap with railway alignment for approximately 15 km between KM 45+250 – KM 59+800 as given in Table 10-1. Potential CH trigger Criterion (4)
Balikdami Natural Site (Section 1)	High	Overlap with railway alignment for approximately 1 km between KM 51+100 – KM 51+700 as given in Table 10-1. Potential CH trigger Criterion (4).
Afyon-Iscehisar Natural Site (Section 1)	High	Overlap with railway alignment for approximately 0.5 km between KM 131+600 – KM 131+900 as given in Table 10-1. Potential CH trigger Criterion (4)
Baskomutan Historical National Park-3 (Section 2)	High	Overlap with railway alignment for approximately 6 km between KM 217+900 – KM 223+800 as given in Table 10-1.
Spil Mountain National Park (Section 4)	High	Overlap with four (4) quarries located between KM 497+600 – KM 539+500 as given in Table 10-11.
Internationally Recognised Areas Overlapping with the Railway Alignment and the Quarries		
Polatli-Tigem KBA (Section 1)	High	Overlap with railway alignment for approximately 2.5 km between KM 1+350 – KM 3+800 as given in Table 10-2. Overlap with one (1) quarry located at KM 2+050 as given in Table 10-11.
Balikdami KBA-IBA (Section 1)	High	Overlap with railway alignment for approximately 3.5 km between KM 48+550 – KM 51+900 as given in in Table 10-2.
Acikir Steppes KBA (Section 1)	High	Overlap with one (1) quarry located at KM 31+200 as given in Table 10-11.
Murat Mountain KBA-IBA (Section 2)	High	Overlap with railway alignment for approximately 5 km between KM 219+550 – KM 224+550 as given in in Table 10-2. Overlap with one (1) quarry located at KM 231+000 as given in Table 10-11.
Yamanlar Mountain KBA (Section 4)	High	Overlap with railway alignment for approximately 15.5 km between KM 529+300 – KM 544+700 as given in in Table 10-2.
Boz Mountains KBA (Section 3)	High	Overlap with one (1) quarry located at KM 472+000 as given in Table 10-11.
Spil Mountain KBA (Section 4)	High	Overlap with three (3) quarries located between KM 499+000 – KM 539+500 as given in Table 10-11.
Habitats		
Gypsum Steppe	High	<ul style="list-style-type: none"> CH trigger Criterion (4) and Criterion (5) Priority Habitat under Annex I of EU Habitats Directive Includes majority of endemic flora species
Juniper Forest	High	<ul style="list-style-type: none"> CH trigger Criterion (4) Habitat listed under Annex I of EU Habitats Directive
Maquis	High	<ul style="list-style-type: none"> Natural habitat to include CH-qualifying regional endemic flora species.
Nests/breeding/roosting sites of small mammals, birds and bats within the Project Area	High	Potential to impact high sensitivity fauna species

Biodiversity Feature	Sensitivity	Rationale
Permanent and temporary water bodies where amphibians can reside/breed, water birds and fish species reside/breed within the Project Area	High	Potential to impact high sensitivity fauna species
Other Natural Habitats	High	
Modified Habitats	Medium	
Flora Species		
<ul style="list-style-type: none"> <i>Glaucium secmenii</i> <i>Alyssum niveum</i> <i>Cephalaria aytachii</i> <i>Verbascum gypsicola</i> <i>Marrubium zeydanlii</i> <i>Acantholimon gemicianum</i> 	High	<ul style="list-style-type: none"> CH trigger Criteria (1c) and (2) IUCN National Red List "CR" All local endemic, restricted range species <i>Alyssum niveum</i> – Acikir Steppes KBA qualifying species (see Table 10-19) <i>Acantholimon gemicianum</i> – Qualifying species of Balikdami Nationally Important Wetland (see Table 10-4 and Table 10-19)
<ul style="list-style-type: none"> <i>Scabiosa hololeuca</i> 	High	<ul style="list-style-type: none"> CH trigger Criteria (1c) and (2) IUCN National Red List "EN" Regional endemic (directly observed), restricted range Qualifying species of Balikdami Nationally Important Wetland (see Table 10-4 and Table 10-19)
<ul style="list-style-type: none"> <i>Salvia aytachii</i> <i>Sideritis gulendamii</i> <i>Scutellaria yildirimlii</i> <i>Verbascum antinori</i> <i>Achillea ketenoglui</i> 	High	<ul style="list-style-type: none"> CH trigger Criterion (2) IUCN National Red List "VU" All regional endemic (directly observed), restricted range <i>Salvia aytachii</i> and <i>Achillea ketenoglui</i> – Acikir Steppes KBA qualifying species (see Table 10-19)
<ul style="list-style-type: none"> <i>Acantholimon anaticum</i> <i>Acantholimon riyatguellii</i> <i>Ferula anatolica</i> Boiss. 	High	<ul style="list-style-type: none"> CH Criterion (1c) and Criterion (2) IUCN National Red List "CR" Local or regional endemic, restricted range species Presumed present flora species (literature data/flora expert opinion) (see Table 10-34)
<ul style="list-style-type: none"> <i>Pyrus anatolica</i> Browicz <i>Bolanthus huber-morathii</i> Simon <i>Verbascum luciliae</i> (Boiss.) Kuntze <i>Cyclamen mirabile</i> Hildebr. <i>Ebenus plumosa</i> Boiss. & Bal. var. <i>plumosa</i> 	High	<ul style="list-style-type: none"> CH Criterion (1c) and/or Criterion (2) IUCN National Red List "EN" Local or regional endemic and/or restricted range species Presumed present flora species (literature data/flora expert opinion)
<ul style="list-style-type: none"> <i>Paronychia dudleyi</i> <i>Centaurea polyclada</i> <i>Thymus leucostomus</i> var. <i>argilleceus</i> 	High	<ul style="list-style-type: none"> All regional endemic (directly observed) <i>Thymus leucostomus</i> var. <i>argilleceus</i> – Qualifying species of Balikdami Nationally Important Wetland (see Table 10-4 and Table 10-19)
<ul style="list-style-type: none"> <i>Alyssum pateri</i> subsp. <i>Pateri</i> <i>Gypsophila ericalyx</i> <i>Gypsophila sphaeocephala</i> var. <i>cappadocica</i> <i>Rhamnus thymifolius</i> <i>Genista aucheri</i> <i>Astragalus acicularis</i> <i>Astragalus lydius</i> <i>Astragalus vulneraria</i> <i>Astragalus oxytropifolius</i> <i>Bupleurum sulphureum</i> <i>Inula anatolica</i> 	Medium	<ul style="list-style-type: none"> Widespread endemic flora species (directly observed) <i>Cirsium sipyleum</i>– Spil Mountain KBA qualifying species (see Table 10-19)

Biodiversity Feature	Sensitivity	Rationale
<ul style="list-style-type: none"> <i>Helichrysum noeanum</i> <i>Helichrysum arenarium</i> subsp. <i>Aucheri</i> <i>Anthemis pauciloba</i> var. <i>pauciloba</i> <i>Ptilostemon afer</i> subsp. <i>Eburneus</i> <i>Jurinea pontica</i> <i>Cousinia stapfiana</i> <i>Cirsium sipyleum</i> <i>Campanula argaea</i> <i>Campanula lyrata</i> subsp. <i>Lyrata</i> <i>Verbascum vulcanicum</i> <i>Stachys cretica</i> subsp. <i>Smyrnaea</i> <i>Nepeta congesta</i> var. <i>Congesta</i> <i>Salvia cadmica</i> <i>Salvia cryptantha</i> <i>Salvia wiedemannii</i> <i>Satureja wiedemanniana</i> <i>Phlomis armeniaca</i> 		
<ul style="list-style-type: none"> <i>Noaea minuta</i> 	Medium	Not endemic but rare flora species IUCN National Red List Category "VU"
Other flora species identified at the Project Area	Low	Widespread, no endemism
Terrestrial Fauna Species		
Endemic Terrestrial Fauna <i>Anatololacerta anatolica</i> <i>Microtus anatolicus</i>	High	Endemic terrestrial fauna species (presumed to be present)
Fauna species falling under Annex II and/or Annex IV of the EU Habitats Directive	High	Species of conservation importance (see Table 10-33)
Fauna species identified to have nests within the Project Area	High	Species of conservation importance (see Table 10-33, Figure 10-27 and Figure 10-28)
Other terrestrial fauna species	Low	Other species identified at the Project Area that do not meet the above conditions
Avifauna Species		
<ul style="list-style-type: none"> <i>Neophron percnopterus</i> (Egyptian Vulture) 	High	<ul style="list-style-type: none"> Potential CH trigger 1(a) and/or 1(c) Presumed to be present IUCN Global Red List Category "EN" Acikir Steppes KBA qualifying species
<ul style="list-style-type: none"> <i>Streptopelia turtur</i> (Turtle dove) 	Medium	<ul style="list-style-type: none"> Presumed to be present IUCN European Red List Category "VU"
Water bird species	Medium	Species feeding/breeding at Balikdami Nationally Important Wetland, Iscehisar Lake and other water ecosystems
Species falling under Annex I of the EU Birds Directive	Medium	See Table 10-33.
Other bird species	Low	
Fish Species		

Biodiversity Feature	Sensitivity	Rationale
<ul style="list-style-type: none"> <i>Anguilla Anguilla</i> <i>Oxynoemacheilus simavicus</i> <i>Alburnus nasreddini</i> <i>Pseudophoxinus maeandricus</i> 	High	<ul style="list-style-type: none"> Potential CH trigger Criterion 1(a) and/or 1(c) IUCN European Red List Category "CR" All endemic fish species (see Table 10-33) All presumed to be present, not observed during ESIA field study.
<ul style="list-style-type: none"> <i>Barbus pergamonensis</i> 	High	<ul style="list-style-type: none"> Potential CH trigger Criterion 1(a) and/or 1(c) IUCN European Red List Category "EN" Not an endemic fish species Presumed to be present (observed by the expert at the Project Area in other previous projects)
<ul style="list-style-type: none"> <i>Chondrostoma holmwoodii</i> <i>Seminemacheilus lendlii</i> <i>Alburnus battalgilae</i> <i>Chondrostoma meandrense</i> <i>Knipowitschia mermere</i> 	High	<ul style="list-style-type: none"> Potential CH trigger Criterion 1(b) IUCN European Red List Category "VU" Endemic fish species <i>Chondrostoma holmwoodii</i> directly observed in the current study <i>Chondrostoma meandrense</i> observed in previous studies in Gediz Basin, rest of the species presumed present
<ul style="list-style-type: none"> <i>Cobitis simplicispina</i> <i>Oxynoemacheilus angorae</i> <i>Oxynoemacheilus banarencui</i> <i>Alburnus escherichii</i> <i>Barbus escherichii</i> <i>Capoeta tinca</i> <i>Capoeta bergamae</i> <i>Squalius fellowesii</i> <i>Squalius pursakensis</i> 	Medium	<ul style="list-style-type: none"> Endemic fish species (see Table 10-33) All directly observed at the Project Area
<ul style="list-style-type: none"> <i>Cobitis kurui</i> <i>Ladigesocypris mermere</i> <i>Luciobarbus lydianus</i> <i>Capoeta baliki</i> <i>Capoeta sieboldii</i> <i>Chondrostoma angorense</i> <i>Aphanius villwocki</i> <i>Gobio sakaryaensis</i> 	Medium	<ul style="list-style-type: none"> Endemic fish species Presumed to be present at the Project Area
<ul style="list-style-type: none"> <i>Barbus tauricus</i> <i>Cyprinus carpio</i> 	Medium	<ul style="list-style-type: none"> IUCN European Red List Category "VU" (see Table 10-33) <i>Cyprinus carpio</i> – Qualifying species of Balikdami Nationally Important Wetland (see Table 10-4 and Table 10-33) <i>Barbus tauricus</i> – Presumed to be present <i>Cyprinus carpio</i> – Directly observed at the Project Area
Other fish species	Low	Other fish species identified at the Project Area that do not meet the above conditions

The impact assessment and proposed mitigation measures as per the mitigation hierarchy (i.e. avoidance, minimization, rehabilitation/restoration, offset) for the management of potential impacts are detailed below.

10.3.3. Construction Phase Impacts

The potential impacts during the construction phase of the Project will stem from the following activities:

- Habitat fragmentation
- Removal of topsoil and clearance of vegetation
- Movement of construction vehicles/machinery
- Construction works at or close by water bodies
- Infrastructure/superstructure works along the railway alignment
- Temporary facilities and quarry/borrow site operations

These activities will lead to potential impacts on habitats and flora/fauna species in terrestrial and aquatic ecosystems.

(1) Impacts on Habitats

The railway alignment and the associated/temporary off-site facilities will have potential direct and indirect impacts on habitats. As given in Section 10.2.2, the railway alignment and the quarries overlap with legally protected and internationally recognised areas at certain locations.

As detailed above, as part of the Project design, numerous engineering structures have been integrated and even already constructed whilst crossing the legally protected areas and internationally recognised areas. It should be noted that, for legally protected areas, official authorization letters will be secured from relevant conservation authorities and measures as stipulated by the authorities will be implemented during construction works.

The construction works of Section 1 and Section 2 initially started between 2012 and 2016. Afterwards, in 2018, the construction (infrastructure) works of the contractors in these sections were suspended. Back that time, as also identified during the ESIA field surveys, some of the engineering structures (bridges, viaducts, tunnels, culverts) have already been constructed.

As reported by the experts who carried out the field surveys, at some locations where the construction works were suspended, for example at R6 and R7 in Section 1 as given in Table 10-15, topsoil removal and management practices were observed to be poor. It is worth noting that back in 2012-2018 period, Balıkdami Nationally Important Wetland was not officially registered yet (as given in Table 10-3 it is registered in February 2019).

As of Q3 2021, the construction works in Section 3a, Section 3b, Section 4a (initial part of Salihli-Manisa between KM 439+000 and 456+500) and Section 4d (Manisa-Menemen section between KM 522+100 and 547+805) are still in progress under the responsibility of other contractors previously contracted by the TCDD.

The overall progress of the physical works in the sections at which the remaining infrastructure works will be completed by the Contractor based on the data compiled by the Contractor as of December 2020 is summarised in Section 10.2. It should be noted that impacts on habitats due to land clearance and earthworks and construction of engineering structures (as presented in Table 10-15) have already taken place.

The Project direct impact on habitats is quantified within the 200 m corridor along the rail alignment as summarised below. The 200 m corridor along the rail alignment includes all permanent Project components to be built plus the temporary ones such as worker camp sites, material storage areas, waste storage areas of both the Contractor and the subcontractors. The permanent engineering structures as embedded in the Project design will reduce direct impacts on natural habitats. For example, the aquatic habitats will be crossed by bridges and as previously described *Pinus nigra* woodland will be crossed by tunnels. Therefore, the habitats at the direct Project footprint along the alignment is to be evaluated from this perspective.

The Project is for the majority a brownfield as construction works were suspended back in 2018 in Section 1, Section 2 and Section 4 and as of Q3 2021 the infrastructure works are ongoing in Section 3, Sections 4a and 4d by other contractors. During the construction phase, it should be noted that the construction moves along the alignment and the pace of the construction works will depend on the already existing status of the on-site works

and therefore the extent and duration of the impact will vary depending on the Project status. Nonetheless, the construction activities are short-term and move along the rail alignment with limited potential secondary impacts (due to dust and noise emissions, vibration etc.) on flora and fauna elements.

Habitat Type	Direct Habitat Impact Along the Full Rail Alignment (200 m Impact Corridor) (*)	
	ha	%
Natural Habitats		
C1.1: Permanent oligotrophic lakes, ponds, and pools	3.38	0.03
C3.2: Water-fringing reedbeds and tall helophytes other than canes	12.11	0.10
E1.2: Perennial calcareous grassland and basic steppes	1,517.98	12.68
E1.00: Gypsum steppes	807.84	6.75
E3.3: Sub-Mediterranean humid meadows	2.92	0.02
F5.2: Maquis	347.24	2.90
G1.1: Riparian and gallery woodland, with dominant <i>Salix</i>	55.61	0.46
G1.7: Thermophilous deciduous woodland	350.14	2.93
G3.5: <i>Pinus nigra</i> woodland	197.41	1.65
G3.9: Coniferous woodland dominated by <i>Juniperus</i>	17.27	0.14
H5.4: Dry organic substrates with very sparse or no vegetation	67.15	0.00
Total Natural Habitats	2,683.78	22.42
Modified Habitats		
FB.4: Vineyards	1,037.87	8.67
G2.9: Evergreen orchards and groves	64.52	0.54
I1.2: Mixed crops of market gardens and horticulture	7,715.29	64.46
G3.F: Highly artificial coniferous plantations (<i>Cedrus libani</i>)	112.66	0.94
G1.D: Fruit and nut tree orchards	355.69	2.97
Total Modified Habitats	9,286.02	77.58
TOTAL (natural + modified)	11,969.80	100.00
(*) It should be noted that the direct impact area as calculated for aquatic habitats will be crossed by bridges and the natural habitat <i>Pinus nigra</i> will be crossed by tunnels.		

For each section of the rail alignment, the habitat distribution within the 200 m corridor which includes all permanent Project components to be built plus the temporary ones such as worker camp sites, material storage areas, waste storage areas of both the Contractor and the subcontractors is presented in Table 10-17.

Section 1:

- In Section 1, within the 200 m corridor, 46% by area is represented by natural habitats and 54% by modified habitats.
- Amongst the natural habitats in Section 1, the dominant ones are with 27% EUNIS Habitat E1.00 (Gypsum steppes) and 15% EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes).as given in Table 10-17.
- Due to the past construction activities completed in Section 1, through satellite imagery, it is calculated that approximately 30% by area of the Gypsum Steppe habitat along the railway alignment in Section 1 within this ecological corridor has been disturbed.
- Similarly, approximately 25% by area of EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes) within the 200 m corridor along the railway alignment in Section 1 has been disturbed.
- As presented previously, these habitats sustain the majority of the flora species of conservation importance (see Table 10-19) including local and regional endemic flora species as shown in Figure 10-22.

- Quantification of the exact impact that had taken place on the flora species of conservation importance within the direct Project footprint of the already disturbed areas is not possible. This said, during the field surveys in Q1 2021, the biodiversity experts have directly observed the presence of local and regional endemic species in the vicinity of the disturbed areas. Therefore, for flora species that potentially trigger critical habitat, in line with mitigation hierarchy, ex-situ and in-situ measures will be devised as part of post-ESIA biodiversity management.

Section 2:

- Amongst the natural habitats in Section 2, approximately 19% within the 200 m ecological corridor along Section 2 is represented by EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes) as given in Table 10-17. Due to the past construction activities completed in Section 2, through satellite imagery, it is calculated that approximately 25% by area of this habitat along the railway alignment in Section 2 within this ecological corridor has been disturbed.
- Amongst the natural habitats in Section 2, approximately 11% within the 200 m ecological corridor of Section 2 is represented by EUNIS Habitat G3.5 (*Pinus nigra* woodland) as given in Table 10-17. Due to the past construction activities completed in Section 2, through satellite imagery, there are no disturbances observed. It should be noted that, as explained above, engineering structures embedded into the Project design minimises impacts to *Pinus nigra* woodland as shown in Figure 10-37 and Figure 10-38.

Section 3:

- As described in Section 10.2.4 on Biodiversity Field Surveys, the site programme executed in Q1 2021 excluded Section 3 of the HSR alignment as the infrastructure works are ongoing under other contractors as per the national legislation. Within the scope of this ESIA Report, the flora expert, through satellite imagery, has identified the possible habitats in Section 3 as presented in Table 10-17.
- In Section 3, within the 200 m corridor, 21% by area is represented by natural habitats and 79% by modified habitats. Amongst the natural habitats in Section 3, the dominant ones are 7% EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes) and 6% EUNIS Habitat F5.2 (Maquis).
- It should be noted that, and as reported in Section 10.2, as of December 2020, excavation progress at Section 3a was reported as approximately 50% and for Section 3b as approximately 80%. As of Q3 2021, the construction works in these sections are still in progress under the responsibility of other contractors previously contracted by the TCDD.

Section 4:

- In Section 4, within the 200 m corridor, 15% by area is represented by natural habitats and 85% by modified habitats (mixed crops of market gardens and horticulture and vineyards). The majority natural habitat in Section 4 is EUNIS Habitat E1.2 (Perennial calcareous grassland and basic steppes).
- As per the satellite imagery results, agricultural areas have been disturbed through land clearance. However, it is also observed that although the land is cleared agricultural activities continue along the alignment. For that reason, it is considered not possible to correctly quantify the disturbance through satellite imagery.

Up until the Contractor (ERG/SSB) will start the Project activities along the railway alignment, the contractors for the ongoing infrastructure works of Sections 3a, 3b, 4a and 4d are contractually required to comply with the national legislation and implement mitigation measures as per the requirements of the national legislation for biodiversity conservation, topsoil management, wastewater/waste management, air quality/noise, erosion control and others that may lead to direct and/or indirect impacts to biodiversity features.

The main gaps between the national legislation and international standards with respect to management of biodiversity features can be summarised as below:

- Assessment of impacts in line with international standards including critical habitat assessment in line with IFC PS6, development of mitigation measures following the mitigation hierarchy including species-specific actions targeting no net loss and net gain of biodiversity features through implementation of Project-specific Biodiversity Action Plan (BAP).

- Integration of any new field data/finding and respective site-specific and/or species-specific measures to the Project BAP as part of ongoing management of biodiversity elements bearing in mind that risks are not static.

Prior to start of superstructure works in Section 3a, 3b, 4a and 4d (at the time these sections of the Project will be handed over to the Contractor for the superstructure works), any outstanding/ongoing/retrospective issues, impacts, risks and/or grievances in Sections 3a, 3b, 4a and 4d related to management of biodiversity features by other contractors (see Chapter 1 for the definition of other contractors) that completed the infrastructures works in these sections will be assessed by an E&S Audit to be carried out by the Contractor.

Mitigation Measures

To manage the potential direct and indirect impacts on habitats, measures will be in place in line with the mitigation hierarchy:

- Official authorization letters to be secured from relevant conservation authorities before entry into legally protected areas. Any mitigation measure to be stipulated by the authorities will be implemented on site during construction works.
- For potential quarries and material borrow sites considered within the scope of the Project, the existing status of the specific site will be evaluated. If there has been no previous production at the candidate site, avoid impacts on the natural habitat by not using the site. If not using the site is technically not possible, ensure that the permits/licenses and EIA decisions are in place. Any new sites/facilities to be included within the Project will require identification of potential site-specific E&S impacts and management measures including field surveys to be conducted for biodiversity prior to entry into such new areas. Based on the field findings, update the Project BAP and implement ex-situ and in-situ measures for habitats and species of conservation importance targeting no net loss and net gain for CH trigger biodiversity elements.
- Avoid use of quarry site at survey location Q6 (Emirinkoyu) as there has been no previous production and the license area is dominated by Juniper forest.
- Topsoil stripping along the Project route (within the expropriation corridor) and at the off-site Project/associated facilities (at land that have not been affected by previous infrastructure works or quarry/material borrow site operations) will be implemented in line with the measures as detailed in the ESMMFP under land use.
- Careful vegetation clearance to avoid impacts on animal nests. As the Project is majority brownfield and land clearance activities took place along the full alignment at varying levels in the past, for sections of the rail alignment where no clearance has taken place care must be taken to avoid pick nesting season based on the ecoregion and altitude. Nests of small mammals identified during field surveys to be checked at pre-construction and experts to be involved if removal of nests/animals are required.
- Topsoil stripped will be stored and further used for reinstatement and rehabilitation. The affected areas will be rehabilitated as per the requirements of the authorities following the completion of the activities at each site. Rehabilitation of the natural vegetation at the temporary facilities and river crossings will be carried out with appropriate native flora species to avoid soil erosion, run off and colonization by invasive flora species, appropriate engineering techniques will be planned wherever appropriate (steep slopes, river crossings, etc.).
- Avoid direct impacts on terrestrial and aquatic ecosystems through implementation of management measures for waste, hazardous materials, erosion control, and wastewater.
- Avoid sediment transport to aquatic ecosystems induced by erosion at construction areas through appropriate in-situ measures such as performing construction earth movement activities away from the river crossing to the extent possible, avoiding rainy seasons and ensuring the rapid rehabilitation of a vegetation cover.
- The presence and spread of invasive flora species will be monitored as part of biodiversity monitoring during the vegetative season, with attention to disturbed areas. Especially during reuse of stored topsoil

for rehabilitation purposes care should be taken to avoid introduction of any invasive species. If spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.

- Train on-site employees to avoid any impacts on terrestrial and aquatic ecosystems and species.

Monitoring

- The detailed monitoring program will be established within the BMP with target Key Performance Indicators (KPIs) towards achieving no net loss and net gain of natural habitats and net gain of critical habitats within the Project BAP. Trained personnel to carry out on-site monitoring as per the requirements of the BMP/BAP on a continuous basis at areas where construction activities are ongoing both at terrestrial and aquatic ecosystems. External biodiversity experts will be involved to carry out seasonal monitoring activities along the rail alignment and the quarry locations and will assess and report the field findings including potential additional measures to be included in the Project BMP/BAP.

(2) Impacts on Species

During the construction phase of the Project, the following are the potential impacts on species:

- Damage to/loss of flora species due to Project construction activities including, but not limited to, movement of vehicles/machinery, air emissions, on-site waste and wastewater management practices.
- Disturbance to and direct mortality of terrestrial and aquatic fauna species due to construction activities including, but not limited to, movement of vehicles/machinery, noise and air emissions, on-site waste and wastewater management practices.

It should be noted that the construction moves along the alignment and the pace of the construction works will depend on the already existing status of the on-site works and therefore the extent and duration of the impact will vary depending on the Project status. The quarry operations, on the other hand, will be continuous within the quarry license area.

Mitigation Measures

To manage the potential direct and indirect impacts on species, measures will be in place in line with the mitigation hierarchy:

- Limiting project activities to designated areas to prevent direct impacts and careful siting of temporary facilities to avoid direct impacts on flora/fauna species.
- On-site implementation of mitigation measures for air quality, noise, waste, and wastewater management.
- As an ex-situ measure collection of seeds of local/regional endemic flora species as per the schedule given in Table 10-20 and submission to Turkey Seed Gene Bank.
- To support the biodiversity management strategy to achieve no net loss and net gain of critical habitat qualifying flora species, in-situ measures to be implemented through flora salvaging and translocation (prior to land clearance) to suitable habitats of local/regional endemic flora species by an expert botanist.
- Fauna species with low mobility to be relocated to suitable habitats through supervision of fauna experts or trained project staff. Especially for areas where land was not cleared previously, pre-construction surveys will be performed before vegetation clearing by a wildlife ecologist to identify the presence of any nest or fauna species with low mobility to be relocated to suitable undisturbed habitats and a record of these activities will be kept.
- Careful vegetation clearance to avoid impacts on animal nests with any clearance activity to be scheduled so as to avoid the nest season based on the ecoregion. Nests of small mammals identified during field surveys to be checked at pre-construction and experts to be involved if removal of nests/animals are required.
- Regular visual monitoring of the construction activities at the Project Area by the trained Contractor team to ensure mitigation measures are effectively implemented.

- Train on-site employees to avoid any impacts on local/regional endemic flora species, nests of fauna species and low mobility fauna elements.

Monitoring

- The detailed monitoring program will be established within the BMP with target KPIs towards achieving net gain of critical habitats within the Project BAP. Trained personnel to carry out on-site monitoring as per the requirements of the BMP/BAP on a continuous basis at areas where construction activities are ongoing both at terrestrial and aquatic ecosystems. External biodiversity experts will be involved to carry out seasonal monitoring activities along the rail alignment and the quarry locations and will assess and report the field findings including potential additional measures to be included in the Project BMP/BAP.
- The monitoring should include a holistic approach and combine the findings of environmental monitoring studies and also the activities carried out by other stakeholders within the vicinity of the Project Area. It should be noted that Ankara-Afyon-Izmir conventional train line is in operation and extends along Ankara-Izmir HSR Project alignment. Therefore, monitoring and management approach has to take into account the existing Projects in the vicinity for the development of conservation efforts for habitat fragmentation, fauna mobility and species conservation in aquatic and terrestrial ecosystems.
- For CH-qualifying fish species it is worthwhile to note that any impact on the aquatic ecosystem by other stakeholders could lead to adverse impacts resulting in deterioration of the water quality and subsequent loss of species.

10.3.4. Operation Phase Impacts

Railways share several characteristics with roads and with power lines when the trains are electric. This said, railways have lower traffic intensity, but trains usually have much higher speeds than road vehicles, and the electric structures in railways are typically lower than in most power lines⁶⁵.

During the operation phase of the HSR, to avoid the risk of trespassers, the entire alignment will be fenced off as per the technical specifications of the Employer/Operator. The measures required to maintain integrity of the fencing across the route and the operational measures/procedures to be followed will be identified and implemented by the Operator.

(1) Impacts on Habitats

The Project's permanent structures including all the engineering structures (e.g. bridges, tunnels, culverts), the stations/gars and associated facilities will be constructed within the expropriation corridor along the rail alignment.

Mitigation Measures

- As previously described, the Project design includes numerous engineering structures that will provide habitat continuity and animal crossings along the HSR alignment. It is important to note that some fauna species will use certain engineering structures and not the others. This will be monitored starting from the construction phase and assessed on a case-by-case basis to ensure permeability of the habitat to possibly impacted fauna species to avoid indirect loss of habitat and fragmentation due to avoidance of infrastructure by terrestrial fauna elements. During the fauna monitoring studies, if for certain fauna elements the HSR alignment is detected to not provide adequate permeability, then specific measures such as habitat management and new engineering structures will be considered.
- Aquatic ecosystems will be crossed by engineering structures to ensure continuity of the habitat is not hindered and the aquatic species are not impacted through loss of habitat. At the post-construction phase, at the river crossings, habitat management measures will be implemented to ensure erosion does not take place, soil protection measures are in place and natural vegetation is used for rehabilitation purposes.
- At post-construction phase, temporarily used areas such as camp sites, waste storage areas, etc. will be rehabilitated back to its original with the aim to restore the habitat temporarily impacted/lost

⁶⁵ Luís Borda-de-Água, Rafael Barrientos, Pedro Beja, Henrique M. Pereira, Railway Ecology, 2017 (ISBN 978-3-319-57496-7).

Monitoring

- The temporary Project units once closed and rehabilitated will be monitored twice a year during the vegetative season for at least three years after completion of the rehabilitation process to ensure the success of the rehabilitation efforts. Depending on the outcome of the rehabilitation process, monitoring will be extended until the efforts are achieved.
- Vegetation growth within the track area along the rail alignment will be monitored. Regular maintenance of vegetation is necessary to avoid interference with train operations and track maintenance. The track area should be kept clear. Vegetation maintenance beyond that which is necessary for safety may remove unnecessary amounts of vegetation, resulting in the continual replacement of successional species and an increased likelihood of the establishment of invasive species.

(2) Impacts on Species

The biodiversity monitoring studies to be carried out during the construction works will provide insight into fauna mobility patterns along the railway alignment.

Mitigation Measures

- Through habitat management measures, the attractiveness of the alignment to the fauna elements can be reduced so as to avoid potential fauna injury and/or mortality.
- Both the exclusion fences and animal crossings are amongst the measures to mitigate potential fauna mortality.

Monitoring

- The operation phase impacts on fauna mortality to be monitored especially at potential hot spots for animal crossings.
- The condition of the fences is to be regularly checked on site to ensure that they remain intact and avoid uncontrolled animal crossing that might lead to injury/mortality.
- Fauna mobility along the rail alignment is to be monitored in an holistic way as the presence of other linear or point projects and animal grazing activities within the vicinity and also changes in urban/rural setting will all have impact on fauna behaviours
- The presence and spread of invasive alien species (IAS) will be monitored at rehabilitated areas during the vegetative season. If spread of IAS is observed, then eradication program will be developed.

The impact assessment and proposed mitigation measures as per the mitigation hierarchy (i.e. avoidance, minimization, rehabilitation/restoration, offset) for the management of potential impacts are detailed in Section 10.2.8.6 and Section 10.3 of the ESIA Report and summarised in Table 10-37.

Table 10-37. Impacts, Proposed Mitigation Measures and Residual Impacts (Biodiversity)

Impact Description	Receptor	Impact Identification (extent, reversibility, duration, frequency)	Impact Magnitude	Sensitivity/ Value of Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
Habitat loss and fragmentation due to removal of topsoil, clearance of vegetation, railway construction works including quarry operations	Balikdami Nationally Important Wetland	<ul style="list-style-type: none"> - Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible/Irreversible - Short-term/Long-term - Intermittent/Continuous 	High	High	Major	<ul style="list-style-type: none"> • Official authorization letters to be secured from relevant conservation authorities and measures as stipulated by the authorities to be implemented during construction works. • The railway alignment passes through the southern tip of the wetland. As can be seen, engineering structures are designed and some already constructed to help maintain the continuity of the aquatic ecosystem between the wetland area and the creek. The construction activities in the vicinity of the wetland area should avoid disturbance/contamination of the aquatic ecosystem through accidental discharges and/or erosion related sedimentation. If technically feasible, sediment traps could be considered to avoid further spread of sediments into to wetland area. • Implementation of mitigation measures as described for waste and wastewater management in relevant chapters of this ESIA Report. • Regular visual monitoring of the construction activities at the wetland area by the trained Contractor team to ensure mitigation measures are effectively implemented. • Train on-site employees to avoid any impacts on this wetland. • Topsoil stripping along the Project route (within the expropriation corridor) and at the off-site Project/associated facilities (at land that have not been affected by previous infrastructure works or quarry/material borrow site operations) will be implemented in line with the measures as detailed in Chapter 5 on Land Use and Geology. • The potential long-term impacts of a linear project on the wetland are avoided through engineering structures to ensure habitat continuity. The potential short- to medium-term impacts due to construction phase is to be minimised through implementation of the measures listed here. • Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. • Develop and implement BMP/BAP including regular monitoring of this sensitive habitat by biodiversity experts. 	Moderate to Minor
	Legally Protected Areas and Internationally Recognised Areas Overlapping with the Railway Alignment and the Quarries	<ul style="list-style-type: none"> - Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible/Irreversible - Short-term/Long-term - Intermittent/Continuous 	High	High	Major	<ul style="list-style-type: none"> • Official authorization letters to be secured from relevant conservation authorities before entry into legally protected areas. Any mitigation measure to be stipulated by the authorities will be implemented on site during construction works. • Implementation of mitigation measures as described for waste and wastewater management in relevant chapters of this ESIA Report. • Topsoil stripping along the Project route (within the expropriation corridor) and at the off-site Project/associated facilities (at land that have not been affected by previous infrastructure works or quarry/material borrow site operations) will be implemented in line with the measures as detailed in Chapter 5 on Land Use and Geology. • Avoid destruction of vegetation for purposes other than planned Project activities. • Topsoil stripped will be stored and further used for reinstatement and rehabilitation to avoid loss of flora species of conservation importance. 	Minor

Impact Description	Receptor	Impact Identification (extent, reversibility, duration, frequency)	Impact Magnitude	Sensitivity/ Value of Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
						<ul style="list-style-type: none"> Avoid direct impacts on aquatic ecosystems through implementation of waste and wastewater management measures. Avoid sediment transport to aquatic ecosystems induced by erosion at construction areas. Train on-site employees to avoid impacts on protected areas. Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. Develop and implement BMP/BAP including regular monitoring of this sensitive habitat by biodiversity experts. 	
	Gypsum Steppe Habitat (at KM 13+400-KM 76+700 in Section 1)	<ul style="list-style-type: none"> - Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible/Irreversible - Short-term to Long-term - Intermittent/Continuous 	High	High	Major	<ul style="list-style-type: none"> Habitat management measures to be adopted to rehabilitate the potential impacts to be caused by temporary project components. Gypsum steppe habitats are under pressure of agricultural activities in the region so habitat related improvements are to be carried out in liaison with related conservation authorities and stakeholders. The local and regional endemic flora species qualifying this habitat is to be conserved through ex-situ measures (seed collection and submission to Turkey Seed Gene Bank) and implementation of in-situ measures either through transplantation of existing flora species at the footprint of the Project that will be impacted by construction activities to suitable locations within the same habitat and/or using the collected seeds for further habitat management upon finalization of construction activities at this habitat in Section 1. Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. Develop and implement BMP/BAP including identification of endemic flora species population and distribution within this habitat. Species-specific no net loss and net gain measures to be developed within Project BAP. 	Minor
	Juniper Forest (at Station No. Q6)	<ul style="list-style-type: none"> - Restricted/Local - Reversible/Irreversible - Long-term - Continuous 	High	High	Major	<ul style="list-style-type: none"> If technically feasible, avoid using this area as a quarry site. The area is a natural habitat of Juniper Forests (EU Habitats Directive Annex I habitat, please see Q6 in Table 10-15) If this area will be used as quarry, offset measures to be developed as part of the Project BAP to ensure loss of habitat is compensated through no net loss approach. Prior to any construction activity at this specific quarry location, detailed flora and fauna study need to be carried out to set a baseline for offset design and overall biodiversity management. Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. Species-specific no net loss and net gain measures to be developed within Project BAP. 	Minor
	Temporary facilities located on natural habitats outside the expropriation corridor (at land that have not been affected by previous infrastructure works)	<ul style="list-style-type: none"> - Local (within the Aol) - Reversible/Irreversible - Long-term - Continuous 	High	High	Major	<ul style="list-style-type: none"> For potential quarries and material borrow sites considered within the scope of the Project, evaluate the existing status of the specific site. If there has been no previous production at the candidate site, avoid impacts on the natural habitat by not using the site. If not using the site is technically not possible, ensure that the permits/licenses and EIA decisions are in place. Any new sites/facilities to be included within the Project will require identification of potential site-specific E&S impacts and 	Minor

Impact Description	Receptor	Impact Identification (extent, reversibility, duration, frequency)	Impact Magnitude	Sensitivity/ Value of Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
						<p>management measures including field surveys to be conducted for biodiversity prior to entry into such new areas.</p> <ul style="list-style-type: none"> Based on the field findings, update the Project BAP and implement ex-situ and in-situ measures for habitats and species of conservation importance targeting no net loss and net gain for CH trigger biodiversity elements. The affected areas will be rehabilitated as per the requirements of the authorities following the completion of the activities at each site. Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. 	
	Maquis (at Station No. Q12)	<ul style="list-style-type: none"> - Restricted (within the License Area of the quarry) - Reversible/Irreversible - Long-term - Continuous 	High	High	Major	<ul style="list-style-type: none"> Only the quarry location Q12 in Section 4 is represented by this habitat. The area also falls within Yamanlar Mountain KBA. In Q1 2021, one (1) local endemic species (<i>Verbascum antinori</i>) and one (1) regional endemic species (<i>Centaurea polyclada</i>) were observed at this area. The local and regional endemic flora species qualifying this habitat is to be conserved through ex-situ measures (seed collection and submission to Turkey Seed Gene Bank) and implementation of in-situ measures either through transplantation of existing flora species at the footprint of the Project that will be impacted by quarry activities to suitable locations within the same habitat and/or using the collected seeds for further habitat management at this area. Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. Develop and implement BMP/BAP including identification of endemic flora species population and distribution within this habitat. Species-specific no net loss and net gain measures to be developed within Project BAP. 	Minor
	<ul style="list-style-type: none"> Nests/breeding/roosting sites of small mammals, birds and bats within the Project Area Permanent and temporary water bodies where amphibians can reside/breed, water birds and fish species are present and reside/breed within the Project Area 	<ul style="list-style-type: none"> - Restricted (within the land acquisition corridor or license area of quarries/borrow sites) or Local (within the Aol of the alignment) - Reversible - Short-term - Intermittent 	High	High	Major	<ul style="list-style-type: none"> Avoid direct impacts on aquatic ecosystems through implementation of waste and wastewater management measures. Avoid sediment transport to aquatic ecosystems induced by erosion at construction areas. Careful vegetation clearance to avoid impacts on animal nests. Nests of small mammals identified during field surveys to be checked at pre-construction and experts to be involved if removal of nests/animals are required. Train on-site employees to be aware of nests, avoid any displacement without an expert opinion on the status of the nests. Train on-site employees to avoid any impacts on the temporary water bodies. Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. 	Minor
Impacts of Project activities on ecosystem services	<ul style="list-style-type: none"> Ecosystem services along the railway alignment 	<ul style="list-style-type: none"> - Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible/Irreversible - Short-term/Long-term - Intermittent/Continuous 	High	High	Major	<ul style="list-style-type: none"> Project-specific Stakeholder Engagement Plan (SEP) will be implemented to address any grievance related to impacts on ecosystem services (e.g. damage on agricultural lands adjacent to the expropriation corridor or the access roads, reduction in agricultural productivity in the adjacent lands due to construction activities) and plan/take corrective actions, where necessary. Implementation of mitigation measures as described for air quality, waste, and wastewater management in relevant chapters of this ESIA Report. 	Minor

Impact Description	Receptor	Impact Identification (extent, reversibility, duration, frequency)	Impact Magnitude	Sensitivity/ Value of Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
						<ul style="list-style-type: none"> Implement Project-specific Resettlement Action Plan (RAP). Develop and implement BMP/BAP. 	
Damage to/loss of flora species due to Project construction activities including, but not limited to, movement of vehicles/machinery, air emissions, on-site waste and wastewater management practices	<p><u>CH trigger (Criteria 1c + 2), local endemic and CR (directly observed):</u></p> <ul style="list-style-type: none"> <i>Glaucium secmenii</i> <i>Alyssum niveum</i> <i>Cephalaria aytachii</i> <i>Verbascum gypsicola</i> <i>Marrubium zeydanlii</i> <i>Acantholimon gemicianum</i> <p><u>CH trigger (Criteria 1c + 2), regional endemic and EN (directly observed):</u></p> <ul style="list-style-type: none"> <i>Scabiosa hololeuca</i> - <p><u>CH trigger (Criterion 2), regional endemic and VU (directly observed):</u></p> <ul style="list-style-type: none"> <i>Salvia aytachii</i> <i>Sideritis gulendamii</i> <i>Scutellaria yildirimlii</i> <i>Verbascum antinori</i> <i>Achillea ketenoglui</i> <p><u>CH trigger (Criteria 1c + 2), local/regional endemic and CR (presumed present):</u></p> <ul style="list-style-type: none"> <i>Acantholimon anatolicum</i> <i>Acantholimon riyatguelii</i> <i>Ferula anatolica</i> Boiss. - <p><u>CH trigger (Criterion 1c and/or 2), local/regional endemic and EN (presumed present):</u></p> <ul style="list-style-type: none"> <i>Pyrus anatolica</i> Browicz <i>Bolanthus huber-morathii</i> Simon <i>Verbascum luciliae</i> (Boiss.) Kuntze <i>Cyclamen mirabile</i> Hildebr. <i>Ebenus plumosa</i> Boiss. & Bal. var. <i>plumosa</i> - <p><u>Regional endemic (directly observed):</u></p> <ul style="list-style-type: none"> <i>Paronychia dudleyi</i> <i>Centaurea polyclada</i> <i>Thymus leucostomus</i> var. <i>argilleceus</i> 	<p>- Restricted (within the land acquisition corridor) or Local (within the Aol)</p> <p>- Reversible</p> <p>- Short-term</p> <p>- Intermittent</p>	Medium	High	Major	<ul style="list-style-type: none"> Implementation of mitigation measures as described for air quality, waste and wastewater management in relevant chapters of this ESIA Report. Limiting project activities to designated areas to prevent direct impacts. Careful siting of temporary facilities to avoid direct impacts on flora species. As an ex-situ measure collection of seeds of local and regional endemic flora species as per the time schedule given in Table 10-20 and send the seeds to Turkey Seed Gene Bank. As an in-situ measure, Table 10-20 provides the time schedule favourable to carry out transplantation and seed plantation for the local and regional endemic species. At areas where these species are identified to be spread and to be directly affected by Project activities by an expert botanist and be translocated to suitable habitats within the Project Area. Train on-site employees to avoid any impacts on local and regional endemic flora species. Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. Prepare and implement BAP to achieve no net loss, and for CH trigger species, net gain of biodiversity elements. 	Minor
	<p><u>Widespread endemic:</u></p> <ul style="list-style-type: none"> <i>Alyssum pateri</i> subsp. <i>Pateri</i> <i>Gypsophila eriocalyx</i> <i>Gypsophila sphaecephala</i> var. <i>cappadocica</i> <i>Rhamnus thymifolius</i> <i>Genista aucheri</i> <i>Astragalus acicularis</i> <i>Astragalus lydius</i> <i>Astragalus vulneraria</i> <i>Astragalus oxytropifolius</i> <i>Bupleurum sulphureum</i> <i>Inula anatolica</i> <i>Helichrysum noeanum</i> <i>Helichrysum arenarium</i> subsp. <i>Aucheri</i> <i>Anthemis pauciloba</i> var. <i>pauciloba</i> 	<p>- Restricted (within the land acquisition corridor) or Local (within the Aol)</p> <p>- Reversible</p> <p>- Short-term</p> <p>- Intermittent</p>	Medium	Medium	Moderate		Minor

Impact Description	Receptor	Impact Identification (extent, reversibility, duration, frequency)	Impact Magnitude	Sensitivity/ Value of Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
	<ul style="list-style-type: none"> <i>Ptilostemon afer</i> subsp. <i>Eburneus</i> <i>Jurinea pontica</i> <i>Cousinia stapfiana</i> <i>Cirsium sipyleum</i> <i>Campanula argaea</i> <i>Campanula lyrata</i> subsp. <i>Lyrata</i> <i>Verbascum vulcanicum</i> <i>Stachys cretica</i> subsp. <i>Smyrmaea</i> <i>Nepeta congesta</i> var. <i>Congesta</i> <i>Salvia cadmica</i> <i>Salvia cryptantha</i> <i>Salvia wiedemannii</i> <i>Satureja wiedemanniana</i> <i>Phlomis armeniaca</i> <p><u>Not endemic but rare flora species:</u></p> <ul style="list-style-type: none"> <i>Noaea minuta</i> 						
	Other flora species identified at the Project Area	- Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible - Short-term - Intermittent	Medium	Low	Minor		Minor
Disturbance to and direct mortality of terrestrial and aquatic fauna species due to construction activities including, but not limited to, movement of vehicles/machinery, noise and air emissions, on-site waste and wastewater management practices	(1) Endemic Terrestrial Fauna <ul style="list-style-type: none"> <i>Anatololacerta anatolica</i> <i>Microtus anatolicus</i> (2) Fauna species falling under Annex II and/or Annex IV of the EU Habitats Directive (see Table 10-33) (3) Fauna species identified to have nests within the Project Area (see Table 10-33) (4) Avifauna Species (EN) <ul style="list-style-type: none"> <i>Neophron percnopterus</i> (Egyptian Vulture) (5) Fish Species (CR + Endemic) <ul style="list-style-type: none"> <i>Anguilla Anguilla</i> <i>Oxynoemacheilus simavicus</i> <i>Alburnus nasreddini</i> <i>Pseudophoxinus maeandricus</i> (6) Fish Species (EN + Not Endemic) <ul style="list-style-type: none"> <i>Barbus pergamonensis</i> 	- Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible/Irreversible - Short-term to Long-term - Intermittent/Continuous	High	High	Major	<ul style="list-style-type: none"> Implementation of mitigation measures as described for air quality, noise, waste and wastewater management in relevant chapters of this ESIA Report. Limiting Project activities to designated areas to prevent direct impacts, to the extent feasible. Speed limits will be implemented for construction vehicles. Careful siting of temporary facilities to avoid direct impacts on fauna elements. During construction phase care should be taken to avoid direct impacts on water bodies through disturbance/contamination Avoid sediment transport to aquatic ecosystems induced by erosion at construction areas. Train on-site employees to avoid any impacts on the water bodies and for avoidance of direct/indirect impacts on terrestrial and aquatic fauna elements. Train on-site employees to be aware of nests, avoid any displacement without an expert opinion on the status of the nests Fauna species with low mobility to be relocated to suitable habitats through supervision of fauna experts or trained project staff. Regular visual monitoring of the construction activities at the Project Area by the trained Contractor team to ensure mitigation measures are effectively implemented. Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. Develop and implement BAP to achieve no net loss, and for CH trigger species, net gain of biodiversity elements through implementation of measures such as conservation of feeding/breeding grounds and appropriate habitat management practices. 	Minor
	(1) IUCN VU Avifauna Species <ul style="list-style-type: none"> <i>Streptopelia turtur</i> (Turtle dove) (2) Water bird species (3) Species falling under Annex I of the EU Birds Directive (see Table 10-33) (4) Endemic fish species (see Table 10-33)	- Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible/Irreversible - Short-term to Long-term - Intermittent/Continuous	High	Medium	Major		Minor

Impact Description	Receptor	Impact Identification (extent, reversibility, duration, frequency)	Impact Magnitude	Sensitivity/ Value of Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
	(5) Fish species listed as VU by the IUCN <ul style="list-style-type: none"> <i>Barbus tauricus</i> <i>Cyprinus carpio</i> 						
	Other terrestrial fauna, avifauna and fish species identified at the Project Area	<ul style="list-style-type: none"> - Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible/Irreversible - Short-term to Long-term - Intermittent/Continuous 	High	Low	Moderate		Minor
Accidental introduction of invasive alien species during construction activities	Natural Habitats at the Project Area	<ul style="list-style-type: none"> - Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible/irreversible - Short-term to Long-term - One-off/rare 	High	High	Major	The presence and spread of invasive flora species will be monitored as part of biodiversity monitoring during the vegetative season, with attention to disturbed areas. Especially during reuse of stored topsoil for rehabilitation purposes care should be taken to avoid introduction of any invasive species.	Minor
	Modified Habitats at the Project Area	<ul style="list-style-type: none"> - Restricted (within the land acquisition corridor) or Local (within the Aol) - Reversible/irreversible - Short-term to Long-term - One-off/rare 	High	Medium	Major	<p>If spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.</p> <p>Undertake a pathway analysis to identify existing and future potential pathways of IAS invasion relevant to the project. This would consider the project location, the likely sources of equipment or materials for the project and what species (both native and IAS) are present at those source sites which could become IAS at the Project Area.</p>	Minor
Fauna mobility along the railway alignment leading to fauna injury or mortality during operation phase of the Project	Terrestrial fauna elements	<ul style="list-style-type: none"> - Restricted (within the fenced area) - Reversible/Irreversible - Short-term to Long-term - Intermittent/Continuous 	High	Low	Moderate	<ul style="list-style-type: none"> The entire HSR will be fenced off as per the technical specifications of the Employer/Operator. The measures required to maintain integrity of the fencing across the route and the operational measures/procedures to be followed will be identified and implemented by the Operator. Section 10.2.8.6 and Section 10.3 of the ESIA Report provides detailed assessment and management and monitoring measures to be implemented. 	Minor
Impacts of vegetation growth within the track area	Vegetative cover along the railway alignment	<ul style="list-style-type: none"> - Restricted (within the fenced area) - Reversible - Short-term - Intermittent 	Medium	Low	Minor	<ul style="list-style-type: none"> Regular maintenance of vegetation is necessary to avoid interference with train operations and track maintenance. The track area should be kept clear. Vegetation maintenance beyond that which is necessary for safety may remove unnecessary amounts of vegetation, resulting in the continual replacement of successional species and an increased likelihood of the establishment of invasive species. 	Minor

10.3.5. Considerations on No Net Loss/Net Gain for Critical Habitat and Natural Habitats

Consideration on No Net Loss /Net Gain for Critical Habitats and Natural Habitats are given in the table below based on the preliminary Critical Habitat Assessment and on the results of the impact assessment.

These considerations will be further addressed within the ongoing Critical Habitat Assessment and Biodiversity Action Plan (BAP) documents that will be developed as part of the post-ESIA Phase as discussed in the following section.

Within these documents, the potential losses of Critical Habitat and Natural Habitat due to Project's activities and the gains of Critical Habitat and Natural Habitat due to planned mitigation/ offset activities will be quantified. The relevant mitigation and offset activities will also be described in detail.

Table 10-38. Review of CH Designated Biodiversity Features

Biodiversity Features (for which CH is designated)	<u>IFC PS6 Clause 17</u> The Project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values	<u>IFC PS6 Clause 18</u> The Project is designed to achieve net gains of biodiversity values for which the critical habitat was designated
Critical Natural Habitats		
Section 1 – Gypsum Steppe (at KM 13+400 – KM 76+700)	<p>Construction activities at Section 1 took place between 2012-2018 and suspended thereafter. Vegetation clearance and construction of some of the permanent engineering structures had taken place.</p> <p>At Section 1, along the rail alignment within 200 m corridor, Gypsum Steppe Habitat covers ca. 808This area includes all permanent Project components to be built plus the temporary ones such as worker camp sites, material storage areas, waste storage areas of both the Contractor and the subcontractors. All this area will not be permanently impacted by the Project.</p> <p>Through implementation of habitat management measures and steppic species conservation efforts as detailed in this ESIA in Section 10.3 and to be further developed within BMP/BAP, the residual impact is expected to be minor.</p>	<p>Habitat management measures to be implemented to restore the potential impacts of temporary project components. Utmost care should be given to avoid potential introduction of IAS and therefore qualified experts should be involved in the design and monitoring of restoration studies. Gypsum steppe habitats are under pressure of agricultural activities in the region, so habitat restoration efforts are to be carried out in liaison with related conservation authorities and stakeholders.</p> <p>As recommended by the conservation ecologists⁶⁶, steppe vegetation susceptible to erosion, soil impoverishment and loss of diversity should be restored based on principles of ecological restoration. In addition, as recommended, many rare species can benefit from reintroduction studies to restore populations of historical distribution with a scientific focus on population structure and dynamics, dispersal of the species, interactions with other species and natural environment such as herbivore-vegetation dynamics at different spatial scales.</p> <p>Any habitat restoration activity and species reintroduction study to be carried out outside the expropriation corridor will require liaison with the Project Owner as offset locations need to be identified. Most probably State-owned treasury lands will be used or if there are any ongoing steppe habitat restoration works within the Project Area, the Project can contribute to such efforts as well.</p> <p>Specific metrics for habitat restoration and species reintroduction are to be established within the Project BAP to ensure net gain targets are monitored through quantified data. Hectares of habitat to be managed and restored and population of plant species to be reintroduced will be monitored together with the use of steppic vegetation by fauna elements.</p>
Section 1 – Juniper Woodland (at Quarry Location Q6)	<p>The Contractor team is assessing to avoid use of this specific quarry location for the Project. Through avoidance measure there will be no impact on this habitat.</p>	<p>If this area will be used as a quarry site, offset measures to be developed as part of the Project BAP to ensure loss of habitat is compensated and net gain is achieved through</p>

⁶⁶ Ambarlı, D., Zeydanlı, U.S., Balkız, Ö. *et al.* An overview of biodiversity and conservation status of steppes of the Anatolian Biogeographical Region. *Biodivers Conserv* **25**, 2491–2519 (2016). <https://doi.org/10.1007/s10531-016-1172-0>.

Biodiversity Features (for which CH is designated)	IFC PS6 Clause 17 The Project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values	IFC PS6 Clause 18 The Project is designed to achieve net gains of biodiversity values for which the critical habitat was designated
	<p>In Turkey, as per 2019 figures published by the Turkish Statistics Institute, a total of 963,217.00 ha of Juniper woodland is available. The Juniper woodland at the quarry Q6 is approximately 242 ha.</p> <p>If avoidance is not possible then prior to site entry biodiversity experts to quantify the age, quality, quantity of the Juniper woodland to establish the basis of the net gain assessment.</p>	<p>quantifiable metrics (hectares of woodland lost, number of trees lost, age of trees etc.) to be established specific to this habitat.</p> <p>Offset location will be identified in liaison with the Project Owner and probably will be a State-owned treasury land. Net gain achievement will be a long-term management concept and it is important to ensure that the offset location will not be used for any other purposes in the long run and will not be part of a land acquisition process for other potential developments in the vicinity.</p>
<p>Section 1 – Balıkdami Nationally Important Wetland (within Gypsum Steppe Habitat at KM 45+250 – KM 59+800)</p>	<p>Construction activities at Section 1 took place between 2012-2018 and suspended thereafter. Vegetation clearance and construction of some of the permanent engineering structures had taken place.</p> <p>As per the official figures published by the authorities⁶⁷, the total registered area of this nationally important site is 14,147.00 ha of which the wetland area is 1,047.00 ha.</p> <p>The railway alignment passes through the southern tip of the wetland avoiding the lake section. Engineering structures are designed and some already constructed to help maintain the continuity of the aquatic ecosystem between the wetland area and the connecting rivers.</p> <p>The overlap of the rail alignment (200 m corridor) and Balıkdami Nationally Important Wetland is ca. 290 ha corresponding to 2% of the registered area and coincides with Gypsum Steppe Habitat. This area includes all permanent Project components to be built plus the potential temporary ones such as material storage areas, waste storage areas of both the Contractor and the subcontractors. All this area will not be permanently impacted by the Project.</p> <p>Through implementation of mitigation measures as detailed in this ESIA in Section 10.3 and to be further developed within BMP/BAP, the residual impact is expected to be moderate to minor.</p>	<p>Official authorization letters to be secured from relevant conservation authorities and measures as stipulated by the authorities to be implemented during the remaining construction works.</p> <p>Any conservation effort as described within the site-specific Management Plan dated June 2019 to be implemented.</p> <p>Habitat management measures to be implemented to restore the potential impacts of temporary project components. Utmost care should be given to avoid potential introduction of IAS and therefore qualified experts should be involved in the design and monitoring of restoration studies. Gypsum steppe habitats are under pressure of agricultural activities in the region, so habitat restoration efforts are to be carried out in liaison with related conservation authorities and stakeholders.</p> <p>The potential long-term impacts of a linear project on the wetland are avoided through engineering structures to ensure habitat continuity. Engineering structures at river crossings have already been built. Remaining work at these areas to be managed so as to avoid any direct and/or indirect impact on the aquatic ecosystem. Once the river crossing works are finalised necessary restoration activities will be carried out at the riverbanks and the vicinity where the engineering structures are built.</p> <p>The construction activities in the vicinity of the wetland area should avoid disturbance/contamination of the aquatic ecosystem through accidental discharges and/or erosion related sedimentation. If technically feasible, sediment traps could be considered to avoid further spread of sediments into to wetland area.</p>

⁶⁷ Source: Ministry of Agriculture and Forestry, Directorate General of Nature Protection and Natural Parks, National Wetland Inventory Management Information System (<https://saybis.tarimorman.gov.tr/>).

Biodiversity Features (for which CH is designated)	<u>IFC PS6 Clause 17</u> The Project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values	<u>IFC PS6 Clause 18</u> The Project is designed to achieve net gains of biodiversity values for which the critical habitat was designated
		Specific metrics for habitat restoration and species reintroduction are to be established within the Project BAP to ensure net gain targets are monitored through quantified data.
Species		
Section 1 – CH qualifying flora species directly observed at Gypsum Steppe Habitat (as listed above, 13 flora species)	<p>Construction activities at Section 1 took place between 2012-2018. Direct impacts at the Project footprint took place, construction of some of the permanent engineering structures had started.</p> <p>Through implementation of mitigation measures as detailed in this ESIA in Section 10.3 and to be further developed within BMP/BAP, the residual impact is expected to be minor as a result of Project construction activities (damage to/loss of flora species due to Project construction activities including, but not limited to, movement of vehicles/machinery, air emissions, on-site waste and wastewater management practices).</p>	<p>Retrospective impact management through quantification of approximate population that is potentially lost along the direct Project footprint through already completed land clearance and infrastructure works.</p> <p>The species population within the Gypsum Steppe Habitat within a given area in the vicinity of the rail alignment will be calculated to set the basis for quantification within the direct footprint. Number of individuals and/or clusters potentially lost will be the metric for net gain assessment.</p> <p>Any undisturbed population of the species within the expropriation corridor will be identified. If the location coincides with potential permanent and/or temporary structures to be built in the future, then flora salvaging will be implemented to avoid loss of species. The salvaged flora species will be translocated ideally to areas within the expropriation corridor that will not have any permanent and/or temporary structures and impacts.</p> <p>It is important to note that the conservation efforts towards achieving net gain is a long-term process. Any offset area to be identified outside the expropriation corridor will need to be discussed with the Project Owner to ensure that such areas will not be used or acquired by other projects. To this end, liaison with conservation authorities is crucial to provide long-term solutions and potentially contribute to ongoing efforts already carried out by other stakeholders.</p> <p>As part of the Project monitoring, seed collection and submission to Turkey Seed Gene Bank will also be done so as to support the ex-situ species conservation efforts.</p> <p>Specific metrics for the species are to be established within the Project BAP to ensure net gain targets are monitored through quantified data.</p>

Biodiversity Features (for which CH is designated)	<u>IFC PS6 Clause 17</u> The Project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values	<u>IFC PS6 Clause 18</u> The Project is designed to achieve net gains of biodiversity values for which the critical habitat was designated
<p>Section 3 – Potential CH trigger flora species (as listed above, 6 flora species presumed present)</p>	<p>As described above in the ESIA Report, as of Q3 2021, the construction activities at Section 3 of the rail alignment are ongoing by other contractors. Once the infrastructure works are completed by these contractors, this section will be handed over to ERG/SSB for completion of the superstructure works. During this hand over process, an E&S audit will take place to identify the outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances, if any, for incorporation to the Management and Corrective Action Plan.</p> <p>These species are not only restricted to the direct footprint of the rail alignment and thus viable populations are expected to exist in the wider area. Therefore, through implementation of mitigation measures as detailed in this ESIA in Section 10.3 and to be further developed within the Management and Corrective Action Plan and BMP/BAP, the residual impact is expected to be minor.</p>	<p>Retrospective impact management through quantification of approximate population that is potentially lost along the direct Project footprint through already completed land clearance and infrastructure works.</p> <p>The species population within a given area in the vicinity of the rail alignment will be calculated to set the basis for quantification within the direct footprint. Number of individuals and/or clusters potentially lost will be the metric for net gain assessment.</p> <p>Any undisturbed population of the species within the expropriation corridor will be identified. If the location coincides with potential permanent and/or temporary structures to be built in the future for superstructure works, then flora salvaging will be implemented to avoid loss of species. The salvaged flora species will be translocated ideally to areas within the expropriation corridor that will not have any permanent and/or temporary structures and impacts.</p> <p>It is important to note that the conservation efforts towards achieving net gain is a long-term process. Any offset area to be identified outside the expropriation corridor will need to be discussed with the Project Owner to ensure that such areas will not be used or acquired by other projects. To this end, liaison with conservation authorities is crucial to provide long-term solutions and potentially contribute to ongoing efforts already carried out by other stakeholders.</p> <p>As part of the Project monitoring, seed collection and submission to Turkey Seed Gene Bank will also be done so as to support the ex-situ species conservation efforts.</p> <p>Specific metrics for the species are to be established within the Project BAP to ensure net gain targets are monitored through quantified data.</p>
<p>Section 4 – CH qualifying flora species present within Maquis habitat (at Quarry Q12 located within Yamanlar Mountain KBA) (as listed above, 1 flora species)</p>	<p>The CH qualifying species has been observed at the quarry location Q12 within the maquis habitat.</p> <p>Through implementation of mitigation measures as detailed in this ESIA in Section 10.3 and to be further developed within BMP/BAP, the residual impact is expected to be minor as a result of Project construction activities (damage to/loss of flora species due to Project construction activities including, but not</p>	<p>Any undisturbed population of the species within the quarry license area will be identified (it should be noted that the quarry activities are not conducted within the whole license area but in the EIA permitted area). If the location of the species coincides with potential permanent and/or temporary structures to be established within the quarry, then flora salvaging will be implemented to avoid loss of species. The salvaged flora species will be translocated ideally to areas within the quarry license area that will not have any permanent and/or temporary structures and impacts.</p>

Biodiversity Features (for which CH is designated)	<u>IFC PS6 Clause 17</u> The Project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values	<u>IFC PS6 Clause 18</u> The Project is designed to achieve net gains of biodiversity values for which the critical habitat was designated
	<p>limited to, movement of vehicles/machinery, air emissions, on-site waste and wastewater management practices).</p>	<p>Any offset area to be identified outside the quarry license area will need to be discussed with the Project Owner to ensure that such areas will not be used or acquired by other projects.</p> <p>As part of the Project monitoring, seed collection and submission to Turkey Seed Gene Bank will also be done so as to support the ex-situ species conservation efforts.</p> <p>Specific metrics for the species are to be established within the Project BAP to ensure net gain targets are monitored through quantified data.</p>
<p>Section 1 – Potential CH trigger avifauna species (presumed present within the Project Area) (as listed above, 1 avifauna species)</p>	<p>Through implementation of mitigation measures as detailed in this ESIA in Section 10.3 and to be further developed within BMP/BAP, the residual impact is expected to be minor as a result of Project activities (disturbance to and direct mortality of terrestrial fauna species due to construction activities including, but not limited to, movement of vehicles/machinery, noise and air emissions, on-site waste and wastewater management practices)</p>	<p>Agricultural practices and animal husbandry, reduced food availability and habitat change are amongst the threats for this species. Therefore, it is important to understand the species behaviour and use of the habitat at the Project Area through monitoring studies. Habitat management measures aligned with conservation efforts at the national level is to be devised so as to achieve net gain target for the species. In addition to Project specific monitoring studies, ongoing species-specific studies carried out by the authorities and/or conservation groups is to be analysed to ensure the net gain measures are applicable and the metrics to be established are sensible.</p> <p>Specific metrics for habitat restoration and species reintroduction are to be established within the Project BAP to ensure net gain targets are monitored through quantified data.</p>
<p>Potential CH trigger fish species (as listed above, 1 fish species directly observed, 3 fish species previously recorded by the experts and 8 fish species presumed present as per literature information)</p>	<p>Through implementation of mitigation measures as detailed in this ESIA in Section 10.3 and to be further developed within BMP/BAP, the residual impact is expected to be minor as a result of Project construction activities (disturbance to and direct mortality of aquatic fauna species due to construction activities including, but not limited to, movement of vehicles/machinery, noise and air emissions, on-site waste and wastewater management practices)</p>	<p>For CH-qualifying fish species, any impact on the aquatic ecosystem by other stakeholders could lead to adverse impacts resulting in deterioration of the water quality and subsequent loss of species. Therefore, establishing a holistic monitoring approach and combining the findings of environmental monitoring studies and also the activities carried out by other stakeholders within the vicinity of the Project area is crucial. Monitoring metrics and population trends should include water quality assessment through sampling and analysis and also on-site visual observations during biodiversity field surveys.</p> <p>Aquatic ecosystems will be crossed by engineering structures to ensure continuity of the habitat is not hindered and the aquatic species are not impacted through loss of habitat. During the post-construction phase, implementation of habitat management</p>

Biodiversity Features (for which CH is designated)	<u>IFC PS6 Clause 17</u> The Project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values	<u>IFC PS6 Clause 18</u> The Project is designed to achieve net gains of biodiversity values for which the critical habitat was designated
		measures at the river crossings can ensure erosion does not take place, soil protection measures are in place and natural vegetation is used for rehabilitation purposes. Specific metrics for habitat restoration and species reintroduction are to be established within the Project BAP to ensure net gain targets are monitored through quantified data.

10.3.6. Post-ESIA Phase Biodiversity Management

A **Biodiversity Management Plan** (BMP) is ongoing in line with the IFC PS6. The BMP will detail the mitigation and monitoring measures to be applied during the construction and operation phases of the Project to avoid, minimize or restore the impacts on biodiversity components (if any) according to the mitigation hierarchy.

As for the E&S Management Plans, the BMP will include roles and responsibilities, mitigation measures, monitoring, training, review, and auditing process. The document will be updated regularly based on new field data/information as part of ongoing management of biodiversity elements.

Any new facilities (e.g. quarries, borrow pits, etc.) needed by the Project will require identification of potential site-specific E&S impacts and relevant management measures including site-specific field surveys to be conducted for biodiversity prior to entry into such new areas.

As previously addressed, prior to start of superstructure works in Section 3a, 3b, 4a and 4d (at the time these sections of the Project will be handed over to the Contractor for the superstructure works), any outstanding/ongoing/retrospective issues, impacts, risks and/or grievances in Sections 3a, 3b, 4a and 4d related to management of biodiversity features by other contractors will be assessed through an E&S audit to be carried out by the Contractor. For the E&S audit, the relevant documentation related to biodiversity management will be requested (through the Employer) during the site hand over and outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances, if any, will be identified for incorporation into the Management and Corrective Action Plan, as appropriate. Examples include:

- Official authorization letters secured from relevant conservation authorities for the legally protected areas and measures as stipulated by the authorities to be implemented during construction works.
- List of and information including permit/licenses and EIA decisions, as applicable, on the quarries, material borrow sites, construction camp sites, topsoil storage sites, excavated material storage sites and other Project facilities used by other contractors.
- Documentation/information on the rehabilitation works done/to be done at the quarries and material borrow sites that will not be further used in the Project or transferred to other authorities for future use.
- Documentation/information on topsoil management practices.
- Reports on biodiversity monitoring conducted along the HSR alignment and at the temporary facilities.

Following this audit, a Management and Corrective Action Plan will be developed and implemented for these sections of the Project where potential impacts will be identified. The implementation responsibilities for the Management and Corrective Action Plan will be further clarified between the Employer and the Contractor.

A comprehensive **Critical Habitat Assessment (CHA)**, including the results of the summer field campaign recently concluded will be prepared according to IFC PS6 and relevant Guidance Note 6 (June 2019) as a separate document to:

1. confirm the presence of Critical Habitats and Natural Habitats within the study areas and evaluate the extent they could be impacted by the Project;
2. discuss the residual impacts (net loss) considering the effect of mitigation and monitoring measures proposed within the ESIA and the BMP;
3. assess needs of additional conservation actions and offsets to achieve No Net Loss or preferably Net Gain for Critical and Natural Habitats.

A **Biodiversity Action Plan** (BAP) will be prepared to describe the strategy and timeline for identifying actions to deliver Net Gain of those biodiversity values for which the critical habitat was designated and No Net Loss or preferably Net Gain for natural habitats (IFC PS6.18, GN6.91).

The BAP will define the conceptual framework and the main steps that will be taken to ensure the residual and unavoidable impact on Natural Habitats and Critical Habitats resulting from the Project after the application of the mitigation measures, and the need for offset. The BAP will provide a roadmap of the scoping and feasibility studies activities that will to be undertaken to identify and evaluate offset opportunities and additional conservation activities, including the engagement of relevant stakeholders.

Based on the activities described in the BAP, one or more **Offset Management Plan(s)** will be identified as needed. The Offset Management Plan will define habitat- and species-specific actions to achieve No Net Loss and Net Gain targets for CH designated biodiversity features and demonstrate this through robust monitoring including specific metrics to benchmark overall performance and adaptive management approach. Through implementation of the Offset Management Plan(s) the Project will achieve No Net Loss, and if possible, Net Gain for natural habitats and Net Gain for critical habitats.

11. SOCIO-ECONOMY

This Chapter provides baseline information on the socio-economic conditions of the settlements located in the social study area⁶⁸ of the Ankara-Izmir HSR Project and assesses the potential social impacts of the Project. The social baseline, assessment and reporting studies have been conducted by a team of qualified social experts ("social team") led by CE Management Consultancy and Trade Ltd. Co.

The Chapter is structured to include the following main subjects about Project Affected Settlements (PASs⁶⁹) and Project Affected People (PAPs):

- Methodology for social baseline characterisation and assessment of social impacts
- Applicable national legislation and international standards
- Baseline information covering the following:
 - Population and demographics
 - Infrastructure and social services
 - Socio-economic conditions
 - Vulnerable groups
- Identification and assessment of potential social impacts on PASs and PAPs, description of management measures to be implemented, and assessment of the residual impacts covering the following:
 - Impacts on population and demographics
 - Impacts on infrastructure, social services and life conditions (roads, access and traffic; infrastructure and facilities; waste services and management; dust, noise and vibration; and social services – health and education)
 - Impacts on local economy (welfare and wages; local employment; livelihood activities)
 - Impacts on land use⁷⁰, assets and land-based livelihood activities
 - Impacts on vulnerable groups

For the management of physical and economic displacement impacts of the Project-related land acquisition, Resettlement Action Plan (RAP) has been prepared as a stand-alone document in line with IFC PS5.

The settlements affected from the Project-related land acquisition are shown on the maps presented in Figure 11-1, Figure 11-2, Figure 11-3, and Figure 11-4 and listed in Appendix A. Number of settlements affected from the Project-related land acquisition per sections and provinces and districts crossed by the railway are summarised in Table 11-1.

⁶⁸ The social study area of the Project includes the settlements affected from Project-related land acquisition along the railway route between Ankara (Polatli district) and Izmir (Menemen district) and the settlements located in the proximity of the associated/off-site Project facilities including quarries, material borrow sites, construction camp sites, etc. This comprises the Area of Influence (AoI) for potential socio-economic impacts of the Project.

⁶⁹ PASs represent settlements affected from Project-related land acquisition along the railway route between Ankara (Polatli district) and Izmir (Menemen district) and the settlements located in the proximity of the associated/off-site Project facilities including quarries, material borrow sites, construction camp sites, etc. as given in Chapter 1

⁷⁰ Baseline conditions on land use are described in Chapter 5 on Land Use and Geology.

Table 11-1. Number of Settlements Affected by Project-related Land Acquisition

Section-based		Province-based		District-based			
Section	Number of PASs	Province	Number of PASs	District	Number of PASs		
Section 1	47	Ankara	4	Polatli	4		
		Eskisehir	12	Gunyuzu	4		
				Sivrihisar	8		
		Afyonkarahisar	66	Emirdag	16		
				Bayat	6		
				Iscehisar	3		
				Merkez	29		
Section 2	47			Sinanpasa	12		
		Kutahya	4	Dumlupinar	4		
		Usak	48	Banaz	19		
				Merkez	10		
Section 3	71			Ulubey	7		
				Esme	12		
		Manisa	67	Alasehir	18		
				Kula	3		
				Salihli	19		
		Section 4	42			Ahmetli	4
						Turgutlu	9
				Sehzadeler	6		
				Yunusemre	8		
Izmir	6			Menemen	6		
4 Sections – 207 PASs		7 Provinces – 207 PASs		21 Districts – 207 PASs			

(*) The town municipalities crossed by the Project include multiple neighbourhoods. When the number of all neighbourhoods under the town municipalities included, total number of settlements affected by the Project reach 207.

The status of construction for various engineering structures (Table 1-6) and progress with excavation and fill operations (Table 1-22) along the railway route (Section 1, Section 2 and Section 4) were previously provided in Chapter 1.

As can be seen from the settlement-based status of expropriation presented in Appendix D.2, majority of the land acquisition required for the Project has been completed in line with the Expropriation Law (No. 2942, 1983). Information on the ongoing infrastructure works under the responsibility of other contractors in Section 3a, Section 3b, Section 4a, and Section 4d is provided in Chapter 1.

Throughout this Chapter, the section references will be made as per the below table:

Section	Sub-section	Start KM (*)	End KM
Section 1	- Polatli-Afyon	0+000.000	151+500.000
Section 2	- Afyon-Banaz	151+500.000	230+370.612
	- Hatipler Passage	267+156.053	278+632.464
Section 3	(3a) Banaz-Esme	279+000.000	364+600.000
	(3b) Esme-Salihli	364+600.000	438+918.726
Section 4	(4a) Salihli-Manisa	439+000.000	456+500.000
	(4b)	456+500.000	501+000.000
	(4c) Manisa North Passage	501+000.000	514+983.302
	(4d) Manisa-Menemen	522+100.000	547+805.481

(*) The difference between the start and end kilometres of sections, if any, is caused by the fact that the design of different sections have been carried out by different companies. The route alignment is a continuous line and there is no physical gap in between different sections.

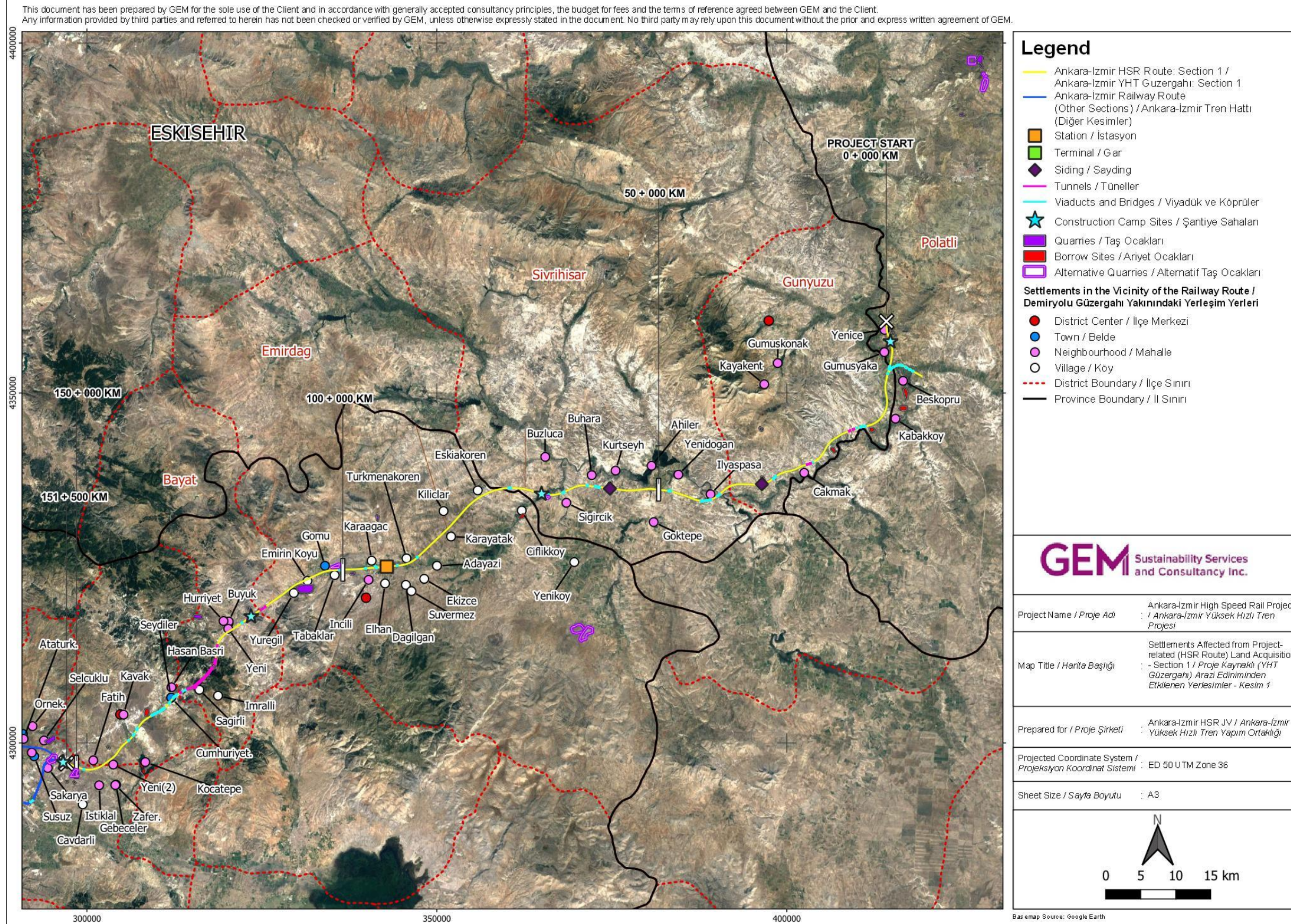


Figure 11-1. Settlements Affected from Project-related Land Acquisition along the HSR Route – Section 1

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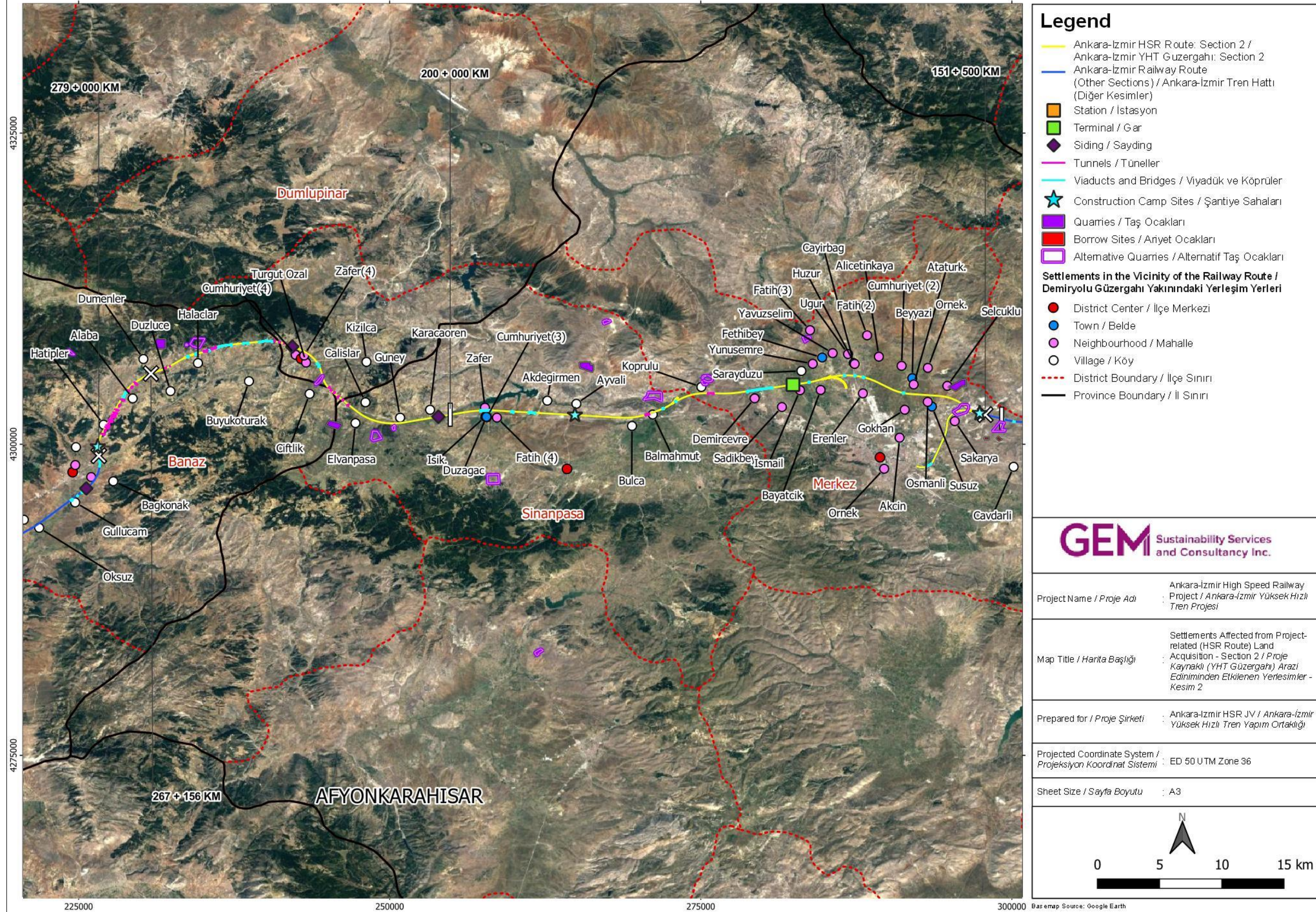


Figure 11-2. Settlements Affected from Project-related Land Acquisition along the HSR Route – Section 2

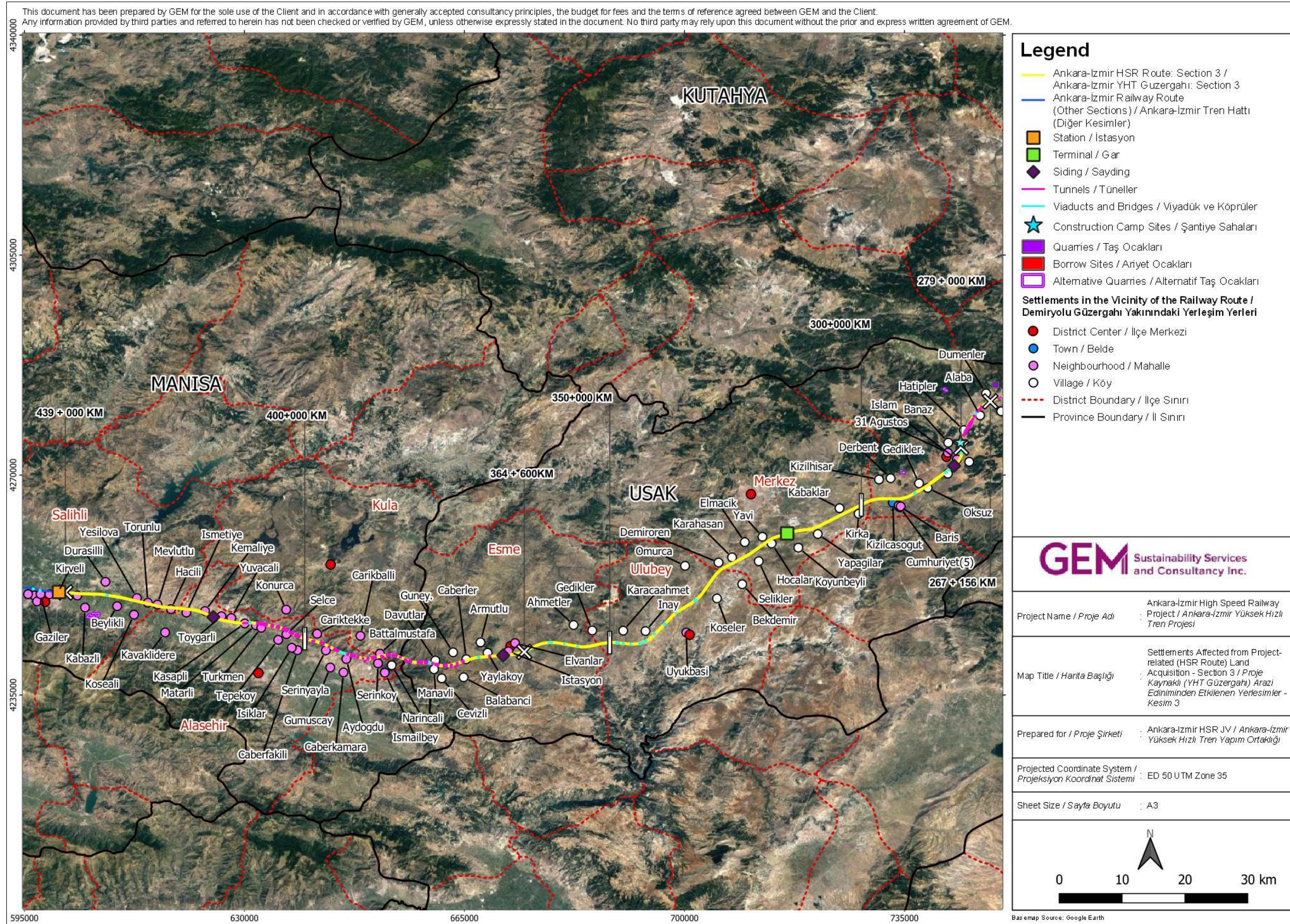


Figure 11-3. Settlements Affected from Project-related Land Acquisition along the HSR Route – Section 3

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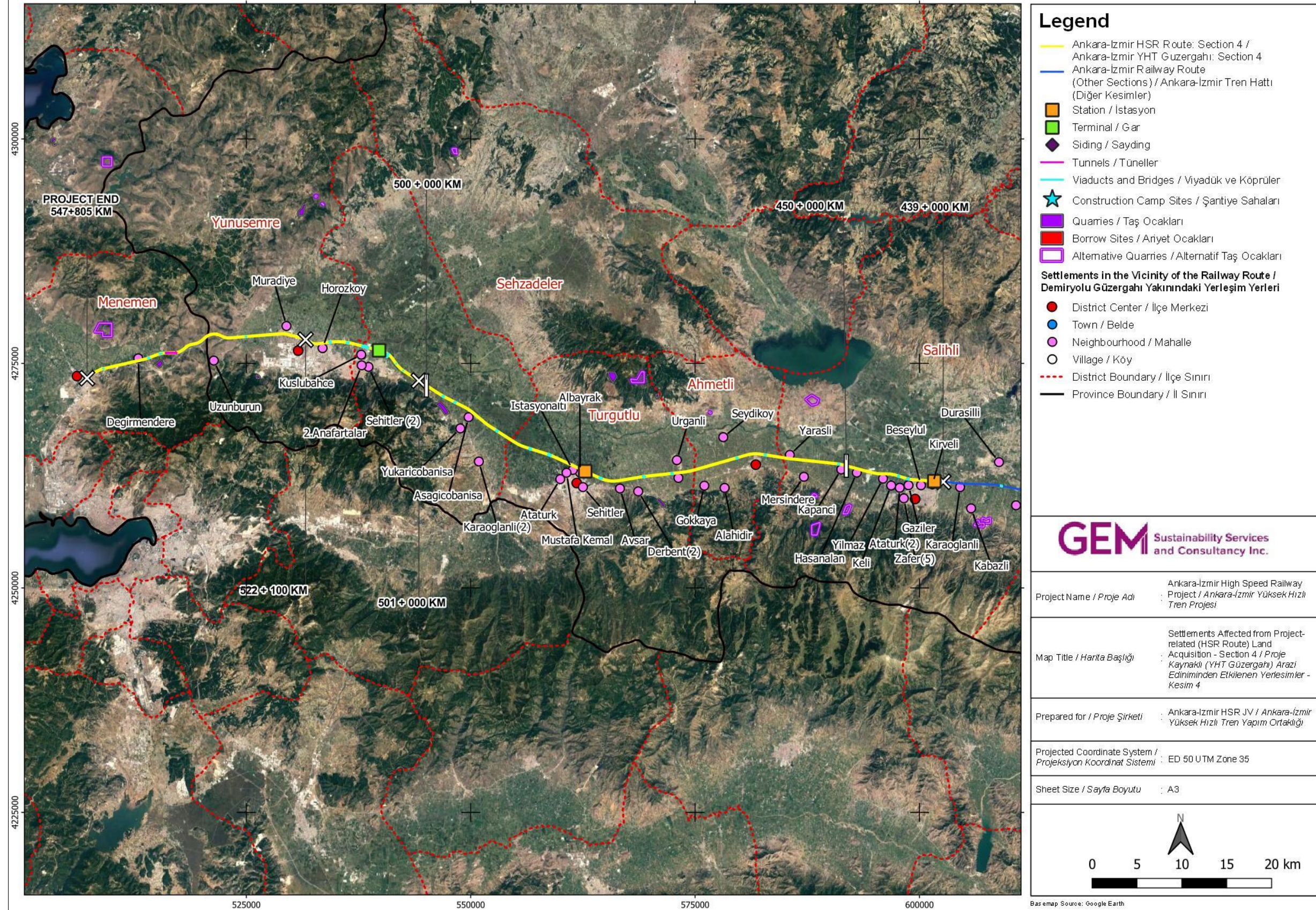


Figure 11-4. Settlements Affected from Project-related Land Acquisition along the HSR Route – Section 4

Remaining expropriation works along the route are summarised in Table 11-2.

Table 11-2. Summary of Remaining Expropriation Works (as of Q2 2021)

Section	Location	KM Chainage	Status
Section 1	Ankara-Konya HSR Connection Line	7+800; 0+000-6+683.120	Expropriation plans will be prepared once design works for this part proceeds.
	Bayat Relocation	108+740-120+520	Expropriation plans will be reconsidered/reprepared (if required) due to route relocation, once the route modification is approved by the related authorities.
Section 2	Hatipler Relocation	267+156.053-278+632.464	Expropriation plans will be reprepared due to route relocation once the route modification is approved by the related authorities.
Section 3	Koyunbeyli	311+678-313+159	Legal procedures as per the Expropriation Law (Law No: 2942, 1983) are ongoing.
	Yavi	313+061-314+395	Legal procedures as per the Expropriation Law (Law No: 2942, 1983) are ongoing.
Section 4	<u>Salihli-Manisa (4b)</u>		Legal procedures as per the Expropriation Law (Law No: 2942, 1983) are ongoing.
	Asagicobanisa	491+597.42-494+893.46	
	Karaoglanli	490+331.80-491+600.00	
	Yukaricobanisa	494+200-501+056.27	
	Manisa North Passage (4c)		Expropriation plans have been prepared but expropriation works have not started.
	Yukaricobanisa	494+200-501+056.27	
	Sehitler	KM 506+331-507+916	
	2. Anafartalar	507+916-508+170	
	Kuslubahce	508+170-508+624	
	Horozkoy	508+624-514+607	
	Manisa-Menemen (4d)		(*) Expropriation works have been ceased by the authorities.
	Uzunburun (*)	530+162-531+517	
	Samar(**)	531+517-533+200	
	Telekler(**)	533+200-536+200	(**) Expropriation plans have not been prepared to date.
	Suleymanli(**)	536+200-539+100	
	Degirmendere (*)	539+100-542+091	

Further land acquisition might be required for the camp sites, quarries, energy transmission lines (ETLs), excavated material storage sites, alternative⁷¹ quarries (see Chapter 3 on "Project Alternatives") etc. should they be located partially or fully outside the boundaries of the expropriation corridor.

The infrastructure (excavation and fill) works have already been partly completed in Section 1 and Section 2 and ongoing under the scope of other contractor(s) in Section 3a, Section 3b, Section 4a, and Section 4d.. There are also parts in Section 1 and 2, where the infrastructure works (including engineering structures) conducted by previous contractors have been suspended in 2018. Thus, inter alia, the social surveys and impact assessment conducted for the Project have taken into consideration and reflect retrospective social impacts experienced by the PASSs where construction activities were previously conducted/suspended⁷² by the previous contractors.

⁷¹ Besides the quarries and material borrow sites included in the current design, Contractor is currently in the process of evaluating additional sites that may be required/used during the Project construction works. The list of alternative quarries and material borrow sites that are under evaluation as of Q2 2021 are provided in Chapter 3. Following the final selection of the alternative quarry and material borrow sites to be used in the scope of the Project (in addition to the sites described in Section 1.4.7.2), further surveys and/or assessments will be conducted by qualified experts prior to site entry as to identify site-specific E&S impacts and management measures.

⁷² Based on the information collected through the ESIA surveys (Community Level Questionnaires – CLQs and Household Questionnaires – HHQ), it is estimated that that construction works were started and left unfinished in approximately 63% of the PASSs. This ratio is to be further verified by the Contractor as part of ongoing pre-construction surveys and evaluations.

11.1. Methodology

The scope of the social studies conducted as part of the ESIA is summarised in Table 11-3. Detailed information on each study component is presented in the following sections.

Table 11-3. Methodological Summary of the Social Studies

Study Component	Scope
Desktop Study	<ul style="list-style-type: none"> Desktop study (completed based on a review of publicly available data, analysis of route maps and maps of Project/associated facility locations by maps, expropriation plans, and itinerary of settlement-based expropriation status).
Scoping Study	<ul style="list-style-type: none"> Scoping Field Study was conducted on 13-14 January 2021. <ul style="list-style-type: none"> Observation of lands affected from previous expropriation and infrastructure works Observation of potential construction camp areas including the existing Sinanpasa (Dogus) Construction Camp Site (KM 190+000), which is planned to be used by the Contractor as the main Project construction camp site. Interviews/consultations with the municipality mayors and elected settlement heads (mukhtars) on general socio-economic conditions, past expropriation processes and retrospective impacts (e.g. access restrictions, impact on agricultural, pasture and forest lands, impact on buildings and structures, affected people in settlements) stemming from the previous construction activities conducted by other contractors and suspended in 2018.
Social Surveys	<p>Data collection strategy:</p> <ul style="list-style-type: none"> Community level interviews (by telephone) with the elected settlement heads (mukhtars) in PASs (see Appendix D.1 for the List of Settlements Affected from Project-related Land Acquisition) as per IFC's Interim Advices for IFC Clients on Safe Stakeholder Engagement in the Context of COVID-19 (2020) in order to collect settlement level data on baseline socio-economic conditions and potential social impacts of the Project for ESIA and feed in to RAP studies to be prepared in line with IFC PS5. Household-level surveys with the Project Affected People (PAPs) to collect household level data on baseline socio-economic conditions and potential social impacts of the Project for ESIA and feed in to RAP studies for baseline data and impact assessment Engagement with the authority (TCDD – Department of Real Estate), which was responsible from the Project-related expropriation in the previous Project phases. Deep interviews with: <ul style="list-style-type: none"> Vulnerable groups Women <p>Engagement with other governmental and non-governmental stakeholders will be initiated as part of Stakeholder Engagement Plan (SEP) implementation.</p> <p>Sampling strategy:</p> <ul style="list-style-type: none"> Community-level interviews with: <ul style="list-style-type: none"> 108 mukhtars of the settlements in Section 1, Section 2 and Section 4a, 4b and 4c (full census targeted⁷³), 13 mukhtars of selected settlements in Section 3 and 4d, 7 mukhtars of the settlements which were not affected by land acquisition but close to the Project route and quarry. Household-level surveys: Sample calculated as 85% confidence level 10% margin of error and its representation ability was enhanced by purposeful selection favouring more affected settlements. Priority categories are; <ul style="list-style-type: none"> PAPs who are impacted by land acquisition Land users of the private and public lands <ul style="list-style-type: none"> Beneficiaries of the affected common properties (forest and pasture) PAPs living in residences close to the Project area Individuals of different age and gender <p>As a result 128 mukhtars and 229 PAPs were surveyed.</p>

⁷³ Elected settlement heads in 16 villages/neighbourhood could not be reached or did not accept the interview.

Study Component	Scope
Impact Assessment and Management	<ul style="list-style-type: none"> Assessment of social impacts and development of management/mitigation measures as part of the ESIA Report, covering the following subjects: <ul style="list-style-type: none"> Impacts on population and demographics Impacts on infrastructure, social services and life conditions (roads, access and traffic; infrastructure and facilities; waste services and management; dust, noise and vibration; and social services – health and education) Impacts on local economy (welfare and wages; local employment; livelihood activities) Impacts on land use, assets and land-based livelihood activities Impacts on vulnerable groups <p>Participatory approach: It should be noted majority of the land acquisition within the Project expropriation corridor has been completed by the TCDD in line with the Expropriation Law (Law No. 2942, 1983). Infrastructure (excavation and fill) works have already been partly completed in Section 1 and Section 2, except the Hattipler Passage (KM 267+156-278+632) and Ankara-Konya HSR Connection Line (7+800; 0+000-6+683.120) (see Section 1.6.1 for progress of excavation and fill per railway sections). As of Q2 2021, construction works are being conducted by other contractors in Section 3, Section 4a (KM 439+000-456+500 in Salihli-Manisa section) and Section 4d (KM 522+100-547+805 in Manisa-Menemen section) under the contracts executed by the TCDD. Since the construction work has started and reached a certain progress, a participatory approach was adopted instead of expert opinion in determining the impacts. Accordingly, information on the impacts that have already been experienced by the PAPs due to previous land acquisition processes conducted by the TCDD and construction processes conducted by the previous contractors have been collected and considered in the assessment and management of potential impacts of the activities to be conducted by the Contractor.</p> <ul style="list-style-type: none"> Resettlement Action Plan (RAP) covering both physical and economic displacement impact of the Project

11.1.1. Scoping Study

As part of the scoping phase of the ESIA process, a Scoping Field Study was carried out on 13-14 January 2021, with the participation of representatives from ERG Construction on behalf of the Contractor and GEM including the senior social experts.

The key locations visited within the scope of the Scoping Field Study are summarised in Table 11-4.

Table 11-4. Locations Visited within the Scope of the Field Study

Settlements	Camp Sites	Route and Engineering Structures	Stations	Biodiversity
Yenice (infrastructure works completed)	Yenice (0+000)	Project Start (Yenice; KM 0+000)	Afyonkarahisar (170+000)	Sakarya River
Gomu	Beskopru (3+450)	Sakarya Viaduct (6+500)	Dumlupinar (218+175)	Dumlupinar
Yuregil (construction by previous contractors suspended in 2018)	Bayat (119+500)	Tunnel 6-7-8 (123+720)		National Park (near Dumlupinar Station)
Seydiler (construction by previous contractors suspended in 2018)	Dogus (190+000) (to be used by the Contractor)	Tunnel 4-5 (210+980)		
Erenler (construction not started)	AGA Camp Site (Section 3) (Current contractor of Section 3)	Hattipler-Banaz (267+850-279+724)		
Duzagac (construction by previous contractors suspended in 2018)				

The following settlements, which are affected from the Project-related land acquisition, were visited during the Scoping Field Study and consultations were conducted with the elected settlement heads and municipality mayors of the settlements visited to obtain information on the general socio-economic conditions, past expropriation processes and retrospective impacts (e.g. access restrictions, impact on agricultural, pasture and forest lands, impact on buildings and structures, affected people in settlements) stemming from the previous construction activities conducted by other contractors and suspended in 2018:

- Afyonkarahisar, Emirdag, Gomu town municipality (Consultation with Mayor)
- Afyonkarahisar, Emirdag, Yuregil village (headman)
- Afyonkarahisar, Iscehisar, Seydiler town municipality (Hasan Basri neighbourhood) (headman)
- Afyonkarahisar, Merkez, Erenler neighbourhood (headman)
- Afyonkarahisar, Sinanpasa, Duzagac town municipality, Cumhuriyet neighbourhood (headman)

During the scoping field consultations, maximum care was taken against COVID-19 risks. As such, the interviews were conducted by observing the mask, distance and hygiene rules, wherever possible outdoors.

In addition to the settlements;

- The existing Sinanpasa (Dogus) Construction Camp Site (at KM 190+000) was visited to observe the working, accommodation and health and safety conditions, as this site is planned to be used as the main camp site in the scope of the Project.
- The existing construction camp site of AGA Energy, the Contractor for infrastructure works in Section 3 was visited to consult with the existing Contractor and obtain information on ongoing construction works and related E&S aspects.

As a result of the scoping phase assessments, all settlements (in Section 1, 2, 3, and 4) affected/will be affected from the infrastructure and/or superstructure works of the Contractor, have been included in the scope of the social impact assessment to be conducted as part of the ESIA.

The following key social issues identified as a result of the Scoping Study have been taken into consideration in establishing the methodology and scope of social surveys and assessment of social impacts as part of the ESIA:

- There are settlements in which agriculture and livestock activities were potentially adversely affected by Project-related land acquisition
- Owners/users of the residential buildings/structures located within the expropriation corridor of the Project had experienced physical displacement as a result of Project-related land acquisition.
- Unfinished construction works have caused impacts on life conditions and resulted in access restrictions in some of the settlements (e.g. health and safety concerns due to construction traffic using the village roads, damage on village access roads due to suspension of construction works in 2018).

11.1.2. Social Surveys

11.1.2.1. Data Sources

Qualitative and quantitative research methods have been used together for the purposes of the social surveys as part of the ESIA. To this end, primary and secondary data have been evaluated together.

Primary data sources used in the studies include;

- Structured interviews (survey) with the representatives (mukhtars⁷⁴) of the PASs,
- Structured interviews (survey) with the PAPs living in the PASs, and
- Semi-structured interviews (deep interview) with vulnerable persons and women.

The target groups and the contents of the questionnaires are summarised in Table 11-5. To obtain information from stakeholders, instead of using standard community-level and household questionnaires, Project-specific questionnaires and interview forms have been developed by the social team so as to reflect the unique characteristics and current conditions of the Project and Project-related land acquisition process.

Table 11-5. Data Collection Tools for Specific Target Groups

Data Collection Tool	Target Group	Content of the Tool
Community Level Questionnaire (CLQ)	Mukhtars of the PASs	<ul style="list-style-type: none"> - Demographic characteristics of settlements (including vulnerable persons) - Socio-economic data about settlements - Infrastructural characteristics of settlements - Lands, assets and PAPs affected by land acquisition
Household Questionnaires (HHQ) (separate questionnaires designed for ESIA and RAP surveys – conducted in parallel to ESIA surveys)	Land (parcel) based impacted PAPs	<ul style="list-style-type: none"> - Demographic characteristics of household members - Income sources and socio-economic condition of household - Land ownership, agriculture and animal husbandry - House ownership - Past experiences with the land acquisition process - Affected assets and houses - Project impacts on the use of public lands
Deep Interview Form for vulnerable persons and women	Vulnerable PAPs and women who live in PASs	<ul style="list-style-type: none"> - Impacts of land acquisition on vulnerable groups - The means to develop the Grievance Mechanism - Impact of/potential for income loss

Data collection from governmental organisation and non-governmental organisations (NGOs) is targeted to be initiated at the ESIA Disclosure Phase (see Chapter 16 on Stakeholder Engagement) once the information on the current Project design and outcomes of the impact assessment is made available to stakeholders through the ESIA Disclosure Package. For this purpose, online consultation forms will be used as indicated in the Project SEP, which has been prepared as a stand-alone E&S document.

Secondary data sources of studies to be used in the studies have included Turkish Statistical Institute (TurkStat) and the Address Based Population Registration System (ABPRS) indicators, published data of the relevant governmental organisations, NGOs, etc.

11.1.2.2. Sampling

A sampling technique based on representative sampling has been used to identify the potential socio-economic impacts of the project and specifically to identify economic displacement risks and impacts.

In determining the sample settlements, initially, the railway route has been examined based on Google Earth images. The settlements where agricultural lands (privately-owned or treasury land) and common properties (pasture lands and forest lands) are fragmented by the Project, settlements affected/potentially affected by physical and/or economic displacement, and settlements located in the proximity of the route, quarries, borrow sites and/or construction camp sites, been identified as priority areas to be considered in determining the sample for social surveys.

The data collection tools, sampling strategy and number of questionnaires/interviews conducted with the targeted stakeholder groups, including the Mukhtars and affected households, vulnerable groups and women in sample settlements, is presented in Table 11-6.

⁷⁴ Turkey is a centralised unitary system, and the provinces are subordinated to the centre. The largest administrative units are the provinces, and under them are districts, towns (semi-rural) and settlements. There are two type of settlements: (1) villages (rural life) and (2) neighbourhoods (urban life). There are elected mukhtars at the head of both the villages and the neighbourhoods.

Table 11-6. Sampling Strategies Per Data Collection Tools and Number of Interviews per Target Groups

Data Collection Tool	Target Group	Sampling Strategy	Number of Interviews per Target Group	Total Interviews Conducted
Community Level Questionnaire (CLQ)	All Mukhtars of the PASs in - Section 1 - Section 2 - Section 4a, 4b, and 4c	Full census (targeted)	Achieved: 108 Targeted number of interviews was 124. There were 16 mukhtars who could not be reached or who did not wish to participate.	128 CLQs
	Selected mukhtars of PASs in -Section 3 -Section 4d	Purposeful selected sampling	Achieved: 13 The settlements with relatively more significant impacts were determined by Google Earth observations in Section 3 and 4d	
	Selected mukhtars of PASs impacted by quarries and railway, although not affected by land acquisition	Purposeful selected sampling	Achieved: 7 The settlements with relatively more significant impacts were determined by Google Earth observations in quarry areas.	
Household Questionnaire (HHQ) for SIA	In Section 1, 2 and 4a, 4b, and 4c: <ul style="list-style-type: none"> Owners of the impacted private lands and land assets Users of the impacted private and public lands (formal-informal) Beneficiaries of the impacted common properties (forest and pasture) 	Randomly and categorised sampling	Achieved: 200 Targeted number of interviews was approximately 200 samples for 6,000/7,000 affected parcels with 85% confidence level 5% margin of error in Section 1,2 and 4a, 4b, and 4c. Randomly selected names from the expropriation list have been reached according to the impact and communication information received from the Mukhtars. See formula below: $\text{Sample size} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N} \right)}$	229 HHQs⁷⁵

⁷⁵ Through 229 HHQs, information on 840 household members were obtained.

Data Collection Tool	Target Group	Sampling Strategy	Number of Interviews per Target Group	Total Interviews Conducted
	In Section 3 and 4d: <ul style="list-style-type: none"> Users of the affected private and public lands PAPs living in the houses located close to the Project route/facilities 	Purposeful selected sampling	Achieved: 26 In order to understand comparatively whether there are different types of impacts from in sections for which infrastructure works are under the responsibility of other contractor(s), 26 HHQs were applied in Sections 3 and 4d. Impacts in Section 3 and 4d have also been included in the CLQs as well.	
	<ul style="list-style-type: none"> PAPs impacted by quarries and railway, even though they are not affected by land acquisition 	Purposeful selected sampling	Achieved: 3 Settlements close to quarry and railway, although not affected by land acquisition, were included in the study with CLQ. PAPs living in these settlements have been included in the HHQ study with a few applications.	
	<ul style="list-style-type: none"> Owners and residents of the affected houses 	Full census (targeted based on the information available at the time of survey design)	Achieved: 21 Additional residential buildings have been identified based on the information provided/obtained after the design of surveys (through structure identification reports of the TCDD regional directorates and information received as part of the CLQs and HHQs).	21 HHQs within the 229 HHQs
Interview form for vulnerable persons and women	Vulnerable and women PAPs who live in PASs in all Sections	Purposeful selected sampling	Achieved: 28 Selected among the women and vulnerable PAPs, whose contact information was obtained from the mukhtars of the PASs in Section 1, 2, 3 and 4.	28 interviews
Consultation form for institutions	Representatives of national and local institutional stakeholders	Purposeful selected sampling	Selected institutions	To be conducted as part of ESIA
Consultation form for NGOs	Representatives of related local NGOs	Purposeful selected sampling	Selected NGOs	Disclosure as per Project SEP

Number of CLQs and HHQs applied in PASs is summarised in Table 11-7.

Table 11-7. Breakdown of CLQ and HHQ Numbers per PASs

PASs	Status of Land Acquisition	Status of Construction Activities	CLQs		HHQs	
			Number	Percent	Number	Percent
PASs in Section 1	Started	Started	46	35.9	91	39.7
PASs in Section 2a	Started	Started	33	25.8	73	31.9
PASs in Section 2b - Hattipler Passage	Expropriation plans will be reprepared due to Project relocation	Started in a limited part	4	3.1		
PASs in Section 4a, 4b, and 4c	Started	Started in a limited part	13	10.2	36	15.7
Section 3 and 4d	Started	Started	25	19.5	26	11.4
PASs in all sections potentially affected by railway, even though they are not affected by land acquisition	N/A	N/A	2	1.6	2	0.9
PASs in all sections potentially affected by quarries, even though they are not affected by land acquisition	N/A	N/A	5	3.9	1	0.4
Total			128	100.0	229	100.0

Source: ESIA Field Study, February 2021.

11.1.2.3. Limitations of the Study

The Ankara-Izmir HSR is a linear project with 503.2 km length in total. There are 207 PASs in 21 district and 7 provinces potentially affected by the Project due to land acquisition and other Project-related impacts along the entire alignment of the HSR including all Project sections. In other words, the Project affects a wide area and different geographical regions of the country at the same time. Therefore, in the impact assessment study, it was tried to deal with a heterogeneous socio-economic structure in many issues such as geographical features, income sources pattern, product pattern etc.

The owner of the Project is AYGM⁷⁶ of MoTI. The land acquisition has been previously completed by TCDD, another affiliated state entity of the MoTI, in the majority of the settlements (this dates back to 2012 in some of the settlements) and the infrastructure works have been partly completed in Section 1 and Section 2 by other contractors, which had suspended their activities within the scope of the Project in 2018. The Project-related expropriation data is kept by TCDD as hard copies at the Regional Directorates. These characteristics show that some of the impacts of the Project that should be anticipated in advance are already realized. Since the construction work started and reached a certain progress, a participatory approach was adopted instead of expert opinion in determining the impacts. Besides, the parties who have the information about the sources of the existing impacts and the parties that will take responsibility for the mitigation of the impacts are no longer the same. JV will not only take measures to eliminate potential impacts, but will also play a role in mitigating ongoing impacts arising from past project activities.

Because of the unique Project characteristics in terms of previous construction activities conducted and suspended by other contractors mainly in Section 1 and Section 2, partial involvement of other contractors with ongoing works in Section 3a, Section 3b, Section 4a and Section 4b of the route as of Q2 2021, previous Project implementations conducted under the responsibility of those different parties and separated responsibilities for construction and operation phases between the Contractor and the Employer/Operator, it has been decided to target a full census with the elected settlement heads (through community level interviews) to verify the validity of the data from expropriation plans and structure identification reports and make a consistent characterisation of the existing socio-economic conditions and impact status along the entire route. A total of 128 CLQs has been applied as part of the social surveys.

⁷⁶ Former Directorate General of Railways, Harbors and Airports Construction (DLH) has been reorganised under the name of Directorate General of Infrastructure Investments – AYGM as of 1 November 2011.

Throughout the duration of the social survey program, COVID-19 related curfew restrictions (covering weekends between Fridays 9 p.m and Mondays 5 a.m) were applicable in Turkey. Considering the potential limitations and challenges that may stem from COVID-19 related restrictions, risks and concerns and the extent of the survey area and large number of communities and PAPs potentially affected from the Project that may limit the possibility of reaching all PAPs, social surveys were decided to be conducted remotely via phone calls as per IFC's Interim Advices for IFC Clients on Safe Stakeholder Engagement in the Context of COVID-19 (2020).

To this end, a sampling-based methodology (see Table 11-6 for description of sampling strategies) has been adopted for the surveys to be conducted with the affected households through HHQs. To ensure effective and accurate data collection in this context, Project-specific questionnaires and interview forms, instead of standard templates, have been developed by the social team so as to address the challenges and limitations of remote interviews and reflect the unique characteristics and complexities of the Project stemming from the current status of the affected lands and Project-related land acquisition process.

Conducting research in pandemic conditions has brought along certain limitations together with advantages. Telephone interviews lack some of the communication advantages when compared to face-to-face interviews. This said, telephone interviews have allowed the social team to reach higher number of PAPs that could have been reached in the case of settlement visits.

There were cases in which some of the mukhtars, who do not have sufficient information about the Project and the Contractor yet, did not agree to/wish to participate in the interviews. Prior to start of, social survey program, the ESIA team was provided by the Contractor with an authorisation letter explaining the scope of the surveys and studies to be conducted for the Project. Also, the social team was provided with a copy of the Ministry Circular, which was issued for the Project by the MoTI on 29 June 2020, requiring all the relevant stakeholders to prioritise the Project-related works and procedures as such all relevant processes are adequately undertaken without any interruption. Prior to implementation of questionnaires, the social surveyors informed the mukhtars and households about the Contractor, current status and scope of Contractor works and the scope and objective of the surveys. The social survey team reminded the interviewees that answering all questions is not compulsory. For this reason, the total number of answers to questions may be less than the number of interviewees in some of the settlements.

The Contractor Community Liaison Officer (CLO), appointed in February 2021, informed some of the mukhtars on the Contractor, activities under the responsibility of the Contractor, current status of the Project and scope of the social surveys being conducted by the ESIA Consultant, as necessary. Despite the information efforts of the social team and the Contractor CLO and due to concerns of the mukhtars around online and phone fraud, interviews could not be conducted with the mukhtars of 16 settlements (out of the 124 mukhtars targeted) so contact information of households affected from Project-related land acquisition could not be obtained in those settlements. Some of the mukhtars were also avoidant/hesitant to share contact information of households and vulnerable individuals, even though the social team provided information about the context and scope of the surveys. This said, in-depth interviews could be made with the targeted number of vulnerable individuals throughout the surveys (as summarised in Table 11-6).

In line with the overall Project schedule, the duration of the entire ESIA process until the date foreseen for the start of ESIA Disclosure was limited to three (3) months starting from the award of ESIA Contract. The studies were conducted based on the information that could be made available by the Contractor within the duration of social surveys and impact assessment. Further information on land acquisition, such as lists of PAPs (owners and users) actually affected from physical displacement, may be available in the post-ESIA period. The ESIA consultant made all the reasonable efforts through field surveys as part of the scoping study and remote (telephone) surveys (referred to as ESIA field surveys) as part of the ESIA and RAP and desk-based reviews to identify the parcels and PAPs affected from the displacement impacts of the Project.

The remaining expropriation works have been summarised in Table 11-2. Expropriation plans have not been prepared in some of those settlements with expropriation plans still to be prepared. In those settlements, CLQs were implemented but parcel/PAP based surveys and assessments could not be made within the duration of ESIA.

The potential Project risks and impacts stemming from the associated facilities located within and outside the expropriation corridor have been included in the ESIA study to the extent information was made available up until ESIA design freeze during Scoping Phase. Further land acquisition might be required for the camp sites, quarries, energy transmission lines (ETLs), excavated material storage sites, alternative⁷⁷ quarries (see Chapter 3 on "Project Alternatives") etc. should they be located partially or fully outside the boundaries of the expropriation corridor.

⁷⁷ Besides the quarries and material borrow sites included in the current design, Contractor is currently in the process of evaluating additional sites that may be required/used during the Project construction works. The list of alternative quarries and material borrow sites that are under evaluation as of Q2 2021 are provided in Chapter 3. Following the final selection of the alternative quarry and material borrow sites to be used in the scope of the Project (in addition to the sites described in Section 1.4.7.2), further surveys and/or assessments will be conducted by qualified experts prior to site entry as to identify site-specific E&S impacts and management measures.

11.1.3. Impact Assessment

The methodology defined in Chapter 4 ("ESIA Methodology") of this ESIA Report has been used to assess the potential social impacts of the Project. Accordingly, significance of potential social impacts has been determined as a factor of the sensitivity of the receptor and the overall magnitude of the Project's impact on that specific receptor.

The area of influence (AoI) for the assessment of potential social impacts have been defined to include the following:

- Settlements affected from Project-related land acquisition along the railway route between Ankara (Polatli district) and Izmir (Menemen district) (see Appendix A)
- Settlements located in the proximity of the associated/off-site Project facilities including quarries, material borrow sites, construction camp sites, etc. (see Table 1-17, Table 1-18 and Table 1-19 in Chapter 1)
- Settlements located in the proximity of the stations/gars (see Chapter 11 on Socio-economy and Chapter 13 on Community Health and Safety)

The sensitivity of the social receptors has been determined based on the baseline information, which has taken into consideration the stakeholder feedback received through the ESIA surveys. The overall magnitude of the impacts has been determined by using professional judgement in consideration of the geographical extent, reversibility, duration and frequency of the impact.

Finally, the significance assessment matrix provided in Chapter 4 has been used to assess the significance of the potential social impact of the Project prior to mitigation and after mitigation, and residual impacts have also been assessed accordingly. Overall, the significance of the impacts has been categorised as major, moderate, minor or negligible.

Majority of the land acquisition within the Project expropriation corridor has been completed by the TCDD in line with the Expropriation Law (Law No. 2942, 1983). Infrastructure (excavation and fill) works have already been partly completed in Section 1 and Section 2, except the Hattipler Passage (KM 267+156-278+632) and Ankara-Konya HSR Connection Line (7+800; 0+000-6+683.120) (see Section 1.6.1 for progress of excavation and fill per railway sections). As of Q2 2021, construction works are being conducted by other contractors in Section 3, Section 4a (KM 439+000-456+500) and Section 4d (Manisa-Menemen KM 522+100-547+805) under the contracts executed by the TCDD. Since the construction work started and reached a certain progress, a participatory approach was adopted instead of expert opinion in determining the impacts by using the Participatory Impact Assessment (PIA) method, which allows measurement of the current/occurred effects of projects.

11.2. Project Standards

The Project-related land acquisition has affected agricultural (privately-owned or treasury land), forest and pasture lands. Thus, the relevant requirements of the following key laws and related secondary regulations will be applicable to the Project. In addition to the national legislation, as presented in Chapter 2 ("Institutional and Legal Framework"), each of the eight (8) IFC Performance Standards include specific requirements on management of projects' social performances, stakeholder engagement and/or disclosure of information.

Law on Soil Conservation and Land Use (Law No. 5403, 2005)

This Law sets forth the rules and principles for determining land and soil resources and their classification, preparing land utilisation plans, preventing non-purpose utilisation, and defining the tasks and obligations to ensure land and soil preservation. Soil Preservation Boards are established in each province to examine, assess and monitor the activities related to the preservation, development and productive utilisation of lands.

Pasture Law (Law No. 4342, 1998)

This Law sets forth basic procedures and rules for the defining and allocation of pasture areas to various settlements and municipalities. The Ministry of Agriculture and Forestry is authorised to determine the boundaries of pastures and their allocation to relevant entities. The procedure for this application is clearly defined in the Law. The finalised boundaries are then recorded to corresponding title deeds. Allocation process is renewed every five years.

The purpose of this Law is to ensure that pastures are used in accordance with the rules to be determined, to increase and maintain their productivity by maintaining and improving them, to constantly monitor their use, to protect and to change the purpose of use if it is necessary. The Law stipulates that in-forest pastures and graze lands are re-defined by a committee and cannot be used for any other purposes unless their allocation purposes are modified.

Forest Law (Law No. 6831, 1956)

This Law sets forth the basic forestry legislation. The boundaries of protection forest are determined and declared to the surrounding settlements. The conditions, principles and periods of designation of such forests and management, development, improvement and utilisation principles and decisions are decided by the Ministry of Agriculture and Forestry.

The Law regulates the protection and conservation of forests, including issues such as rights of forest villagers, permissible tourism related activities, water management, the forests under protection, natural parks, non-wood products, public consciousness, grasslands and financial supports given to the villagers. The grazing of herds on the State forest lands shall be done according to the plans and permission of the forestry administration.

Expropriation Law (Law No. 2942, 1983)

The expropriation process in Turkey is undertaken as per the requirements of the Expropriation Law (No.2942, 1983). For the implementation of large projects that concern issues such as energy, irrigation and afforestation etc., administrations may expropriate by paying the fee for the immovables, resources and their easement rights in cash or as down payment in equal instalments, as required for the conduct of public services or interventions they are obliged to provide according to laws.

As per the Expropriation Law, government and statutory bodies are authorised to expropriate and establish an easement on personal property partially or fully, in condition of cash payment covering its market value.

Article 27 of the Expropriation Law, states that; the immovable property subject to expropriation may be seized through urgent (immediate) expropriation under three circumstances; (i) in situations for which President takes decision regarding the need for national defense in the scope of the implementation of the Law on National Defense Obligations (Law No: 3634); (ii) in situations of emergency determined by the Presidential decision, or (iii) in extraordinary situations as envisaged by special laws. In such cases/situations, upon the request of the relevant administration, a court may decide on the seizure of the immovable property under the principles set forth in Article 10 on condition that the procedures other than valuation shall be completed afterwards. In this process, upon request of the related administration, compensation amount for the immovable property shall be appraised by the court within 7 days through the experts assigned as per Article 10 and 15 of the Expropriation Law. Seizure shall only be made following the invitation to be done in accordance with Article 10 and the amount is deposited to the

bank specified in the announcement. The related Directorate of Land Registry is notified about the seizure decision to be made by the Court. The provision related to the prohibition of the transfer or alienation of the immovable asset is annotated to the land register. The asset is evacuated as per Article 20 following the issuance seizure decision.

Article 27 of the Law enables land entry earlier through an accelerated process when compared to the regular expropriation processes conducted under Article 10 of the Law. This said, Article 27 does not limit the rights and claims of the owners on valuation of land and fixed assets. The valuation process is done by the court or court nominated experts as per the Expropriation Law.

Accelerated expropriation decisions were taken for the immovable properties located on the railway route of the Project and published on Official Gazette for the immovable properties located between

- (i) Polatli and Afyonkarahisar (Council of Ministers' Decision No: 2012/3142);
- (ii) Afyonkarahisar and Usak (Banaz), between Usak (Banaz) and Esme and on Afyonkarahisar Passage (Council of Ministers' Decision No: 2016/8504);
- (iii) Esme and Salihli (Council of Ministers' Decision No: 2018/11288);
- (iv) Salihli and Manisa (Council of Ministers' Decision No: 2016/9085);
- (v) Manisa North Railway Passage (Council of Ministers' Decision No: 2016/9084), and
- (vi) Manisa and Menemen (Council of Ministers' Decision No: 2013/4708).

Resettlement Law (Law No. 5543, 2006)

Resettlement activities are regulated by Resettlement Law No. 5543 and Regulation for the Execution of Resettlement Law. The Resettlement Law deals with the families applying to related governmental agencies in project region and requesting government assisted resettlement. Resettlement assistance of the government is provided for entitled families while expropriation compensation payments are paid to all individuals possessing immovable properties in Project area. According to the Article 3 of the Law, three types of resettlement can be applied based on the choices and requests of affected families.

Civil Law (Law No. 4721, 2001)

The Law upholds equality between women and men, puts an end to sexual discrimination, renders women equal to men in both family and the society; and values the women's work. With the new Civil Code, substantial changes were made considering the developments in the law of domestic relations, and the changes and needs of the day.

Besides complying with the requirements of the national legislation, the Contractor aims to fulfil the requirements of the applicable international standards to the extent possible for the management of the Project's potential social impacts, as discussed in Chapter 2 ("Institutional and Legal Framework") of this ESIA Report.

Among the ten (10) principles of EP4, principles particularly relevant to management of Project's social performance include the following:

- Principle 5: Stakeholder Engagement
- Principle 6: Grievance Mechanism
- Principle 10: Reporting and Transparency

11.3. Baseline Conditions

The socio-economic baseline conditions of the PASs and PAPs are described in this section based on the findings of the desktop studies and social surveys conducted by the social team.

11.3.1. Population and Demographics

According to TurkStat (2020), the population and population growth rates of the districts in the social study area are presented in Table 11-8. Considering the population growth rates in the districts affected by the Project, the rates found to be low or negative in value, except Emirdag district in Afyonkarahisar and Menemen district in İzmir. The average population growth in Turkey was +5.5 for the same year. Gunyuzu in Eskisehir and Ulubey in Usak are the districts with the highest population loss (as indicated by negative growth rate).

Table 11-8. Population Growth Rate in Districts Crossed by the Project (2020)

Province	District	Population	Population Growth in thousand (2019-2020)
Ankara	Polatli	126,623	+1.24
Eskisehir	Gunyuzu	5,455	-3.81
	Sivrihisar	20,140	-0.93
Afyonkarahisar	Emirdag	39,518	+5.77
	Bayat	7,573	-1.30
	Iscehisar	25,043	+1.46
	Merkez	313,063	+2.01
	Sinanpasa	39,432	-0.76
Kutahya	Dumlupinar	2,945	+0.03
Usak	Banaz	35,647	-0.37
	Merkez	256,050	-0.24
	Ulubey	12,350	-2.36
	Esme	34,991	+0.30
Manisa	Kula	44,035	+0.08
	Alasehir	105,145	+0.50
	Salihli	164,371	+0.97
	Ahmetli	16,614	+0.54
	Turgutlu	169,882	+2.08
	Sehzadeler	168,110	-1.77
	Yunusemre	251,905	+2.22
Izmir	Menemen	186,182	+3.50
Total		2,025,074	Turkey average: +5.50

Source: TurkStat, ABPRS, 2020.

According to TurkStat data (2020), total population of the PASs is 228,430 (see Appendix D.1 for the population of settlements within the social study area as per TurkStat). The mukhtars, who are the elected leaders of the villages and neighbourhoods, were asked whether there has been a change in their population in the last 10 years. As can be seen in Table 11-9, 34.4% of the mukhtars stated that the population increased, 24.2% said decreased and 41.4% reported no change.

Table 11-9. Population Change of PASs in the Last 10 Years

Change	Frequency	Percent
Increased	44	34.4
Decreased	31	24.2
No change	53	41.4
Total	128	100.0

Source: ESIA Field Study, CLQ, February 2021.

An important variable regarding the village and neighbourhood populations is the permanent and seasonal population differences. Approximate numbers about permanent and seasonal populations of settlements were obtained from the mukhtars as part of the CLQs. The distribution of the settlements according to the number of permanent households (residing in summer and winter) and their population is presented in Table 11-10 below. Accordingly, very small, small and medium sized settlements are affected by the Project. Erenler, affiliated to Afyonkarahisar (Merkez), is the largest settlement (at neighbourhood/village level) affected by the Project with approximately 20,000 households. The lowest number of households is the Huzur village of the same province and district (16 permanent residents).

Table 11-10. Number and Population of Permanent Households in PASs

Number of Households	Frequency	Percent	Population	Frequency	Percent
16-50	25	16.6	35-120	14	11.2
60-110	28	22.0	130-250	21	16.6
120-200	18	14.2	260-700	31	24.2
210-400	24	18.9	750-1,200	19	14.9
450-1,000	19	14.8	1,300-3,000	18	14.3
1,100-4,000	12	9.4	3,100-9,000	14	11.2
5,000+	2	1.6	10,000+	9	3.9
Total	128	100	Total	128	100

Source: ESIA Field Study, CLQ, February 2021.

Settlements also have populations living in the region seasonally. These people would also be exposed to the impacts of the Project seasonally (for example in the summer). There are also seasonal residents (due to land ownership) among individuals covered by the HHQ. As part of the CLQs, 54 mukhtars were able to provide information about the population residing for seasonally (not in summer and winter, residing in a certain part of the year). See Table 11-11 for number of seasonal households and population.

Table 11-11. Number and Population of Seasonal Households in PASs

Number of Households	Frequency	Percent	Population	Frequency	Percent
3-15	15	27.78	15-50	18	33.33
20-70	25	46.30	60-100	10	18.52
80-150	6	11.11	150-600	19	35.18
200-300	5	9.26	1000-5000	5	9.26
1000+	3	5.56	15,000+	2	3.70
Total	54	100	Total	54	100.00

Source: ESIA Field Study, CLQ, February 2021.

In the sample-based HHQ study, information about 840 household members were obtained from 229 household representatives. 50.48% of the households are women and 49.52% are men (see Table 11-12).

Table 11-12. Gender Distribution of Household Members

Gender	Frequency	Percent
Woman	424	50.48
Man	416	49.52
Total	840	100.00

Source: ESIA Field Study, HHQ, February 2021.

Population in PASs according to age groups is presented in Table 11-13.

Table 11-13. Population in PASs According to Age Groups

Population in PASs	Number of Settlements				
	0-6 age group	7-18 age group	19-35 age group	36-65 age group	65 + age group
0-14 people	30	18	9	2	9
15-50 people	43	41	34	21	45
60-140 people	18	18	24	24	28
150-250 people	15	18	15	25	15
300-900 people	11	20	21	33	19
1000 + people	11	13	23	23	13
Total	128	128	128	128	128

Source: ESIA Field Study, CLQ, February 2021.

The distribution of households by age is presented in Table 11-14. According to this representative sample, it has been observed that the majority of the population affected by the Project (37.53) is in the 36-65 age group, and individuals over 65 (66-74 and 74+) constitute 12.33% of the impacted population.

Table 11-14. Distribution of Household Members by Age

Age Groups	Frequency	Percent
0-6	47	5.63
7-18	152	18.10
19-35	196	23.38
36-65	315	37.53
66-74	101	11.99
74+	3	0.34
Total	814⁷⁸	100.00

Source: ESIA Field Study, HHQ, February 2021.

Excluding the children and young people attending education, the distribution of adults by graduation degree is presented in Table 11-15. Among the the population affected by the Project, 44.68% are primary school graduates. The university graduates among the affected population (0.87%) is significantly lower than the Turkey's average of 13.9%. Approximately, one third of the university graduates are women.

Table 11-15. Distribution of Adults by Educational Level

Graduation Level	Frequency	Percent
Primary School	340	44.68
Secondary School	178	23.39
High School	177	23.26
University	66	0.87
Total	761	100.00

Source: ESIA Field Study, HHQ, February 2021.

11.3.2. Infrastructure and Social Services

This Section presents information relevant to the existing health and education services capacity of the provinces crossed by the HSR based on publicly available data of related authorities as well as the waste and wastewater management services and methods applicable in the affected settlements based on the social survey (CLQs) results. The Section also sets out the the availability and adequacy of infrastructure and social service facilities in the PASs based on the results of the CLQs.

Information on the state hospitals and healthcare facilities in the provinces and districts crossed by the HSR is separately provided in Chapter 12 on Labour and Working Conditions.

Health Services

The health service indicators in the provinces crossed by the HSR were examined in terms number of hospital beds and number of intensive care beds per 10,000 population and number of people per neighborhoods surgery and ambulance. As far as the number of beds per 10,000 population was considered in all the project provinces the ratio was better than the Turkish average of 28.6 beds. Again as far as intensive care beds per 10,000 population were concerned all the provinces performed more or less similar to the Turkish average of 4.8. However, population per ambulance varies immensely in each province when compared to the Turkish average of 15,451, Ankara and Izmir being provinces with least adequate capacity (see Table 11-16).

⁷⁸ There were some HHQ respondents who did not respond this question.

Table 11-16 Selected Health Service Indicators per Provinces Crossed by the HSR

Section	Province	Number of Hospitals (*)	Number of Hospital Beds (*)	Number of Beds per 10,000 (**)	Number of Intensive Care Beds per 10.000 (**)	Number of Medical Personnel (*)	Population per Ambulance (**)
Section 1	Ankara	83	19,326	34.3	5	76,266	25,063
	Eskisehir	15	3,507	39.5	5.9	11,406	15,848
	Afyonkarahisar	22	2,185	30	3.4	6,826	11,223
Section 2	Kutahya	13	1,886	32.6	3.7	5,320	12,593
	Usak	8	1,235	33.3	4	3,659	7,561
	Manisa	29	4,730	32.8	5	13,759	16,948
Section 4	Izmir	60	12,248	28	4.4	48,911	27,817
	General Total in Country – Turkey	1,538	237,504	28.6	4.8	642,461	15,451

(*) Turkish Ministry of Health, Health Statistics Yearbook for 2019. Retrieved from <https://dosyasb.saglik.gov.tr/Eklenti/40566,health-statistics-yearbook-2019pdf.pdf?0>

(**) Turkish Ministry of Health, Health Statistics Annual for 2019.

Education

As far as the number of students per classroom and teacher were concerned in both primary education and general secondary education, the provinces crossed by the HSR performed around Turkish average or better. In the primary education, the number of students per classroom was much lower than the Turkish average for each province. The number of students per teacher in the same category was either at Turkish average or slightly better. Again there was a similar outcome when the general secondary education was taken into consideration. The number of students per teacher in this category were much lower than the Turkish average in all provinces and the number of students per classroom were around the Turkish average (see Table 11-17).

Table 11-17 Primary Education (8 years) and High School Ratio of Students per Classroom and Teacher

Section	Province	Preschool Education		Primary Education (8 years)		Secondary Education	
		Number of Schools	Number of Teachers	Number of students per classroom	Number of students per teacher	Number of students per classroom	Number of students per teacher
Section 1	Ankara	908	4,373	15	24	10	17
	Eskişehir	135	739	14	22	11	20
	Afyonkarahisar	88	377	14	16	13	20
Section 2	Kütahya	84	377	13	15	11	18
	Uşak	65	271	12	18	10	19
	Manisa	158	734	14	20	12	21
Section 4	Izmir	660	3,078	15	24	11	20
	Turkey	55,543	56,218	16	24	12	21

Source: National Education Statistics, 2020. Formal Education 2019/20. Retrieved from http://sgb.meb.gov.tr/meb_iys_dosyalar/2020_09/04144812_meb_istatistikleri_orgun_egitim_2019_2020.pdf

Waste Management

Information on the waste management facilities in the provinces crossed by the HSR is provided in Chapter 9 on Waste Management.

Current solid waste disposal methods of the PASs have been identified based on CLQs administered with the mukhtars of the settlements. In all PASs, with the exception of Huzur village (Afyonkarahisar, Merkez), solid wastes are removed from the settlement through waste collection services provided by the authorities (see Table 11-18).

Table 11-18. Collection of Solid Wastes in PASs

Responses	Frequency	Percent
Collected by an authority	126	99.2
We take them away from the village with our own means	1	0.8
Total	127	100.0
No answer	1	
Total	128	

Source: ESIA Field Study, CLQ, February 2021.

Based on the CLOs, the number of PASs served by different authorities in terms of municipal solid waste collection services is presented in Table 11-19. In the absence of municipal services, the municipal solid waste collection services are provided mainly by the Special Provincial Administrations, while District Governorships and Rural Services are other authorities providing these services.

Table 11-19. Number of PAS according to the Authority Providing Municipal Solid Waste Collection Services

Authority	Number of PASs
Municipality	93
Provincial Special Administration	26
District Governorship	4
Rural Services	3
No Answer	2
Total	128

Source: ESIA Field Study, CLQ, February 2021.

Domestic Wastewater Management

According to Table 11-20, 75.6% of PASs have sewage network system and 36.3% have septic tank/pits. Accordingly, it is seen that both methods are used together in 15 settlements.

Table 11-20. Distribution of PASs according to Wastewater Disposal Methods

Wastewater Disposal Methods	Number of PASs	Percent of PASs
Sewage Network System	96	75.60
Septic Tank/Pits	46	36.30

Source: ESIA Field Study, CLQ, February 2021.

Availability and Adequacy of Infrastructure and Social Service Facilities in the PASs

The infrastructure and social service facilities available in the PASs and the adequacy of the relevant facilities are listed in Table 11-21 based on the CLQs.

Table 11-21. Infrastructure and Social Service Facilities in PASs

Infrastructure/Social Service Facilities	Number of PASs with Infrastructure/Facilities	Adequacy of Infrastructure/ Facilities (as reported by Mukhtars)
a. Electrical Installation	128	Not adequate in two settlements
b. Road	127	1 settlement with problems Not adequate in 5 settlements
c. Drinking Water Network	125	Insufficient supply in 5 settlements Not adequate in 6 settlements
d. Internet	120	8 settlement with problems Not adequate in 27 settlements (low signals and so on)
e. Telephone	127	1 settlement with problems Not adequate in 10 settlements (low signals and so on)
f. Public Transport	89	No public transport in 39 settlements Not adequate in 1 settlement
g. Health Center	64	No health center in 64 settlements Not adequate in 1 settlement
h. Doctor-Midwife on Duty	60	None in 64 settlements; Once a week in 10 settlements; Once a month in 8 settlements
i. Elementary School	85	
j. Secondary School	54	
k. High School	22	
l. Kindergarten / Nursery	56	
m. Bussed (Mobile) Education	100	
n. Public Education Center	9	
o. Village Bazaar	53	Not adequate in 1 settlement
p. Shops	91	
q. Mosque	125	
r. Cemetery	114	
s. Structures with Social and Cultural Importance	12	
t. Historical and Religious Sites	15	9 registered, 3 without registration
u. Touristic Facilities	4	
v. Irrigation System	73	In 37 settlements less than 50% of the land could be irrigated
w. Agricultural Cooperatives	33	
x. Milk Collection Association	17	

Source: ESIA Field Study, CLQ, February 2021.

11.3.3. Socio-economic Conditions

Existing socio-economic conditions in the PASs with regard to employment and income sources, expenses, house ownership and housing conditions, land and assets, agricultural activities, animal husbandry and utilisation of forest resources/products are described in the following sections.

11.3.3.1. Employment and Income Sources

With regard to employment/working status of the sample based on the HHQs, 148 people are retired. However, some retirees continue to work actively (engaged in farming or other jobs). The number of working people is 303 and the number of housewives is 251 among the members of the surveyed households. It is known that a large proportion of women, who are referred to as housewives, are engaged in farming. There are 41 people who are currently unemployed and seeking employment (see Table 11-22).

Table 11-22. Working Situations of the Sample Household Members

Employment/Working Status	Number of Household Members
Working	303
Housewife	251
Student	219
Unemployed	41
Not working	25
Retired	148
Not economically active	99
Total	1,086

Source: ESIA Field Study, HHQ, February 2021.

44.22% of the working population is engaged in farming. The rural population representation in this study is higher. This is mainly due to the fact that contact information of the individuals in the sample were received from the mukhtars and mukhtars have given priority to provide the information of the individual living in the settlements, who are the actual users of the affected parcels. While the rate of wage earners is 27.90%, the rate of those who are engaged in other jobs along with farming is 13.29%. Among the paid employees, 13 people work as self employed (see Table 11-23).

Table 11-23. Type of Work/Employment of the Working Population

Type of Work/Employment	Frequency	Percent
Farmer	163	54.16
Wage-earner	84	27.90
Farmer and wage-earner	33	10.96
Self-employed	13	4.32
Farmer and self-employed	7	2.33
Shepherd	1	0.33
Total	301	100.00
No answer	2	
General Total	303	

Source: ESIA Field Study, HHQ, February 2021.

The distribution of the households in the sample in terms of occupational characteristics is presented in Table 11-24 below on province and district basis. Accordingly, except for Bayat and Iscehisar districts of Afyon, most of the households that make up the sample are farming. The primary reason for this result is that residents of the settlements affected from the Project had priority in the sampling strategy.

Table 11-24. Type of Work/Employment of the Working Population according to Districts and Provinces

Province	District	Farmer	Self-employed	Wage-earner	Farmer and wage-earner	Farmer and self-employed	Other	Total
Ankara	Polatli	13	0	10	3	0	0	26
Eskisehir	Gunyuzu	8	0	3	0	1	0	12
	Sivrihisar	10	0	3	4	0	0	17
Afyon	Emirdag	25	2	8	2	0	1	38
	Bayat	0	0	5	1	1	0	7
	Iscehisar	2	0	11	3	2	0	18
	Merkez	15	2	12	5	0	0	34
	Sinanpasa	27	6	13	5	0	0	51
Kutahya	Dumlupinar	2	0	2	0	0	0	4
Usak	Banaz	10	1	0	1	1	0	13
	Merkez	3	0	0	1	0	0	4
	Ulubey	7	0	2	1	0	0	10
Manisa	Alasehir	7	0	2	4	2	0	15
	Kula	8	0	1	0	0	0	9
	Salihli	9	1	8	3	0	1	22
	Turgutlu	5	0	3	0	0	0	8
	Sehzadeler	12	1	1	0	0	0	14

Source: ESIA Field Study, HHQ, February 2021.

Both main and supplementary livelihoods of the sample were examined. According to the answers from the household representatives, the main income source of 42.4% of the households is agriculture, while 11.1% of them are animal husbandry (livestock). While the rate of those who declare that the basic means of living of their household is retirement pension is 21.7%, 19.4% of the households wages appear to be as the main source of income (see Table 11-25).

Table 11-25. Distribution of Households by Main Source of Income

Main Source of Income	Frequency	Percent
Agriculture	92	42.4
Retirement pension	47	21.7
Wage, salary earner	42	19.4
Animal husbandry	24	11.1
Self employed	7	3.2
Rental income	2	0.9
Social aid	1	0.5
Seasonal agricultural worker	1	0.5
Income from finances (interest and so on)	1	0.5
Total	217	100.0
No answer	12	
General total	229	

Source: ESIA Field Study, HHQ, February 2021.

The distribution of the sample by provinces and districts in terms of primary means of income is presented in Table 11-26. While 52.9% of the sample in Polatli was dealing with agriculture as the primary subsistence activity, no animal husbandry activity was encountered. 29.4% of the sample declared that the primary means of income is pension. A very large part of the sample (87.5%) in the district of Gunyuzu of Eskisehir stated that agriculture as the main source of income. In Sivrihisar district, this rate was 61.5% and 23.1% of them earned their living from livestock farming.

Considering the districts of Afyon, the rate of those whose primary source of income was agriculture is low among the samples of Iscehisar and Bayat. It is seen that the rate of paid work was high in these districts. The proportion of those whose primary income is agriculture is 47.1% in Emirdag, 16.7% in the Centre (Merkez) and 30.3% in Sinanpasa. Afyon district with the highest rate of those declared that their basic means of living was retirement pension is Emirdag (35.3%).

In Uşak's Banaz district, the retirement pension was the primary means of subsistence for the majority of the sample (58.3%), while the rate of those living on agriculture and animal husbandry as a primary source of income was 25%. In Ulubey district, agriculture and wage labour equally constitute primary livelihoods. It is seen that agriculture was one of the main sources of income in all of Manisa's districts affected by the project. It has been observed that animal husbandry was among the primary sources of income in Kula and Alasehir. While more than 20% of the sample in Alasehir and Salihli declared that their basic means of living was wage labour, this rate was 16.7% in Turgutlu (see Table 11-26).

Table 11-26 Distribution of Households by Main Source of Income according to Provinces and Districts

Province	District		Main income sources								Total
			Agri culture	Animal husbandry	Retire ment pension	Wage, salary earner	Self employed	Social aid	Rental income	Other	
Ankara	Polatli	N	9	0	5	3	0	0	0	0	17
		%	52.9	0	29.4	17.6	0	0	0	0	100
Eskişehir	Gunyuzu	N	7	0	0	0	1	0	0	0	8
		%	87.5	0	0	0	12.5	0	0	0	100
	Sivrihisar	N	8	3	1	1	0	0	0	0	13
		%	61.5	23.1	7.7	7.7	0	0	0	0	100
Afyon	Bayat	N	1	0	2	3	1	0	0	0	7
		%	14.3	0	28.6	42.9	14.3	0	0	0	100
	Iscehisar	N	0	2	1	6	0	0	0	0	9
		%	0	22.2	11.1	66.7	0	0	0	0	100
	Emirdag	N	16	2	12	3	1	0	0	0	34
		%	47.1	5.9	35.3	8.8	2.9	0	0	0	100
	Merkez	N	4	6	6	6	1	0	1	0	24
		%	16.7	25	25	25	4.2	0	4.2	0	100
	Sinanpasa	N	10	5	9	7	2	0	0	0	33
		%	30.3	15.2	27.3	21.2	6.1	0	0	0	100
Kütahya	Dumlupınar	N	0	1	0	1	0	0	0	0	2
		%	0	50	0	50	0	0	0	0	100
Uşak	Merkez	N	1	0	0	0	0	0	0	0	1
		%	100	0	0	0	0	0	0	0	100
	Banaz	N	2	1	7	1	1	0	0	0	12
		%	16.7	8.3	58.3	8.3	8.3	0	0	0	100
	Ulubey	N	3	1	0	3	0	0	0	0	7
		%	42.9	14.3	0	42.9	0	0	0	0	100
Manisa	Alasehir	N	6	1	0	3	0	0	0	1	11
		%	54.5	9.1	0	27.3	0	0	0	9.1	100
	Kula	N	2	2	0	0	0	0	0	0	4

Province	District		Main income sources								Total
			Agri culture	Animal husbandry	Retire ment pension	Wage, salary earner	Self employed	Social aid	Rental income	Other	
	Salihli	%	50	50	0	0	0	0	0	0	100
		N	9	0	2	4	0	0	1	1	17
		%	52.9	0	11.8	23.5	0	0	5.9	5.9	100
	Sehzadel er	N	11	0	1	0	0	0	0	0	12
		%	91.7	0	8.3	0	0	0	0	0	100
	Turgutlu	N	3	0	1	1	0	1	0	0	6
		%	50	0	16,7	16.7	0	16.7	0	0	100
Total	N	92	24	47	42	7	1	2	2	217	
	%	42.4	11.1	21.7	19.4	3.2	0.5	0.9	0.9	100	

Source: ESIA Field Study, HHQ, February 2021.

Supplementary (auxiliary) livelihoods of the households were also examined. A total of 309 responses were received for 229 households reported supplementary sources of income, apart from the above basic livelihoods. Agriculture constitutes 24.9% of the answers, and livestock breeding 24.9%. For 41.6% of households, these are supplementary sources. The majority of the answers (29.1%) received were the pensioners. In 48.6% of impacted households, pension stands out as a supplementary livelihood. Only one person benefiting from the social support provided by the institutions has been identified (see Table 11-27).

Table 11-27. Distribution of Households by Supplementary Sources of Income

Supplementary Source	N	Responses	Percent of Households
		Percent	
Retirement pension	90	29.10	48.60
Agriculture	77	24.90	41.60
Animal husbandry	77	24.90	41.60
Wage, salary earner	39	12.60	21.10
Rental income	13	4.20	7.00
Self-employed	7	2.30	3.80
Student scholarship (bursary)	5	1.60	2.70
Social aid	1	0.30	0.50
Total	309	100.00	

Source: ESIA Field Study, HHQ, February 2021.

Expenses

When the share of the food expenditure in general household expenses is considered, it is seen that this expenditure is around 50%. A small proportion of respondents spent a substantial part of their income on food (as 5.63%), who spend 80% or more of their income on food (see Table 11-28).

Table 11-28. Share of Food Expenditure in Household Expenditure

Share/Rate	Frequency	Percent
10-25%	10	4.70
30-50%	122	57.28
55-75%	69	32.39
80% +	12	5.63
Total	213	100.00
No answer	16	
General total	229	

Source: ESIA Field Study, HHQ, February 2021.

11.3.3.2. House Ownership and Housing Characteristics

According to mukhtars, the population in the settlements is largely homeowners. 52.75% of the mukhtars who declared that all of the households in their settlements own their houses. The rate of those who declare that 95% to 99% are homeowners is 15.75%. The proportion of tenants in 12 settlements ranges from 50% to 30% (see Table 11-29).

Table 11-29. The Rate of Homeowners in PASs

Percentage of Homeowner Households (%)	Frequency	Percent
50-70	12	9.45
75-90	28	22.05
95-99	20	15.75
100	67	52.75
Total	127	100.00
No answer	1	
General total	128	

Source: ESIA Field Study, CLQ, February 2021.

The conditions of the houses the respondents are living in are summarised in Table 11-30.

Table 11-30 . Conditions of the Houses the Respondents are Living In

House Condition	Frequency	Percent
Good	129	57.6
Neither good nor bad	78	34.8
Bad	17	7.6
Total	224	100.0

Source: ESIA Field Study, HHQ, February 2021.

93.8% of the respondents own the house they live in. Only 2% paid rent and the remaining 4% do not own the house and do not pay any rent either (see Table 11-31).

Table 11-31. House Ownership/Rental Status

House Ownership/Rental Status	Frequency	Percent
Belongs to us	182	93.8
Rented	4	2.1
Without paying rent	8	4.1
Total	194	100.0

Source: ESIA Field Study, HHQ, February 2021.

When the respondents were asked about the number of rooms including living room in their houses, about 2% mentioned having just two rooms. However, almost 82% of them had 3 to four rooms in their houses and 17% 5 rooms or more (see Table 11-32).

Table 11-32. Number of Rooms Including Living Room

Number of Rooms	Frequency	Percent
1 -2 rooms	3	1.6
3 – 4 rooms	250	81.6
5 rooms and more	31	16.7
Total	284	100.0

Source: ESIA Field Study, HHQ, February 2021.

The respondents were also asked about the size of their house in m². The majority (72.9%) of the respondents had houses their size varied between 100 m² and 150 m². For 19% their houses were under 99 m² and for the remaining (8%) the size of their house were above 152 m² (see Table 11-33).

Table 11-33. Size of Your House (m²)

Size (m ²)	Frequency	Percent
10-99	36	19.1
100-150	137	72.9
151 and over	14	8.0
Total	187	100.0

Source: ESIA Field Study, HHQ, February 2021.

For the majority of the respondents the main building material for their house were concrete and brick (80.3%). This was followed by adobe (7.4%), stone (4.8%), wood (4%), briquette (2.3%) and other materials (2.2%) (see Table 11-34).

Table 11-34. Main Building Material of the Houses

Main Material	Frequency	Percent
Concrete and brick	184	80.3
Adobe	17	7.4
Stone	11	4.8
Wood	9	4.0
Briquette	3	2.3
Other (plastic, nylon, etc.)	5	2.2
Total	229	100.0

Source: ESIA Field Study, HHQ, February 2021.

Table 11-35 lists the distance of the houses of the respondents to the railway construction corridor.

Table 11-35. Distance of the House to the Railway Construction

Distance	Frequency	Percent
0 and 100 meters	14	7.7
101 and 500 meters	37	20.4
501 and 1000 meters	48	26.5
1001 and 2000 meters	33	18.2
2001 and 5000 meters	28	15.5
5001 meters and above	21	11.6
Total	181	100.0

Source: ESIA Field Study, HHQ, February 2021.

11.3.3.3. Lands and Assets

The detailed breakdown of the number and area of affected parcels within the Project expropriation corridor per Project sections is presented in Chapter 5 on Land Use and Geology (see Table 5-1).

Household representatives were asked whether they own or share lands and 221 people responded. 87.3% of the sample, most of whom are from rural areas and affected by land acquisition, are landowners (see Table 11-36).

Table 11-36. Land Ownership

Responses	Frequency	Percent
Yes	193	87.3
No	28	12.7
Total	221	100.0
No answer	8	
General total	229	

Source: ESIA Field Study, HHQ, February 2021.

When asked about the size of the land owned or shared, 190 household representatives responded. More than 45% of the sample is entitled to lands less than 30 decares. The rate of users in lands above 200 decares is over 16% (see Table 11-37).

Table 11-37. Size of the Land as Owners or Shareholders

Size of the Land	Frequency	Percent
1-5 decares	22	11.58
6-15 decares	36	18.95
16-30 decares	31	16.32
35-60 decares	35	18.42
65-100 decares	28	14.74
110-200 decares	22	11.58
250-500 decares	11	5.79
550+	5	2.63
Total	190	100.00
No answer	3	
General total	193	

Source: ESIA Field Study, HHQ, February 2021.

Considering the distribution of the lands owned or shared according to types, it is seen that 84.46% of the lands consists of farm lands and 11.40% of them are gardens (see Table 11-38).

Table 11-38. Type of Lands Owned or Shared

Type of Land	Frequency	Percent
Field	163	84.46
Garden	22	11.40
Wine yard	7	3.63
Estate	1	0.53
Total	193	100.0

Source: ESIA Field Study, HHQ, February 2021.

11.3.3.4. Agricultural Activity

HHQ respondents were asked if they were engaged in agricultural activities on their own land. 78.5% of the sample declared that they engaged in agricultural activities in their entire land and 6.8% in part of it. 28 landowners / shareholders do not have agricultural activities in their lands (see Table 11-39).

Table 11-39. Agricultural Activity on Land Owned or Shared

Responses	Frequency	Percent
Yes, all	150	78.5
Yes, in some part of it	13	6.8
No agricultural activity on land	28	14.7
Total	191	100
No answer	2	
General total	193	

Source: ESIA Field Study, HHQ, February 2021.

Respondents were also asked whether they were engaged in agricultural activities on land owned by others (may be tenants, crop sharer, etc.) or on public lands (whether formal or informal). According to the answers received, the rate of engaging in agriculture on someone else's land is 28.1%, and the rate of engaging in agriculture on public lands is 7.2% (see Table 11-40).

Table 11-40. Agricultural Activity on Lands Owned by the Respondents and on Public Lands

Type	Answer	Frequency	Percent
Agricultural lands not owned by respondents	Yes	62	28.1
	No	159	71.9
	Total	221	100
	No answer	8	
	General total	229	
Agricultural activity on public land	Yes	16	7.2
	No	205	92.8
	Total	221	100.0
	No answer	8	
	General total	229	

Source: ESIA Field Study, HHQ, February 2021.

When asked about the total land size on which agricultural activities were carried out, it was revealed that more than 30% of 141 household representatives PAPs who responded farmed on 20 decares or less land, and the rate of those engaged in agricultural activities in lands between 81 and 120 decares was 31.7%. It has been learned that approximately 13% of them are users of more than 200 decares of land (see Table 11-41).

Table 11-41. Total Land Size in Which Agricultural Activities Are Carried Out

Land Size	Frequency	Percent
1-10 decares	22	15.6
11-20 decares	22	15.6
21-40 decares	15	10.6
41-80 decares	30	21.3
81-120 decares	16	11.3
125-200 decares	17	12.1
210-400 decares	11	7.8
410-750 decares	8	5.7
Total	141	100.0
No agricultural activity	88	
General total	229	

Source: ESIA Field Study, HHQ, February 2021.

The total size of the sample in which the agricultural activity is carried out is 14,519 decares. Of these, 12,287 decares, that is, about half of them are irrigable land. 28 people engaged in agricultural activities do not have any irrigable land. In all these lands, 6,800 tons of wheat is planted annually and 458 tons of it is consumed in households. 4,300 tons of barley is produced, of which approximately 1,700 tons are consumed in households. Approximately 1,700 tons of this production is consumed in households where approximately 4,300 tons of barley is produced, and the rest is sold. 17 tons of chickpeas are produced by two producers and 100 kilos of this are consumed in the household during the year. A person produces 350 kilograms of green lentils and sells almost all of them. 173 tons of sunflower and 5,300 tons of corn are produced in impacted households.

A total of 1,700 tons of fodder crops are produced in a year in households, nearly 1,500 tons of this are used in agricultural activities, and a small amount is sold. 12,666 tons of sugar beet produced annually is put on the market.

In the households constituting the sample, 1,335 tons of potatoes and onions, 22 tons of cherries, 242 tons of olives, 500 tons of melon / watermelon, 160 kilograms of walnuts and almonds, 6 tons of tomatoes and cucumbers, 350 kilograms of beans and broad beans, 143 tons of green vegetables, 100 kilograms of tobacco, 244 tons of poppy, 37 tons of pumpkin seeds can be produced by the household, 10 tons of cotton and peas, plum, canola, apricot and other fruits can be produced by a household. 153 people were registered in the Farmer Registration System.

Table 11-42 shows the products produced in PASs and number of settlements in which these products are produced in total. Accordingly, the commonly produced products are, respectively, wheat, barley, corn, sugar beet, feed crops, poppy and grape.

Table 11-42. Products Produced in PASs

Product	Number of Producer PASs
Wheat	89
Barley	83
Corn	42
Sugar beet	38
Feed crops	31
Poppy	28
Grape	27
Potatoes, Onions	20
Tomato cucumber	14
Sunflower	10
Plum	6
Chickpea	5
Olive	5
Pea	4
Melon watermelon	4

Product	Number of Producer PASs
Oat	3
Pumpkin seeds	2
Cherry	2
Vegetables, greens, lettuce	2
Peach	2
Beans, broad beans	1
Canola	1
Apricot	1
Mushrooms	1
Cotton	1
Green lentils	1

Source: ESIA Field Study, CLQ, February 2021.

11.3.3.5. Animal Husbandry

When the status of livestock activities in PASs is examined, 16.38% of the settlements have one to five cattle owner households. In 23.28% of the settlements, there are households with 16 to 35 cattle per settlement. The number of settlements with more than 100 households with cattle is 25 (see Table 11-43).

The total number of households selling animals in PASs is approximately 6,097. The total number of cattle in these 116 villages is approximately 91,885, with a minimum of 10 and a maximum of 20,000 in a settlement. The distribution of settlement according to the number of households with sheep and goats is also presented in Table 11-43 below. Usually 6 to 15 households have sheep and goats in the settlements. There are more than 100 households dealing with sheep and goat breeding in eight villages. The total number of sheep and goats is approximately 217,000.

Table 11-43. Distribution of PASs by Household Numbers of Cattle and Ovine Owners

Number of Households In the PASs	Cattle-owner Households		Ovine-owner Households	
	Frequency	Percent	Frequency	Percent
1-5 household	19	16.38	31	26.72
6-15 household	26	22.41	38	32.76
16-35 household	27	23.28	29	25.0
40-90 household	19	16.38	10	8.62
100-200 household	21	18.10	8	6.90
300-500 household	4	3.45	0	0.00
Total	116	100.00	116	100.00

Source: ESIA Field Study, CLQ, February 2021.

While 6,450 tons of dairy products are produced monthly in PASs, it has been declared by the mukhtar that 3,000 tons of dairy products are produced in the village of Erenler in the Afyonkarahisar (Merkez). In addition, it has been learned that people are selling milk in 90 PASs (see Table 11-44).

Table 11-44. Number of PASs Selling Milk

Status of Milk Sale	Number of PASs
Yes	90
No	33
Total	123
No answer	5
General total	128

Source: ESIA Field Study, CLQ, February 2021.

Egg production is available in PASs, which are sold in the domestic market by a small number of households, which are mostly intended for household consumption.

11.3.3.6. Benefiting from Forest

8.8% of the household representatives answered the question “Do you benefit from forests to take natural products like mushrooms etc. or wood?” positively (see Table 11-45).

Table 11-45 Benefiting of PAPs from the Forests

Responses	Frequency	Percent
Yes	20	8.8
No	208	91.2
Total	228	100.0
No answer	1	
General total	229	

Source: ESIA Field Study, HHQ, February 2021.

The PAPs benefit from the forest to take the following products:

- Cone
- Mushrooms
- Wood
- Herbs
- Daisy
- Thyme

It has been learned that 9 of the PASs have beehive-owner households. At least 1 and at most 5 households own beehives in a settlement (see Table 11-46).

Table 11-46. Number of Households with Beehives in PASs

Number of Households with Beehives	Frequency	Percent
1-2 household(s)	6	66.6
3-4 households	2	22.2
5 households	1	11.1
Total	9	100.0

Source: ESIA Field Study, CLQ, February 2021.

11.3.4. Vulnerable Groups

Two types of vulnerability are generally considered in such investment projects. These can be briefly called independent and dependent vulnerabilities:

Independent vulnerabilities: It includes individuals who are vulnerable in all situations, regardless of the context. These vulnerabilities are related to individual's or group's race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth, or other status. What distinguishes them from other people affected by the Project-related land acquisition is that they need to be supported when involved in expropriation processes, as they need the support of others in other daily duties/routines because of physical (disability), social (gender) or economic (poverty, landless) disadvantages. Because of these disadvantages, they may be expected to experience difficulties at some stages of land acquisition and construction (such as stakeholder engagement, access to payments, livelihood activities or access to grievance mechanism).

Dependent vulnerabilities: Contextually, it refers to the disadvantageous positions created by the current project or investment. Dependent vulnerabilities can occur due to cumulative effects or indirect effects. What distinguishes them from other people affected by the Project-related land acquisition and construction is that they are more at risk than others due to the sequences of economic losses. In other words, they face the risk of loss of livelihood and income because of high, multiple, direct, and indirect impacts of the Project.

Based on the CLQs, the following independent vulnerable groups have been identified to be present in the PASs:

- People with mental and/or physical disabilities
- Carer of ill who is house bound
- Foreigner who cannot speak/understand Turkish (not Syrian)
- Elderly people who lives alone
- Illiterate people
- Shepherds who do not own any animals
- Poor living on social benefit
- Female-headed households
- Widowed woman without children
- Girls who are at school age but not going to school

Based on the CLQs, the dependent vulnerable groups have been identified to cover the following:

- Physically displaced households
- Seasonal workers
- Informal users of the public lands
- PAPs whose lands as livelihood sources are affected by the Project more than 20% (Including impacts from fragmented lands)

Due to some disadvantages in the land acquisition and construction process, there may be various problems that vulnerable people may encounter such as difficulty in access to payment etc. For independently vulnerable PAPs, this may include difficulty in access to;

- stakeholder engagement activities undertaken throughout the land acquisition and construction process by virtue of their some disadvantages,
- grievance mechanism despite being subject to economic displacement or suffering damage or loss due to project activities,
- compensation or crop payment for their crops and assets acquired for the Project by virtue of their some disadvantages in the process of the land acquisition,
- their livelihood activities in private lands, public lands and common properties (pasture and forest),
- infrastructure and social services,
- livelihood restoration activities.

While Project dependent vulnerable PAPs are not disadvantaged in accessing these opportunities; they are individuals who may need enhanced opportunities to access to these mechanism/services/activities.

The surveys results for the vulnerable groups in the PASs are presented below.

Only 55 mukhtars responded to questions related to vulnerable groups. The numbers of vulnerable individuals obtained from 55 settlements are presented in Table 11-47 below. Gender-based vulnerabilities in PASs are provided in the following table.

Table 11-47. Number of Vulnerable Individuals Identified in the PASs

Type of Vulnerability	Number of Women	Number of Men
People with physical disabilities	266	265
People with mental disabilities	89	92
Carer of ill who is house bound	209	197
Foreigner who cannot speak/understand Turkish (not Syrian)	3	2
Elderly people who lives alone	253	143
Shepherds who do not own any animals	141	150
Poor living on social benefit	1,219	1,170
Total	2,180	2,019

Source: ESIA Field Study, CLQ, February 2021 (N=55).

Gender-based vulnerabilities in PASs have also been studied. Number of female-headed households, widowed women without children and girls who are at school age but not going to school in 55 PASs, for which data could be obtained from the mukhtars, are presented in Table 11-48.

Table 11-48. Number of PAPs Having Vulnerabilities Related to Gender Issues in PASs

Gender-based Vulnerabilities	Total Numbers of PAPs
Female-headed households	603
Widowed woman without children	187
Girls who are at school age but not going to school	20
Total	810

Source: ESIA Field Study, CLQ, February 2021 (N=55).

Number of adults with no schooling experience and their literacy status is presented in Table 11-49.

Table 11-49. Number of Adults with No Schooling Experience and their Literacy Status

Status of Reading and Writing Ability with/without Schooling Experience	Total	Women	Men
Never been to school cannot read and write	29	26	3
Never been to school but can read and write	12	10	2

Source: ESIA Field Study, HHQ, February 2021

According to Directorate General of Migration Management, as of March 2021 there are 3.655.067 Syrian people living under temporary protection in Turkey. However, most of them live in cities like İstanbul (521,006); Gaziantep (449,945); Hatay (436,264); and Sanliurfa (427,986). Among the cities crossed by the HSR, there are in general 100,146 Syrian people living in Ankara, 5,496 in Eskisehir, 11,354 in Afyonkarahisar, 2,006 in Kutahya, 2,749 in Usak, 13,735 in Manisa and 147,810 in Izmir. It needs to be emphasised that the data is available at province level. However, recent studies show that Syrian refugees are “urban refugees” (KAS 2019:7), meaning that because of the employment, housing, access to health and education facilities and also because of their social networks, Syrian refugees tend to settle in the urbanised parts of the central districts of the large provinces. No Syrian population has been identified in the PASs – which are mainly rural with relatively unfavorable socio-economic conditions - through the social surveys. Although there were refugee families who came to the region and stayed for a short time in the past, it was declared by a headman that they left these regions due to social conflicts.

11.4. Impact Assessment and Management

Socio-economic impact assessment and development of management measures for the Project have been done by using the following methods:

- Expert assessment based on the baseline information
- Consideration of PAPs' anticipation/expectations of impacts and mitigation measure suggestions through participatory approach

Mitigation measures for the management of potential social impacts of the Project have been developed as part of the ESIA based on a participatory approach, to the extent feasible.

Most of the PAPs surveyed in the scope of ESIA studies have already experienced construction phase impacts as construction works started and remained unfinished (in 2018) in some of the PASSs. Also, majority of the land acquisition required for the Project has been completed (see Appendix D.2) in line with the Expropriation Law (No. 2942, 1983), with the remaining locations/areas summarised previously in Table 11-2.

- Potential impacts of the future land acquisition processes (see Table 11-2 for the remaining expropriation works)
- Potential impacts of the construction works to be conducted by the Contractor
- Retrospective impacts stemming from the past construction activities conducted by previous contractors:
 - Impacts of Project-related land acquisition on agriculture and livestock activities (e.g. parts of expropriated parcels that remained useless due to partial expropriation; restriction of access to pasture lands due to suspension of construction works in 2018; Damage to agricultural lands due to excavated material disposal)
 - Impacts due to physical resettlement experienced by PAPs
 - Unfinished construction works causing impacts on life conditions and access restrictions (e.g. health and safety concerns due to construction traffic using the village roads, damage on village access roads due to suspension of construction works in 2018)

As part of the social surveys, PAPs were posed questions about their expectations about the impacts of the Project in the future. Anticipation of PAPs with regard to future Project impacts are summarised in Table 11-50.

Table 11-50. Anticipation of PAPs with regard to Future Project Impacts

Anticipation of Impacts	Frequency	Percent
Yes, positive	24	10.5
Yes, negative	92	40.2
Yes, both positive and negative	65	28.4
No	16	7.0
No answer/unknown	32	14.0
Total	229	100.0

Source: ESIA Field Study, HHQ, February 2021.

Once the construction of the Project is completed, the Ankara-Izmir HSR with all relevant components and infrastructure will be transferred by the AYGM (Employer) to the TCDD (Operator). Eventhough the questions asked to the mukhtars and PAPs were about the construction phase, not all PAPs could be able to refrain from making evaluations regarding the operation phase. However, the impacts (past and future) identified in this Chapter are largely related to land acquisition, land preparation and construction phases of the Project, as these are the phases when the Project's social impacts will be more prominent. The potential noise and vibration and community health and safety impacts and risks of the operation phase have been presented in Chapter 6 and Chapter 13, respectively. If shared during the questionnaires, expectations and impact anticipations of PAPs with regard to operation phase have also been reflected in this Chapter, as appropriate.

11.4.1. Impacts on Population and Demographics

11.4.1.1. Migration

Population growth rate in the affected districts is below the average in Turkey. Therefore, there is a potential for migration. Migration is an indirect result of impacts on livelihoods. Thus, damage to livelihoods could cause migration of individuals of working age, especially if new jobs are not provided prior to migration decision/action. Migration can also occur as a result of physical displacement.

The impacts of the Project on land use, assets and land-based livelihood activities have been assessed in Section 11.4.4. The conservation of the population structure during the construction phase depends on the increase in job opportunities in the region and compensation of the impact of Project-related land acquisition on the livelihoods of PAPs. The Project is anticipated to contribute to creation of direct and indirect job opportunities throughout the construction phase. Expropriation of the land is conducted by the related governmental agency as per the requirements of the Expropriation Law of Turkey (Law No. 2942, 1983).

For the management of physical and economic displacement impacts of the Project-related land acquisition, RAP has been prepared as a stand-alone document in line with the requirements of IFC PS5..

During the operation phase, the Project will enhance connectivity and access to job and touristic opportunities in the region. The cities and district centres with positive population growth, including Ankara, Afyonkarahisar (Emirdag, Iscehisar and Merkez districts), Manisa and Izmir (Menemen district and other districts to be connected to the HSR through the intercity rail line) will potentially continue the current urbanisation process in the next decades with receiving further migration. Also, there may be temporary population increases in the cities and districts connected with the HSR as the Project will potentially promote tourism in the region. This will result in the transformation of the existing land use types and further development of the real estate sector. Especially, the city and district centres close to the stations and gars, as listed below, are likely to be the centre of potential positive economic impacts, while there will be the risk of unplanned urbanisation and inadequacy of infrastructure services, which is to be taken into consideration and managed by the central and local administrations in the long term:

- Section 1 (Emirdag Station): Emirdag district in Afyonkarahisar province
- Section 2 (Afyon Gar): Afyonkarahisar city centre and districts
- Section 3 (Usak Gar): Usak city centre
- Section 4 (Salihli Station, Turgutlu Station and Manisa Gar): Manisa city centre, Salihli and Turgutlu districts

11.4.1.2. Worker Influx

The breakdown of the construction workforce, including estimated composition of the workforce (qualified, semi-qualified and non-qualified) is provided in Chapter 1 on Project Description. The total number of the personnel estimated to be employed by the Contractor and subcontractors during the peak period of the construction phase is 14,778, of which 67% is estimated to be non-qualified.

Construction camp sites planned to be used by the Contractor, including their distances to the closest settlements, are listed in Section 1.4.7.1 and summarised below:

- In Section 1:
 - Gumusyaka neighbourhood (Ankara, Polatli) – closest building is located at a distance of 470 m to Gumusyaka camp site (new) at app. KM 3+000.
 - Sigircik neighbourhood (Eskisehir, Sivrihisar) – closest building is located at a distance of 2,340 m to Sigircik camp site (new) at app. KM 67+000.
 - Bayat Merkez (Afyonkarahisar, Bayat) – closest building is located at a distance of 20 m to Sigircik camp site (new) at app. KM 67+000.
- In Section 2:
 - Ayvali neighbourhood (Sinanpasa, Afyonkarahisar) – closest building is located at a distance of 1,000 m to Sinanpasa camp site at app. KM 190+000, which is an existing camp site used by previous contractors within the scope of the Project.

- Halaclar village (Usak, Banaz) – closest building is located at a distance of 1,230 m to Halaclar camp site at app. KM 228+000.
- In Section 3:
 - Asagicobanisa village (Manisa, Sehzadeler) – closest building is located at a distance of 650 m to the camp site at app. KM 493+000.

The accommodation capacity of the Contractor Camp Sites is provided in Chapter 12 on Labour and Working Conditions. The existing Sinanpasa (Dogus) Construction Camp Site (KM 190+000) is planned to be used as the main camp site in the scope of the Project. It is anticipated that several lower tier subcontractors will be involved in the Project at the different phases of the construction based in several construction camp site. Accommodation of subcontractors at the subcontractor camp sites or off-site residences/accommodation places will be clarified upon selection of subcontractors.

Since the construction works have started and reached a certain point, the experiences and opinions of the local people have been consulted to evaluate the impacts. The percentage of those expecting impacts from workers coming to the region for construction work is quite low (6.7%), but there are also those who do not have an idea and did not respond (see Table 11-51) . The reason for the low worker impact expectation can be evaluated, as the construction works have started before and no negativity has been experienced.

Table 11-51. PAPs Anticipation of Impacts due to Construction Worker Influx

Anticipation of Impacts due to Worker Influx	Frequency	Percent
Yes	12	6.7
No	138	76.7
Do not know	30	16.7
Total	180	100.0

Source: ESIA Field Study, HHQ, February 2021.

Avoiding/mitigating issues that may stem from worker influx will be achieved through:

- (i) locating the camp sites at suitable places,
- (ii) training the Project workforce on Project's Social Policy and relations with the local communities, and
- (iii) operating an External Grievance Mechanism as part of the Project SEP.

The expectation of positive impacts of workers on local people is related to potential benefits to local economy (e.g. supply of goods through shopping from local markets/stores).

Based on the information collected through the social surveys and experience with typical impacts of similar infrastructure projects, the existing and potential impacts of worker influx will be addressed and managed under two main impact categories (see Figure 11-5):

- (1) Issues that may arise in case of camp sites being close to settlements, and
- (2) Exposure of settlements to the impacts of Project-related construction traffic.

Respondents shared general concerns related to social conflict and gender-based issues when they think about examples in which construction camp sites of industrial projects are located close to settlements.

Project-related traffic is also considered as a potential conflict issue between workers and local people if the vehicles pose Community Health and Safety (CHS) risks on local communities due to access routes used (see Chapter 13 on Community Health and Safety for assessment and management of risks and impacts on public traffic and pedestrian health and safety due to Project-related traffic)

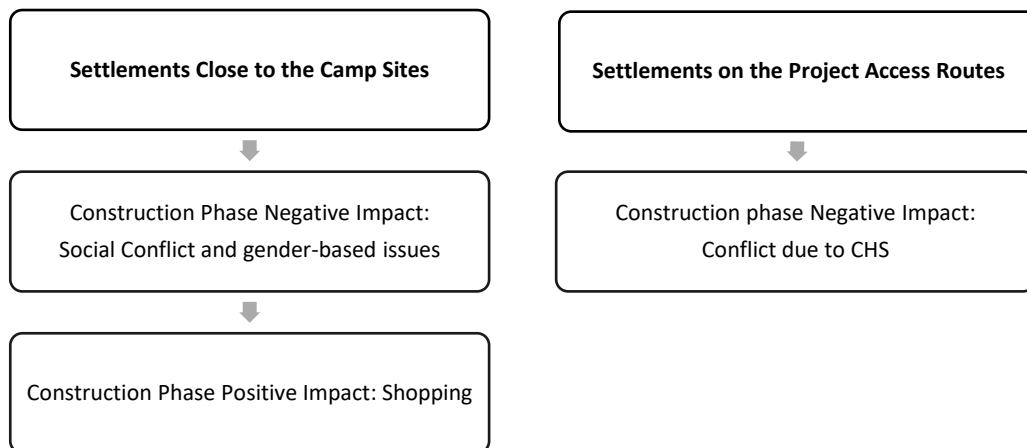


Figure 11-5. Potential Impacts of Worker Influx

In order to reduce potential negative impacts, the following recommendations have been received from several PAPs for impacts anticipated:

- Workers must be kept under control and public disturbance must be avoided.
- Workers should not travel within the village, outside the construction site.
- Trucks should not enter the village.
- Construction sites can be installed in remote locations.

Separating construction sites and residential areas is one method, but a reverse planning may be more appropriate for both local workers to be employed and local communities. For this reason, it is a preferable practice to develop preventive measures for conflicts, gender-based issues (e.g. gender-based violence and harassment– GBVH and sexual harassment and abuse – SHA), and safety risks, instead of removing the camp sites from the settlements. The most basic tool is the training to be provided to the workers. GBVH and SHA issues require some additional measures:

- Gender sensitivity will be sought in the employment of community liaison officers (CLOs) who will work in the region.
- CLOs will be trained on GBVH.
- In addition to the socio-cultural characteristics and non-violent communication ways in the training of workers, GBVH will also be on the agenda. Worker training will include the following information on GBVH:
 - Definition of violence against women in national and international documents,
 - Types of violence (physical, sexual, economic, emotional), and
 - Legal sanctions.
- The Grievance Mechanism (external and internal) will be accessible throughout the construction phase of the Project and will ensure confidentiality of personal information.
- Information activities will be carried out to inform women about the mechanism. The following types of information are presented in these studies:
 - Women's rights,
 - Self-protection in cases of violence and sexual abuse,
 - Emergency phone numbers,
 - Contact information of the institutions and organisations that can be applied to, and
 - Project grievance mechanism and privacy policy.

The confidentiality principle of the grievance mechanism will be repeated in all information materials.

Detailed planning of the operation and maintenance workforce (direct and contracted) requirements of the Project will be done by the AYGM and TCDD in due course.

11.4.2. Impacts on Life Conditions

11.4.2.1. Roads, Access and Traffic

The construction activities will include transportation of construction staff and construction equipment and materials. Transportation will mainly be carried out by using existing roads. Therefore, an increase in local traffic to some extent is expected. The Contractor is at the stage of planning the access routes to the construction camp and work sites (HSR corridor, off-site facilities, quarries and material borrow sites, excavated material storage areas, etc.) and will take the measures defined in Chapter 13 in order to avoid/minimise traffic-related impacts on local communities located on the transportation routes. With regard to quarries and material borrow sites, proximity to route and distance to settlements is a criterion taken into consideration during site selection in order to reduce haul distances as described in Chapter 3 on Project Alternatives. The Project-specific Traffic Safety Management Procedure including both on-site and off-site traffic safety measures will be implemented for the management of traffic related impacts on the CHS.

Since the construction activities have already started and reached a certain point, the experience and opinions of the local people were also consulted to assess the impacts on living conditions. With regard to retrospective impacts stemming from the the previous construction activities that were suspended in 2018, the following have been reported as common example issues with ongoing impacts:

- Potholes that remained on roads, damages caused by truck traffic on asphalt roads, village access roads and inner village roads
- Transportation difficulties because of the excavations
- Land fragmentation and distance of the locations of crossing structures causing access difficulties for the villagers
- Difficulty in accessing own residential houses
- The issues caused by the design and construction of the engineering structures (e.g. bridge constructed for river crossing causing overflow issues during rainy periods, width of the crossing structures not fit for the passage of agricultural machinery)
- Life conditions are adversely affected and public health is endangered due to unrequired roads.
- Damage on pastures, agricultural fields and access roads to home are damaged, materials/soils being stockpiled on lands
- Lands used to access construction sites without consent of/mutual agreement with the land owners

Among the surveyed settlements, damage on local roads due to previous construction activities has been raised as a concern in the settlements listed in Table 11-52.

Table 11-52. Settlements with Retrospective Impacts on Local Roads due to Previous Project Construction Works conducted by Other Contractors (Suspended in 2018)

Province	District	Village/Neighbourhood	Province	District	Village/Neighbourhood
Ankara	Polatlı	Beşköprü	Afyon	İşçehisar	Hasan Basri (Seydiler town)
		Yenice		Bayat	Büyük (Merkez town)
		Gümüşyaka			Hürriyet (Merkez town)
Eskişehir	Günyüzü	Ayvalı			Cumhuriyet (Merkez town)
		Çakmak			Yeni (Merkez town)
		Kayakent			Sağırılı
		Gümüşkonak		Emirdağ	Yeniköy
	Sivrihisar	Buzluca			Karaağaç
		Yenidoğan			Adayazı

Province	District	Village/Neighbourhood	Province	District	Village/Neighbourhood
Kütahya	Dumlupınar	Kurtşeyh	Emirdağ	Merkez	Tabaklar
		Buhara			Yeni Mahalle (Gebecler town)
		Ahiler			Fatih (Gebecler town)
		İlyaspaşa			Emirdağ
		Zafer			Emirinköyü
					Yüregil
					Elhan
					Türkmenakören
					Dağılgan
					Kılınçlar
Kütahya	Dumlupınar		Emirdağ	Suvermez	Emirdağ
					Karayatak
					Eskiakören
					Ekizce

PAPs were asked whether the Project would have an impact on the existing roads and 180 people responded. Accordingly, 69.4% of the respondents stated that they expect an impact on roads and transportation (see Table 11-53).

Table 11-53. Anticipated Impacts on Roads and Transport

Responses	Frequency	Percent
Yes (positive and negative)	125	69.4
No	42	23.3
Do not Know	13	7.2
Total	180	100.0

Source: ESIA Field Study, HHQ, February 2021.

47 positive and 85 negative statements were received from 125 PAPs who stated that they anticipate an impact. All of the expected positive impacts are directed towards transport infrastructure development and operation phase:

- We will be able to go to the hospitals in the center more easily
- Access to metropolitan cities is easier
- If the station is built, our intercity access becomes easier
- Provides positive impacts for the whole
- Saves time

Partly based on their previous experiences, the anticipated negative impacts are mostly related to the construction phase. Statements from PAPs relate to the restricted access to lands and social services, as summarised below (further information is provided in Section 11.4.4):

- Difficulty in access to land and fields, increased travel distance and loss of time
- Access problems adversely affecting agriculture and animal husbandry activities
- Fragmentation of lands, making part of the land unviable for agricultural use
- Reduced pasture area and fragmentation of pastures
- Decline in land value due to transportation problems and land fragmentation
- Difficulty in responding to fire due to access difficulties
- Construction machinery damaging the roads

- Difficulty in access to social services due to deterioration of roads (especially student services)
- Difficulty in access due to fencing

As seen in Table 11-54, 26.7% of the PAPs anticipate Project-related traffic to result in adverse impacts impact.

Table 11-54. PAPs Anticipation of Project-related Impacts on Traffic

Responses	Frequency	Percent
Yes	48	26.7
No	110	61.1
Do not know	22	12.2
Total	180	100.0

Source: ESIA Field Study, HHQ, February 2021.

The anticipated impacts on life conditions and safety due construction related traffic have been reported under the following categories:

- Traffic due to heavy vehicles and truck disturbing the settlements and roads
- Increased traffic load on roads
- Damage to be caused on existing infrastructure (reportedly, a bridge over Sakarya River was damaged due to past construction activities)
- Safety risks to be caused by concrete batching plant, construction site machines and trucks on children and animals
- Risks to be caused by heavy vehicles passing through narrow roads at high speed
- Construction site traffic causing disturbances for the surrounding settlements
- Vibration to be caused by truck and dozer traffic, with concerns related to damage that may be caused on the houses
- Risk of fatal accident due to construction machines (a fatal accident reportedly took place Manisa, Salihli, Hasanalan; relevance of this accident with the Project could not be verified)

Based on the information collected through the social surveys and experience with typical impacts of similar infrastructure projects, the existing and potential road and access problems arising from the land acquisition and construction activities of the Project will be addressed and managed under two main impact categories (see Figure 11-6):

- (1) Restrictions of access to land (private and public) due to land fragmentation and lack of proper/adequate engineering structures designed and constructed to ensure continuity of access between fragmented lands, causing potential impacts on livelihoods
- (2) Restricted access to services and centers due to temporary access restrictions or temporary vehicle traffic during the construction phase causing potential impacts on life conditions

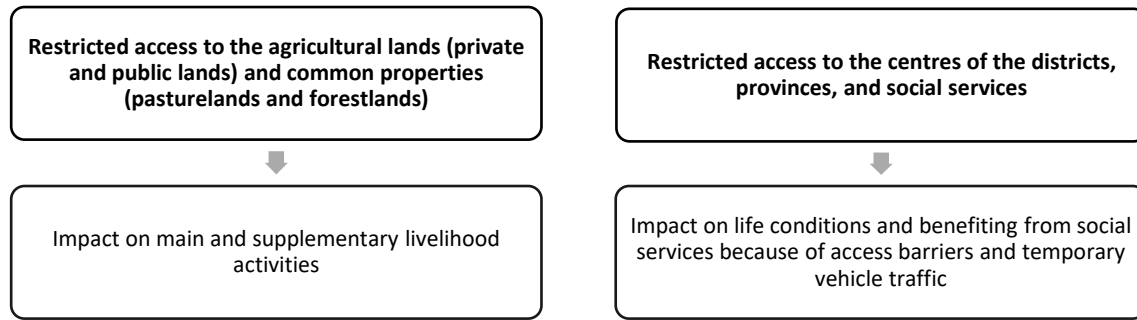


Figure 11-6. Potential Impacts related to Access Restrictions

The experiences and/or impact anticipation/expectation of the mukhtars regarding roads and access are listed in Table 11-55.

Table 11-55. Settlements with Expectations / Experience of Impacts on Roads and Access

Settlement	District	Province	Impact expectation and experience on road and access
Cumhuriyet (Seydiler town)	Iscehisar	Afyonkarahisar	Negative
Emirinkoyu	Emirdag	Afyonkarahisar	Negative
Sehitler	Turgutlu	Manisa	Positive
Hurriyet (Merkez town)	Bayat	Afyonkarahisar	Negative
Cumhuriyet (Merkez town)	Bayat	Afyonkarahisar	Negative
Cakmak	Gunyuzu	Eskisehir	Negative
Kayakent	Gunyuzu	Eskisehir	Negative
Sagirli	Bayat	Afyonkarahisar	Negative
Beskopru	Polatli	Ankara	Negative
Karaagac	Emirdag	Afyonkarahisar	Negative
Yuregil	Emirdag	Afyonkarahisar	Negative
Turkmenakoren	Emirdag	Afyonkarahisar	Negative
Ekizce	Emirdag	Afyonkarahisar	Negative
Ciftlikkoy	Emirdag	Afyonkarahisar	Negative
Yenice	Polatli	Ankara	Negative
Kurtseyh	Sivrihisar	Eskisehir	Negative
Buhara	Sivrihisar	Eskisehir	Negative
Ilyaspasa	Sivrihisar	Eskisehir	Negative
Osmanlı (Susuz town)	Merkez	Afyonkarahisar	Negative
Beseylul	Salihli	Manisa	Positive
Erenler	Merkez	Afyonkarahisar	Negative
Ali Cetinkaya	Merkez	Afyonkarahisar	Positive
Turgut ozal	Dumlupinar	Kutahya	Positive
Huzur	Merkez	Afyonkarahisar	Positive
Balmahmut	Sinanpasa	Afyonkarahisar	Negative
Buyukoturak	Banaz	Usak	Positive
Hasalan	Salihli	Manisa	Negative
Kizilca	Dumlupinar	Kutahya	Negative
Akcin	Merkez	Afyonkarahisar	Positive
Ismail	Merkez	Afyonkarahisar	Negative
Sakarya (Susuz town)	Merkez	Afyonkarahisar	Positive
Yenikoy	Turgutlu	Manisa	Negative
Inaz	Merkez	Afyonkarahisar	Positive
Isık (Duzagac Town)	Sinanpasa	Afyonkarahisar	Negative
Seydikoy	Ahmetli	Manisa	Positive
Yarasli	Ahmetli	Manisa	Positive

Settlement	District	Province	Impact expectation and experience on road and access
Incili	Emirdag	Afyonkarahisar	Negative
Zafer (Duzagac town)	Sinanpasa	Afyonkarahisar	Negative
Urganli	Turgutlu	Manisa	Negative
Yilmaz	Salihli	Manisa	Negative
Sarayduzu	Merkez	Afyonkarahisar	Negative
Sigircik	Sivrihisar	Eskisehir	Positive

Source: ESIA Field Study, CLQ, February 2021.

The suggestions of the PAPs regarding the elimination/avoidance of the Project impacts on the roads and access, and management of traffic-related impacts have been reported during the social surveys as follows:

- Ensuring accessibility of the roads blocked due to previous construction activities that were suspended in 2018.
- Repairing roads damaged due to previous construction activities that were suspended in 2018.
- Ensuring access between lands by means of structures such as bridges, crossings, connection roads.
- Design and construction of passage structures with adequate dimensions for the passage of agricultural machinery and animals (e.g. with a width 5 to 6 meters for structures that will serve passage of agricultural machinery) and with sufficient intervals
- Consultation to be made with the local communities regarding the planning of passage structures and selection of access roads to be used by trucks in consideration of traditional access preferences, where applicable
- Avoiding truck traffic along the settlement access roads, where possible through alternative access roads
- Stipulating/enforcing strict speed limit for the trucks using settlement access roads/passing through settlements if this is unavoidable and installing speed bumps, safety signs, etc. where necessary (with approval of relevant authorities)
- Install speed bumps, safety signs, etc. on settlement
- Repairing village roads damaged by the construction works upon completion of construction (this was reportedly not done by the previous contractors)
- Regular maintenance and repairment of access roads
- Optimisation of construction schedule to limit the impact period
- Ensuring the safety of the roads during the construction phase
- Ensuring continuity of access to residential areas prior to start of construction
- The traffic of the construction site is separated, the truck traffic is taken away from the village, the trucks do not enter the village

The suggestions of the settlements captured as part of the social surveys will be taken into consideration by the Contractor in the development and implementation of relevant management plans (e.g. Community, Health, Safety and Security Management Plan).

The social surveys have identified retrospective access restriction issues stemming from the previous construction activities that were suspended in 2018 and have current impacts on the communities. The Contractor will develop and implement a Community Health, Safety and Security Plan that will identify the current access restriction issues (access to private and public lands and access to the centres of the districts, provinces, and social services) that have been caused by the previous construction works (with prioritisation in the construction schedule where needed

and possible) and describe the management/resolution measures to be implemented to eliminate them, if feasible under the scope of Contractor's works and subject to the approval of the AYGM.

The Contractor will also engage with the local communities through the implementation of Project SEP to receive their feedback and suggestions on the engineering structures (built and to be built) designed to ensure continuity of access between fragmented lands. The Contractor will consult and work with the mukhtars of the affected settlements to identify the locations where there are current and may be potential future access restriction issues. These feedback and suggestions will be evaluated and feasible measures will be planned, incorporated to the Community Health, Safety and Security Plan and implemented - subject to the approval of the AYGM - to eliminate existing access restriction impacts (if feasible under the scope of Contractor's works) and avoid/minimise access restrictions due to the Contractor's activities.

Measures for the management impacts on livelihoods due to restriction of access are described in the RAP that has been prepared as a stand-alone document.

Potential impact of construction traffic on community and animal health and safety and traffic and pedestrian safety during the operation phase are discussed in Chapter 13 ("Community Health and Safety").

11.4.2.2. Infrastructure and Facilities

Investment projects can have an impact on existing infrastructure and communication/energy facilities during the construction, which are compensated/repared as per the requirements of construction contracts executed with the authorities upon completion of activities at respective work sites. In this Project, the HSR corridor would overlap with different types of infrastructure and services including electricity transmission and distribution infrastructure, natural gas pipelines, water pipelines, irrigation channels, state and local roads, telecommunication infrastructure, etc. The impact of the Project on the infrastructure and facilities will be temporary and any damage will be restored/compensated by the contractors following the completion of works at respective sites as per the requirements of the national legislation and the Construction Contract executed with the Employer. The Contractor is at the stage of identification of infrastructure to be affected through the pre-construction site surveys.

Out of 180 PAPs who evaluated this issue, 74.4% do not anticipate the Project to have any impact on electricity, water, internet and telephone infrastructure (see Table 11-56).

Table 11-56. Impacts on the Infrastructure and Communication Facilities according to PAPs

Responses	Frequency	Percent
Yes	24	13.3
No	134	74.4
Do not know	22	12.2
Total	180	100.0

Source: ESIA Field Study, HHQ, February 2021.

7 PAPs, who declared that they expect a positive impact, expect an increase in infrastructure investments as the Project passes through the settlement. There is little expectation of improvement especially in electricity and internet infrastructure. All of these impacts are indirect impacts that are expected to be achieved during the operation phase.

14 PAPs think the Project will have negative impacts on the infrastructure (except the communication infrastructure which is not anticipated by the respondents to be impacted). Based on both their past/current experiences and future impact anticipations, these considerations are largely related to the construction phase and can be grouped as follows:

- Damage on electricity line/poles
- Damage on water infrastructure, water channels, wells and pipes
- Unfunctionality of existing irrigation due to land fragmentation
- Disruption of future water supply plans due to land fragmentation (e.g. separation of planned water well location and fields to be irrigated)
- Proximity of HSR line with potential effects on the drinking water well

These problems, similar to road and access problems may pose risks and impacts both on life condition and livelihoods activities (see Figure 11-7).

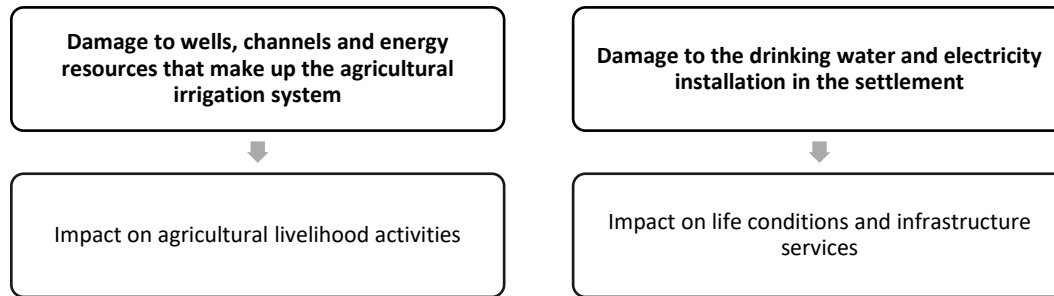


Figure 11-7. Potential Impacts on Infrastructure with Impacts on Livelihoods and Life Conditions (Water and Energy)

The suggestions of the PAPs for the avoidance/mitigation of the Project impacts on the water and energy infrastructure have been reported during the social surveys as follows:

- Reinstatements/repairment of the damage caused by the Project on electrical infrastructure, local water supply/irrigation infrastructure
- Compensation of the economic losses due to damage caused by the Project on the irrigation infrastructure including provision of alternative water resources for irrigation, when necessary (covered in the stand-alone RAP)

The suggestions of the settlements captured as part of the social surveys will be taken into consideration by the Contractor in the development and implementation of relevant management plans (e.g. Community, Health, Safety and Security Management Plan).

The Project risks related to infrastructure safety during the operation phase (e.g. superstructure, electrification, signalisation and structural system) and safety of rail operations are discussed in Chapter 13 on Community Health and Safety. During the routine operations, the Project is not anticipated to cause any impact (damage) on the existing infrastructure and services in the settlements crossed by the HSR. The Project will operate its own electrification system to be built in the construction phase.

11.4.2.3. Waste and Wastewater Management Systems and Services

Potential impacts of the Project on municipal solid waste and wastewater systems were also questioned. 180 PAPs responded, whilst only 5% of the respondents anticipate impacts on solid waste and wastewater management systems and services (see Table 11-57).

Table 11-57. Impacts on Waste and Wastewater Services according to PAPs

Responses	Frequency	Percent
Yes	9	5.0
No	148	82.2
Do not know	23	12.8
Total	180	100.0

Source: ESIA Field Study, HHQ, February 2021.

With regard to impacts of Project-related water and wastewater generation and management on the quality of life, one of the PAPs declared as part of HHQs his/her expectation of a positive impact on solid waste and wastewater systems and services as the Project would trigger investments in the region leading to indirect and long-term impacts.

During the ESIA surveys, damage to agricultural lands due to excavated material disposal within the scope of previous works, has been raised as an issue.

Indeed, one impact of projects on water, energy and waste infrastructure is the increasing population impact on infrastructure, as mentioned in Section 11.4.1 on "Population and Demographics".

Impacts due to waste and wastewater generation and management measures to be taken in the scope of the Project, including the management of excavated materials, are described in details in Chapter 8 ("Water and Wastewater Management") and Chapter 9 ("Waste Management") of the ESIA Report.

11.4.2.4. Dust, Noise and Vibration

The potential impacts of the dust, noise and vibration to be caused by the Project on the communities (receptors) have been assessed through modelling studies and management measures to be taken to mitigate potential impacts have been described as presented in Chapter 6 ("Noise and Vibration") and Chapter 7 ("Air Quality and GHG Emissions").

The distance of the quarries and material borrow sites to the closest buildings in the nearby settlements are provided in Chapter 1 (Table 1-18 and Table 1-19). Chapter 6 on Noise and Vibration identifies the safe blasting distance as 220 m. The following settlements have buildings located within 220 m distance to the EIA permit boundary of the quarry

- Cikrikci (Turgutlu, Manisa) – the closest building in the settlement is located at 200 m distance to the EIA permit boundary.
- Caltidere (Aliaga, Izmir) – the closest building in the settlement is located at 67 m distance to the EIA permit boundary.

As discussed in Chapter 6, blasting locations will be identified considering the safe blasting distances determined in this ESIA. Further measures to be taken during blasting operations are described in Chapter 6.

The tunnels planned in the scope of the Project are listed in Chapter 1 (see Table 1-8). Tunnels will be constructed by using the New Austrian Tunneling Method (NATM). As described in Chapter 6 on Noise and Vibration, to minimise tunnel blasting, excavation by means of construction machinery will be the preferred method in the tunnels. In case of necessity, soft blasting (*yumusak patlatma*) technique will be used. The following settlements are located within the safe blasting distance of 220 m (considered as worst case distance for soft blasting operations to be practice within the tunnels):

- Yeni (Bayat, Afyonkarahisar) is located at a distance of approximately 100 m to Tunnel 4 in Section 1 (Length: 300 m) to be constructed between KM 122+620.000 and 122+920.000.
- Sagirli (Bayat, Afyonkarahisar) are located at a distance of approximately 100 m to Tunnel 6-7-8 in Section 1 (Length: 5.2 km) to be constructed between KM 123+720.000 and 128+880.000.
- Balmahmut (Sinanpasa, Afyonkarahisar) is located at a distance of approximately 100 m to Tunnel 3 in Section 2 (Length: 279 m) to be constructed between KM 182+613 and 182+892.
- Calisar (Sinanpasa, Afyonkarahisar) is located at a distance of approximately 185 m to Tunnel 4 in Section 2 (Length: 1,260 m) to be constructed between KM 209+615 and 210+875.
- Alaba (Banaz, Usak) is located at a distance of approximately 200 m to Tunnel 1 in Section 2 (Length: 1,095 m) to be constructed between KM 269+735.000 and 270+830.000.
- Hatipler (Banaz, Usak) is located at a distance of approximately 100 m to Tunnel 6 in Section 2 (Length: 780 m) to be constructed between KM 275+338.000 and 276+123.000.

The experience and opinions of the receptors should also be consulted when the construction works have already started and reached a certain point to evaluate the impacts. 180 PAPs, which form the sample of the social surveys, answered the question about the dust and noise on the living spaces of the Project and 46.1% stated that they expect dust and noise impact (see Table 11-58).

Table 11-58. Dust and Noise Expectation from the Project of PAPs

Responses	Frequency	Percent
Yes	83	46.1
No	80	44.4
Do not know	17	9.4
Total	180	100.0

Source: ESIA Field Study, HHQ, February 2021.

The dust, noise and vibration to be generated during the construction phase has the potential to adversely affect both the quality of life of the permanent and seasonal populations and livelihoods of the local communities, if not properly managed.

The potential impacts of the HSR construction activities on the background noise levels and air quality will be temporary and removed upon completion of activities at respective work sites. Dust, noise and vibration impacts of the quarry and borrow site operations will continue throughout the construction phase. Due to their temporary nature, construction phase impacts are not anticipated to cause any impact on the real estate prices during the construction phase. The long-term operation phase impacts will be managed by the operator of the HSR.

Impacts due to dust, noise and vibration generation and management measures to be taken in the scope of the Project are described in details in Chapter 6 ("Noise and Vibration") and Chapter 7 ("Air Quality and GHG Emissions") of the ESIA Report.

The Contractor will also engage with the local communities through the implementation of Project SEP to inform them about the activities and construction schedule and collect their grievances, feedback and suggestions for the management of potential impacts.

The suggestions of the PAPs for the avoidance/mitigation of the Project impacts due to dust, noise and vibration have been reported during the social surveys as follows:

- Optimisation of construction schedule to minimise dust formation (e.g. the dust impact is anticipated to be less if dust generating construction activities are performed during rainy periods - after September-October) and limit the impact duration
- Where feasible, paving the roads with proper materials (e.g. gravel)
- Use of alternative Project access roads away from the settlements/residential areas
- Implementation of noise mitigation measures
- Consultation to be made with the local communities regarding the construction schedule
- Watering of access roads for dust suppression

During the operation phase of the Project, noise will be generated as a result of the HSR operations, intermittently affecting the receptors located along the Project route parallel to the HSR operation hours. On the other hand, as part of the road traffic load is anticipated decrease because of the shift of passengers from motorways to HSR operations, the noise and air quality impact on the receptors caused by the road vehicles is anticipated to reduce. As given in details in Chapter 6 on Noise and Vibration, operation phase noise and vibration modelling studies will be updated during the construction phase with input from the Employer/Operator and site-specific mitigation measures, along with the highly sensitive receptors such as hospital/inpatient healthcare facilities, education facilities, rehabilitation centres, required to ensure compliance with the Project Standards during the operation phase of the Project will be identified and implemented.

11.4.2.5. Social Services (Health and Education)

One of the common and indirect impacts of infrastructure projects on social services (health, education) occurs when the roads used by the public to access the services coincide with the roads used for construction works. Construction vehicles may increase the traffic load on the public roads used to access health and education services, which in turn may result in health and safety issues. As part of the SEP implementation, information on mobile schooling times will be collected and taken into account for planning the transportation of construction materials.

Also, the influx of construction workers may put additional load on the healthcare services, if the projects do not have adequate infirmary facilities on-site. The Project will have on-site infirmary services at the construction camp sites for direct and contracted employees in order to reduce the load on public health facilities.

Throughout the Covid-19 pandemic, the measures will be taken by Project personnel as described in details in Chapter 12 on Labour and Working Conditions and Chapter 13 on Community Health and Safety to avoid/minimise Covid-19 cases amongst the Project's direct and contracted workforce. Besides the avoidance/minimisation measures, the Project will provide for isolation facilities/accommodation rooms in case of positive COVID-19 test results are received for the site employees to alleviate the load on the capacity of local health services.

During the operation phase, there may be temporary population increases in the cities and districts connected with the HSR and located close to the stations, as the Project will potentially trigger urban development and tourism in the region, as described in Section 11.4.1.1. The risk of inadequacy of infrastructure services against the anticipated population increase triggered by the Project is to be taken into consideration and managed by the central and local administrations in the long term.

11.4.3. Impacts on Local Economy

Under this heading, the impacts on the local economy are discussed under the following headings: impacts on welfare and wages, local employment impact of the Project, procurement impact of the Project and Impacts on livelihood activities.

11.4.3.1. Welfare and Wages

The proportion of those who express their opinion that the Project will have a positive or negative impact on the welfare level and wages is 19.4% (see Table 11-59).

Table 11-59. Project's Anticipated Impact on Welfare Level and Wages according to PAPs

Responses	Frequency	Percent
Yes	35	19.4
No	115	63.9
Do not know	30	16.7
Total	180	100.0

Source: ESIA Field Study, HHQ, February 2021.

The Project-related employment and procurement opportunities to be provided during the construction phase will result in short-term impacts on the welfare level of local communities. The short-term benefits of the Project will be enhanced through Project's policy on localisation of workforce to the extent possible. Impact of Project-related land acquisition on welfare level is discussed in Section 11.4.4.

According to the outcomes of the social surveys, the expected positive impacts on welfare level and wages are indirect and long-term impacts related to the operation phase:

- Increase in land values
- Increased activity at the regional scale
- Enhanced commercial opportunities and benefits as a result of the operation of stations
- Increased welfare levels at the local, regional and national levels as result of increased employment

11.4.3.2. Local Employment

As described in Chapter 1 (Section 1.8), the number of the construction personnel to be employed by the Contractor and subcontractors during the construction phase is estimated to be 14,778 at the peak period of construction

phase, including the management personnel of the Contractor as well as the site personnel of the subcontractors. Majority of the workforce (estimated to be 67%) is anticipated to be non-qualified, whilst the rest is anticipated to be composed of semi-qualified (8%) and qualified (25%) personnel.

In order to enhance Project benefits around employment opportunities during the construction phase, the Project will adopt the policy of localisation of workforce from the PASs, districts and cities crossed by the HSR to the maximum extent, where possible. The Contractor will set localisation targets for the employment of unskilled, semi-skilled and skilled workers (direct and contracted) within the Labour Management Plan.

Potential indirect employment creation, for example through sub-contracting. It is particularly important to look carefully at the potential impact on the informal sector, i.e. economic activity that is not taxed or monitored by government authorities, e.g. small roadside shops). The informal sector is important as changes in this area can have significant consequences on the livelihoods of vulnerable people⁷⁹. The targeted local employment rates, which will be determined by the JV according to the local employment potential of the region, will be added to the sub-contractor contracts as a commitment. Providing the required labor force from PASs would also bring in the positive impact of Project ownership by the local communities.

Detailed planning of the operation and maintenance workforce (direct and contracted) requirements of the Project will be done by the AYGM and TCDD in due course. Besides the employment within the HSR operations and at the O&M facilities, local economy at the settlements located close to the station/gar sites would benefit from the developing service sectors. There will be new business and employment opportunities having the potential to provide benefits to the economy, especially at the settlements located close to the stations/gars (Afyonkarahisar, Usak, Manisa and Izmir provinces and Emirdag, Salihli ve Turgutlu districts). With the enhanced connectivity and access to job and touristic opportunities in the region, the Project is anticipated to be beneficial for local employment in a variety of sectors (e.g. marble industry in Iscehisar district in Afyonkarahisar; education, logistics, tourism and real estate sectors in the cities crossed by the HSR).

In response to the questions on employment opportunities, almost 30% of the 180 respondents provided positive answers. However, it is noteworthy that the majority of the sample does not believe that the Project will have an impact on employment (see Table 11-60). The low impact expectation stems from the fact that the employment issue is mostly a positive impact category.

Table 11-60. Project Impact on Employment According to PAPs

Responses	Frequency	Percent
Yes	54	30.0
No	102	56.7
Do not know	24	13.3
Total	180	100.0

Source: ESIA Field Study, HHQ, February 2021.

Participants explained the positive impact of the Project on employment based on their past experiences and future expectations:

- Job opportunities may arise
- There may be job opportunities such as guard
- May be job opportunities for PAPs and their relatives
- Our work areas will expand
- There have been village workers before, it still happens
- May create temporary employment
- Young people can work
- Unemployed people in the village can work in construction

These and similar answers emphasise different aspects of the same impact, such as the expansion of employment areas, the increase in the number of employment and the reduction of unemployment, provision of temporary employment, youth finding jobs. These impacts indirectly affect people's purchasing power and welfare level,

⁷⁹ "Projects requiring an ESIA under EBRD Environmental and Social Policy"

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providing sustainability and experience by protecting the young population, reducing the pressure on social support systems by preventing poverty.

It was asked whether there were any previous employees in construction projects in the households and 7.5% of them gave a positive answer. Individuals who have previously worked (or have been working) in construction projects are experienced in jobs such as construction, electrical installation, molding and masonry works, machinery operation (e.g. crane operator) and watchman. Six household representatives stated that there are household members who can work even though they have not worked before (see Table 11-61).

Table 11-61. Potential for Local Employment

Responses	Frequency	Percent
Yes, there is (with previous employment in construction projects)	17	7.5
There are people worked before and they still could	6	2.7
No, there is not	203	89.8
Total	226	100.0
No answer	3	
General total	229	

Source: ESIA Field Study, HHQ, February 2021.

The information in Table 11-62 below was obtained from the mukhtars when the local employment potential was questioned on the basis of the settlement. This list, which includes unskilled and semi-skilled people in which village, is intended to facilitate communication with mukhtars while recruiting workers.

Table 11-62. Unqualified and Semi-qualified Local Employment Potential of the Settlements

Settlement	District	Province	Cook	General Construc tion Work	Road Worker	Tree Surgeon	Type of Job/Work Security	Rearch and Rescue	Heavy Vehicle Operator	Driver	Welder	Wall Builder
Ahiler	Sivrihisar	Eskisehir	+	+	+	+	+	+	+	+	+	+
Albayrak	Turgutlu	Manisa	+	+	+	-	+	+	+	-	-	-
Istasyonalti	Turgutlu	Manisa	+	-	+	-	+	+	+	+	-	-
Cumhuriyet	Iscehisar	Afyonkarahisar	+	+	+	+	+	+	+	-	-	-
Hasan Basri	Iscehisar	Afyonkarahisar	+	-	+	-	-	+	-	-	-	-
Mustafa Kemal	Turgutlu	Manisa	+	-	+	-	+	+	+	-	+	-
Ataturk	Turgutlu	Manisa	+	-	+	+	+	+	+	-	+	+
Emirin	Emirdag	Afyonkarahisar	+	-	+	-	-	+	-	-	+	-
Sehitler	Turgutlu	Manisa	+	-	+	+	+	+	-	-	-	-
Buyuk	Bayat	Afyonkarahisar	+	-	+	+	-	+	-	-	-	-
Hurriyet	Bayat	Afyonkarahisar	+	-	+	+	-	+	-	-	-	-
Cumhuriyet	Bayat	Afyonkarahisar	+	-	+	-	-	+	-	-	-	-
Cakmak	Gunyuzu	Eskisehir	+	+	+	+	+	+	-	-	-	+
Kayakent	Gunyuzu	Eskisehir	+	-	+	+	-	+	+	+	+	+
Sagirli	Bayat	Afyonkarahisar	+	-	+	+	-	+	+	+	-	+
Beskopru	Polatli	Ankara	+	+	+	+	+	+	+	-	+	+
Yenikoy	Emirdag	Afyonkarahisar	+	+	+	+	+	+	+	-	+	+
Karaagac	Emirdag	Afyonkarahisar	+	+	+	+	+	+	+	-	-	-
Adayazi	Emirdag	Afyonkarahisar	+	+	+	-	+	+	-	-	-	-
Tabaklar	Emirdag	Afyonkarahisar										
Turkmen	Alasehir	Manisa	+	-	+	-	+	+	+	-	-	-
Battalmustafa	Kula	Manisa	+	+	+	-	+	+	+	-	+	+
Yavi	Merkez	Usak	+	+	+	-	+	+	-	+	+	-
Bekdemir	Ulubey	Usak	+	+	+	+	-		+	-	+	+
Kasapli	Alasehir	Manisa	+	+	+	+	+	+	-	-	-	+
Banaz	Banaz	Usak	+	-	+	+	+	+	+	-	-	+
Yeni Mahalle	Gebeceler	Afyonkarahisar	+	+	+	+	+	+	+	-	-	+
Yeni	Bayat	Afyonkarahisar	+	+	+	+	+	+	-	-	+	+

Settlement	District	Province	Cook	General Construc tion Work	Road Worker	Tree Surgeon	Type of Job/Work Security	Rearch and Rescue	Heavy Vehicle Operator	Driver	Welder	Wall Builder
Yukaricobanisa	Sehzadeler	Manisa	+	+	+	-	+	+	+	-	-	-
Sehitler	Sehzadeler	Manisa	+	+	+	+	+	+	+	+	+	+
Uzunburun	Yunus Emre	Manisa	+	+	+	-	+	+	-	+	+	+
Gokkaya	Ahmetli	Manisa	+	+	+	-	-	+	+	+	-	-
Hatipler	Banaz	Usak	+	-	+	-	+	+	-	-	-	-
Zafer	Dumlupinar	Kutahya	+	+	+	-	-	+	-	-	-	-
Asagicobannisa	Sehzadeler	Manisa	-	-	-	-	-	-	-	-	-	-
Durasilli	Salihli	Manisa	+	-	+	-	+	+	-	-	-	-
Inay	Ulubey	Usak	+	+	+	-	+	+	+	-	+	-
Gumuskonak	Gunyuzu	Eskisehir	+	+	+	-	+	+	+	+	-	+
Balcidam	Banaz	Usak	+	+	+	+	+	+	+	-	-	-
Fatih	Gebeceler	Afyonkarahisar	+	+	+	-	+	+	+	+	+	-
Yuregil	Emirdag	Afyonkarahisar	+	-	-	-	+	+	+	-	-	+
Elhan	Emirdag	Afyonkarahisar	+	-	+	+	+	+	+	+	+	-
Pasacik	Suhut	Afyonkarahisar	+	-	+	-	+	+	-	-	-	-
Hacili	Salihli	Manisa	+	+	+	+	+	+	+	+	+	+
Turkmenakoren	Emirdag	Afyonkarahisar	+	+	+	+	+	+	+	-	-	-
Dagilgan	Emirdag	Afyonkarahisar	+	+	+	+	+	+	+	+	+	+
Karakose	Banaz	Afyonkarahisar	+	+	+	+	+	+	+	+	+	+
Aydogdu	Alasehir	Manisa	+	-	+	-	-	+	-	-	+	-
Sart	Salihli	Manisa	+	-	+	+	+	+	+	+	-	-
Islam	Banaz	Usak	+	+	+	-	-	+	-	-	-	-
Gaffur Okan	Salihli	Manisa	+	-	+	-	+	+	+	-	-	-
Koseler	Ulubey	Usak	+	+	+	+	+	+	-	-	+	+
Kilincilar	Emirdag	Afyonkarahisar	+	+	+	+	+	+	+	-	+	+
Suvermez	Emirdag	Afyonkarahisar	+	+	-	-	+	+	+	+	-	+
Buzluca	Sivrihisar	Eskisehir	+	+	+	-	+	+	+	-	+	-
Yenidogan	Sivrihisar	Eskisehir	+	+	+	-	+	+	+	+	+	-
Karayatak	Emirdag	Afyonkarahisar	+	+	+	-	+	+	+	+	+	+
Eskiakoren	Emirdag	Afyonkarahisar	+	+	+	+	+	+	+	+	+	+

Settlement	District	Province	Cook	General Construc tion Work	Road Worker	Tree Surgeon	Type of Job/Work Security	Rearch and Rescue	Heavy Vehicle Operator	Driver	Welder	Wall Builder
Ekizce	Emirdag	Afyonkarahisar	+	+	+	-	+	+	+	-	+	-
Ciftlikkoy	Emirdag	Afyonkarahisar	+	+	+	-	+	+	+	-	+	-
Yenice	Polatli	Ankara	+	+	+	+	+	+	+	-	+	+
Kurtseyh	Sivrihisar	Eskisehir	+	-	+	+	+	+	+	-	+	-
Buhara	Sivrihisar	Eskisehir	+	+	+	+	+	+	+	-	+	-
Gumusyaka	Polatli	Ankara	+	+	+	+	+	+	+	-	+	+
Ayvali	Gunyuzu	Eskisehir	+	-	+	-	+	+	+	-	+	-
Ilyaspasa	Sivrihisar	Eskisehir	+	+	+	+	+	+	+	-	+	+
Osmanli	Merkez	Afyonkarahisar	-	+	+	+	-	+	-	-	-	-
Gokhan	Merkez	Afyonkarahisar	-	-	+	+	+	+	-	-	-	-
Elvanpasa	Sinanpasa	Afyonkarahisar	+	+	+	-	+	+	+	+	+	-
Bulca	Sinanpasa	Afyonkarahisar	-	-	+	-	-	+	-	-	-	-
Kirveli	Salihli	Manisa	+	+	+	+	+	+	+	+	+	+
Fatih	Merkez	Afyonkarahisar	+	-	+	+	-	+	-	-	-	-
Ciftlik	Banaz	Usak	+	-	+	+	-	+	-	-	+	-
Avsar	Turgutlu	Manisa	+	-	+	-	-	-	-	-	-	-
Beseylul	Salihli	Manisa	+	-	+	+	-	+	-	-	-	+
Cumhuriyet	Dumlupinar	Kutahya	+	+	+	+	+	+	+	+	+	+
Erenler	Merkez	Afyonkarahisar	-	-	-	-	-	+	-	-	-	-
Bayatcik	Merkez	Afyonkarahisar	+	+	+	+	+	+	+	-	+	+
Yenikoy	Sehzadeler	Manisa	-	-	+	+	+	+	-	-	-	-
Ali Cetinkaya	Merkez	Afyonkarahisar	-	-	-	-	-	+	-	-	-	-
Turgut Ozal	Dumlupinar	Kutahya	-	-	+	-	+	+	-	-	-	-
Huzur	Merkez	Afyonkarahisar	+	+	+	+	+	+	-	+	+	+
Balmahmut	Sinanpasa	Afyonkarahisar	+	+	+	+	+	+	-	+	-	-
Buyukoturak	Banaz	Usak	-	-	+	-	-	-	-	-	-	-
Hasalan	Salihli	Manisa	-	-	+	-	-	+	-	-	-	-
Kizilca	Dumlupinar	Kutahya	+	-	+	+	+	+	+	+	-	-
Karacaoren	Sinanpasa	Afyonkarahisar	+	-	+	-	-	+	+	-	-	-
Cumhuriyet	Sinanpasa	Afyonkarahisar	+	-	+	+	-	+	-	-	-	-

Settlement	District	Province	Cook	General Construc tion Work	Road Worker	Tree Surgeon	Type of Job/Work Security	Rearch and Rescue	Heavy Vehicle Operator	Driver	Welder	Wall Builder
Akcin	Merkez	Afyonkarahisar	+	-	-	+	+	+	-	-	-	-
Ismail	Merkez	Afyonkarahisar	+	+	+	-	+	+	+	-	+	+
Sakarya	Merkez	Afyonkarahisar	-	-	+	+	-	+	+	-	-	-
Calislar	Sinanpasa	Afyonkarahisar	+	-	+	-	-	+	-	-	-	-
Ugur	Merkez	Afyonkarahisar	-	-	+	-	-	+	-	-	-	-
Yenikoy	Turgutlu	Manisa	+	+	+	-	+	+	+	+	+	+
Koprulu	Merkez	Afyonkarahisar	+	+	+	+	+	+	+	+	+	+
Inaz	Merkez	Afyonkarahisar	+	-	+	-	-	-	-	-	-	-
Zafer	Salihli	Manisa	-	-	+	+	+	+	+	+	+	+
Isik	Sinanpasa	Afyonkarahisar	-	-	+	+	+	+	-	-	-	-
Fatih	Sinanpasa	Afyonkarahisar	+	-	+	+	+	+	-	+	-	-
Ataturk	Salihli	Manisa	-	-	+	+	+	+	+	-	+	+
Selcuklu	Merkez	Afyonkarahisar	-	-	+	+	+	+	-	-	+	+
Cavdarli	Merkez	Afyonkarahisar	+	-	+	+	+	+	+	-	+	+
Seydikoy	Ahmetli	Manisa	+	+	+	+	+	+	+	+	+	+
Keli	Salihli	Manisa	+	+	+	+	+	+	+	+	+	+
Derbent	Turgutlu	Manisa	+	+	+	-	-	+	-	-	-	-
Mevlutlu	Salihli	Manisa	+	+	+	+	+	+	-	-	-	-
Akdegirmen	Sinanpasa	Afyonkarahisar	+	-	+	+	+	+	-	-	-	-
Duzluce	Banaz	Usak	+	-	+	-	-	-	-	-	+	+
Dumenler	Banaz	Usak	+	-	+	-	+	+	+	-	-	-
Halacilar	Banaz	Usak	+	+	+	+	+	+	+	+	+	+
Yarasli	Ahmetli	Manisa	+	+	+	+	+	-	-	-	-	+
Incili	Emirdag	Afyonkarahisar	-	-	+	+	+	-	-	-	-	-
Zafer	Sinanpasa	Afyonkarahisar	-	-	+	+	+	+	-	-	+	+
Urganli	Turgutlu	Manisa	+	-	+	+	+	+	-	-	-	-
Yavuz Selim	Merkez	Afyonkarahisar	-	-	-	+	+	-	-	-	-	-
Alaba	Banaz	Usak	-	-	+	+	+	+	-	-	+	+
Fatih	Merkez	Afyonkarahisar	-	-	-	+	+	+	-	-	-	-
Yilmaz	Salihli	Manisa	-	-	+	+	+	+	+	-	-	-

Settlement	District	Province	Cook	General Construc tion Work	Road Worker	Tree Surgeon	Type of Job/Work Security	Rearch and Rescue	Heavy Vehicle Operator	Driver	Welder	Wall Builder
Turktaciri	Polatli	Ankara	+	-	+	+	+	+	-	-	-	+
Cikrikci	Turgutlu	Manisa	+	-	+	+	-	+	+	+	-	+
Mersindere	Salihli	Manisa	-	+	+	+	-	+	+	-	-	-
Sarayduzu	Merkez	Afyonkarahisar	+	-	+	+	+	+	+	-	+	+
Kabakkoy	Polatli	Ankara	+	-	+	+	+	+	+	+	+	+
Goktepe	Sivrihisar	Eskisehir	+	-	+	+	+	+	+	-	-	-
Sigircik	Sivrihisar	Eskisehir	+	+	+	+	+	+	+	-	-	-
Sadikbey	Merkez	Afyonkarahisar	-	-	+	+	-	+	-	-	-	-

Source: ESIA Field Study, CLQ, February 2021.

It has been observed in CLQ interviews that there is also local employment potential for occupational groups qualified in PASS. Table 11-63 lists the settlements that have the potential to provide qualified workforce.

Table 11-63. Qualified Local Employment Potential of the Settlements

Settlement	District	Province	Type of Work/Job					
			Engineer	Guide	Education	Translator	Health Worker	Jobs Requiring Computer Literacy
Hasan Basri	Iscehisar	Afyonkarahisar	-	-	+	-	+	+
Mustafa Kemal	Turgutlu	Manisa	-	-	-	-	+	-
Ataturk	Turgutlu	Manisa	+	-	-	-	-	-
Sehitler	Turgutlu	Manisa	+	-	+	-	+	-
Buyuk	Bayat	Afyonkarahisar	+	-	+	-	+	+
Hurriyet	Bayat	Afyonkarahisar	+	-	-	-	+	+
Cumhuriyet	Bayat	Afyonkarahisar	+	-	-	-	-	-
Adayazi	Emirdag	Afyonkarahisar	-	-	+	-	-	-
Turkmen	Alasehir	Manisa	+	-	-	-	-	-
Kasapli	Alasehir	Manisa	-	-	-	-	+	-
Sehitler	Sehzadeler	Manisa	+	-	+	-	-	-
Zafer	Dumlupinar	Kutahya	-	-	+	-	+	-
Asagicobani sa	Sehzadeler	Manisa	+	-	+	-	+	-
Durasilli	Salihli	Manisa	-	-	+	-	-	-
Turkmenakoren	Emirdag	Afyonkarahisar	+	-	+	-	-	-
Islam	Banaz	Usak	+	-	+	-	-	-
Kilinclar	Emirdag	Afyonkarahisar	-	-	+	-	-	-
Suvermez	Emirdag	Afyonkarahisar	-	-	-	-	-	+
Ciftlikkoy	Emirdag	Afyonkarahisar	+	-	-	-	-	-
Yenice	Polatli	Ankara	+	-	+	-	-	-
Gumusyaka	Polatli	Ankara	+	-	-	-	-	-
Ayvali	Gunyuzu	Eskisehir	+	-	-	-	+	-
Ilyaspasa	Sivrihisar	Eskisehir	+	-	-	-	-	-
Osmanli	Merkez	Afyonkarahisar	-	-	-	-	+	+
Gokhan	Merkez	Afyonkarahisar	-	-	-	-	+	+
Bulca	Sinanpasa	Afyonkarahisar	-	-	-	-	-	+
Fatih	Merkez	Afyonkarahisar	-	-	-	-	+	-
Ciftlik	Banaz	Usak	-	-	-	-	-	+
Avsar	Turgutlu	Manisa	-	-	-	-	+	+
Beseylul	Salihli	Manisa	+	-	-	-	-	-
Cumhuriyet	Dumlupinar	Kutahya	-	-	-	-	-	-
Erenler	Merkez	Afyonkarahisar	+	-	+	+	+	+
Yenikoy	Sehzadeler	Manisa	+	-	-	-	-	+
Ali Cetinkaya	Merkez	Afyonkarahisar	-	-	+	-	+	+
Turgut Ozal	Dumlupinar	Kutahya	+	+	-	-	+	-
Buyukoturak	Banaz	Usak	+	-	+	+	+	+
Hasalan	Salihli	Manisa	-	-	-	-	+	+
Kizilca	Dumlupinar	Kutahya	+	-	-	-	-	-
Karacaoren	Sinanpasa	Afyonkarahisar	-	-	-	-	-	+
Akcin	Merkez	Afyonkarahisar	-	-	-	-	-	+
Sakarya	Merkez	Afyonkarahisar	+	-	-	-	-	+

Settlement	District	Province	Type of Work/Job					
			Engineer	Guide	Education	Translator	Health Worker	Jobs Requiring Computer Literacy
Calislar	Sinanpasa	Afyonkarahisar	+	-	-	+	-	+
Ugur	Merkez	Afyonkarahisar	-	+	-	-	-	+
Inaz	Merkez	Afyonkarahisar	+	-	-	-	+	+
Zafer	Salihli	Manisa	+	-	-	-	-	-
Isik	Sinanpasa	Afyonkarahisar	+	-	-	-	+	+
Selcuklu	Merkez	Afyonkarahisar	+	-	-	-	+	-
Derbent	Turgutlu	Manisa	-	-	-	-	-	+
Mevlutlu	Salihli	Manisa	-	-	-	-	-	+
Duzluce	Banaz	Uzak	-	-	-	-	+	-
Yarasli	Ahmetli	Manisa	-	-	-	-	-	+
Incili	Emirdag	Afyonkarahisar	+	-	-	-	+	+
Zafer	Sinanpasa	Afyonkarahisar	+	-	-	-	-	-
Urganli	Turgutlu	Manisa	-	-	-	-	+	+
Yavuz Selim	Merkez	Afyonkarahisar	+	-	-	-	+	+
Alaba	Banaz	Uzak	-	-	-	-	-	-
Fatih	Merkez	Afyonkarahisar	+	+	+	-	-	+
Yilmaz	Salihli	Manisa	-	-	-	-	-	+
Turktaciri	Polatli	Ankara	-	-	-	-	-	+
Cikrikci	Turgutlu	Manisa	-	-	+	-	-	-
Mersindere	Salihli	Manisa	-	-	-	-	+	+
Goktepe	Sivrihisar	Eskisehir	-	-	-	-	-	+
Sigircik	Sivrihisar	Eskisehir	-	-	-	-	-	+
Sadikbey	Merkez	Afyonkarahisar	-	-	-	-	+	+

Source: ESIA Field Study, CLQ, February 2021.

11.4.3.3. Procurement

The construction of the Project will result in temporary positive economic impacts because of procurement of goods and services required during construction phase. Procurement of goods and services (such as transport, catering, laundry, food supply, etc.) is planned to be supplied locally and regionally to the extent possible. Thus, the Project is anticipated to contribute to the local economy.

Temporary economic impacts will also emerge from induced impacts of spending on goods and services by construction workers, who will have increased disposable income and the ability to spend more money in the local economy (indirect impacts).

Employment of non-locals, as well as the increase in incomes of local employees, is also expected to bring in some benefits for local communities, associated with increased spending in the Project area, which would bring positive economic impacts for the small-scale settlements located in the vicinity of the Project.

In order to enhance Project benefits around procurement of goods and services, the Project will adopt the policy of giving priority to local procurement, where possible during the construction phase. Providing the needed goods and services from local tradesmen would also bring in positive impact on the reputation of the Project.

For the operation phase, detailed planning of the O&M procurement requirements (goods, materials, and services) and supply mechanisms will be done by the Employer and the Operator in due course. The procurement needs for the HSR operations and the services to be provided at the stations/gars will result in long-term positive economic impacts.

11.4.3.4. Livelihood Activities in the PASs

According to baseline information, the livelihood activities in the PASs are; agriculture, animal husbandry, retirement pension, wage, salary earning, self employment, rental income, social aid, seasonal agricultural working, income from finances (interest and so on) and student scholarship (bursary). In addition, in the ESIA field study, it was learned that some households live in PASs in the summer season and they live in metropolises during the winter months. Therefore, it is necessary to add the tourism income obtained from these people to the list.

The impact of the Project-related land acquisition on the livelihoods of the PAPs is discussed in Section 11.4.4.

As it is seen in Table 11-64, 40% of PAPs believe that the Project will have positive or negative impacts on livelihood activities.

Table 11-64. Impacts on Livelihood Activities According to PAPs

Responses	Frequency	Percent
Yes	72	40.0
No	83	46.1
Do not know	25	13.9
Total	180	100.0

Source: ESIA Field Study, HHQ, February 2021.

The positive impacts expected by 13 PAPs (out of 72) are mainly related to operation phase of the Project:

- Employment opportunities (applicable to construction phase as well)
- Enhanced economic activities in the region (applicable to construction phase as well)
- Opportunities to find work outside when the speed of transportation increases
- Ease of selling products
- Increase in land prices

The adverse impacts anticipated by 59 PAPs (out of 72) are categorised below:

- Loss of yield due to dust
- Production loss in fragmented lands
- Increased costs due to difficulty in access to agricultural and pasture lands
- Increased livestock costs due to reduced pasture size
- Loss of income from agriculture (including orchards, vineyards) and livestock
- Difficulty in cultivation due to reduced size of agricultural lands

As can be seen, when it comes to impacts on livelihoods, the concerns are concentrated on land-based livelihood activities, which will be addressed in Section 11.4.4.

The impacts of construction works, especially during the summer months, will affect not only the permanent/seasonal population but also the people residing in the region seasonally. It is important to mitigate the temporary impacts of construction, such as dust and noise formation, traffic, etc. to ensure that the population visiting the settlements seasonally is not affected so as the tourism income and contribution to the local economy (through purchase of materials, goods) brought by seasonal population.

11.4.4. Impacts on Land Use, Assets and Land-based Livelihood Activities

The permanent and temporary land use requirements of the Project (e.g. agricultural lands, pasture lands, forest lands) are described in Chapter 5 on Land Use and Geology. Based on the expropriation plans prepared for the Project and approved by the TCDD, the land use/ownership characteristics of the parcels affected/to be affected within the expropriation corridor⁸⁰ are classified as below:

- Privately owned lands
- Treasury lands
- Lands owned by legal entities
- State-owned pasture lands
- State-owned forest lands

Total area within the expropriation corridor of the Project sums up to 3,556.50 ha. Approximately 63% (2,247.45 ha) of the land (in terms of area) and %76 (8,647 parcels) of the parcels (in terms of parcel numbers) acquired/will be acquired within the expropriation corridor of the Project is classified as privately-owned, which are assumed to be utilised mainly for agricultural purposes. Besides agricultural parcels, there are 421 pasture parcels (3.7%) and 88 forest parcels (0.8%) affected/to be affected from the Project, which are limited when compared to privately-owned parcels. Summary of the number and area of parcels as per privately owned and public land categories is presented in Table 11-65, while the details are presented in Chapter 5.

Table 11-65. Summary of the Number and Area of Affected Parcels within the Project Expropriation Corridor (based on Expropriation Plans)

Section (*)	Description		Privately Owned Lands	Public Lands (including Treasury, Pasture, Forest, etc.)	Total
Number of Affected Parcels					
Section 1	-	Polatli-Afyon	2,119	848	2,967
Section 2	-	Afyon-Banaz	2,123	614	2,737
Section 3	(3a)	Banaz-Esme	1,669	393	2,062
	(3b)	Esme-Salihli	907	375	1,282
Section 4	(4a) –(4b)	Salihli-Manisa	1,308	264	1,572
	(4c)	Manisa North Passage	278	85	363
	(4d)	Manisa-Menemen	243	100	343
Total			8,647	2,679	11,326
Percentage of Affected Parcels in terms of Number of Affected Parcels (%)					
Section 1	-	Polatli-Afyon	18.7	7.5	26.2
Section 2	-	Afyon-Banaz	18.7	5.5	24.2
Section 3	(3a)	Banaz-Esme	14.7	3.5	18.2
	(3b)	Esme-Salihli	8.0	3.3	11.3
Section 4	(4a) –(4b)	Salihli-Manisa	11.5	2.4	13.9
	(4c)	Manisa North Passage	2.5	0.7	3.2
	(4d)	Manisa-Menemen	2.1	0.9	3.0
Total			76.3	23.7	100.0
Area of Affected Parcels (ha)					
Section 1	-	Polatli-Afyon	574.7	734.00	1,308.7
Section 2	-	Afyon-Banaz	395.2	164.40	559.6

⁸⁰ The expropriation corridor for the HSR has a minimum width of 30 meters along the HSR alignment. The width of the expropriation is extended up to 100 m based on the design of excavation and fill areas, footprint of the stations, etc.

Section (*)	Description		Privately Owned Lands	Public Lands (including Treasury, Pasture, Forest, etc.)	Total
Section 3	(3a)	Banaz-Esme	500.2	140.00	640.2
	(3b)	Esme-Salihli	306.7	213.00	519.7
Section 4	(4a) –(4b)	Salihli-Manisa	353.5	45.50	399.0
	(4c)	Manisa North Passage	100.3	8.60	108.9
	(4d)	Manisa-Menemen	16.9	3.60	20.5
Total			2,247.4	1,309.1	3,556.5
Percentage of Affected Parcels in terms of Affected Area (%)					
Section 1	-	Polatli-Afyon	16.2	20.6	36.8
Section 2	-	Afyon-Banaz	11.1	4.6	15.7
Section 3	(3a)	Banaz-Esme	14.1	3.9	18.0
	(3b)	Esme-Salihli	8.6	6	14.6
Section 4	(4a) –(4b)	Salihli-Manisa	9.9	1.3	11.2
	(4c)	Manisa North Passage	2.8	0.3	3.1
	(4d)	Manisa-Menemen	0.5	0.1	0.6
Total			63.2	36.8	100.0

(*) Expropriation plans for Ankara-Konya HSR Connection Line (KM 7+800; 0+000-6+683.120), Hatipler Relocation (KM267+156.053-278+632.464), and part of Manisa-Menemen (KM 531+517-539+100), will be prepared/reprepared thus have not been included in the data presented.

Chapter 5 on Land Use and Soils presents the distribution of agricultural, pasture and forest parcels within the expropriation corridor at the district-level within, as well as the land use types corresponding to the quarry and materials borrow sites.

In all PASs (see Appendix A), there are agricultural parcels owned/used by the PAPs within the expropriation corridor. Table 11-66 lists the settlements with the total agricultural land acquired more than 25 ha based on the expropriation plans.

Table 11-66. Settlements with Agricultural Land Acquisition of over 25 ha within the Expropriation Corridor

Section 1	Section 2	Section 3		Section 4			
		3a	3b	4a	4b	4c	4d
Ciftlikkoy, Emirdag, Afyonkarahisar (26.05 ha)	Susuz town municipality, Gokhan, Merkez, Afyonkarahisar (57.60 ha)	Kabaklar, Merkez, Usak (30.87 ha)	Toygarli, Alasehir, Manisa (29.41 ha)	Kapanci, Salihli, Manisa (25.31 ha)	Gokkaya, Ahmetli, Manisa (47.03 ha)	Yukaricoba nisa, Sehzadeler, Manisa (69.92 ha)	-
Eskiakoren, Emirdag, Afyonkarahisar (28.75 ha)	Susuz town municipality, Osmanli, Merkez, Afyonkarahisar, 30.87 ha)	Yapagilar, Merkez, Usak (45.99 ha)	Kemaliye, Alasehir, Manisa (26.01 ha)		Mustafa Kemal (former 8. Mintika and former 11. Mintika), Turgutlu, Manisa (41.62 ha)	Horozkoy, Yunusemre, Manisa (38.42 ha)	

Section 1	Section 2	Section 3		Section 4			
		3a	3b	4a	4b	4c	4d
Merkez town municipality, Buyuk, Bayat, Afyonkarahisar (30.39 ha)	Ismail, Merkez, Afyonkarahisar (26.11 ha)	Yavi, Merkez, Usak (25.28 ha)					
Seydiler town municipality, Cumhuriyet, Iscehisar, Afyonkarahisar (27.95 ha)	Guney, Sinanpasa, Afyonkarahisar (25.68 ha)	Uyukbasi, Ulubey, Usak (48.65 ha)					
Gebeceler town municipality, Fatih, Merkez, Afyonkarahisar (27.15 ha)		Inay, Ulubey, Usak (42.51 ha)					
		Ahmetler, Esme, Usak (30.35 ha)					

Table 11-67 lists the settlements with the affected forest parcels based on the expropriation plans. According to the available EPs, there is no forest parcels affected in Section 4.

Table 11-67. Settlements with Affected Forest Parcels within the Expropriation Corridor

Section 1	Section 2	Section 3	Section 3
		3a	3b
Yuregil, Emirdag, Afyonkarahisar (4.1 ha)	Calislar, Sinanpasa, Afyonkarahisar (2.71 ha)	Kabaklar, Merkez, Usak (0.00 ha)	Armutlu, Esme, Usak (7.40 ha)
Merkez town, Buyuk, Bayat, Afyonkarahisar (25.21 ha)		Karacaahmet, Ulubey, Usak (4.22 ha)	Caberler, Esme, Usak (1.14 ha)
Imralli, Bayat, Afyonkarahisar (0.38 ha)		Ahmetler, Ulubey, Usak (17.56 ha)	Manavli, Esme, Usak (10.61 ha)
Sagirli, Bayat, Afyonkarahisar (7.57 ha)			Davutlar, Esme, Usak (12.44 ha)
Seydiler town, Hasanbasri, Iscehisar, Afyonkarahisar (8.79 ha)			Narincali, Esme, Usak (10.91 ha)
Susuz town, Osmanli, Merkez, Afyonkarahisar (4.37 ha)			Battalmustafa, Kula, Manisa (3.52 ha)
			Carikballi, Kula, Manisa (3.98 ha)
			Konurca, Kula, Manisa (0.01 ha)
			Ismailbey, Alasehir, Manisa (5.81 ha)

Section 1	Section 2	Section 3
	3a	3b
		Serinkoy, Alasehir, Manisa (6.41 ha)
		Caberkamara, Alasehir, Manisa (3.53 ha)
		Aydogdu, Alasehir, Manisa (8.02 ha)
		Gumusday, Alasehir, Manisa (10.27 ha)
		Serinyayla, Alasehir, Manisa (10.44 ha)
		Cariktekk, Alasehir, Manisa (7.37 ha)
		Caberkakili, Alasehir, Manisa (1.05 ha)
		Isiklar, Alasehir, Manisa (6.33 ha)
		Selce, Alasehir, Manisa (8.47 ha)
		Tepekoy, Alasehir, Manisa (3.88 ha)
		Turkmen, Alasehir, Manisa (6.77 ha)

Table 11-68 lists the settlements with the affected pasture parcels based on the expropriation plans.

Table 11-68. Settlements with Affected Pasture Parcels within the Expropriation Corridor

Section 1	Section 2	Section 3		Section 4			
		3a	3b	4a	4b	4c	4d
Ankara, Polatli	Afyonkarahisar, Merkez	Usak, Banaz	Manisa, Alasehir	Manisa, Salihli			Manisa, Yunusemre
Yenice (8 ha)							
Gumuskaya (13.6 ha)	Erenler (0.9 ha)	Islam (1.5 ha)	Isiklar (0.2 ha)	Yilmaz (2.2 ha)			Muradiye (0.1 ha)
Beskopru (3 ha)	Ornek (0.2 ha)	Bagkonak (0.04 ha)	Matarli (0.1 ha)				
Kabakkoy (21.3 ha)	Fethibey (5 ha)	Bayatcik (0.2 ha)	Gullucam (0.3 ha)	Kasapli (2 ha)			
	Koprulu (1.9 ha)	Oksuz (9.2 ha)	Kizilcasogut (6.7 ha)				
Eskisehir, Gunyuzu	Afyonkarahisar, Sinapasa	Usak, Merkez	Manisa, Salihli				

Section 1	Section 2	Section 3		Section 4			
		3a	3b	4a	4b	4c	4d
Gumuskonak (53 ha)	Duzagac, Isik (24 ha)	Yapagilar (0.3 ha)	Torunlu (7.9 ha)				
Cakmak (19.5 ha)	Karacaoren (1.4 ha)	Hocalar (5.2 ha)	Yesliova (4.6 ha)				
Kayakent (97.6 ha)	Guney (8.1 ha)	Karahasan (0.1 ha)	Beylikli (2.1 ha)				
	Elvanpasa (0.1 ha)	Koseler (3.7 ha)	Mevlutlu (2.6 ha)				
	Calislar (0.4 ha)	Inay (0.1 ha)					
Eskisehir, Sivrihisar	Kutahya, Dumlupinar	Usak, Ulubey					
Yenidogan (50.3 ha)	Turgutozal (1 ha)	Koseler (3.7 ha)					
Goktepe (2.6 ha)	Zafer (0.7 ha)	Inay (0.1 ha)					
Ahiler (1.22 ha)	Ciftlik (8.1 ha)						
Kurtseyh (73.3 ha)	Buyuoturak (2.8 ha)						
Sigircik (45.2 ha)	Halaclar (4.4 ha)						
Afyonkarahisar, Emirdag		Usak, Esme					
Ciftlikkoy (16.8 ha)		Elvanlar (24.2 ha)					
Eskiakoren (22.8 ha)		Istasyon (24.6 ha)					
Karaagac (11.7 ha)							
Tabaklar (18.8 ha)							
Emirinkoyu (3 ha)							
Afyonkarahisar, Bayat							
Merkez, Buyuk (20.8 ha)							
Seydiler, Hasanbasri (3.5 ha)							
Kavak (0.02 ha)							

Expropriation of the affected lands and assets is done by the related governmental agency (this was TCDD for the past expropriation processes undertaken in the scope of the Project) in line with the provision and requirements of the Expropriation Law of Turkey (Law No. 2942, 1983). For the management of physical and economic displacement impacts of the Project-related land acquisition, RAP has been prepared in line with IFC PS5.

The indicative information on the number and area of affected parcels, number of PAPs (owners/shareholders) and number of affected buildings within the Expropriation Corridor is presented in Table 11-69. The table provides land acquisition related information per Project sub-sections for the Expropriation Corridor along the full HSR alignment, as summarised below:

- A) Number of Settlements (Villages/ Neighbourhood) Affected from Project-related Land Acquisition **(Total: 207)**
- B) Number of Parcels (with private, treasury, pasture, forest, etc. breakdown) **(Total: 11,326)**
- C) Area of Parcels (ha) (with private, treasury, pasture, forest, etc. breakdown) **(Total: 3,556.5 ha)**
- D) Number of PAPs (owners/shareholders) **(Total: 14,421)**
- E) Number of Buildings (with demolished and present breakdown) **(Total: 210)**

Table 11-69. Indicative Information on Number and Area of Affected Parcels, Number of PAPs (Owners/Shareholders) and Number of Affected Buildings within the Expropriation Corridor

Section	Sub-section		Start KM	End KM	Total Length of the Section (km)	Responsibility		A. Number of Settlements (Villages/ Neighbourhood) Affected from Project-related Land Acquisition	B. Number of Parcels							C. Area of Parcels (ha)							D. Number of PAPs (Owners/ Shareholders)	E. Number of Residential Buildings		
						Infrastructure	Superstructure, Electrification, Signalisation, Buildings, Facilities		Private	Treasury	Pasture	Forest	Public Legal Entity	Litigious (not related with Project)	Total	Private	Treasury	Pasture	Forest	Public Legal Entity	Litigious (not related with Project)	Total		Demolished	Present	Total
Distribution in terms of Number and Area																										
Section 1	-	Polatli-Afyon	0+000.000	151+500.000	151.2	Contractor (ERG-SSB)	Contractor	47	2119	287	157	21	380	3	2967	574.7	158.7	486.3	46.1	42.6	0.3	1308.7	3370	36	2	38
Section 2	(2a)	Afyon-Hatipler Passage	151+500.000	230+370.612	90.3	Contractor (ERG-SSB)	Contractor	43	2123	201	178	2	233	0	2737	395.2	58.9	59.0	7.1	39.5	0.0	559.6	4286	13	1	14
	(2b)	Hatipler-Passage	267+156.053	278+632.464		Contractor (ERG-SSB)	Contractor	4																		
Section 3	(3a)	Banaz-Esme	279+000.000	364+600.000	159.9	AGA Energy	Contractor	31	1669	304	54	22	10	3	2062	500.2	55.0	56.1	21.8	0.5	6.6	640.2	2319	10	46	56
	(3b)	Esme-Salihli	364+600.000	438+918.726		Bayburt Grup + Kolin JV	Contractor	40	907	226	29	43	77	0	1282	306.7	36.4	39.5	128.4	8.8	0.0	519.7	1094			
Section 4	(4a)	Salihli-Manisa	439+000.000	456+500.000	101.8	NAS+ Budakyol JV	Contractor	9	1308	17	2	0	245	0	1572	353.5	4.3	2.2	0.0	39.0	0.0	399.0	1162	7	11	18
	(4b)		456+500.000	501+000.000		Contractor (ERG-SSB)	Contractor	15															1308	4	28	32
	(4c)	Manisa North Passage	501+000.000	514+983.302		Contractor (ERG-SSB)	Contractor	5	278	5	0	0	79	1	363	100.3	1.3	0.0	0.0	7.0	0.2	108.9	503	0	37	37
	(4d)	Manisa-Menemen	522+100.000	547+805.481		AGA Energy	Contractor	13	243	57	1	0	42	0	343	16.9	1.8	0.1	0.0	1.6	0.0	20.5	379	0	15	15
Total					503.2			207	8647	1097	421	88	1066	7	11326	2247.4	316.4	643.2	203.3	139.1	7.1	3556.5	14421	70	140	210
Distribution in terms of Percentages																										
Section 1	-	Polatli-Afyon	0+000.000	151+500.000	151.2	Contractor (ERG-SSB)	Contractor	47	18.7	2.5	1.4	0.2	3.4	0.0	26.2	16.2	4.5	13.7	1.3	1.2	0.0	36.8	23.4	17.1	1.0	18.1
Section 2	(2a)	Afyon-Hatipler Passage	151+500.000	230+370.612	90.3	Contractor (ERG-SSB)	Contractor	43	18.7	1.8	1.6	0.0	2.1	0.0	24.2	11.1	1.7	1.7	0.2	1.1	0.0	15.7	29.7	6.2	0.5	6.7
	(2b)	Hatipler-Passage	267+156.053	278+632.464		Contractor (ERG-SSB)	Contractor	4																		
Section 3	(3a)	Banaz-Esme	279+000.000	364+600.000	159.9	AGA Energy	Contractor	31	14.7	2.7	0.5	0.2	0.1	0.0	18.2	14.1	1.5	1.6	0.6	0.0	0.2	18.0	16.1	4.8	21.9	26.7
	(3b)	Esme-Salihli	364+600.000	438+918.726		Bayburt Grup + Kolin JV	Contractor	38	8.0	2.0	0.3	0.4	0.7	0.0	11.3	8.6	1.0	1.1	3.6	0.2	0.0	14.6	7.6			
Section 4	(4a)	Salihli-Manisa	439+000.000	456+500.000	101.8	NAS+ Budakyol JV	Contractor	9	11.5	0.2	0.0	0.0	2.2	0.0	13.9	9.9	0.1	0.1	0.0	1.1	0.0	11.2	8.1	3.3	5.2	8.6
	(4b)		456+500.000	501+000.000		Contractor (ERG-SSB)	Contractor	15															9.1	1.9	13.3	15.2
	(4c)	Manisa North Passage	501+000.000	514+983.302		Contractor (ERG-SSB)	Contractor	5	2.5	0.0	0.0	0.0	0.7	0.0	3.2	2.8	0.0	0.0	0.0	0.2	0.0	3.1	3.5	0.0	17.6	17.6
	(4d)	Manisa-Menemen	522+100.000	547+805.481		AGA Energy	Contractor	14	2.1	0.5	0.0	0.0	0.4	0.0	3.0	0.5	0.1	0.0	0.0	0.0	0.0	0.6	2.6	0.0	7.1	7.1
Total					503.2			206	76.3	9.7	3.7	0.8	9.4	0.1	100.0	63.2	8.9	18.1	5.7	3.9	0.2	100.0	100.0	33.3	66.7	100.0

(*) The buildings in Section 3 and 4d may include structures that are used for non-residential purposes (e.g. Depot, animal shelter, cottage, etc.). Further surveys will be conducted to identify the actual use of the buildings.

The results of the HHQs and CLQ conducted by the social team as part of the ESIA are presented below.

11.4.4.1. Agricultural Lands and Activities

In all PASs (see Appendix A), there are agricultural parcels owned/used by the PAPs within the expropriation corridor. List of settlements with the total agricultural land acquired more than 25 ha based on the expropriation plans are presented in Table 11-66. The engineering structures providing continuity of access between the fragmented agricultural parcels (viaducts, overpasses, underpasses, culverts) is presented in Chapter 1.

As it is seen in Table 11-70, 56.4% of the respondents engaged in agriculture think that their agricultural activities are affected or will be affected negatively by the Project.

Table 11-70. Potential for Negative Impacts on Agricultural Activity due to the Project

Responses	Frequency	Percent
Yes	88	56.4
No	68	43.6
Total	156	100.0

Source: ESIA Field Study, HHQ, February 2021.

Based on the responses received from the PAPs on their past experiences with Project impacts on agricultural lands and activities, the current and potential negative impacts of the Project are anticipated to be as presented in Figure 11-8.

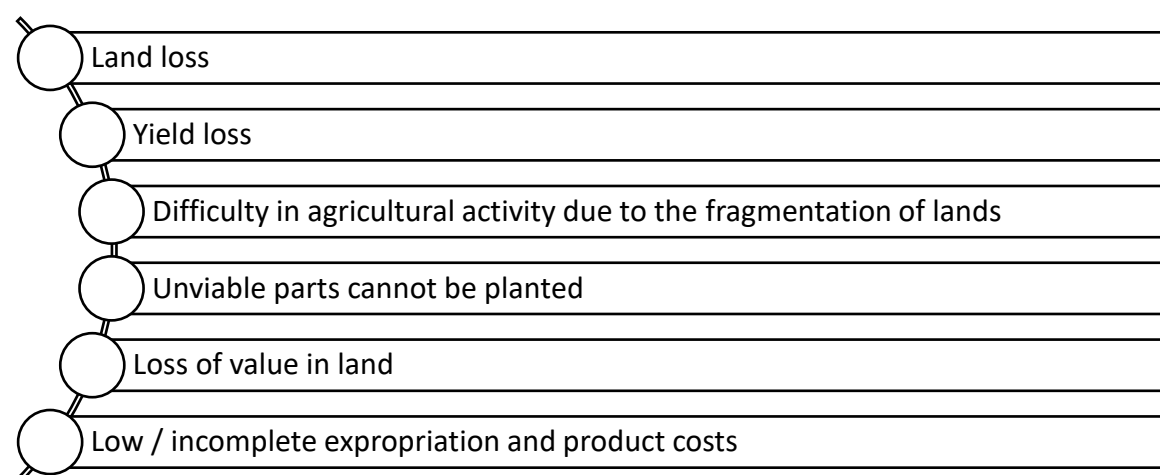


Figure 11-8. Adverse Impacts of the Project on Agricultural Activities

The RAP prepared for the Project in line with IFC PS5 will address the management of Project impacts on agricultural activities and livelihoods.

11.4.4.2. Pasture Lands and Animal Husbandry

List of the settlements with the affected pasture parcels based on the expropriation plans is presented in Table 11-66. The engineering structures providing continuity of access between the fragmented forest parcels (viaducts, overpasses, underpasses, culverts) is presented in Chapter 1.

The most important impact on livestock activity is on pasturelands, as frequently mentioned by PAPs. The main impacts are due to:

- (1) Reduced size of the pasture lands available for livestock activity
- (2) Restricted access to pasturelands due to impact of construction on access roads

According to HHQs, the pasture lands used by the households are affected by the Project at a rate of 65.5% (see Table 11-71).

Table 11-71. Affected Status of Pastures by the Project

Responses	Frequency	Percent
Yes	57	65.5
No	28	32.2
Do not know	2	2.3
Total	87	100.0

Source: ESIA Field Study, HHQ, February 2021.

The types of impacts on pasture lands as experienced/anticipated by PAPs are listed in Table 11-72.

Table 11-72. Types of Impacts on Pasture Lands according to PAPs

Types of Impacts	Number of PAPs
Shrinking of pastures	35
Cutting access to pasture	19
Access to rangeland is difficult	37
We'll lose our point	1
Adversely affected by the Project activities of the animals in the pasture	1
Total	93

Source: ESIA Field Study, HHQ, February 2021.

According to the statements of mukhtars, the pasture lands of the villages listed below (Table 11-73) are affected by the Project.

Table 11-73. List of Pasture Affected PASs

Settlement	District	Province	Are there any impacted pasture lands?
Cumhuriyet (Seydiler town)	Iscehisar	Afyonkarahisar	Yes
Hurriyet (Merkez town)	Bayat	Afyonkarahisar	Yes
Cumhuriyet (Merkez town)	Bayat	Afyonkarahisar	Yes
Yeni (Merkez town)	Bayat	Afyonkarahisar	Yes
Buyuk (Merkez town)	Bayat	Afyonkarahisar	Yes
Cakmak	Gunyuzu	Eskisehir	Yes
Kayakent	Gunyuzu	Eskisehir	Yes
Sagirli	Bayat	Afyonkarahisar	Yes
Beskopru	Polatli	Ankara	Yes
Karaagac	Emirdag	Afyonkarahisar	Yes
Adayazi	Emirdag	Afyonkarahisar	Yes
Asagicobanisa	Sehzadeler	Manisa	Yes
Durasilli	Salihli	Manisa	Yes
Gumuskonak	Gunyuzu	Eskisehir	Yes
Fatih (Gebeceler town)	Merkez	Afyonkarahisar	Yes
Yuregil	Emirdag	Afyonkarahisar	Yes
Yenidogan	Sivrihisar	Eskisehir	Yes
Karayatak	Emirdag	Afyonkarahisar	Yes
Eskiakoren	Emirdag	Afyonkarahisar	Yes
Yenice	Polatli	Ankara	Yes
Kurtseyh	Sivrihisar	Eskisehir	Yes
Gumusyaka	Polatli	Ankara	Yes
Ilyaspasa	Sivrihisar	Eskisehir	Yes
Gokhan (Susuz town)	Merkez	Afyonkarahisar	Yes
Bulca	Sinanpasa	Afyonkarahisar	Yes
Fatih	Merkez	Afyonkarahisar	Yes
Ciftlik	Banaz	Usak	Yes
Bayatcik	Merkez	Afyonkarahisar	Yes

Settlement	District	Province	Are there any impacted pasture lands?
Turgut Ozal	Dumlupinar	Kutahya	Yes
Huzur (Cayirbag town)	Merkez	Afyonkarahisar	Yes
Hasalan	Salihli	Manisa	Yes
Calislar	Sinanpasa	Afyonkarahisar	Yes
Koprulu	Merkez	Afyonkarahisar	Yes
Isik (Duzagac Town)	Sinanpasa	Afyonkarahisar	Yes
Ataturk	Salihli	Manisa	Yes
Mevlutlu	Salihli	Manisa	Yes
Zafer (Duzagac town)	Sinanpasa	Afyonkarahisar	Yes
Yavuz Selim	Merkez	Afyonkarahisar	Yes
Yilmaz	Salihli	Manisa	Yes
Kabakkoy	Polatli	Ankara	Yes
Goktepe	Sivrihisar	Eskisehir	Yes
Sigircik	Sivrihisar	Eskisehir	Yes

Source: ESIA Field Study, CLQ, February 2021.

11.4.4.3. Forests and Benefiting Natural (Wood and Non-wood) Products

List of the settlements with the affected forest parcels based on the expropriation plans is presented in Table 11-68. The engineering structures providing continuity of access between the fragmented forest parcels (tunnels, viaducts, overpasses, underpasses, culverts) is presented in Chapter 1.

Livelihood activities in forests may be adversely affected by investment projects due to barriers to passage and reduced forest area. These activities can be for economic income or household consumption.

20 PAPs who take wood and non-wood natural products (cones, mushrooms, and herbs) from forests were asked whether these forests were affected by the Project and 55% of them answered "yes" (see Table 11-74).

Table 11-74. Affected Status of the Forest by the Project

Responses	Frequency	Percent
Yes	11	55.0
No	9	45.0
Total	20	100.0

Source: ESIA Field Study, HHQ, February 2021.

When asked about the experience or expectation that the benefiting activity will be adversely affected by the Project's land acquisition, half of the PAPs responded positively and half negatively (see Table 11-75).

Table 11-75. Affected Status of the Forest Beneficiary Activity from the Project

Responses	Frequency	Percent
Yes	6	50.0
No	6	50.0
Total	12	100.0

Source: ESIA Field Study, HHQ, February 2021.

The PASs with the forests declared to be affected by the Project are listed in Table 11-76 below.

Table 11-76. List of Forest Affected PASs

Settlement	District	Province	Is there any impacted forestlands?
Cumhuriyet (Seydiler town)	Iscehisar	Afyonkarahisar	Yes
Hasan Basri (Seydiler town)	Iscehisar	Afyonkarahisar	Yes
Hurriyet (Merkez town)	Bayat	Afyonkarahisar	Yes
Cumhuriyet (Merkez town)	Bayat	Afyonkarahisar	Yes

Settlement	District	Province	Is there any impacted forestlands?
Yeni (Merkez town)	Bayat	Afyonkarahisar	Yes
Uzunburun	Yunus Emre	Manisa	Yes

Source: ESIA Field Study, CLQ, February 2021.

11.4.4.4. Beekeeping

Beekeeping is among the livelihoods of the region. In Table 11-77, the settlements with beehive owners are listed and the current number of hives are presented. The dust and noise impact of the Project can have adverse impact on beehives. Measures described in Chapter 6 ("Noise and Vibration") and Chapter 7 ("Air Quality and GHG Emissions") will be implemented to mitigate potential impacts on beekeeping.

Location of beehives in the vicinity of the quarries, where blasting is to be practiced, will be identified by the Contractor prior to start of quarry operations. The local communities will be communicated and consulted through the implementation of SEP, and if necessary, measures will be planned and implemented in agreement with the beehive owners.

In addition, efficient use of SEP and GRM, and continuous openness of stakeholder engagement channels are important.

Table 11-77. PASs Having Beehives

Settlement	District	Province	Number of Beehive-owner Households	Number of Hives
Cumhuriyet	Bayat	Afyonkarahisar	1	20
Kayakent	Gunyuzu	Eskisehir	4	150
Adayazi	Emirdag	Afyonkarahisar	2	10
Yeni	Bayat	Afyonkarahisar	1	30
Ciftlikkoy	Emirdag	Afyonkarahisar	3	5
Yenice	Polatli	Ankara	1	50
Buhara	Sivrihisar	Eskisehir	5	60
Gumusyaka	Polatli	Ankara	1	15
Alicetinkaya	Merkez	Afyonkarahisar	1	Unknown
Total			19	340

Source: ESIA Field Study, CLQ, February 2021.

11.4.4.5. Assets on Land and Houses

According to the expropriation plans prepared for the entire railway route, there are buildings and structures affected/will be affected from the railway construction. It should be noted that part of these buildings and structures had already been affected from the construction (infrastructure and/or superstructure) works conducted by the previous contractors and expropriation fees were paid by the TCDD for the past processes.

Based on the SIRs and EPs, the structures affected by the land acquisition of the Project is categorised as below:

- Residential buildings
- Structures with potential commercial use
- Non-residential structures
- Commonly using assets

Residential Buildings

For the identification buildings affected from the Project-related land acquisition, the following approach has been followed:

- (i) Structure Identification Reports (SIRs) have been used whenever available for the settlements (SIRs are prepared after approval the of Expropriation Plans (EPs) within the entire process). Please note that there were several settlements for which SIRs are not available (they may either be not prepared or not shared by the TCDD with the Contractor)
- (ii) Expropriation Plans (EPs) have been used when (i) is unavailable (which is the case for several settlements in this Project). The settlements for which expropriation plans have not been prepared yet (they are limited in number) are listed within the ESIA (in Chapter 1 and Chapter 11)
- (iii) Buildings not covered in the SIRs and EPs have been identified through Google Earth images and GIS analyses (at this stage, this has been completed on for Section 1, Section 2, Section 4b, and Section 4c. Identification process is ongoing for Section 3a, Section 3b, Section 4a, and Section 4d is ongoing, as of the beginning of May 2021)

In May 2021, RAP surveys targeting full census of the affected residential buildings was conducted in Section 1, 2, 4a, 4b, and 4c.

It should be noted that EPs have not been prepared yet or will be reprepared for certain parts of the HSR. Once the EPs and the subsequent SIRs are prepared, information on the number of affected parcels, buildings and PAPs will be updated in the post financial close period of the Project.

As summarised below, the RAP surveys of May 2021 consisted of the surveys with the settlement heads and surveys with the households affected/to be affected from the Project-related physical displacement:

- 1) Surveys with the settlement heads to identify the status of affected buildings
 - a. Status of buildings (residential or non-residential; demolished or present)
 - b. Contact information of the households affected from the physical displacement
- 2) Surveys with the households affected from physical displacement
 - a. Information on the user of the residential building (owner or formal/informal user)
 - b. Status of evacuation of the residential building
 - c. Type of residency (permanent or seasonal)
 - d. Information on the house characteristics (construction material, number of rooms)
 - e. Resettlement location (in the same settlement, in another settlement)
 - f. Post resettlement conditions of the households
 - g. Compensation payments (amount and utilisation method)
 - h. Socio-economic conditions of the affected households

The RAP surveys targeted for full census of the households affected from the Project-related physical displacement in the surveyed settlements. To this end, the survey design has followed the following steps:

- The social team, led by a senior social expert (sociologist; academician at the Medipol University in Ankara), has initially designed the RAP surveys based on the list of affected buildings compiled within the ESIA Report. This initial design included a total of 130 buildings (54 demolished and 76 present) in Section 1, Section 2 and Section 4 (excluding Section 4d) in 25 settlements (village/neighbourhood).
- The expropriation works in Section 4c (Manisa North Passage) have not started as of Q2 2021. According to satellite images, there are 34 buildings within the expropriation corridor in Section 4c (in Horozkoy neighbourhood). During the design of the RAP surveys, the Contractor informed that the owners/users of the buildings within the expropriation corridor in this section have not been notified by the authorities as the expropriation process as per the Expropriation Law (Law No: 2942, 1983) has not started and there is potential for a route change (subject to approval by the Employer) in this section to avoid physical displacement. Thus, Section 4c has been excluded from the RAP surveys of May

2021 and will be addressed in an updated RAP (RAP Addendum) once the expropriation plans for this section are finalised by the Employer. With the omission of the buildings located in Section 4c (in Horozkoy neighbourhood), the number of buildings to be covered in the RAP survey of May 2021 has been reduced to 96 (from 130).

- The following parts of the route have not been included in the survey design as expropriation plans as the expropriation plans, identifying the affected parcels and owners/shareholders, were not in place as of Q2 2021:
 - Hatipler Relocation in Section 2 (KM 267+156.053-278+632.464)
 - Ankara-Konya HSR Connection Line in Section 1 (7+800; 0+000-6+683.120)

In April 2021, the Presidency of the Republic of Turkey has announced full lockdown and COVID-19 related restrictions that will be applicable across the whole country from 29 April 2021 to 17 May 2021. This included intercity travel restrictions as well. Therefore, the RAP surveys of May 2021 have been conducted by the social team remotely (through telephone calls) between 8 May 2021 and 17 May 2021.

During the surveys, the list of affected parcels, including the names of the owners/shareholders where available, has been used to guide the settlement heads to understand the affected buildings and provide the contact information of the owners/users of the buildings. Where necessary and feasible, the social team sent images of the affected buildings to the mobile phones of the settlement heads to help them understand the exact location of the affected buildings. In certain circumstances when the settlement heads did not have information on the past expropriation processes and the owners/users of the buildings, they directed the social survey team to other local community representatives (elderly community members, etc.) who are acquainted with the process and affected households. Besides the 96 buildings included in the initial RAP survey design, the social survey team, through the settlement head surveys, has identified additional buildings affected from the Project-related land acquisition.

Consequently, the RAP surveys of May 2021 targeted to reach out the owners/user of 111 buildings. Summary of the targeted and achieved RAP surveys of May 2021 is presented in Table 11-78.

Through the best efforts of the social team;

- 25 community level questionnaires (CLQs) were conducted with the head of the settlements where the affected buildings are located.
- 27 buildings included in the initial RAP survey design based on the EPs/SIRs and satellite image analyses have been identified as non-residential structures thus excluded from the household surveys. Thus, the number of residential buildings to be targeted in the RAP surveys have been revised as 84.
- Among the 84 residential buildings,
 - Owners/users of the 44 residential buildings were contacted and household level questionnaires (HHQs) were conducted with the representatives of these households affected from Project-related physical displacement. These 44 residential buildings were covered in 43 surveys, as there were 2 demolished buildings on Parcel 0/1943 (Afyonkarahisar, Sinanpasa, Balmahmut near KM 182+433).
 - Owners/users of the 40 residential buildings could not be reached⁸¹ (unreachable) despite the best efforts of the social team. The unreachable cases included the following:
 - The cases in which the head of the settlement head could not identify the name of the owners/users of the affected buildings based on the lot/parcel information
 - The cases in which the head of the settlement head did not have the contact information of the owners/users of the affected buildings.

⁸¹ The social survey team observed and noted during the surveys that part of the settlement heads/households were hesitant to collaborate and provide information on the expropriation processes completed in the previous Project stages potentially due to unjustified fears around a follow-up process that may lead them to pay back the compensation money they received in the past.

- The cases in which the settlement head did not recognise the names of the owners/users of the affected buildings potentially due to discrepancies in the EPs/SIRs or modifications done in the administrative borders of the settlements in the post EP/SIR period (i.e. the lot/parcels indicated to be located in Ornek neighbourhood in Afyonkarahisar, Merkez as per the EPs/SIRs are not located within the current administrative boundaries of this settlement)
- The cases in which the owner/user of the affected buildings were not accessible through the phone numbers provided by the settlement heads.

Table 11-78. Summary of the RAP Surveys of May 2021

Data Collection Tool	Target Group	Sampling Strategy	Total Interviews	
			Targeted	Achieved
Community Level Questionnaire (CLQ)	Mukhtars of the settlements with affected buildings (in Section 1, 2, and 4a, 4b, and 4c; excluding Horozkoy in Manisa ⁸²)	Full census (targeted)	25 CLQs	25 CLQs
Household Questionnaires (HHQs)	Owners/users of the affected residential building in Section 1, 2 and 4a, 4b and 4c	Full census (targeted)	84 HHQs	43 HHQs (representing 44 buildings)

The number of residential buildings affected from Project-related land acquisition resulting in physical displacement impacts (loss of houses owned/used by households for residential purposes) along the full Project alignment are listed in Table 11-79. The information provided is based on the Structure Identification Reports (SIRs) (where available), Expropriation Plans (EPs), most recent satellite Imagery (for buildings not covered in the SIRs and EPs, and RAP Surveys of February and May 2021 (to verify the analyses done based on above sources for Section 1, Section 2, Section 4a, 4b and 4c).

Table 11-79. List of Affected Residential Buildings

Section	Settlement	Settlement-based		Section-based	
		Demolished	Present	Demolished	Present
Section 1	Yenice	2	0	36	2
	Merkez	3	1		
	Emirinkoyu	0	0		
	Yuregil	4	0		
	Seydiler	27	1		
Section 2	Akcın	1	0	13	1
	Beyyazi belediyesi Ornek mah	7	0		
	Inaz (Demircevre)	0	0		
	Balmahmut	3	0		
	Elvanpasa	1	0		
	Duzagac	1	1		
Section 3	Banaz Village	0	1	10	46
	31 Agustos	0	2		
	Islam	2	28		
	Bagkonak	0	2		
	Gullucam	0	1		
	Istasyon	2	2		
	Yapagilar	0	1		
	Koyunbeyli	0	1		
	Inay	2	1		
	Kasapli	0	5		
	Yesilova	0	1		
	Karaoglanli	4	1		
Section 4	Ataturk	0	0	9	93
	Beseylul	1	0		
	Gaziler	1	1		
	Kapanci	0	0		
	Yilmaz	1	2		

⁸² The Contractor informed that the owners/users of the buildings within the expropriation corridor in this section have not been notified by the authorities as the expropriation process as per the Expropriation Law.

Section	Settlement	Settlement-based		Section-based	
		Demolished	Present	Demolished	Present
	Zafer	0	3		
	Kirveli	2	7		
	Ahmetli	1	0		
	Yarasli	0	3		
	Gokkaya	0	1		
	Albayrak (former 2. Mintika)	2	7		
	Derbent	0	2		
	Istasyonalti	0	2		
	Mustafa Kemal (former 8. and 11. Mintika)	1	7		
	Urganli	0	0		
	10. Mintika	0	1		
	4. Mintika	0	1		
	8. Mintika	0	2		
	11. Mintika	0	2		
	Asagicobanisa	0	1		
	Sehitler	0	1		
	Yukaricobanisa	0	1		
	Horozkoy	0	34		
	Muradiye	0	5		
	Uzunburun	0	2		
	Emiralem	0	8		
Total		68	142	68	142
Grand Total		210		210	

As explained in Chapter 3, Hatipler Relocation has been introduced to the Project design to avoid physical displacement that was to be caused according to the previous route. There are 34 present buildings identified in Horozkoy settlement in Section 4c (Manisa North Passage) based on Google Earth imagery.

Structures with Potential Commercial Use

In addition, to the residential buildings, structures with potential commercial use have been identified based on SIRs and EPs, as listed in Table 11-80. These structures are considered and compensated as part of the valuation process conducted as per the Expropriation Law of Turkey (Law. No. 2942, 1983). Where applicable, depreciation is deducted for the structures (e.g. dairy farms - mandira)

Part of the structures might be potentially used by households to support agricultural and livestock activities. There are also greenhouses (present or affected) identified within the expropriation corridor in Section 3 and 4, which will be covered in future social surveys to be conducted as part of RAP updates.

Table 11-80. List of Structures with Potential Commercial Use

Section	Sub-section	Province	District	Neighbourhood/Village	Total No- of Buildings	Building Status (per Settlement)		Closest Railway KM Chainage	Lot/ Parcel No	Structure Type	Status of Structure(s)	Impact Status of the Structures
						Demolished	Present					
Section 2	(2a)	Afyonkarahisar	Sinanpasa	Balmahmut	3	0	1	181+900	0/1946 (former 0/530)	Masonry farmhouse	Present	>20%
						0	1	182+900	0/1948 (former 0/532)	Masonry dairy farm	Present	50%
						0	1	182+100	0/1899 (former 0/1677)	Dairy farm	Present	50%
Section 3	(3b)	Usak	Banaz	31 Agustos Islam	1	0	1	279+100	25/1	Dairy farm	Present	100%
					5	0	1	282+300	53/65	Dairy farm	Present	<20%
						2	0	282+720	64/10	Dairy farm	Demolished	100%
						1	0	282+750	64/13	Greenhouse	Relocated/ Demolished	50%
				Bagkonak		1	0	282+800	65/19	Greenhouse	Relocated/ Demolished	100%
					5	1	0	280+000	107/242 (former 107/50)	Greenhouse	Relocated/ Demolished	50%
						2	0	280+300	107/216 107/215 (former 107/29)	Greenhouse	Relocated/ Demolished	>20%
						2	0	280+300	107/218 (former 107/30)	Greenhouse	Relocated/ Demolished	100%
		Manisa	Salihli	Eşme	4	0	4	355+000	181/34	Farmhouse	Present	<20%
				Ulubey	2	2	0	342+521	0/5924 (former 0/5834)	Greenhouse	Relocated/ Demolished	100%
				Karaoglanli	1	0	1	436+800	103/31 103/7 (former 0/564)	Dairy farm	Present	100%
				Kirveli	1	0	1	438+700	4187/72 4187/121	Tile and Brick	Present	<20%

Section	Sub-section	Province	District	Neighbourhood/Village	Total No- of Buildings	Building Status (per Settlement)		Closest Railway KM Chainage	Lot/ Parcel No	Structure Type	Status of Structure(s)	Impact Status of the Structures
Section 4	(4a)	Manisa	Salihli	Hasalan	1	1	0	447+600	0/1058	Greenhouse	Production Factory ⁸³ Fragmented (partial loss on the footprint; rest present)	> 20%
	(4b)		Turgutlu	Albayrak (former 2. Mintika)	4	0	2	479+900	80/31	Dairy farms	Present	100%
					2	0	0	480+300	81/41	Dairy farms	Demolished	100%
				Mustafa Kemal (former 8. 1 and 11. Mintika)	1	0	1	481+800	35/101	Dairy farm	Present	50%
	(4d)	Manisa	Yunusemre	Muradiye	3	3	0	526+200	0/5625	Greenhouse	Relocated/ Demolished	100%
		Izmir	Menemen	Telekler	1	0	1	535+100	0/352	Greenhouse	Present	>20%
		Izmir	Menemen	Degirmendere	10	0	1	539+200	0/802	Greenhouse	Present	>20%
						0	1	539+700	0/693	Greenhouse	Present	100%
						1	0	539+500	0/704	Greenhouse	Relocated/ Demolished	50%
						0	6	540+000	0/40	N/A		-
						0	1	541+450	0/979	N/A	Present	100%
								541+700				
				Emiralem	1	0	1	542+300	0/941	Greenhouse	Present	0%
Total					43	18	25					

⁸³ According to the most recent satellite imagery, the construction works in the surroundings of this factory has been conducted but the factory buildings which were originally within the expropriation corridor have not been demolished.

In HHQ implementation, the rate of ownership of immovable assets affected by the Project is 13.1% due to the deliberate inclusion of people whose homes are affected (see Table 11-81). If purposefully selected houses are excluded, the rate becomes 4.2%.

Table 11-81. PAPs Whose Immovable Assets on the Land are Affected by the Project

Impact Status	Frequency	Percent
Affected	30	13.1
Not Affected	199	86.9
Total	229	100.0

Source: ESIA Field Study, HHQ, February 2021.

Considering the status of the houses affected by the Project, different displacement stages are observed in places where construction works have started and where they are not. According to Table 11-82, most of the impacted houses were demolished (57.14%). There are also impacted houses which the official process has not started (14.28%) or are in the process of lawsuit (9.52%). Project revision is made especially in Hatipler Passage, where houses were located on the previous route, which is not included in Table 11-82.

Table 11-82. Status of the Houses Affected by the Project

Expropriation Status	Frequency	Percent
Expropriated and demolished	12	57.14
Expropriated, emptied but not demolished	3	14.28
Expropriated but we have not yet emptied	1	4.76
We heard that it will be expropriated, but no action has been initiated yet.	3	14.28
The case is ongoing	2	9.52
Total	21	100.00

Source: ESIA Field Study, HHQ, February 2021.

The HHQ respondents were mostly people who are/were the residents of these houses (76%).

It should be noted that, official list of affected/to be affected buildings by the Project has not been available in the course of this ESIA study (through the land acquisition related archives of the TCDD or the land acquisition database of the Contractor as of Q2 2021) and local revisions are/can be done by the TCDD on the route during the site implementation stage to leave the buildings out of the construction corridor (to avoid physical displacement) even though they were initially located within the expropriation corridor of the Project. Thus, exact number of residential and commercial buildings affected/to be affected by the Project and their official registration status is to be verified by the Contractor in due course. With regard to the route for which infrastructure responsibility belong to the Contractor, it is estimated that majority of the buildings located within the expropriation corridor of Section 1 and Section 2 have already been affected/demolished, whilst part of the buildings in Section 4 are still to be affected by the infrastructure works to be conducted by the Contractor once the Construction Contract executed with the AYGM becomes effective. Number of residential and commercial buildings affected/to be affected within the land acquisition corridor of the route for which infrastructure responsibility belong to Contractor, will further be clarified in the RAP to be prepared for the Project.

Expropriation of affected assets were conducted by TCDD as per the provisions and requirements of the Expropriation Law (Law No. 2942, 1983). Depreciation has been deducted from the expropriation costs paid to all households subjected to physical displacement. For the management of physical displacement impacts of the Project-related land acquisition in line with the requirements of IFC PS5, a stand-alone RAP has been prepared.

11.4.5. Impacts on Vulnerable Groups

Vulnerable people may face with disadvantages during the land acquisition and construction processes, as they may not be able to access to the following as other PAPs:

- Information on the Project,
- Stakeholder engagement activities to be undertaken by the Contractor throughout the land acquisition and construction process,
- Project grievance mechanism,
- Mitigation measures to be provided through implementation of E&S management plans,
- Measures to be provided through implementation of the RAP, and
- Project benefits

In interviews with 28 vulnerable individuals, they were asked whether past construction activities have created any difficulties in their daily lives, and the answers listed in Table 11-83 have been received. Most vulnerable PAPs reported no difficulties.

Table 11-83. Vulnerable Individuals Experiencing Difficulties with the Project

Difficulty Experiences	Number of vulnerable PAPs
I did not have any difficulties	18
I had difficulty	5
Construction has not started yet	5
Total	28

Source: ESIA Field Study, Interviews with vulnerable PAPs, February 2021.

The concerns of vulnerable PAPs, who stated that the Project caused difficulties in their lives, are presented in Table 11-84. Vulnerable individuals have similar complaints as the rest of the community. However, for example, access barriers or dust-noise pollution can affect them more adversely than other individuals.

Table 11-84. Statements of Vulnerable PAPs Stating that Their Life Is Getting Harder due to Project Activities

Province	District	Settlement	Type of Vulnerability	Explanation
Afyonkarahisar	Sinanpasa	Elvanpasa	Elderly	"My house where I went and stayed in the summer and spent a lot of money to build is gone. It was important for us to go there at least in the summer and spend time there as a family."
Afyonkarahisar	Emirdag	Ekizce	Elderly	"Access to the fields has become difficult. They built a road, a bridge, but left it incomplete."
Manisa	Sehzadeler	Asagicobannisa	Elderly	"The Project will reduce the yield and create problems in the agricultural activities of the people."
Afyon	Sinanpasa	Akdegirmen	Person with disability	"We were disturbed by dust, noise and truck traffic."
Ankara	Polatli	Turktaciri	Female head of household	"We were disturbed by the dust from truck traffic."

Source: ESIA Field Study, Interviews with vulnerable PAPs, February 2021.

According to statements of vulnerable PAPs in response to the question on their life getting harder due to Project activities, potential impacts on vulnerable groups have been identified as follows;

- (1) deterioration of living conditions and habits,

(2) economic displacement.

The SEP and RAP will be implemented, together with the specialised measures to be developed for the vulnerable groups, to mitigate Project's potential adverse impacts on them and enhance Project benefits. The list of vulnerable persons identified through the ESIA surveys is kept in the Project database, and will be updated as necessary throughout the Project.

Vulnerable individuals were also asked whether they expect any adversely impact from the Project activities in the future, and the following answers have been received (see Table 11-85).

Table 11-85. Vulnerable Individuals Anticipating Difficulties Related to the Project

Impact Expectation	Number of Vulnerable PAPs
No	8
Yes	16
I don't know	4
Total	28

Source: ESIA Field Study, Interviews with vulnerable PAPs, February 2021.

The statements of vulnerable PAPs who think that Project activities will create difficulties in their lives and their suggestions regarding mitigation measures are presented below in Table 11-86.

Table 11-86. Statements of Vulnerable PAPs Stating that Their Life Will Be Difficult due to Project Activities

Province	District	Settlement	Type of vulnerability	Impact explanation	Mitigation measure Suggested by the PAP
Afyon karahisar	Sinanpasa	Elvanpasa	Elderly	"It will not be possible to build a place like my destroyed summer house again."	No suggestion
Afyon karahisar	Merkez	Erenler	Woman	"The irrigation system will be damaged. For this reason, it will be difficult for people who practice irrigated farming like me."	No suggestion
Manisa	Sehzadeler	Asagi cobannisa	Woman	"When the construction activities start, dust and construction equipment may cause disturbance in the village."	"They should pay attention to their working hours and construction machines should not be used inside the village."
Manisa	Sehzadeler	Asagi cobannisa	Elderly	"It will disrupt the roads, access to the fields will be difficult, the irrigation system will be damaged, so we will have to make additional spending."	"The project is not necessary"
Manisa	Sehzadeler	Yukari cobannisa	Elderly	"Construction can disturb the order of the village. Not yet, but my house that I used in the summer will be demolished. This situation will disrupt my order that I have established for years."	"Construction could start in October when agricultural activity is less"
Manisa	Turgutlu	Derbent	Elderly	"First of all, our access to pastures will be difficult. We will have to go further to graze our animals. It will hinder the jobs of those employed in agriculture."	"The train line should change."
Manisa	Salihli	Mersindere	Woman	"The project would be good for the country. However, during construction, the crop becomes dusty and agricultural income decreases."	"Construction should start in October. Then the crops are less affected."
Manisa	Salihli	Zafermevzi	Elderly	"My house has been expropriated and will be demolished. For this reason, we	

Province	District	Settlement	Type of vulnerability	Impact explanation	Mitigation measure Suggested by the PAP
				will build a new house by making additional costs. Of course, our established order will be disrupted."	
Afyonkarahisar	Sinan pasa	Balmahmut	Woman	"There will be dust."	No suggestions
Afyonkarahisar	Sinanpasa	Duzagac	Person with disability	"We can be affected by dust and noise"	No suggestions
Afyonkarahisar	Sinanpasa	Akdegirmen	Person with disability	"There may be noise"	No suggestions
Manisa	Alasehir	Kasapli	Poor informal user, landowner without title	"Our house will go. We don't know what to do next. Because we have neither money nor security."	No suggestions
Manisa	Alasehir	Kasapli	Poor informal user, landowner without title	"Our house will go and our life will change completely."	No suggestions
Usak	Banaz	Hatipler	Poor receiving social assistance	"As they say, if the project is to divide the village into two, dozers, trucks, construction noise, dust make these places unbearable. If the crop is dusted in the soil and the yield falls, we are left with nothing."	"They should take the project not through the village, but along the mountain slope. After this time, the decision has been made, but if there are people who think about us, they should take this into consideration in order not to divide the village and to prevent the livelihood from being adversely affected."
Usak	Banaz	Hatipler	Daughter physically disabled, taking care of herself	"Some say the train will pass through the mountain, some say the train will pass through the middle of the village. There is greenhouse cultivation in our village. The land is barren. There are many people who go to their homes, greenhouses and fields."	"I do not want our village to be divided. We want to be informed about the project."
Manisa	Salihli	Durasilli	Son paralyzed physically disabled, taking care of herself	"If the project passes through the village, I do not know how far it will be from our home, how it will affect agriculture. If a train passes through the village, how do we go to the field with a tractor? They say that some of their homes and greenhouses could be demolished. We are	"The Project should be carried out without damaging the houses and fields."

Province	District	Settlement	Type of vulnerability	Impact explanation	Mitigation measure Suggested by the PAP
				afraid if our house is destroyed too."	

Source: ESIA Field Study, Interviews with vulnerable PAPs, February 2021.

Vulnerable individuals should have easy access to accurate information. To ensure that vulnerable people are adequately informed about the Project, cooperation will be made with mukhtars. The recommendations of vulnerable PAPs in Table 11-86 will be considered.

The ways of informing / communication preferred by vulnerable PAPs are as in Table 11-87.

Table 11-87. Engagement Preferences of Vulnerable PAPs

Engagement	Number of vulnerable PAPs
To be reached by phone	9
To be informed through the mukhtar	12
Via meeting	12
Total	33

Source: ESIA Field Study, Interviews with vulnerable PAPs, February 2021.

The most basic way to reduce the impact on these issues is to include measures that take into account the vulnerable groups of stakeholder participation. Measures such as visual warning signs for the illiterate, warning signs in different languages for refugees, allowing anonymous complaints by the grievance mechanism are presented in the SEP document.

The groups mentioned above are vulnerable groups independent of the Project. Often times, projects create their own vulnerable groups. The dependent vulnerable groups of the AIHSR project were determined within the scope of ESIA. For vulnerabilities that are dependent on the Project, RAP has been prepared and will be implemented with the aim of compensating economic losses for the following groups:

- Physically displaced PAPs
- Seasonal workers
- Informal users of impacted public lands
- Those who are affected by the Project more than 20% of their livelihoods (including impacts caused by the division of land into two)

Prior to start of superstructure works in Section 3a, 3b, 4a and 4d (at the time these sections of the Project will be handed over to the Contractor for the superstructure works), any outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances in Sections 3a, 3b, 4a and 4d related to socio-economic impacts due to activities of other contractors (see Chapter 1 for the definition of other contractors) that completed the infrastructures works in these sections will be assessed by an E&S Audit to be carried out by the Contractor.

The contractors for the ongoing infrastructure works of Sections 3a, 3b, 4a and 4d are contractually required to comply with the national legislation. The main gaps between the national legislation and international standards with respect to labour and working conditions can be summarised as below:

- Socio-economic baseline data for affected settlements is not required to be collected by the national legislation
- Implementation of the RAP (that has been prepared) for the management of impacts on PAPs caused by Project-related land acquisition processes as per international standards (e.g. compensation at full replacement cost for affected assets, transitional support after land acquisition, etc.) is not required by the national legislation.

- Stakeholder Engagement Plan (SEP) including an external grievance mechanism is not required by the national legislation.
- Project-specific Environmental and Social Management System (ESMS) incorporating social management plans, such as Community, Health, Safety and Security Management Plan, Labour Management Plan, etc. is not required by the national legislation.

For the E&S Audit, the relevant documentation related to labour and accommodation conditions will be requested (through the Employer) during the site hand over and outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances, if any, will be identified for incorporation to the Management and Corrective Action Plan, as appropriate:

- Livelihood and physical displacement supports provided to the local communities
- Community development projects implemented
- Accident statistics involving local communities and relevant reports
- Records on engagement with local communities
- External grievance mechanisms and registers

Following this audit, a Management and Corrective Action Plan will be developed and implemented for these sections of the Project. The implementation responsibilities for the Management and Corrective Action Plan will be further clarified between the Employer and the Contractor.

The potential impacts of the Project, significance of the impacts prior to mitigation, proposed mitigation measures and the significance of residual impact are summarised in Table 11-88. These measures will be implemented in conjunction with the measures in RAP for the management of social impacts on PAPs.

Table 11-88. Impacts, Proposed Mitigation Measures and Residual Impacts (Socio-economy)

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Impacts on population and demographics	Land Preparation and Construction	Local Communities in PASs (see Appendix A for the list of PASs)	Restricted to Wide	Low	Short-term reversible to Long-term reversible	Short-term	Continuous/ Recurrent	Low to Medium	Medium	Minor to Moderate	<ul style="list-style-type: none"> Subcontractors will be contractually required to maximise use of local workforce. RAP has been developed as a stand alone plan and will be implemented for the management of impacts on physically and economically displaced persons/households and to restore livelihoods of the PAPs. 	Minor
	Operation Phase	Province and district centres in PASs, especially: Section 1: Emirdag district in Afyonkarahisar province Section 2: Afyonkarahisar city centre and districts Section 3: Usak city centre Section 4: (Salihli Station, Turgutlu Station and Manisa Gar): Manisa city centre, Salihli and Turgutlu districts	Wide	Low to Medium	Irreversible	Long-term	Continous	Medium	Medium	Moderate	<ul style="list-style-type: none"> Employer/Operator will collaborate with the related central and local administrations for the long-term management of the risk of unplanned urbanisation, if and when demanded. 	Moderate
Impacts of Project-related worker influx	Land Preparation and Construction	Local Communities, especially women in PASs (see Section 11.4.2.1) Section 1: Gumusyaka neighbourhood (Ankara, Polatli) – Sigircik neighbourhood (Eskisehir, Sivrihisar) Bayat Merkez (Afyonkarakisar, Bayat) In Section 2: Ayvali neighbourhood (Sinanpasa, Aftonkarahisar) existing camp site	Restricted to Wide	Low	Short term reversible	Short-term	One-off/rare	Low	High	Moderate	<ul style="list-style-type: none"> Project-specific SEP, including external grievance mechanism, will be implemented. In case GBVH is reported through the external grievance mechanism, this will be investigated by trained investigators and responded in accordance with current GIIPs. Through the implementation of SEP, local women will be specially informed by qualified Project personnel/representatives about the following following: <ul style="list-style-type: none"> Project external grievance mechanism and privacy policy Women's rights Self-protection in cases of violence and sexual abuse Emergency phone numbers, and Contact information of the institutions and organisations that can be applied to Contractor and subcontractor personnel (accommodating on-site and off-site) will be provided with training on Project's Social Policy and Contractor's Code of Conduct covering Project's approach to relations with the local communities, prevention of GBVH and SHA, at 	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
		used by previous contractors within the scope of the Project. Halaclar village (Usak, Banaz) Section 3: Asagicobanisa village (Manisa, Sehzadeler)									<p>the time of employment (refresher training will be provided annually and as required). Trainings will cover, inter alia, the following</p> <ul style="list-style-type: none"> - Definition of violence against women in national and international documents, - Types of violence (physical, sexual, economic, emotional), and - Legal sanctions. <ul style="list-style-type: none"> • Project CLOs and Contractor's Human Resources (HR) team will be specially trained on GBVH. • Project-specific Labour Management Plan, Camp Site Management Plan and Contractor Management Plan will be developed and implemented. • The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with the requirements of the Labour Management Plan covering the off-site accommodation aspects. • The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with the requirements of the following Project-specific documents; <ul style="list-style-type: none"> - Social Policy - HR Policy - Subcontractor Management Plan - Labour Management Plan - Internal Grievance Mechanism as part of Project SEP. • Subcontractor will be contractually required to maximise use of local workforce. 	
Impacts on life conditions: Roads, access and traffic issues	Land Preparation and Construction	Local Communities in PASs See Table 11-52 for Settlements with Retrospective Impacts on Local Roads due to Previous Project Construction Works conducted by Other Contractors (Suspended in 2018)	Local to Wide	Low to Medium	Short term reversible	Short-term	Continuous/ Recurrent	Low to Medium	Low to High	Minor to Major	<ul style="list-style-type: none"> • Project-specific Community Health, Safety, and Security Management Plan that will identify the current access restriction issues (access to private and public lands and access to the centres of the districts, provinces, and social services) that have been caused by the previous construction works (with prioritisation in the construction schedule where needed and possible) and describe the management/resolution measures to be implemented to eliminate them, if feasible under the scope of Contractor's works subject to the approval of the AYGM, will be developed and implemented. • The Contractor (through ERG Construction as one of the JV companies) has in place a Traffic Safety Management Procedure developed for the construction of a large-scale motorway 	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<p>project in Turkey. This procedure is to be revised and adapted to the Ankara-Izmir HSR Project and implemented within the scope of Project land preparation and construction activities.</p> <ul style="list-style-type: none"> Project-specific SEP, including external grievance mechanism, will be implemented. The Contractor will engage with the local communities through the implementation of Project SEP to receive their feedback and suggestions on the engineering structures (built and to be built) designed to ensure continuity of access between fragmented lands. The Contractor will consult and work with the mukhtars of the affected settlements to identify the locations where there are current and there may be potential future access restriction issues. These feedback and suggestions will be evaluated and feasible measures will be planned, incorporated to the Community Health, Safety and Security Management Plan and implemented - subject to the approval of the AYGM - to eliminate existing access restriction impacts (if feasible under the scope of Contractor's works) and avoid/minimise access restrictions due to the Contractor's activities. Engineering structures (see Section 1.4.2.1 for the list of Engineering Structures) will be constructed to ensure that access of PAPs to the privately-owned agricultural lands, pastures and other common lands is not hindered/restricted. Livelihood restoration measures developed as part of the stand alone RAP will be implemented to restore livelihoods of the PAPs affected from temporary access restrictions that will stem from the infrastructure activities. A Traffic Safety Management Procedure will be developed and implemented by all Project personnel (direct and contracted) (details are provided in Chapter 13 on Community Health and Safety). The suggestions of the PAPs (e.g. enforcement of speed limits, placing warning signs, for the management of traffic-related impacts, collected through social surveys, will be reflected in the Procedure as relevant. 	
Impacts on life conditions: Dust, noise and vibration	Land Preparation and Construction (including operation of quarries) (see Chapter 6 for the operation phase noise&vibration impacts)	Local Communities in PASs See Chapter 1 (Table 1-18 and Table 1-19) for distance of the quarries and	Local	Low to High	Short term reversible	Short-term	Intermittent	Low to High	Medium	Moderate to Major	<ul style="list-style-type: none"> Project-specific Noise and Vibration Management Plan will be developed and implemented by the Contractor and the subcontractors (through contractual requirements). For dust emissions, Project-specific Air Quality and GHG Emissions Management Plan will be developed and implemented by the Contractor 	Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
		<p>material borrow sites to the closest buildings in the nearby settlements</p> <p>See Chapter 6 for assessment of noise and vibration impacts on receptors:</p> <p>The following settlements have buildings located within 220 m distance to the EIA permit boundary of the quarry</p> <ul style="list-style-type: none"> - Cikrikci (Turgutlu, Manisa) – the closest building in the settlement is located at 200 m distance to the EIA permit boundary. - Caltidere (Aliaga, Izmir) – the closest building in the settlement is located at 67 m distance to the EIA permit boundary. <p>The following settlements are located within the safe blasting distance of 220 m (considered as worst case distance for soft blasting operations to be practice within the tunnels):</p> <ul style="list-style-type: none"> - Yeni (Bayat, Afyonkarahisar) - Sagirli (Bayat, Afyonkarahisar) - Balmahmut (Sinanpasa, Afyonkarahisar) - Calislar 									<p>and the contractors (through contractual requirements).</p> <ul style="list-style-type: none"> • Project-specific SEP will be implemented to inform the communities about the activities and address any dust, noise or blasting/vibration related grievance and plan/take corrective actions, where necessary. • Product losses proved to be caused by Project-related dust formation will be compensated by the Project (source and extent of damage to be verified through collaboration with the mukhtars and related authorities, where necessary). 	

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
		(Sinanpasa, Afyonkarahisar) - Alaba (Banaz, Usak) - Hatipler (Banaz, Usak) See Chapter 7 for assessment of air quality impacts on receptors										
Impacts on infrastructure	Land Preparation and Construction	Local Communities in PASS (The Contractor is at the stage of identification of infrastructure to be affected through the pre-construction site surveys)	Local	Low	Short-term to Medium-term reversible	Short-term	One-off/rare	Low	Low to Medium	Minor	<ul style="list-style-type: none"> Project-specific SEP, including the external grievance mechanism, will be implemented to inform the mukhtars and communities about potential interruptions on local infrastructure services and collect relevant concerns and grievances for further management/resolution. Work sites and access routes to be used by the contractors and subcontractors will be clearly identified to avoid potential off-site impacts on local infrastructure. Damage caused by the Project (by contractor or subcontractor) on electrical infrastructure, local water supply/irrigation infrastructure, etc. will be reinstated/repared immediately after the completion of construction activities at respective work sites in collaboration with the related authorities. Where necessary, the Contractor will enforce and monitor the corrective actions to be taken by the subcontractors RAP will be implemented to compensate temporary economic losses due to damage caused by the Project infrastructure activities on irrigation infrastructure (source and extent of damage to be verified through collaboration with the mukhtars and related authorities, where necessary). 	Negligible
Impacts on social services (education and health)	Land Preparation and Construction	Local Communities in PASS (potential for all settlements given in Appendix A for the list of PASS)	Wide	Low	Short term reversible	Short	Intermittent	Low	High	Moderate	<ul style="list-style-type: none"> Project-specific SEP, including the external grievance mechanism, will be implemented. On-site infirmary service will be provided at the construction camp sites for direct and contracted employees in order to reduce the load on public health facilities. The medical personnel and facilities to be provided on-site will meet the requirements of the applicable national legislation. Mobile schooling times will be taken into account for planning the transportation of construction materials. 	Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Impacts on welfare and wages	Land Preparation and Construction	Local Communities in PASs (potential for all settlements given in Appendix A for the list of PASs)	Local to Wide	Low	Short term reversible	Short-term	Continuous/ Recurrent	Low	Low to High	Minor to Moderate	<ul style="list-style-type: none"> Project-specific HR Policy will be developed and implemented in line with IFC Guidance Note 2 (see Chapter 12 on Labour and Working Conditions for the scope of the HR Policy). In order to enhance Project benefits around employment opportunities, the Project will adopt the policy of localisation of workforce, where possible. 	Minor to Moderate (Positive)
	Operation		Local to Wide	Low	Long term reversible	Long-term	Continuous/ Recurrent	Low	Low to High	Minor to Moderate	<ul style="list-style-type: none"> The operation phase employment strategies will be identified and implemented by the Operator 	Minor to Moderate
Impacts on local employment	Land Preparation and Construction	Local Communities and Businesses in PASs (potential for the working age (15-64 years old) group in all settlements given in Appendix A for the list of PASs)	Local	Medium (Beneficial)	Short term reversible	Short-term	Continuous/ Recurrent	Low	Low to High	Minor to Moderate	<ul style="list-style-type: none"> In order to enhance Project benefits around employment opportunities, the Project will adopt the policy of localisation of workforce, where possible. The Contractor will set localisation targets for the employment of unskilled, semi-skilled and skilled workers (direct and contracted) within the Labour Management Plan to be developed and implemented. Job applications will be collected from the settlements in collaboration with the mukhtars (The local employment potential of the settlements is presented in this Chapter) Project Contractor will develop and implement Subcontractor Management Plan (covering employment, procurement and supply chain aspects in line with IFC PS2) . Project-specific SEP, including the external grievance mechanism, will be implemented. General job application forms will be collected from the settlements (The local employment potential of the settlements is presented in this report) 	Minor to Moderate (Positive)
Impacts on procurement of required goods, materials and services	Land Preparation and Construction	Local Businesses in PASs (potential for all settlements given in Appendix A for the list of PASs)	Local	Medium (Beneficial)	Short term reversible	Short	Continuous/ Recurrent	Low	Low to High	Minor to Moderate	<ul style="list-style-type: none"> Localisation of procurement of goods and services will be prioritised. Consultations will be held with local businesses to inform them about the potential local procurement of goods and services. Subcontractor procurement will be monitored by the Contractor on a monthly basis through a system to be established. 	Minor to Moderate (Positive)
Impacts on Livelihood activities	Land Preparation and Construction	Owner/shareholders and users of the parcels affected from the Project-related land acquisition in PASs (see Section 11.4.4; Table 11-65 Table 11-66 Table 11-67)	Restricted	Low to Medium	Short-term to Medium-term reversible	Short-term	Intermittent	Low to Medium	Low to High	Minor to Major	<ul style="list-style-type: none"> RAP will be implemented to restore livelihoods of the PAPS. Localisation of workforce and procurement will be prioritised. Subcontractors will be encouraged to maximise use of local workforce. Location of beehives in the vicinity of the quarries, where blasting is to be practiced, will be identified by the Contractor prior to start of quarry operations. The local communities will be communicated and consulted through the implementation of SEP, and if necessary, 	Minor to Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
		Table 11-68 Table 11-69)									measures will be planned and implemented in agreement with the beehive owners.	
Impacts on agricultural activities	Land Preparation and Construction (impacts can extend to Operation if not mitigated properly)	Local communities (owners/users) who are engaged in agricultural activity on public and private lands located within Project's expropriation corridor in PASs (see Section 11.4.4; Table 11-66; Table 11-69)	Restricted	Low to High	Short-term to Medium-term reversible	Short-term	Continuous/ Recurrent	Low to High	Low to High	Minor to Major	<ul style="list-style-type: none"> RAP will be implemented to restore livelihoods of the PAPs (landowners and users) consistent with requirements of IFC PS5. Project-specific SEP, including the external grievance mechanism, will be implemented. Engineering structures (see Section 1.4.2.1 for the list of Engineering Structures) will be constructed to ensure that access of PAPs to the privately-owned agricultural lands, pastures and other common lands is not hindered/restricted. 	Minor
Impacts on forestry and benefiting from natural products	Land Preparation and Construction (impacts can extend to Operation if not mitigated properly)	Local communities who use the affected forests in PASs (see Section 11.4.4; Table 11-67)	Restricted	Low	Short term reversible	Short-term	Continuous/ Recurrent	Low	Low to Medium	Minor	<ul style="list-style-type: none"> RAP will be implemented to restore livelihoods of the PAPs consistent with requirements of IFC PS5 (e.g. covering measures to increase the production of non-wood products in forestlands). Permanent passages will be provided to sustain lbenefiting activities. Project-specific SEP, including the external grievance mechanism, will be implemented. Engineering structures (see Section 1.4.2.1 for the list of Engineering Structures) will be constructed to ensure that access of PAPs to the forest lands is not hindered/restricted. 	Negligible
Impacts on pasturelands and livestock activities such as reduced size of the pasture lands available for livestock activity and restricted access to pasturelands due to impact of construction on access roads	Land Preparation and Construction (impacts can extend to Operation if not mitigated properly)	Local communities who use the impacted pasturelands in PASs (see Section 11.4.4, Table 11-68)	Restricted	Low to Medium	Short term reversible	Short-term	Continuous/ Recurrent	Low to Medium	High	Moderate to Major	<ul style="list-style-type: none"> RAP will be implemented to restore livelihoods of the PAPs consistent with requirements of IFC PS5 (covering PAPs facing with temporary income loss affected from construction phase access restrictions through appropriate support – e.g. feed support, support to shephards). Engineering structures (see Section 1.4.2.1 for the list of Engineering Structures) will be constructed to ensure that access of PAPs to the pastures lands is not hindered/restricted. The design and location of the Engineering Structures will take into consideration the traditional use and human and animal safety. Any relevant grievance will be collected and managed through SEP implementation. If access to the pasture lands cannot be provided during the construction period, land users whose livelihood is highly dependent on livestock and pasture use will be provided with feed support through the implementation of RAP. This support can be provided in the form of direct provision and distribution of fodder in cooperation with cooperatives and related institutions. Project-specific SEP, including the external 	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											grievance mechanism, will be implemented.	
Acquisition of residential buildings	Land Preparation and Construction (impacts can extend to Operation if not mitigated properly)	Owner/shareholds and users of the houses/structures affected from the Project-related land acquisition in PASs See Table 11-78 for Distribution of Residential Buildings per project Section and Settlements	Restricted	High	Short-term to Medium-term reversible	Long-term	One-off/rare	High	High	Major	<ul style="list-style-type: none"> RAP will be implemented for the management of impacts on physically displaced persons/households in line with the requirements of IFC PS5. The entitlements for the physically displaced persons will be described within the RAP (e.g. salvage of materials before demolition of buildings, moving assistances, priority in access to RAP benefits/programs). Project-specific SEP, including the external grievance mechanism, will be implemented. 	Minor
Acquisition of commercial buildings	Land Preparation and Construction (impacts can extend to Operation if not mitigated properly)	Owner/employees of the commercial buildings affected from the Project-related land acquisition in PASs See Table 11-79 for Distribution of Commercial Buildings per Project Section and Settlements in Section 1,2 and 4 (excluding 4d)	Restricted	Low to Medium	Short-term to Medium-term reversible or Irreversible	Long-term	One-off/rare	Low to Medium	Medium	Moderate	<ul style="list-style-type: none"> RAP will be implemented for the management of impacts on physically displaced businesses in line with the requirements of IFC PS5. 	Minor
Impacts on vulnerable groups and persons (see Section 11.3.4)	Land Preparation and Construction	Vulnerable groups in PASs The list of vulnerable persons in PASs is kept in the Project database and will be updated periodically by the CLOs	Local to Wide	Medium to High	Short-term to Medium-term reversible	Short-term	One-off/Rare or Intermittent or Continuous/ Recurrent depending on the type of impact	Medium	High	Major	<ul style="list-style-type: none"> Special mitigation/enhancement measures will be designed tailored to the needs of vulnerable groups/persons affected from the Project (vulnerable PAPs) in PASs such needs will be identified by Project CLOs through implementation of Project-specific SEP, including but not limited to the following as necessary:.. <ul style="list-style-type: none"> Access to legal resources with an assistance in case of a need (i.e. transportation) when relevant to management of Project-related impacts Assistance on acknowledging and signing official documents when relevant to management of Project-related impacts Assistance to access compensation payments as part of RAP implementation management of Project-related impacts Assistance to clear and store materials from their land as part of RAP implementation Assistance to find alternative land as part of RAP implementation Assistance to obtain personal documents 	Minor to Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<ul style="list-style-type: none"> - Job assistance for PAPs - Priority for job opportunity during the construction phase of the Project - Temporary livelihood assistance - Travel assistance as part of RAP implementation <ul style="list-style-type: none"> • The deterioration that has occurred or is likely to occur in seasonal workers' housing conditions will be eliminated. • The SEP and RAP will be implemented, together with the specialised to be developed for the vulnerable groups, to mitigate Project's potential adverse impacts on them and enhance Project benefits. The list of vulnerable persons identified through the ESIA surveys is kept in the Project database, and will be updated as necessary throughout the Project. • Vulnerable persons/groups will be specially informed about the Project activities and the external grievance mechanisms in collaboration with mukhtars. • Vulnerable persons/households with vulnerable members will be given priority for Project's employment and procurement benefits, where possible. • Physical and economic displacement impacts on vulnerable PAPs will be particularly focused on and managed through the implementation of specially designed RAP measures. For the avoidance and mitigation of impacts (e.g. avoiding former and informal owners/users of affected assets becoming homeless), cooperation will be made with the Employer, other related governmental institutions and mukhtars. Vulnerable persons/households with vulnerable members will be given priority for the community-level supports/programs. 	
Retrospective social impacts due to suspended/incomplete construction activities (such as access restrictions due to uncompleted engineering structures, damage neighbourhood/village roads,	Land Preparation and Construction	Local Communities who are already affected by the activities conducted previously (before the appointment of the Contractor) <u>Section 1:</u> <u>Ankara:</u> Gumusyaka <u>Eskisehir:</u> Ilyaspasa Ahiler	Resrticted to Local	Low to High	Medium term reversible	Long-term	Continuous/ Recurrent	Low to High	High	Moderate to Major	<ul style="list-style-type: none"> • In settlements, where village/ neighbourhood roads remain affected/blocked and/or health and safety risks prevail due to uncompleted construction works previously conducted in the scope of the Ankara-Izmir HSR Project, repair and improvement works will be prioritised in the construction schedule by the Contractor if feasible under the scope of Contractor's works and where permitted by the related governmental authorities. Relevant measures required for rectification of the retrospective impacts and risks (due to uncomplete construction works of previous contractors) such as completion of the suspended engineering structures, improvement of the damage village/neighbourhood roads, etc. 	Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
damage on pasture and/or agricultural lands due to disposal of excavated materials without any mutual agreement ,etc. which have been in place due to past construction activities performed by previous contractors)		Sigircik									to be identified as part of the E&S Audit to be done during the site hand over to the Contractor and will be incorporated to the Management and Corrective Action Plan and the Community Health, Safety and Security Management Plan to be developed and implemented.	
		<p><u>Afyonkarahisar:</u> Turkmenakoren Tabaklar Yuregil Kavak</p> <p>Section 2</p> <p><u>Afyonkarahisar:</u> Akcin Erenler Ismail Koprulu Akdegirmen</p> <p>Section 3</p> <p><u>Usak:</u> <u>Buyukoturak</u> <u>Islam</u> <u>Gullucam</u> <u>Karahasan</u> <u>Ahmetler</u></p> <p>Manisa: <u>Durasilli</u></p> <p>Section 4</p> <p>Manisa (4a): <u>Kirveli</u> <u>Mevlutlu</u> <u>Kapanci</u> <u>Yarasli</u></p> <p>Manisa(4b): <u>Seydikoy</u> <u>Gokkaya</u> <u>Derbent</u> <u>Mustafa Kemal</u> <u>Asagicobanisa</u></p> <p>Izmir (4c): <u>Emialen</u> <u>Degirmendere</u></p>										

12. LABOUR AND WORKING CONDITIONS

This Chapter provides baseline information on the labour and working conditions in Turkey, explains the Contractor's approach to the management of labour and working conditions including occupational health and safety (OHS) aspects and accommodation conditions during the construction phase, sets out operation phase labour and working conditions risks and impacts, and presents management measures to be taken in the Project to ensure compliance with the applicable legislative requirements as well as international standards.

12.1. Project Standards

The Labour Law (Law No. 4857, 2003) and related regulations, and the Occupational Health and Safety Law (Law No. 6331, 2012) and related regulations will set the OHS requirements for the Project (see Chapter 2 for detailed list of secondary OHS legislation).

The International Labour Organisation (ILO) conventions ratified by Turkey (see Chapter 2, Table 2-8) will also be applicable to the Project.

The following list of international standards will be applicable to the Project:

- IFC PS2 on Labour and Working Conditions (2012)
- IFC/European Bank for Reconstruction and Development (EBRD) Worker's Accommodation: Processes and Standards (2009)
- IFC Good Practice Note on Managing Contractors' E&S Performance (2017)
- IFC Handbook for Addressing Project-Induced In-Migration (2009)
- World Bank Group (WBG) General Environmental, Health and Safety (EHS) Guidelines (2007)
- WBG EHS Guidelines on Railways (2007)
- WBG EHS Guidelines for Construction Materials Extraction (2007)

In the context of COVID-19 pandemic, the following Interim Advice Notes published by the IFC will also be applicable to the Project:

- Tip Sheet for Company Leadership on Crisis Response: Facing the COVID-19 Pandemic
- Interim Advice for IFC Clients on Preventing and Managing Health Risks of COVID-19 in the Workplace
- Interim Advice for IFC Clients on Supporting Workers in the Context of COVID-19
- Interim Advice for IFC Clients on Developing a COVID-19 Emergency Preparedness and Response Plan (EPRP)
- Addressing Increased Reprisals Risk in the Context of COVID-19
- Interim Advice for IFC and EBRD Clients on Migrant Workers and COVID-19

As discussed in Chapter 18 ("ESMS"), ERG Construction and SSB AG have in place ISO 45001:2018 Occupational Health and Safety Management System certifications.

12.2. Baseline Conditions

Main data sources used to compile the baseline information are listed below:

- ILO website and related documentation (www.ilo.org)
- Statistical Yearbooks⁸⁴ from 2013 to 2019, Turkish Social Security Institute (SGK) (www.sgk.gov.tr)
- National Programme on the Elimination of Child Labour for 2017-2023⁸⁵, former Ministry of Labour and Social Security (currently acting as Ministry of Family, Labour and Social Services) (2017)
- Ministry of Interior, Directorate General of Migration Management website (<https://www.goc.gov.tr/>)
- Turkey Migration Report for 2016⁸⁶, Ministry of Interior (2017)
- Labour Force and Child Labour Statistics published by Turkish Statistical Institute (TurkStat)

12.2.1. Labour and Working Conditions

Turkey has ratified 59 ILO conventions⁸⁷ (see Table 2-8), including but not limited to the conventions on equal treatment of employees, gender equality, child labour, forced labour, OHS, right of association and minimum wage (<https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm>).

The Labour Law (Law No. 4857, 2003) of Turkey is aligned with the international labour standards and IFC PS2 requirements with regard to aspects including child labour, forced labour, non-discrimination, equal opportunity and right to join workers' organisations.

This said, in sectors such as construction where high numbers of unskilled workforce is involved, practical alignment with the labour standards in certain areas such as employment rates, working and accommodation conditions, arrangement of overtime work, salary payments, women's presence in the workforce, freedom of association, and child labour, require further improvement to ensure full compliance with the international standards.

As per ILO Turkey statistics⁸⁸, as of 2020, Turkey has been the highest refugee hosting country in the world for the seventh consecutive year. According to United National High Commissioner for Refugees (UNHCR), as of 31 December 2019, the number of Syrians in Turkey was 3.576.370. According to the UNHCR, a large part of Syrians in Turkey work in construction, manufacturing, and service sectors and more than 97% of the Syrian workers in Turkey are working informally (UNHCR, 2020. *Syrian Barometer for 2019*;))

Employment/Unemployment

According to Labour Force Statistics of TurkStat dated November 2020, the number of employed persons was 27 million 66 thousand persons and the number of unemployed persons aged 15 years old was 4 million 5 thousand persons. The unemployment rate was 12.9%. The ratio of persons working without any social security relating to the main job was 29.7%.

According to ILO Turkey, as of 2020, Turkey is the country hosting the largest number of refugees in the world. The vast majority, close to 3.6 million, come from Syria⁸⁹. Distribution of Syrians under temporary protection in Turkey by provinces crossed by the Railway is presented in Table 12-1.

⁸⁴ Most recent Statistical Yearbook published by SGK is for 2019;

http://www.sgk.gov.tr/wps/portal/sgk/tr/kurumsal/istatistik/sgk_istatistik_yilliklari

⁸⁵ https://www.ailevecalisma.gov.tr/media/53623/cocuk_isciligi-ulusal-programi.pdf

⁸⁶ Most recent Migration Report published by the Ministry is for 2016; 2019;

https://www.goc.gov.tr/kurumlar/goc.gov.tr/files/2016_yiik_goc_raporu_haziran.pdf

⁸⁷ Out of 59 conventions ratified by Turkey, 55 are in force, 3 Conventions have been denounced and 1 instrument has been abrogated.

⁸⁸ https://www.ilo.org/ankara/projects/WCMS_379375/lang--en/index.htm

⁸⁹ https://www.ilo.org/ankara/projects/WCMS_379375/lang--en/index.htm

Table 12-1. Distribution of Syrians Under Temporary Protection in Turkey by Provinces Crossed by the Railway

Province	Number of Registered Syrian Refugees per Province	Province Total Population
Ankara	100,146	5,663,332
Eskisehir	5,496	888,828
Afyonkarahisar	11,354	736,912
Kutahya	2,006	576,688
Usak	2,749	369,433
Manisa	13,735	1,450,616
Izmir	147,810	4,394,694

Source: Ministry of Interior, Directorate General of Migration Management, Distribution of Syrians Under Temporary Protection in Turkey by Provinces as of 17 February 2021. Retrieved from <https://www.goc.gov.tr/gecici-koruma5638>.

As reported by ILO, Syrian refugees have gradually been able to access work opportunities. However, only 3 percent of working refugees are estimated to work formally. Since 2016, refugees can obtain a work permit through their employer; however, to date, very few have obtained a work permit and very few Syrians are working formally. Out of 2.16 million Syrians of working age in Turkey, 1 million are estimated to participate in the labour market, most of them informally in low-skilled and low-paid jobs⁵ with the risk of facing poor working conditions including OHS risks and long working hours.

The majority of refugees are employed in the manufacturing sector, mainly in the textile industry, as well as in construction and trade and hospitality sectors. 13.2% of Syrian refugees work in the construction sector. Syrian workers are concentrated in a few provinces including Istanbul (46%), Adana (9%), Bursa (9%), Gaziantep (7%), Hatay (5%), Konya (4%) and Izmir (3%)⁹⁰.

Child Labour

Working age and restriction on the employment of children in Turkey is governed by Article 71 of the Labour Law (Law No. 4857, 2003). As per the Law, employment of children who have not completed the age of 15 is prohibited. However, children, who have completed the full age of 14 and their primary education, are allowed to work on light works that will not hinder their physical, mental and moral development and that will not prevent their school attendance for those who continue their education.

In line with the Labour Law (Law No. 4857, 2003), the Regulation on the Procedures and Principles of Employing Children and Young Workers determines the types of works, where employment of children and young employees who have not completed the full age of 18 is prohibited, and the works where young employees who have not completed the age of 18 may be permitted to work, as well as the light works and working conditions in which children who have completed the age of 14 and their primary education may work.

In the OHS Law (Law No. 6331, 2012), those who have completed the age of 15 but have not completed the age of 18 are defined as young employees.

According to the Child Labour Force Survey of TurkStat conducted in the fourth quarter of 2019, the number of children in the 5-17 age group was estimated at 16 million 457 thousand persons and the number of children engaged in economic activities was 720 thousand persons, as presented in Figure 12-1 (<https://data.tuik.gov.tr/Bulten/Index?p=Child-Labour-Force-Survey-2019-33807>).

⁹⁰ https://www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-ankara/documents/genericdocument/wcms_738618.pdf

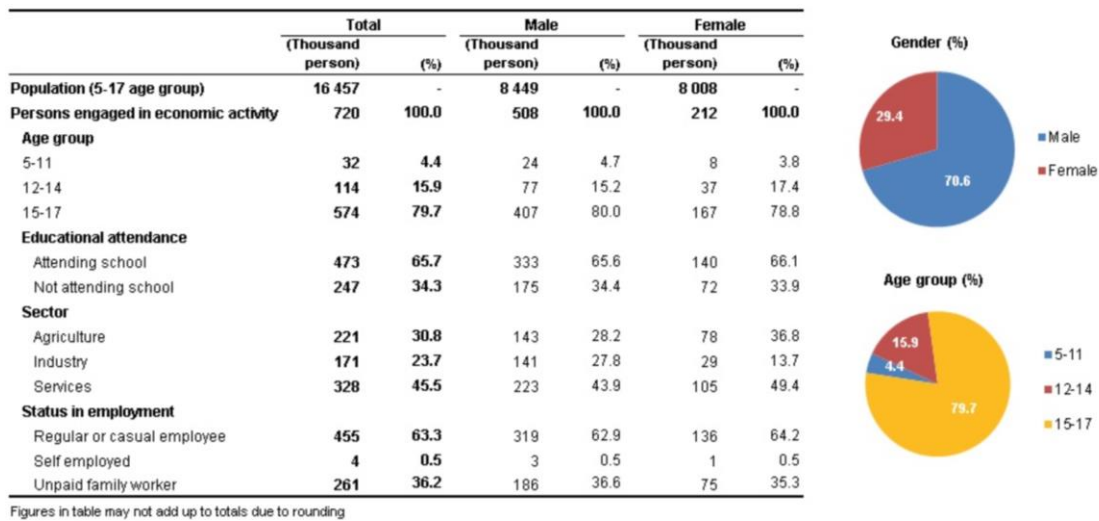


Figure 12-1. Basic Indicators of Children Engaged in Economic Activities in Turkey as of Fourth Quarter of 2019, 5-17 Age Group (TurkStat, March 2020. Child Labour Force Survey)

Women Participation in Labour Force

In Turkey, according to the World Bank's Labour Force Participation Statistics, female participation in labour force (% of female population ages of 15+) was 33.9% in 2020, whilst the same rate was 71.9% for male population, as presented in Figure 12-2⁹¹.

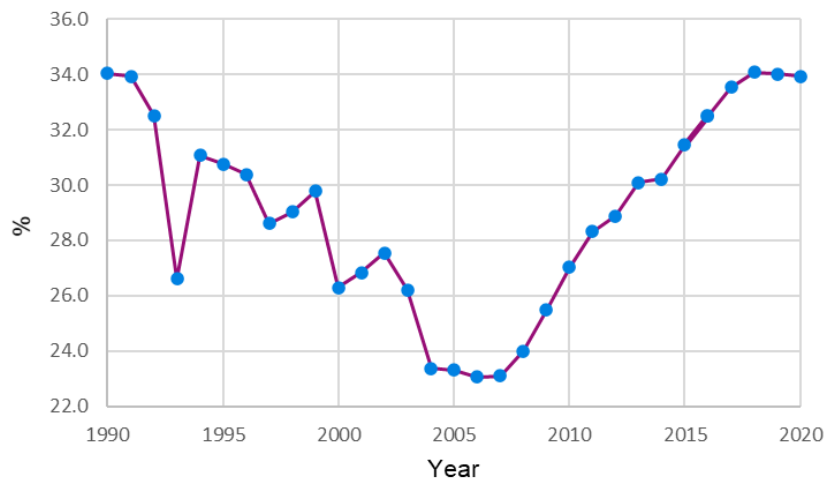


Figure 12-2. Change in Female Labour Force Participation Rate in Turkey for 1990-2020 (% of female population ages 15+) (Source: World Bank Open Data, 2020. Labour Force Participation Statistics)

12.2.2. OHS in Construction of Railways Sector

Table 12-2 show the numbers of work accident and fatal incidents in construction of railways and subways sector from 2013 to 2019.

⁹¹ <https://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS?locations=TR>

Table 12-2. Number and Percentage of Work Accidents and Fatal Incidents in Construction of Railways and Subways Sectors

Year	Number of Insured Having Work Accidents by Incapacity Days			Number of Fatal Incidents		
	Construction of Railways and Subways Sector	All Sectors	Percentage (%)	Construction of Railways and Subways Sector	All Sectors	Percentage (%)
2019	2,889	422,463	0.68	12	1,126	1.07
2018	3,279	430,985	0.76	16	1,541	1.04
2017	2,811	359,653	0.78	9	1,633	0.55
2016	1,148	286,068	0.40	8	1,405	0.57
2015	742	241,547	0.31	5	1,252	0.40
2014	777	221,366	0.35	4	1,626	0.25
2013	877	191,389	0.46	10	1,360	0.74

Source: Social Security Institution, 2019. Statistics Yearbooks⁹²

An overview of the COVID-19 pandemic in Turkey is provided in Chapter 13 on Community Health and Safety. For the management of COVID-19 pandemic related risks at the construction camp sites, the Ministry of Environment and Urbanisation (MoEU published a Circular (No: 2020/9) on 20 March 2020 defining the measures to be taken at the work sites, dormitories and social facilities.

12.2.3. Health Services in the Vicinity of the Project Route

The health services infrastructure of the region is developed. The existing state hospitals and healthcare facilities along the Project route is listed in Table 12-3.

Table 12-3. State Hospital and Healthcare Facilities Along the Project Route

Section	Province	District	Name of the Hospital
Section 1	Ankara	Polatli	Polatli Duatepe State Hospital
	Eskisehir	Gunyuzu	Gunyuzu State Hospital
		Sivrihisar	Sivrihisar State Hospital
		Emirdag	Emirdag State Hospital
	Afyonkarahisar	Bayat	Dr. Mete Tan State Hospital
		Iscehisar	Iscehisar State Hospital
Section 2	Afyonkarahisar	Merkez	Afyonkarahisar State Hospital
		Sinanpasa	Sinanpasa State Hospital
		Kutahya	Evliya Celebi Research and Training Hospital
	Usak	Banaz	Banaz State Hospital
Section 3	Usak	Banaz	
		Merkez	Usak State Hospital
		Ulubey	Ulubey State Hospital
		Esme	Esme State Hospital
	Manisa	Alasehir	Alasehir State Hospital
		Kula	Kula State Hospital
		Salihli	Salihli State Hospital
		Salihli	
Section 4	Manisa	Ahmetli	Ahmetli State Hospital
		Sehzadeler	Sehzadeler Polyclinic
		Turgutlu	Turgutlu State Hospital
		Yunusemre	Yunusemre Celal Bayar University Hafsa Sultan Hospital
	Izmir	Menemen	Menemen State Hospital

⁹² http://www.sgk.gov.tr/wps/portal/sgk/tr/kurumsal/istatistik/sgk_istatistik_yilliklari

12.3. Impact Assessment and Management

This section details the potential risks and impacts associated with the labour and working conditions in the Project's construction and operation phases, covering both the Contractor and subcontractors (main and lower tier) as relevant, and the mitigation measures to be taken for the management of identified impacts in line with Project Standards.

Given the nature and scale of the Project, the WBG General EHS Guidelines (OHS, Construction and Decommissioning for general impacts) and relevant industry specific WBG EHS Guidelines have been taken into consideration in the identification of Project-related risks and impacts on the labour and working conditions, including the OHS risks and impacts as summarised below:

- Risks and impacts associated with labour and working conditions during the construction and operations phases (including on-site and off-site accommodation conditions of the Contractor and subcontractor personnel during the construction phase)
- OHS risks and impacts associated with general and job-specific hazards during the construction and operation phases
- OHS risks due to emergency situations (including COVID-19 pandemic related risks) during the construction and operation phases

Labour and Working Conditions

During the construction phase, the infrastructure and superstructure works of Ankara-Izmir HSR Project requires involvement of a significant number of construction personnel under the organisation of the Contractor and subcontractors. It is anticipated that several lower tier subcontractors will be involved in the Project at the different phases of the construction based in several construction camp sites (see Section 1.4.7.1 for the list of camp sites), which will include infrastructure, superstructure, electrification, signalisation and structural (buildings and facilities) works. In addition to the work sites along the railway corridor and construction camp sites, the main Project work sites will include quarries, material borrow sites, concrete plants (if located outside the railway corridor and construction camp sites), excavated material storage sites (if located outside the railway corridor, and route of electrification infrastructure.

Detailed information on the estimated number of construction workforce is provided in Section 1.8 of this ESIA Report. At the peak construction phase, the number of construction workforce, including the management and site personnel of the Contractor and subcontractors, is estimated to be 14,778, of which 67% would be non-qualified. The total duration of construction of the Project is 42 months following the Financial Close date. The responsibility and liability of the Contractor for periodical maintenance works covers a duration of 1 year (defects liability period) for each section of the railway. The construction personnel will be employed by the Contractor and subcontractors for a fixed term duration covering only the construction phase activities.

Working hours and shifts will be regulated in compliance with the requirements of the national Labour Law (Law No. 4857, 2003), as summarised below:

- The work week is foreseen to comprise 6 working days of 7.5 hours each for a total of 45 work hours per week, which is the legal minimum requirement for full-time labour employment as per the national Labour Law.
- Employees will have one rest day per week as mandated by the Labour Law.
- Where needed and contingent on the employee's consent, overtime work will be regulated and compensated in accordance with the Labour Law, up to the legal upper limit of 11 hours per day.
- Single shifts are foreseen to be used throughout the project. However, additional shifts would be organised based on need, with the employees allocated to said additional shifts working within the legal limits mentioned above.

The accommodation capacity of the Contractor Camp Sites is provided in Table 12-4. A Project-specific Camp Site Management Plan will be developed and implemented and the accommodation conditions at the construction camp sites will meet the requirements of IFC/EBRD's Guidance Note on Worker's Accommodation (2009).

Besides technical facilities, the labour-related facilities that will be provided at the construction camp sites will include the following:

- Dormitories (for engineers, foremen and workers)
- Water supply, waste and wastewater management facilities (water wells or water supply lines, temporary waste storage areas, package wastewater treatment units/plants or septic tanks or sewerage connection lines in areas where sewerage infrastructure is present, as appropriate)
- Social facilities (television room, gym, prayer rooms, etc.)
- Cafeteria and dining halls
- Infirmary
- Parking area

Table 12-4. Contractor Camp Site Accommodation Capacities

Section	Camp Site	Approximate Railway KM	Closest Settlement			Indicative Accommodation Capacity
			Province	District	Neighbourhood/ Village	
Section 1	Gumusyaka	3+000	Ankara	Polatli	Gumusyaka	300
	Sigircik	67+000	Eskisehir	Sivrihisar	Sigircik	100
	Bayat	119+000	Afyonkarahisar	Bayat	Merkez	400
Section 2	Sinanpasa	190+000	Afyonkarahisar	Sinanpasa	Ayvali	508
	Halacilar	228+000	Usak	Banaz	Halacilar	200
Section 3	TBD					
Section 4	TBD	493+000	Manisa	Sehzedeler	Asagi Cobanisa	
Total						1,708

Source: Contractor, February 2021.

Accommodation of subcontractors at the subcontractor camp sites or off-site residences/accommodation places will be clarified upon selection of subcontractors. The workers to be employed from the local will lodge in their local houses and transported to the Project site by means of service buses to be arranged by the Project. Part of the non-local workers may prefer off-site accommodation at rental houses in the nearby district or neighbourhoods/villages. As each subcontractor will be engaged in the Project activities over a limited duration for the 42 months construction period, the adverse risks or impacts of off-site accommodation on the nearby district centres, such as increased demands on infrastructure, services and utilities, development of illicit trade activities, inflation in local rent and other subsistence items or risk of gender-based violence and harassment (GBVH), as well as the potential benefits on the economies of the nearby settlements, are anticipated to be temporary. Potential impacts of off-site accommodation will be managed through the development and implementation of the Project-specific Labour Management Plan covering off-site accommodation. Contractor and subcontractor personnel using off-site accommodation facilities will be provided with special training on, inter alia, Project's Social Policy and Contractor's Code of Conduct to communicate Project's approach to prevention of gender-based violence and harassment (GBVH) and raise awareness among the Project personnel. As part of internal audit system to be established and implemented by the Contractor during the construction phase, potential risks of impacts of the Project due to off-site accommodation will be monitored and managed. Through the external and internal grievance mechanisms, such risks, if any, will be continuously identified, evaluated and managed to be operated as part of Project SEP implementation.

Due to the nature and scale of the Project, management of labour and working conditions will be important. The Project is required to provide adequate working and accommodation conditions, promote fair treatment, non-discrimination and equal opportunities to all personnel, including both the direct workers of the Contractor and contracted workers of the subcontractors. Due to the high number of potential lower-tier subcontractors to be involved in the Project, additional management and monitoring measures are anticipated to be required to ensure that the Project Standards are consistently fulfilled by the Project subcontractors.

The Labour Law of Turkey (Law No: 4857, 2003) inherently provides for the basic principles of international labour standards in the subjects including equal treatment, equal opportunity and non-discrimination, child labour, forced labour and worker's organisations, labour unions.

The Contractor (through ERG Construction as one of the JV companies) has in place a Human Resources (HR) Policy and the following management plans developed for the construction of a large-scale motorway project in Turkey to address management of labour, working and accommodations aspects of the Project:

- Camp Site Management Plan
- Subcontractor Management Plan (covering the management of risks stemming from Project's supply chain)
- Labour Management Plan (including off-site accommodation and covering management of risks stemming from Project's supply chain)

In addition, the Contractor will develop and implement a Project-specific HR Policy as well as Camp Site, Subcontractor and Labour Management Plans and Internal Grievance Mechanism in line with the requirements of IFC PS2. Through compliance with the requirements of the Labour Law (Law No. 4857, 2003) and implementation of the HR Policy and related management plans, the potential risks and/or impacts on Project personnel associated with labour and working conditions will be managed in line with the Project Standards.

As detailed in the stand-alone Project SEP and summarised in Chapter 16 on Stakeholder Engagement, engagement with the Project workforce and collection of their feedback, concerns, grievances and suggestions for integration to the Project implementation will be provided through the following channels:

- Verbally through Project directors, managers, chiefs, H&S specialists, CLOs, etc. and subcontractors (to be conveyed to the Contract systematically)
- During monthly H&S committee meetings and other meetings with employees
- Through periodical employee satisfaction surveys
- Through grievance and feedback and forms to be placed at the camp, work and accommodation sites, as appropriate (the locations are listed in the Project SEP)

For the operation phase of the Project, detailed planning of the operation and maintenance (O&M) workforce (direct and contracted) requirements of the Project will be done by the Employer and the Operator in due course. The Project facilities at which the workforce (direct and contracted) will be employed includes the high-speed trains, Operator's offices, HSR control centre (in Izmir), other operational facilities including stations/gars, operation and maintenance facilities of the Operator. The personnel of the affiliated enterprises of the Operator may also have Project-related responsibilities. The Project-related labour and working conditions at the Project facilities during the operation phase will be in line with the requirements of the Labour Law (Law No. 4857, 2003). The labour-related policies, plans and procedures to be implemented during the operation phase will be decided by the Operator.

Occupational Health and Safety (OHS) Risks and Impacts

The following works to be undertaken as part of land preparation and construction phase of the Project involves general and job-specific hazards, which may cause OHS risks and impacts for Project's direct and contracted personnel:

- Excavation works
- Operation of construction vehicles/machinery/equipment (mobile, pressurised, etc.)
- Working at heights
- Works in confined spaces (including tunnel constructions)
- Hot works
- Works associated with electricity and magnetic fields
- Works with chemicals, hazardous or explosive/ flammable materials and wastes, etc.
- Works at severe temperature conditions

- Works resulting in exposure to dust and noise
- Maintenance works (e.g. maintenance of construction vehicles/machinery)
- Works in remote environments where natural risks are present (e.g. water drainage, animal/insect stings)

As discussed previously under the labour and working conditions sections, employees will have one rest day per week as mandated by the Labour Law (Law No. 4857, 2003) during the construction phase. In this type of major infrastructure projects, as a common practice, non-local site worker may prefer to work for longer periods without a break so that they can spend aggregated off-days to pay family visits to their hometowns. It is important to establish practices and monitoring systems through relevant management plans to ensure that overtime management by the Contractor and subcontractors (main and lower tier) stays within the limits of Labour Law (Law No. 4857, 2003) and worker fatigue caused by excessive working periods is avoided for the management of related OHS risks and impacts.

As identified in the WBG EHS Guidelines for Railways, the risks/hazards stemming from HSR operations and maintenance include the following:

- Train / worker accident risks and exposure to moving trains
- Exposure of crew members to continuous/repetitive noise and vibration during HSR operations
- Fatigue of drivers, signallers, maintenance works and other Project personnel critical for the safety of operations due to potential irregular work hours, night shifts, shift time starts, etc.
- Electrical hazards for O&M personnel responsible from the Project-related power lines
- Exposure to electric and magnetic fields while working in proximity to electric power lines
- General physical hazards due to working in proximity to moving equipment, confined spaces, etc., chemical hazards due to use of solvent-based paints, cleaning solvents, etc. and biological hazards due to maintenance of rolling stock and railways

The OHS Law (Law No. 6331, 2012) of Turkey regulates the duties, authority, responsibilities, rights and obligations of the employers and employees for ensuring occupational health and safety at the workplaces and improving the existing conditions. In line with the international OHS standards, including IFC PS2, the OHS Law (Law No. 6331, 2012) and related secondary legislation of Turkey specifies the requirements, principles and procedures for the following key OHS aspects:

- Principles of protection from risks
- OHS services
- Occupational physicians and occupational safety specialists
- Determining the hazard classification
- Risk assessment, control, measurement and examinations
- Emergency plans, fire-fighting, first aid
- Evacuation
- Rights of the workers to abstain (from work in case of serious and imminent danger)
- Recording and notification of occupational accidents and diseases
- Health surveillance
- Worker information (of the safety and health risks and protective and preventive measures, their legal rights and responsibilities, and workers designated to handle first aid, extra ordinary situations, disasters, fire-fighting and the evacuation)
- Training of workers
- Consultation with and participation of workers
- Workers' Representative

The Contractor (through ERG Construction as one of the JV companies) has in place an overarching OHS Plan and a comprehensive suite of related OHS procedures developed for the construction of a large-scale motorway project in Turkey. Those procedures, listed below, will be the basis of the specific OHS procedures to be developed for the Ankara-Izmir HSR Project:

- Accident Incident Notification and Reporting Procedure
- Emergency Response Procedure
- Equipment Control and Maintenance Procedure
- Excavation Backfilling Procedure
- Health and Safety Discipline Procedure
- Health and Safety Trainings Implementation Procedure
- Hot Work Procedure
- Journey Safety and Safe Driving Procedure
- Lifting Work Procedure
- Machinery Protection Procedure
- Manuel Handling Procedure
- Night Work Procedure
- Permit to Work Procedure
- Personal Protective Equipment Procedure
- Scaffold and Ladder Usage Procedure
- Traffic Safety Management Procedure
- Warning Signs and Barrier Procedure
- Working at Height and Fall Protection Procedure
- Working in Confined Space Procedure

The Contractor will develop and implement a Project-specific OHS Plan and related procedures for the management of Project-related OHS risks in line with the Project Standards. Through compliance with the requirements of the OHS Law (Law No. 6331, 2012) and implementation of the OHS Plan and procedures by the Contractor and subcontractors, the potential OHS risks and/or impacts on Project personnel associated with labour and working conditions will be aimed to be managed in line with the Project Standards.

Due to the high number of potential lower-tier subcontractors to be involved in the Project, additional management, training and monitoring measures are anticipated to be required to ensure, to the extent possible, that the OHS performance of the Project subcontractors consistently fulfils the requirements of Project Standards. Especially, management of subcontractors through a well-established subcontractor management system is of utmost importance to cascade Contractor's OHS requirements to main and lower tier subcontractors (through contractual requirements covering implementation, training and monitoring aspects as well as establishment and application of an adequate penalty system addressing OHS incompliance) and avoid OHS incidents/accidents that may result in significant risks and impacts for Project's direct and contracted personnel. The subcontractors will be enforced to operate in compliance with the Project-specific OHS Plan and the Subcontractor Management Plan will be implemented to ensure and monitor compliance of subcontractor implementations with the Project-specific management plans including the OHS Plan. The OHS risks due to emergency situations will be managed through development and implementation of the Project-specific EPRPs during the construction and operation phases of the Project.

The operation phase OHS Plan and procedures will be developed and implemented by the Employer/Operator. The planning regarding the contractor and subcontractor personnel and the personnel of the affiliated enterprises of the Operator to be involved in the operation phase activities will further be done by the Employer/Operator.

COVID-19 pandemic related risks on Project personnel, will be managed through a separate COVID-19 EPRP that will be prepared in line with the Interim Advice of IFC (May 2020) for IFC Clients on Developing a COVID-19 EPRP.

The potential impacts of the Project related to labour and working condition (including OHS), significance of the impacts prior to mitigation, proposed mitigation measures and the significance of residual impact are summarised

in Table 12-5. In the assessment of impact significance, impacts magnitude factors have been determined based on professional judgement. For the assessments related to OHS and working conditions, the receptor sensitivity level has always been assumed as high as this can affect human health, safety and welfare. Sensitivity level has been assumed as medium for receptors subject to other impact types.

Prior to start of superstructure works in Section 3a, 3b, 4a and 4d (at the time these sections of the Project will be handed over to the Contractor for the superstructure works), any outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances in Sections 3a, 3b, 4a and 4d related to labour and working conditions of other contractors (see Chapter 1 for the definition of other contractors) that completed the infrastructures works in these sections will be assessed by an E&S Audit to be carried out by the Contractor.

The contractors for the ongoing infrastructure works of Sections 3a, 3b, 4a and 4d are contractually required to comply with the national legislation. The main gaps between the national legislation and international standards with respect to labour and working conditions can be summarised as below:

- Development and implementation of a Project-specific Human Resources Policy and relevant plans and procedures is not required by the national legislation.
- Workers accommodation conditions as stipulated by the IFC/EBRD is not applicable under the national legislation.
- Project-specific worker's (internal) grievance mechanism is not required by the national legislation.
- Project-specific Environmental and Social Management System (ESMS) incorporating the subcontractor and supply chain management plans is not required by the national legislation.

For the E&S Audit, the relevant documentation related to labour and accommodation conditions will be requested (through the Employer) during the site hand over and outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances, if any, will be identified for incorporation to the Management and Corrective Action Plan, as appropriate:

- Information on the contractors, subcontractors and number of workforce involved in the infrastructure works (direct and contracted)
- Documentation related to compliance of labour practices with the requirements of applicable national legislation (e.g. Labour Law, OHS Law, secondary legislation) including employment related documents, permits, legal notifications/registrations, documentation on OHS services, training plans and records, etc.)
- Labour and OHS related policies, plans and procedures developed and implemented (e.g. HR Policy, OHS Plan, procedures, etc.)
- Internal grievance mechanisms and registers
- OHS statistics (including fatalities), root cause analyses for major accidents
- Retrenchment/employment termination procedures
- Labour related audit reports of the authorities
- Internal audit reports on labour-related aspects

Following this audit, a Management and Corrective Action Plan will be developed and implemented for these sections of the Project. The implementation responsibilities for the Management and Corrective Action Plan will be further clarified between the Employer and the Contractor.

Table 12-5. Impacts, Proposed Mitigation Measures and Residual Impacts (Labour and Working Conditions)

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Risks and/or impacts associated with management of worker relationship and working conditions	• Land Preparation and Construction	• Contractor personnel (direct)	Restricted	Low to high	Short to medium term reversible	Short to medium term	One-off to Intermittent	Low to Medium	Medium	Minor to Moderate	<ul style="list-style-type: none"> Project-specific HR Policy, covering the following labour aspects, will be developed and implemented in line with IFC Guidance Note 2: <ul style="list-style-type: none"> Working relationship Working conditions and terms of employment Workers' organisations Non-discrimination and equal opportunity Retrenchment Grievance mechanism Child Labour Forced Labour OHS Workers engaged by third parties Supply chain The Project-specific HR Policy will be posted at the work and accommodation sites of the Contractor and subcontractors (main and lower-tier). In line with the Project-specific HR Policy, Project-specific Labour Management Plan will be developed and implemented. All Project personnel (direct and contracted) will be provided with documented information (through employment contracts and supporting documentation) that is clear and understandable, regarding their rights under national Labour Law (Law No.4857, 2003), applicable collective agreements, including their rights related to hours of work, duration of works throughout Project's construction period, wages, overtime, compensation, and benefits at the time of employment and when any material changes occur. Project-specific Subcontractor Management Plan, covering the following points at minimum, will be developed and implemented. <ul style="list-style-type: none"> E&S requirements for main and lower tier subcontractors, including responsibilities related to documentation, implementation, training (e.g. induction, job-specific and refresher), monitoring and corrective actions Requirements and procedures related to inclusion of E&S requirements in main and lower tier subcontractor contracts/agreements Penalty system to be applied for incompliance related to labour and working conditions including OHS Project-specific SEP, including internal grievance mechanism, will be implemented (see stand-alone SEP for details of the mechanism). Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and labour aspects (including child labour, works permitted by law for workers under the age of 18, etc.) at the time of employment (refresher training will be provided annually and as required). The Contractor will develop and implement an internal audit system and workplace inspection system to check and monitor compliance of the Contractor and subcontractor implementations with the requirements of the following Project-specific documents; <ul style="list-style-type: none"> HR Policy Subcontractor Management Plan Labour Management Plan 	Negligible
		• Subcontractor (main and lower-tier) personnel (contracted)	Restricted	Low to high	Short to medium term reversible	Short to medium term	Intermittent to Recurrent	Medium to High	Medium	Moderate to Major		

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											- Internal Grievance Mechanism as part of Project SEP	
Risks and/or impacts associated with on-site accommodation conditions including: <ul style="list-style-type: none"> - Health and safety risks on Project personnel accommodating at on-site facilities - Spread of diseases/COVID-19 - Reduced worker motivation - Internal grievances 	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Contractor personnel (direct) 	Restricted	Low	Short term reversible	Short term	Continuous	Low	Medium	Minor	<ul style="list-style-type: none"> Project-specific Camp Site Management Plan, setting out the on-site accommodation conditions including safety and quality of catering/kitchen services, will be developed and implemented at Contractor and Subcontractor (main and lower-tier) construction camp sites (through contractual requirements), addressing the following requirements of IFC/EBRD's Guidance Note on Worker's Accommodation (2009): <ul style="list-style-type: none"> Heating, air-conditioning and ventilation to be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time. An adequate supply of potable water to be available in the same buildings where bedrooms or dormitories are provided. Drinking water is to meet local or WHO drinking water standards and water quality to be monitored regularly. Wastewater treatment and effluent discharge as well as solid waste treatment and disposal are to comply with Project Standards and be adequately designed to prevent contamination of any water body, to ensure hygiene and to avoid the spread of infections and diseases, the proliferation of mosquitoes, flies, rodents, and other pest vectors. Pest extermination, vector control and disinfection to be carried out throughout the living facilities in compliance with local requirements and/or good practice. Where warranted, pest and vector monitoring to be performed on a regular basis. The standards of the rooms or dormitory facilities to be adequate to allow workers to rest properly and to maintain good standards of hygiene. In collective rooms, which are minimised, in order to provide workers with some privacy, only a reasonable number of workers to be allowed to share the same room. Density standards to ensure 10 to 12.5 cubic metres (volume) or 4 to 5.5 square metres (surface). A minimum ceiling height of 2.10 metres to be provided. A minimum space of 1 metre to be kept between beds. Facilities for the storage of personal belongings for workers to be provided (e.g. individual cupboard for each worker to providing 475 litre big lockers and 1 metre of shelf unit). Separate storage for work boots and other personal protection equipment, as well as drying/airing areas to be provided. Shower/bathroom facilities to be provided with an adequate supply of cold and hot running water. Handwash facilities are to consist of a tap and a basin, soap and hygienic means of drying hands. An adequate number of handwash facilities to be provided to workers. Handwash facilities are to consist of a tap and a basin, soap and hygienic means of drying hands. An adequate number of shower/bathroom facilities to be provided to workers. 	Negligible
		<ul style="list-style-type: none"> Subcontractor (main and lower-tier) personnel (contracted) 	Restricted	Low to High	Short term reversible	Short term	Continuous	Low to High	Medium	Minor to Major		

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<ul style="list-style-type: none">- Adequate canteen, cooking and laundry facilities and equipment to be provided.- Basic leisure and social facilities to be provided to workers to rest and socialise during their free time.- A specific fire safety plan to be prepared, including training of fire wardens, periodic testing and monitoring of fire safety equipment and periodic drills.- A number of first aid kits adequate to the number of residents to be available. First aid kits to be adequately stocked. Where possible a 24/7 first aid service/facility to be available.- Food provided to workers is to contain an appropriate level of nutritional value; different choices of food must be served if workers have different cultural/ religious backgrounds. <ul style="list-style-type: none">• The construction camp site designs will take into consideration GBVH hotspots for personnel, visitors and suppliers.• Smoke detectors will be provided separately at each dormitory room.• Pedestrian separation and security/site entry measures will be adequately taken at the construction camp sites.• Adequate shelters for resting and dining, portable toilets and waste management facilities (e.g. separate waste bins for organic waste, recyclables, hazardous waste, etc.) will be provided for Contractor and subcontractor personnel working along the railway route, remote from construction camp site locations.• Project-specific Waste Management Plan and Water and Wastewater Management Plan will be developed and implemented at the on-site accommodation facilities and at the resting and dining locations of the off-site/remote work sites.• Contractor and subcontractor personnel will be provided with training on Project's Social Policy and Contractor's Code of Conduct covering Project's approach to prevention of GBVH, at the time of employment (refresher training will be provided annually and as required).• Contractor and subcontractor personnel will be provided with training on the Camp Site Management Plan, including general waste management, good housekeeping, hygiene and food safety practices, at the time of employment (refresher training will be provided annually and as required).• The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor (main and lower-tier) with Project Standards on-site accommodation as set out in the Camp Site Management Plan.• Project-specific SEP, including internal grievance mechanism, will be implemented.• In case GBVH is reported through the internal grievance mechanism, this will be investigated by trained investigators and responded in accordance with current GIIPs.	
OHS risks and impacts due to Project activities	• Land Preparation and Construction	• Contractor personnel (direct)	Restricted	Low to High	Short term reversible to Irreversible	Short term	Intermittent	Low to High	High	Minor to Major	• Project-specific H&S Policy to be developed by the Contractor and implemented by the Contractor and subcontractors.	Minor to Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
		<ul style="list-style-type: none">Subcontractor (main and lower-tier) personnel (contracted)	Restricted	Low to High	Short term reversible to Irreversible	Short term reversible to Irreversible	Intermittent/re current	Low to High	High	Minor to Major	<ul style="list-style-type: none">The Project-specific H&S Policy will be posted at the work and accommodation sites of the Contractor and subcontractors (main and lower-tier).In line with the H&S Policy, Project-specific OHS Plan, covering the following subjects at minimum, will be developed by the Contractor and implemented by the Contractor and subcontractors (through contractual requirements).<ul style="list-style-type: none">Risk AssessmentJob Hazard AnalysisPermit to Work SystemFitness to WorkMachinery and Equipment Inspections and Control FormsPersonal Protective Equipment (PPE)Health Units and PersonnelHazard-specific MeasuresOHS TrainingNear Miss ReportingIncident/Accident ReportingRoot-cause AnalysisEmergency Preparedness and ResponseOccupational Hygiene MeasurementsOHS TargetsMonitoring and ReportingBased on the Project-specific OHS Plan, the following H&S procedures will be developed and implemented for specific-hazards types:<ul style="list-style-type: none">Accident Incident Notification and Reporting ProcedureEmergency Response ProcedureEquipment Control and Maintenance ProcedureExcavation Backfilling ProcedureHazardous Materials Management ProcedureHealth and Safety Discipline ProcedureHealth and Safety Trainings Implementation ProcedureHot Work ProcedureJourney Safety and Safe Driving ProcedureLock-out/Tag-out ProcedureLifting Work ProcedureMachinery Protection ProcedureManual Handling ProcedureNight Work ProcedurePermit to Work ProcedurePersonal Protective Equipment ProcedureScaffold and Ladder Usage ProcedureTraffic Safety Management ProcedureWarning Signs and Barrier ProcedureWorking at Height and Fall Protection ProcedureWorking in Confined Space Procedure (covering a clear and simple identification of the confined space examples within the Project, specification of legislative requirements, rescue operations, etc.)The Contractor and subcontractors will procure required OHS services, in accordance with the scope and durations stipulated in the legislation, by certified OHS Specialists (in-house or from licensed Joint Health and Safety Units).	

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<ul style="list-style-type: none">• Health unit/infirmaries will be provided at the construction camp sites as per the requirements of the applicable national legislation (e.g. workplace doctor and other health personnel will be provided in line with the legislative requirements according to hazard classes, in consideration of work shifts).• Adequate number of trained first aiders, with valid certifications from authorised institutions, will be provided at the work sites. Shifts and working arrangements will be accordingly.• Risk assessments tailored to each work activity will be conducted by risk assessment team as specified in the Regulation on Risk Assessment for Occupational Health and Safety (working at height, electrical works, working with hazardous materials, working in tunnels, excavation works, heavy lifting, etc.) and the precautions and mitigation measures identified in the risk assessments will be communicated by the Contractor to all direct and contracted Project personnel for site implementation.• An OHS Training Plan will be developed by the Contractor and OHS trainings, including mandatory OHS training (16 hours as per national legislation), job-specific training, toolbox, refresher OHS training, first-aid, safety leadership, visitor orientation, vocational training and driving safely training will be provided to Contractor and subcontractor personnel in line with the OHS Training Plan.• Personnel who will be responsible for conduction works with specific hazards will be properly trained on the specific job type.• Job-specific toolbox trainings will be conducted at the beginning of each new work activity and at least once per week by competent personnel such as OHS Specialists and/or trained foremen.• Certified first aid trainings will be conducted with sufficient number of Project personnel (direct and contracted) in line with national legislations and the national requirements will be ensured.• Firefighting and search and rescue teams will be established with sufficient number of Project personnel (direct and indirect) in line with national legislations.• Project orientation and basic OHS training will also be provided to visitors and use of related PPEs are enforced.• Incident/accident reporting (including near miss), investigation and recording systems will be established in line with the OHS Plan. Incidents and accidents, findings of the root cause analysis and corrective actions planned for specific work sites will be communicated to OHS personnel.• The permit to work system will be established to include the definition of the work to be done, clear definition of the specific risks/hazards of the work activity, all precautions to be taken, who will be working under that specific work permit, and documentation ensuring that the people doing the job understand the risks of the activity.• Under the Health and Safety Discipline Procedure, a penalty and/or reward system will be established by the Contractor (with input from related departments such as HR, legal, etc.) in order to define the actions to be taken/processes to be followed in case of non-compliances/major E&S incidents (e.g. issuance of notices or warnings, actions to be taken in the case of repeated notices) or satisfactory/exceeding E&S performance.	

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<ul style="list-style-type: none">• Adequate and sufficient PPE will be provided by Contractor and subcontractor OHS teams for all Project personnel (direct and contracted) and visitors and replacement stocks will be kept at site in adequate numbers. The Contractor and subcontractor OHS teams will provide necessary information and training related to the effective and safe usage of the PPEs. Adequate use of PPE by all direct and contracted Project personnel for different types of work activities will be ensured through contractual requirements and monitoring by the Contractor and certified OHS specialist.• Medical checks will be conducted for all Project personnel (direct and contracted) at the beginning of employment and then periodically.• Occupational health and safety measurements will be conducted according to the risk assessments, e.g., personal dust exposure, noise, vibration, etc.• All equipment and vehicle will be checked periodically within the legally required intervals and maintained regularly. All areas prior to initiation of work for overhead electricity lines and underground services will be checked and safe distance during works will be ensured.• The following Project-specific environmental management plans, which has aspects relevant to the management of health and safety of the Project personnel, will be developed and implemented by the Project personnel (direct and contracted):<ul style="list-style-type: none">- Air Quality and GHG Management Plan- Hazardous Materials Management Plan will be developed and implemented (including pesticide use and management, if planned in the scope of the Project)- Noise and Vibration Management Plan- Waste Management Plan- Water and Wastewater Management Plan• Project-specific Stakeholder Engagement Plan including internal grievance mechanism will be implemented throughout the Project.• The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor (main and lower-tier) with the requirements of OHS Plan and procedures.• Detailed job-specific OHS measures will be described in the OHS procedures and will be implemented by the Contractor and subcontractors. These measures will include but not limited to the following:• Speed limits will be set for on-site and off-site traffic and the right of way practices will be implemented.• Appropriate exclusion zones will be set and maintained below any lifting and working at height activities to avoid incidents/accidents due to falling objects.• Fall protection systems will be in place during works at height (e.g. fall arrest equipment, etc.).• Personnel that will conduct lifting activities will be specifically trained regarding the job type.• Major on-site lifting operations will be planned in scheduled and planned in advance taking into account the weather conditions.	

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			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<ul style="list-style-type: none">• Areas for the loading/unloading of materials will be clear of traffic, pedestrian and Project personnel. Loads should be spread evenly as uneven loads can make the vehicle unstable and loads will be secured as to not slide around in/on the vehicle.• Before unloading, checks will be made to make sure loads/materials have not shifted during the transit and are not likely to move or fall when restraints are removed.• All tools and equipment will be appropriately positioned whilst working at height to avoid falling of objects.• A traffic signalling/signalmen team will be established to work at construction sites together with heavy construction machineries to prevent any incidents and/or accidents that may result due to the limited view of machinery operators.• Limits on manual lifting/handling will be implemented throughout the Project activities.• Guard rails, warning signs will be installed at the work sites.• Sufficient illumination will be provided at all work sites.• Regular visual checks will be conducted and excavation debris and other potential risk sources such as cables and ropes will be maintained /cleaned-up after work activities.• Operation of heavy machinery will be restricted to those that are trained and competent (licensed if required).• Only competent and authorised personnel will be permitted using the hazardous materials and substances.• Safety Data Sheets (SDS) written in the native language of the workers for each hazardous material will be kept at the hazardous materials storage areas and at work sites that the materials are used.• Hazardous materials will be managed and stored in designated areas with secondary containment as per WBG General EHS Guidelines, keeping absorbent pads or materials next to storage areas and keeping drums and containers containing fuel, oil or other chemicals in a containment with a capacity of up to 110% of the volume of material stored. Spill kits will be provided, and fire detection and prevention systems will be established in hazardous materials storage areas in case of any spillage and leakage.• Under the Hazardous Materials Management Plan, a Blasting Procedure, defining the principles for explosives transportation, loading/unloading, storage, communication (informing the communities, alarm system), etc., will be developed and implemented. A schedule will be established for the blasting operations in the quarries used for the material extraction requirements of the Project and for engineering structures and the proper planning will be provided for these activities.• On-site operations will be scheduled and planned well in advance taking into account the weather conditions and details of the operation to be communicated to all site personnel on time. Work at height activities and lifting activities will not be conducted during heavy rain/storm and other poor/extreme weather conditions.	

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
	<ul style="list-style-type: none">• Operation	<ul style="list-style-type: none">• Operator personnel• Personnel of contractors/subcontractors	Restricted	Low to High	Short term reversible to Irreversible	Short term reversible to Irreversible	Intermittent/ recurrent	Low to High	High	Minor to Major	<ul style="list-style-type: none">• For the operation phase of the Project, detailed planning of the operation and maintenance (O&M) workforce (direct and contracted) requirements of the Project will be done by the Employer and the Operator in due course. Project-related labour and working conditions at the Project facilities during the operation phase will be in line with the requirements of the Labour Law (Law No. 4857, 2003). The labour-related policies, plans and procedures to be implemented during the operation phase will be decided by the Operator.• Measures to be taken for the safety of the personnel who has to work on rails will be taken in line with Operator's safety procedures. Consistent with the national EIA Report;<ul style="list-style-type: none">- Access of maintenance personnel to the railroad on foot to be provided by taking appropriate safety measures (i.e. trackside walking paths). At locations where there are steps and ramps with access to the trackside walking path, flat platforms with non-slippery surfaces to be established on both sides.- An automatic warning system to be installed st locations where the works are to be performed while the trains are in motion, if the setting is not suitable for the personnel to see the approaching train and have enough time to leave their work area for reaching a safe place.- The locations where where the personnel will not be permitted to work on the railway while trains are in motion, working prohibition will be clearly identified by means of sufficient number of warning to be posted on both sides of such sections, as well as potential access points, including all platform edges.• The following measures of the WBG EHS Guidelines for Railways are applicable to the operation phase of the Project, as appropriate in line with Operator's :<ul style="list-style-type: none">- Against the risk of exposure to moving trains, (i) training workers in personal track safety procedures; (ii) blocking train traffic on lines where maintenance is occurring ("green zone working") or, if blocking the line is not feasible, use of an automatic warning system or, as a last resort, human lookouts, and (iii) design and construction of rail lines with adequate clearance for workers- Training of the workers exposed to electrical hazards from electrified railways on personal track safety and permitting only workers who are specifically trained and competent in working with overhead lines to approach these systems.- Avoiding/minimising occupational electric and magnetic (EMF) field exposure through the preparation and implementation of an EMF safety program including (i) establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, and limiting access to properly trained workers; and (ii) implementation of an action plan to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE).	

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											<ul style="list-style-type: none">- Against the risk of exposure of crew members to noise and vibration, (i) use of air conditioning systems to maintain cabin temperature and provide fresh air so that windows can remain closed, limiting wind and outside noise; (ii) application of available engineering controls, (iii) use of personal protective equipment (PPE) if engineering controls are not feasible or adequate to reduce noise levels; (iv) use of dampers at the seat post to reduce the vibration experienced by the operator; (v) installation of active vibration control systems as needed.- Scheduling rest period of the critical operation personal including drivers, signalers, maintenance workers, and others whose work is critical to safe operation, at regular intervals and during night hours, to the extent feasible, to maximise the effectiveness of rest breaks, and in accordance with international standards and good practices for work time.- If hazardous materials such as solvents, coolants, acids, and alkalis, are to be used in the maintenance operations. hazardous materials management strategies are to include (i) use of aqueous detergent cleaning solutions or steam cleaning, or use and recycling of cleaning solvents; (ii) Use of water-based paints; and (iii) use of track mats to retain wayside grease and other contaminants;	
Building demolition works	<ul style="list-style-type: none">Land Preparation and Construction	<ul style="list-style-type: none">Contractor and subcontractor personnel involved in demolition works	Restricted	Low to High	Short term reversible to Irreversible	Short term reversible to Irreversible	One-off to Intermittent	Low to Medium	Medium	Minor to Moderate	<ul style="list-style-type: none">The building works during the construction phase will be conducted in line with the requirements of the Regulation on Waste Management and Regulation on the Control of Excavation Soil, Construction and Demolition Waste, the Regulation on Health and Safety Measures in Working with Asbestos, Regulation on the Assessment and Management of Air Quality and Regulation on Assessment and Management of Environmental Noise. To this end, specific requirements defined for the demolition works, including occupational health and safety measures to be taken for the protection of employee health and safety, measures against dust and noise generation, management of hazardous demolition wastes will be fulfilled.	Negligible

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Risks and impacts of off-site accommodation conditions on Project personnel (Risks and impacts of Project-related off-site accommodation on local communities is discussed in Chapter 13 “Community Health and Safety”)	• Land Preparation and Construction	• Contractor and subcontractor (main and lower-tier) personnel (contracted)	Wide	Low	Short term reversible	Short term	Continuous (for the duration of the employment for construction)	Low	Medium	Minor	<ul style="list-style-type: none">• The Project-specific Labour Management Plan will cover off-site accommodation conditions and requirements for the Contractor and subcontractor personnel.• The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with the requirements of the Labour Management Plan covering the off-site accommodation aspects.• Service buses will be provided for the non-local workers (direct and contracted) accommodating at off-site accommodation facilities to ensure safe travel of the Project workers to the Project sites.• Project-specific Stakeholder Engagement Plan including internal grievance mechanism will be implemented throughout the Project.	Minor
Retrenchment of construction personnel at the end of the Project	• Land Preparation and Construction	• Contractor personnel	Restricted	Medium	Medium term reversible	Short term	One-off	Medium	Low	Minor	<ul style="list-style-type: none">• Project-specific HR Policy will be developed and implemented in line with IFC Guidance Note 2.	Negligible
		• Subcontractor (main and lower-tier) personnel (contracted)	Restricted	High	Medium term reversible	Short term	One-off	High	Medium	Major	<ul style="list-style-type: none">• All Project personnel (direct and contracted) will be provided with documented information (through employment contracts and supporting documentation) that is clear and understandable, regarding their rights under national Labour Law (Law No. 4857, 2003) and duration of works throughout Project’s construction period.• Termination of employment for Contractor and subcontracted personnel will be conducted in compliance with the applicable requirements of the Labour Law (Law No. 4857, 2003) and IFC PS2.• Project-specific Stakeholder Engagement Plan including internal grievance mechanism will be implemented.• Contractor’s HR team will monitor and check compliance of the employment termination process applied across the Project.	Minor to negligible

OHS risks due to emergency situations, including COVID-19 pandemic	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Contractor and subcontractor (main and lower-tier) personnel (contracted) 	Restricted	Low to High	Short term reversible to Irreversible	Short term	Intermittent	Low to High	High	Moderate to Major	<ul style="list-style-type: none"> A Project-specific EPRP will be developed as a stand-alone document to describe provide preventive measures and response strategies to manage potential incidents/accidents and to protect the personnel and community health, safety and environment. The EPRP will include, but not limited, to the following emergency situations: <ul style="list-style-type: none"> Earthquakes Emergencies related with working at height Emergencies related with works in confined spaces (including tunnels) Environmental incidents First aid and incidents and accidents that require evacuation Fire (including specifications for fire emergencies in tunnels) Health and safety incidents including community health Poisoning Sabotage / terrorist attack Unfavourable weather conditions (flood, snowfall, etc.) EPRP to be develop will include at least the following management principles: <ul style="list-style-type: none"> Roles and responsibilities of the emergency teams (including contact numbers) Emergency situations and specific preparedness requirements Emergency response measures/actions Description and usage of emergency response and rescue equipment Emergency trainings and drills (including yearly plans) COVID-19 pandemic related risks on Project personnel, will be managed through a separate COVID-19 EPRP that will be prepared by the Contractor in line with the Interim Advice of IFC (May 2020) for IFC Clients on Developing a COVID-19 EPRP. This EPRP will also be communicated and endorsed to subcontractor personnel. The Contractor will ensure enough personal space is provided in the accommodation facilities and service buses to respect social distancing requirements. Health conditions of the personnel will be checked regularly such as temperature checks, random health checks. Adequate COVID-19 PPE will be provided and regular disinfection services will be conducted in accommodation facilities, offices and service buses. Isolation facilities/accommodation rooms in case of a workers COVID-19 test resulting positive will be provided. Wastes generated due to COVID-19 such as used masks, personal hygiene materials and gloves will be managed in accordance with the Circular issued by MoEU entitled 'COVID-19 Measures for the Waste Management of Single Use Masks, Gloves and Other Personal Hygiene Materials' (No. 2020/12, dated April 7, 2020). As per the Circular (No: 2020/9) published by the MoEU on 20 March 2020, the following measures will be taken at the work sites, dormitories and social facilities of the Contractor and subcontractor work/camps sites: <ul style="list-style-type: none"> Information posters of the Ministry of Health regarding the measures to be taken for the COVID-19 will be posted on various locations at the construction sites. In case of natural ventilation in public areas such as dormitories, cafeterias, and social facilities is not enough, the Contractor will consider the usage of air cleaning devices using carbon filter, electrostatic filter, hepafilter, 	Negligible
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Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											<div>active oxygen and UV technology (according to the capacity per m2/per person).</div> <div><div>-</div>If the capacity of the cafeterias is insufficient, shift systems will be used at cafeterias to provide social distancing amongst the personnel.</div> <div><div>-</div>Common material usage will be prohibited in places such as dormitories, cafeterias and social facilities. Personal materials such as paper towels, disposable cups, liquid soap dispensers and packaged salt, sugar, spices and packaged bread, etc. will be used in the dormitories and cafeterias.</div> <div><div>-</div>Necessary cleaning measures will be taken in sections with wet areas such as WC, bathroom, and disinfectants will be available in the construction sites, dormitories and cafeterias.</div> <div><div>-</div>Rotational or remote working system will be introduced in offices where desk work is performed.</div> <div><div>-</div>Visitors will not be permitted to the construction site without masks, gloves and without performing temperature checks.</div> <div><div>-</div>PPEs such as helmets, gloves and vests will not be shared amongst personnel.</div> <div><div>-</div>Risk and Control Plan will be prepared in line with the relevant legislation of the Ministry of Health.</div> <div><div>-</div>In suspicious cases, the person will be taken to an isolated environment as soon as possible and health institutions and the site chief will be informed. In all suspicious cases, the 14-day rule determined by the Ministry will be applied.</div> <div><div>-</div>Forms for temperature measurements and hygiene check will be kept for the construction sites regularly.</div>	
	<div>• Operation</div>	<div>• Operator personnel</div> <div>• Personnel of contractors/ subcontractors</div>	Restricted	Low to High	Short term reversible to Irreversible	Short term	Intermittent	Low to High	High	Moderate to Major	<div>• The Employer/Operator will develop and implement the EPRP for the operation phase (with special measures for emergencies at the HSRs, tunnels, engineering structures, stations/gars). The operation phase EPRP will consider the relevant aspects of the construction phase EPRP, as appropriate.</div>	Negligible

13. COMMUNITY HEALTH AND SAFETY

This Chapter provides baseline information on the existing conditions associated with the community health and safety (CHS) and explains the Project's approach to the management of CHS issues to ensure compliance with the applicable legislative requirements as well as international standards.

This Chapter is to be read in conjunction with the following chapters, which describe the existing conditions and measures to be taken as per the Project Standards to avoid/minimise the potential Project risks and impacts on environmental and ecological receptors, Project personnel (direct and contracted) as well as health, safety and welfare of the local communities:

- Chapter 5 on Land Use and Geology, which covers the regional risk of sinkhole occurrence in Sivrihisar district of Eskisehir province (in approximately 4 km south of Railway KM 56+250 – 63+250) that may pose CHS risks particularly during the long-term operation of the railway by the Operator. Inter alia, the Chapter presents measures to be taken by the Contractor as part of the design and construction works in collaboration with the relevant governmental and non-governmental organisations.
- Chapter 6 on Noise and Vibration, which covers the background environmental noise levels and assessment of environmental noise at the nearby residential receptors to be caused by the construction and operation activities along the railway route and at quarry/material borrow sites as well as vibration effect due to blasting operations to be practiced in the scope of the Project.
- Chapter 7 on Air Quality and GHG Emissions, which covers the baseline concentrations of the relevant air pollutants and the assessment of impacts of air and GHG emissions on the nearby receptors to be caused by the construction and operation activities along the railway route and at quarry/material borrow sites during material extraction.
- Chapter 8 on Water and Wastewater Management, which covers the existing water quality of the main water resources crossed by the Project and the use of water as well as measures to be taken for the management of wastewaters generated as a result of Project activities.
- Chapter 9 on Waste Management, which covers sound management of hazardous and non-hazardous wastes at the construction camp and work sites during the construction phase and as well as within the high-speed trains and at the Operator's operation and maintenance (O&M) facilities.
- Chapter 11 on Socio-economy, which covers management of social impacts including risks and impacts on the health, safety and welfare of the local communities (e.g. risks and impacts caused by Project-related traffic, Project impacts on local infrastructure services which are restored upon completion of construction activities at respective work sites, etc.).
- Chapter 12 on Labour and Working Conditions, which covers management of CHS issues and/or risks that may be sourced by Project-related accommodation arrangements, including on-site and off-site accommodation, interaction/communication between Project personnel and local communities mainly during the construction phase, and CHS risks that may be posed by the activities of the O&M workforce, etc.

In addition, as discussed in Chapter 16 on Stakeholder Engagement, a stand-alone Stakeholder Engagement Plan (SEP) has been prepared for the Project in line with EP4 (2020) and IFC PSs (2012). The SEP, including an External Grievance Mechanism as per IFC PS1, will be instrumental in managing of CHS related issues, risks and impacts throughout the Project.

The CHS issues addressed in this Chapter specific to the operation phase including⁹³ general rail operational safety, transport of dangerous goods, and pedestrian safety (safety of O&M workforce is covered in Chapter 12 on Labour and Working Conditions).

⁹³ The Ankara-Izmir HSR Project does not include level crossings, which pose significant CHS risks in conventional railway projects.

13.1. Project Standards

The following national legislation will be key to the management of CHS risks and impacts:

- Highways Traffic Law (Law No: 2918, 1983)
- Regulation on Highways Traffic
- Regulation on the Transportation of Hazardous Substances by Road
- Regulation on the Implementation of the Law Concerning Private Security Services
- Regulation on the Investigation and Review of the Railway Accidents and Incidents
- Regulation on Transportation of Dangerous Goods by Railway
- Railway Safety Regulation

Regarding the management of COVID-19 related risks that may stem from the Project work sites and pose CHS risks, the Ministry of Environment and Urbanisation (MoEU) has published a Circular entitled 'COVID-19 Measures for the Waste Management of Single Use Masks, Gloves and Other Personal Hygiene Materials' (Circular Date: 7 April 2020; Circular No. 2020/12) for the management of COVID-19 related wastes such as masks, gloves and other personal hygiene materials. The requirements of this Circular will be applicable at the Project construction camp sites and other off-site work sites such as concrete plants, quarries, material borrow sites, etc. (should they be located outside the expropriation corridor), and as relevant at the O&M facilities should the pandemic conditions prevail.

Additionally, for the management of COVID-19 pandemic related risks at the construction camp sites, the MoEU published a Circular (No: 2020/9) on 20 March 2020 defining the measures to be taken at the work sites, dormitories and social facilities.

The international standards with applicable requirements related to management of CHS issues in the scope of the Project includes the following:

- IFC PS 4 on Community Health, Safety and Security
- IFC Interim Advice for IFC Clients on Developing a COVID-19 Emergency Preparedness and Response Plan (EPRP) (2020)
- CDC Group, EBRD and IFC Emerging Good Practice for the Private Sector on Addressing Gender-Based Violence and Harassment (2020)
- IFC Good Practice Note on Managing Contractors' E&S Performance (2017)
- IFC Good Practice Handbook on Use of Security Forces: Assessing and Managing Risks and Impacts (2017)
- IFC Good Practice Note on Addressing Grievances from Project-Affected Communities (2009)
- IFC Handbook for Addressing Project-Induced In-Migration (2009)
- IFC Introduction to Health Impact Assessment (2009)
- IFC Stakeholder Engagement Handbook: A Good Practice Handbook for Companies Doing Business in Emerging Markets (2007)
- Guidance Note on Implementation of Human Rights Assessments under EPs

- World Bank Group (WBG) General Environmental, Health and Safety (EHS) Guidelines (2007)
- WBG EHS Guidelines on Railways (2007)
- WBG EHS Guidelines for Construction Materials Extraction (2007)

13.2. Baseline Conditions

The main data sources used to compile the baseline information are listed below:

- General Directorate of Forestry (<https://www.ogm.gov.tr>) Yearly Official Statistics on Forest Fires
- General Directorate of Forestry (<https://cbs.ogm.gov.tr/vatandas/>) E-map Application for Distribution of Forest Area
- Population statistics for 2020 published by Turkish Statistical Institute (TurkStat)
- COVID-19 Statistics of World Health Organisation (WHO) for Turkey (<https://www.who.int/countries/tur>)
- Websites of the following municipalities:
 - Afyonkarahisar Municipality (<https://www.afyon.bel.tr/Default.aspx>)
 - Ankara Metropolitan Municipality (<https://www.ankara.bel.tr/>)
 - Eskisehir Metropolitan Municipality (<https://www.eskisehir.bel.tr/ebb.php#>)
 - Izmir Metropolitan Municipality (<https://www.izmir.bel.tr/>)
 - Kutahya Municipality (<https://www.kutahya.bel.tr/>)
 - Manisa Metropolitan Municipality (<https://www.manisa.bel.tr/>)
 - Usak Municipality (<https://www.usak.bel.tr/>)

The Project route passes through the provincial boundaries of Ankara, Eskisehir, Afyonkarahisar, Kutahya, Usak, Manisa, Izmir. A list of settlements affected from potential impacts of the Project (due to Project-related land acquisition, construction works and operation of quarries and material borrow sites) is presented in Appendix A. Detailed information on the demographics and socio-economic conditions of these settlements and maps showing the locations of the settlements are presented in Chapter 11 on “Socio-economy”.

13.2.1. Overview of COVID-19 Pandemic in Turkey

The first COVID-19 case was encountered in Turkey in March 2020. Figure 13-1 shows the total number of confirmed cases and number of daily new cases in Turkey from the beginning of 2021.

In November 2020, Ministry of Internal Affairs have published a Circular dated (effective from 20 November 2020)⁹⁴ on the restrictions to be applied throughout the country (including restrictions on weekdays and weekend long curfews, etc.). On 2 March 2021, Ministry of Interior has published the decisions⁹⁵ taken on the controlled normalisation process after the Cabinet Meeting held under the chairmanship of the President on 1 March 2021.

⁹⁴ <https://www.icisleri.gov.tr/koronavirus-salginini-yeni-tedbirler>

⁹⁵ <https://icisleri.gov.tr/koronavirus-ile-mucadelede-kontrollu-normallesme-sureci>

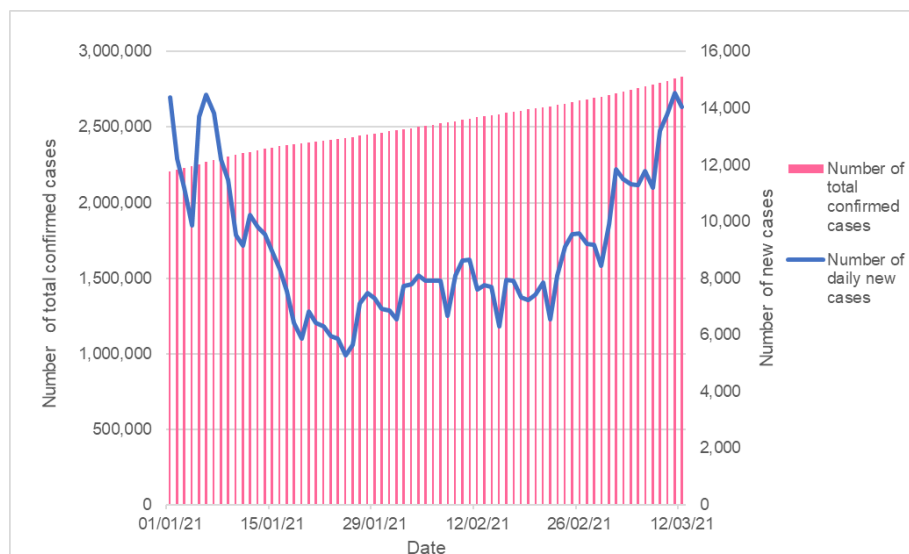


Figure 13-1. Overview of COVID-19 Pandemic in Turkey between 1 January 2021 and 12 March 2021

Source: WHO, February 2021 (<https://www.who.int/countries/tur>)

The Republic of Turkey Ministry of Health has started publishing weekly case numbers (per 100 Thousand Population) by mid-February 2021. Table 13-1 shows the number of cases for the week of 6-12 March 2021 for each province crossed by the Project. As of 12 March 2021, cumulative number of COVID-19 cases has reached 2.85 million.

Table 13-1. Number of COVID-19 Cases (per 100 Thousand Population and Weekly New Cases) in Provinces Crossed by the Project (for the week of 6-12 March 2021)

Province	Population (for 2020)	Number of COVID-19 Cases per 100 Thousand Population	Number of Weekly COVID-19 Cases
Ankara	5,663,322	68.53	3,881
Eskisehir	888,828	74.59	663
Afyonkarahisar	736,912	47.50	350
Kutahya	576,688	85.14	491
Usak	369,433	19.12	71
Manisa	1,450,616	50.12	727
Izmir	4,394,694	78.57	3,453



Source: Ministry of Health, 6-12 March 2021. COVID-19 data (<https://covid19.saglik.gov.tr/>); TurkStat, 2021. Population Statistics for 2020. (<https://tuikweb.tuik.gov.tr/PreTabloArama.do?metod=search&araType=vt>).

13.2.2. Forest Fires and Existing Fire Response Capacity

According to the expropriation plans of the Project, the Ankara-Izmir HSR route crosses forest parcels in Emirdag, Bayat, Iscehisar, Merkez and Sinanpasa districts of Afyonkarahisar province (see Chapter 5 on Land Use and Geology). Figure 13-2 shows the Project route on the forest area distribution map of Turkey.

The Project is located within the jurisdiction of the following Regional Directorates of the Forestry:

- Regional Directorate of Ankara
- Regional Directorate of Eskisehir
- Regional Directorate of Denizli
- Regional Directorate of Izmir

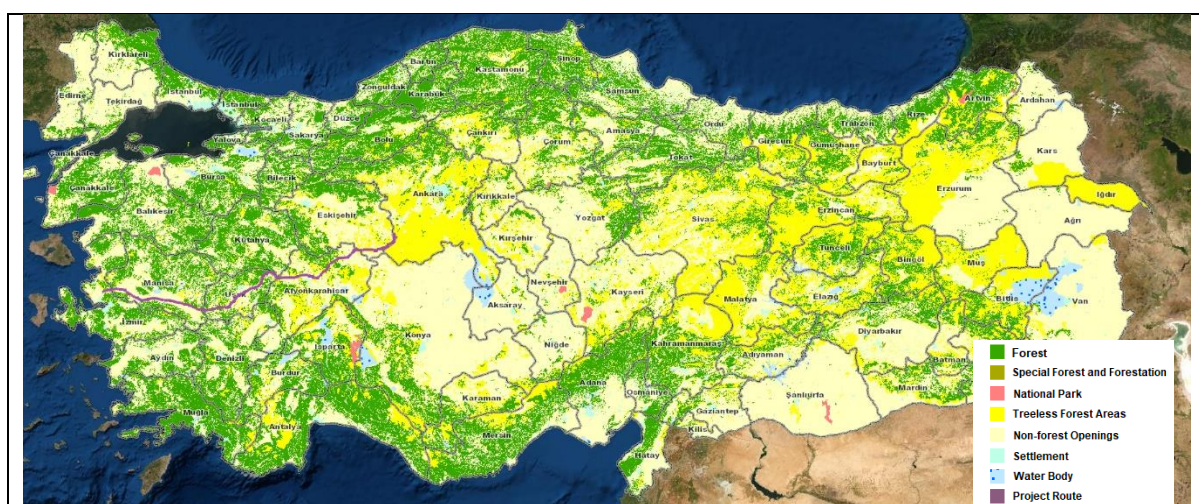


Figure 13-2. Distribution of Forest Area of Turkey

Source: Ministry of Agriculture and Forestry, General Directorate of Forestry, February 2021. (<https://cbs.ogm.gov.tr/vatandas/>)

Table 13-2 show the forest fire statistics in provinces crossed by the Project. As per the data provided by the Ministry the main known causes of the forest fires include natural causes (such as lightning) – 13.8%, accidents – 5.5% and intentional actions – 4.6%.

Table 13-2. Forest Fire Statistics in Provinces Crossed by the Project (2015-2019)

Province	2015		2016		2017		2018		2019	
	No. of Forest Fires	Area (ha)	No. of Forest Fires	Area (ha)	No. of Forest Fires	Area (ha)	No. of Forest Fires	Area (ha)	No. of Forest Fires	Area (ha)
Ankara	29	10	86	386	67	78	23	7	38	47
Eskisehir	6	3	27	204	22	72	16	7	18	45
Afyonkarahisar	6	3	34	21	13	4	14	12	17	101
Kutahya	33	6	68	285	49	861	52	44	38	112
Usak	9	11	20	24	10	7	5	4	5	6
Manisa	88	80	122	110	67	235	98	96	93	45
Izmir	178	73	255	931	167	1,787	167	299	146	4,859
Turkey	2,150	3,219	3,188	9,156	2,411	11,993	2,167	5,644	2,688	11,332

Source: Ministry of Agriculture and Forestry, General Directorate of Forestry, Yearly Official Statistics (<https://www.ogm.gov.tr/tr/ormanlarimiz/resmi-istatistikler>)

According to the respective websites of municipalities of each province along the railway route, the fire response capacities is understood to be sufficiently developed. Each province has a fire departments/response unit at least in the central district, with Ankara and Izmir having multiple fire response units in each district. In Afyonkarahisar province, where the Project crosses forest parcels, there are fires departments in the district of Emirdag, Merkez and Iscehisar as per the information provided by respective municipalities.

13.2.3. Road Traffic Infrastructure

The main roads to be used during the construction, for the transportation of construction materials to the works sites, are under the responsibility of the KGM, an affiliated organisation of the MoTI. Existing road network of KGM along the Project route is shown between Figure 13-3, Figure 13-4 and Figure 13-5.



Figure 13-3. Existing Road Infrastructure of 4th Regional Directorate

Source: KGM, May 2020. 2019 Traffic and Transportation Data

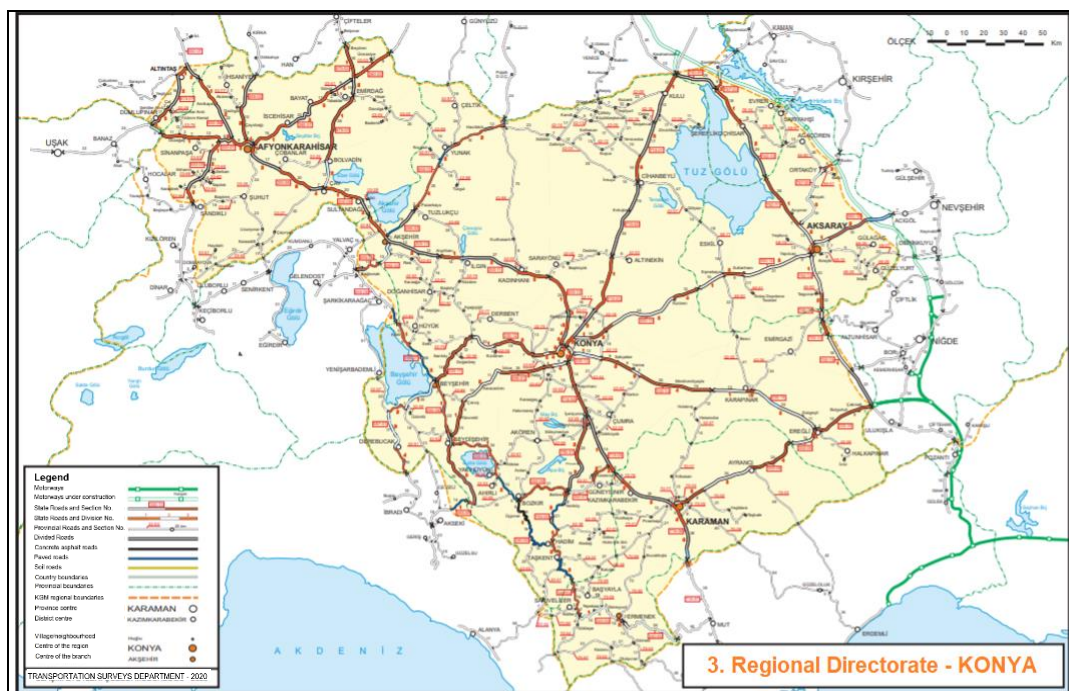


Figure 13-4. Existing Road Infrastructure of 3rd Regional Directorate

Source: KGM, May 2020. 2019 Traffic and Transportation Data



Figure 13-5. Existing Road Infrastructure of 2nd Regional Directorate

Source: KGM, May 2020. 2019 Traffic and Transportation Data

As the Project construction works were started by previous contractors and suspended in 2018, the local road networks have been used in the scope of the past Project activities. As discussed in details in Chapter 11 on Socio-economy, there are retrospective CHS issues reported (during the social surveys) by the local communities stemming from unfinished construction works. For example, there are conventional village roads in the settlements located within the expropriation corridor of the Project that were blocked and became unfunctional during the past construction works, which can/will be refurbished once the construction works resume. As such roads are not accessible since 2018, local communities are using alternative local routes (e.g. in Yuregil neighbourhood of Ayfonkarahisar), part of which are reportedly not as safe as the conventional village roads that were being used in the pre-Project periods.

13.2.4. Railway Accidents

The Ministry of Transportation and Infrastructure (MoTI) published transportation safety statistics, including railway transportation. The transportation accident statistics for the railways between the years 2015 and 2020 are summarised in Table 13-3.

Table 13-3. Railway Operations Accident Statistics for 2015-2020 (including Passenger, Freight, Inner-city and Other Railway Transportation Types)

Operations Accidents	2015	2016	2017	2018	2019	2020
A. Accident Number						
Collision of trains	2	0	0	1	1	2
Derailment	0	0	3	1	2	0
Level crossing collisions	18	27	14	11	12	9
Collision with pedestrians	46	37	23	23	17	4
Fire	0	0	0	0	0	0
Others	4	3	5	2	1	1
Total	70	67	45	38	33	16
B. Accidents per Transportation Type						
Passenger Train	32	32	18	19	15	1
Freight Train	21	27	15	10	12	11
Others	11	8	4	2	6	4
Inner-city Public Transportation	6	0	6	6	0	0

Operations Accidents	2015	2016	2017	2018	2019	2020
Total	70	67	43(*)	37(*)	33	16
C. Number of Losses/Injuries						
Mortality	78	95	54	73	37	21
Injury	16	83	31	430	23	8

Source: MoTI. Database for Transportation Safety for the Years 2015-2020 (<https://ulasimemniyeti.uab.gov.tr/istatistikler>)

(*) The difference with the total number of accidents is not explained within the reports.

An HSR accident, involving collision of an HSR train and a locomotive, happened in Ankara on 13 December 2018. The accident resulted in the death of nine people (including three railroad engineers and six passengers). The accident investigation report is not available through the transportation safety database⁹⁶ of the MoTI as of Q2 2021.

13.3. Impact Assessment and Management

Potential CHS related issues that require management during the Project include the following:

- Traffic and Pedestrian Safety during construction and operation
- Blasting Activities and Explosive Usage during construction
- Infrastructure and Equipment Safety during construction and operation (including general rail operational safety)
- Worker Influx during operation
- Community Exposure to Diseases during construction
- Hazardous Materials Management and Safety during construction and operation
- Security Personnel during construction and operation
- Emergency Preparedness and Response during construction and operation
- Safety of Visitors during construction and operation

As mentioned in the introductory part of this Chapter, this Chapter is to be read in conjunction with the Chapter 5 to 9, and Chapter 11 and Chapter 12, which describe the potential Project risks and impacts on environmental and ecological receptors along with the health, safety and welfare of the local communities.

13.3.1. Traffic and Pedestrian Safety

The following activities which may result in increased traffic on off-site roads during the construction period will require planning in advance and strictly implemented traffic management practices to avoid/minimise risks on CHS:

- Material transport vehicles transporting required materials from the quarries and material borrow sites and other industrial areas (e.g. supply of concrete, asphalt, steel) and transporting the waste generated at construction sites (i.e. excavated materials, recyclable waste, etc.) to the related reuse/disposal sites:

According to the construction schedule of the Project, the procurement works of the Project will begin in March 2021 and continue until August 2024 (see Chapter 1 - Implementation Schedule). Thus, material transportation will be spread over time reducing the intensity of Project-related traffic due to material transport but lengthening the duration of the impact.

The Project activities will be mainly conducted within the Project's expropriation corridor.

The Contractor is planning to prioritise designating excavated material storage sites within the expropriation corridor of the railway. This will minimise the off-site Project traffic by dump trucks. It is worth noting that the infrastructure (excavation and fill) works have already been partly completed by previous

⁹⁶ <https://ulasimemniyeti.uab.gov.tr/demiryolu>

contractors in Section 1 and Section 2, except the Hattipler Passage (KM 267+156-278+632) and Ankara-Konya HSR Connection Line (7+800; 0+000-6+683.120).

The selection of quarry and material borrow site locations by the Contractor takes into consideration the distance to nearby settlements as well as haul distances both for the minimisation of potential E&S impacts that may be caused by Project-related traffic as well as for the minimisation of associated costs.

The locations of the concrete plants and facilities are also strategically selected considering distance to nearby settlements and proximity to route in order to minimise transportation distances for concrete trucks, trailers, etc. on off-site roads.

- Diversion or temporary closure of some of the existing roads due to construction activities such as construction of interchanges connecting the Project to existing roads, effective on local communities:

At a number of locations, the Project route crosses existing state and/or local roads, where overpasses, underpasses and culverts are designed and will be constructed (see Chapter 1 on Project Description). At these locations, risks on public traffic and pedestrian safety may emerge temporarily until the completion of respective works at the crossing points.

- Personnel transport vehicles transporting workers from construction camp sites to related Project construction and facility sites.

The locations of the construction camp site are also strategically selected considering distance to nearby settlements and proximity to route in order to minimise transportation distances for concrete trucks, trailers, etc. on off-site roads.

Pedestrians, children, elderly people and cyclists are at greatest risk when the Project vehicles are using roads near or through the settlements. In such cases, it is important to prioritise designating alternative access routes to avoid use of village roads, where feasible.

The Contractor (through ERG Construction as one of the JV companies) has in place a Traffic Safety Management Procedure developed for the construction of a large-scale motorway project in Turkey. This procedure is to be revised and adapted to the Ankara-Izmir HSR Project and implemented within the scope of Project land preparation and construction activities.

The risk of trespassers on the HSR line will be avoided as the entire HSR will be fenced off as per the technical specifications of the Employer/Operator. The measures required to maintain integrity of the fencing across the route and the operational measures/procedures to be followed to prevent the pedestrian collision risks at the stations/gars throughout the operation phase will be identified and implemented by the Operator.

The Ankara-Izmir HSR Project does not include level crossings. Thus, the accident risks (with pedestrians and other road vehicles) posed by the presence of level crossings are avoided in the Project.

The design and construction of the infrastructure, superstructure, electrification, signalisation, telecommunication facilities, and the buildings and structures (including the Control Centre) required for the safe operation of the Project will be done by the Contractor as per the TCDD technical specifications and the requirements of the Construction Contract.

13.3.2. Blasting Activities and Explosive Usage

During the construction phase, blasting activities will be conducted for extracting construction material from the quarries and at route sections where the soil conditions warrant. The impact of blasting has been evaluated in Chapter 6 ("Noise and Vibration") and safe distances for blasting have been described for the quarries with different types of resources. On condition that the explosive amounts considered in the assessments are not exceeded and safe distances are overseen, the effects of blasting activities will be temporary and vanish upon the completion of the scheduled blasting activities, without causing any significant impact on the CHS and the assets (e.g. fractures/damage on houses and structures, water wells, etc.) owned/used by the local people.

List of quarries where blasting activities will be conducted and the closest settlements to these quarries (including the distance to the closest building) are provided in Section 1.4.7.2.

In addition to blasting activities, transportation of explosives will require management, collaboration with the authorities and engagement with the local communities to avoid potential CHS risks along the transportation route. Under the Hazardous Materials Management Plan, a Blasting Procedure, defining the principles for explosives transportation, loading/unloading, storage, communication (informing the communities, alarm system), etc., will be developed and implemented.

13.3.3. Infrastructure and Equipment Safety

Project construction works were started by the previous contractors between 2012-2016 and suspended in 2018. The infrastructure (excavation and fill, construction of engineering structures such as viaducts, tunnels, overpasses, culverts, etc.) works have already been partly completed by previous contractors in Section 1 and Section 2, except the Hatipler Passage (KM 267+156-278+632) and Ankara-Konya HSR Connection Line (7+800; 0+000-6+683.120). The design and construction responsibility of the Contractor in each section of the Project as per the Construction Contract is described in Section 1.6.1.

As the infrastructure works, including the foundations of several engineering structures were started/conducted within the scope of the previous construction works, part of those facilities/components and construction materials (e.g. steel, concrete bars) have remained incomplete exposed to environmental conditions and human interference/public access since the suspension of activities in 2018. Assessment of the stability and safety of the previously constructed Project components by the Contractor, with respect to the requirements of the Construction Contract, is crucial to fulfil the technical requirements and resume the construction works.

Besides the safety of the Project infrastructure, the construction works may accidentally damage the existing local infrastructure facilities (e.g. road, electricity, water, irrigation, etc.) overlapping with the Project components. If cannot be avoided through the implementation of measures defined in Table 13-6 (e.g. detailed site surveys and measurements to identify the existing infrastructure, cooperation with the related authorities and enterprises owning/operating the infrastructure facilities, etc.), this impact will be temporary and the damages caused by the Project (through Contractor or subcontractors) will be restored/compensated as per the requirements of applicable legislation.

Once the construction resumes by the Contractor's activities, regarding the retrospective impacts on local infrastructure facilities, the Contractor will develop and implement a Community Health, Safety and Security Management Plan that will identify the ongoing infrastructure safety problems caused by the previous construction activities and describe the management/resolution measures to be implemented to eliminate them, if feasible under the scope of Contractor's works and subject to the approval of the Employer. Therefore, the Project is anticipated to bring along positive impacts with respect to rectification of part of the retrospective impacts, where feasible under the scope of Contractor's works.

The design and construction, including the infrastructure, superstructure, electrification, signalisation and structural works, will be conducted by the Contractor as per the General and Special Conditions and Technical Specifications (including the standards and regulations indicated) contained in the Construction Contract executed between the Contractor and the AYGM on 23 November 2020 (will be effective after the date of financial close). The supervision and control works will also be performed by the competent professional of third parties in line with the Construction Contract. Design of the viaduct, bridge, overpass and tunnels engineering structures will be in accordance with the highest Eurocodes, AASHTO and Turkish standards using a 2475-year return period.

Following the commissioning of the HSR, the development and implementation of the O&M safety programs and procedures in line with the applicable national and international safety standards for ensuring stability, integrity and reliability of the infrastructure and equipment across the full HSR lines and at the O&M facilities including the control centre, will be under the responsibility of the Operator.

Also, regular maintenance of vegetation (growth of trees and plants) within railroad rights-of-way is necessary to avoid interference with HSR operations, track maintenance, and signals, as well as tracks and overhead power lines. Measures for the maintenance of vegetation during the operation phase are to be included in the O&M safety programs in line with the Operator's relevant procedures.

The risk of sinkhole occurrence in the wider area of Railway KM 56+250 and 63+250 (near Sigircik neighbourhood of Sivrisihisar district, Eskisehir province) has been identified and assessed in Chapter 5 on Land Use and Geology. As such, the closest sinkhole to the Project route (identified as part of ESIA based on satellite images of 2021) is observed at a distance of approximately 4 km in the south of the Railway KM 60+745. The presence of sinkhole risk zones in the proximity of the area crossed by the planned HSR route may pose long-term risks on the safety of HSR operations. The measures to be taken by the Contractor to ensure the safety of the Project design and construction, including evaluation of route relocation alternatives subject to approval of the Employer, have been described in Chapter 5. Based on the technical information to be collated by the Contractor on site-specific risks through geological, geotechnical and hydrogeological site investigations and assessments, and the collaborations that will take place between the Contractor and the Employer/Operator in the pre-construction and construction periods, development and implementation of the operational plans and procedures, including long-term geotechnical monitoring studies to be conducted by the Operator and/or their consultants, that will ensure stability and integrity of the infrastructure and safety of HSR operations, will be under the responsibility of the Employer/Operator.

13.3.4. Workers Influx

The Project construction will require involvement of significant workforce (direct and contracted) (see Section 1.8 for estimated construction workforce, with breakdown of management and site personnel and Section 12.3 for the accommodation capacities of the contractor camp sites). Approximately 75% of the workforce is estimated to be non-qualified (67%) and semi-qualified (8%). The Contractor prioritise localisation of workforce (including subcontractors through contractual requirements). This policy will maximise the use of local workers and reduce the influx of non-local workers to the area.

Non-local workers will accommodate at the on-site and off-site accommodation facilities of the Contractor and subcontractors. The accommodation capacity of the Contractor Camp Sites is provided in Chapter 12 on Labour and Working Conditions. Accommodation of subcontractors at the subcontractor camp sites or off-site residences/accommodation places will be clarified upon selection of subcontractors.

The workers to be employed from the local will lodge in their local houses and transported to the Project site by means of service buses to be arranged by the Project. Part of the non-local workers may prefer off-site accommodation at rental houses in the nearby district or neighbourhoods/villages (see Appendix A for the Settlements Affected from Project-related Land Acquisition). As each subcontractor will be engaged in the Project activities over a maximum duration of 42 months construction period. Duration of involvement of each subcontractor will vary depending on their work scopes, such that, part of the subcontractors will work for longer durations, whilst part of them will work for very limited durations - weeks.

The adverse risks or impacts of off-site accommodation on the nearby district centres, such as increased demands on infrastructure, services and utilities, development of illicit trade activities, inflation in local rent and other subsistence items or risk of gender-based violence and harassment (GBVH), as well as the potential benefits on the economies of the nearby settlements and district centres (e.g. rental incomes, supply of goods and materials, etc.), are anticipated to be temporary.

The Contractor will arrange service busses for the personnel to be transported to the work sites either from camp sites or their local houses including rental houses in the nearby district or neighbourhoods/villages.

Further social impacts on the local communities due to worker influx is discussed in Chapter 11 on Socio-economy.

13.3.5. Community Exposure to Diseases

Due to influx of non-local workers as described in the previous section, the risk of communicable and vector borne diseases may be heightened throughout the construction phase. As mentioned in the above section, the Contractor will be contractually required to maximise use of local workforce from the settlements in the vicinity of the Project route. These risks will be managed through implementation of Project-specific Camp Site Management Plan addressing the following requirements of IFC/EBRD's Guidance Note on Worker's Accommodation (2009).

The current COVID-19 pandemic also requires additional management plans and procedures to be developed and implemented for the COVID-19 related risks and impacts posed by the Project workforce on nearby settlements. The Contractor will closely monitor the potential diseases among the Project employees (direct and contracted) as well as COVID-19 symptoms and cases, together with monitoring the course of pandemic in the surrounding settlements and plan/take relevant actions, as necessary. The Contractor will ensure implementation of the

measures as per the Circular (No: 2020/9) published by the MoEU on 20 March 2020 and additional measures as detailed in Chapter 12 on Labour and Working Conditions (see Table 12-5) at the work sites, dormitories and social facilities of the Contractor and subcontractor work/camps sites. The Contractor will ensure that the necessary medical checks are in place (at contractor and subcontractor work and accommodation sites) such as routine temperature checks, and HES code⁹⁷. The medical checks at the beginning of employment of Project personnel will also cover COVID-19 symptoms. Through adequate health facilities/infirmarys to be provided on-site, Project's load on public health care facilities will be minimised.

Stakeholder engagement activities will also be performed under the provisions of IFC's Interim Advices for IFC Clients on Safe Stakeholder Engagement in the Context of COVID-19 (May 2020) through methods including remote/telephone engagement during COVID-19 pandemic, publishing information on Project web site, posting announcement/information at local places stakeholders can safely access, etc.

13.3.6. Hazardous Materials Management and Safety

Contractor will avoid and/or minimise the potential for community exposure to hazardous materials and substances that may be used within the Project activities and will establish mitigation measures to minimise the exposure of workers and communities to the impacts of hazardous materials within the scope of the Hazardous Materials Management Plan.

Hazardous Materials Management Plan to be developed and implemented by the Contractor, will include the management of pesticide usage, in case pesticides use is practices as a control method for vegetation at camp sites or other work areas.

The relevant provisions of the Regulation on the Transportation of Hazardous Substances by Road will be complied with.

The hazardous materials to be used in the O&M activities will be determined by the Employer/Operator. Development and implementation of the Hazardous Materials Management Plan (or similar) during the operation phase will be under the responsibility of the Operator.

Transportation type (passenger and/or load including dangerous goods) will further be clarified between the Employer and the Contractor based on the ongoing discussions.

13.3.7. Security Personnel

During the land preparation and construction, there will be security personnel appointed at the entrances and exits of the construction camp sites and as necessary other work sites as per the requirements of the Law on Private Security Services (Law No: 5188, 2004) and related secondary legislation. There may be local persons to be employed as security personnel as part of the Project. The security arrangements for each site will be determined at the time of mobilisation in consultation with the Employer depending on the site-specific conditions and requirements.

As per the national law, private security officers are required to receive basic security trainings for not less than 120 hours, consisting of theoretical and practical trainings. The basic trainings are required to be renewed every 5 years. The private security basic training program includes the following courses, which includes effective communication techniques as well empathy and sympathy recommendations:

⁹⁷ HES (Hayat Eve Sıgar – Life Fits Into Home) code is a personalised mandatory application implemented by the Ministry of Health under COVID-19 measures for surveillance of COVID-19 cases and persons who contact with positive cases.

- Private Security Law and Immaterial Rights
- Security Measures
- Security Systems and Devices
- Basic First Aid
- Fire Safety and Natural Disaster Response Style
- Information on Drugs
- Effective Communication
- Crowd Management
- Person Protection (against the risk of assassination)
- Relations with General Law Enforcement
- Information on Weapon and Shooting Practice

The security requirements and arrangements for the operation phase for the HSR services and at the O&M facilities including the stations/gars will be determined and managed by the Operator. The Project SEP will be implemented throughout the operation phase.

13.3.8. Emergency Preparedness and Response

Potential emergency situations that may arise throughout the Project may include emergencies related to natural hazards (earthquakes, flood events, etc.), medical emergencies including COVID-19 pandemic related cases, fire emergencies, emergencies involving train accidents and accidental releases or spill of hazardous materials, etc.

The Contractor (through ERG Construction as one of the JV companies) has in place an Emergency Response Procedure developed for the construction of a large-scale motorway project in Turkey. A Project-specific EPRP will be developed for the Ankara-Izmir HSR Project and implemented within the scope of Project land preparation and construction activities.

The Employer/Operator will develop and implement the EPRP for the operation phase. The conventional railway lines running/to be built in parallel to the HSR in Section 4, where the route passes close to settlements in Manisa province and especially in locations where there is no access road for motor vehicles, will be used to access to the HSR line in case of emergencies. Nearest settlements to the tunnels and the distance of the closest buildings to the inlet and outlet structures are listed in Table 13-4.

Table 13-4. Nearest Settlements to the Tunnel Portals

No.	KM Start	KM End	Tunnel Name	Length (m)	Tunnel Location	
					Nearest Settlement	Distance to the Nearest Building(km)
Section 1 (Polatli-Afyon)						
1	18+465.000	18+705.000	On-off Tunnel-1	218.00	Kabakkoy	0.4
2	19+064.000	19+306.000	On-off Tunnel-2	242.23	Kabakkoy Cakmak	0.8 1.3
3	26+585.000	26+845.000	Tunnel 1	260.00	Cakmak	1.3
4	26+945.000	27+245.000	Tunnel 2	300.00	Cakmak	1.1
5	112+540.000	113+300.000	Bayat 1	760.00	Yuregil	2.7
6	115+140.000	115+620.000	Bayat 2	480.00	Buyuk	1.5
7	121+420.000	121+760.000	Tunnel 3	340.00	Yeni	0.4
8	122+620.000	122+920.000	Tunnel 4	300.00	Yeni	0.1
9	123+115.000	123+655.000	Tunnel 5	540.00	Imrali	0.9
10	123+720.000	128+880.000	Tunnel 6-7-8	5160.00	Imrali Sagirli	1.1 0.1

No.	KM Start	KM End	Tunnel Name	Length (m)	Tunnel Location Nearest Settlement	Distance to the Nearest Building(km)
Section 2 (Afyon-Banaz)						
1	176+395.000	176+855.000	Tunnel 2	460.00	Koprulu	0.3
2	182+613.000	182+892.000	Tunnel 3	279.00	Balmahmut	0.1
3	209+615.000	210+875.000	Tunnel 4	1,260.00	Calislar	1.3
4	211+436.000	212+176.000	Tunnel 5	740.00	Ciftlik	1.2
5	218+815.000	219+683.000	Tunnel 6	868.00	Cumhuriyet	1.7
6	224+835.000	225+225.000	Tunnel 7	390.00	Halacilar	0.3
7	225+650.000	225+965.000	Tunnel 8	315.00	Halacilar	1.0
8	229+363.550	230+059.550	Tunnel 9	696.00	Halacilar	1.0
9	269+735.000	270+830.000	Tunnel 1	1,095.00	Alaba	0.2
10	271+958.000	273+193.000	Tunnel 2	1235.00	Alaba Hatipler	0.4 0.8
11	273+548.000	273+843.000	Tunnel 3	295.00	Hatipler	0.3
12	274+008.000	274+398.000	Tunnel 4	390.00	Hatipler	0.3
13	274+578.000	275+108.000	Tunnel 5	530.00	Hatipler	0.3
14	275+338.000	276+123.000	Tunnel 6	785.00	Hatipler	0.1

Nearest settlements to the stations and gars are listed in Table 13-5.

Table 13-5. Railway Stations and Nearest Settlements

Section	Stations	Type	KM Start	KM End	Nearest Settlements (within 1 km distance)
Section 1	Emirdag	Station	93+349.91	94+805.09	Turkmenakoren (780 m (NE)
Section 2	Afyon	Gar (*)	168+971.94	170+402.09	Ismail (300 m SE) Demircevre Sarayduzu (1,000 m NE)
Section 3	Usak	Gar (*)	312+925.55	314+541.33	Hocalar (500 m SW)
Section 4	Salihli	Station	440+077.18	441+851.31	Salihli (passing from the north of the district centre)
	Turgutlu	Station	479+096.98	480+910.72	Turgutlu (passing from the north of the district centre)
	Manisa	Gar (*)	506+587.00	507+837.94	Manisa (passing from the north of the city centre)

EMRP to be developed for the Project will include, but not limited to the following emergency situations:

- First aid and incidents and accidents that require evacuation
- Fire (including specifications for fire emergencies in tunnels)
- Earthquake
- Unfavourable weather conditions (flood, snowfall, etc.)
- Sabotage / terrorist attack

- Poisoning
- Emergencies related with works at height
- Emergencies related with works in confined spaces (including tunnels)
- Environmental incidents
- Health incidents (including community health)
- Train accidents during the operation phase

EPRP needs to include at least the following:

- Roles and responsibilities of emergency response teams (including contact numbers)
- Emergency situations and specific preparedness requirements (including any measures and/or warning system designed to notify local communities in case of emergencies)
- Emergency response measures/actions
- Emergency trainings and drills (including yearly plans)

EPRP to be developed will cover accommodation sites, office areas, work sites, and as well as emergency preparedness including the impacts on nearby settlements for the construction phase and O&M facilities including stations/gars, control centre, Operator's offices, depots, etc. for the operation phase. The Plan will consider the nearby settlements that may be affected in emergency situations rising due to the Project activities and/or additional influx of the Project workforce and/or passenger on these settlements in cases of natural disasters. Measures to be taken will be specialised for the Project context.

The Contractor will also develop COVID-19 EPRP in line with national legislative requirements and IFC Interim Advice for IFC Clients on Developing a COVID-19 EPRP. The subcontractors will also be stipulated to adopt the Contractor's COVID-19 EPRP.

13.3.9. Safety of Visitors

Intentional or unintentional entrance of visitors to hazardous Project sites may pose H&S risks to themselves as well as Project employees and nearby communities. Therefore, all visitors will receive visitor orientation upon their arrival at the Project sites to understand and be informed about the basic H&S rules, emergency procedures and site specific H&S implementations.

The visitors will be escorted at all times and will only be allowed at predetermined safe zones. Upon receipt of the orientation training, as necessary depending on the Project sites to be visited, personal protective equipment (PPE) will be provided to the visitors.

Records will be kept by the site teams on visitor programs, trainings and PPE provided, etc.

Additional induction and H&S trainings will be provided to persons, who will be at the Project sites for extended durations (e.g. auditors, service providers, etc.).

The potential impacts of the Project, significance of the impacts prior to mitigation, proposed mitigation measures and the significance of residual impact are summarised in Table 13-6. For the assessments related to CHS, the receptor sensitivity level has always been assumed as high when the safety of local communities is of concern.

The operation phase noise and vibration impacts on the residential receptors have been discussed in Chapter 6 on Noise and Vibration. During the operation phase of the Project, noise and vibration will be generated as a result of the HSR operations, intermittently affecting the receptors located along the Project route parallel to the HSR operation hours. On the other hand, as part of the road traffic load is anticipated decrease because of the shift of passengers from motorways to HSR operations, the noise impact on the receptors caused by the road vehicles is anticipated to reduce. Operation phase noise and vibration modelling studies will be updated during the construction phase with input from the Employer/Operator regarding the information on train services, train types, etc. Through the modelling study, noise site specific mitigation measures required to be implemented to ensure compliance with the Project Standards and during the operation phase of the Project will be identified and implemented, which in turn will mitigate the operation phase noise and vibration impacts of the Project on

community health and welfare. Receptors such as hospitals/inpatient healthcare facilities, education facilities, rehabilitation centre, etc., located in the vicinity of the route and may be subject to operation phase noise and vibration impact, will further be identified by the Contractor (impact zones for the receptors will be based on the modelling study that will take into account operation planning of the Operator including number of train services, train types, number of wagons, etc. as well as site assessments and measurements) and considered as very sensitive receptors in the design of measures, as discussed in Chapter 6. Project-specific SEP will be in place during the operation phase (including trial operations) to address/manage any noise and/or vibration related grievance that may be sourced from potential impacts on community health and welfare. The operation phase noise and vibration impacts on the receptors and the operational management measures are set out in Table 6-22 in Chapter 6.

Table 13-6. Impacts, Proposed Mitigation Measures and Residual Impacts (Community Health and Safety)

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance	
			Extent	Magnitude	Reversibility	Duration	Frequency					
Risk on CHS (public traffic and pedestrian) due to Project-related traffic	• Land Preparation and Construction	• Local Communities on the Transport Route • Local Communities in the Vicinity of the Project • Road Users	Wide	Low to High	Short term reversible to irreversible	Short term	One-off/rare	Low to High	High	Moderate to Major	<ul style="list-style-type: none">• Project-specific Community Health, Safety and Security Management Plan will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements).• Project-specific Traffic Safety Management Procedure including both on-site and off-site traffic safety measures will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). All Project personnel/drivers, including the Contractor and subcontractors will be provided with training on the implementation of the Traffic Safety Management Procedure. These trainings will emphasise safety aspects among drivers.• To minimise off-site traffic, the Contractor will prioritise designating excavated material storage sites within the expropriation corridor of the railway and selecting quarry and material borrow sites with minimum possible haul distances.• The Contractor will evaluate and approve subcontractor camp site locations in consideration of potential impacts of the camp site related traffic on nearby communities.• The Contractor will clearly define the construction zones by appropriate visual means such as reflective barriers and flashing signs. Prescribed routes for construction traffic and critical locations (including sensitive receptors such as hospitals, schools, etc.) will be identified and agreed with the relevant authorities (i.e. KGM, local police) and in consultation with the local communities, as necessary. Construction vehicles will conduct activities only within these zones and routes.• The Contractor will avoid passage of construction traffic through the settlements, whenever use of alternative roads is feasible.• Where passage through existing settlements is unavoidable, Contractor will take all necessary measures (i.e. speed limits, traffic signs, driver trainings) to prevent safety risks on local communities and will engage with community representatives to plan the traffic by taking the daily life of the communities into account (i.e. selection of routes, school transportation hours, market days, etc.) and inform the communities about the construction schedule, activities to be conducted and safety measures taken, through appropriate means such as phone calls with mukhtars, meetings and leaflets, notices, signs, etc. as part of Project SEP implementation.• Construction activities on existing roads will be initiated only after relevant permits are obtained and all required measures such as signage, barriers, fencing, lighting, etc. are taken in cooperation with the related authorities.• The Contractor will evaluate all construction areas and construction access routes for potential community interaction (with a particular attention to schools, children parks, etc.). Based on the results of this evaluation, site specific measures (i.e. improve signage, visibility, detection and redirection of trespassers, providing safe pedestrian crossing routes/procedures for locals as described in the Construction Contract) will be developed and implemented and driver/operator trainings prior to initiation of any construction work will be conducted.• As per the Technical Specifications of AYGM for Infrastructure Works, in open excavated road crossings, not more than half of the road will be occupied at the same time and the other half will be kept open to traffic by taking necessary precautions.• For night-time work activities, warning signs, signals, markings and other appropriate traffic regulation devices	Negligible

Impact Description	Project Phase	Receptor	Extent		Impact Magnitude		Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
				Magnitude	Reversibility	Duration						
											<p>will be installed at all required sites. Periodic visual checks to identify signs of structural deterioration will be conducted regularly and all signage and lighting will be replaced as required. All barriers and warning signs placed in the construction work areas will be illuminated from sunset to sunrise.</p> <ul style="list-style-type: none">• Entry restrictions will be implemented below bridges, viaducts and other high structures to ensure community members are not affected by potential of falling objects.• Deliveries by vehicles transporting hazardous materials and wastes will be planned carefully to avoid risks on the local communities.• A traffic signalling team will be established to work at construction sites together with heavy construction machineries to prevent any incidents and/or accidents that may happen due to the limited view of machinery operators.• Compliance of all drivers with the regulatory speed limits on public roads will be strictly monitored by using appropriate tools (e.g. random speed checks).• Contractor will collaborate with local communities to raise awareness about traffic and pedestrian safety.• As needed, the Contractor and subcontractors will be required to arrange service buses for the transportation of Project personnel to minimise Project-related off-site traffic.• Project-specific SEP will be implemented to address any construction transport/traffic related grievance and plan/take corrective actions in line with the Grievance Mechanisms, where necessary. As part of SEP, local communities will be informed about the construction sites, traffic restrictions to be applied for health and safety purposes and duration of such restrictions.	
	<ul style="list-style-type: none">• Operation	<ul style="list-style-type: none">• Local Communities in the Vicinity of the Project	Restricted	High	Short term reversible to irreversible	Long term	One-off/rare	High	High	Major	<ul style="list-style-type: none">• The design and construction of the infrastructure, superstructure, electrification, signalisation, telecommunication facilities, and the buildings and structures (including the Control Centre) required for the safe operation of the Project will be done by the Contractor as per the TCDD technical specifications and the requirements of the Construction Contract.• The risk of trespassers on the HSR line will be avoided as the entire HSR will be fenced off as per the technical specifications of the Employer/Operator. The measures required to maintain integrity of the fencing across the route and the operational measures/procedures to be followed to prevent the pedestrian collision risks at the stations/gars throughout the operation phase will be identified and implemented by the Operator.• The stations will be designed to ensure that the authorised route to be used by the passengers/pedestrian is safe, clearly indicated, and easy to use. At the station/gar locations, potential points of entry to track areas will be identified by H&S professionals prior to start of operations and clear and prominent warning signage will be posted and other preventive measures (e.g. use of closed-circuit television to monitor stations and voice alarm systems to deter trespassers at the stations/gars) will be taken at all necessary locations.• As per the national EIA Report, in urban areas (e.g. Manisa region), the fence height will be sufficiently high and will be constructed using materials that do not allow the children to climb or pass under or over the fence. If necessary/feasible, the lower edge of the fence will be buried in the ground and additional measures will be taken to deter climbing by the children. In order to prevent unauthorised/accidental entries, designated access routes will be defined and barriers will be designed for locations that will provide periodical access to the HSR route for O&M and other purposes.• As per the national EIA Report, the information and warning	Negligible

Impact Description	Project Phase	Receptor	Extent		Impact Magnitude		Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
					Reversibility	Duration						
											signs and markings for the safe HSR operation will provide for the following: <ul style="list-style-type: none">- Distance signs to be eye-catching and installed at appropriate places along the line and at regular intervals.- Line slope markings to be eye-catching and to be installed wherever the slope angle or direction changes significantly.- Signs indicating the location of all energy lines passing over the railway and the maximum height of safe working under them to be installed along the line.- Signs showing the location and depth of underground energy cables passing under the railway or running along the railway to be installed along the line.- All bridges and other fixed structures to be clearly defined and descriptive signs to be visible from both road and rail.- Signs indicating the direction and distance of adjacent access points or crossing roads to be installed at appropriate intervals in tunnels. <ul style="list-style-type: none">• Development and implementation of the management plans and procedures for safe operation of the HSR will be under the responsibility of the Employer/Operator (e.g. safety distances/buffer zones to approach the route, speed adjustments, etc.).	
Explosives Use and Blasting	<ul style="list-style-type: none">• Land Preparation and Construction	<ul style="list-style-type: none">• Local Communities located in the vicinity of quarry sites (see Table 1-18)	Local	Low to Medium	Short Term Reversible	Short Term	Intermittent	Low to Medium	High	Moderate to Major	<ul style="list-style-type: none">• Project-specific Noise and Vibration Management Plan will be developed and implemented based on the mitigation measures identified in Chapter 6 ("Noise and Vibration") of this ESIA.• Project-specific Community Health, Safety and Security Management Plan will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements).• Project-specific Hazardous Material Management Plan will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). Under the Hazardous Materials Management Plan, a Blasting Procedure, defining the principles for explosives transportation, loading/unloading, storage, communication (informing the communities, alarm system), etc., will be developed and implemented.• Project-specific SEP including external grievance mechanism will be implemented throughout the Project. The local communities at the closest settlements will be informed about the blasting schedule prior to start of blasting operations at the quarries through the mukhtars and as necessary, through direct communication with the potentially affected households (through Project Community Liaison Officers – CLOs), where possible. The blasting operations will be conducted consistently according to this schedule. If changes to the blasting schedule occur, updated information will be conveyed to the mukhtars prior to implementation of changes. Blasting-related grievances will be investigated and managed through the implemented of Project SEP and preventive/corrective measures will be planned and taken as necessary.• Blasting-related measures defined in Chapter 6 on Noise and Vibration, including preconstruction surveys of the nearby settlements/buildings (within approximately 250 m distance to blasting locations), vibration measurements, record keeping, and monitoring, will be implemented.• Additional structures that prevent pieces from scattering will be constructed where necessary.• Additional measures to be taken before and during the blasting activities are described in Chapter 6 ("Noise and Vibration").	Negligible

Impact Description	Project Phase	Receptor	Extent		Impact Magnitude		Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
				Magnitude	Reversibility	Duration						
Damage to existing local infrastructure	• Land Preparation and Construction	• Local Communities • Infrastructure Owners (economic losses)	Restricted	Low	Short Term Reversible	Short Term	One-off/rare	Low	Medium	Minor	<ul style="list-style-type: none"> Detailed site surveys and measurements to identify the existing infrastructure that will be intersected will be conducted. The Contractor will cooperate with related authorities and enterprises to avoid interaction where possible or develop and implement relocation projects. The construction of the railway (at infrastructure crossing locations) will be conducted in line with the protocols signed/to be signed between the Project (where required through AYGM) and relevant authorities and enterprises and applicable technical specifications/regulations. The Contractor will inform the public of the structures and buildings that may be affected and situations (such as temporary occupation, blocking, alterations, etc.) that may arise during the Project activities. The Contractor will notify the public in advance for a suitable time to take precautions. In this notice, information such as conditions of the situation, its characteristics and when will it be remedied will be stated. Project-specific SEP including external grievance mechanism will be implemented throughout the Project. 	Negligible
Project infrastructure safety risks	• Construction	• Contractor and subcontractors (during the construction phase)	Local	High	Short Term Reversible to Irreversible	Short Term	One-off	High	High	Major	<ul style="list-style-type: none"> The design and construction, including the infrastructure, superstructure, electrification, signalisation and structural works, will be conducted by the Contractor as per the General and Special Conditions and Technical Specifications (including the standards and regulations indicated) contained in the Construction Contract executed between the Contractor and the AYGM on 23 November 2020 (will be effective after the date of financial close). The supervision, design review/approval and control works will also be performed by the competent professionals/technical consultants (third party engineers) in line with the Construction Contract (to be provided by AYGM). Assessment of the stability and safety of the previously constructed Project components will be procured by the Contractor. As a requirement of the Contract to enter into effect, technical determinations of the previously constructed works will be made and recorded. Measures necessary to ensure fulfilment of the technical requirements will be planned in consultation with and approval of AYGM. Once the construction resume by the Contractor activities, regarding the retrospective impacts on local infrastructure facilities, the Contractor will develop and implement a Community Health, Safety and Security Management Plan that will identify the ongoing infrastructure safety problems caused by the previous construction activities and describe the management/resolution measures to be implemented to eliminate them, if feasible under the scope of Contractor's works and subject to the approval of the AYGM (will result in positive impacts). Measures to be taken during the construction for the avoidance/mitigation of risk associated with sinkhole occurrence is provided in Chapter 5 ("Land Use and Geology"). 	Negligible
	• Operation	• HSR operations personnel • HSR passengers	Restricted to Local	High	Short Term Reversible to Irreversible	Long Term	One-off	High	High	Major	<ul style="list-style-type: none"> Trial operations/commissioning tests will be performed by the Contractor in accordance with the requirements of the Construction Contract prior to temporary acceptance of the work by the Employer. Trial operations will include: <ul style="list-style-type: none"> Pre-commissioning tests (Dry or cold function tests) including appropriate inspections and functional tests to demonstrate that each item of the facility can safely undertake the commissioning tests). Commissioning tests, which will include specified operational tests to demonstrate that the works or a part of them can be operated safely under all current operating conditions and as specified. A trial run that will demonstrate that the works or a part of them are working in accordance with the 	Negligible

Impact Description	Project Phase	Receptor	Extent	Magnitude	Impact Magnitude		Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
					Reversibility	Duration						
											<ul style="list-style-type: none"> Contract and reliably. The Contractor will carry out the training of the Employer's/Operator's personnel for the execution and operation of the works as per the requirements of the Construction Contract. Based on the technical information to be collated by the Contractor on site-specific risks through geological, geotechnical and hydrogeological site investigations and assessments, and the collaborations that will take place between the Contractor and the Employer/Operator in the pre-construction and construction periods, development and implementation of the operational plans and procedures, including long-term geotechnical monitoring studies to be conducted by the Operator and/or their consultants, that will ensure stability and integrity of the infrastructure and safety of HSR operations, will be under the responsibility of the Employer/Operator. <p>Measures for the maintenance of vegetation during the operation phase will be taken in line with the Operator's relevant procedures to keep the track area completely clear of vegetation by using biological, mechanical, and thermal vegetation control measures where practical.</p>	
Impacts of Project-related worker influx	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Communities (especially women) <p>See Table 1-17 for the local settlements located in the vicinity of the planned construction camp sites of the Contractor. Location of subcontractor construction camp sites (main and lower tier) will further be identified upon selection of subcontractors.</p>	Restricted to Wide	Low	Short term reversible	Short-term	One-off/rare	Low	High	Moderate	<ul style="list-style-type: none"> See Chapter 11 on Socio-economy for the measures to be taken with regard to management of risks and impacts of worker influx. 	Negligible
Community Exposure to Disease	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local communities especially in the vicinity of the Construction Camp Sites, Project accommodation facilities/sites <p>(See Table 1-17 for the local settlements located in the vicinity of the planned construction camp sites of the Contractor. Location of subcontractor construction camp sites (main and lower tier) will further be identified upon selection of subcontractors)</p>	Local to Wide	Low	Short term reversible	Short term	One-off	Low	High	Moderate	<ul style="list-style-type: none"> The following Project-specific management plans will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements): <ul style="list-style-type: none"> Project-specific Community Health, Safety and Security Management Plan Camp Site Management Plan (see Chapter 12 on Labour and Working Conditions for the detailed requirements to be fulfilled at the camp sites in line with the IFC/EBRD's Guidance Note on Worker's Accommodation (2009): <ul style="list-style-type: none"> Labour Management Plan (including off-site accommodation) Waste Management Plan Water and Wastewater Management Plan Project-specific EPRP and COVID-19 EPRP to be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). Contractor will ensure that necessary medical checks for all direct and contracted employees are in place at the time of hiring, including medical checks for symptoms of COVID-19. These medical checks will be repeated as necessary. Adequate COVID-19 PPE will be provided and regular disinfection services will be conducted in accommodation facilities, offices and service buses. Isolation facilities/accommodation rooms will be provided by the Contractor in case of positive COVID-19 test results are received for the site employees. The Contractor will closely monitor potential diseases 	Negligible

Impact Description	Project Phase	Receptor	Extent		Impact Magnitude		Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
				Magnitude	Reversibility	Duration						
											among the Project employees (direct and contracted) throughout the Project, also diseases among the nearby communities, and plan/take necessary actions accordingly.	
Risks and/or impacts due to use of hazardous materials	• Land Preparation and Construction	• Local Communities	Restricted	Low	Short term reversible	Short term	One-off	Low	High	Moderate	• Project-specific Hazardous Materials Management Plan will be developed and implemented (including pesticide use and management, if planned in the scope of the Project).	Negligible
	• Operation	• Local Communities	Restricted to Local	Low	Short term reversible	Short term	One-off	Low	High	Moderate	• The hazardous materials to be used in the O&M activities will be determined by the Employer/Operator. Development and implementation of the Hazardous Materials Management Plan (or similar) during the operation phase will be under the responsibility of the Operator. As appropriate, the Project-specific Hazardous Materials Management Plan developed and implemented for the construction phase will be basis of the management approach during operation phase. • Transportation type (passenger and/or load including dangerous goods) will further be clarified between the Employer and the Contractor based on the ongoing discussions. Depending on the decision for transportation of loads, which may include dangerous goods, risk analysis will be conducted prior to start of operations and the Hazardous Materials Management Plan (or similar) will be updated to include relevant risk management measures.	Negligible
Security Personnel	• Land Preparation and Construction	• Local Communities (See Table 1-17 for the local settlements located in the vicinity of the planned construction camp sites of the Contractor. Location of subcontractor construction camp sites (main and lower tier) will further be identified upon selection of subcontractors)	Restricted to Wide	Low	Short term reversible	Short term	One-off	Low	High	Moderate	• Project-specific Community, Health, Safety and Security Management Plan will be developed and implemented. The security management measures will be covered in the Plan. • The Contractor will obtain security services from a certified Private Security Contractor Firm or with in-house security personnel (with required training). • The agreements with the Private Security Contractor Firms will include provisions related to the Contractor's requirements of the appointment of certified officers, who received basic trainings for private security officers, were subject to necessary security inquiries and fulfils the age and education standards. • The Contractor will monitor the legal and special trainings provided to the private security officers and ensure that these officers receive periodical trainings on adequate use of force, appropriate conduct towards the Project employees and the local communities, gender sensitivities, cultural sensitivities (if required) and human rights in line with the requirements of national legislation as well as IFC PS 2 and PS 4. • Legal inquiries during the hiring process of security personnel (or the company the security service is procured from) will be conducted to check competency and existence of any former abuse incidents. • Trainings on code of conduct, gender sensitivities (including GBVH and SHA) and local cultural sensitivities will be provided to security personnel or the company the security service is procured from will provide evidence that the personnel received these trainings from qualified trainers. The trainings will ensure force is used only for preventive and defensive purposes and in proportion to the threat. • The required identification, communications devices, and any other equipment required for the job will be provided to the security personnel to ensure maximum efficiency. • The Contractor will investigate any grievance from local communities regarding inappropriate conduct of security forces immediately. • The Contractor will ensure appropriate conduct of security personnel through incident report reviews, as well as review of grievances received. • All measures regarding private security services will be included in the contractual agreements. • Project-specific SEP including external grievance mechanism will be implemented throughout the Project.	Negligible

Impact Description	Project Phase	Receptor	Extent		Impact Magnitude		Reversibility	Duration	Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
	• Operation	<ul style="list-style-type: none">Local Communities near the Stations and other O&M facilitiesHSR passengers	Restricted to Wide	Low	Short term reversible	Long term	One-off	Low	High	Moderate	<ul style="list-style-type: none">The security requirements and arrangements for the operation phase for the HSR services and at the O&M facilities including the stations/gars will be determined and managed by the Operator. The Project-specific Community, Health, Safety and Security Management Plan developed and implemented for the construction phase will be basis of the management approach during operation phase, as appropriate.	Negligible		
Building demolition works	<ul style="list-style-type: none">Land Preparation and Construction	<ul style="list-style-type: none">Any part that may be subject to the environmental, health and safety impacts of building demolition works and subcontractor	Restricted	Low to High	Short term reversible to Irreversible	Short term reversible to Irreversible	One-off to Intermittent	Low to Medium	Medium	Minor to Moderate	<ul style="list-style-type: none">The building demolition works during the construction phase will be conducted in line with the requirements of the Regulation on Waste Management and Regulation on the Control of Excavation Soil, Construction and Demolition Waste, the Regulation on Health and Safety Measures in Working with Asbestos, Regulation on the Assessment and Management of Air Quality and Regulation on Assessment and Management of Environmental Noise. To this end, specific requirements defined for the demolition works, including occupational health and safety measures to be taken for the protection of employee health and safety, measures against dust and noise generation, management of hazardous demolition wastes will be fulfilled.	Negligible		
Emergency Preparedness and Response and Fire Risk	<ul style="list-style-type: none">Land Preparation and ConstructionOperation	<ul style="list-style-type: none">Local Communities along the route (to be identified in the EPRP based on emergency zones to be defined)Project Personnel	Local	Low to High (depending the type of the incident)	Short term to long term reversible	Short term	One-off	Low to High	High	Minor to Major	<ul style="list-style-type: none">The Project-specific EPRP (covering both on-site and off-site emergencies) will be developed and implemented by the Contractor for the construction phase.The Employer/Operator will develop and implement the EPRP for the operation phase (with special measures - e.g. crews, equipment- considered for the tunnels, bridges and viaducts to provide easy access to the HSR route, as required by the national EIA Report as well as fire safety measures including monitoring of right-of-way vegetation according to fire risk, planting and management of fire-resistant species within, and adjacent to, rights-of-way, as recommended by the GIIP).	Negligible		
	• Operation	<ul style="list-style-type: none">HSR passengersLocal Communities close to tunnel portals (see Table 13-4)Local Communities close to stations/gars (see Table 13-5)Project personnel	Local	Low to High (depending the type of the incident)	Short term to long term reversible	Short term	One-off	Low to High	High	Minor to Major	<ul style="list-style-type: none">Measures/systems for collaboration with the local communities and other external parties including local governmental agencies, media, etc. will be developed, where necessary. Emergency preparedness and response information will be disseminated to the potentially affected communities (e.g. emergency notification systems and evacuation procedures).Local communities will be notify by using appropriate tools (e.g. telephone call lists, vehicle mounted speakers) in case of emergencies arising from the Project work/construction sites may pose risk on them.Where necessary, the details of the nature of the emergency, protection options, etc. will be communicated through trained community liaison officers (CLOs).The related authorities will be cooperated both for prevention of and responding to emergencies and during emergency situations, where necessary. For fire emergencies, the procedures to be applied, including the trainings to be given to Project personnel and the measures to be taken, will be planned in coordination with the fire response units of the provinces.In the event of a fire, wall-mounted, hand-held, suitable type fire extinguishers and special extinguishing systems in places where the fire response units cannot enter or reach quickly will be provided, and kept ready for use.The media will be communicated through qualified, trained persons and/or by using appropriate tools (i.e. press releases), where necessary.The Contractor will develop COVID-19 EPRP in line with national legislative requirements and IFC Interim Advice for IFC Clients on Developing a COVID-19 EPRP. The subcontractors will also be stipulated to adopt the Contractor's COVID-19 EPRP.	Negligible		

Impact Description	Project Phase	Receptor	Extent		Magnitude		Frequency	Overall Magnitude	Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
					Reversibility	Duration						
H&S risks to visitors	<ul style="list-style-type: none">ConstructionOperation	<ul style="list-style-type: none">Visitors (e.g. auditors, consultants, other external stakeholders)	Restricted	Low to High (depending the type of the incident)	Short term to long term reversible	Long term	One-off	Low to High	High	Minor to Major	<ul style="list-style-type: none">All visitors will receive visitor orientation upon their arrival at the Project sites to understand and be informed about the basic H&S rules, emergency procedures and site specific H&S implementations.The visitors will be escorted at all times and will only be allowed at predetermined safe zones. Upon receipt of the orientation training, as necessary depending on the Project sites to be visited, personal protective equipment (PPE) will be provided to the visitors.The visitor orientation training will cover, at minimum, the following:<ul style="list-style-type: none">Information on the Project sites to be visitedSite-specific hazards (e.g. mobile vehicles, site traffic, etc.) and basic HSE site rules for visitorsInformation on site signage, communication proceduresInformation on usage of PPEEmergency muster points and basic emergency procedures.Records will be kept by the site teams on visitor programs, trainings and PPE provided, etc.Additional induction and H&S trainings will be provided to persons, who will be at the Project sites for extended durations (e.g. auditors, service providers, etc.).	Negligible

14. CULTURAL HERITAGE

14.1. Methodology

The ESIA studies for the identification, assessment and management of the potential Project impacts on the tangible and intangible⁹⁸ cultural heritage assets have been performed by REGIO Cultural Heritage Management Consultancy ("REGIO").

The Project-specific Cultural Heritage Management Plan (CHMP) developed based on the outcomes of the baseline studies and impact assessment is presented in Appendix E including the Chance Find Procedure for the Project.

The tangible cultural heritage study comprised desktop review of the data available for the wider study area and field surveys conducted by the senior archaeologists. The study area for the tangible cultural heritage encompasses the following:

- Expropriation corridor of the HSR (including connection lines⁹⁹),
- Cultural heritage impact corridor, representing 50 meter-wide corridor at each side of the expropriation boundary (making a total of 100 m corridor beyond the expropriation corridor, referred to as 100 m impact corridor or impact corridor throughout the report),
- Outside the 100 m impact corridor covering the immediate surroundings, and
- Quarry locations including access roads.

Findings of the studies are presented in the following sections. The main objectives of the study are summarised below:

- Identifying the exact location and properties of registered and non-registered¹⁰⁰ cultural heritage sites and assets located within the cultural heritage study area of the ESIA based on desktop research and field surveys.
- Identifying the intangible cultural heritage elements of the settlements crossed by the Project alignment.
- Developing mitigation measures for the management of registered and non-registered cultural heritage and intangible cultural heritage elements within the study area, consistent with the requirements and procedures set by the Law on the Conservation of Cultural and Natural Property (No. 2863, 1983) and related secondary legislation as well as decisions of the related Regional Councils for the Conservation of Cultural Property for the registered sites or sites that are in the process of registration by the Ministry of Culture and Tourism (MoCT).
- Providing upfront information on the cultural heritage sites and assets located within Project's impact area to the related cultural heritage authorities to ensure timely evaluation of the sites by the authorities within the framework of the Law on the Conservation of Cultural and Natural Property (Law No. 2863, 1983) and identify the management measures to be required by the authorities for those sites.
- Providing upfront information on the cultural heritage sites and assets located within Project's impact area to relevant Project departments to ensure timely planning and progress of the activities, in alignment with the evaluation and decision processes of the cultural heritage authorities.
- Contributing to the archaeological and cultural inventory of Turkey by sharing the information on the cultural heritage sites and assets located within the ESIA study area (collected through scientific methods) with related Regional Councils for the Conservation of Cultural Property.

⁹⁸ The Project does not propose to use the cultural heritage, including knowledge, innovations, or practices of local communities for commercial purposes (examples include, but are not limited to, commercialisation of traditional medicinal knowledge or other sacred or traditional technique for processing plants, fibers, or metals).

⁹⁹ Connection lines refer to routes diverging from the main HSR line and connecting it to other existing and planned railway routes.

¹⁰⁰ Non-registered sites may include (i) sites in the process of registration by the related cultural heritage authorities; sites with archaeological potential as identified/discovered by the cultural heritage team as part of the ESIA field surveys; or (iii) other sites including the remains of a historic bridge, a grave/graveyard, fountain etc.

In consideration of the scope of work (design and construction responsibility) of the Contractor as defined in the Construction Contract (see Chapter 1 “Project Description”), the scoping of the tangible cultural heritage studies, including the baseline, impact assessment and management, has been done as summarised in Table 14-1.

Table 14-1. Scope of Tangible Cultural Heritage Studies

Section	Sub-section	Tangible Cultural Heritage Studies
Section 1	Polatli-Afyonkarahisar	Scoped-in
Section 2	Afyonkarahisar -Banaz (including Hatipler Passage)	Scoped-in
Section 3	Banaz-Esme Esme-Salihli	Desk-based study scoped-in. Further studies to be covered as part of the E&S Audit, and Management and Corrective Action Plan (at the time these sections of the Project will be handed over to the Contractor for the superstructure works)
Section 4	Salihli-Manisa Manisa-Menemen	Scoped-in Desk-based study scoped-in. Further studies to be covered as part of the E&S Audit, and Management and Corrective Action Plan (at the time these sections of the Project will be handed over to the Contractor for the superstructure works)

The desk-based research for intangible cultural heritage studies were conducted for the entire alignment. The community-level interviews, covering questions on intangible cultural heritage elements of the settlements crossed by the Project, were conducted in 128 settlements (see Appendix D.1 for the settlements covered in the surveys). The methodology for the community-level interviews are described in Chapter 11 (“Socio-economy”), whilst the findings of the surveys with regard to intangible cultural heritage elements of the settlements are presented in this Chapter.

The routine operation and maintenance (O&M) activities of the Operator during the operation phase are not anticipated to cause any additional impact on the cultural heritage elements.

14.2. Project Standards

The Project will comply with the national legislative requirements, international conventions and agreements ratified by Turkey, and international standards applicable to the protection and management of cultural heritage, as summarised in the following sections.

14.2.1. National Legislation

As per Article 63 of the Constitution of the Republic of Turkey, “The State shall ensure the protection of the historical, cultural and natural assets, and shall take supportive and promotive measures towards that end”.

In line with the Constitution, movable and immovable cultural and natural assets are protected and shall be conserved under the Law on the Conservation of Cultural and Natural Property (Law No: 2863,1983).

Immovable cultural and natural property to be protected by legislation are specified under Article 6 of the Law as below:

- Natural property to be protected and the immovable property built until the end of the 19th century,
- The immovable property created after the mentioned date that the MoCT deems necessary to be protected considering its importance and characteristics,
- Immovable cultural property situated in the conservation site¹⁰¹,

¹⁰¹ As per the Law on Conservation of Cultural and Natural Properties (Law No. 2863, 1983), conservation site shall be the cities and remains of cities that are product of various prehistoric to present civilisations that reflect the social, economic, architectural

- Buildings that were stages of great historic events during the National War of Independence and the Foundation of the Republic of Turkey that are not subject to time and registration rules due to their importance for national history, areas to be identified as such and houses used by Mustafa Kemal Atatürk,
- However, the immovable property not decided to be protected by the Conservation Councils on the basis of their architectural, historical, aesthetic, archaeological and other important characteristics shall not be regarded as immovable cultural property to be protected.
- Rock-cut tombs, stones with inscription, painting, and relief, cave paintings, mounds (höyük), tumuli, archaeological sites, acropolis and necropolis, castle, fortress, tower, wall, historic barrack, bastion and fortification with their fixed weaponry, ruins, caravanserai, khan, public bath and madrasah, cupola, tomb and tablets, bridges, aqueducts, waterways, cisterns and wells, ancient road ruins, stones indicating distance, stones with holes delineating ancient borders, obelisks, altars, shipyards, quays, ancient palaces, pavilions, dwellings, waterside residences and mansions, mosques, masjids, musallahs, namazgahs, fountains and sebils, imarethane (communal kitchen), mint, şifahane (hospital), muvakkithane (room for the mosque timekeeper), simkeşhane (silver shop), tekke (dervish lodge) and zaviyals, cemeteries, hazire (graveyard), arasta, bedesten, bazaar, sarcophagi, stelae, synagogue, basilica, church, monasteries, külliye (complex of buildings adjacent to a mosque), ancient monuments and mural ruins, frescoes, reliefs, mosaics, chimney rocks and similar immovable are examples of immovable cultural property.
- Historic rock shelters, tree and tree populations with special characteristics and such are examples of immovable natural property.

The relevant requirements of the Law on Conservation of Cultural and Natural Property (Law No. 2863, 1983) applicable to the Project construction works are listed below (see Table 14-2):

Table 14-2. Applicable Requirements of the Law No. 2863

Article	Provision
Article 4 – Obligation to Notify	<p>Persons that discover movable and immovable cultural and natural property, owners, proprietors or occupants that know or have recently found out about the existence of cultural and natural property on the land they own or use shall be obliged to notify the nearest museum directorship or the village headman or the local administrators of other places within at the latest three days.</p> <p>If such property is in military garrisons and restricted areas, the relevant command levels shall be notified in line with the relevant procedure.</p> <p>The village headman, the local administrator receiving such notification or the relevant authorities that are directly notified of such property shall take the necessary measures to protect and secure such property. The village headman shall notify the nearest local administrator as of the situation and the measures taken on the same day. The local administrator and other authorities shall notify in writing the MoCT and the nearest museum directorship within ten days.</p> <p>Upon receiving this notification, the Ministry and Museum Director shall instigate due proceedings as soon as possible in line with the provisions of this law.</p>
Article 5 – Quality of state property	<p>Immovable property belonging to the state, public institutions and organisations and movable and immovable cultural and natural property to be protected that is known to exist or will be discovered on an immovable property owned by real and legal persons subject to civil law shall have the quality of state property.</p> <p>Registered and annexed foundation property subject to a separate status due to its special qualities shall not be covered by this provision.</p>
Article 25 – Transfer to Museums	<p>MoCT shall classify and register based on scientific principles movable cultural and natural property declared to MoCT according to article four and movable cultural and natural property to be protected as specified in article 23. Antiquities that need to be conserved in state museums shall be duly transferred to museums.</p> <p>The criteria, procedures and principles for classification, registration and transfer to museums of movable cultural and natural property to be protected shall be specified in a regulation.</p> <p>The historical features of all kind of weapons and materials concerning Turkish military history</p>

and similar characteristics of the respective period, areas that have been stages of social life or important historical events with a concentration of cultural property and areas the natural characteristics of which have been documented to require protection.

shall be surveyed, examined and evaluated by the General Staff at the location they are found or are reported to be found.

Antiquities excluded from the classification and registration and not needed to be placed in museums shall be returned with a document to their owners. The cultural property that has been returned with a document shall be at the discretion of their owner. Antiquities not taken back within one year by their owners can be kept at the museum or sold duly by the State.

In addition to the Law on Conservation of Cultural and Natural Property (Law No: 2863, 1983), secondary legislation (e.g. regulations, principal decisions) govern the procedures about the conservation of cultural and natural assets. The most prominent one being the Principal Decision No. 658 issued on 5 November 1999, which states that all archaeological sites need to be classified and protected according to their significant features. Three main categories are determined relevant to archaeological sites as:

Site Category	Definition
1st Degree Archaeological Sites	Areas requiring highest level of protection. They shall be preserved except for scientific excavations. The area shall be free of any type of buildings and construction. All kinds of construction, excavation, and modification activities are prohibited. However, for exceptional cases such as the necessity for essential infrastructure construction, Regional Preservation Boards may permit such activities based on the approval of the relevant museum and the head of the scientific excavation team.
2nd Degree Archaeological Sites	Areas requiring medium level of protection. They shall be preserved based on the conditions of protection and utilisation set by the Regional Preservation Boards. Additional construction is prohibited. As the 1st Degree Sites, for exceptional cases such as necessity for infrastructure construction among others, Regional Preservation Boards may permit such activities based on the approval of the relevant museum and the head of the scientific excavation team.
3rd Degree Archaeological Sites	Lowest level of protection area. Construction is permitted based on the decisions of Regional Preservation Boards. Before applying for a construction permit, test pit excavations shall be conducted, and the outcomes of these excavations shall be reviewed by the relevant museum and, if present, the head of the scientific excavation team. Reviews shall be submitted to Regional Preservation Boards. The Boards may ask for extension of the coverage of test pits before taking any decision.

14.2.2. International Conventions

Turkey has ratified the following key international conventions regarding the cultural heritage, which are applicable to the Project:

- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention on the Protection and Promotion of the Diversity of Cultural Expressions. Paris, 20 October 2005
- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention for the Safeguarding of the Intangible Cultural Heritage. Paris, 17 October 2003.
- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention concerning the Protection of the World Cultural and Natural Heritage. Paris, 16 November 1972.
- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. Paris, 14 November 1970.

14.2.3. International Standards and Guidelines

The guiding principles of the following international standards are also applicable to the Project:

- The IFC Performance Standards on Environmental and Social Sustainability (2012), PS 8 on Cultural Heritage.
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, ICOMOS 2011.

14.3. Baseline Conditions

The baseline conditions of the tangible and intangible cultural heritage elements within the study area have been characterised based on the findings of the desktop review and field surveys conducted as part of the ESIA. Detailed information on the baseline conditions is provided in the following sections.

14.3.1. Methodology for Baseline Studies

14.3.1.1. Tangible Cultural Heritage

Archaeological publications relevant to the region have been compiled in order to determine the cultural heritage potential of the study area. As part of the study, official inventory records of the tangible and archaeological cultural heritage assets were requested by the Contractor from the relevant Regional Councils for the Conservation of Cultural Property to identify whether any tangible archaeological or cultural heritage has already been identified/registered within the study area.

Resources used as part of the desktop study are listed below:

- Inventory records of Regional Councils for the Conservation of Cultural Property in Ankara, Eskisehir, Kutahya, and Izmir (Council No. 2)¹⁰²
- National Environmental Impact Assessment (EIA) Report of 2006
- Academic publications
- Historic/topographic and digital maps
- Previous reports on the cultural heritage studies conducted in the area (published by other parties/academia, studies conducted by the cultural heritage team, etc.)

The field surveys were conducted by the team of qualified experts of REGIO¹⁰³ between 13 January 2021 and 9 February 2021. The cultural heritage team visited the following locations in order to gather field data on the location and features of the tangible cultural heritage elements within the study area:

- HSR including connection lines
- Quarries including access roads (see Chapter 1, Table 1-18 for quarries planned to be used in the Project)

During the archaeological field surveys, the archaeological findings that could be observed on the surface were recorded on field survey forms by taking Geographical Positioning System (GPS) coordinates (WGS 1984, 6 degree) together with detailed photographs of the findings from various angles to form a Project archive.

Based on the field survey findings, daily reports were prepared by the cultural heritage team throughout the entire field survey program.

Walkover Surveys

As the primary research method as part of the study, walkover surveys were carried out within the cultural heritage study area¹⁰⁴ by a team of three (3) senior archaeologists. During walkover survey, the field survey team leader walked along the main axis of the Project expropriation corridor, using a GPS device, while other two specialists walked at both edges of the 100 m impact corridor. The instant communication between the members of the field team, who move forward in parallel was provided by walkie-talkies.

¹⁰² Inventory records of related Regional Councils for the Conservation of Cultural Property responsible for the management of cultural heritage in Section 3b were not available for this ESIA study.

¹⁰³ Senior Archaeologist Mr. Halim Özatay, Senior Archaeologist Mr. Serkan Akdemir, Senior Archaeologist Mr. Yunus Ekim

¹⁰⁴ The cultural heritage study area encompasses; (i) Expropriation corridor of the HSR (including connection lines); (ii) cultural heritage impact corridor, representing 50 meter-wide corridor at each side of the expropriation boundary (making a total of 100 m corridor beyond the expropriation corridor, referred to as 100 m impact corridor throughout the report); outside the 100 m impact corridor covering the immediate surroundings, and quarry locations including access roads.

During the field walkover surveys, all archaeological traces (ceramic shards spread on the surface, architectural elements or traces, graves or traces of graves, mounds, tumuli, etc.) observed on the surface of the study area were recorded on the Field Surveys Forms (kept in ESIA database) and relevant findings were incorporated to the Project Archaeological Baseline Table (see Section 14.3.2.2)

Intensive Surveys

When archaeological traces were encountered during the walkover surveys, the method of Intensive Survey was employed to determine the width of the archaeological site, identify its association with the Project route, reveal the area of distribution of archaeological surface findings and complete entire documentation, which would contribute to interpreting the history of the site on the basis of archaeological artefacts on the surface.

During the intensive surveys, by taking sufficient number of GPS coordinates (at least four different points) at each site, surface area of the site in current geography, and its location were determined. Moreover, detailed photographs of each site were taken from different angles and archived for documentation purposes.

The area was divided into 10x10 m wide squares in the north-south direction and the samples of archaeological material such as pottery, stone tool shards etc. on the surface were systematically documented (photographing, etc). Data collected on each site through intensive surveys were incorporate to the Field Survey Forms /kept in ESIA database) and Project Archaeological Baseline Table (see Section 14.3.2.2)

By processing the field GPS coordinates in the Esri ArcGIS software, the locations of the sites with respect to Project impact area (encompassing the expropriation corridor) were recorded digitally for further consideration in impact assessment studies.

14.3.1.2. Intangible Cultural Heritage

The UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage defines the intangible cultural heritage as the “practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognise as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity”. The Convention further states that the “intangible cultural heritage as defined by the Conveniton is manifested inter alia in the domains of oral traditions and expressions, including language as a vehicle of the intangible cultural heritage; performing arts; social practices and festive events; knowledge and practices concerning nature and universe; traditional craftsmanship”.¹⁰⁵

Turkey has completed the process of becoming a party to the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage on 27 March 2006.

As part of the ESIA study, besides the academic publications and study reports on intangible cultural heritage, the publicly available databases of the following sources have been reviewed to identify the baseline conditions to set the basis for the identification and assessment of potential impacts, if any:

- Turkish National Commission for UNESCO
- Provincial Directorates of the Ministry of Culture and Tourism
- Research Centre for Turkish Folklore (THBMER)
- Regional Development Agencies

The social surveys conducted as part of the ESIA are described in Chapter 11 (“Socio-economy”). The community-level interviews, held with the settlement heads in 128 settlements along the route, included questions on the traditional knowledge and practices and cultural spaces of the local communities associated with intangible cultural heritage, as listed below:

¹⁰⁵ <https://ich.unesco.org/en/convention#art2>

- Oral traditions and expressions
- Traditional food
- Performing arts
- Skills to produce traditional handicrafts
- Traditional clothing
- Traditional knowledge in health and medicine (for human and animals)
- Traditional agricultural and husbandry practices
- Traditional production techniques and other practices
- Cultural places, cemeteries, historical artefacts, etc. used by the locals in the forest, grasslands, public lands, etc.

The field walkover surveys conducted as part of the tangible cultural heritage studies within the cultural heritage study area of the Project have also served for the evaluation of potential intangible cultural heritage related to immovable (tangible) cultural assets such as historical or religious fountains, monuments, shrines, etc.

14.3.2. Findings of the Baseline Studies

14.3.2.1. Archaeological and Historical Background based on Desktop Review

With the Holocene epoch, where mankind founded permanent settlements and started written history, the Central and Western Anatolia regions, through which the HSR Project runs, have become home to many civilisations. The route of the HSR Project starts at the region defined as Little Phrygia (Phrygia Epiktetos) by the ancient geographer Strabon in his work titled Geographica, and after crossing the Hermos (Gediz) River which divides the Lydian Region, ends at Ionia (Strabon, 1993; A. Pekman, Cev., 1993).

It is understood from the geological studies performed near Phrygia and Lydia that the overall chronostratigraphy of the Project area was shaped in the Cenozoic era and took its final form in the Holocene epoch of the Quaternary system. The climatic and geological formation becoming fit for life in the paleogeographic sense has made it possible for various signs of life to appear in the area on the Project route. Fossil evidence in strata belonging to the Cenozoic era identified in recent studies verify such data. Concerning the geological structure, the regions crossed by the HSR route, consist of graben formed at different time periods. Geologically, the Polatli Basin is a graben, which was developed during the Paleocene-Lower Eocene epochs. Volcanic activity and hot waters, which emerged during the Neogene period, effectively shaped the graben (Unadan and Yuksel, 1998). The historic remains and present day settlements indicate that hot water springs coming out of the graben fractures due to active fault lines, were center of attraction for the ancient people.

Regional metamorphic rocks on the graben in Afyonkarahisar and its vicinity, which falls within the Phrygian Region, consist of units whose metamorphic evolution completed before the Mesozoic era (Tolluoglu et al. 1997). In terms of formation density, marble is the greatest metamorphic rock in the region. Looking from a paleogeographical viewpoint, marble resources formed by the pressure caused by plate tectonics have been the focal point of human activity within the region from protohistory to current day. In Afyonkarahisar province, Iscehisar district and its vicinity, which is located on the HSR route, tuff formations caused by volcanic activity, which are natural formations of a young geomorphology, have shaped the physical geography of the region from the Neogene period. Tuff layers formed as a result of tectonic volcanic activity were shaped by external forces and took on various forms. Currently, partially protected as a geopark, the region provides a suitable environment for mankind to settle and live in its historic development due to the presence of tuff, which is a malleable formation.

The regions falling to the west of the Project route, historically named as Lydia and Ionia Region, consist of graben formed under the control of plate tectonics in Western Anatolia. These grabens, which were shaped by the rivers running on their bases (Gediz, Nif, Aksu, etc.) formed vast alluvial plains. On this graben, especially the terrigenous Pleistocene sediments are considered to be one of the potential areas for man-made formations. One of the great tectonic depressions in Western Anatolia, the Gediz graben has been a popular settlement area throughout the Holocene epoch (Vardar, 2018). In studies carried out on deposits located in sediments on the Menderesli river facies in Cobanisa, Turgutlu and Salihli localities overlapping with the HSR route, fossils belonging to large and small mammals from the Late Pliocene age were identified (Gulec et al., 1999).

Based on archaeological evidence, it is known that the regions of Phrygia, Lydia and Ionia have been settlements since prehistoric times. The earliest of such times is named as the Paleolithic Age, when the mankind had not started production yet and survived as a semi-nomadic hunter-gatherer society. Caves and under-rock shelters were suitable dwellings for the Paleolithic man. Signs from the Paleolithic Age were found near the HSR route in the provinces of;

- Ankara (Eti Yokusu, Cubuksuyu);
- Eskisehir (Kuzfindik Valley; *Dincer and Turkcan, 2011*);
- Afyonkarahisar (Phrygian Sanctuary; *Taskiran and Taskiran, 2011*);
- Kutahya (West of Kocahoyuk, Beykoy, Cardakli, Goynuk localities; *Efe, 1990c*; Dellenpinari, Cakmakli Hill, Cukuralica; *Efe, 1993*; and Aizanoi, *Dincer et al., 2014*);
- Manisa (around Gediz River; *Maddy et al., 2015*), and
- Izmir province (*Cape Komur Burnu; Kansu, 1963; Cilingiroglu, 2016*).

In Neolithic Age, which comes after the Paleolithic, where mankind started production. While some part of humans tried to survive on hunting and gathering, some transitioned into a productive economy by growing their own food. When compared with the Paleolithic Age, the number of settlements started to grow in the Neolithic Age. Signs from the Neolithic Age were found on the HSR route in the provinces of;

- Eskisehir (Demircihoyuk, Keciayırı; *Efe, 2009a*);
- Usak (Banaz Ada Hoyuk and Mercimeklik; *Oy 2019*);
- Kutahya (Akmakca, Hachamza Hoyugu; *Efe, 1994a*);
- Afyonkarahisar (Uchoyuk, Eyice Hoyuk, Pani, Pirenlik, Baldanlar, Ahalarin Cesme 1, Pazarcik, Govem Locality, Arslan Tepesi, Maltepesi, Sinneli, Karakaya; *Kocak and Bilgin, 2010*; and Eyupoglu Huyuk which is located on the 149+810 km of the HSR route);
- Manisa (Kizilcukur, Moralilar Hoyuk ve Dedecik-Heybelitepe Settlement); and
- Izmir (Ulucak, Yesilova, Ege Gubre, Dedecik-Heybelitepe, Cukurici; *Saglamtimur, 2012*).

At the end of the Neolithic Period, the Chalcolithic Period, in which copper was used as well as stone tools, began. With an increase in the population in the beginning of this age, the number of settlements also grew exponentially. Trade become commonp with the utilisation of mineral ores. The Anatolian geography saw migration waves coming in from the Bosphorus and Dardanelles straits during this time period. Archaeological findings from the Chalcolithic Age were found near the HSR route and surrounding areas in;

- Ankara Cayyolu and Ahlatlibel;
- Eskisehir Karabayir Plantation, Kanlitas (*Turkcan, 2011*) Ahirozu Incir Locality, Ayvali, Bahcecik I-III, Berberini, Buyukpinar, Beykisa, Cukurhisar, Erenkoy 2 Settlement, Eski Camii, Golluce, Hamidiye II, Ikipinar, Kalkanli, Kayaagzi, Keskaya, Kirci, Kocadere, Kocakaya, Kustepe, Kucuk Kizlar, Kulahli, Taslik, Toroman, Turkmentokat, Yazir, Yilankiran, Karaagac Locality, Tilkilik River Locality Huyuks, Ucbasli, Yukari Sogutonu, Zeynepkadin, Dereyalak Hillside Settlements, Karadere Turbesi Kaya Ustu Settlement;
- Afyonkarahisar Uchoyuk, Eyupoglu, Eyice and Pani Huyuks;
- Usak Banaz Ada Huyuk and Mercimeklik (*Oy, 2019*);
- Kutahya Aslanapa, Kizilkilise, Dellenpinari, Manisa Moralilar Hoyugu, Naim Tepe, Taklantepe (*Akdeniz, 2011*); and
- Izmir Ulucak, Yesilova, Ege Gubre, Cape Komur Burnu, Dedecik-Heybelitepe and Cukurici.

With the Early Bronze Age, manufacturing of bronze tools which require high technology commenced. Mineral processing technology of that age developed alongside trade, which took on a systematic structure with the impact of migrations. Population increase, triggered by trade and technology, gave birth to the concept of cities in this age.

Archaeological findings of the Early Bronze Age were found in archaeological sites crossed by the HSR route, such as;

- Eskisehir province Kulluoba;
- Kutahya Seyitomer;
- Ankara Yassihoyuk (Gordion), Polatlı Huyuk;
- Afyonkarahisar Kusura Huyuk, Seydiler (*Kocak and Isik, 2008*), Uchoyuk;
- Manisa Tabantepe (Yortan Burial Site), Eski Balikhane and Ahlatlı Tepecik Burial Site and
- İzmir Limantepe and Panaztepe.

Urbanisation in the Early Bronze Age gave way to city states in the Middle Bronze Age. During that period, writing became to be utilised in Anatolia and developments in the cultural and political areas sped up. The Hittite Empire which arose in the Middle Bronze Age is a product of this accumulation of knowledge. Burushanda/Purushanda, which is mentioned in written documents from the period, is believed to be Uchoyuk in Afyonkarahisar-Bolvadin (*Barjamovic, 2011*).

In the Middle and Late Bronze Ages, developing trade and accumulation of knowledge and capital transformed scattered city states into empires. The Hittite State, which was founded in Central Anatolia around 1600 BC as a result of centralisation, became an empire during mid-14th century BC. In 2000 BC in Western Anatolia, Hittites formed relations with the city states of Arzawa, Mira-Kuwalya, Wiluša, Karkışa, Maša, Şeha River (Gediz), Pitašša and Lukka. The locations of these city states are not known exactly. Archaeological findings of the Hittites were found near the HSR route in Afyonkarahisar in the Ancient City of Amorium (Hisar), in Eskisehir Sarhoyuk (Dorylaion), in İzmir in Karabel Relief near Kemalpaşa, in Ankara Yassihoyuk (Gordion), Kulhoyuk and Gavurkale.

The Hittite Empire collapsed as a result of the migration waves coming to Anatolia from the Balkans in 1200 BC. Iron Age starts in Anatolia from 1100 BC. Thracian peoples began to migrate towards Anatolia from the Balkans at the beginning of the Iron Age. It is known that Phrygians came to Central and Central-Western Anatolia with these migrations and settled mostly in the Afyon-Kutahya-Eskisehir region.

In the 8th century BC, Phrygians founded a great kingdom centred around Gordion (Polatlı), which is near the starting point of the Project. Gordion was included in the "UNESCO Tentative World Heritage List" in 2012. Failing to withstand the Cimmerian invasion from the Caucasus, Phrygians were erased from history in 696 BC. Lydians, another Iron Age people, founded an independent state in 687 BC in the region encompassing modern day Usak and Manisa provinces. The capital of the Lydian state was the Ancient City of Sardis, which is located in Manisa province, Salihli district near the HSR Project route. Known to be of Anatolian origin, Lydians constituted the greatest and richest kingdom of the Iron Age. As part of their religious practices, Lydians also built numerous tumuli in the 6th and 7th centuries BC. Around 114 of such tumuli are located to the north of the HSR route, in the region between Gediz River and Lake Marmara. Sardis and the mentioned Lydian tumuli were included in the "UNESCO Tentative World Heritage List" in 2013 under the title "The Ancient City of Sardis and the Lydian Tumuli of Bin Tepe". At the close of the Late Bronze Age and the start of the Iron Age, Achaeans (Mycenae) founded a federation consisting of 12 city states around İzmir. The historical development of the Ionian Region is usually addressed together with the Lydian Region. In 700 BC, the Lydian King Gyges invaded the cities of Smyrna and Miletus and economically bound them to Lydia.

Unable to stand against the expansionist policy of the Persians, Lydians came under the rule of Persia in 546 BC and were governed as a satrapy centred around Sardis until Alexander the Great came to the region in 334 BC. In the Hellenistic Era (334-30 BC) Phrygia also received migratory influxes from the Galatian people. The region entered into the domination of the Roman Empire in 133 AD. Sardis had its richest and most glorious era under the dominion of the Roman Empire but began to collapse with an earthquake that happened in 17 BC.

After the Roman period, the Byzantine Empire ruled the entirety of Anatolia and established a vast dominion over the regions of Phrygia, Lydia and Ionia. Sardis became an important Episcopacy during the Byzantine Era. During that period, one of the first seven churches in Anatolia was built in Sardis. Lydia and Phrygia regions were laid to waste in 615 AD by the Sasanian.

After the Battle of Manzikert of 1071, Turkish reign started in the regions of Phrygia, Lydia and Ionia with campaigns carried out under the command of Suleiman I (Kutalmışoğlu Süleyman Şah). The region which first came under the command of Beyliks under the Great Seljuk Empire was later ruled by the Rum Seljuk Sultanate and the Ottoman Empire, respectively. In recent history, the most significant feature of the region is that resistance to

occupation after the First World War started here. The HSR Project route runs on a geography, which houses the most significant battlefields of the Turkish War of Independence.

The registered archaeological and immovable cultural heritage sites located within a 10 km corridor along the railway main axis (5 km either side of the main axis) have been identified based on a desktop research in order to set forth the tangible cultural heritage potential of the area. To this end, national EIA Report¹⁰⁶ of 2006 prepared for the Project, relevant academic publications, historical maps, official data from the MoCT obtained in previous studies conducted in the region, data obtained from Regional Councils for the Conservation of Cultural Property and publicly available resources have been utilised.

The registered archaeological and immovable cultural heritage sites identified through desktop research for the full alignment of the HSR are presented in Table 14-3. Accordingly, the registered archaeological and/or immovable cultural heritage sites potentially overlapping with the HSR route have been identified as below, whilst there are other registered sites located in the immediate surroundings (100-200 m) of the route:

- Section 1:
 - Seydiler 3. Degree Archaeological Site (KM 131+950-132+539)
 - Eyupoglu Hoyuk (149+833-149+931)
- Section 2:
 - Yunakbasi (Connection 160+050-160+295)

According to desk-based research, there are no registered sites overlapping with the HSR route in Section 3 and Section 4 of the HSR route. As the closest sites, Palamuttepe 3. Degree Archaeological Site and Cardaktepe Tumulus in Section 4d are located at 150 m (KM 541+000) and 103 m (KM 545+970) distance to HSR route.

Detailed information on the sites covered in the field surveys and outcomes of the impact assessment studies is provided in the following sections.

¹⁰⁶ According to the EIA (2006), 6 registered archaeological sites are located around the Project route. The EIA Report indicates that none of these registered archaeological sites are overlapping with the Project route.

Table 14-3. Archaeological and Immovable Cultural Heritage Sites Identified through Desktop Research (within an approximately 5 km Desktop Study Area)

No.	Name of Archaeological/ Immovable Cultural Heritage Asset	Province	District	Village/ Neighbourhood	Closest Distance to HSR Corridor (Metre)	Approximate HSR Kilometre (KM) (*)	Periods													
							Neolithic Period	Chalcolithic Period	Early Bronze Age	Middle Bronze Age	Hittite Empire Age	Late Bronze Age	Iron Age	Hellenistic Period	Roman Period	Medieval	Late Ottoman	The Turkish War of Indepen dence		
Section 1																				
1	Yildizdagi	Ankara	Polatli	Eskikarsak	5,136	0+000														
2	Saricataltepe			Yenice	1,175	2+600														
3	Goktepesi Watchtower			Gumusyaka	232	CL 1+800														
4	Kocahacili			Kocahacili	788	CL 6+559														
5	Cemalin Agili Hoyuk	Eskisehir	Sivrihisar	Cakmak	1,571	26+000														
6	Cakmakbası Suyu Settlement					1,460	28+100													
7	Adatepe Hoyuk					1,451	28+943													
8	Degirmenkaya Settlement and Necropolis			Yenidogan	220	46+310														
9	Ahiler Nomad Cemetery			Ahiler	2,700	50+220														
10	Tekke Mevkii Necropolis				1,950	26+970														
11	Kurtseyh Necropolis			Kurtseyh	1,611	54+660														
12	Kurtseyh Nomad Cemetery 1				1,990	55+100														
13	Kurtseyh Nomad Cemetery 2				1,539	55+310														
14	Kurtseyh Tumulus				1,254	56+000														
15	Kurtseyh Koyu Kiyi Mevkii Necropolis				2,100	57+330														
16	Benlikuyu Hoyuk,Settlemet and Nomad Cemetery			Benlikuyu	3,877	69+700														
17	Adayazi Cemetery and Cemetery and Necropolis	Afyonkarahisar	Emirdag	Adayazi	3,376	88+450														
18	Friklikaya Necropolis				2,052	89+153														
19	Buyukoren, Kucukoren, Porsu Settlement and Cemetery			Emirinkoyu	624	105+900														
20	Karain Mevkii Rock Cut Church		Bayat	Center	4,389	116+300														
21	Hurriyet Mahallesi Necropolis			Hurriyet	1,074	118+550														
22	Kirkinler		Iscehisar	Karakaya	1,070	130+700														
23	Seydiler 3.Degree Archaeological Site			Seydiler	0	131+950- 132+530														
24	The Ancient City of Documeium			Center	2,820	138+910														
25	Bacakkale Ancient Marble Quarry			Bahcecik	442	139+220														
26	Eyupoglu Hoyuk		Susuz	Center	0	149+833 149+931														
Section 2																				
27	Yunakbasi	Afyonkarahisar	Center	Beyazit	0	CL 160+050 - 160 + 295														
28	Cukuroren Necropolis	Usak	Banaz	Kozviran	993	221+100														
29	Manastir Archaeological Site			Buyukoturak	387	224+100														
30	Keklik Tepe Archaeological Site				335	224+700														
Section 3																				
31	Banaz Hoyuk	Usak	Banaz	31 Ağustos	1,177	280+000														
32	Banaz Martyrs Monument			Dilek	1,000	282+000														
33	Bagkonak Tumulies			Kizilcaoren	550	283+400														
34	Oksuz Hoyuk			Oksuz	250	287+000														
35	Nohutova Hovuk			Kizilcasoqut	770	296+500														

No.	Name of Archaeological/ Immovable Cultural Heritage Asset	Province	District	Village/ Neighbourhood	Closest Distance to HSR Corridor (Metre)	Approximate HSR Kilometre (KM) (*)	Periods												
							Neolithic Period	Chalcolithic Period	Early Bronze Age	Middle Bronze Age	Hittite Empire Age	Late Bronze Age	Iron Age	Hellenistic Period	Roman Period	Medieval	Late Ottoman	The Turkish War of Indepen dence	
36	Kapaklar Hoyuk			Kapaklar	1,302	303+000													
37	Degirmenderesi Archaeological Site			Merkez	Koyunbeyli		750	304+200											
38	The Ancient City of Alaudda						2,707	307+000											
39	Koyunbeyli Hoyuk					2,133	316+500												
40	Cinci Degirmeni Necropolis		Elmacik			759	318+000												
41	Elmacik Hoyuk					1,010	319+000												
42	Inay Hoyuk				Ulubey	Inay	1,050	342+500											
43	The Ancient City of Blaundus		Kiran	2,550		345+500													
44	Balcikli Hoyuk and Necropolis		Karacaahmet	1,800		350+000													
45	Kumluca Hilltop Settlement		Eşme	Ahmetler	755	353+800													
46	Goztepe Tumulus				370	354+000													
Section 4a																			
47	The Ancient City of Sardis	Manisa	Salihli	Sart	1,830	450+550													
48	The Lydian Tumuli of Bin Tepe		Ahmetli	Kendirlik	2,950	456+500													
Section 4b																			
49	Akcapinar Tumulus	Manisa	Turgutlu	Akcapinar	1,765	469+600													
50	Archaeological Site 1		Center	Karaoglanli	3,930	491+100													
Section 4d																			
51	Yunus Emre Tumulus 1-2	Izmir	Menemen	Yunusemre	1,200	527+600													
52	The Ancient City of Temnos			Gorece	4,200	537+000													
53	Palamuttepe 3. Degree Archaeological Site			Degirmendere	150	541+000													
54	Goktepe Necropolis			Goktepe	1,148	541+500													
55	The Ancient City of Neonteikhos			Yanikkoy	4,789	545+550													
56	Cardaktepe Tumulus			Koyici	103	545+970													
57	Asarlik 1. Degree Archaeological Site			Asarlik	2,500	546+000													

(*) CL: Connection Line

14.3.2.2. Tangible Cultural Heritage based on Field Surveys

Registered and non-registered tangible cultural heritage sites located within the study area have been identified by the cultural heritage team through ESIA surveys. The sites identified to be located within the study area have been classified based on the criteria presented in Table 14-4.

Table 14-4. Site Classification Criteria

Site	Type of the Surface Material	Size of the Site Taken into Consideration	Intensity Rate of the Surface Material
Registered Sites	Sites that are registered and protected by the Law No. 2863.		
Non-registered Sites			
Sites in the Process of Registration	Sites that are in the process of registration as per the Law No. 2863.		
Potential Archaeological Site	Ceramic, roof tile, architectural stone block, glass object shards, stone object shards, metal object shards, bone etc.	10mx10m	Between 1-10 pieces (Low Intensity)
Archaeological Site	Ceramic, roof tile, architectural stone block, glass object shards, stone object shards, metal object shards, bone etc.	10mx10m	Between 10-100 pieces (High Intensity)
	Architectural remains, etc.		1 tumulus, 1 wall, 1 cistern etc.
Other Sites	Sites including the remains of bridge, redoubt, blockhouse, fountain, entrenchment, grave/cemetery, etc.		

Provincial distribution of the sites identified within the study area is presented in Table 14-5.

Table 14-5. Provincial Distribution of Registered and Non-registered Sites Identified within the Study Area

Province	Corresponding Railway KM	Registered Sites	Archaeological Site	Potential Archaeological Site	Other Modern/Old Cemetery, Fountain etc.)	Total Number of Sites
Ankara (*)	0+000-7+050		2			2
Eskisehir	7+050-70+595		5		1	6
Afyonkarahisar	70+595-210+845	6	10	1	4	21
Usak (**)	210+845-384+876		1		1	2
Kutahya	212+057-221+018			1		1
Manisa	384+876-533+491		2	1		3
Izmir	533+491-547+805	2	1	1		4
Total		8	21	4	6	39

(*) Includes the Konya Connection Line of 6.6 km.

(**) The railway route in Usak covers 210+845-212+057, 221+018-230+370 and 267+156-278+632 through 278+632-384+876, as the routes enters and exits the province of Kutahya at several locations.

Distribution of the sites identified with respect to their location/position within the Study Area is provided in Table 14-6. List of registered and non-registered sites within the study area, together with information on their registration status, classification, features and position, is provided in Table 14-7 and shown on Figure 14-2.

Table 14-6. Distribution of Sites with Respect to their Location/Position within the Study Area

Legal Registration Status	Within the Expropriation Corridor	Outside the Expropriation Corridor, within Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site	Total
Registered	3		4		1	8
Non-registered	14	7	3	5	2	31
Total						39

The drawings and photographs pertaining to the registered and non-registered cultural heritage sites are presented below between Figure 14-3 and Figure 14-47.

Ankara Province (KM 0+000-7+050; see Figure 14-1)

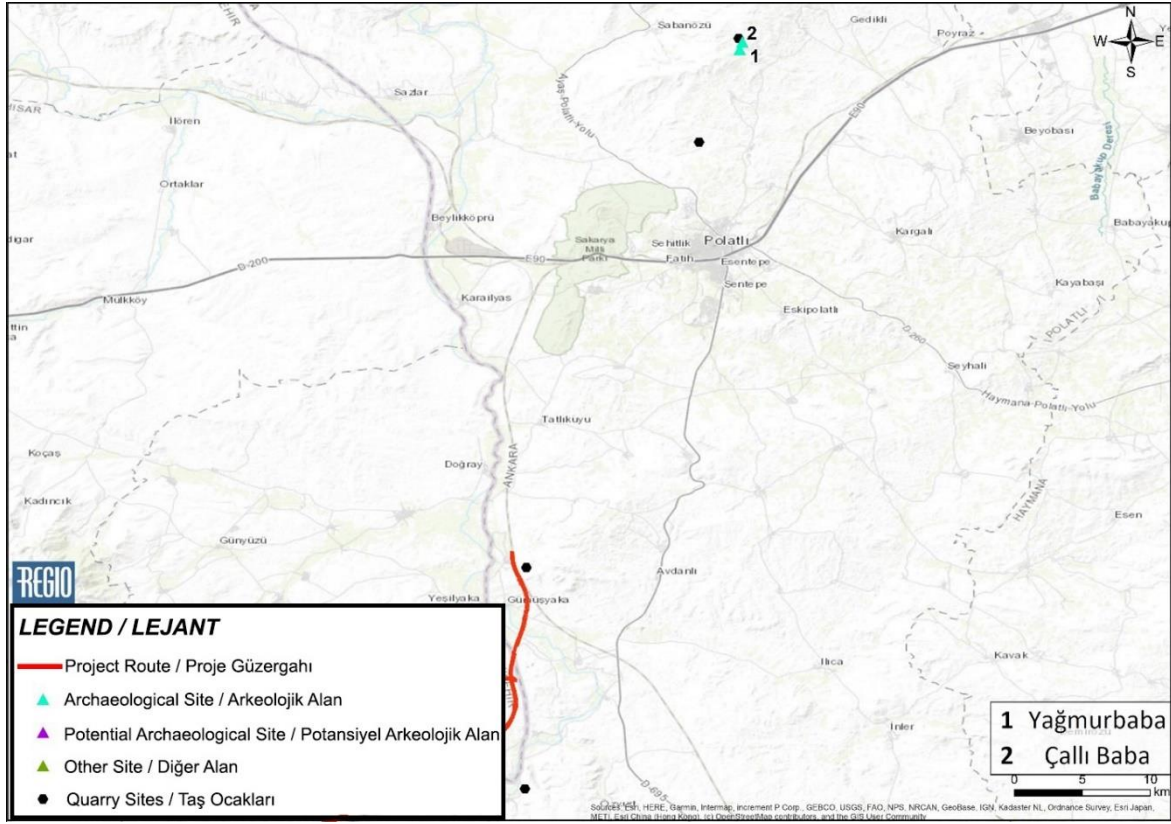


Figure 14-1. Archaeological/Immovable/Movable Cultural Heritage Sites in the Province of Ankara

Table 14-7. Registered and Non-registered Cultural Heritage Sites within the Study Area

Site No.	Site Name (*)	Province	District	Neighbourhood/ Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites		Non-Other	Description Features		Ref. Figure No.	Site Position				
						Yes	No	Archaeo logical Site	Potential Archaeo logical Site		Site Type	Detailed Description		Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site
1	Yagmurbaba	Ankara	Polatli	Yagmurbaba	Yagmurbaba-4 and Yagmurbaba-5		x	x			Tumuli	"Yagmurbaba" tumulus is a burial mound of Phrygian or Roman period.	Figure 14-3				x	
2	Calli Baba	Ankara	Polatli	Yagmurbaba	Yagmurbaba-4 Quarry Site		x	x			Flat Settlement	Shards of ceramic from the Roman Period were observed to be present on the surface of the "Calli Baba" archaeological site. Additionally, marks of architectural remainings were also found on the area surface.	Figure 14-4				x	
3	Gumuskonak	Eskisehir	Gunyuzu	Gumuskonak	20+500 20+590	-	x	x			Pastoral Settlement	Shards of ceramic from the Late Ottoman Period were observed to be present on the surface of the "Gumuskonak" archaeological site. Additionally, marks of architectural ruins were also found on the area surface.	Figure 14-6		x			
4	Capkininbel	Eskisehir	Sivrihisar	Yenidogan	45+155 45+203	—	x	x			Tumuli	Shards of ceramic from the Iron Age and the Roman Period were observed to be present on the surface of the "Capkininbel" tumulus (a burial mound).	Figure 14-7			x		
5	Alihoyugu	Eskisehir	Sivrihisar	Ahiler	50+860 50+980	-	x	x			Hoyuk	Shards of ceramic from the Early Bronze Age were observed to be present on the surface of the "Alihoyugu" mound.	Figure 14-8	x				
6	Sogutlu	Eskisehir	Sivrihisar	Kurtseyh	56+700 57+000	—	x	x			Slope Settlement	Shards of ceramic from the Late Ottoman Period were observed to be present on the surface of the "Sogutlu" archaeological site. Additionally, marks of architectural ruins were also found on the area surface. The ruins continue under the stockyard located to the north of the HSR Project route. It was also established as a result of the surveys carried out that the early construction works for the HSR Project caused partial damage on the archaeological site.	Figure 14-9	x				
7	Mahmutozu Grave Stele	Eskisehir	Sivrihisar	Sigircik	64+140		x			x	Grave Stele	"Mahmutozu Grave Stele" is an ex-situ grave stele made of marble belonging to the Roman Period.	Figure 14-10		x			
8	Mahmutozu	Eskisehir	Sivrihisar	Sigircik	65+900 66+400	—	x	x			Flat Settlement/ Old Cemetery	Shards of ceramic from the Ottoman Period were observed to be present on the surface of the "Mahmutozu" archaeological site. Additionally, marks of architectural ruins and graves were also found on the area surface.	Figure 14-11	x				

Site No.	Site Name (*)	Province	District	Neighbourhood/ Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites		Non-Other	Description Features		Ref. Figure No.	Site Position					
						Yes	No	Archaeo logical Site	Potential Archaeo logical Site		Site Type	Detailed Description		Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site	
9	Samangedigi	A.Karahisar	Emirdag	Ciftlik	67+600 68+150	-	x	x			Flat Settlement	Shards of ceramic from the Roman-Byzantine Period were observed to be present on the surface of the “Samangedigi” archaeological site. Additionally, architectural remaining traces were also observed on the area surface.	Figure 14-13	x					
10	Kelkaklik	A.Karahisar	Emirdag	Karaagac	98+010 98+065	–	x			x	Stone Bridge	“Kelkaklik” bridge, which belongs to the Ottoman period is originally single arched. However, it went under a restoration in 1940’s and became a double-arch bridge with the addition of an abutment in the middle portion. With its superstructure lined with concrete, the bridge is still in use today.	Figure 14-14		x				
11	Tabaklar	A.Karahisar	Emirdag	Hurriyet	Tabaklar Quarry Site		x			x	Smelting Furnace Complex	Dense slag formations were identified inside and in close vicinity of the “Tabaklar” ore smelting furnace complex. With an approximate conserved height of 6 m, the southern furnace has a diameter of 4 m and the northern furnace has a diameter of 5 m. The furnaces are built from cut stone and bricks.	Figure 14-15					x	
12	Hurriyet	A.Karahisar	Emirdag	Hurriyet	99+300 99+450	–	x	x			Tumuli	“Hurriyet” tumulus (a burial mound) is ravaged by treasure hunters. Shards of ceramic and cut stone blocks from the Iron Age were observed to be present on the surface of the area.	Figure 14-16			x			
13	Emirinkoy	A.Karahisar	Emirdag	Emirinkoy	Emirin Koyu Quarry Site		x	x			Slope Settlement	Shards of ceramic from the Roman-Byzantine Period were observed on the surface of the “Emirinkoy” archaeological site.	Figure 14-17					x	
14	Emirinkoy Cementery	A.Karahisar	Emirdag	Emirinkoy	105+250 105+400	–	x			x	Modern/ Old Cemetery	The “Emirinkoy Cemetery” has been used since the Ottoman Period. The Ottoman tombstones are proving that in the cemetery area. Additionally, it was observed that pieces of marble columns from the Byzantine Period are used as tombstones.	Figure 14-18		x				
15	Kumderesi	A.Karahisar	Emirdag	Yuregil	107+900 108+250	-	x	x			Flat Settlement/ Hoyuk	Shards of ceramic from the Bronze Age and the Roman Period were observed to be present on the surface of the “Kumderesi” archaeological site. Additionally, marks of architectural ruins were also found on the area surface. The early construction works for the HSR Project caused partial damage on the archaeological site.	Figure 14-19	x					
16	Tavsantepe	A.Karahisar	Bayat	Merkez	115+300 115+420	–	x	x			Watch Tower	Shards of ceramic from the Byzantine – Ottoman Period were observed to be present on the surface	Figure 14-20		x				

Site No.	Site Name (*)	Province	District	Neighbourhood/ Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites		Non-	Description Features		Ref. Figure No.	Site Position					
						Yes	No	Archaeo logical Site	Potential Archae logical Site		Other	Site Type		Detailed Description	Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site
												of the “Tavsantepe” archaeological site. Additionally, marks of architectural ruins were also found on the area surface.							
17	Cinkic	A.Karahisar	Bayat	Merkez	119+500 119+605	–	x				Hoyuk	Shards of ceramic from the Early Bronze Age were observed to be present on the surface of the “Cinkic” archaeological site. According to the data acquired from the relevant institutions for the project, the area constitutes a registered archaeological site.	Figure 14-21					x	
18	Seydiler	A.Karahisar	Iscehisar	Seydiler	131+650 132+770	–	x				Flat Settlement	According to the data acquired from the relevant institutions for the project, the area comprises a registered (3rd degree) archaeological site (“Seydiler” archaeological site). It was observed that excavation activities within the scope of the previous construction works for the HSR project were completed on the archaeological site. The site has been disturbed partially during the previous of the construction works.	Figure 14-22	x					
19	Buyuk Kepez	A.Karahisar	Merkez	Gebeciler	145+360 145+745	–	x				Hilltop Settlement	According to the data acquired from the relevant institutions for the project, the area constitutes a registered archaeological site (“Buyuk Kepez” archaeological site).	Figure 14-23					x	
20	Kepez Altı	A.Karahisar	Merkez	Gebeciler	145+437 145+515	–		x	x		Tumuli	The previous construction works for the HSR Project caused partial damage on the “Kepez Altı” tumulus (a burial mound). According to the data acquired from the relevant institutions for the project, the area comprises a cultural heritage which is not yet registered.	Figure 14-24	x					
21	Pirenlikuyu	A.Karahisar	Merkez	Gebeciler	146+220 146+420	–		x	x		Hoyuk	Shards of ceramic and pieces of human bones from the Early Bronze Age were observed to be present on the surface of the “Pirenlikuyu” mound.	Figure 14-25			x			
22	Kuzviran	A.Karahisar	Merkez	Susuz - Sakarya	149+460 149+620	–		x			x	Necropolis	Shards of ceramic from the Byzantine Period were observed to be present on the surface of the “Kuzviran” potential archaeological site. Additionally, some traces of architectural remainings were also found on the area surface.	Figure 14-26	x				
23	Eyupoglu	A.Karahisar	Merkez	Susuz - Sakarya	149+810 149+960	–	x					Hoyuk	According to the data acquired from the relevant institutions for the project, the area constitutes a	Figure 14-27	x				

Site No.	Site Name (*)	Province	District	Neighbourhood/ Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites		Non-	Description Features		Ref. Figure No.	Site Position					
						Yes	No	Archaeo logical Site	Potential Archae logical Site		Other	Site Type		Detailed Description	Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site
												registered archaeological site (“Eyupoglu” is a settlement mound - Huyuk). Within the scope of the Project, a viaduct is planned to be constructed to pass over the mound. It is known that archaeological drilling and salvage excavations were carried out by the Directorate of Afyonkarahisar Archaeological Museum on the eastern and western slopes of the mound where the abutments of the viaduct will be placed.							
24	Eyupoglu Necropolis	A.Karahisar	Merkez	Susuz - Sakarya	150+030 150+174	–	x	x			Necropolis	Shards of ceramic and broken pieces of artifacts from the Early Bronze Age and ancient graves were observed to be present on the surface of the “Eyupoglu Necropolis”. Additionally, several illegal excavations were also observed on the area surface.	Figure 14-28	x					
25	Cesmealti	A.Karahisar	Merkez	Susuz - Sakarya	150+865 150+982	–	x	x			Tumuli	The early construction works for the HSR Project caused partial damage on the “Cesmealti” tumulus (a burial mound).	Figure 14-29	x					
26	Yunakbasi	A.Karahisar	Merkez	Beyazit	Afyonkarahisar Connection Line		x				Hoyuk	According to the data acquired from the relevant institutions for the project, the area comprises a registered archaeological site (“Yunakbasi” mound). It was observed that filling activities within the scope of the previous construction works for the HSR project were completed on the archaeological site.	Figure 14-30	x					
27	Guzelim Tepesi	A.Karahisar	Merkez	Beyyazi	Beyyazi Quarry Site		x				Historical Site	Marks of trenches and walls from the Turkish Independent War Period were found on the surface of the “Guzelim Tepesi” historical site.	Figure 14-31						x
28	Oren	A.Karahisar	Sinanpasa	Guney Asagi	204+413 204+443	–	x			x	Stone Bridge	The “Oren” bridge which belongs to the Ottoman period is double-arched. With its superstructure lined with concrete, the bridge is still in use today.	Figure 14-32	x					
29	Dolay	A.Karahisar	Sinanpasa	Gunay Asagi	205+930 206+137	–	x	x			Hoyuk	Shards of ceramic from the Early and Middle Bronze Age were observed to be present on the surface of the “Dolay” mound.	Figure 14-33				x		
30	Olukbasi	Kutahya	Dumlupinar	Cumhuriyet	217+087 217+237		x		x		Pastoral Settlement	Shards of ceramic from the Byzantine Period were observed to be present on the surface of the “Olukbasi” potential archaeological site.	Figure 14-35	x					

Site No.	Site Name (*)	Province	District	Neighbourhood/ Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites		Non-Other	Description Features		Ref. Figure No.	Site Position					
						Yes	No	Archaeo logical Site	Potential Archaeo logical Site		Site Type	Detailed Description		Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site	
31	Alaba	Usak	Banaz	Alaba	270+600 270+850	-	x			x	Modern Cemetery	Some Ottoman Period graves have been observed in the “Alaba” cemetery along modern graves.	Figure 14-37		x				
32	Ahmetlidag	Usak	Esme	Kolankaya	Kolankaya Quarry Site		x	x			Hilltop Settlement	Shards of ceramic from the Iron Age were observed to be present on the surface of the “Ahmetlidag” archaeological site. Additionally, marks of architectural ruins were also found on the area surface.	Figure 14-38					x	
33	Toprakcukuru	Manisa	Turgutlu	Urganli	468+055 468+445	–	x	x			Flat Settlement	Shards of ceramic from the Roman Period were observed to be present on the surface of the “Toprakcukuru” archaeological site. Additionally, roof tile fragments and around 1 m2 sized mosaic floor remainings which may belong to an architectural structure were also found on the area surface.	Figure 14-40	x					
34	Kuslubahce	Manisa	Sehzadeler	Kuslubahce	508+520 508+668	–	x		x		Flat Settlement	Shards of ceramic from the Byzantine Period were observed to be present on the surface of the “Kuslubahce” potential archaeological site.	Figure 14-41	x					
35	Magrabahce	Manisa	Yunusemre	Horozkoy	510+724 510+875	–	x	x			Flat Settlement	Shards of ceramic from the Byzantine Period were observed to be present on the surface of the “Magrabahce” archaeological site.	Figure 14-42	x					
36	Degirmendere	Izmir	Menemen	Degirmendere	Degirmendere Quarry Site		x		x		Old Cemetery	Shards of ceramic and a grave structure from the Late Ottoman Period were observed to be present on the surface of the “Degirmendere” potential archaeological site. Additionally, a built-up hill which may be a tumulus (a burial mound) is located approximately 150 m to the northwest of the peak of the site.	Figure 14-44					x	
37	Caltidere	Izmir	Aliaga	Caltidere	Caltidere-2 Quarry Site		x	x			Castle/ Slope Settlement	Shards of ceramic from the Byzantine Period were observed to be present on the surface of the “Caltidere” fortress. Additionally, marks of architectural ruins were also found on the area surface.	Figure 14-45						x
38	Palamuttepe	İzmir	Menemen	Değirmendere	541+000		x				Hilltop Settlement/ Necropolis	Shards of ceramic and broken pieces of artifacts from the Roman Period and ancient graves were observed to be present on the surface of the “Palamuttepe 3.Degree Archaeological Site”. Additionally, several illegal excavations were also observed on the area surface.	Figure 14-46				x		

Site No.	Site Name (*)	Province	District	Neighbourhood/ Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites		Non-Other	Description Features		Ref. Figure No.	Site Position					
						Yes	No	Archaeo logical Site	Potential Archaeo logical Site		Site Type	Detailed Description		Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site	
39	Çardaktepe	İzmir	Menemen	Yahselli	545+970	x					Tumuli	The early construction works for the HSR Project caused partial damage on the “Cesmealti” tumulus (a burial mound).	Figure 14-47			x			

(*) Site names for non-registered sites have been designated by the cultural heritage team based on the location names as indicated in the topographical maps or the common names used by the locals to describe the area where the non-registered sites have been identified. (*) A non-registered archaeological site, Karatepe Slope Settlement /Old Cemetery, was identified by the cultural heritage team as part of the ESIA field surveys near the 97-Bayat 2 Quarry (Afyonlarahisar, Banaz, Merkez), which was a quarry indicated as “considered for use” during the scoping phase of the ESIA but then eliminated by the Contractor from the Project design based on the ESIA (cultural heritage study) findings. Therefore, the impact of the Project on the non-registered archaeological site of Karatepe has been avoided. For reference, shards of ceramic from the Byzantine – Ottoman Period were observed to be present on the surface of the “Karatepe” archaeological site. Additionally, marks of architectural remaining’s and martyrs’ cemetery from the Turkish Independence War were also found on the area surface.

Another non-registered archaeological site, Cobanisa Mithological Mountain/Cave, was identified by the cultural heritage team as part of the ESIA field surveys near the 239-Asagi Cobanisa Quarry (Manisa, Turgutlu, Asagicobanisa), which was a quarry indicated as “considered for use” during the scoping phase of the ESIA but then eliminated by the Contractor from the Project design based on the ESIA (cultural heritage study) findings. Therefore, the impact of the Project on the non-registered potential archaeological site of Cobanisa has been avoided. For reference, “Cobanisa” potential archaeological site consists of 2 caverns on high and steep rocky surface. The caves were not climbed due to safety risks, but the area was considered to be a "potential archaeological site" due to the fact that similar caves in the area were seen to contain archaeological assets in literature reviews. Both Cobanisa Quarry Site and these two caverns fall within the boundaries of Mount Sipylus (Spil) attested to in the ancient records.

Note: Palamuttepe 3. Degree Archaeological Site and Cardaktepe Tumulus registered sites in Section 4d are located at 150 m (KM 541+000) and 103 m (KM 545+970) distance to HSR route. They could not be visited as part of the ESIA field surveys and will be covered during the time of E&S Audit.

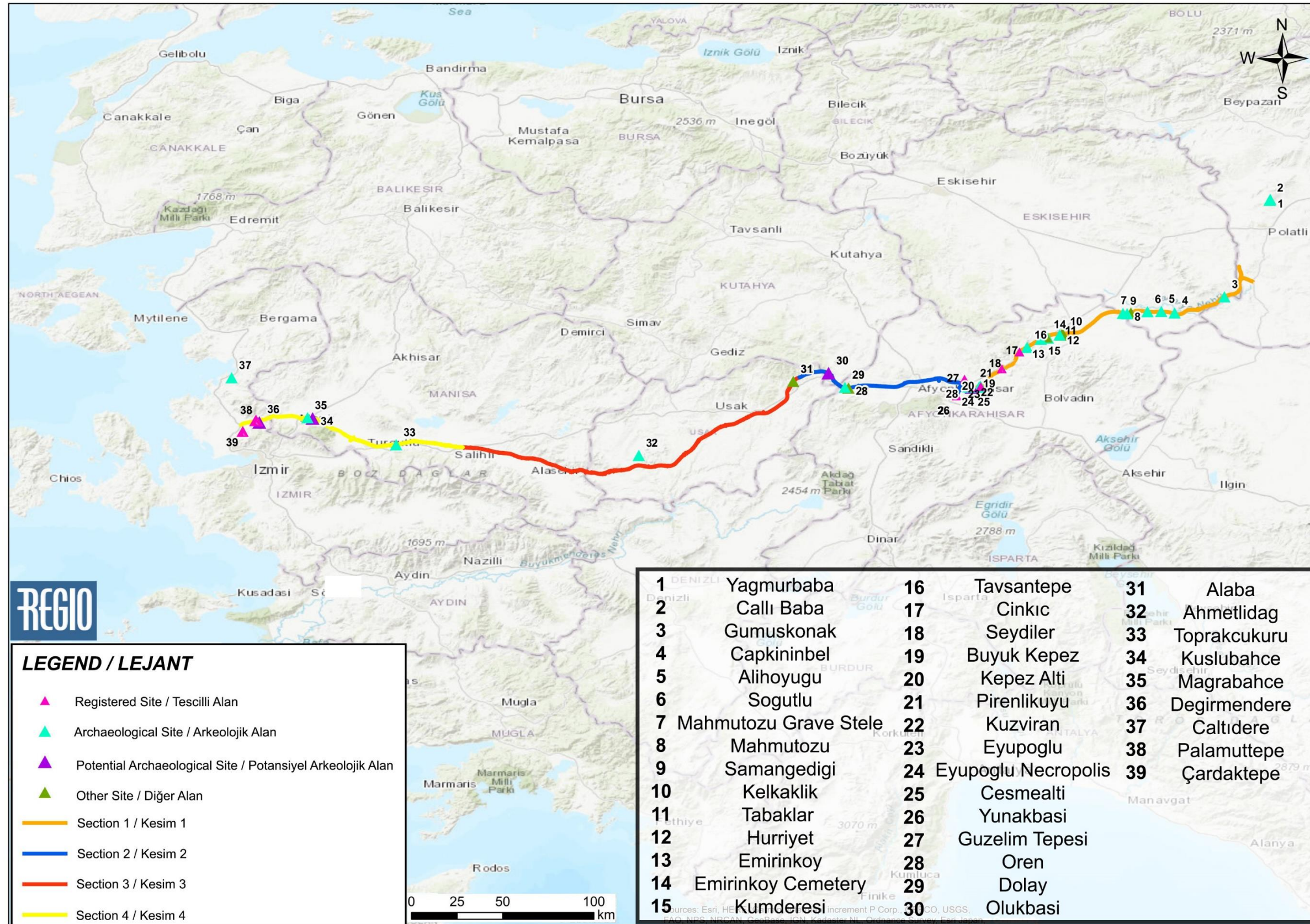


Figure 14-2. Locations of the Registered Archaeological Sites and Non-registered Potential Site within the Study Area

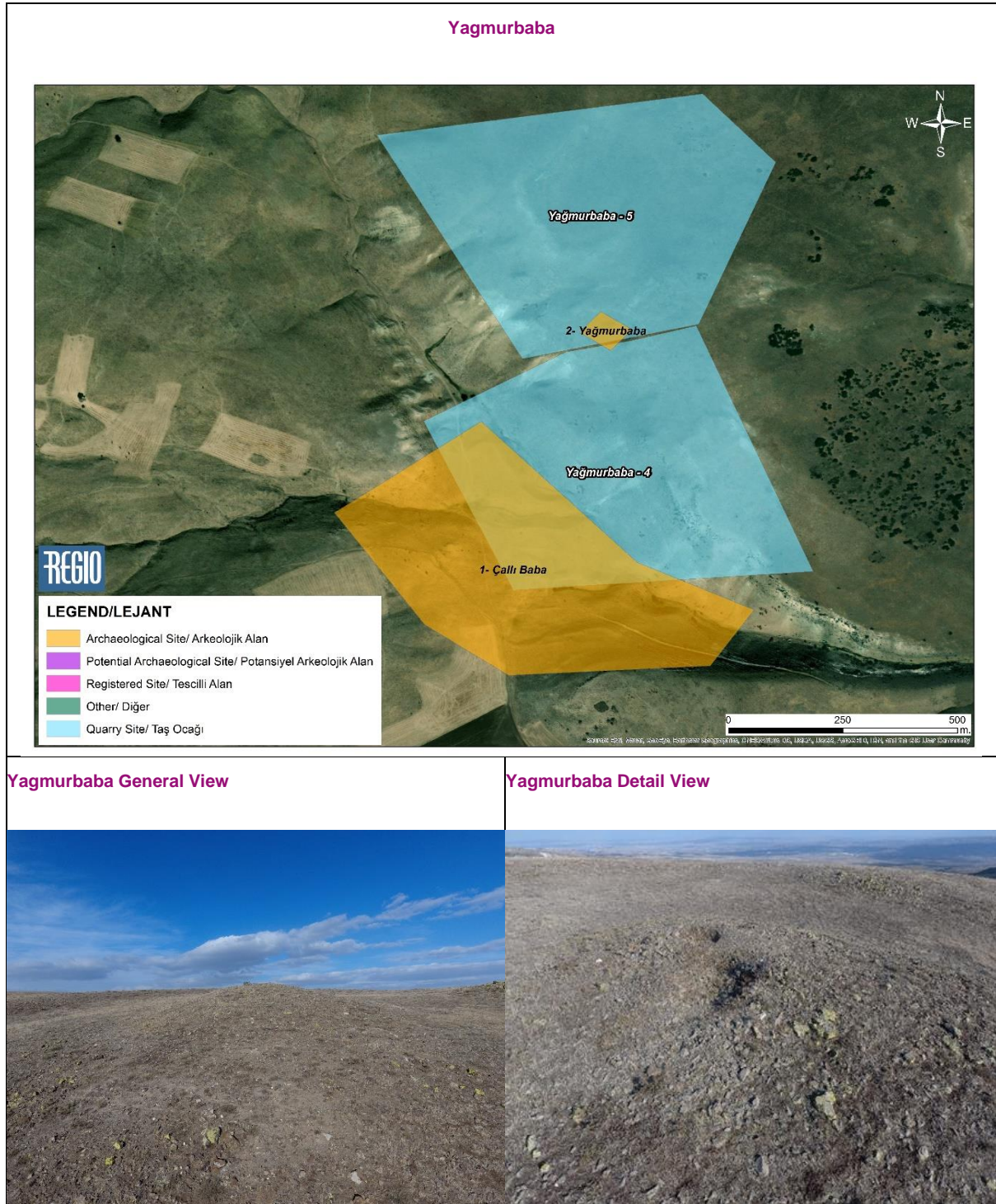


Figure 14-3. (1) Yagmurbaba Tumuli (Non-registered Archaeological Site) within the Yagmurbaba-4 and Yagmurbaba-5 Quarry Site

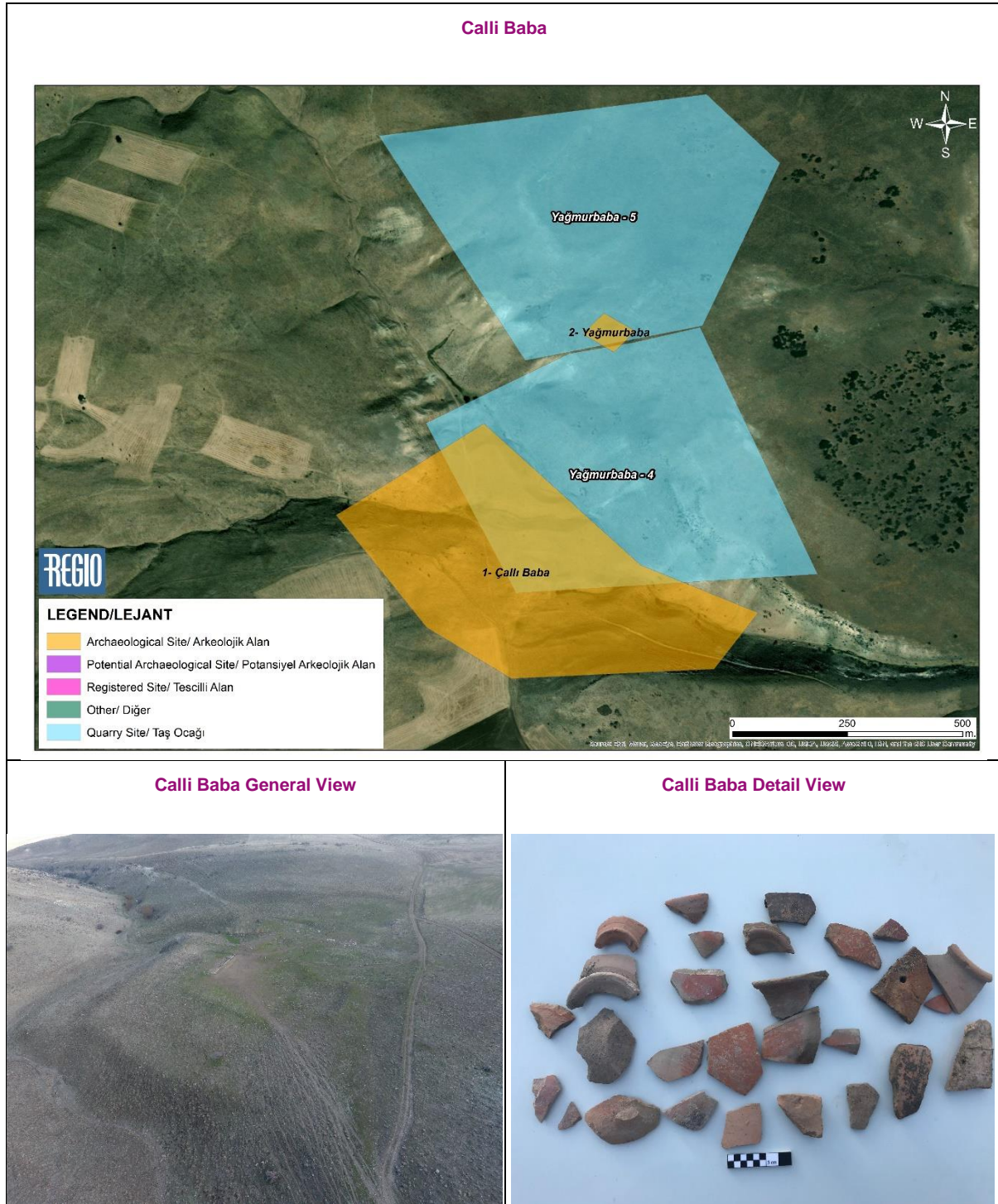


Figure 14-4. (2) Calli Baba Flat Settlement (Non-registered Archaeological Site) Outside the Yagmurbaba-4 Quarry Site

1) Eskisehir Province (KM 7+050-70+595; see Figure 14-5)

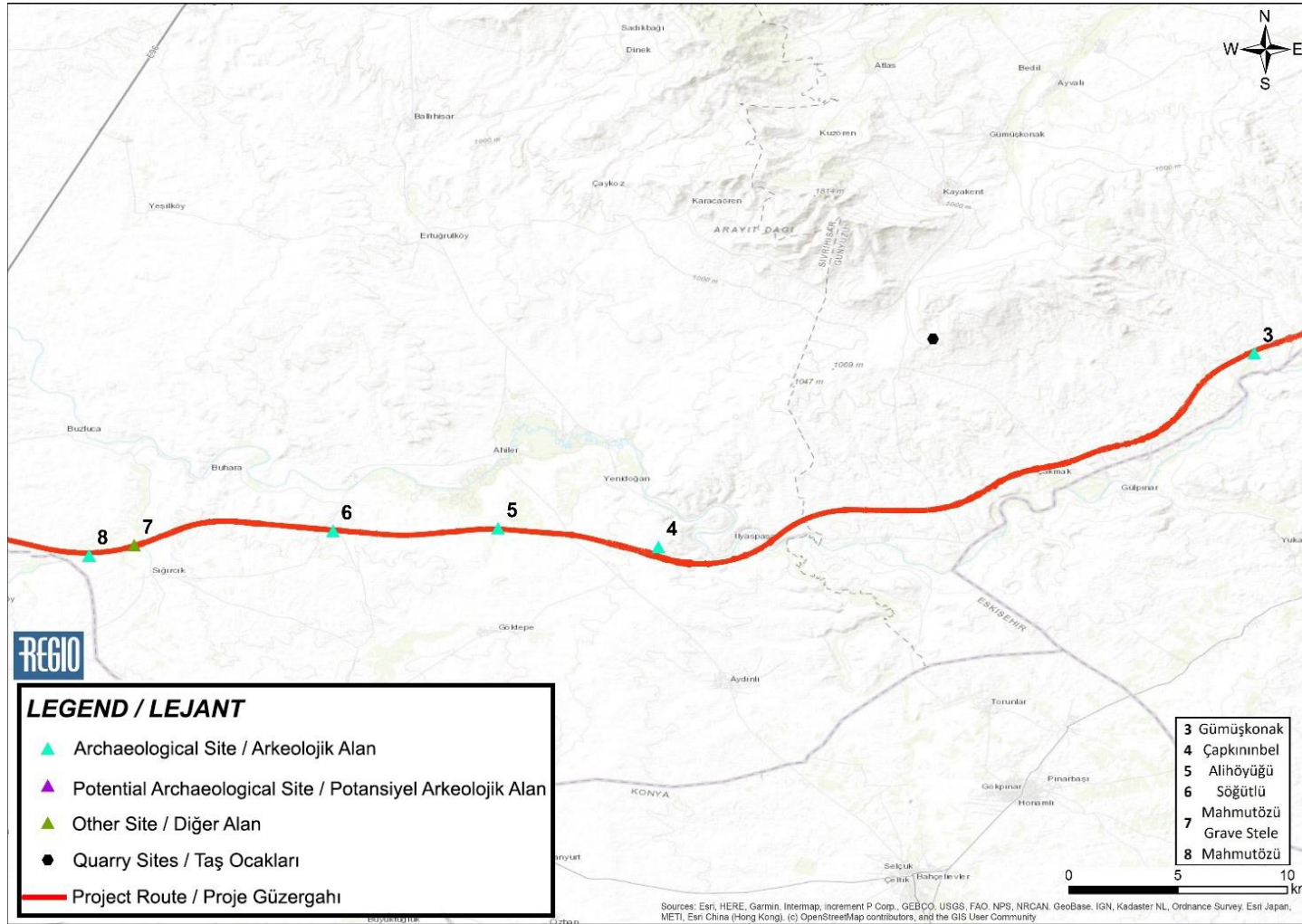


Figure 14-5. Archaeological/Immovable/Movable Cultural Heritage Sites in the Province of Eskisehir

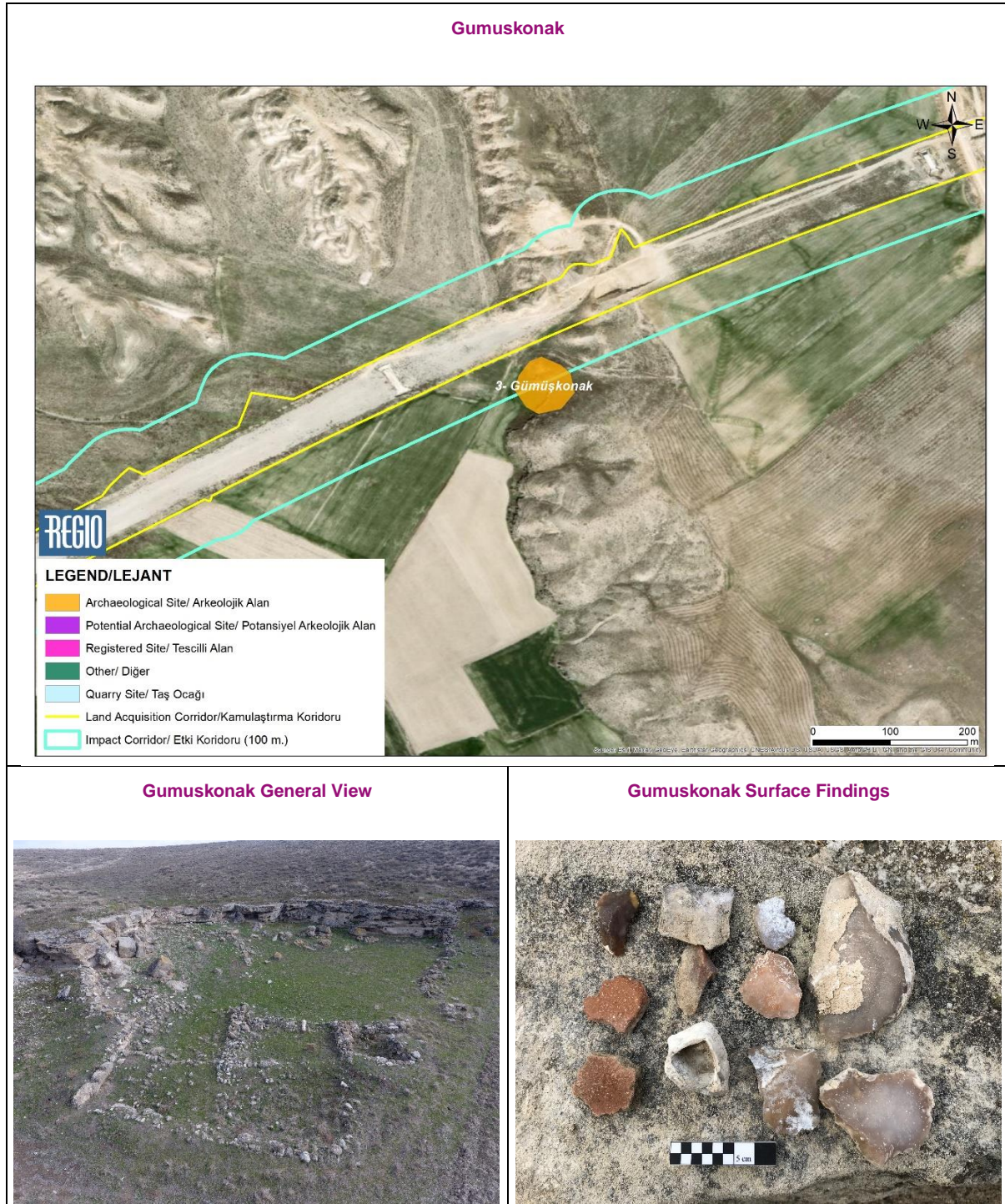


Figure 14-6. (3) Gumuskonak Pastoral Settlement (Non-registered Archaeological Site) within the Impact Corridor (KM 20+500)

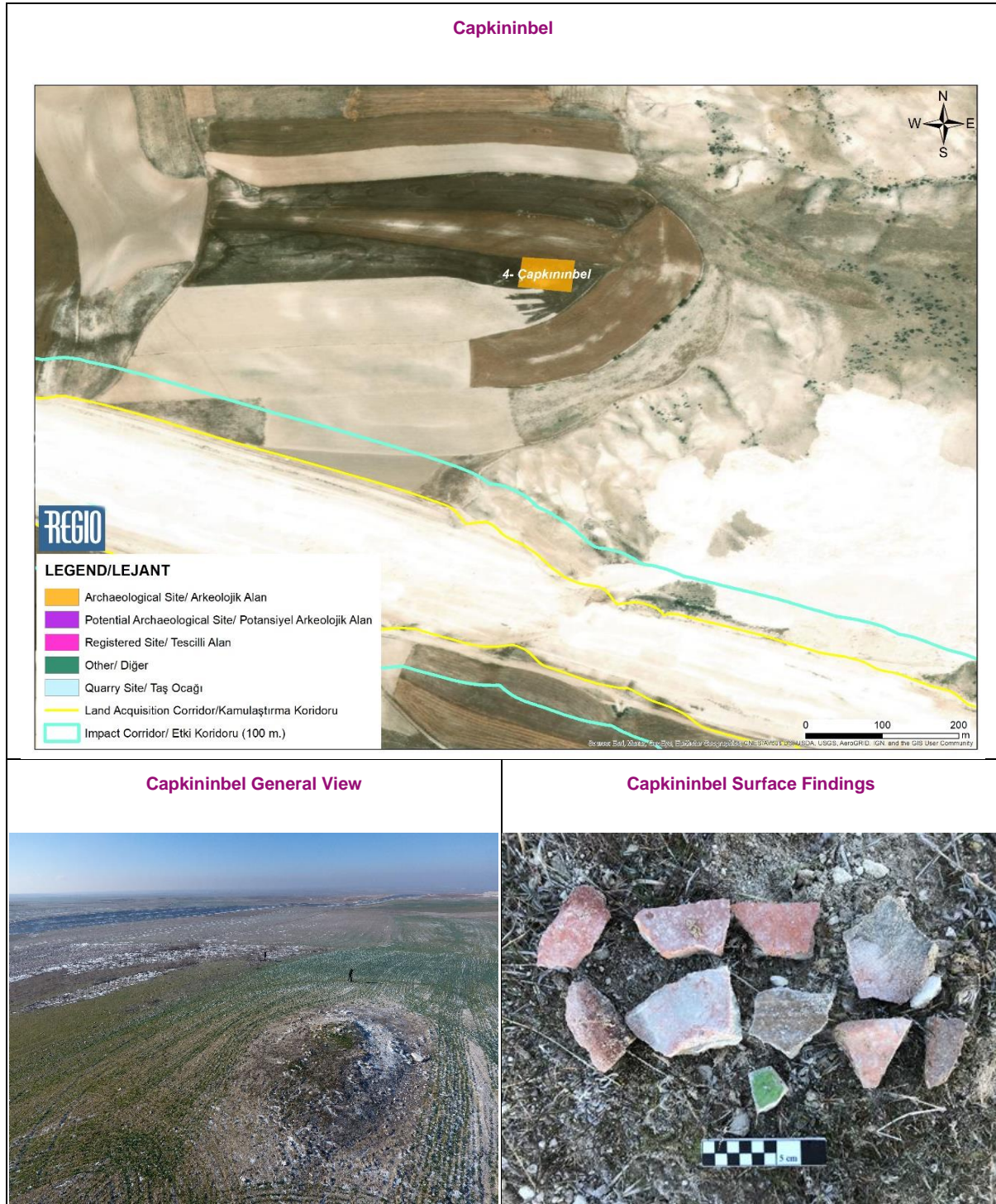


Figure 14-7. (4) Capkininbel Tumuli (Non-registered Archaeological Site) outside the Impact Corridor (KM 45+155)

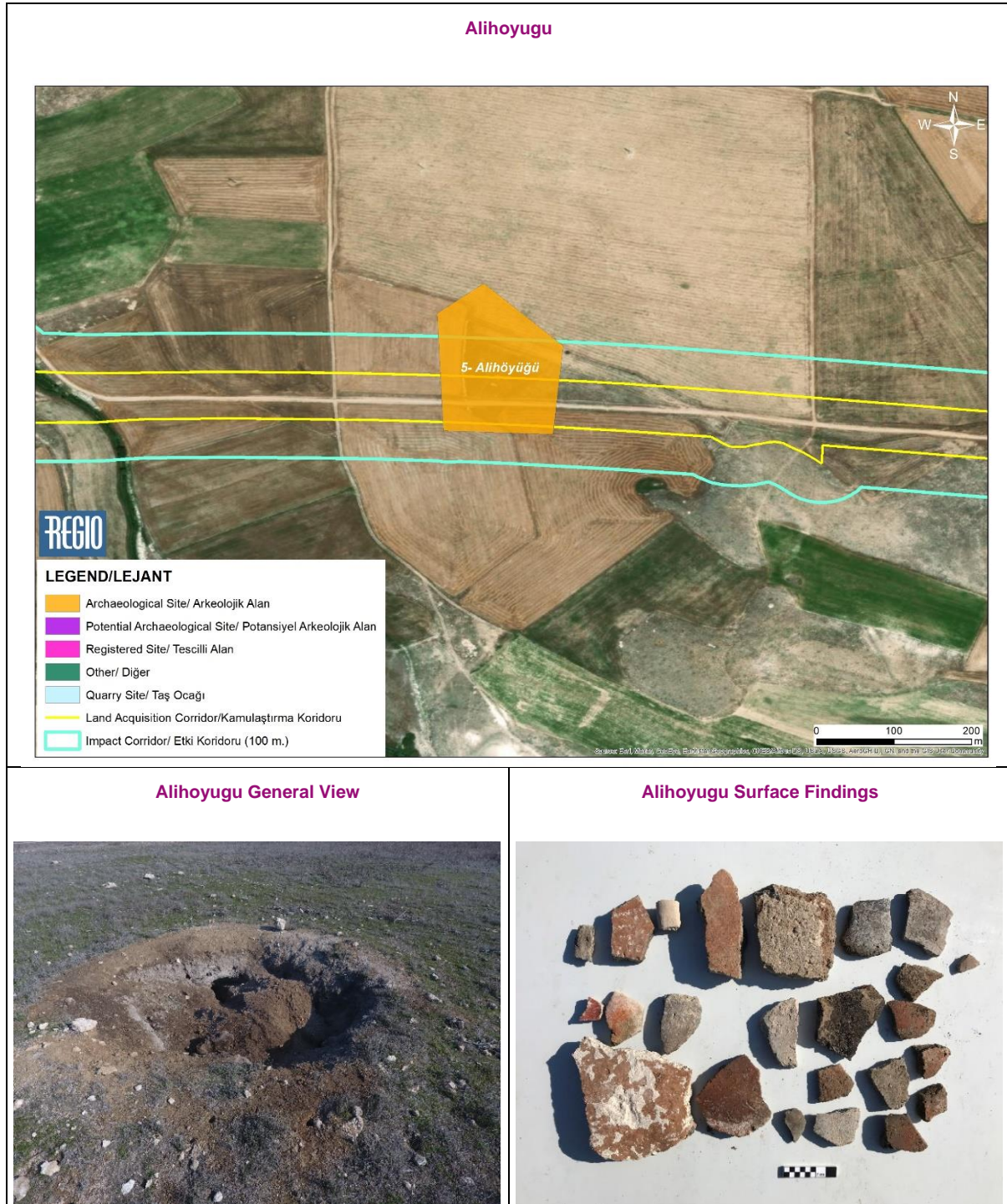


Figure 14-8. (5) Alihoyugu Mound (Non-registered Archaeological Site) within the Expropriation Corridor (KM 50+800)

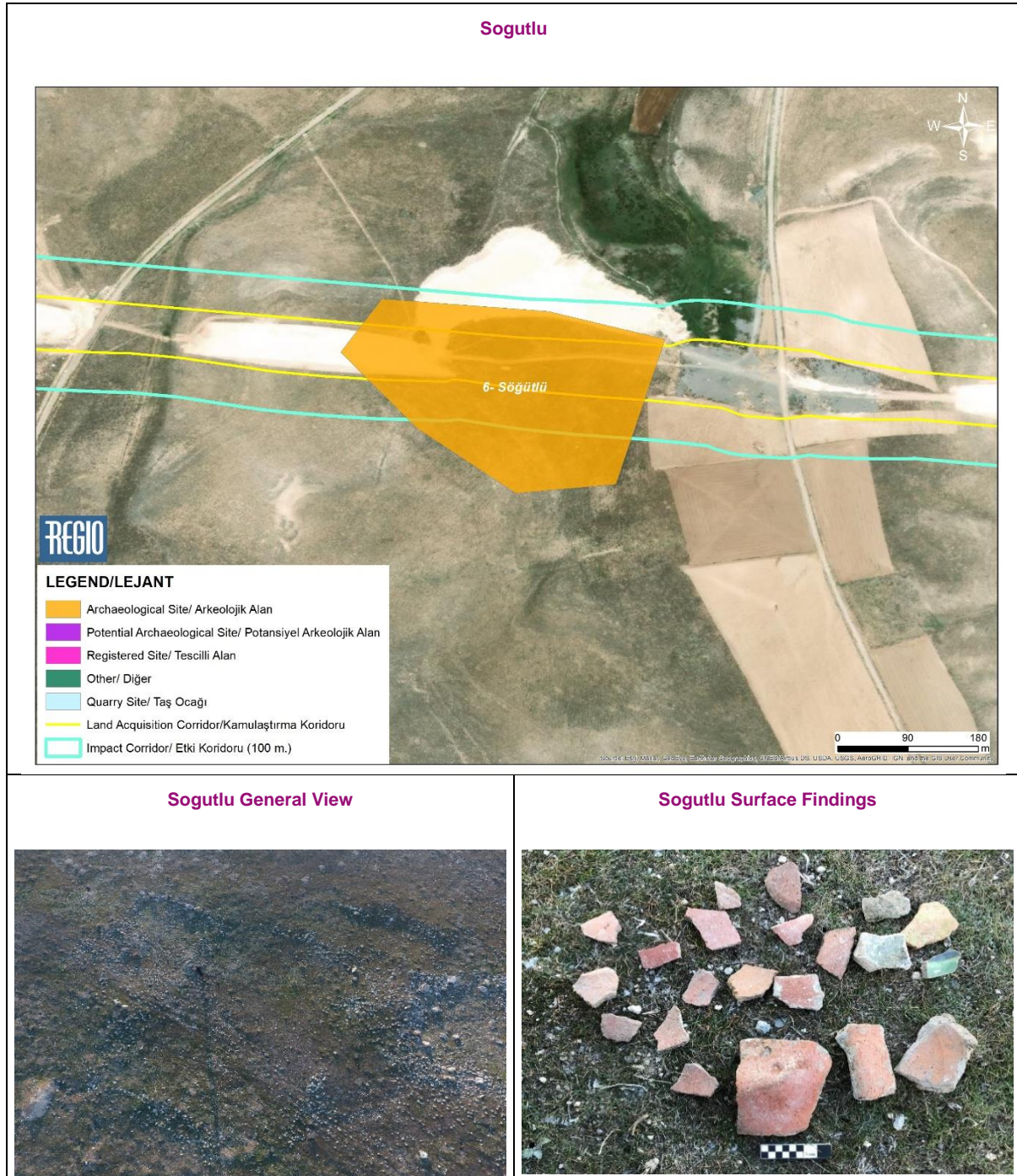


Figure 14-9. (6) Sogutlu Slope Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (56+700)

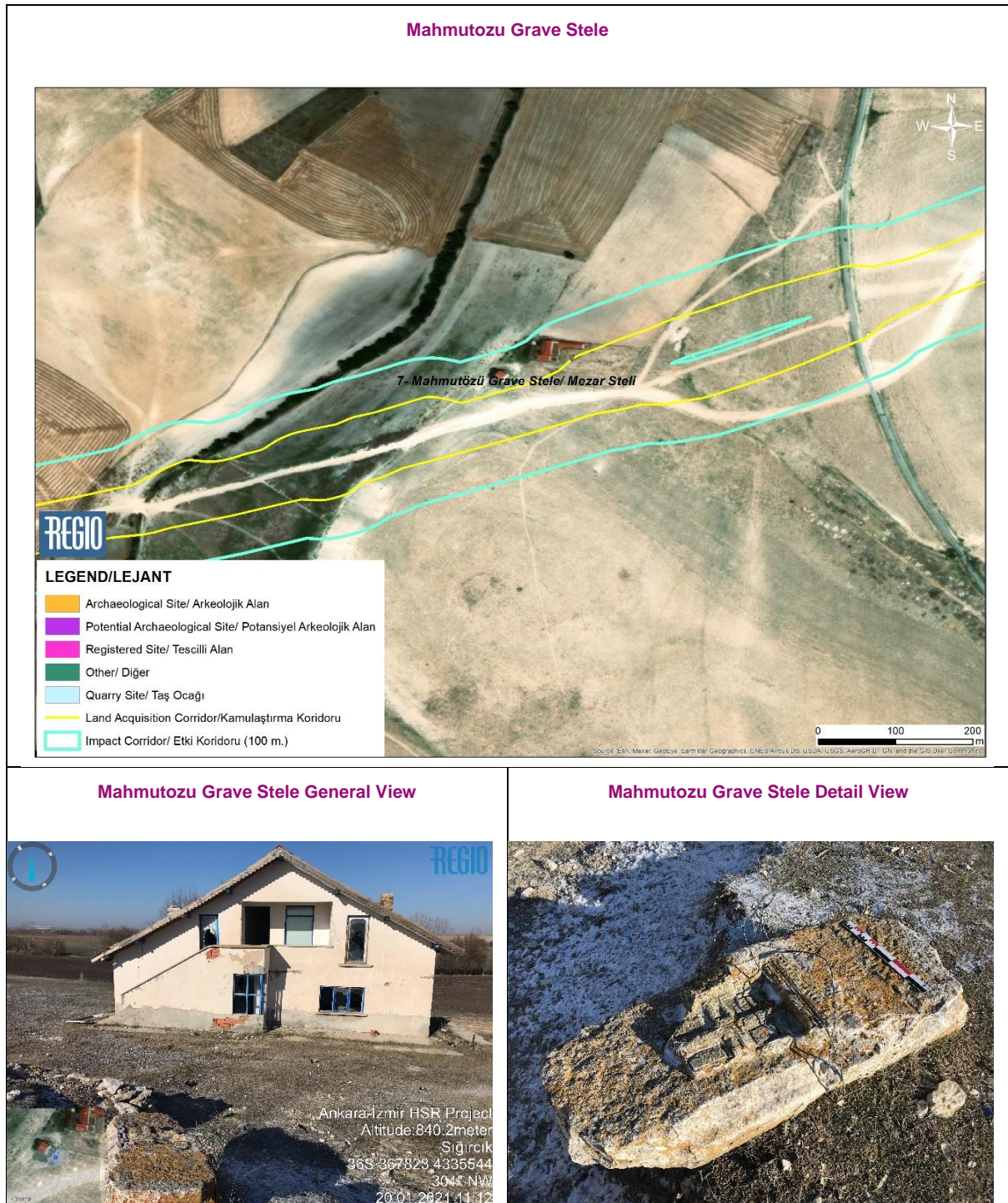


Figure 14-10. (7) Mahmutozu Grave Stele (Non-registered Site – Classified as Other) within the Impact Corridor (64+140)

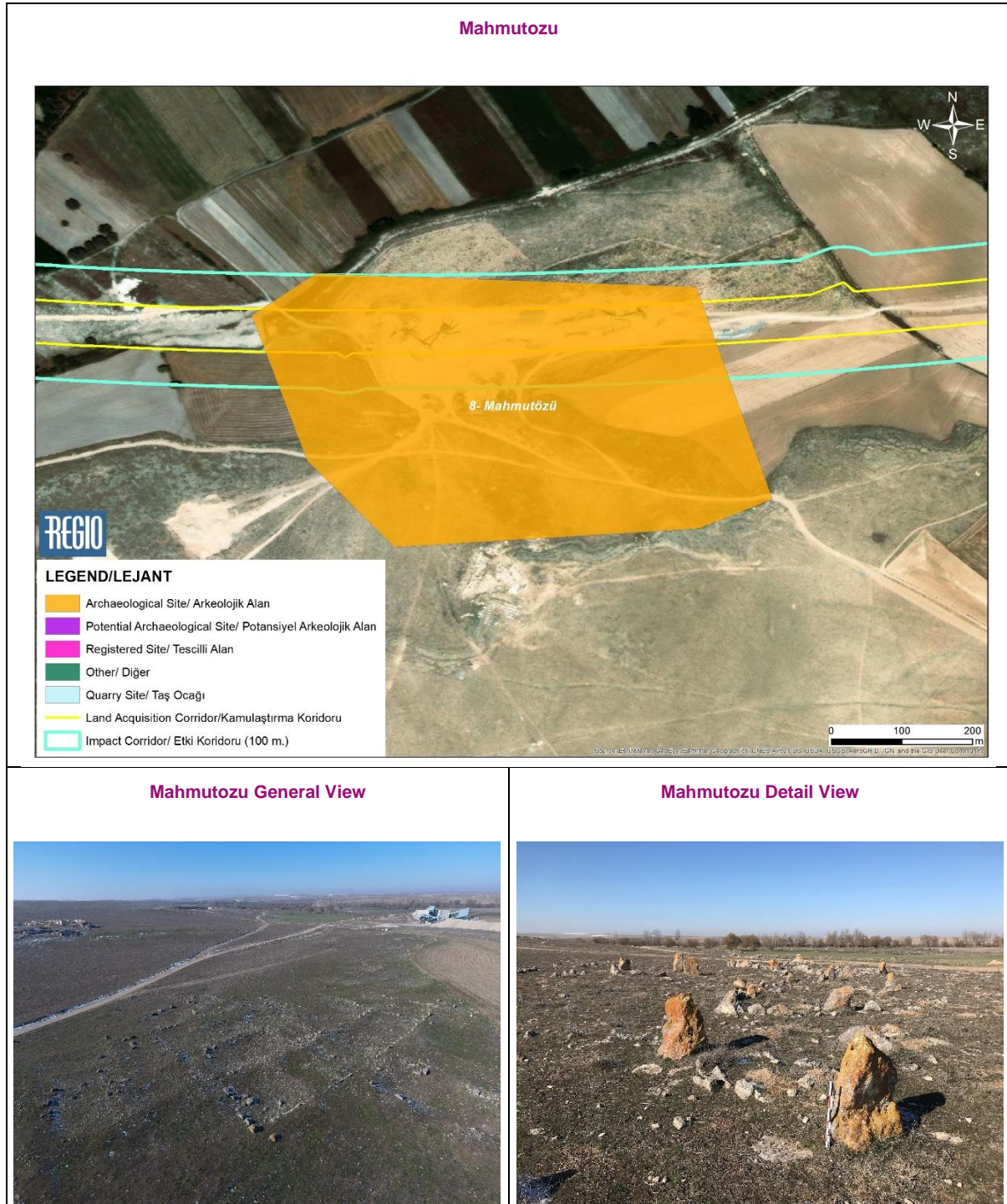


Figure 14-11. (8) Mahmutozu Flat Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (KM 65+900)

2) Afyonkarahisar (KM 70+595-210+845; Figure 14-12)

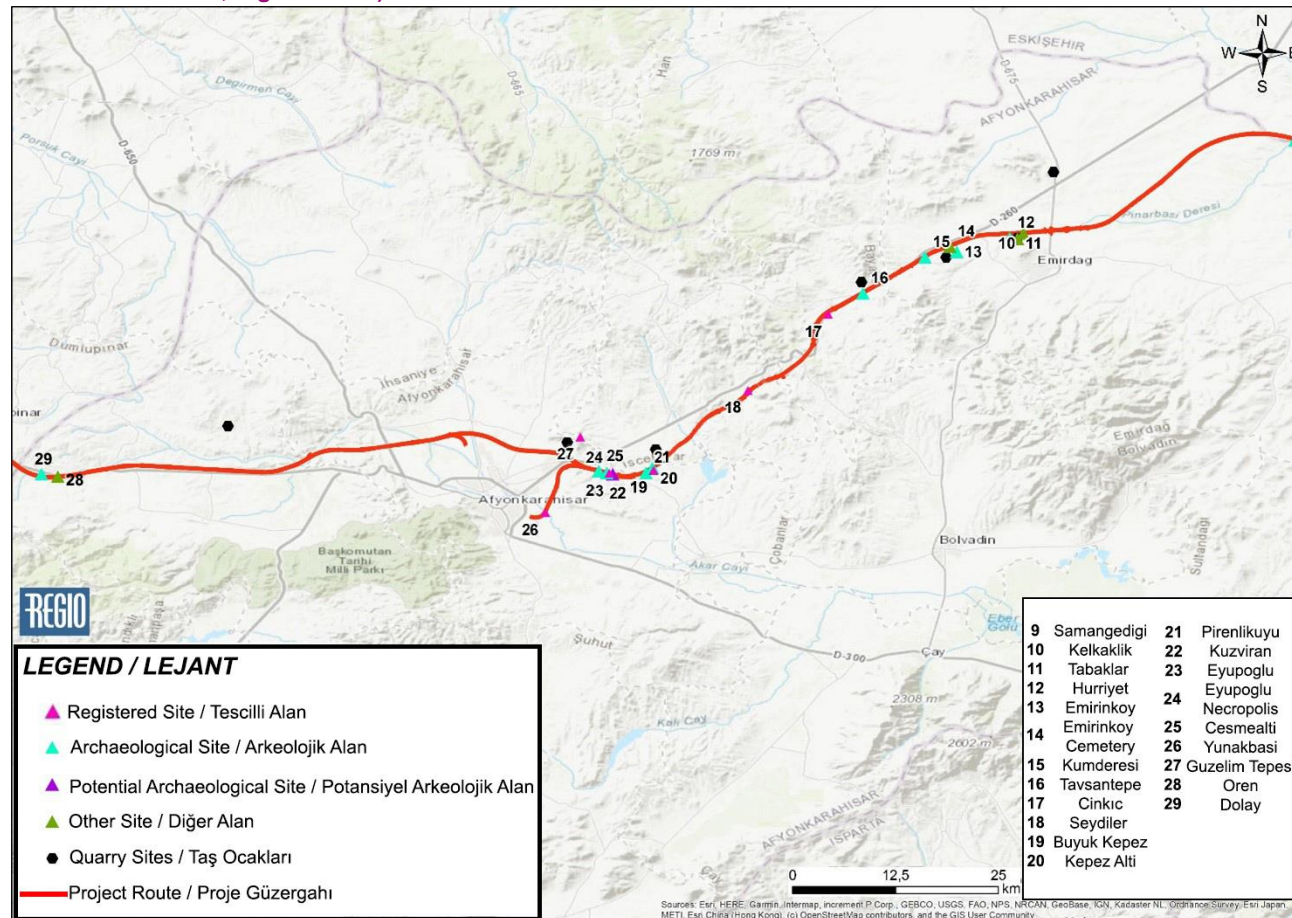


Figure 14-12. Archaeological/Immovable/Movable Cultural Heritage Sites in the Province of Afyonkarahisar



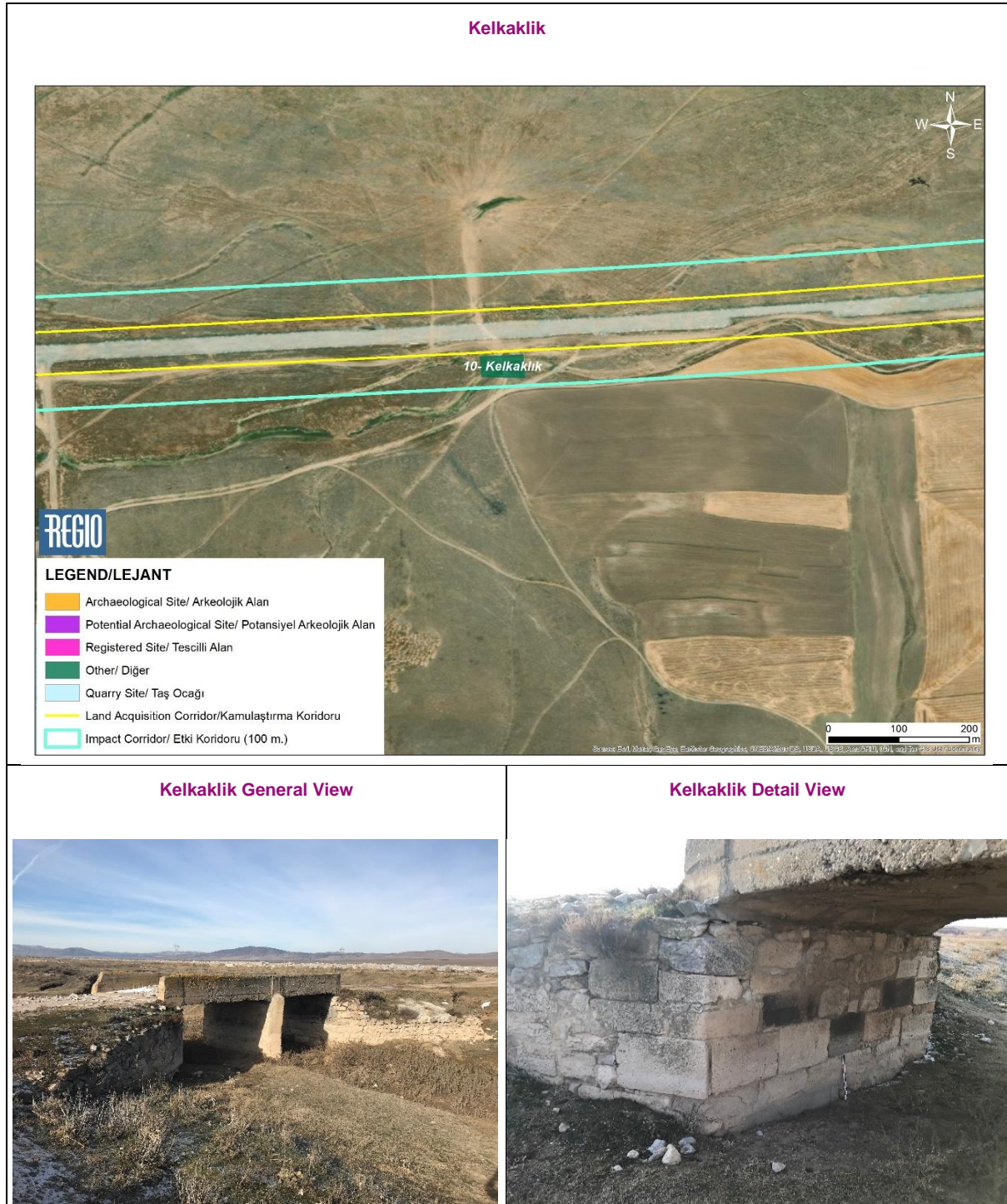


Figure 14-14. (10) Kelkaklık Stone Bridge (Non-registered Site – Classified as Other) within the Impact Corridor (KM 98+010)

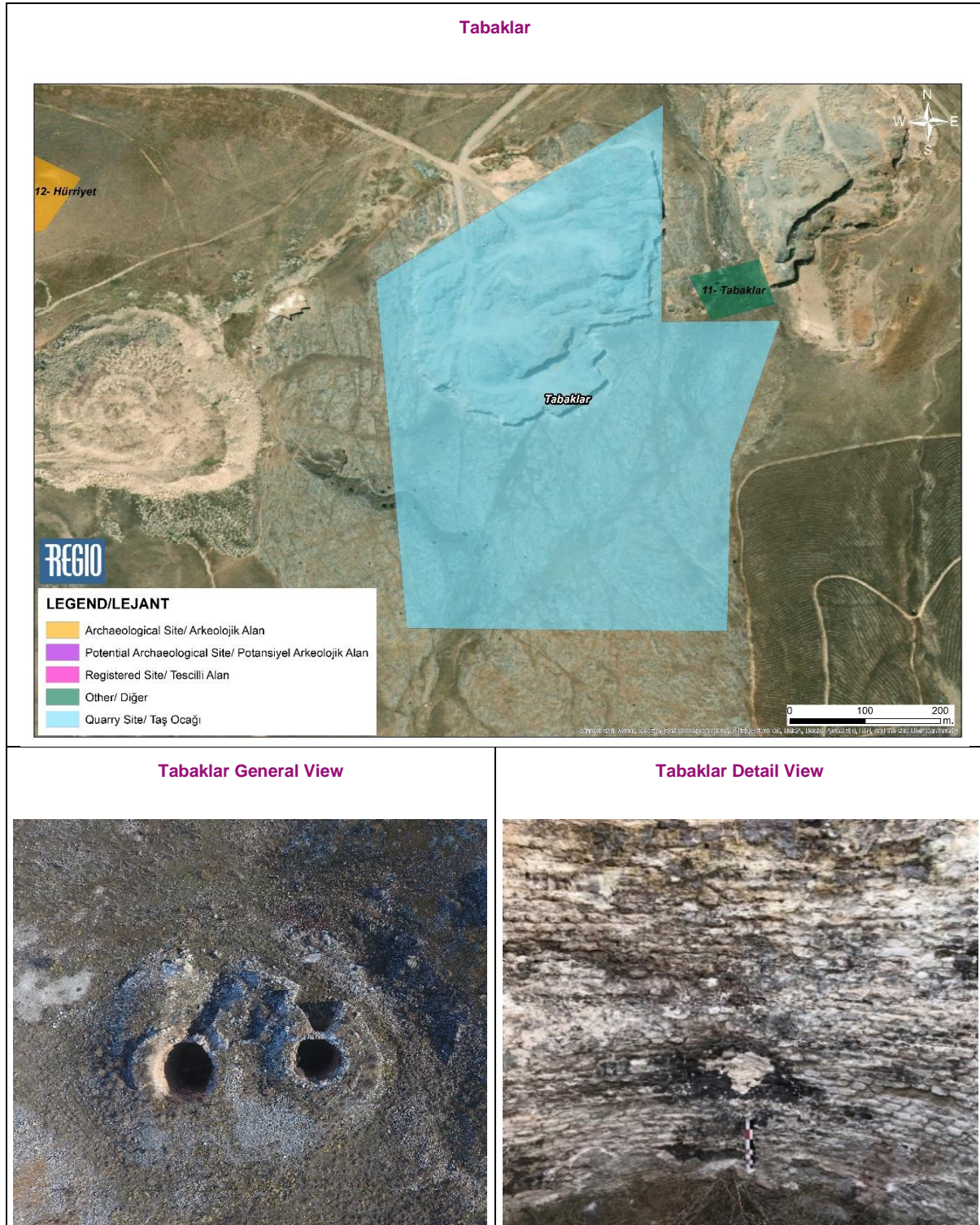


Figure 14-15. (11) Tabaklar Smelting Furnace Complex (Non-registered Site – Classified as Other) within the Expropriation Corridor at Tabaklar-2 Quarry Site

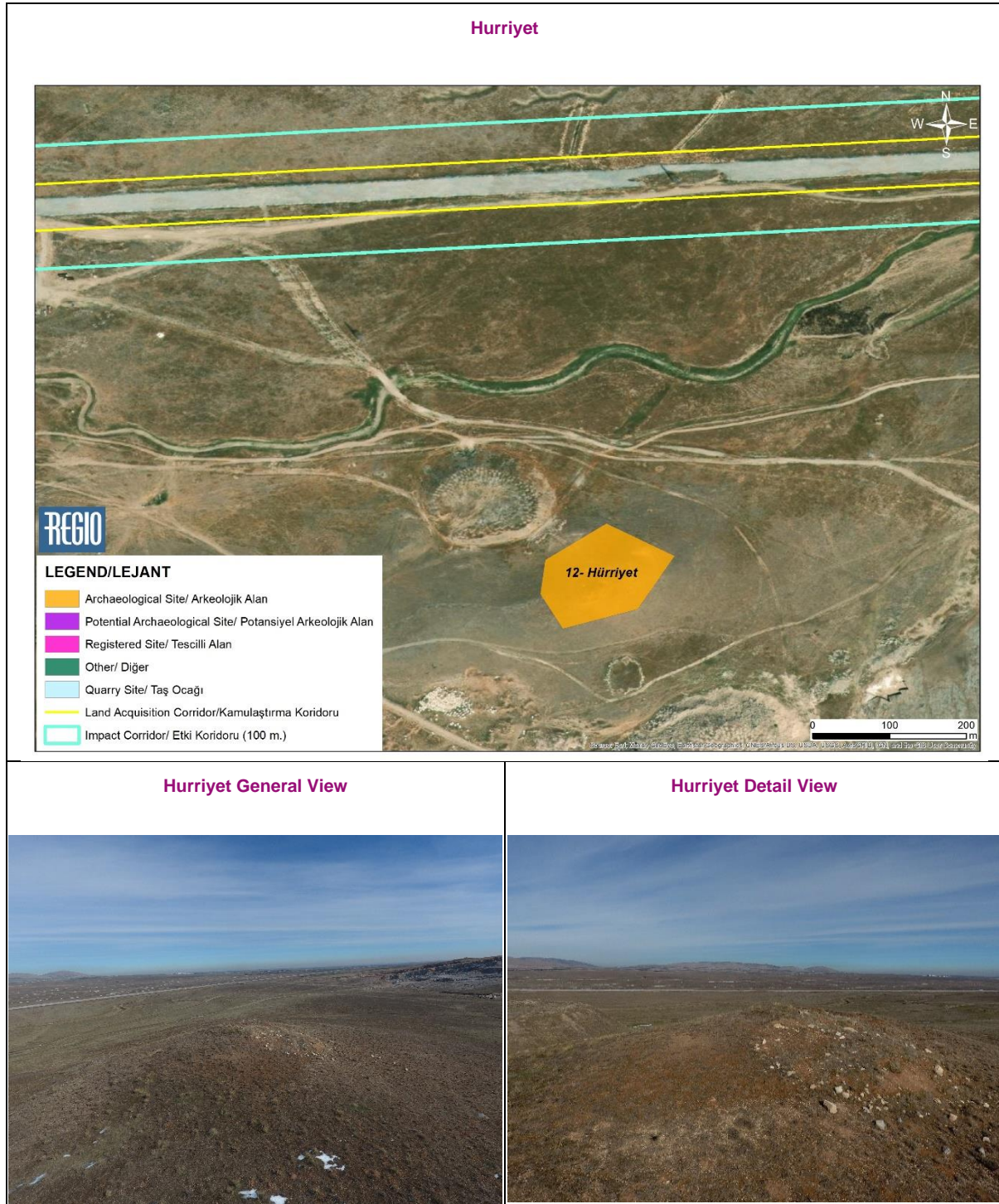


Figure 14-16. (12) Hurriyet Tumuli (Non-registered Archaeological Site) outside the Impact Corridor (KM 99+300)

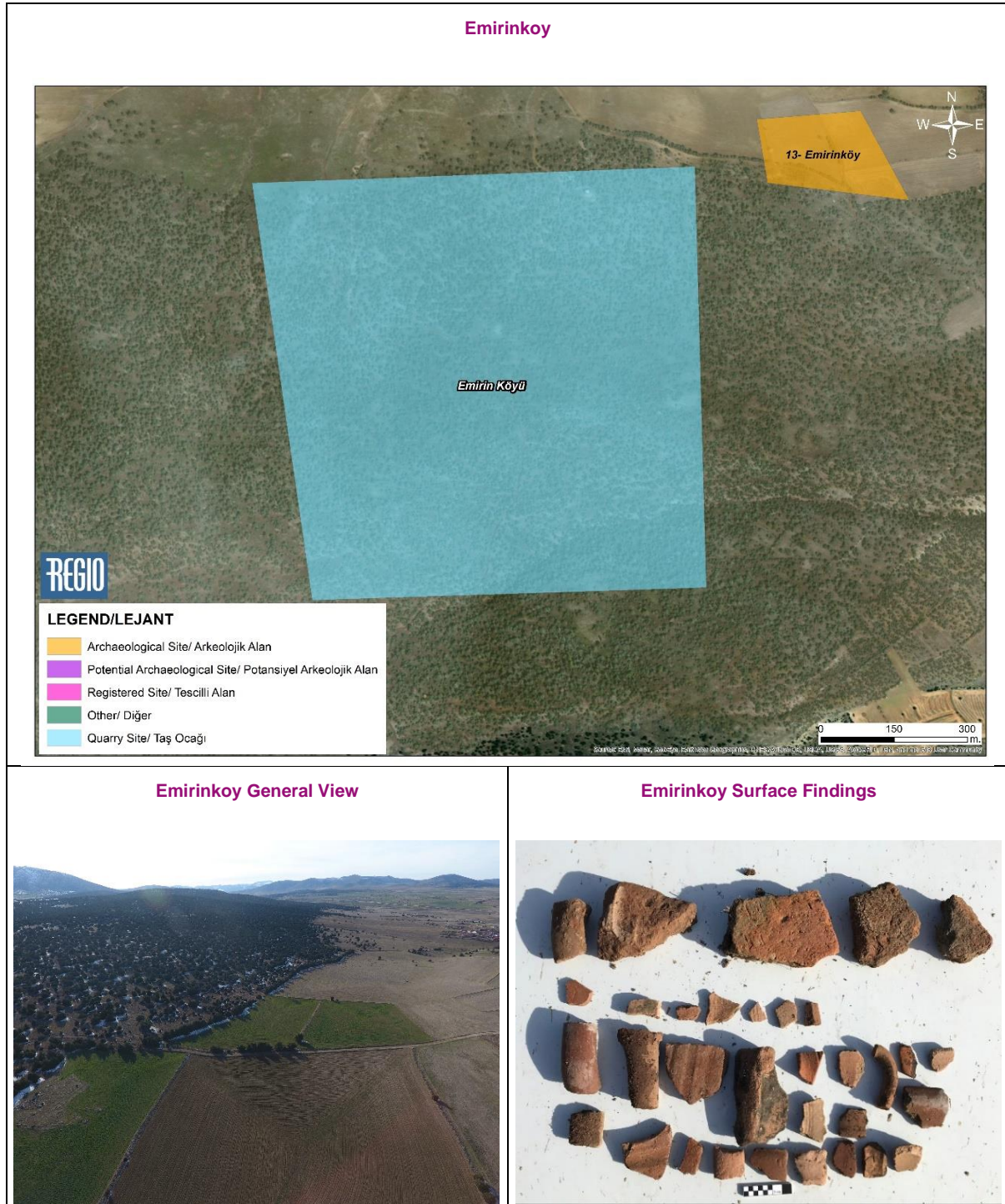


Figure 14-17. (13) Emirinkoy Slope Settlement (Non-registered Archaeological Site) within the Emirin Koy Quarry Site

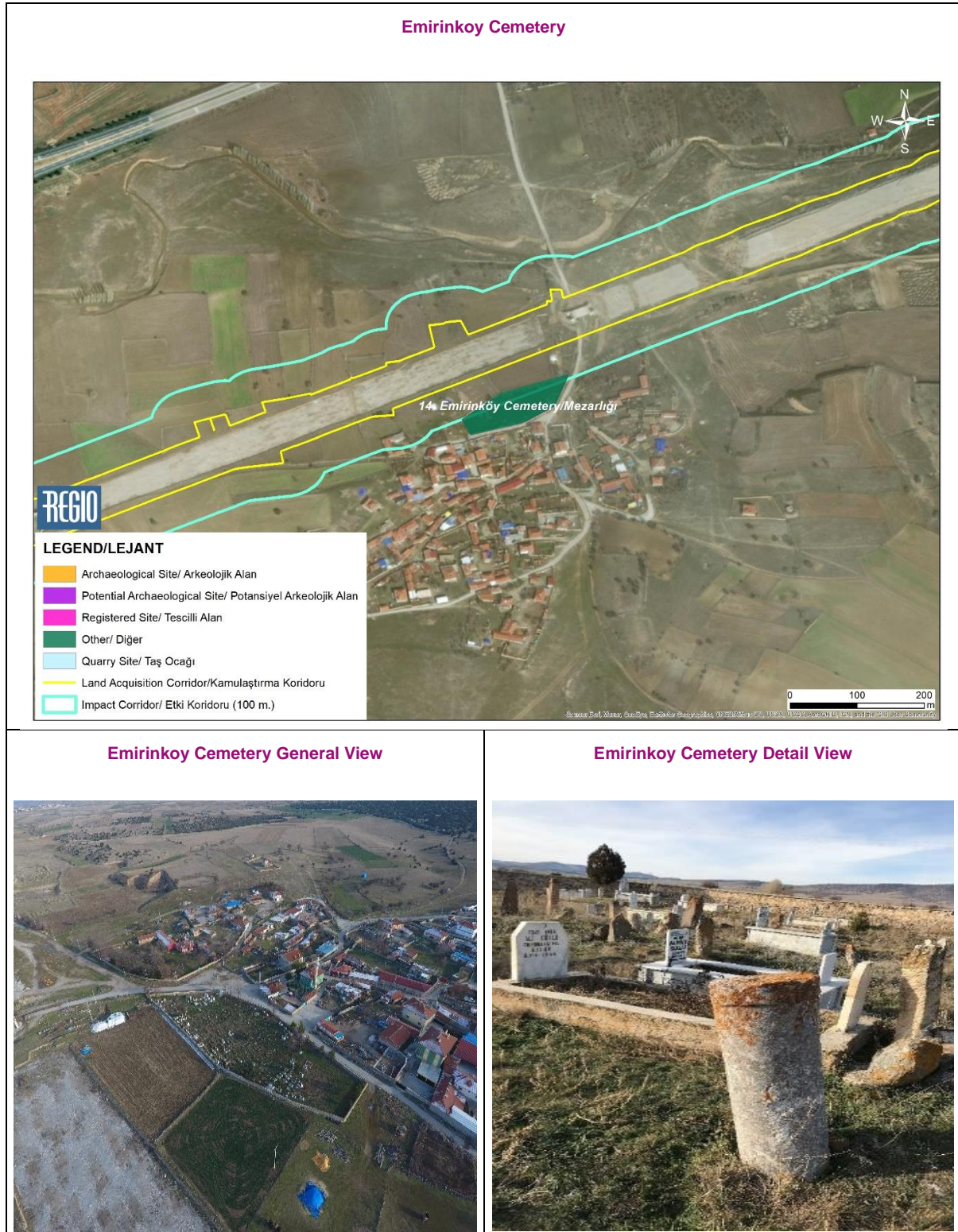


Figure 14-18. (14) Emirinkoy Cemetery (Non-registered Potential Archaeological Site) within the Impact Corridor KM 105+250)

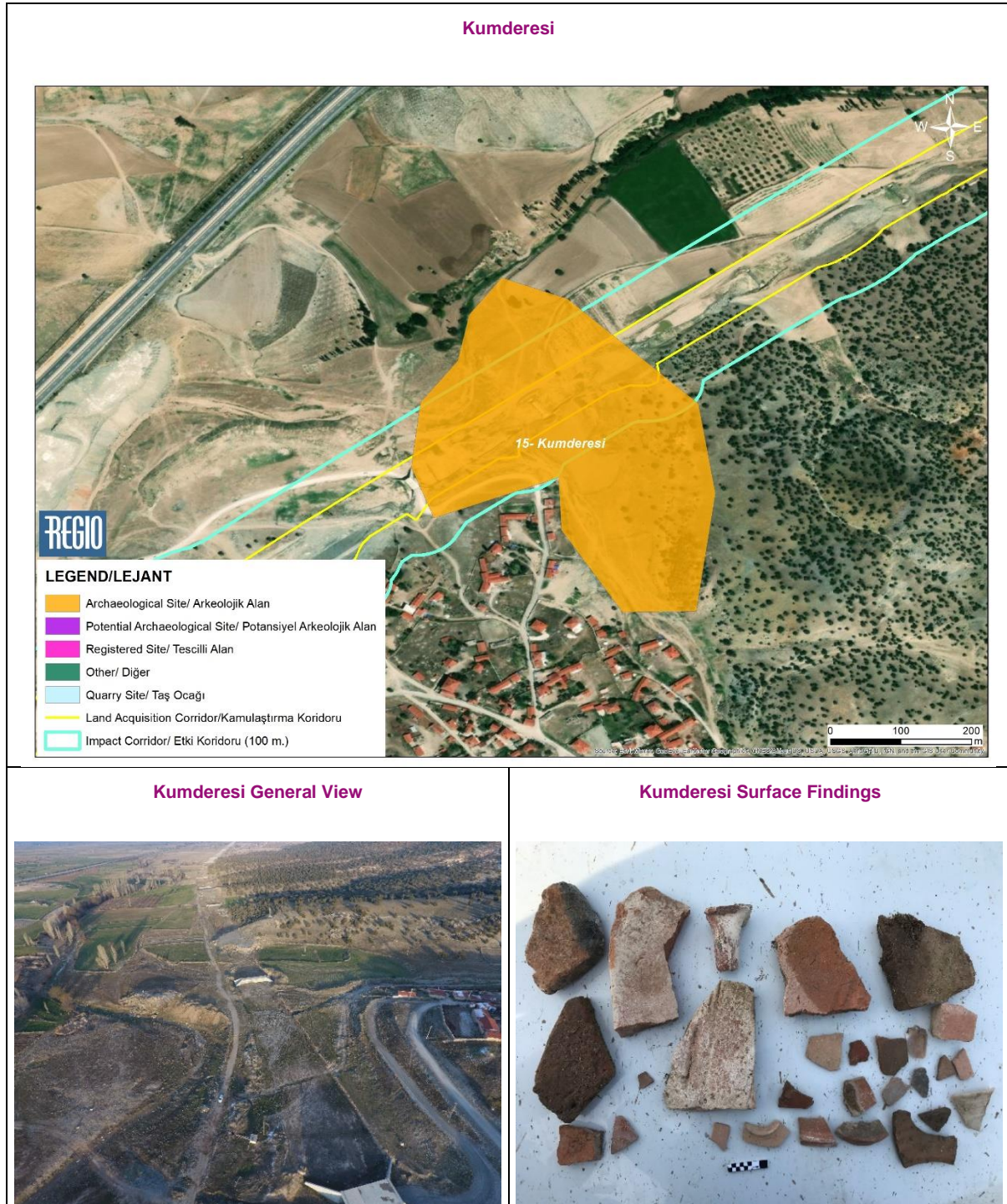


Figure 14-19. (15) Kumderesi Flat Settlement/Mound (Non-registered Archaeological Site) within the Expropriation Corridor (KM107+900)

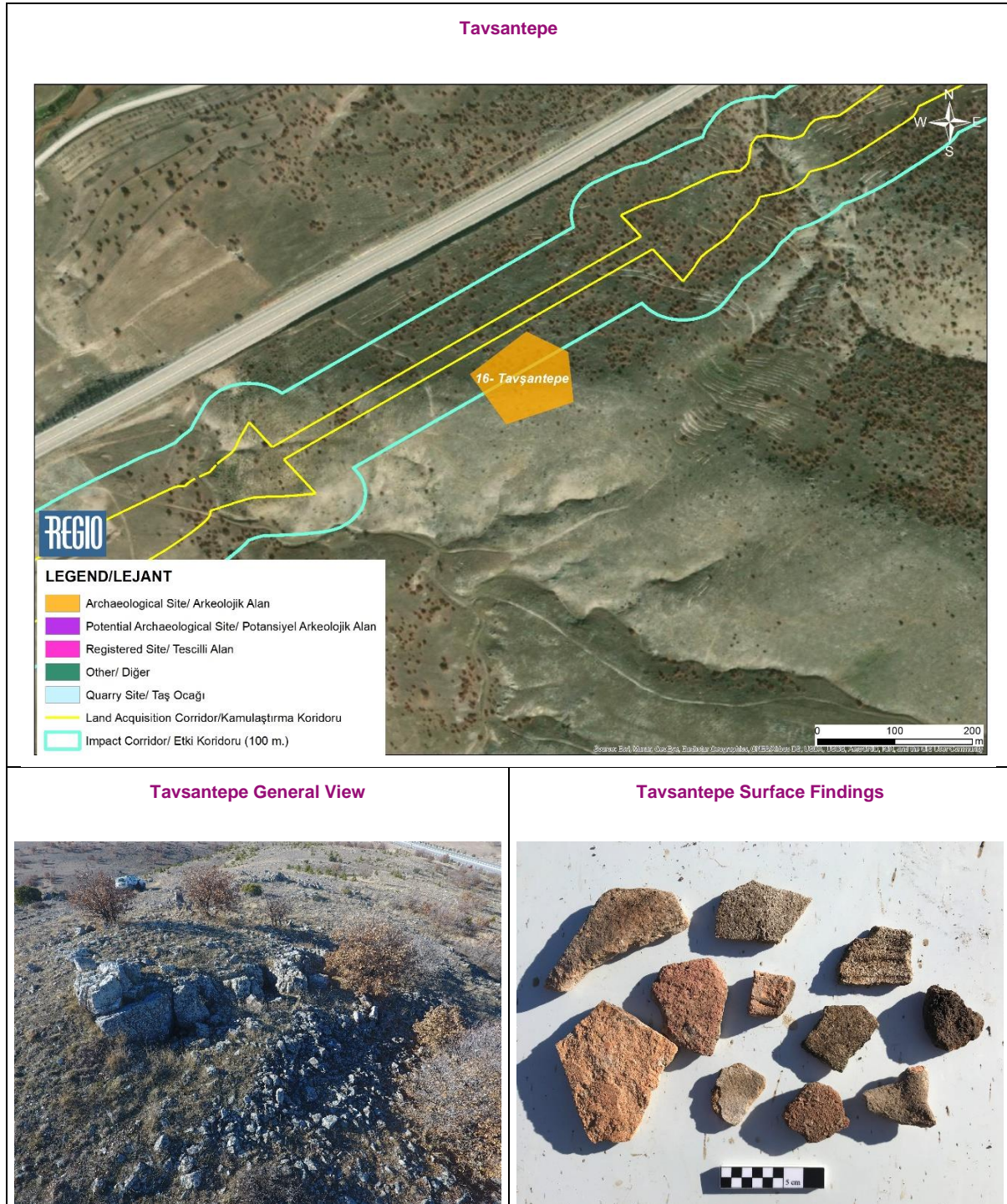


Figure 14-20. (16) Tavsantepe Watch Tower (Non-registered Archaeological Site) within the Impact Corridor (KM 115+300)

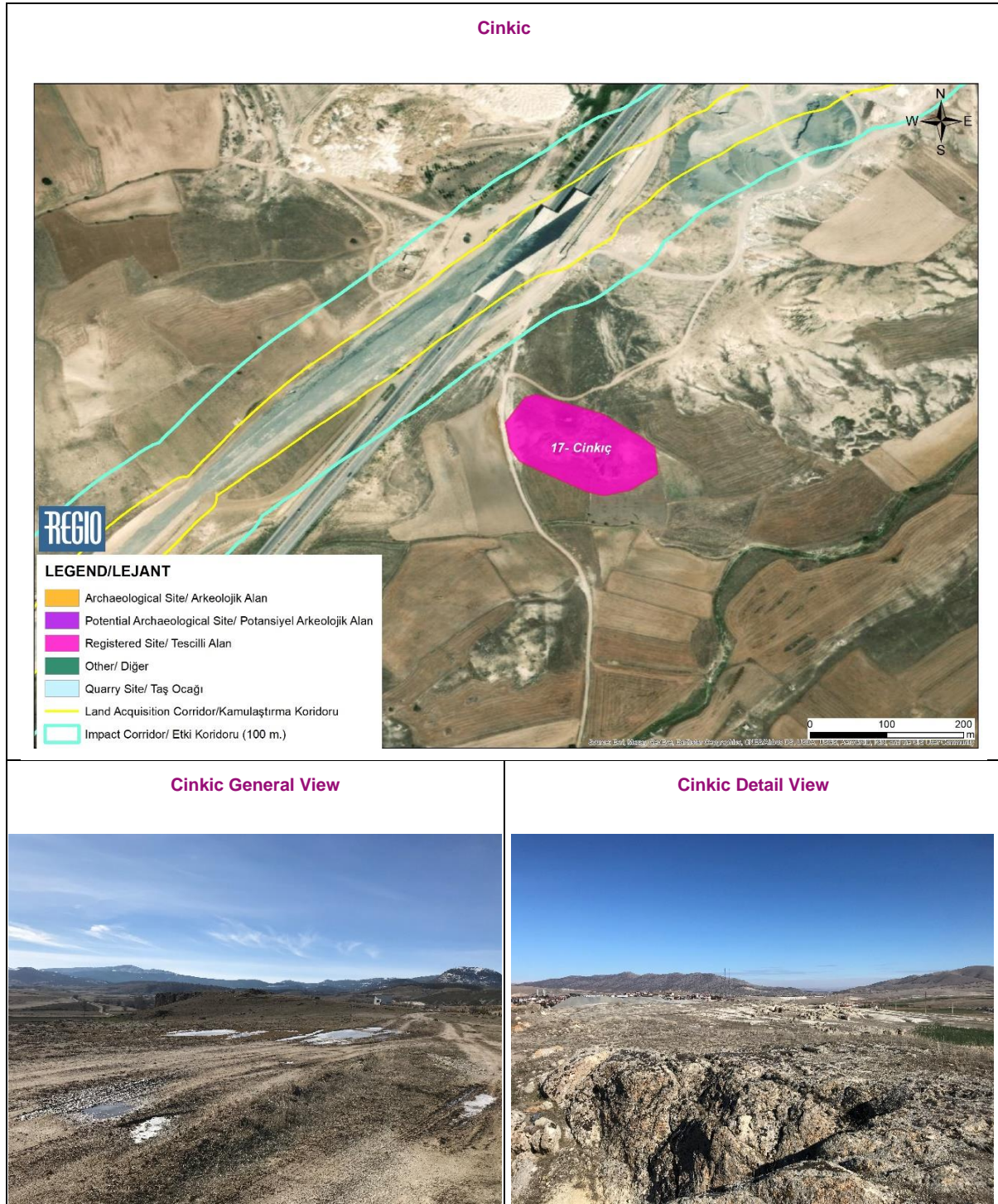


Figure 14-21. (17) Cinkic Mound (Registered Site) Outside the Impact Corridor (KM 119+500)

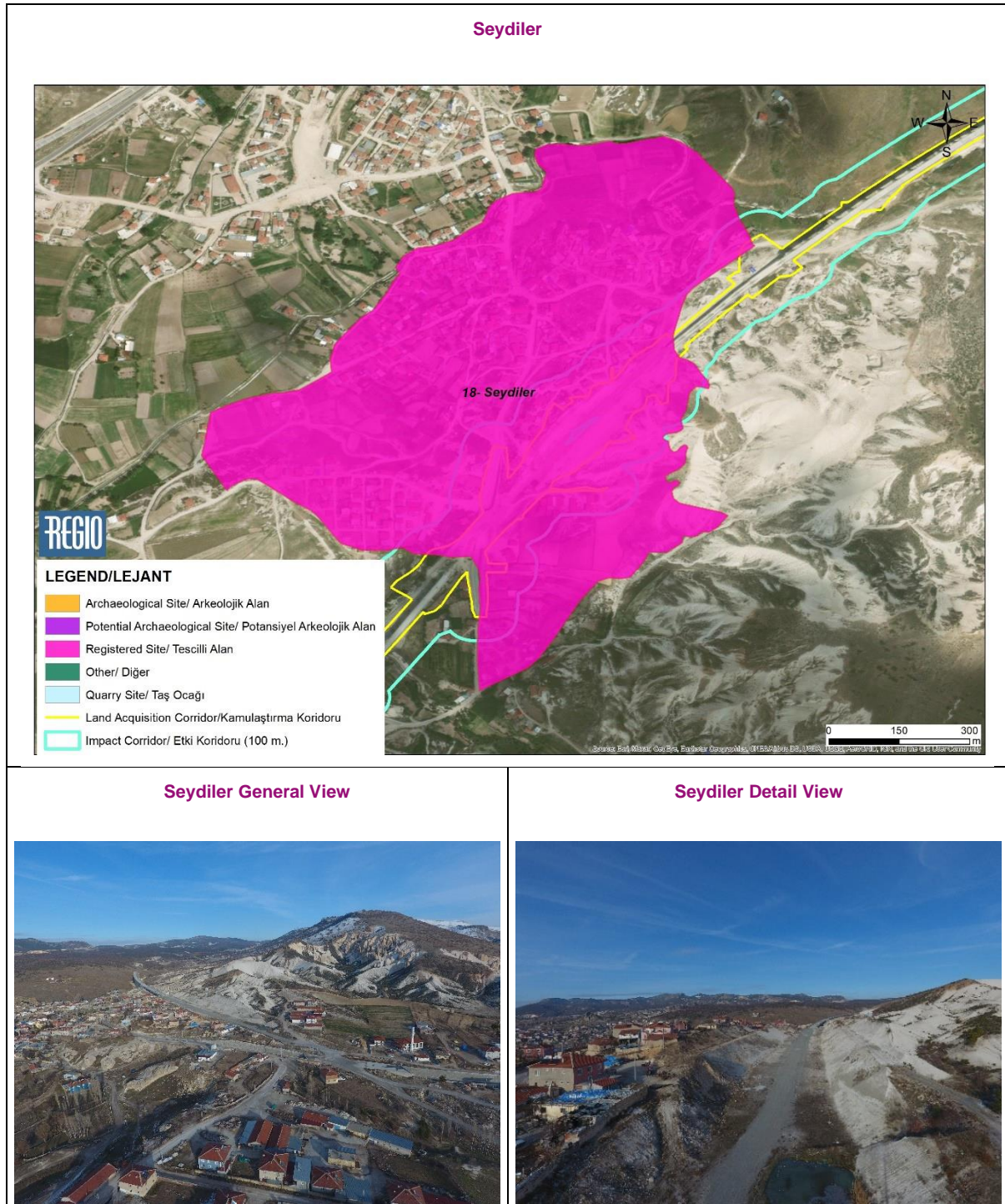


Figure 14-22. (18) Seydiler Flat Settlement (Registered Site) within the Expropriation Corridor (KM 131+650)

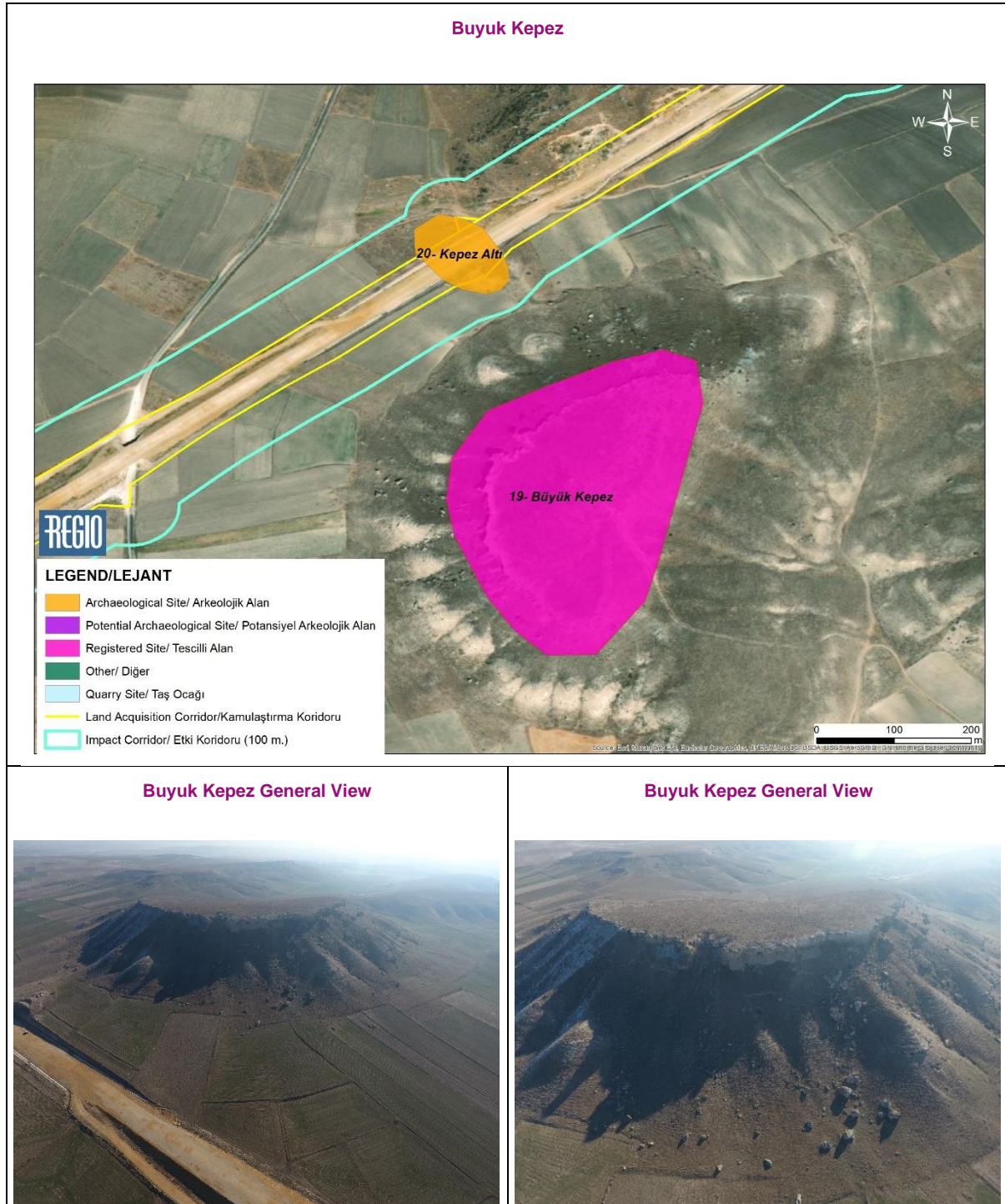


Figure 14-23. (19) Buyuk Kepez Hilltop Settlement (Registered Site) outside the Impact Corridor (KM 145+360)

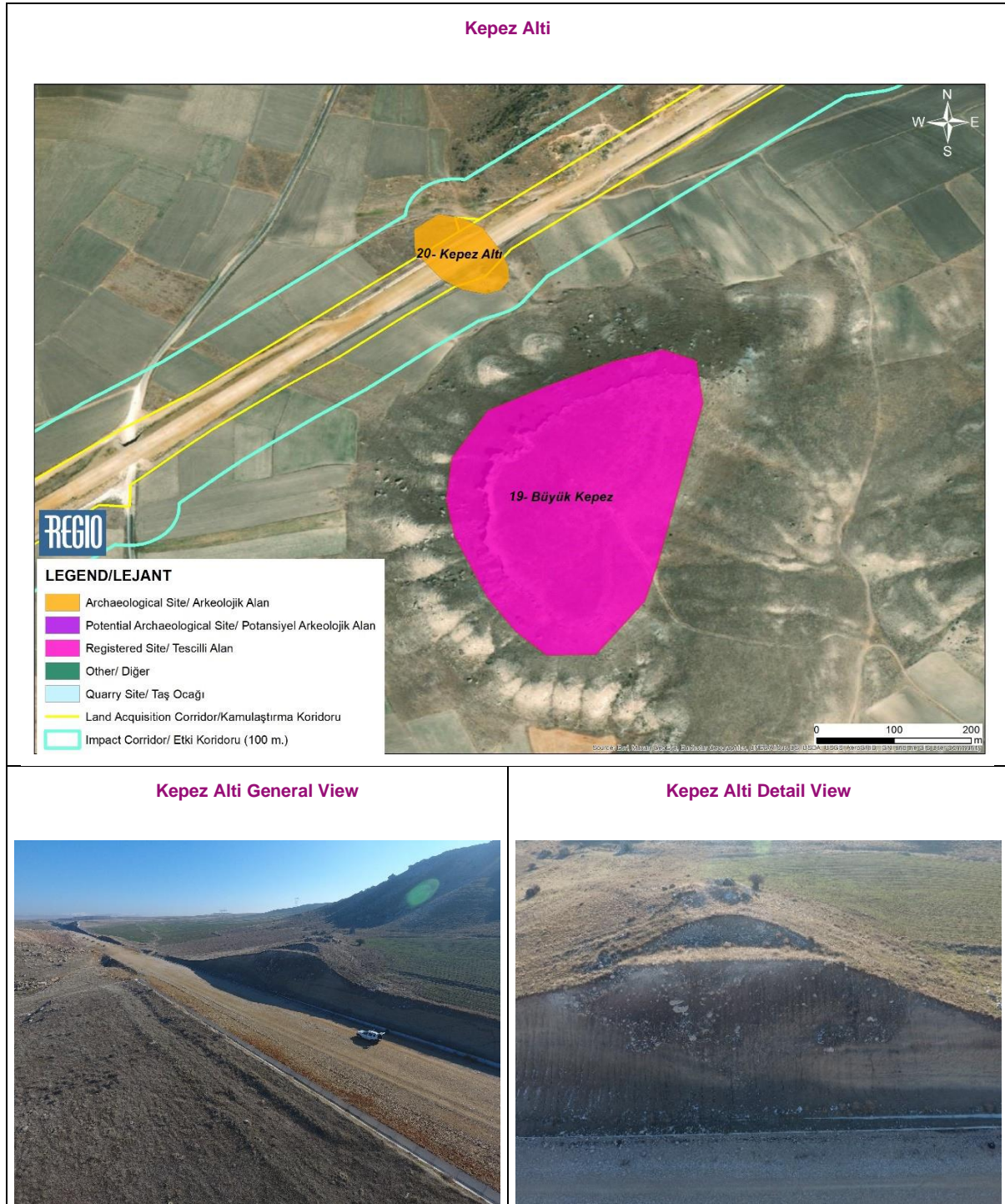


Figure 14-24. (20) Kepez Altı Tumuli (Non-registered Archaeological Site) within the Expropriation Corridor (KM 145+437)



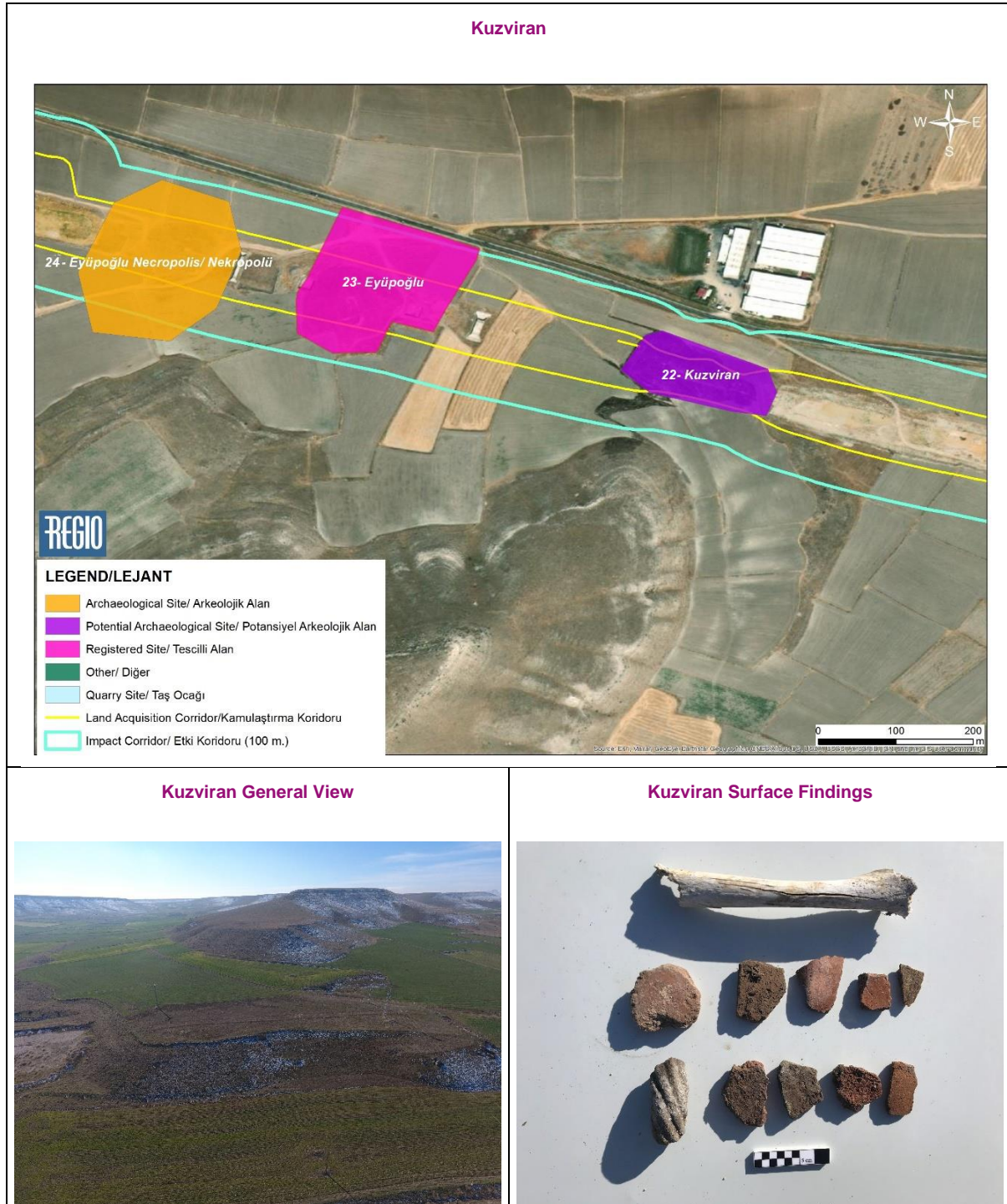


Figure 14-26. (22) Kuzviran Necropolis (Non-registered Potential Archaeological Site) within the Expropriation Corridor (KM 149+460)

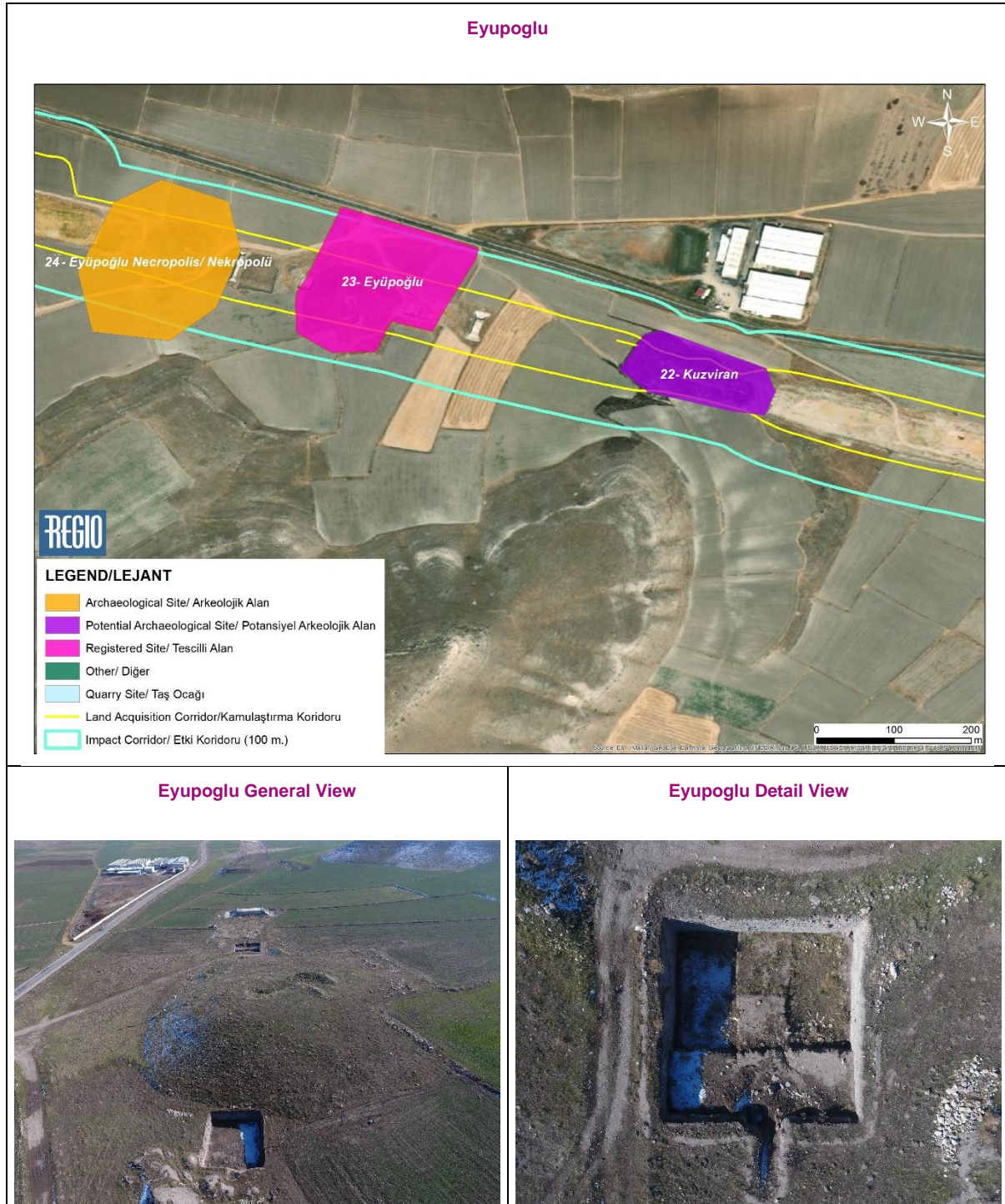


Figure 14-27. (23) Eyupoglu Mound (Registered Site) within the Expropriation Corridor (KM 149+810)

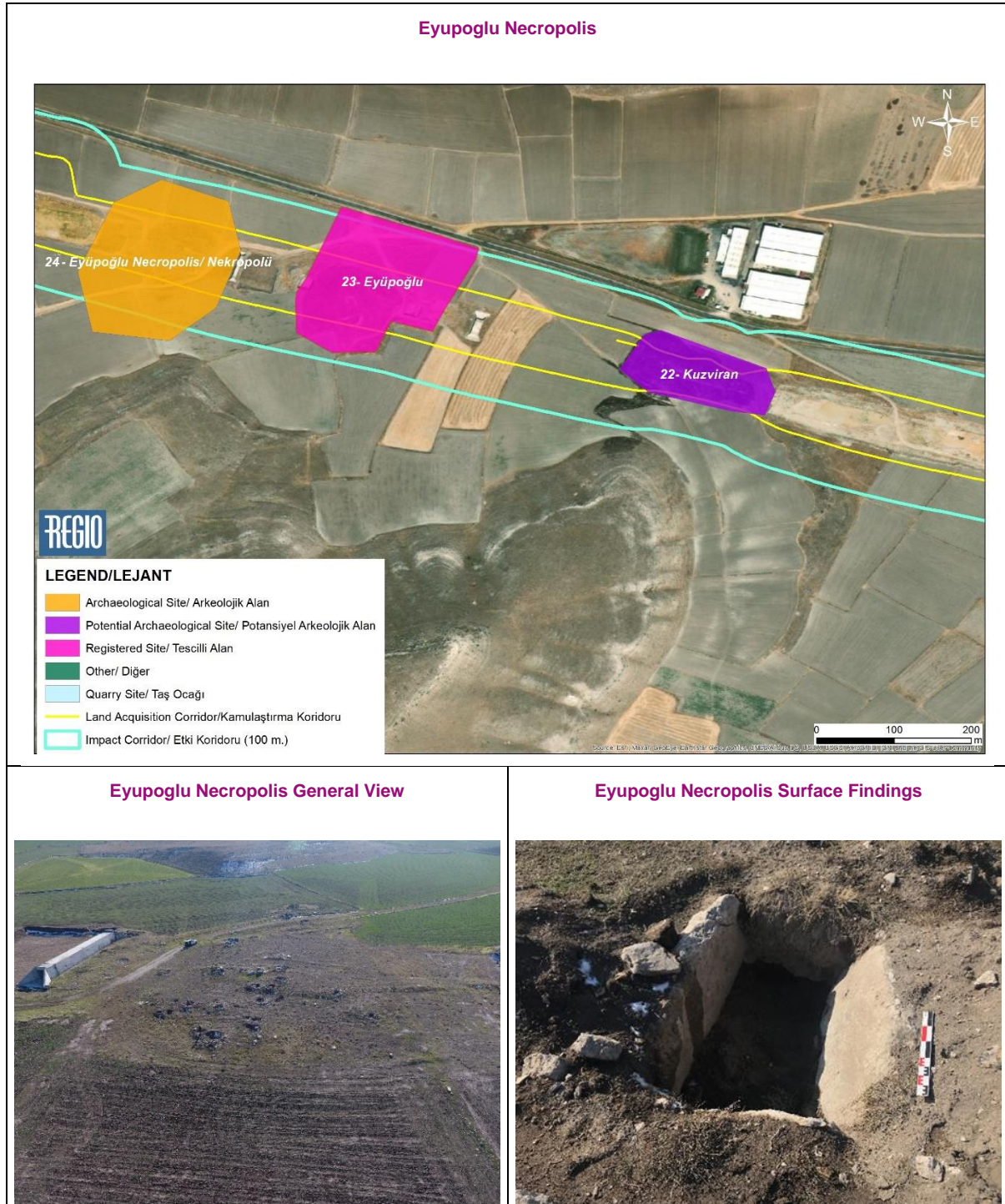


Figure 14-28. (24) Eyupoglu Necropolis (Non-registered Archaeological Site) within the Expropriation Corridor (KM 150+030)

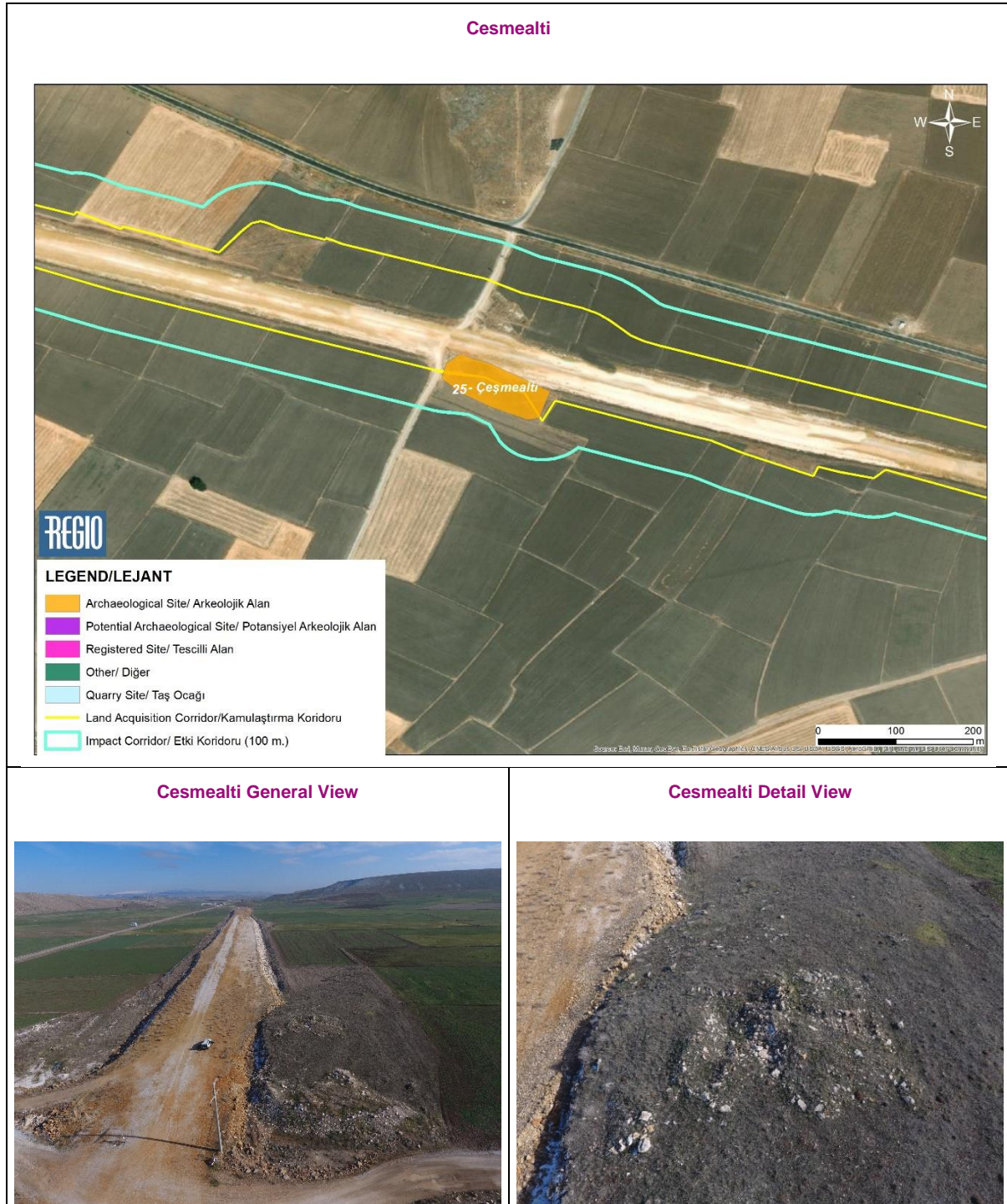


Figure 14-29. (25) Cesmealti Tumuli (Non-registered Archaeological Site) within the Expropriation Corridor (KM 150+865)

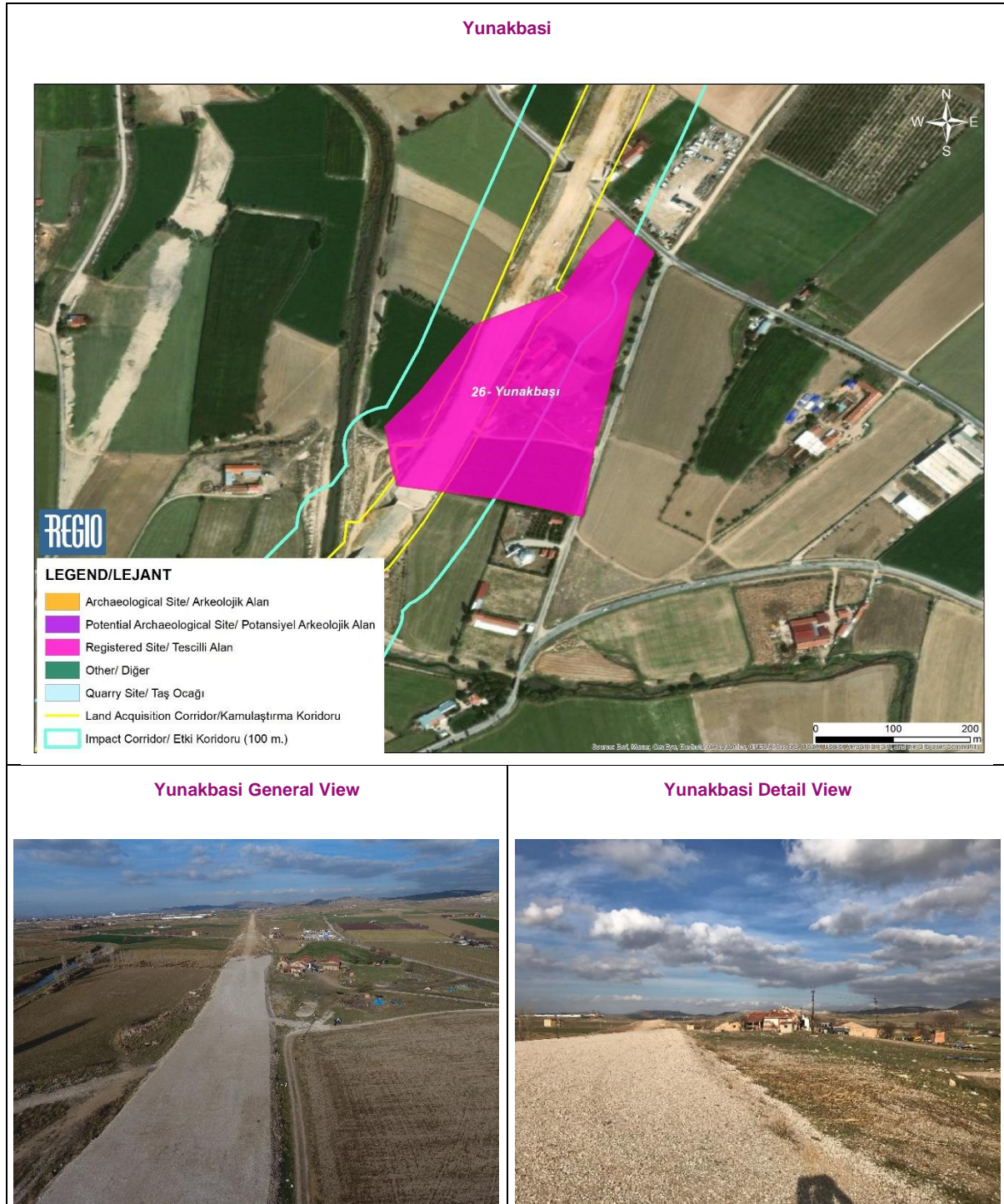


Figure 14-30. (26) Yunakbasi Mound (Registered Site) within the Expropriation Corridor (Afyonkarahisar Connection Line)

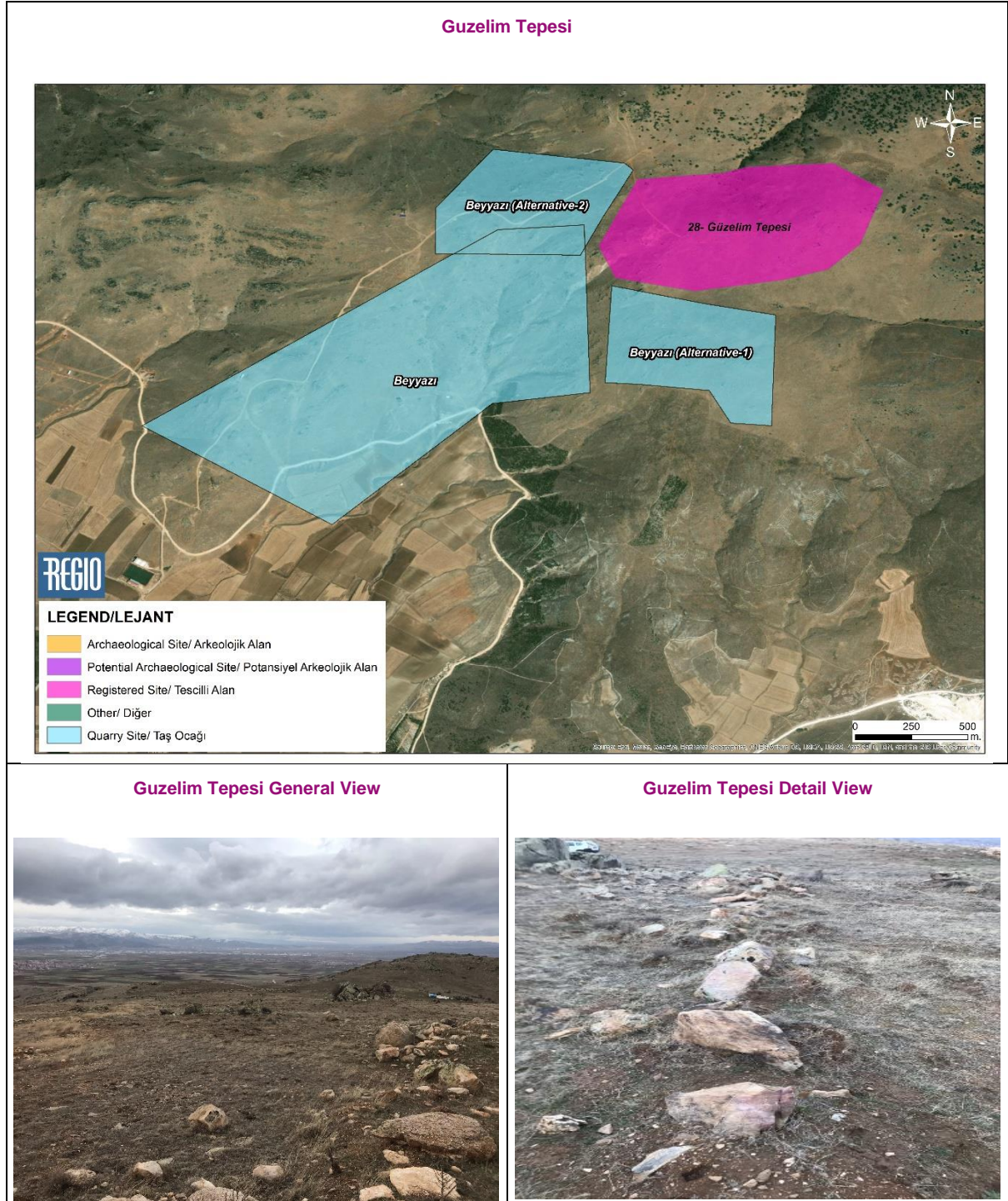


Figure 14-31. (27) Guzelim Tepesi Historical Site (Registered Site) outside the Beyyazi Quarry Site



Figure 14-32. (28) Oren Stone Bridge (Non-registered – Classified as Other) within the Expropriation Corridor (KM 204+413)

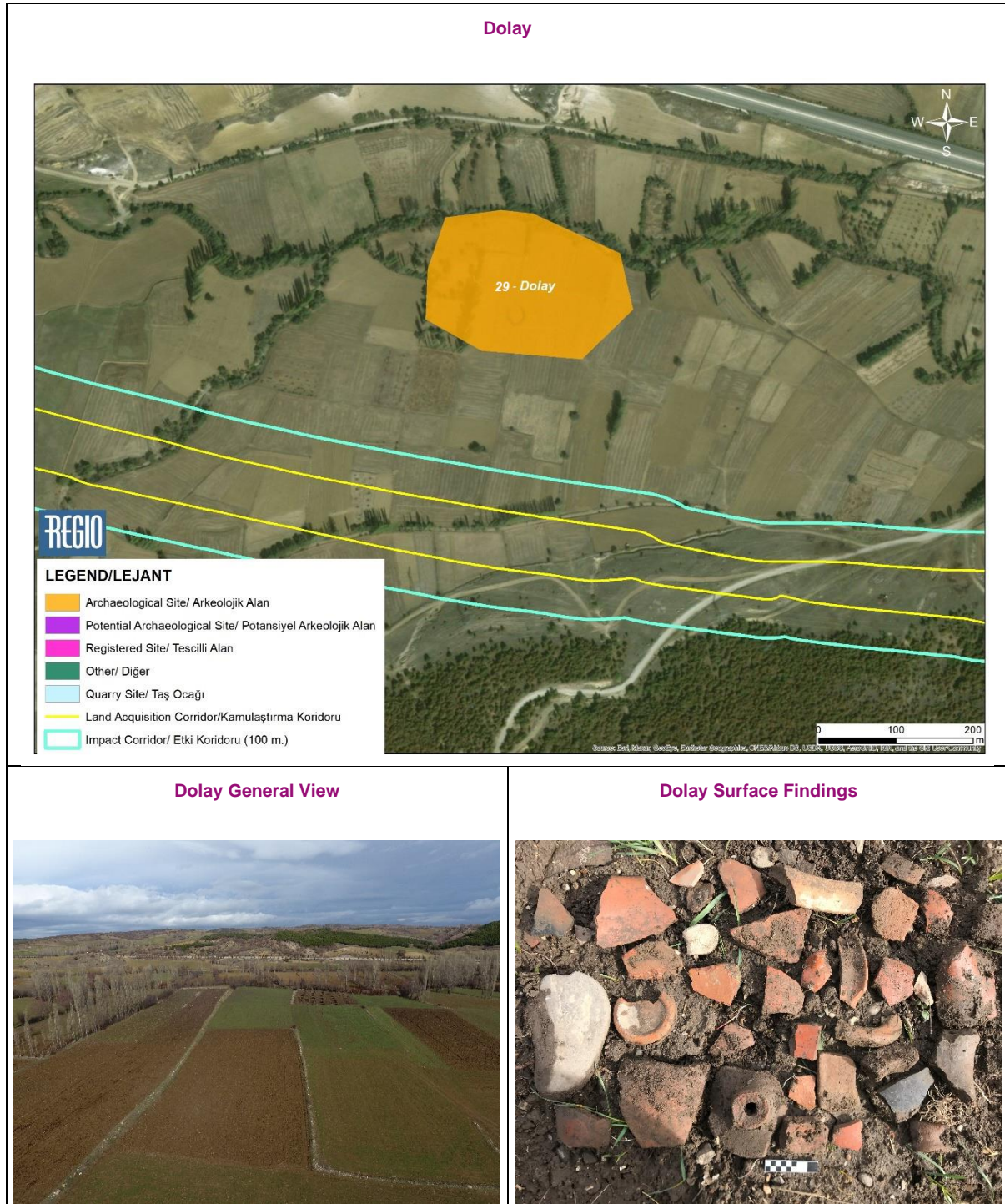


Figure 14-33. (29) Dolay Mound (Non-registered Archaeological Site) outside Impact Corridor (KM 205+930)

Kutahya (KM 212+057-221+01; see Figure 14-34)

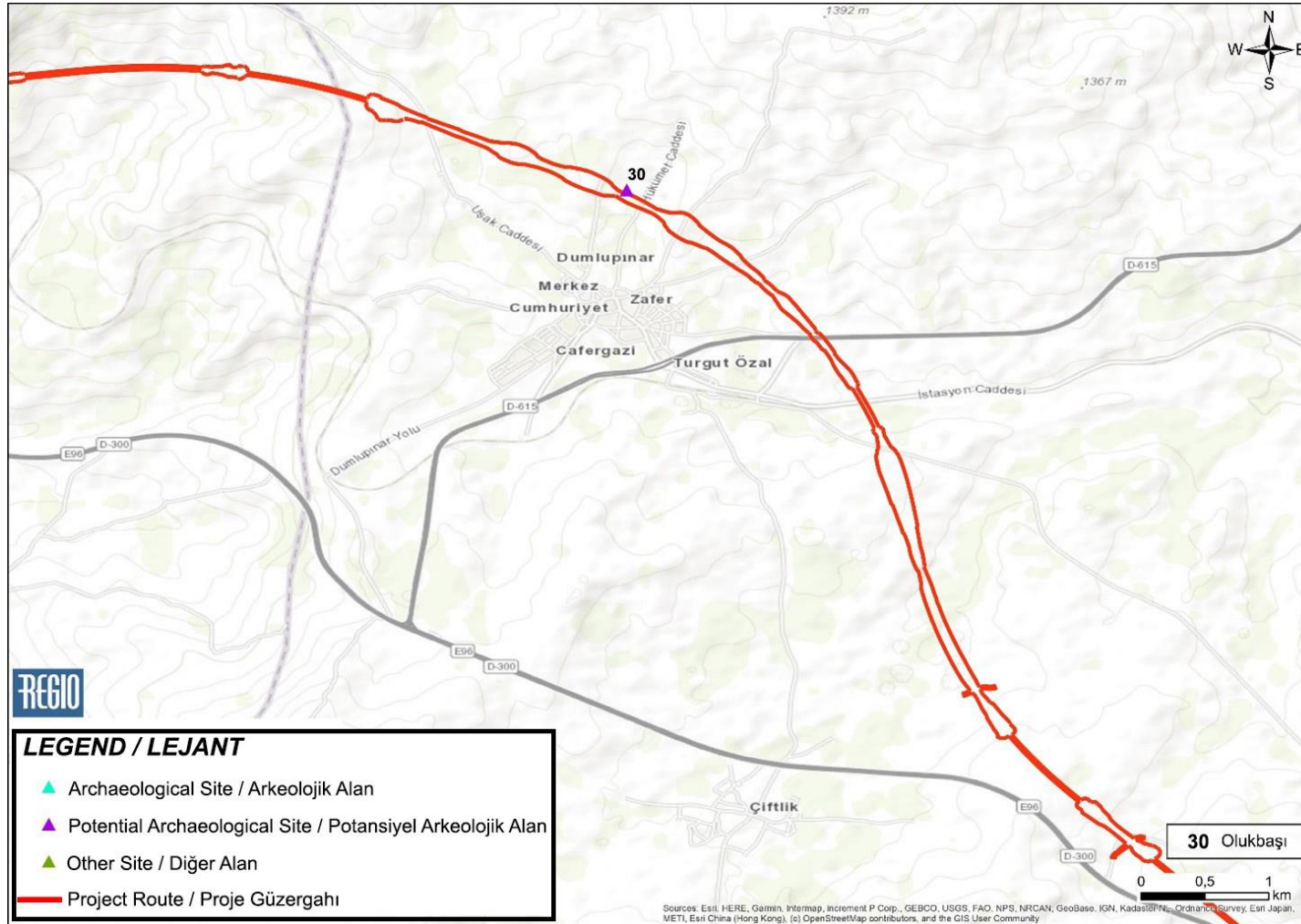


Figure 14-34. Archaeological/Immovable Cultural Heritage Sites in the Province of Kutahya



Usak (KM 210+845-212+057, 221+018-230+370; 267+156-278+632; 278+632-384+876; see Figure 14-36)

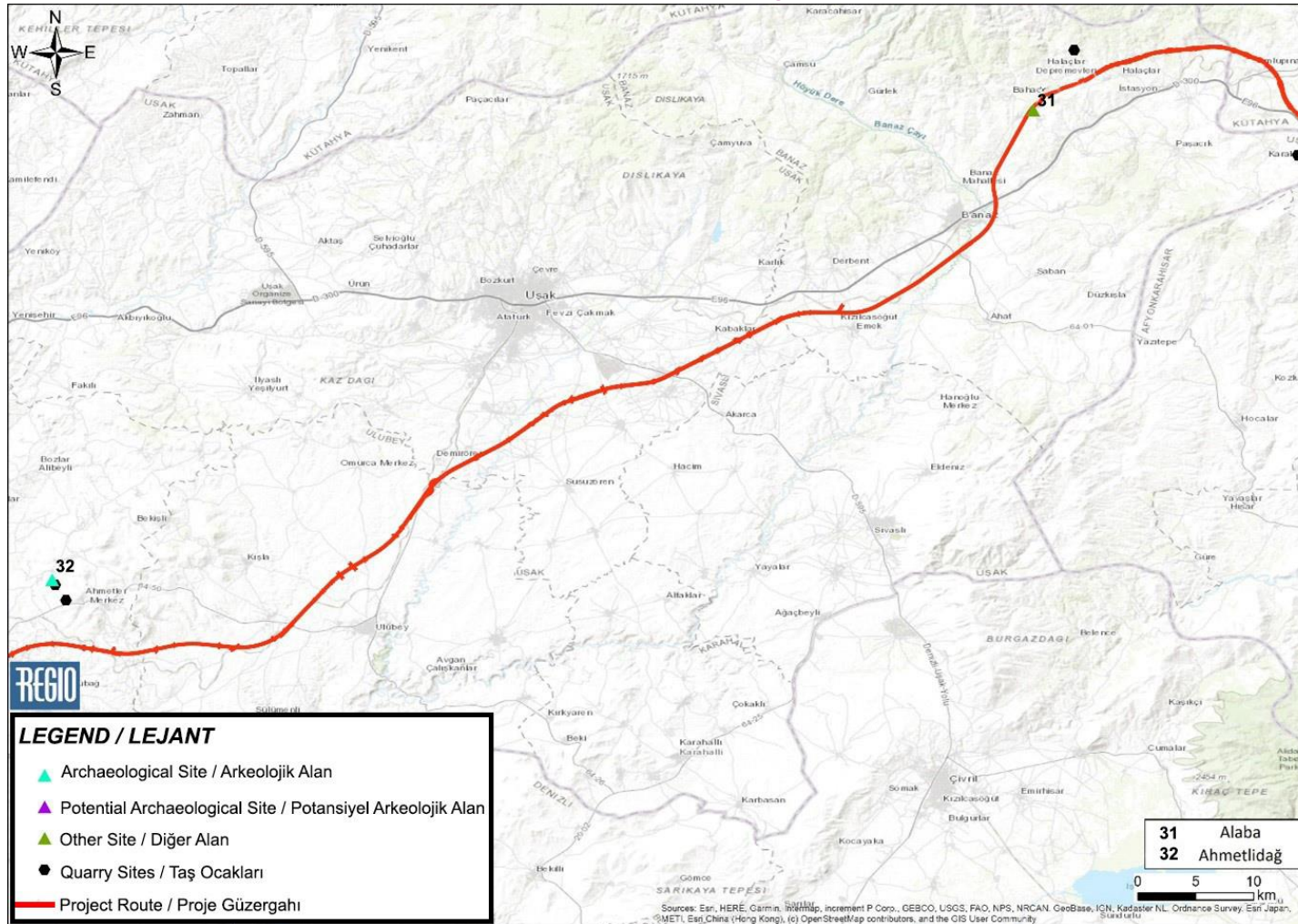


Figure 14-36. Archaeological/Immovable Cultural Heritage Sites in the Province of Usak

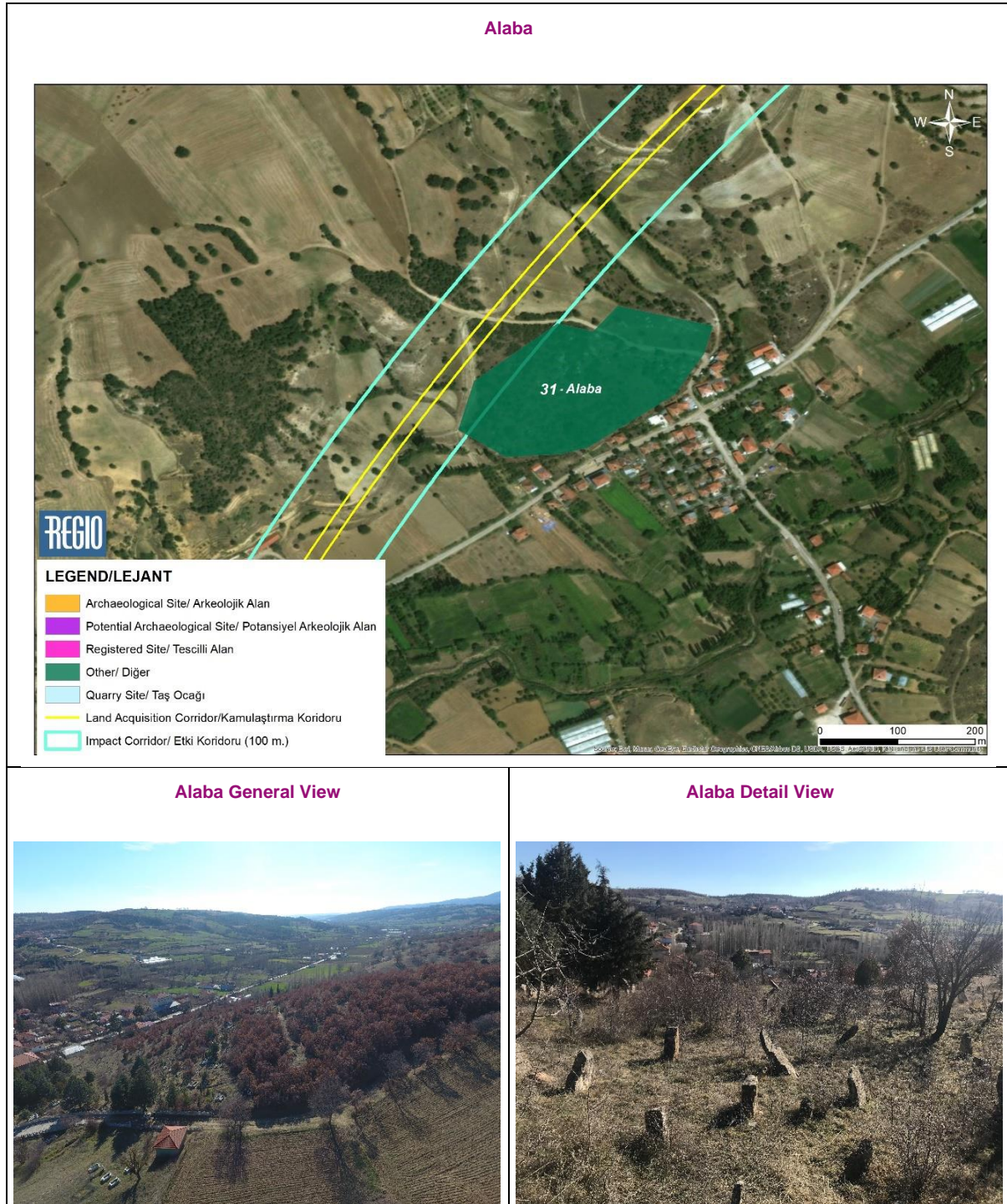


Figure 14-37. (31) Alaba Modern Cemetery (Non-registered Site – Classified as Other) within the Impact Corridor (KM 270+600)

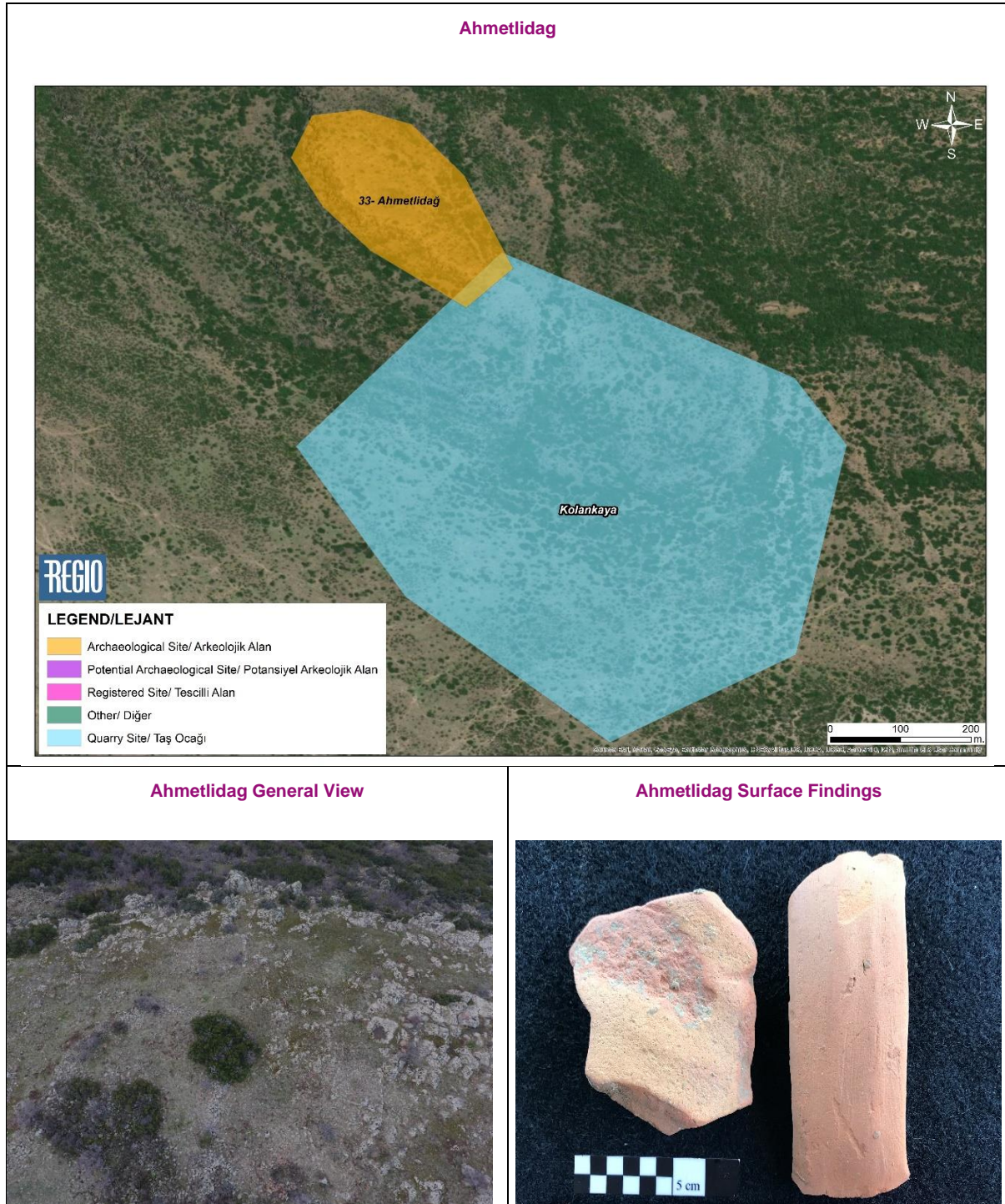


Figure 14-38. (32) Ahmetlidag Hilltop Settlement (Non-registered Archaeological Site) outside the Kolankaya Quarry Site

Manisa Province (KM 384+876-533+491; see Figure 14-39)

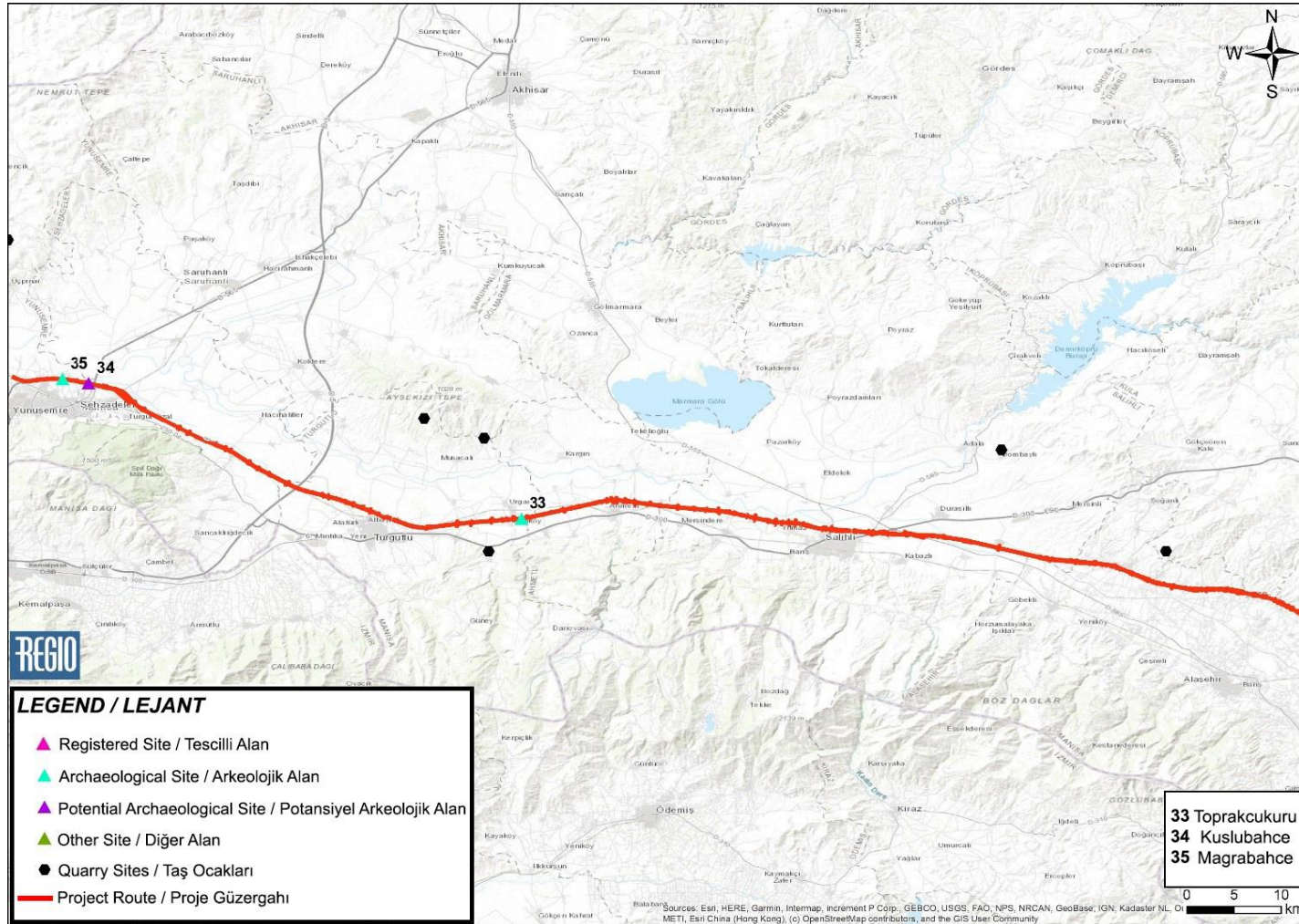


Figure 14-39. Archaeological/Immovable Cultural Heritage Sites in the Province of Manisa



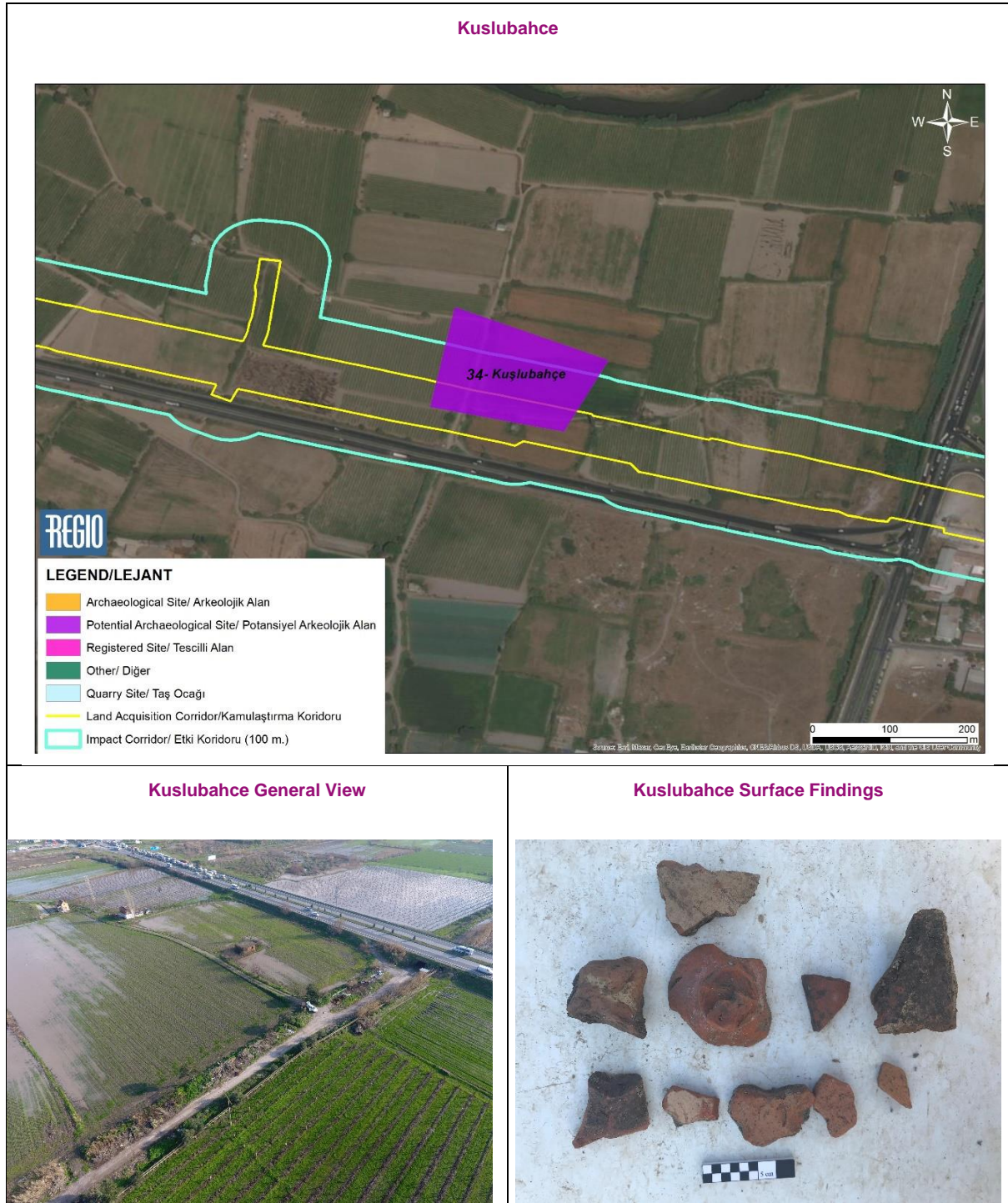


Figure 14-41. (34) Kuslubahce Flat Settlement (Non-registered Potential Archaeological Site) within the Expropriation Corridor (KM 508+520)

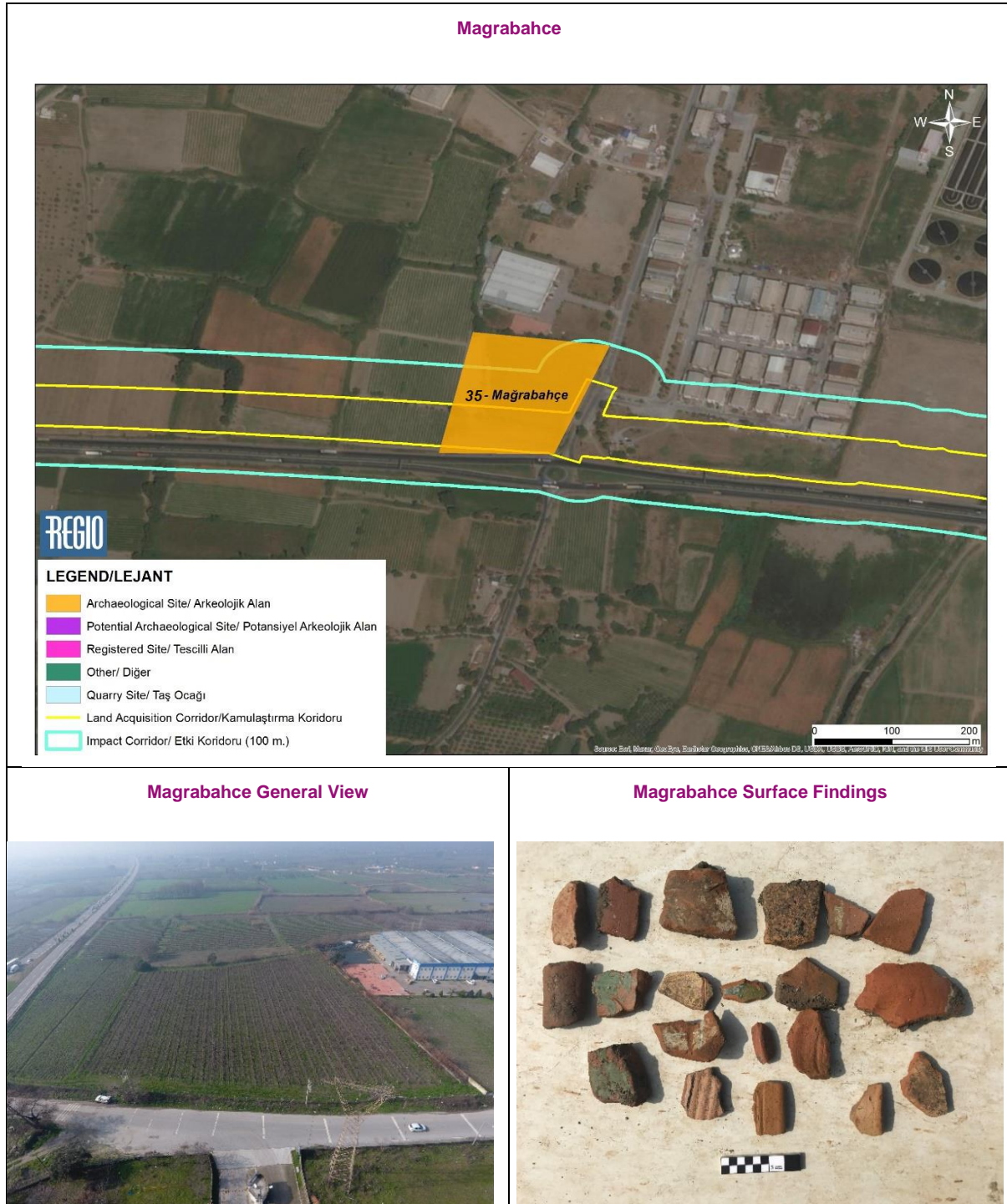


Figure 14-42. (35) Magrabahce Flat Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (KM 510+724)

Izmir Province (KM 533+491-547+805; see Figure 14-43)

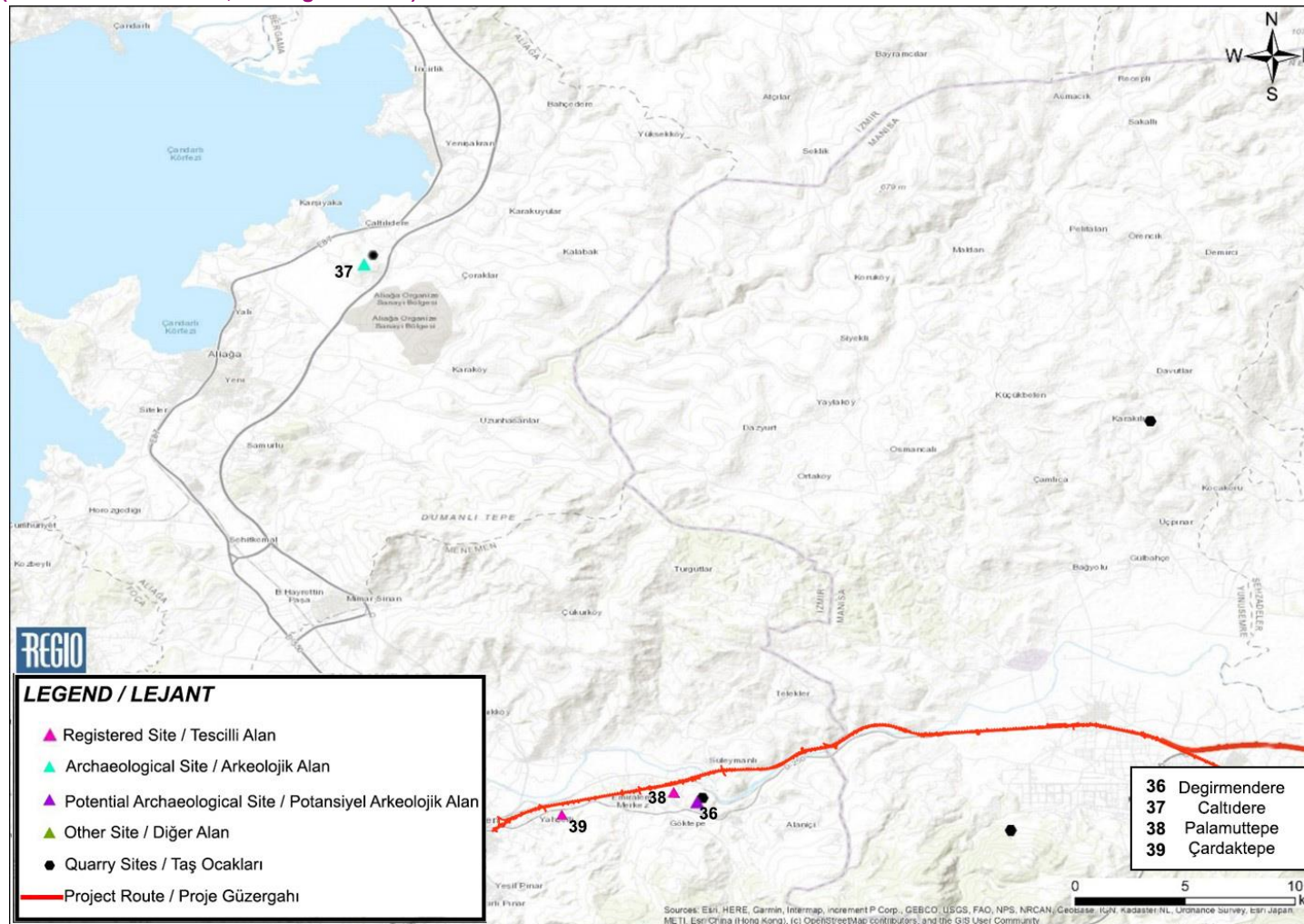


Figure 14-43. Archaeological/Immovable Cultural Heritage Sites in the Province of Izmir

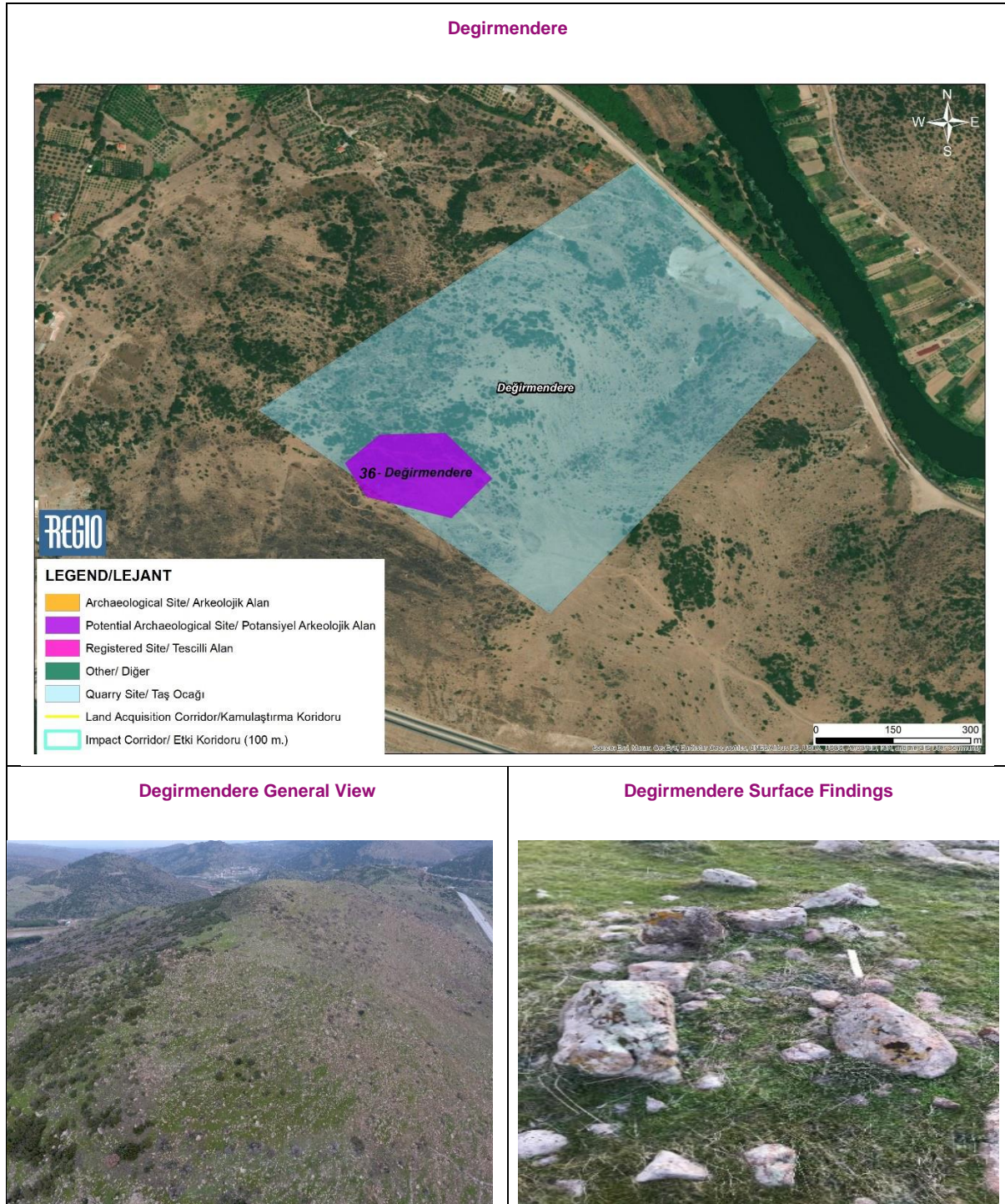


Figure 14-44. (36) Degirmendere Old Cemetery (Non-registered Potential Archaeological Site) within the Degirmendere Quarry Site

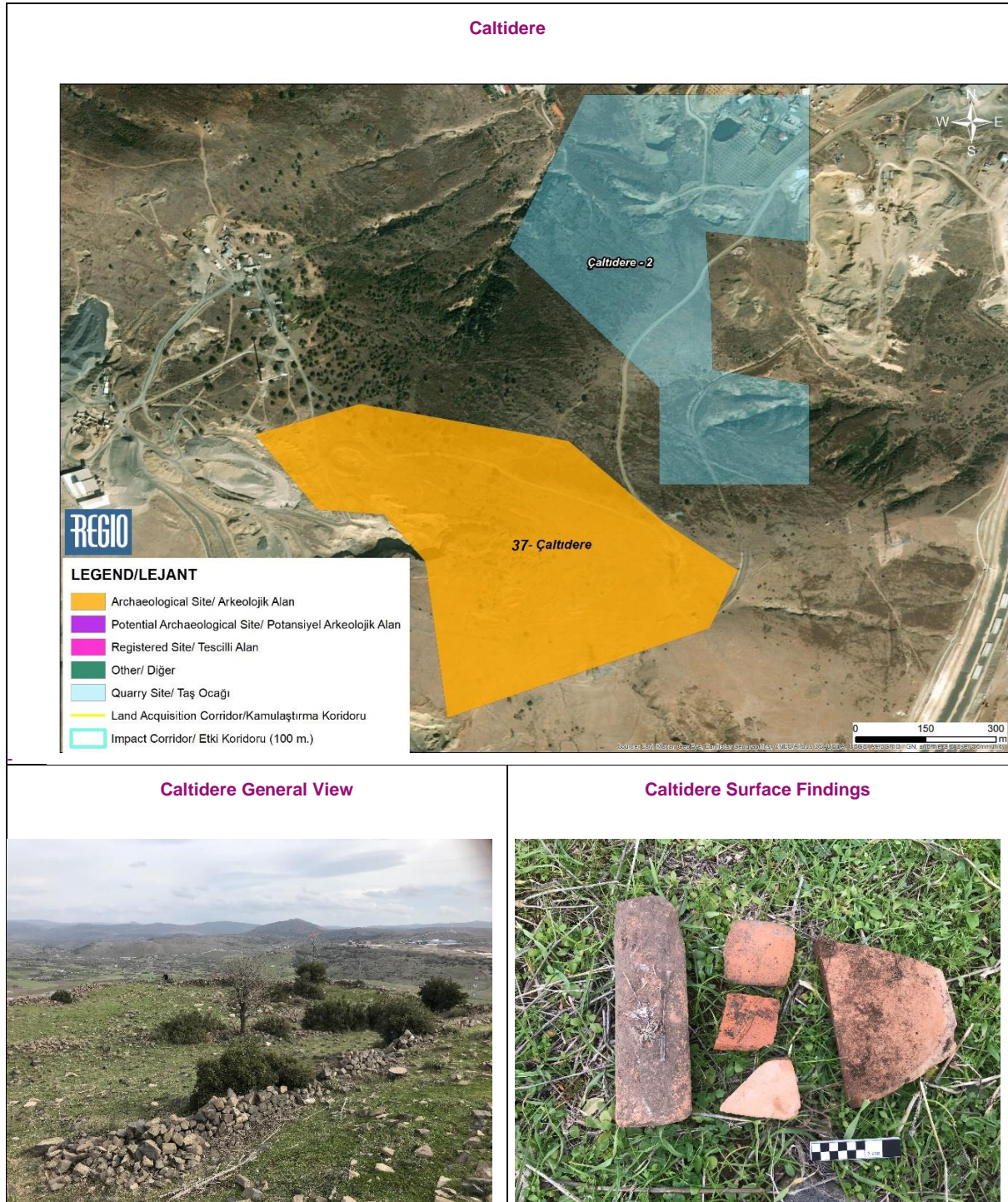


Figure 14-45. (37) Caltidere Castle/Slope Settlement (Non-registered Archaeological Site) outside the Caltidere-2 Quarry Site

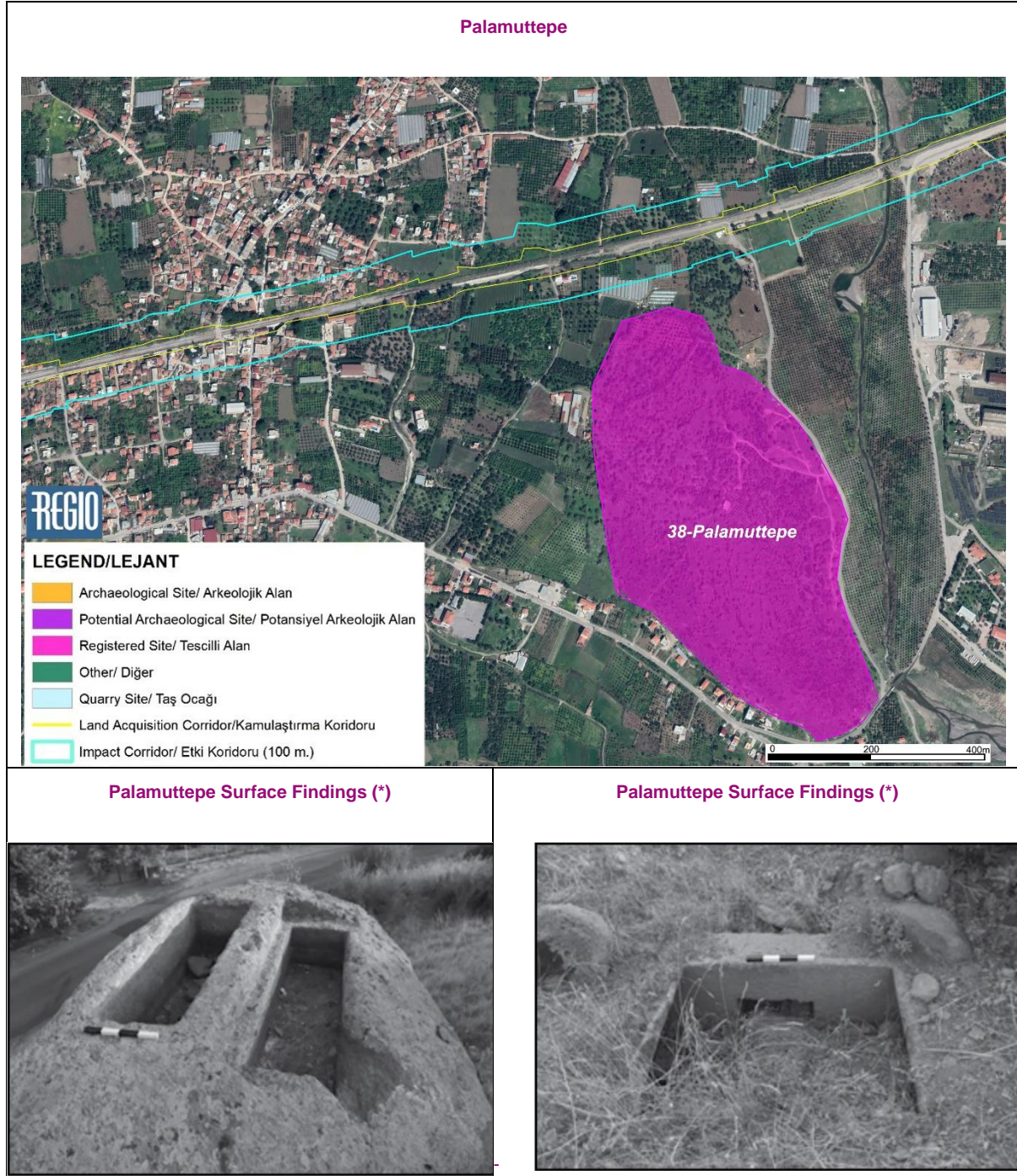


Figure 14-46. (38) Palamuttepe 3. Degree Archaeological Site (Registered Archaeological Site) outside the Impact Corridor

(*) Source for the Photos:

ÇINARDALI-KARAASLAN, N., & KOLANKAYA-BOSTANCI, N. (2014, Haziran). İzmir İli, Menemen İlçesi Prehistorik ve Protohistorik Dönem 2013 Yılı Arkeolojik Yüzey Araştırması. 32. Araştırma Sonuçları Toplantısı, 1, s. 553-572.

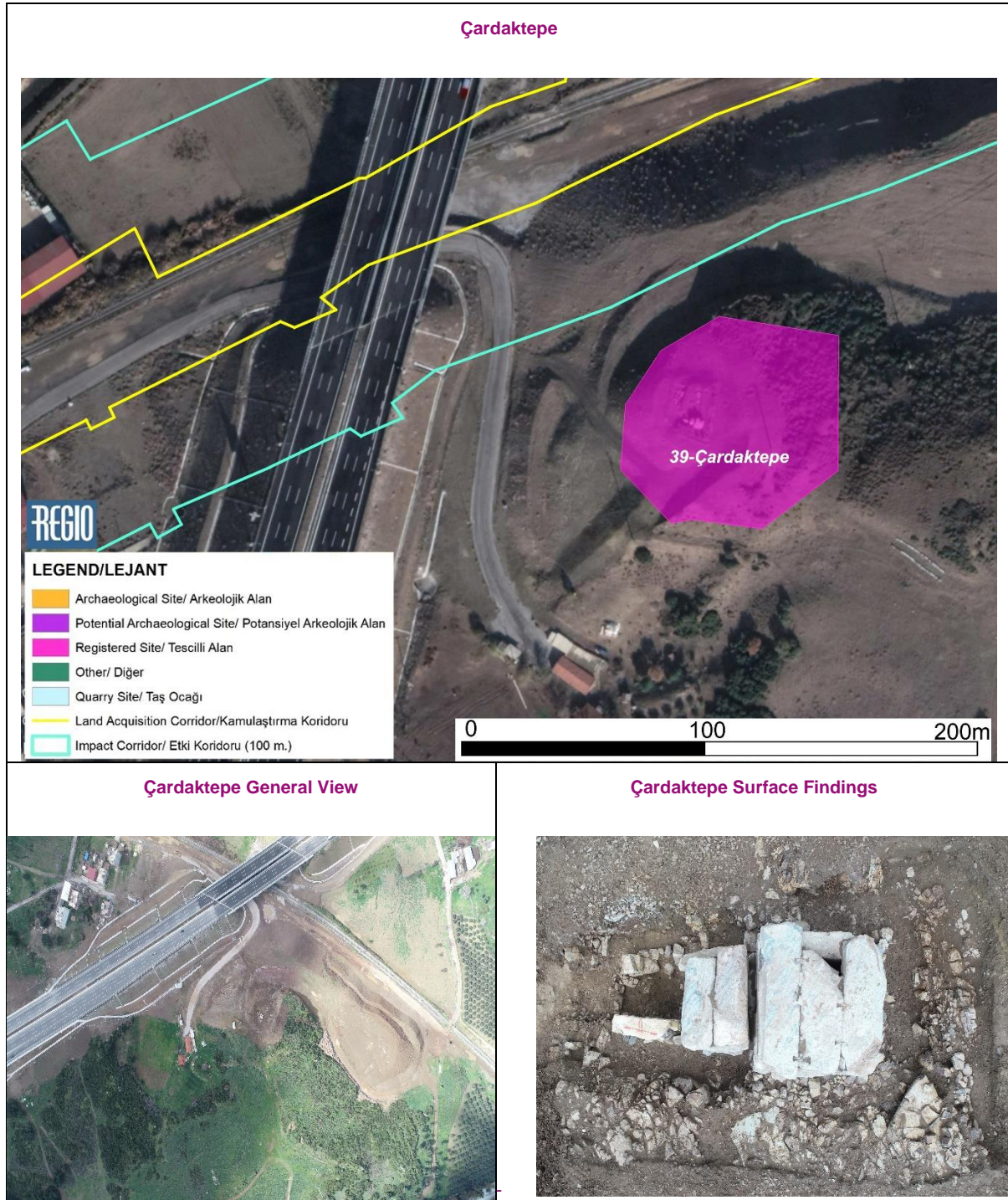





Figure 14-47. (39) Çardaktepe Tumuli (Registered Archaeological Site) outside the Impact Corridor



14.3.2.3. Intangible Cultural Heritage

As of 2021, there are 20 elements of Turkey inscribed on the UNESCO Representative List of Intangible Cultural Heritage. Among these elements, there are 9 elements registered in the provinces crossed by the Project as presented in Table 14-8.



Table 14-8. Intangible Cultural Heritage Elements in the Provinces Crossed by the Project



No	UNESCO List No.	Intangible Cultural Heritage Element	Year of Admission to the UNESCO List	Province with the Element along the Project Route (according to National Inventories)	Descriptive Information for the Element ¹⁰⁷ Summary of the Element	Representative Photograph
1	(3)	Âşıklık (Minstrelsy) Tradition	2009	Ankara Afyonkarahisar Izmir	The Âşıklık (minstrelsy) tradition of Turkey is performed by wandering poet-singers known as âşıks. Dressed in traditional clothes and plucking a stringed saz, the âşık is a common performer at weddings, in coffeehouses and during public festivals of all sorts. The âşık is called in a dream to undertake a long apprenticeship in the arts of playing string and percussion instruments, singing, storytelling and repartee that form the heart of the vocation. The poems they recite, usually about love, are written in rhymed syllabic meter and end with a quatrain in which the âşık utters the Mâhlas, his pseudonym.	
2	(5)	Nevruz	2016	Izmir	New Year is often a time when people wish for prosperity and new beginnings. 21 March marks the start of the year in Turkey (also practiced in Afghanistan, Azerbaijan, India, Iran, Iraq, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan and Uzbekistan). It is referred to as Nevruz - 'new day' when a variety of rituals, ceremonies and other cultural events take place for a period of about two weeks.	
3	(6)	Traditional Sohbet Meetings	2010	Ankara Afyonkarahisar Kutahya Manisa Izmir	Traditional Sohbet meetings play a crucial role in transmitting Turkish folk literature, folk dances and music, village plays as well as societal values. Turkish men meet regularly indoors, especially in winter, to discuss local social and cultural issues, safeguard traditions, and encourage solidarity, mutual respect and a sense of community. Meetings may include music, dances and plays, all enjoyed while consuming local dishes. A traditional Sohbet meeting may last until the early morning. Meetings are open to men above the age of 15 or 16, regardless of ethnicity, religion or status, with the basic requirement that members be of honest families, be trustworthy and respectful of their elders, and not gamble or display public drunkenness.	

¹⁰⁷ <https://ich.unesco.org/en/state/turkey-TR?info=elements-on-the-lists>

No	UNESCO List No.	Intangible Cultural Heritage Element	Year of Admission to the UNESCO List	Province with the Element along the Project Route (according to National Inventories)	Descriptive Information for the Element ¹⁰⁷ Summary of the Element	Representative Photograph
4	(9)	Ceremonial Keşkek Tradition	2011	Usak	Keşkek is a traditional Turkish ceremonial dish prepared for wedding ceremonies, circumcisions and religious holidays. Women and men work together to cook wheat and meat called 'Keşkek' in huge cauldrons, then serve it to the guests. The wheat is washed with prayers the preceding day, and then carried to a large stone mortar, to the accompaniment of music from the davul drum and zurna double-reed pipe. At the mortar it is hulled by two to four persons using gavels in a fixed rhythm. Cooking is usually carried out outdoors. Based on the publications ¹⁰⁸ , it has been identified that this tradition continues with festivities held in Ulupinar village of Banaz district. The festival site is located approximately 10 km southeast of the Project route.	
5	(10)	Mesir Paste Festival	2012	Manisa	The Mesir Macunu festival of Manisa, Turkey, commemorates the recovery of Hafsa Sultan, mother of Suleiman the Magnificent, who was cured of a disease by the invention of a paste known as mesir macunu. The Sultan then ordered that the paste be disseminated to the public. So, every year from 21 to 24 March, the paste is prepared by a chef and apprentices from 41 fresh spices and herbs according to traditional practice. A team of 14 women wrap the paste in small pieces of paper, and 28 imams and apprentices bless it before scattering the paste from the top of the minaret and the domes of the Sultan Mosque. Thousands of people come from different regions of Turkey to compete to catch the pieces as they fall. The festival site (Sehzadeler district) is located about 3 km south of the Project route.	

¹⁰⁸ Cekic, 2015. 76

No	UNESCO List No.	Intangible Cultural Heritage Element	Year of Admission to the UNESCO List	Province with the Element along the Project Route (according to National Inventories)	Descriptive Information for the Element ¹⁰⁷ Summary of the Element	Representative Photograph
6	(11)	Turkish Coffee Culture and Tradition	2013	All provinces	Turkish coffee combines special preparation and brewing techniques with a rich communal traditional culture. The freshly roasted beans are ground to a fine powder; then the ground coffee, cold water and sugar are added to a coffee pot and brewed slowly on a stove to produce the desired foam. The beverage is served in small cups, accompanied by a glass of water, and is mainly drunk in coffee-houses where people meet to converse, share news and read books. The tradition itself is a symbol of hospitality, friendship, refinement and entertainment that permeates all walks of life. An invitation for coffee among friends provides an opportunity for intimate talk and the sharing of daily concerns. Turkish coffee also plays an important role on social occasions such as engagement ceremonies and holidays; its knowledge and rituals are transmitted informally by family members through observation and participation. The grounds left in the empty cup are often used to tell a person's fortune. Turkish coffee is regarded as part of Turkish cultural heritage: it is celebrated in literature and songs, and is an indispensable part of ceremonial occasions.	
7	(13)	Flatbread Making and Sharing Culture: Lavash, Katyrma, Jupka, Yufka	2016	All provinces	The culture of making and sharing flatbread in Turkey (also practice in Azerbaijan, Iran, Kazakhstan, and Kyrgyzstan) carries social functions that have enabled it to continue as a widely-practised tradition. Making the bread (lavash, katyrma, jupka or yufka) involves at least three people, often family members, with each having a role in its preparation and baking. In rural areas, neighbours participate in the process together. Traditional bakeries also make the bread. It is baked using a tandyr/tanūr (an earth or stone oven in the ground), sāj (a metal plate) or kazan (a cauldron). Besides regular meals, flatbread is shared at weddings, births, funerals, various holidays and during prayers. The practice, transmitted by participation within families and from master to apprentice, expresses hospitality, solidarity and certain beliefs that symbolize common cultural roots reinforcing community belonging.	

No	UNESCO List No.	Intangible Cultural Heritage Element	Year of Admission to the UNESCO List	Province with the Element along the Project Route (according to National Inventories)	Descriptive Information for the Element ¹⁰⁷ Summary of the Element	Representative Photograph
8	(14)	Traditional Craftsmanhip of Cini-making	2016	Kutahya	Çini are traditional, handmade glazed tiles and ceramics made in Turkey featuring colourful motifs of plants, animals and geometric patterns often found on facades of buildings and in homes throughout the country. Producing çini involves a series of processes. The clay is first shaped, lined, dried and fired in ovens specifically for çini making. Designs representing local customs and beliefs are then drilled on paper and transferred to the surface with coal dust. Outer contours of the patterns are hand drawn, the surface dyed in various colours and then the work is glazed and fired. Çini-making workshops involve craftspeople, supervisors and apprentices. The tradition is also practised in the home, public education centres, vocation schools and universities throughout the country where neither age, gender nor ethnicity are barriers to knowledge sharing, transmission and skills development.	
9	(15)	Spring Celebration – Hidrellez	2017	<u>Afyonkarahisar</u> <u>Usak</u> <u>Izmir</u>	The Spring Celebration 'Hidrellez' takes place annually on 6 May, which is recognized as Spring Day, or the awakening of nature. 'Hidrellez' is a compound noun derived from 'Hidir' and 'Ilyas', which are believed to be the protectors of earth and water and the helpers of individuals, families and communities in need of them (also practiced in North Macedonia). To mark this occasion, various ceremonies and rituals connected with nature are performed, guaranteeing the wellbeing, fertility and prosperity of the family and community and protecting livestock and crops for the upcoming year. The element belongs to all participants: families, children, youth, adults, dancers and singers. The rituals have deep-rooted cultural meanings and provide the community with a sense of belonging and cultural identity and an opportunity to strengthen relations. The communities concerned ensure the viability of the element by participating in the Spring Celebration on an annual basis.	

Source: <https://www.unesco.org.tr/Pages/126/123/UNESCO-%C4%B0nsanl%C4%B1%C4%9F%C4%B1n-Somut-Olmayan-K%C3%BClt%C3%BCrel-Miras%C4%B1-Temsil%C3%AE-Listesi>

Besides the intangible cultural elements inscribed on the UNESCO Representative List of Intangible Cultural Heritage, there are also elements that are registered in the national inventory, as listed in Table 14-9.

Table 14-9. Intangible Cultural Heritage Elements of the Provinces Crossed by the Project as Registered in the National Inventory

Provinces	Group Headlines of Elements	Name of the Element	Name of the Element in the National Inventory
Ankara	Classical Turkish Decoration and Crafts	Miniature art	Miniature art
	Traditional handicraft and craftsmanship	Glass craftsmanship and glass processing art	Glass blowing craftsmanship
		Copper craftsmanship	Copper craftsmanship
		Filigree/Telkari handicraft	Filigree/Telkari
		Saddlebag Making	Saddlebag Making
	Weaving art and traditions	Cloth weaving tradition	Ankara lint/traditional sof (lining made of raw silk) weaving
	Oya/embroidery processing, sewing and knitting traditions	Knitting	Sock knitting
	Traditional instrument production and performance	Bağlama production and performance	Bağlama production
	Traditional children's games and toys	Traditional toys and toy production	Traditional wooden toy production
		Traditions of playing children's games	Beştaş game
	Traditional meetings and organisations	Traditional chat/sohbet meetings such as barana, sıra gecesi, yâren, etc.	Ferfene
		Seymenlik tradition	Seymenlik
		Ahilik/The Ahi Brotherhood	Ahilik/The Ahi Brotherhood
		Zeybeklik tradition	Kırka Zeybeği (folk dancing)
	Social practices related to cultural sites	Village room/mansion tradition	Village room tradition
		Visiting traditions	Hacı Bayram-ı Veli visits and traditions
	Prenatal /postnatal and childhood traditions	Midwife knowledge and practices	Midwife culture
	Marriage traditions	Wedding	Groom dressing tradition
	Traditions and practices based on beliefs	Rain prayer ceremonies	Çalı gezme-Rain prayer
	Faith, celebration and traditions linked to the calendar	Sarıçalı day (A traditional local festival)	Sarıçalı Day (A traditional local festival)
		Çiğdem pilavı day (A traditional local festival)	Tradition of Çiğdem day
	Tradition of the bard	Aşıkılık (minstrelsy)	Aşıkılık (minstrelsy)
	Traditional cruising arts and plays	Traditional circus arts	Canbazhane/Körmük tradition (a type of acrobatics)
		Village stage-plays	Saya gezme (a type of village stage-play)
		Village stage-plays	Sinsin (a type of village stage-play)
		Puppet	Baby puppet
	Traditional sports	Matrak game	Traditional matrak game
		Tomak game	Traditional tomak game
		Tulum game	Traditional tulum game
		Mangala/Göçürme (Traditional brain and strategy game)	Mangala/Göçürme (Traditional brain and strategy game)
	Traditional healing and cleaning practices, production of care products	Turkish bath culture	Bath traditions in Ankara historical baths
	Turkish culinary culture/ traditional food and beverage making and social practices	Traditional bagel production	Ankara bagel
		Höşmerim tradition (a type of dessert)	Höşmerim as a tradition of seeing a Groom in Ankara
		Ankara Tava tradition (local dish)	Ankara Tava (local dish)

Provinces	Group Headlines of Elements	Name of the Element	Name of the Element in the National Inventory
	Traditional handicraft and craftsmanship	Döner tradition (local dish)	Ankara yaprak döneri (local dish)
		Molasses, sherry and pestle making and traditions	Macın/paste boiling
		Meerscham carving	Meerscham carving
		Traditional jewellery	Sivrihisar cebesi ve incili küpesi (a special bracelet and pearl earrings)
		Silver handicraft and craftsmanship	Silver handicraft and craftsmanship
		Kilim/rug weaving tradition	Cicim and zili weaving
		Kilim/rug weaving tradition	Sivrihisar five-chimney rug weaving
		Weaving goods production	İğdir bags production
		Traditions of afterlife, brotherhood of the road and relatives	Nartları toy künü (name of the event)
		Prenatal /postnatal and childhood traditions	Diş hediği tradition (celebration for first tooth of babies)
		Wedding traditions	Wedding ceremony
		Narrative tradition and traditional lyric arts	Tel(li) şırak ve koraz telleme/ Wedding Ceremony Tradition
		Tradition of telling Nasreddin Hodja stories	Tradition of telling Nasreddin Hodja stories
		Tradition of telling Nasreddin Hodja stories	Tradition of telling Nasreddin Hodja stories
Afyonkarahisar	Traditional handicraft and craftsmanship	Keçecilik/Felt Making	Keçecilik/Felt Making
		Pottery	Pottery making
		Semercilik/ Saddlebag Making	Semercilik/ Saddlebag Making
		Saraçlık/ Saddlery	Saraçlık/ Saddlery
	Weaving art and traditions	Saraçlık/ Saddlery	Koşumculuk/ Harnessing
		Kilim/rug weaving tradition	Kilim/rug weaving
	Traditional clothing production and usage	Kilim/rug weaving tradition	Root dyed Stale rug weaving
		Traditional shoemaking	Yemenicilik/ Traditional hand made scarves
	Oya/embroidery processing, sewing and knitting traditions	The art of processing and embroidery	Kanaviçe/ Cross-stitch
	Traditional meetings and organisations	Traditional chat/sohbet meetings; Barana, sıra gecesi, yâren etc.	Gezekler (Chat tradition)
		Traditional chat/sohbet meetings; Barana, sıra gecesi, yâren etc.	Yaran (Sohbet/Chat tradition)
	Faith, celebration and traditions related to the calendar	Hıdırellez festivities	Hıdırellez festivities
	Bards tradition	Aşıkılık (minstrelsy) tradition	Aşıkılık (minstrelsy) tradition
	Turkish culinary culture/ traditional food and beverage making and social practices	Ashura tradition	Sultan Divani and healing Ashura day
		Traditional cream making	Afyon cream
		Turkish delight culture	Turkish delight tradition
Kutahya	Classical Turkish Decoration and Crafts	Calligraphy	Plant leaf carving calligraphy
		Ceramics art	Ceramics art
	Traditional handicraft and craftsmanship	Spoon production tradition	Wood spoon carving
		Telkari/ Filigree art	Telkari/ Filigree
		Traditional door and door decoration craftsmanship	Ottoman craftsmanship of handmade door locks
	Weaving art and traditions	Kilim/rug weaving tradition	Rug weaving
	Oya/embroidery processing, sewing and knitting traditions	The Art of Oya/ embroidery	Needle Carving and checkers
		The tradition of sewing	Fragrance (Lavender) pouches
		The art of processing and embroidery	Sim glaze and wrapping
	Traditional instrument production and performance	Rebab production and performance	Rebab production
	Traditional meetings and organisations	Traditional chat/sohbet meetings; Barana, sıra gecesi, yâren etc.	Yaren organisation

Provinces	Group Headlines of Elements	Name of the Element	Name of the Element in the National Inventory
	Send-off and welcome traditions	Traditional chat/sohbet meetings; Barana, sıra gecesi, yâren etc.	Gezek (Chat tradition)
		Hacı Send-off and welcome traditions	Hacı pilavı (food delivery)
	Wedding traditions	Wedding ceremony	Kütahya Wedding ceremony
	Traditions and practices related to beliefs	Ramadan traditions	Küpecik/Kids Play
		Kandil gecesi traditions	Kâbe Kabe/Belief Tradition
	Traditional sports	Traditional Turkish archery	Pedestrian archery
	Traditional animal breeding and social practices	Traditional horse breeding	Rahvan horse breeding and racing
Usak	Weaving art and traditions	Kilim/rug weaving tradition	Eşme rug weaving
		Carpet weaving tradition	Uşak carpet weaving
	Traditional meetings and organisations	Zeybeklik traditions	İslamoğlu Zeybeği/ Folk Dance
	Send-off and welcome traditions	Asker Send-off and welcome traditions	Soldier's send-off ceremony
	Prenatal /postnatal and childhood traditions	Diş hediği tradition (celebration for first tooth of babies)	Diş bulguru/ First tooth celebration
	Wedding traditions	Henna night	Aylila tradition
		Henna night	Hanne night ceremony
	Traditions and practices related to death	Condolence traditions	Condolence traditions
	Faith, celebration and traditions related to the calendar	Hıdırellez festivities	Hıdırellez festivities
	Narrative tradition and traditional lyric arts	The tradition of saying mâni (rhymes)	Mâni saying
	Traditional sports	Javelin	Equestic javelin
	Turkish culinary culture/ traditional food and beverage making and social practices	Ashura tradition	Ashura
		Tarhana producing and tradition	Uşak tarhanası/Local dish
		Ceremonial Keşkek tradition	Keşkek/Local Dish
Manisa	Traditional handicraft and craftsmanship	Keçecilik/ Feltin Making	Keçecilik/ Felt Making
		Copper craftsmanship	Copper Workmanship with Plastering and Forging Technique
		Iron craftsmanship	Iron craftsmanship
	Weaving art and traditions	Kilim/rug weaving tradition	Rug weaving
		Kilim/rug weaving tradition	Zili weaving
		Kilim/rug weaving tradition	Cicim weaving
		Carpet weaving tradition	Carpet weaving
			Yunt Dağı Carpet weaving
		Cloth weaving tradition	Historical Manisa cloth weaving
	Traditional clothing production and usage	Local clothing, underwear, apron and ornamentation (belt, belt, hood, buckle)	Albez
	Traditional children's games and toys	Traditions of playing children's games	Dörtel/Traditional Kids Play
	Traditional meetings and organisations	Traditional chat/sohbet meetings; Barana, sıra gecesi, yâren etc.	Kula yarenleri/Traditional Chat
	Traditions of charity and solidarity	Hayrat tradition	Suyolculuk/Drink Water Charity
	Traditions and practices related to beliefs	Nazar bead tradition and craftsmanship	Sinek sarayı/Fly Net
		Rain prayer ceremonies	Rain charity
		Kandil gecesi traditions	Çıtır pıtır gecesi/Traditional Celebration
	Traditional festivals and festivities	Mesir Paste Festival	Traditional Mesir Paste Festival
	Narrative tradition and traditional lyric arts	The tradition of storytelling	Dragon's tale
Izmir	Traditional handicraft and craftsmanship	Nazar bead tradition and craftsmanship	Nazar bead craftsmanship

Provinces	Group Headlines of Elements	Name of the Element	Name of the Element in the National Inventory
		Keçecilik/Felt Making	Keçecilik/Felt Making
		Pottery	Menemen pottery
		Leather Making and leather processing	Karatabaklık/ Parchment Making
		Basketmaking/Wicker knitting	Basketmaking/Wicker knitting
	Weaving art and traditions	Cloth weaving tradition	Beledi weaving
	Oya/embroidery processing, sewing and knitting traditions	Oya/embroidery	Needle lace
		The art of processing and embroidery	Wire wrapping
	Traditional instrument production and performance	Calabash violin production and performance	Calabash violin production
		Clarinet production and performance	Clarinet performance
	Traditional meetings and organisations	Traditional chat/sohbet meetings; Barana, sıra gecesi, yâren etc.	Delikanlı odaları/Chat Rooms
		Zeybeklik tradition	Zeybeklik tradition
	Traditions of charity and solidarity	Charity tradition	Mahya tradition
		Charity tradition	Lokma (food delivery)
	Prenatal/postnatal and childhood traditions	Circumcision ceremonies	Circumcision bed decoration
	Wedding traditions	Çeyiz/dowry tradition	Çeyiz ve çeyiz serme (exhibition of the dowry)
	Faith, celebration and traditions related to the calendar	Hıdırellez festivals	Hıdırellez
		Newroz festivals	Sultan Nevruz festival
		Koç katımı, yünüm-koyun yüzdürme (Takking activities and ceremonies)	Keçikırkım törenleri (Takking activities and ceremonies)
		Yanar gecesi (a traditional night event)	Yanar gecesi (a traditional night event)
	Bards tradition	Aşıklık / Mıstrelcy tradition	Aşıklık / Mıstrelcy
	Folk music and the tradition of singing song(türkü)	Roman music culture	Roman havası (a type/vibe of music)
	Traditional Cruising Arts and Plays	Traditional circus arts	Canbazhane/Körmük tradition (a type of acrobatics)
	Traditional sports	Traditional Turkish archery	Pedestrian archery
	Turkish culinary culture/ traditional food and beverage making and social practices	Traditional bagel making	İzmir gevreği (a type of bagel)

The potential intangible cultural heritage elements reported by the settlement heads during the community-level interviews (as part of social surveys – see Appendix D.1 for the settlements covered in the surveys) in response to the questions associated with the intangible cultural heritage elements of the affected communities are summarised in Table 14-10.

Table 14-10. Potential Intangible Cultural Heritage Elements Reported by the Settlement Heads in the Settlements Surveyed as part of the ESIA

Category	Province	District	Settlement	Potential Intangible Cultural Heritage Element
Oral traditions and expressions	Afyonkarahisar	Merkez	Erenler	Entombed Saint Myths (<i>Yatir Efsaneleri</i>)
			Ali Cetinkaya	Opium War Narratives (<i>Afyon Savasi Hikayeleri</i>)
	Kutahya	Dumlupinar	Turgut Ozal	Dumlupinar Myths (<i>Dumlupinar Efsaneleri</i>)
Traditional food	Ankara	Polatli	Gumusyaka	Halva with Cream, Flatbread (<i>Hosmerim, Bazlama</i>)
			Turktaciri	Phyllo dough, Flatbread, Meat Pasty, Pastry (<i>Yufka, Bazlama, Manti, Borek</i>)
	Afyonkarahisar	Merkez	Cayirbag town (Ugur Neighbourhood)	Pastry (<i>Hamur Isi</i>)
			Susuz town (Osmanli Neighborhood)	Pastry (<i>Hamur Isi, borek</i>)
			Erenler	Red Meat Dishes (<i>Kirmizi Et Yemekleri</i>)
			Bayatcik	Bukme, Pastry (<i>Bukme, Borek</i>)
			Ali Cetinkaya	Meat Dishes (<i>Et Yemekleri</i>)
			Huzur	Dried Vegetables (<i>Sebze Kuru</i>)
			Cavdarli	Pastry on Sheet Metal, Bukme (<i>Sac Boregi, Bukme</i>)
			Akcin	Oven-baked Dishes (<i>Firin Yemekleri</i>)
			Sarayduzu	Keskek, Tarhana (<i>Keskek, Tarhana</i>)
		Emirdag	Incili	Flat Bread with Eggs on Stewpan, Meatballs with Filling (<i>Guvec, Yumurtali Pide, Dolgulu Kofte</i>)
		Sinanpasa	Ayvali	Meat Dishes, Katmer (<i>Et Yemekleri, Katmer</i>)
			Guney	Bukme, Gozleme (<i>Bukme, Gozleme</i>)
			Balmahmut	Keskek, Bukme with Lentil, Arabasi Soup (<i>Keskek, Mercimekli Bukme, Arabasi Corba</i>)
			Calislar	Village Foods (<i>Koy Yemekleri</i>)
	Kutahya	Dumlupinar	Turgut Ozal	Anatolian Dishes (<i>Anadolu Yemekleri</i>)
	Usak	Banaz	Buyukoturak	Tarhana Soup (<i>Tarhana Corbasi</i>)
	Manisa	Sehzadeler	Yenikoy	Ashura (<i>Asure</i>)
Performing arts	Afyonkarahisar	Merkez	Susuz town (Osmanli Neighborhood)	Kirik Hava, Ciftelli (traditional dance)
			Erenler	Ankara Oyun Havasi, Kirik Hava (traditional dance)

Category	Province	District	Settlement	Potential Intangible Cultural Heritage Element	
			Ali Cetinkaya	Ankara Oyun Havasi, Misket (traditional dance)	
			Akcin	Kirik Hava (traditional dance)	
			Ugur	Afyonkarahisar Oyun Havasi (traditional dance)	
		Emirdag	Incili	Emirdag Havasi, Tabandan (traditional dance)	
		Sinanpasa	Guney	Islamoglu (traditional dance)	
		Usak	Banaz	Buyukoturak	Islamoglu (traditional ance)
	Manisa	Salihli	Beseylul	Efe, Zeybek (traditional dance)	
	Traditional handicrafts	Ankara	Polatli	Turktaciri	Prayer Rug, Dowery Items (Namazlik, Ceyizlik)
Afyonkarahisar		Merkez	Ali Cetinkaya	Bootee, Dowery, Birth Preparation Items (Patik, Ceyiz, Dogum Hazirligi)	
			Sinanpasa	Guney	Carpet Weaving (Hali Dokuma)
			Bulca	Bootee, Sweater, Cardigan (Patik, Kazak, Hirka)	
Kutahya		Dumlupinar	Turgut Ozal	Handiworks (Islemeler)	
Traditional clothing		Ankara	Polatli	Gumusyaka	Central Anatolian Clothings, Shalwar (1c Anadolu Kiyafetleri, Salvar)
				Merkez	Cayirbag town (Fatih Neighborhood)
	Ali Cetinkaya		Marma (traditional clothing)		
	Huzur		Bindalli (traditional clothing)		
	Ugur		Shalwar (Salvar)		
	Cavdarli		Shalwar (Salvar)		
	Sinanpasa		Bulca		Shalwar (Salvar)
			Ayvali		Bindalli (traditional clothing)
			Balmahmut	Catal Don, Omucek (traditional clothing)	
			Calislar	Shalwar (Salvar)	
	Akdegirmen		Pullu Sikma (traditional clothing)		
	Kutahya		Dumlupinar	Turgut Ozal	Shalwar (Salvar)
				Kizilca	Shalwar (Salvar)
	Usak		Banaz	Buyukoturak	Kuyruklu, Tekke (traditional clothing)
	Manisa		Turgutlu	Derbent	Shalwar (Salvar)
		Afyonkarahisar	Merkez	Ali Cetinkaya	Oat, Wheat (Yulaf, Bugday)

Category	Province	District	Settlement	Potential Intangible Cultural Heritage Element
Traditional knowledge in health and medicine (human and animals)		Sinanpasa	Huzur	Clover (<i>Yonca</i>)
			Balmahmut	Soda (<i>Soda</i>)
			Akdegirmen	Soda (<i>Soda</i>)
			Ayvali	Corn (<i>Misir</i>)
Traditional agricultural and husbandry practices	Usak	Banaz	Buyukoturak	Scythe, Reap Hook (<i>Tirpan, Orak</i>)
Traditional production techniques and other practices	Afyonkarahisar	Sinanpasa	Balmahmut	Barley Shattering Shop (<i>Arpa Kirma Dukkani</i>)

As examples of oral traditions and expressions reported during the interviews in Afyonkarahisar and Kutahya provinces, stories and myths about the Battle of the Commander-in-Chief, which started in Afyonkarahisar-Kocatepe on 26 August 1922 and ended with victory in Dumlupinar (Kutahya) on 30 August 1922, have been identified to be transferred verbally to this day. The story of the father who left his home and his 8- year-old son to join the Balkan War and encountered his son in the square of the Battle of the Commander-in-Chief after many years¹⁰⁹ has been example to those stories. A monument was built in the Dumlupinar Martyrdom in the name of this father and son. Dumlupinar Martyrdom is located about 2.5 km southwest of the project route (Figure 14-48).



Figure 14-48. Martyr Father-Son Monument in Dumlupinar Martyrdom ¹¹⁰

The social surveys, supported by desk-based research, further suggested that some of the traditions of life's transition periods are still maintained in the surveyed settlements. The transition periods of life, which begin with birth and are completed with death, manifest themselves in the form of local customs in the region. Cultural qualities of the region are as remarkable as its natural structure and history. In addition to the transition periods of life, national and religious celebrations are of great importance to the local people.

¹⁰⁹ <https://www.kulturportali.gov.tr/turkiye/kutahya/gezilecek yer/dumlupinar-sehtlg>

¹¹⁰ <https://www.kulturportali.gov.tr/turkiye/kutahya/gezilecek yer/dumlupinar-sehtlg>

14.3.2.4. Critical Cultural Heritage

Critical cultural heritage is defined as 'one or both of the following types of cultural heritage:

- (i) The internationally recognised heritage of communities who use, or have used within living memory the cultural heritage for long-standing cultural purposes; or
- (ii) Legally protected cultural heritage areas, including those proposed by host governments for such designation'.

Examples of legally protected areas 'include world heritage sites and nationally protected areas' (IFC, 2012a, 3, fn6).

Internationally Recognised Cultural Heritage Sites

World Heritage List and World Heritage Tentative¹¹¹ List of UNESCO are considered under the internationally recognised cultural heritage sites.

Turkey has 18 sites inscribed on the World Heritage List of UNESCO (as of 1 March 2021). Those located in the wider region of the Project are listed in Table 14-11 and shown in Figure 14-49. The closest site to the Project is the "Hieropolis-Pamukkale" in Denizli, which is located at a distance of 53 km in the south of the HSR route.

Among the sites included in the World Heritage Tentative List of UNESCO, 3 sites are located in the wider region of the Project. The closest sites to the Project are the "Mountainous Phrygia" in Afyonkarahisar, Kutahya and Eshisehir, which is located at a distance of 1.5 km in the north of the HSR route and "The Ancient City of Sardis and the Lydian Tumuli of Bin Tepe" in Manisa, which is located at a distance of 2 km in the south of the HSR route.

None of the internationally recognised cultural heritage sites is overlapping with the study area.

Table 14-11. Internationally Recognised Cultural Heritage Areas (World Heritage List and World Heritage Tentative List of UNESCO)

No	Site Name	Province	Approximate Railway KM	Distance to Project Expropriation Corridor
World Heritage List of UNESCO				
1	Historical Areas of Istanbul	Istanbul	334+000	284.0
2	Hieropolis-Pamukkale	Denizli	355+000	52.0
3	Xanthos-Letoon	Antalya-Mugla	391+000	228.0
4	Archaeological Site of Troy	Canakkale	540+000	168.0
5	Bursa and Cumalikizik: The Bird of the Ottoman Empire	Bursa	322+000	158.0
6	Pergamon and its Multi-Layered Cultural Landscape	Izmir	525+000	53.0
7	Ephesus	Izmir	527+000	71.0
8	Aphrodisias	Aydin	393+000	73.0
World Heritage Tentative List of UNESCO				
1	Gordion	Ankara	0+000	29.0
2	The Ancient City of Sardis and the Lydian Tumuli of Bin Tepe	Manisa	449+000 -464+000	2.0
3	Mountainous Phrygia	Afyonkarahisar - Kutahya - Eskisehir	137+000	1.5

¹¹¹ A Tentative List is an inventory of those properties which each State Party intends to consider for nomination;
<http://whc.unesco.org/en/tentativelists/>

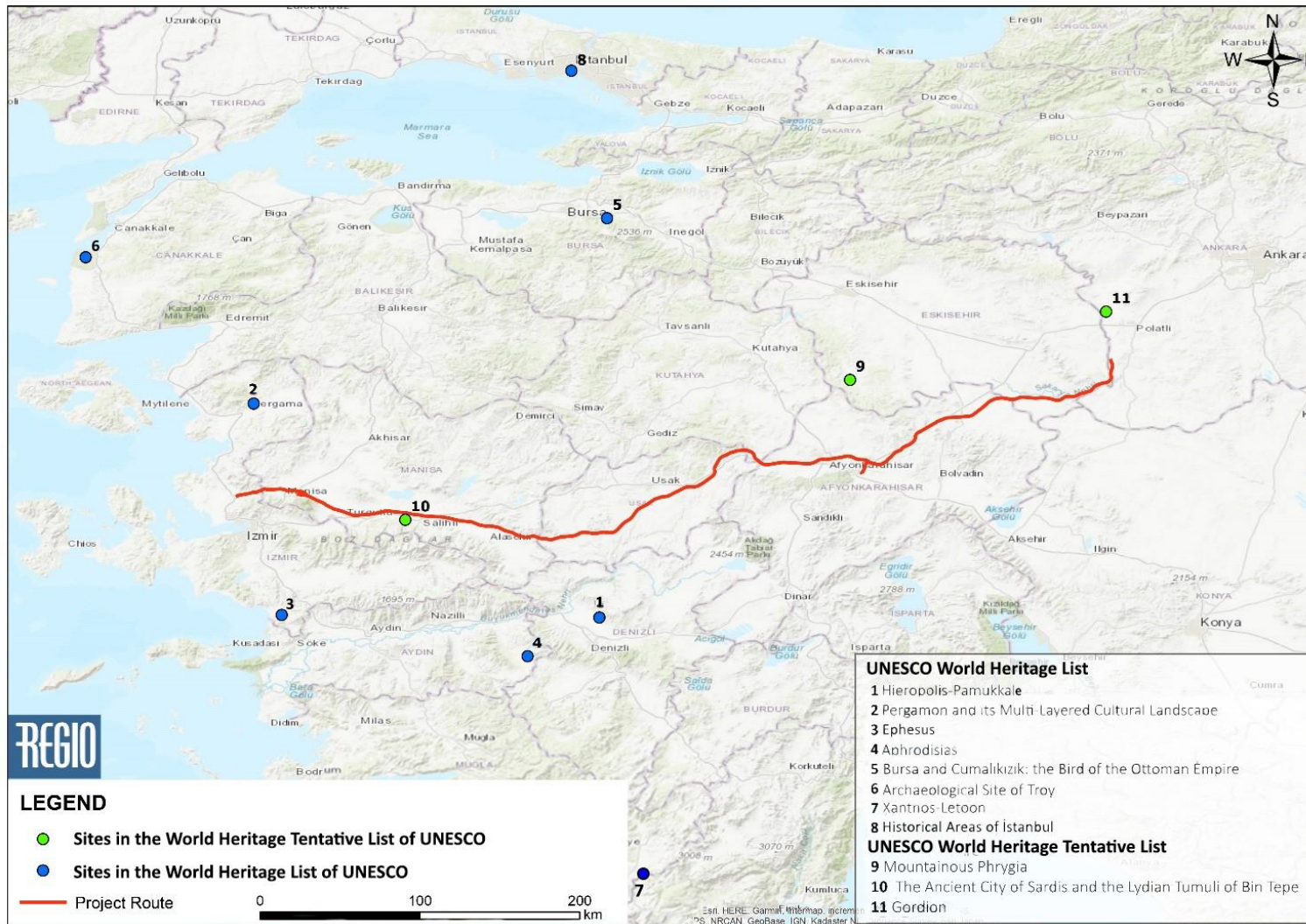


Figure 14-49. Internationally Recognised Cultural Heritage Sites

Legally Protected (Registered) Cultural Heritage Sites

Among the cultural heritage sites identified by the ESIA team within the study area of the Project, the sites listed in Table 14-12 are registered, legally protected cultural heritage areas.

Under Turkish Law, legally protected cultural heritage assets are classified and protected in accordance with Principal Decision No. 658 (issued 5 November 1999) which states that all archaeological sites need to be classified and protected according to their significant features. Detailed information on the features of each site has been previously provided in Table 14-7.

Table 14-12. Legally Protected (Registered) Archaeological Sites

Section	Site Name	Province	District	Neighbourhood/ Village	Approximate Railway KM	Distance to Expropriation Corridor (m)
Section 1	Cinkic	Afyonkarahisar	Bayat	Merkez	119+500 119+605	– 112
	Seydiler	Afyonkarahisar	Iscehisar	Seydiler	131+650 132+770	– 0
	Buyuk Kepez	Afyonkarahisar	Merkez	Gebeciler	145+360 145+745	– 148
	Eyupoglu	Afyonkarahisar	Merkez	Susuz - Sakarya	149+810 149+960	– 0
Section 2	Yunakbasi	Afyonkarahisar	Merkez	Beyazit	Afyonkarahisar Connection Line	0
	Guzelim Tepesi	Afyonkarahisar	Merkez	Beyyazi	Beyyazi Quarry	31
Section 4 (d)	Palamuttepe Degree Archaeological Site	3. Izmir	Menemen	Degirmendere	541+000	150
	Cardaktepe Tumulus	Izmir	Menemen	Koyici	545+970	103

Archaeological Potential

The study area has a high potential to contain stratigraphically intact archaeological remains. Upper levels of these remains have most probably been damaged due to previous ground disturbance and erosion caused by physical, climatic and chemical weathering and agricultural activities.

It is anticipated that any superficial or buried archaeological sites within the Project area are likely to be classed according to IFC criteria as 'replicable cultural heritage'¹¹² (IFC, 2012), and can be mitigated by appropriate archaeological investigation, recording and dissemination.

The assessment of the scientific value of any archaeological site may change following intrusive investigation and recording work.

¹¹² The IFC in PS8 (2012) defines "replicable cultural heritage" as tangible forms of cultural heritage that can themselves be moved to another location or that can be replaced by a similar structure or natural features to which the cultural values can be transferred by appropriate measures. Archaeological or historical sites may be considered replicable where the particular eras and cultural values they represent are well represented by other sites and/or structures.

14.4. Impact Assessment and Management

14.4.1. Tangible Cultural Heritage

The activities to be conducted during the land preparation and construction phase of the Project may cause direct potential impacts on the cultural heritage receptors, if not properly managed. The key Project activities that may result in impact (direct or indirect) upon archaeology and cultural heritage receptors during the land preparation and construction phase are summarised in Table 14-13.

Table 14-13. Activities that may Cause Potential Impacts on Cultural Heritage Receptors during the Land Preparation and Construction Phase

Phase	Description of Activity	Potential Receptors that may be Affected by the Activities
Land preparation phase	<ul style="list-style-type: none"> Removal of vegetation and/or trees Installation of fencing Traffic movements (vehicles and staff) 	<ul style="list-style-type: none"> Architectural heritage Historic landscapes Palaeontological heritage
Railway construction phase	<ul style="list-style-type: none"> Topsoil stripping Excavations and quarry/borrow site operations, etc. Construction traffic movement Siting of construction sites and other Project/associated facilities Piling Landscaping/ earth-mounding Waste disposal including excess excavated materials Structures, installation features (bridges, signage, fencing, etc.) Installation of lighting scheme Presence of workforce 	

In addition to direct impacts, damage due to looting and interference may occur. Sites may suffer inadvertent damage or interference. There may be piecemeal illicit removal of portable antiquities from archaeological sites within the Project Area, in particular from those readily accessed areas adjacent to Project route.

Baseline information on the internationally recognised cultural heritage areas has been provided in Section 14.3.2.4. Given the distances of the sites under the World Heritage List, it is assessed that the Project will not have an adverse physical or setting impact on them nor will it induce any significant changes to visitor numbers, site access and conservation.

The closest site under the World Heritage Tentative List of UNESCO is located at a distance of 1.5 km in the north of the HSR route ("Mountainous Phrygia" in Afyonkarahisar, Kutahya and Eshisehir). It is assessed that the Project will not have an impact on this site.

The routine operation and maintenance (O&M) activities of the Operator during the operation phase are not anticipated to cause any additional impact on the cultural heritage elements. The Cultural Heritage Management Plan (CHMP) (including the Chance Find Procedure as presented in Appendix E) developed for the construction phase would be applicable to unforeseen ground disturbing activities, if any, of the Operator during the operation phase.

Significance of Project's impacts on the cultural heritage elements have been identified based on the sensitivity of the receptors and overall magnitude of the impact on that specific receptor. Sensitivity of the receptors for cultural heritage has been determined in line with the criteria defined in Table 14-14 as per the Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS, 2011).

Table 14-14. Criteria for the Sensitivity of Tangible Cultural Heritage Receptors

Sensitivity	Criteria According to ICOMOS (2011)	Criteria According to Turkish Law	Criteria According to IFC PS8
Very High	<p>Sites of acknowledged international importance inscribed as WH property.</p> <p>Individual attributes that convey outstanding universal value (OUV) of the world heritage (WH) property.</p> <p>Assets that can contribute significantly to acknowledged international research objectives.</p> <p>Sites or structures of acknowledged international importance inscribed as of universal importance as WH property.</p> <p>Individual attributes that convey OUV of the WH property.</p> <p>Other buildings or urban landscapes of recognised International importance.</p>	<p>Tangible cultural heritage: 1st Degree Archaeological Sites (registered)</p>	
High	<p>Nationally- designated Archaeological Monuments protected by the State Party's laws</p> <p>Undesignated sites of the quality and importance to be designated.</p> <p>Assets that can contribute significantly to acknowledged national research objectives.</p> <p>Nationally- designated structures with standing remains.</p> <p>Other buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade.</p> <p>Conservation Areas containing very Important buildings.</p> <p>Undesignated structures of clear national importance.</p>	<p>Tangible cultural heritage: 2nd Degree Archaeological Sites (registered) or other sites depending on their value</p>	
Medium	<p>Designated or undesignated assets that can contribute significantly to regional research objectives.</p> <p>Designated buildings. Historic (unlisted) buildings that can be shown to have exceptional qualities or historical associations.</p> <p>Conservation Areas containing buildings that contribute significantly to its historic character.</p> <p>Historic townscapes or built-up areas with important historic integrity in their buildings, or built settings.</p>	<p>Tangible cultural heritage: 3rd Degree Archaeological Sites (registered) and presently unknown or non-registered archaeological sites or other sites depending on their value (if present)</p>	<p>Complex palaeontological and archaeological remains (if present)</p> <p>Critical Cultural Heritage (cemeteries and burial grounds)</p>
Low	<p>Designated or undesignated assets of local importance.</p> <p>Assets compromised by poor preservation and/or poor survival of contextual associations.</p> <p>Assets of limited value, but with potential to contribute to local research objectives.</p> <p>"Locally Listed" buildings.</p> <p>Historic (unlisted) buildings of modest quality in their fabric or historical associations.</p> <p>Historic Townscape or built-up areas of limited historic integrity in their buildings or built settings.</p>		<p>Isolated palaeontological and archaeological sites and findspots (if present)</p>
Negligible	<p>Assets with little or no surviving archaeological interest.</p> <p>Buildings or urban landscapes of no architectural or historical merit; buildings of an intrusive character.</p>	<p>Non-registered potential archaeological sites</p>	
Unknown	<p>The importance of the resource cannot be ascertained.</p> <p>Buildings with some hidden (i.e. inaccessible) potential for historic significance.</p>		

Based on the sensitivity criteria given in Table 14-14, the sensitivity of the cultural heritage sites identified within the study area has been determined in accordance with the Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS, 2011) as presented in Table 14-15.

Table 14-15. Sensitivity Levels of the Archaeological/Immovable Cultural Heritage Receptors Identified within the Study Area

High	Medium	Low	Negligible
(19) Buyuk Kepez	(27) Guzelim Tepesi	(1) Yagmurbaba	(22) Kuzviran
(23) Eyupoglu		(2) Calli Baba	(30) Olukbası
(26) Yunakbasi		(3) Gumuskonak	(34) Kuslubahce
(38) Palamuttepe 3. Degree Archaeological Site		(4) Capkininbel	(36) Degirmendere
(39) Cardaktepe Tumulus		(5) Alihoyugu	
		(6) Sogutlu	
		(7) Mahmutozu Grave Stele	
		(8) Mahmutozu	
		(9) Samangedigi	
		(10) Kelkaklik	
		(11) Tabaklar	
		(12) Hurriyet	
		(13) Emirinkoy	
		(14) Emirinkoy Cementery	
		(15) Kumderesi	
		(16) Tavsantepe	
		(17) Cinkic	
		(18) Seydiler	
		(20) Kepez Alti	
		(21) Pirenlikuyu	
		(24) Eyupoglu Necropolis	
		(25) Cesmealı	
		(28) Oren	
		(29) Dolay	
		(31) Alaba	
		(32) Ahmetlidag	
		(33) Toprakcukuru	
		(35) Magrabahce	
		(37) Caltidere	

Assessment of the magnitude of impact is based on an understanding of how, and to what extent, the Project would impact on archaeology and cultural heritage receptors. Table 14-16 presents a description of the impact magnitude for archaeology and cultural heritage receptors based on ICOMOS (2011).

Table 14-16. Criteria for Magnitude of Change

Impact Grading	Archaeological Attributes	Built Heritage or Historic Urban Landscape attributes	Historic landscape attributes
Major	Changes to attributes that convey Outstanding Universal Value (OUV) of World Heritage (WH) properties	Change to key historic building elements that contribute to OUV, such that the resource is totally altered.	Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to historic landscape character unit and loss of OUV.
	Most or all key archaeological materials, including those that contribute to OUV such that the resource is totally altered.	Comprehensive changes to the setting.	
	Comprehensive changes to setting.		Change to many key historic landscape elements, parcels or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to historic landscape character.
Moderate	Changes to many key archaeological materials, such that the resource is clearly modified.	Changes to many key historic building elements, such that the resource is significantly modified.	
	Considerable changes to setting that affect the character of the asset.	Changes to the setting of an historic building, such that it is significantly modified.	
Minor	Changes to key archaeological materials, such that the resource is slightly altered.	Change to key historic building elements, such that the asset is slightly different.	Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; limited changes to noise levels or sound quality; slight changes to use or access; resulting in limited change to historic landscape character.
	Slight changes to setting.	Change to setting of an historic building, such that it is noticeably changed.	
Negligible	Very minor changes to key archaeological materials, or setting.	Slight changes to historic building elements or setting that hardly affect it.	Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes in noise levels or sound quality; very slight changes to use or access; resulting in a very small change to historic landscape character.
No Change	No change.	No change to fabric or setting.	No change to elements, parcels or components; no visual or audible changes; no changes in amenity or community factors.

Source: ICOMOS, 2011.

Once the sensitivity of the receptor/resource and the overall magnitude of the impact on that specific receptor/resource have been identified, the significance of the impact has been determined based on the matrix provided in Table 14-17.

Table 14-17. Cultural Heritage Impact Significance Assessment Matrix

Value of Archaeological or Immovable Cultural Heritage	Scale & Severity of Change/Impact				
	No Change	Negligible Change	Minor Change	Moderate Change	Major Change
For Word Heritage List Properties VERY HIGH – Attributes Which Convey Outstanding Universal Value	Significance of Effect or Overall Impact (Either Adverse or Beneficial)				
	Neutral	Slight	Moderate/ Large	Large/ Very Large	Very Large
For Other Cultural Heritage Assets	Significance of Impact (Either Adverse or Beneficial)				
Very High	Neutral	Slight	Moderate/ Large	Large/ Very Large	Very Large
High	Neutral	Slight	Moderate/ Slight	Moderate/ Large	Large/ Very Large
Medium	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate
Negligible	Neutral	Neutral	Neutral/ Slight	Neutral/ Slight	Slight

Source: Adapted from ICOMOS, 2011.

The Project will adopt a proactive management of the potential Project impacts, prioritising avoidance where this is possible. In case avoidance is not possible, relevant archaeology and cultural heritage management/mitigation measures will be taken in accordance with the national legislation, IFC PS 8 and other applicable standards.

The Project does not propose to use the cultural heritage, including knowledge, innovations, or practices of local communities for commercial purposes (examples include, but are not limited to, commercialization of traditional medicinal knowledge or other sacred or traditional technique for processing plants, fibers, or metals).

Management of Potential Impacts

In line with Article 4 of the Law on Conservation of Cultural and Natural Properties (Law No. 2863), the responsible Museum Directorates or Regional Councils for the Conservation of Cultural Property will be notified about the archaeological sites and immovable cultural heritage assets, including registered and non-registered sites, identified within the study area, as given in this ESIA Report. To this end, the information collected through the field surveys (such as site-specific photos, site survey forms, site coordinates, digital data, expert notes, etc.) will be delivered to these institutions in order to initiate official decision processes relevant to these sites. The cultural heritage authorities to be notified in each province are listed in Table 14-18 (contact details of the authorities is provided in the CHMP (including Chance Find Procedure) presented in Appendix E.

Table 14-18. Cultural Heritage Authorities Responsible in the Provinces Crossed by the Project

Relevant Regional Council for the Conservation of Cultural Property	Provinces within the Responsibility Area of the Council	Related Museum Directorate
Ankara Regional Council No: 1 for the Conservation of Cultural Property	Ankara	Anatolian Civilisation Museum
Eskisehir Regional Council for the Conservation of Cultural Property	Eskisehir	Eskisehir Museum
	Afyonkarahisar	Afyonkarahisar Museum
Kutahya Regional Council for the Conservation of Cultural Property	Usak	Usak Museum
	Kutahya	Kutahya Museum
Izmir Regional Council No.2 for the Conservation of Cultural Property	Manisa	Manisa Museum
	Izmir	Izmir Museum

General management measures applicable to different types of sites are listed in Table 14-19. Specific measures and actions stipulated by the relevant cultural heritage authorities in their official decisions (e.g. trial pits, geophysics surveys, salvage excavations, technical drawings, route change/relocation, construction under supervision of the related museum, etc.) will be implemented for the management of potential cultural heritage impacts as part of the Project.

Table 14-19. General Management Measures Applicable to Different Types of Sites

Site Type	Framework Management Measures
Registered Sites or Sites in the Process of Registration as per the Law No. 2863	<ul style="list-style-type: none"> • Avoiding physical intervention • Archaeological monitoring • Following the decisions of the relevant Regional Council
Archaeological Site	<ul style="list-style-type: none"> • Notify the cultural heritage authorities • Mark as archaeological sensitive area in the Project/construction drawings and quarry plans • Avoiding physical intervention/construction until the final decision of the Regional Council is Issued • Following/implementing the decisions of the Regional Council (e.g. test or salvage excavation, if required) • Archaeological monitoring
Potential Archaeological Site	<ul style="list-style-type: none"> • Notify the cultural heritage authorities • Mark as archaeological sensitive area in the Project/construction drawings and quarry plans • Avoiding physical intervention/construction until the final decision of the Regional Council is Issued • Following/implementing the decisions of the Regional Council (e.g. test or salvage excavation, if required)
Other Sites including the remains of a historic bridge, a grave/graveyard, fountain etc.	<ul style="list-style-type: none"> • Notify the cultural heritage authorities • Relocation of moveable cultural heritage asset where applicable • Consideration of alternatives in case of immovable cultural heritage assets where applicable • Avoiding physical intervention/construction until the final decision of the Regional Council is Issued • Following/implementing the decisions of the Regional Council (e.g. Technical documentation, measured drawing, etc., if required)

Even though the Project does not propose to use the cultural heritage, including knowledge, innovations, or practices of local communities for commercial purposes (examples include, but are not limited to, commercialisation of traditional medicinal knowledge or other sacred or traditional technique for processing plants, fibers, or metals), any intangible cultural heritage that may be encountered/identified to be affected by Project's construction works will be considered and managed in line with the applicable principles of IFC PS8 and UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage.

14.4.2. Intangible Cultural Heritage

The Project does not propose to use the cultural heritage, including knowledge, innovations, or practices of local communities for commercial purposes (examples include, but are not limited to, commercialisation of traditional medicinal knowledge or other sacred or traditional technique for processing plants, fibers, or metals) or anticipated to cause any adverse impact on the intangible cultural heritage elements of the local communities in the construction or operation phases.

The intangible cultural heritage elements identified in the settlements crossed by the Project route have been presented in Section 14.3.2.3. Within the scope of the community-level interviews held with the heads of the settlements surveyed as part of the ESIA studies (see Appendix D.1 for the settlements covered in the surveys), none of the settlement heads reported intangible cultural heritage elements that may be potentially affected or used by the Project. In furtherance, no intangible cultural heritage related immovable (tangible) cultural assets such as historical or religious fountains, monuments, shrines, etc., which may be adversely affected by the Project activities, has been identified within the cultural heritage study area (encompassing the expropriation and impact corridors as defined in Section 14.1) of the Project.

Potential social impacts of the Project due to worker influx during the construction and operation phases of the Project have been discussed in Chapter 11 ("Socio-economy"). During the peak period of the construction phase, the total number of the personnel estimated to be employed by the Contractor and subcontractors is 14,778. The Project's social policies will contractually require the subcontractors to maximise use of local workforce.

Depending on the extent of non-local workers, location of the construction camp sites of the contractor and sub-contractors (main and lower tier) and accommodation arrangements of the workers as discussed in Chapter 12 ("Labour and Working Conditions"), the Project site personnel may have social interactions with the local communities, which may require special attention and management to ensure that the intangible cultural heritage elements and practices of the communities are not disturbed as a result of the activities of the Project personnel. To this end, the Contractor and subcontractor personnel (accommodating on-site and off-site) will be provided with training on Project's Social Policy and Contractor's Code of Conduct covering Project's approach to relations with the local communities at the time of employment (refresher training will be provided annually and as required), with emphasis on any settlement-specific sensitivity/issue (e.g. locations of festivals, dates of special celebrations, events, etc. for which information will be compiled by Project CLOs as the SEP implementation starts) with regard to intangible cultural heritage elements and practices inside or outside the Project expropriation corridor and footprint. Also, land preparation and construction works will be conducted at designated sites that will be visibly and appropriately marked. Training will be provided to the construction personnel (direct and contracted) so that they maintain the pre-established construction boundaries.

Through the implementation of the SEP (including the External Grievance Mechanism) throughout the Project, consultations with the affected communities will continue and any issue/sensitivity that may be raised associated with the intangible cultural heritage of the local communities, including any elements or practices that are located outside the Project expropriation corridor and footprint, will be considered and managed in line with the applicable principles of IFC PS8 and UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage. The local communities, through the settlement heads, will be provided with up-to-date information on the Project and its components/facilities inside and outside the Project expropriation corridor as well as the schedule of the activities, potential temporary access restrictions, etc. on an ongoing basis in a timely, transparent, understandable and efficient manner through the implementation of the Project SEP.

The engineering structures to be constructed to avoid access difficulties/restrictions between fragmented lands are presented in Appendix B.

As per the Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS, 2011), the sensitivity of any intangible cultural heritage receptor and magnitude of potential impacts (if any) would be determined in line with the criteria defined in Table 14-20.

Table 14-20. Criteria for the Sensitivity of Intangible Cultural Heritage Receptors and Magnitude of Impact

Sensitivity Level	Criteria	Magnitude Level	Criteria
Very High	Areas associated with Intangible Cultural heritage activities as evidenced by the national register. Associations with particular innovations, technical or scientific developments or movements of global significance. Associations with particular individuals of global importance	Major	Major changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
High	Nationally designated areas or activities associated with globally important Intangible Cultural Heritage activities. Associations with particular innovations, technical or scientific developments or movements of national significance Associations with particular individuals of national importance		
Medium	Areas associated with Intangible Cultural heritage activities as evidenced by local registers. Associations with particular innovations or developments of regional or local significance. Associations with particular individuals of regional importance	Moderate	Considerable changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
Low	Intangible Cultural heritage activities of local significance Associations with particular individuals of local importance Poor survival of physical areas in which activities occur or are associated	Minor	Changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
Negligible	Few associations or Intangible Cultural Heritage vestiges surviving	Negligible	Very minor changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
Unknown	Little is known or recorded about Intangible Cultural Heritage of the area	No change	No change

Cultural Heritage Management Plan

The CHMP developed for the Project based on the findings of the ESIA surveys and assessments is presented in Appendix E including the Chance Find Procedure.

The key measures to be taken through the implementation of the CHMP are listed below:

- Training on implementation of the CHMP, including the Chance Find Procedure, will be provided to all Contractor and subcontractor personnel as part of the induction training (to be given at the time of employment) and refreshments will be done through toolbox talks throughout the construction phase. If required, the Operator will also train the O&M personnel on the CHMP, including the Chance Find Procedure.
- Sites located close to the Project route and temporary facilities (e.g. construction camp sites, quarries, material borrow sites) will be protected, where appropriate, by providing temporary flagging/fencing and signage subject with approval from the cultural heritage authorities.
- Sufficient resources for the implementation of the CHMP will be provided. Archaeological monitoring and Chance Find Procedure will be implemented by qualified experts during the construction works, as necessary.
- Following the notifications (for the sites identified as part of ESIA or discovered during construction) to be made to the authorities in line with Article 4 of the Law on Conservation of Cultural and Natural Properties (No. 2863), appropriate measure(s) will be taken in line with the official decisions of the cultural heritage authorities. Such measures may include documentation, application of remote sensing (e.g. geophysical survey) at areas where chance finds discovered to clarify the character and location of sites and inform design of targeted salvage strategies, excavation of test pits to verify the results of remote sensing at chance find areas, salvage excavation and recording, etc.

For the avoidance/management of potential risks/impacts on the intangible cultural heritage elements of the affected communities, the measures described in Section 14.4.2 will be implemented.

Prior to start of superstructure works in Section 3a, 3b, 4a and 4d (at the time these sections of the Project will be handed over to the Contractor for the superstructure works), any outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances in Sections 3a, 3b, 4a and 4d related to management of cultural heritage assets by other contractors (see Chapter 1 for the definition of other contractors) that completed the infrastructures works in these sections will be assessed by an E&S Audit to be carried out by the Contractor.

The contractors for the ongoing infrastructure works of Sections 3a, 3b, 4a and 4d are contractually required to comply with the national legislation. The main gaps between the national legislation and international standards with cultural heritage management can be summarised as below:

- Retaining competent professionals to assist in the identification and protection of cultural heritage at the Project site, including the locations of the Project facilities, where the risk and identification process determines that there is a chance of impacts to cultural heritage is not required by the national legislation, though cultural heritage authorities review and assess the Project described within the national EIA Report.
- Development and implementation of a Project-specific Cultural Heritage Management Plan (CHMP), including a written Chance Finds Procedure and relevant trainings provided to all direct and contracted Project personnel, is not required by the national legislation, though the requirement for obligation to notify is stipulated by Article 4 of the Law on Conservation of Cultural and Natural Property (Law No. 2863, 1983) (see Table 14-2)

For the E&S Audit, the relevant documentation related to cultural heritage management will be requested (through the Employer) during the site hand over and outstanding/ongoing/ retrospective issues, impacts, risks and/or grievances, if any, will be identified for incorporation to the Management and Corrective Action Plan, as appropriate:

- Pre-construction survey reports on identification of cultural heritage sites (registered and non-registered) within the HSR expropriation corridor and at the Project facility sites (e.g. quarries, material borrow sites, access roads, etc.)
- Project-specific CHMP, including the Chance Find Procedure

- Documentation related to compliance of cultural heritage management practices with the requirements of applicable national legislation (e.g. Law on Conservation of Cultural and Natural Property (Law No. 2863, 1983) including official correspondence with the cultural heritage authorities, notifications made to the cultural heritage authorities as per Article 4 of the Law – obligation to notify, reports on cultural heritage management studies/measures conducted as per the requirements of the authorities
- Reports on archaeological monitoring studies conducted by competent professionals during the ground-disturbing activities conducted in the proximity of registered or potential archaeological sites.

Following this audit, a Management and Corrective Action Plan will be developed and implemented for these sections of the Project. The implementation responsibilities for the Management and Corrective Action Plan will be further clarified between the Employer and the Contractor.

The potential Project impacts, proposed mitigation measures and residual impact significances are summarised in Table 14-21.

Table 14-21 Impacts, Proposed Mitigation Measures and Residual Impacts (Cultural Heritage)

Impact Description	Receptor	Project Phase	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Mitigation Measures						Residual Impact Significance
											General Measures					Other Site-Specific Mitigation Measures	
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			Notify the Museum Directorate	Mark as Arch. Sensitive Area in the Project/ Constructi on Drawings and Quarry Plans	Official Decision of the CH Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention/ Construction to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required		
One or combination of the following: Physical disturbance due to land preparation and construction activities ¹¹³ Visual impacts ¹¹⁴ Impacts on the management of the Cultural Heritage Assets ¹¹⁵ Functional Impacts ¹¹⁶ Impacts on Conservation and Use Balance ¹¹⁷	(1) Yagmurbaba Tumuli (Non-registered Archaeological Site) within the Yagmurbaba-4 and Yagmurbaba-5 Quarry Site	Land Preparation and Construction (as part of quarry operation)	Restricted	High	Irreversible	Short-term	One-off	Major	Low	Slight/Moderate	x	x	x	x	x	License boundaries– presented in this ESIA Report – have been narrowed down to mitigate the predicted impacts. There will be no Project/quarry activity within a distance of 10 metres from the archaeological site boundary.	Slight
	(2) Calli Baba Flat Settlement (Non-registered Archaeological Site) within the Yagmurbaba-4 Quarry Site	Land Preparation and Construction (as part of quarry operation)	Restricted	Medium	Irreversible			Moderate	Low	Slight	x	x	x	x	x		Slight
	(5) Alihoyugu Mound (Non-registered Archaeological Site) within the Expropriation Corridor (KM 50+800)	Land Preparation and Construction	Restricted	Medium	Irreversible			Moderate	Low	Slight	x	x	x	x	x		Slight
	(6) Sogutlu Slope Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (56+700)	Land Preparation and Construction	Restricted	Medium	Irreversible			Moderate	Low	Slight	x	x	x	x	x		Slight
	(8) Mahmutozu	Land Preparation	Restricted	Low	Irreversible			Negligible	Low	Neutral/Slight	x	X	x	x	x		Slight

¹¹³ Indicates physical deterioration on an archaeological site as a result of construction activities.

¹¹⁴ Indicates visual degradation on the landscape on or around an archaeological site.

¹¹⁵ Indicates impact on public areas for protection of cultural assets such as open air museums, visit sites, areas of interest, etc..

¹¹⁶ Some cultural heritage assets may be currently in use such as historic bridges. Indicates impact on the functionality of these assets.

¹¹⁷ Indicates potential modification on the protection status of a protected area. As a result of physical damage, some archaeological sites or areas under protection might lose their historic and/or cultural features and their degree of protection may be modified. For example, if a construction causes heavy damage on a first degree protection area, its status may subsequently be modified to be under second or third degree protection. In that case, light construction under permission of the authorities may be possible.

Impact Description	Receptor	Project Phase	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Mitigation Measures					Residual Impact Significance		
								General Measures				Other Site-Specific Mitigation Measures						
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			Notify the Museum Directorate		Mark as Arch. Sensitive Area in the Project/ Constructi on Drawings and Quarry Plans	Official Decision of the CH Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention/ Construction to be Avoided Until Final Decision of the CH Authority is Issued		Arch. Monitoring is Required	
	Flat Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (KM 65+900)	and Construction																
	(9) Samangedigi Flat Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (67+600)	Land Preparation and Construction	Restricted	Low	Irreversible				Negligible	Low	Neutral/Slight	x	x	x	x	x		Slight
	(15) Kumderesi Flat Settlement/Mound (Non-registered Archaeological Site) within the Expropriation Corridor (KM107+900)	Land Preparation and Construction	Restricted	Medium	Irreversible				Moderate	Low	Slight	x	x	x	x	x		Slight
	(18) Seydiler Registered Flat Settlement (Registered Site Eskisehir Regional Council Decision No:16.04.2014/2347) within the Expropriation Corridor (KM 131+650)	Land Preparation and Construction	Restricted	Low	Irreversible				Negligible	Low	Neutral/Slight		x	x	x	x		Slight
	(20) Kepez Altı Tumuli (Non-registered Archaeological Site) within the Expropriation Corridor (KM 145+437)	Land Preparation and Construction	Restricted	High	Irreversible				Major	Low	Slight/Moderate	x	x	x	x	x		Slight
	(22) Kuzviran Necropolis (Non-registered Potential	Land Preparation and Construction	Restricted	High	Irreversible				Major	Negligible	Slight	x	X	x	x			Slight

Impact Description	Receptor	Project Phase	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Mitigation Measures						Residual Impact Significance
								General Measures					Other Site-Specific Mitigation Measures				
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			Notify the Museum Directorate	Mark as Arch. Sensitive Area in the Project/ Constructi on Drawings and Quarry Plans		Official Decision of the CH Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention/ Construction to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required	
	Archaeological Site) within the Expropriation Corridor (KM 149+460)																
	(23) Eyupoglu Registered Mound (Registered Site Eskisehir Regional Council Decision No:25.11.2016/4615) within the Expropriation Corridor (KM 149+810)	Land Preparation and Construction	Restricted	Medium	Irreversible			Moderate	High	Moderate/ Large		x	x	x	x		Slight
	(24) Eyupoglu Necropolis Necropolis (Non-registered Archaeological Site) within the Expropriation Corridor (KM 150+030)	Land Preparation and Construction	Restricted	Medium	Irreversible			Moderate	Low	Slight	x	X	x	x	x		Slight
	(25) Cesmealti Tumuli (Non-registered Archaeological Site) within the Expropriation Corridor (KM 150+865)	Land Preparation and Construction	Restricted	Medium	Irreversible			Moderate	Low	Slight	x	x	x	x	x		Slight
	(26) Yunakbasi Registered Mound (Registered Site Eskisehir Regional Council Decision No:25.11.2016/4601) within the Expropriation Corridor (Afyonkarahisar Connection Road)	Land Preparation and Construction	Restricted	Medium	Irreversible			Moderate	High	Moderate/ Large		X	x	x	x		Slight
	(28) Oren	Land Preparation	Restricted	High	Irreversible			Major	Low	Slight/ Moderate	x	X	x	x	X	Traffic caused by the project will be restricted for the area.	Slight

Impact Description	Receptor	Project Phase	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Mitigation Measures					Residual Impact Significance	
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			General Measures						Other Site-Specific Mitigation Measures
											Notify the Museum Directorate	Mark as Arch. Sensitive Area in the Project/ Constructi on Drawings and Quarry Plans	Official Decision of the CH Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention/ Construction to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required		
	Stone Bridge (Non-registered – Classified as Other) within the Expropriation Corridor (KM 204+413)	and Construction														Regular monitoring activities will be carried out by qualified cultural heritage/archaeological monitoring expert/s to avoid damage on the bridge structure due to Project construction works.	
	(30) Olukbasi Pastoral Settlement (Non-registered Potential Archaeological Site) within the Expropriation Corridor (KM 217+087)	Land Preparation and Construction	Restricted	Medium	Irreversible			Moderate	Negligible	Neutral/ Slight	x	x	x	x			Slight
	(32) Ahmetlidag Hilltop Settlement (Non-registered Archaeological Site) outside the Kolankaya Quarry Site	Land Preparation and Construction (as part of quarry operation)	Restricted	Low	Irreversible			Moderate	Low	Slight	x	x	x	x	x	Quarry activities can be accomplished within 10 meters of the archaeological site boundary.	Slight
	(33) Topracukuru Flat Settlement (Non-registered Archaeological Site) within the Expropriation Corridor (KM 468+055)	Land Preparation and Construction	Restricted	Medium	Irreversible			Moderate	Low	Slight	x	x	x	x	x		Slight
	(34) Kuslubahce Flat Settlement (Non-registered Potential Archaeological Site) within the Expropriation Corridor (KM 508+520)	Land Preparation and Construction	Restricted	Medium	Irreversible			Moderate	Negligible	Neutral/ Slight	x	x	x	x			Slight
	(35) Magrabahce Flat Settlement (Non-registered Archaeological Site)	Land Preparation and Construction	Restricted	Low	Irreversible			Negligible	Low	Neutral/ Slight	x	X	x	x	x		Slight

Impact Description	Receptor	Project Phase	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Mitigation Measures						Residual Impact Significance	
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			General Measures					Other Site-Specific Measures		Mitigation
											Notify the Museum Directorate	Mark as Arch. Sensitive Area in the Project/ Constructi on Drawings and Quarry Plans	Official Decision of the CH Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention/ Construction to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required			
	within the Expropriation Corridor (KM 510+724)																	
	(36) Degirmendere Old Cemetery (Non- registered Potential Archaeological Site) within the Degirmendere Quarry Site	Land Preparation and Construction (as part of quarry operation)	Restricted	High	Irreversible				Major	Negligible	Slight	x	x	x	x			Slight
Impacts on Conservation and Use Balance	(7) Mahmutozu Grave Stele (Non-registered Site – Classified as Other) within the Impact Corridor (64+140)	Land Preparation and Construction	Local	Medium	Irreversible				Moderate	Low	Slight	x				x	Related authorities will be applied to ensure that the artifact is transported to a secure area under the control of the museum directorate in the pre- construction period.	Major Beneficial
Visual Impacts	(3) Gumuskonak Pastoral Settlement (Non-registered Archaeological Site) within the Impact Corridor (KM 20+500)	Land Preparation and Construction	Restricted	Low	Irreversible				Negligible	Low	Neutral/ Slight	x	x			x		Slight
	(4) Capkininbel (Non-registered Archaeological Site) outside the Impact Corridor (KM 45+155)	Land Preparation and Construction	Local	Low	Irreversible				Negligible	Low	Neutral/ Slight	x	x					Slight
	(10) Kelkaklik Stone Bridge (Non- registered Site – Classified as Other) within the Impact Corridor (KM 98+010)	Land Preparation and Construction	Restricted	Low	Irreversible		Negligible	Low	Neutral/ Slight	x	X			x		Slight		
	(11) Tabaklar	Land Preparation	Restricted	Low	Irreversible		Negligible	Low	Neutral/ Slight	x	X			x		Slight		

Impact Description	Receptor	Project Phase	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Mitigation Measures					Residual Impact Significance	
											General Measures						Other Site-Specific Mitigation Measures
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			Notify the Museum Directorate	Mark as Arch. Sensitive Area in the Project/ Constructi on Drawings and Quarry Plans	Official Decision of the CH Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention/ Construction to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required		
	Smelting Furnace Complex (Non-registered Site – Classified as Other) Outside Tabaklar-2 Quarry Site (*)	and Construction (as part of quarry operation)															
	(12) Hurriyet Tumuli (Non-registered Archaeological Site) outside the Impact Corridor (KM 99+300)	Land Preparation and Construction	Local	High	Irreversible			Major	Low	Slight	x	X			X		Slight
	(13) Emirinkoy Slope Settlement (Non-registered Archaeological Site) outside the Emirin Koyu Quarry Site (*)	Land Preparation and Construction (as part of quarry operation)	Local	Low	Irreversible			Negligible	Low	Neutral/Slight	x	X			X		Slight
	(14) Emirinkoy Cemetery (Non-registered Potential Archaeological Site) within the Impact Corridor KM 105+250)	Land Preparation and Construction	Local	Low	Irreversible			Negligible	Low	Neutral/ Slight	x	X			X		Slight
	(16) Tavsantepe Watch Tower (Non-registered Archaeological Site) within the Impact Corridor (KM 115+300)	Land Preparation and Construction	Local	Low	Irreversible			Negligible	Low	Neutral/ Slight	x	X			X		Slight
	(17) Cinkic Registered Mound (Registered Site Eskisehir Regional	Land Preparation and Construction	Local	Low	Irreversible			Negligible	Low	Neutral/ Slight		X			X		Slight

Impact Description	Receptor	Project Phase	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Mitigation Measures						Residual Impact Significance
								General Measures					Other Site-Specific Mitigation Measures				
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			Notify the Museum Directorate	Mark as Arch. Sensitive Area in the Project/ Constructi on Drawings and Quarry Plans		Official Decision of the CH Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention/ Construction to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required	
	Council Decision No:NA) Outside the Impact Corridor (KM 119+500)																
	(19) Buyuk Kepez Registered Hilltop Settlement (Registered Site Eskisehir Regional Council Decision No:NA) outside the Impact Corridor (KM 145+360)	Land Preparation and Construction	Local	Low	Irreversible			Negligible	High	Slight		X			X		Slight
	(27) Guzelim Tepesi Registered Historical Site (Registered Site Eskisehir Regional Council Decision No:24.06.2020/8679) outside the Beyyazi Quarry Site	Land Preparation and Construction (as part of quarry operation)	Local	Low	Irreversible			Negligible	Medium	Neutral/ Slight		X			X		Slight
	(21) Pirenlikuyu Mound (Non-Registered Archaeological Site) outside the Impact Corridor (KM 146+220)	Land Preparation and Construction	Local	High	Irreversible			Major	Low	Slight	x	X			X		Slight
	(29) Dolay Mound (Non-registered Archaeological Site) outside Impact Corridor (KM 205+930)	Land Preparation and Construction	Local	Low	Irreversible			Negligible	Low	Neutral/ Slight	x	X			x		Slight
	(31) Alaba Modern Cemetery (Non-registered Site –	Land Preparation and Construction	Restricted	Low	Irreversible			Negligible	Low	Neutral/ Slight	x	X			X		Slight

Impact Description	Receptor	Project Phase	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Mitigation Measures					Residual Impact Significance	
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			General Measures						Other Site-Specific Mitigation Measures
											Notify the Museum Directorate	Mark as Arch. Sensitive Area in the Project/ Constructi on Drawings and Quarry Plans	Official Decision of the CH Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention/ Construction to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required		
	Classified as Other) within the Impact Corridor (KM 270+600)																
	(37) Caltidere Castle/Slope Settlement (Non-registered Archaeological Site) outside the Caltidere-2 Quarry Site	Land Preparation and Construction (as part of quarry operation)	Local	Low	Irreversible			Negligible	Low	Neutral/ Slight	x	x			X		
	(38) Palamuttepe Registered (Izmir Regional Council No.2 Decision No:NA) Archaeological Site (Outside the Impact Corridor (541+000))	Land Preparation and Construction	Local	Low	Irreversible			Negligible	High	Minor		x			X		Slight
	(39) Cardaktepe Registered (Izmir Regional Council No.2 Decision No:25.06.2014/4014) Tumulus Outside the Impact Corridor (541+000)	Land Preparation and Construction	Loca	NegLow	Irreversible			Negligible	High	Minor		x			X		Slight

15. CUMULATIVE IMPACT ASSESSMENT

The previous chapters of this ESIA include assessments on the potential Project-level impacts. This Chapter aims to assess the potential cumulative environmental and social impacts of the Project on the Valued Environmental and Social Components (VECs), together with other existing and reasonably foreseeable future Projects.

15.1. Methodology

The IFC's Good Practice Handbook "Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets" defines cumulative impacts as "impacts that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones". The Handbook further states that "multiple and successive environmental and social impacts from existing developments, combined with the potential incremental impacts resulting from proposed and/or anticipated future developments, may result in significant cumulative impacts that would not be expected in the case of a stand-alone development" (see Figure 15-1).

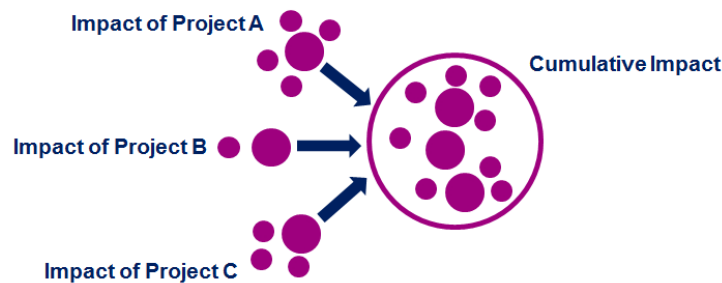


Figure 15-1. Illustration of Cumulative Impacts

The Cumulative Environmental and Social Impact Assessment study of Ankara-Izmir HSR Project will be based on the methodologies specified by the following international guidelines:

- The Good Practice Handbook on the Cumulative Impact Assessment and Management (IFC, August 2013);
- Cumulative Effects Assessment and Management Guidance published by International Association for Impact Assessment (IAIA) (Canter L., and William R., 2009; <https://www.iaia.org/>);
- European Commission's (EC) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (May 1999);
- Cumulative Effects Assessment Practitioners Guide prepared by the Cumulative Effects Assessment Working Group (Hegmann, G. C. Cockling, R. Creasey, S. Dupuis, Kennedy, L. Kingsley, W. Rodd, H. Spaling and D. Stalker; February and AXYS Environmental Consulting Ltd. for the Canadian Environmental Assessment Agency (1999).

The need for Cumulative Impact Assessment (CIA) emerges in circumstances where a series of developments, which may or may not be of the same type, is occurring, or being planned within an area where they would impact the same VECs, which are defined as the environmental and social attributes that are considered to be important in assessing risks.

The CIA process to be implemented in case of such circumstances is defined by IFC (August 2013) as:

- (i) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social drivers on the chosen VECs over time, and
- (ii) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

The IFC proposes a six-step approach for conducting Project-initiated CIA studies as illustrated in Figure 15-2.

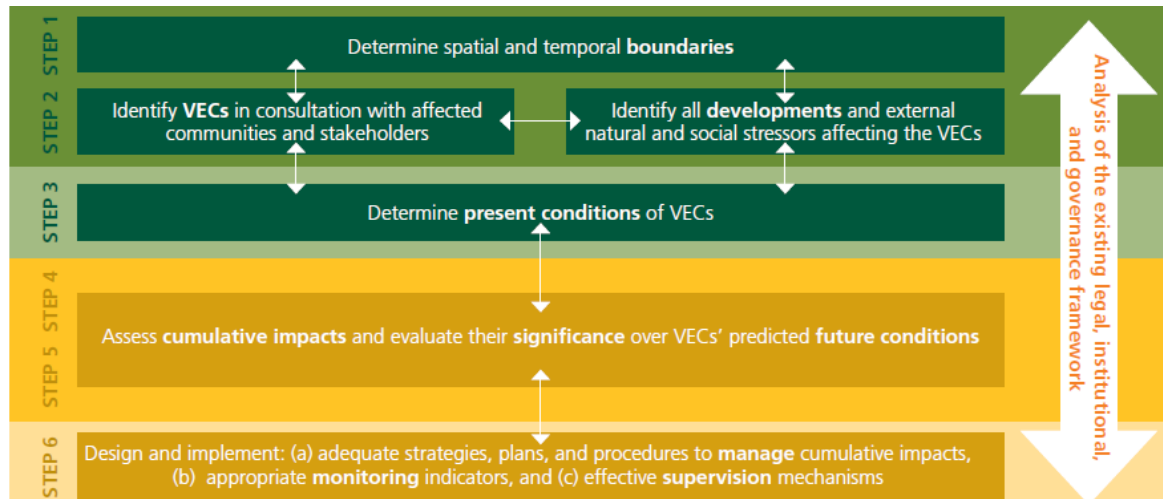


Figure 15-2. IFC's Six-step CIA Approach

There are several limitations to the assessment of the cumulative impacts of the Project with other projects over a wide area and over a long period of time. Most of these limitations would apply to many projects of similar scale and duration. The main limitations are:

- The available information on future projects is variable and, in many cases, very limited. Therefore, their physical characteristics are uncertain or subject to change. The timing of many future projects is also uncertain and subject to change. Additionally, any planning documentation regarding these projects can be confidential.
- Some of the other projects have not been subject to environmental and social impact assessments (or the assessments are not accessible) yet and the effects of these possible developments have therefore not been documented.
- There are several unknowns associated with the baseline conditions in the CIA study area.
- Cumulative impacts will be influenced by policies and developments outside of the study area.

Given the limitations described above, this CIA has been prepared to establish at a very broad level the types of effects that could occur as a result of the Project in addition to other projects.

It should be noted that mitigating the potential negative cumulative impacts are not solely the responsibility of the Contractor. Therefore, other project owners, relevant local and national authorities should also take responsibility to mitigate the potential impacts identified.

15.2. Cumulative Impact Assessment Study

The CIA study of the Project is conducted following the below steps:

- Step 1 – Scoping Phase I: VECs, Spatial and Temporal Boundaries
- Step 2 – Scoping Phase II: Other Developments and Environmental and Social Drivers
- Step 3 – Establish Information on Baseline Status of VECs
- Step 4 – Assess Cumulative Impacts on VECs
- Step 5 – Assess Significance of Predicted Cumulative Impacts
- Step 6 – Management of Cumulative Impacts

15.2.1. Step 1 – Scoping Phase I: VECs, Spatial and Temporal Boundaries

The good CIA practice suggests that the CIA studies are conducted with a focus on the environmentally or socially important natural resources, ecosystems or human values, which are referred to as Valued Environmental and Social Components (VECs) and may include the following:

- Physical features, habitats, wildlife populations (e.g., biodiversity),
- Ecosystem services,
- Natural processes (e.g., water and nutrient cycles)
- Social conditions (e.g., health, economics), or
- Cultural aspects (e.g., archaeological sites, traditional spiritual ceremonies).

This approach entails the CIA studies to be looked at “from the VECs point of view”, instead of a Project-centred perspective as is the case in the ESIA studies and allows assessment of combined (i.e. cumulative) impacts of various projects/activities on each VEC.

The Project-centred perspective of the ESIA and the VEC-centred perspective of the CIA processes are comparatively illustrated in Figure 15-3. Any VEC that would be affected by other projects/activities, but not the Ankara-Izmir HSR Project, will not be assessed in the scope of the CIA.

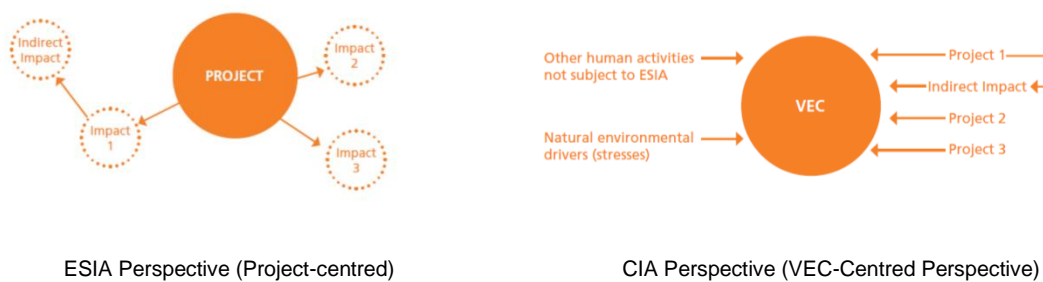


Figure 15-3. ESIA (Project-centred) vs. CIA (VEC-centred) Perspectives

Based on the findings of the Ankara-Izmir HSR Project ESIA study, the VECs to be focused on in the CIA have been selected as presented in Table 15-1.

Table 15-1. Specific VECs of the CIA Study for the Ankara-Izmir HSR Project

Environmental / Social Subject	Valued Environmental and Social Components (VECs)	Specific VECs	VEC No
Biodiversity and Natural Resources	Internationally Recognised Areas	Polatli – Tigem KBA	1
		Acikir Steppes KBA	2
		Balikdami KBA	3
		Murat Mountain KBA	4
		Boz Mountains KBA	5
		Spil Mountain KBA	6
		Yamanlar Mountain KBA	7
	Legally Protected Areas	Balikdami Nationally Important Wetland	8
		Balikdami Natural Site	9
		Afyon-Iscehisar Natural Site	10
		Baskomutan Historical National Park -3	11
		Marmara Lake Nationally Important Wetland	12
		Spill Mountain National Park	13
Water Resources	River Basins	Sakarya Basin	14
		Akarcay Basin	15
		Buyuk Menderes Basin	16
		Gediz Basin	17
Socioeconomic Conditions of the Settlements and Local Communities	Local Employment Procurement and Land Use Change/Livelihood	Settlements and Local Communities in Section 1	18
		Settlements and Local Communities in Section 2	19
		Settlements and Local Communities in Section 3	20
		Settlements and Local Communities in Section 4	21

Assessment of the potential impacts of the Project on the registered and non-registered cultural heritage sites is presented in Chapter 14 (“Cultural Heritage”). Since the cultural assets located within cultural heritage study area (as described in Chapter 14) are not affected by other projects/developments considered in this CIA, they have not been included as VECs in this CIA study.

As defined by the IFC, cumulative impacts can occur:

- when there is “spatial crowding” as a result of overlapping impacts from various actions on the same VEC in a limited area, (e.g. increased noise levels in a community from industrial developments, existing roads, and a new highway; or landscape fragmentation caused by the installation of several transmission lines in the same area), or
- when there is “temporal crowding” as impacts on a VEC from different actions occur in a shorter period of time than the VEC needs to recover (e.g. impaired health of a fish’s downstream migration when subjected to several cascading hydropower plants).

The CIA Study Area was determined as 50 km wide (25 km from each side of the Railway axis) to ensure that the area is sufficiently large to cover Ankara-Izmir HSR Project’s direct impact area (together with the Project/associated facilities) and the borders of the selected VECs. The CIA Study Area is given in Figure 15-4.

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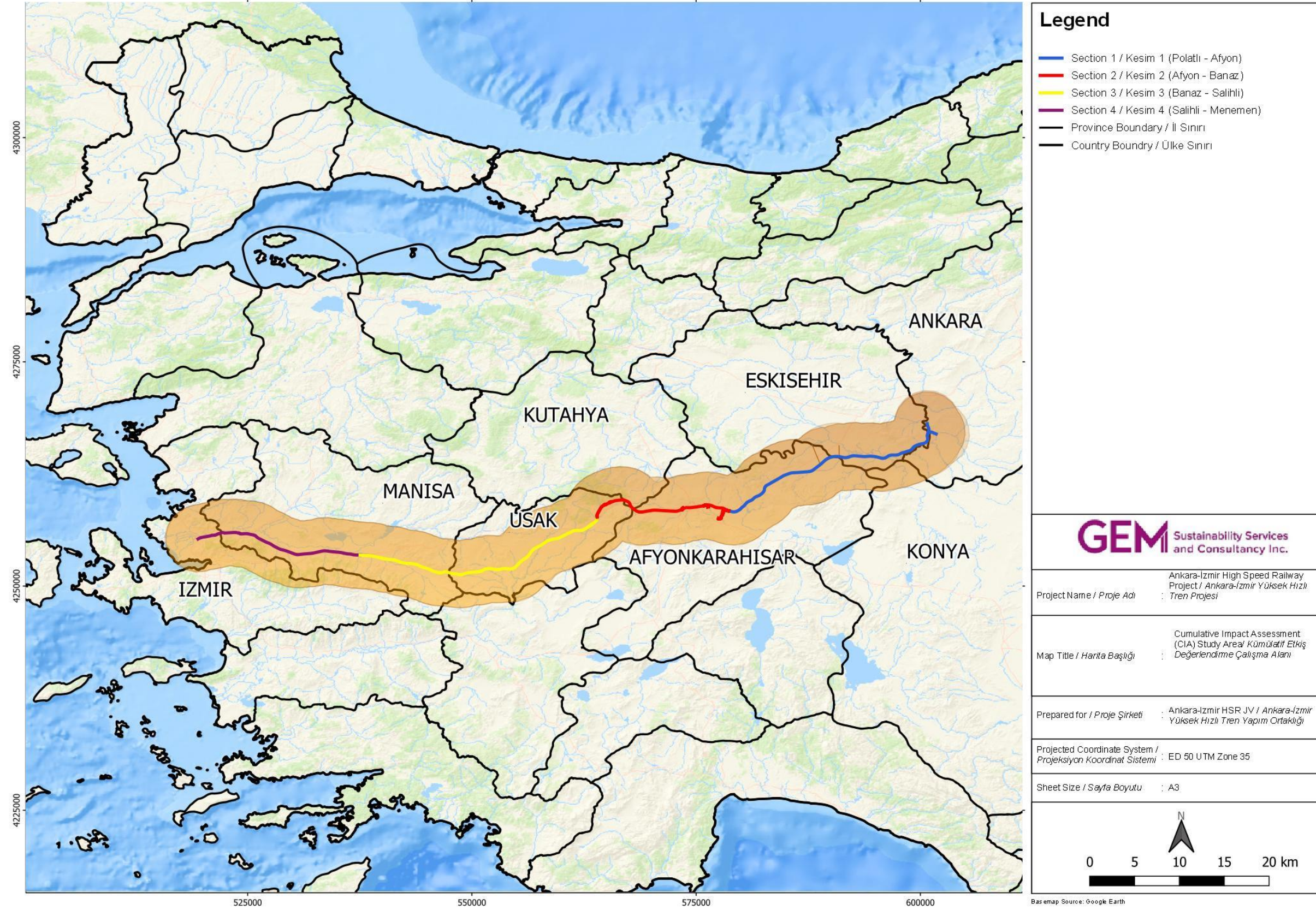


Figure 15-4. CIA Study Area of the Project

15.2.2. Step 2 – Scoping Phase II: Other Developments and E&S Drivers

Upon identification of the spatial and temporal boundaries of the CIA Study Area, the existing and future developments and environmental and social drivers within the CIA boundary that would affect the condition of the selected VECs are identified through review of available public databases. To this end, the following resources are used:

- Environmental Impact Assessment (EIA) Positive Decisions¹¹⁸ (issued by the Ministry of Environment and Urbanisation (MoEU))
- Raw Material Production Licenses pertaining to the quarries and material borrow sites (based on Contractor's database of licenses)¹¹⁹
- Electricity Generation Licenses issued by the Energy Market Regulatory Authority (EMRA) for power plant projects
- Zoning plans (only Izmir-Manisa region was accessible at the time of the CIA study) by the MoEU
- Project websites
- Google Earth Images of 2021

In identifying other contributing projects within the CIA Study Area, the primary focus is given to large scale projects, including power plant projects, dams (built/will be built for irrigation, water supply or hydroelectrical purposes), infrastructure, mining, and transportation projects. The projects within the CIA Study Area that have relatively smaller impact, such as agriculture and/or livestock sector projects were not considered in this CIA Study.

The future projects/developments have been further categorised as certain, reasonably foreseeable and hypothetical as summarised in Figure 15-5.

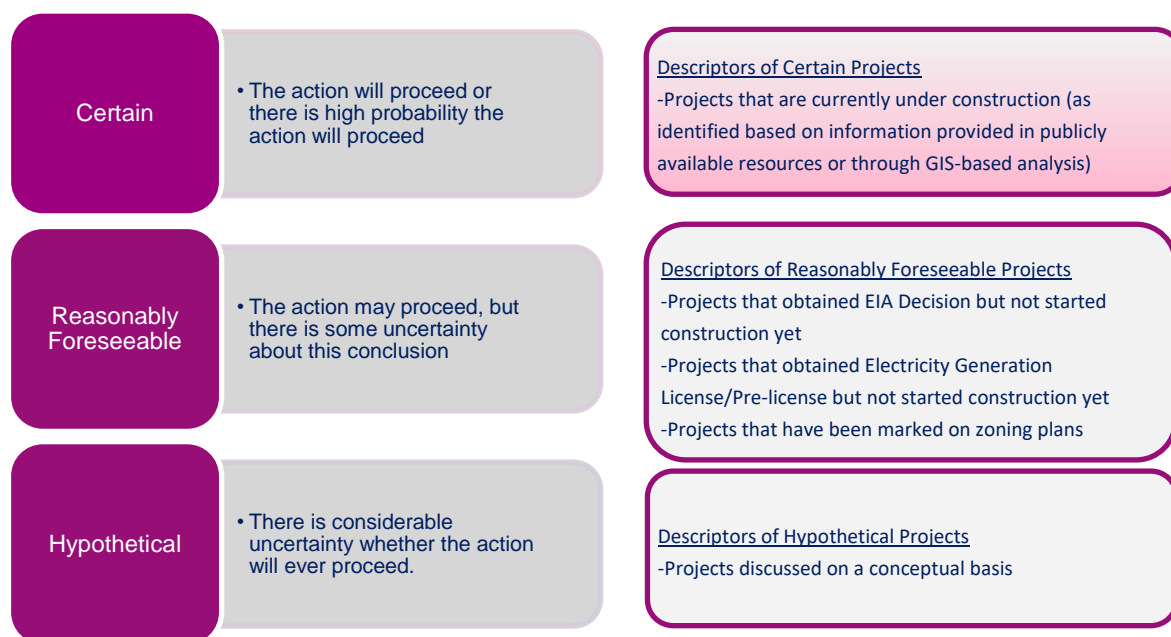


Figure 15-5. Categorisation of Future Projects

Source: Adapted from (Hegmann et al., AXYS Environmental Consulting Ltd. February 1999)

The past, existing and future projects/developments identified within the CIA boundary and considered in the assessment are given in Table 15-2. Distribution of other projects per districts crossed by the HSR is presented in Table 15-3).

¹¹⁸ The projects holding valid EIA Positive Decisions (as published by the MoEU at <https://eced-duyuru.csb.gov.tr/eced-prod/duyurular.xhtml>) were considered in this CIA study. The projects, for which EIA processes have not been finalised (with EIA Positive Decisions) as per the requirements of the EIA Regulation in force have not been included in this assessment.

¹¹⁹ The license search tool of the General Directorate of Mining and Petroleum Affairs website was not publicly accessible at the time of the CIA study.

Table 15-2. Existing and Future Developments in the CIA Study Area

Project Name		Sector	Location/Distance to the Closest Project Facility	EIA Decision	Project Status ¹²⁰ (as of February 2021)	License Information (e.g. Raw Material Production License, Energy Generation License (if applicable/ available))
Project for which the CIA Study is conducted						
Ankara-Izmir HSR Project including the railway, quarries and borrow Sites	Ankara-Izmir HSR		Ankara, Afyonkarahisar, Kutahya, Usak, Manisa, Izmir	EIA Positive Decision (9 March 2006)	See Section 1.9 for Project Implementation Program	Not applicable for the railway
	Quarries and Borrow Sites included in the Current Project Design		See Chapter 1, Table 1-17 and Table 1-18 for information on the quarries and borrow sites included in the Current Project Design			
	Alternative Quarries		See Chapter 3 for information on alternative quarries			
Past Projects - Not in operation						
0	Afyon Cement Facility	Industry	Hamidiye / Merkez / Afyonkarahisar (9.4 km to HSR KM 155+427)	EIA Positive Decision (12 February 2014)	Not in operation (Past project)	Not applicable
Existing Projects- In operation						
1	Biogas Facility	Energy (Biogas)	Canakci / Polatlı / Ankara (10.8 km to HSR KM 0+000)	EIA Positive Decision (8 February 2017)	In operation	Energy Generation License valid from 27 September 2018 to 27 September 2067 (49 years)
2	Biogas Power Plant and Organic Fertilizer Facility	Energy (Biogas)	Hamidiye / Bolvadin / Afyonkarahisar (22.9 km to HSR KM 117+820)	EIA Positive Decision (11 September 2020)	In operation	Energy Generation License valid from 24 December 2020 to 24 December 2069 (49 years)
3	Ala-2 Geothermal Power Plant	Energy (Geothermal)	Yenikoy / Alasehir / Manisa KM 420+100 (5.1 km to HSR)	EIA Positive Decision (18 May 2018)	In operation	Energy Generation License valid from 11 April 2019 to 15 December 2041 (22 years 8 months)
4	Salihli Biomass Power Plant (10,5 MWm/10 MWe/31,6 MWt)	Energy (Biogas)	Adala / Salihli / Manisa (8.3 km to HSR KM 427+200)	EIA Positive Decision (3 July 2018)	In operation	Energy Generation License valid from 17 January 2019 to 17 January 2068 (49 years)

Project Name		Sector	Location/Distance to the Closest Project Facility	EIA Decision	Project Status ¹²⁰ (as of February 2021)	License Information (e.g. Raw Material Production License, Energy Generation License (if applicable/ available))
			(1.7 km to 236-Dombayli Quarry)			
5	Salihli JES-1,2,3	Energy (Geothermal)	Yilmaz / Salihli / Manisa (1.6 km to HSR KM 446+214)	EIA Positive Decision (14 February 2017)	In operation	Energy Generation License valid from 20 December 2018 to 21 May 2039 (20 years 5 months)
6	Kisladag Gold Mine	Mining	Esme (Katrancilar village), Ulubey (Sogutlu village, Gumuskol village) / Usak (6.2 km to HSR KM 349+743)	EIA Positive Decision (27 June 2003)	In operation	Information not available/accessible at the relevant governmental database
7	Afyon Biogas Facility	Energy (Biogas)	Cavdarli / Merkez / Afyonkarahisar (2.3 km to HSR KM 153+466)	Not available/applicable	In operation	Energy Generation License valid from 15 November 2012 to 15 November 2022 (10 years)
8	Usak Sugar Factory Energy Facility	Energy (Other)	Fevzicakmak / Merkez / Usak (8.2 km to HSR KM 313+000)	Not available/applicable	In operation	Energy Generation License valid from 1 May 2014 to 10 July 2052 (38 years 2 months)
9	Turkerler Geothermal Energy Facility-3	Energy (Geothermal)	Caglayan / Alasehir / Manisa (5.4 km to HSR KM 414+800)	Not available/applicable	In operation	Energy Generation License valid from 20 September 2018 to 12 April 2041 (22 years 7 months)
10	Baklaci JES (Geothermal Power Plant)	Energy (Geothermal)	Istasyon / Alasehir / Manisa KM 407+600 (6.8 km to HSR)	Not available/applicable	In operation	Energy Generation License valid from 23 March 2018 to 24 December 204 (24 years 8 months)
11	Mis-1 Geothermal Energy Facility	Energy (Geothermal)	Istasyon / Alasehir / Manisa (7.3 km to HSR KM 408+900)	Not available/applicable	In operation	Energy Generation License valid from 4 August 2016 to 23 August 2042 (26 years)
12	Enerjeo Kemaliye Geothermal	Energy (Geothermal)	Kemaliye, Cumhuriyet /	Not available/applicable	In operation	Energy Generation License valid from 27 March 2013 to 17 October 2041

Project Name		Sector	Location/Distance to the Closest Project Facility	EIA Decision	Project Status ¹²⁰ (as of February 2021)	License Information (e.g. Raw Material Production License, Energy Generation License (if applicable/ available)
	Facility		Alasehir / Manisa (2.3 km to HSR KM 416+389)			(28 years 6 months)
13	Sureko Kula Renewable Energy Facility	Energy (Biogas)	Sandal / Kula / Manisa (16.8 km to HSR KM 405+490)	Not available/applicable	In operation	Energy Generation License valid from 4 April 2012 to 7 June 2031 (19 years 3 months)
14	Alasehir JES (Geothermal Power Plant)	Energy (Geothermal)	Alkan / Alasehir / Manisa (5.7 km to HSR KM 414+900)	Not available/applicable	In operation	Energy Generation License valid from 28 July 2011 to 19 January 2040 (28 years 6 months)
15	Demirkopru Dam	Energy (Hydroelectrical Power Plant)	Sindel, Cariklar, Oraklar, Arpacı / Salihli / Manisa (14.2 km to HSR KM 428+200) (4.0 km to 236-Dombayli Quarry)	Not available/applicable	In operation	Energy Generation License valid from 4 April 2003 to 4 April 2052 (49 years)
16	Polres Biogas Facility	Energy (Biogas)	Sakarya / Polatli / Ankara (6.9 km to HSR KM 0+000)	Not available/applicable	In operation	Energy Generation License valid from 27 March 2013 to 27 March 2028 (15 years)
17	Ala-1 Geothermal Energy Facility	Energy (Geothermal)	Ornekkoy / Alasehir / Manisa (3.1 km to HSR KM 418+662)	Not available/applicable	In operation	Information not available/accessible at the relevant governmental database
18	Afsar Dam	Energy (Hydroelectrical Power Plant) & Irrigation	Sarigol / Alasehir / Manisa (18.3 km to HSR KM 397+061)	Not available/applicable	In operation	Information not available/accessible at the relevant governmental database
19	Emiralem Dam	Irrigation	Emiralem / Menemen / Izmir (2.1 km to HSR KM 542+245) (2.9 km to 263-	Not available/applicable	In operation	Not applicable

Project Name		Sector	Location/Distance to the Closest Project Facility	EIA Decision	Project Status ¹²⁰ (as of February 2021)	License Information (e.g. Raw Material Production License, Energy Generation License (if applicable/ available))
			Degirmendere Quarry)			
20	Guzelhisar Dam	Water Supply & Irrigation	Karakuzu, Kalabak / Aliaga / Izmir , Durasilli / Yunusemre / Manisa (15.8 km to HSR KM 540+888)	Not available/applicable	In operation	Not applicable
21	Mis-3 Geothermal Energy Facility	Energy (Geothermal)	Alkan / Alasehir / Manisa (7.7 km to HSR KM 417+038)	Not available/applicable	In operation	Information not available/accessible at the relevant governmental database
22	Izmir Kemalpas Armutlu Dam (*)	Irrigation	Kemalpas / Izmir, Turgutlu / Manisa	EIA Positive Decision (25 February 2014)	In operation	Not Applicable
23	Izmir Motorway (Cigli - Aliaga - Candarli Motorway) (*)	Transportation	Menemen / Izmir	EIA Positive Decision (8 April 2013)	In operation	Not Applicable
R	Ankara- Afyon-Izmir Conventional Railway	Transportation	Ankara-Izmir	Not available/applicable	In operation	Not Applicable
Future Projects – Certain						
24	Ozmen-2 JES (Geothermal Power Plant)	Energy (Geothermal)	Sogukyurt / Alasehir / Manisa (4.9 km to HSR KM 405+900)	EIA decision information not publicly available	Under construction	Information not available/accessible at the relevant governmental database
25	AS Koc Polatli Biogas Power Plant(6.24Mwe)	Energy (Biogas)	Sakarya / Polatli / Ankara (16.2 km to HSR KM 0+000)	EIA Positive Decision (29 December 2017)	Under construction	Information not available/accessible at the relevant governmental database
26	Usak Biogas Electric Facility	Energy (Biogas)	Ovademirler / Merkez / Usak (3.5 km to HSR KM	EIA Positive Decision (5 November 2020)	Under construction	Energy Generation License valid from 24 October 2019 to 27 June 2047 (27 years 9 months)

Project Name		Sector	Location/Distance to the Closest Project Facility	EIA Decision	Project Status ¹²⁰ (as of February 2021)	License Information (e.g. Raw Material Production License, Energy Generation License (if applicable/ available))
			315+700)			
27	Kula Renewable Energy Facility	Energy (Renewable)	Sandal / Kula / Manisa (15.8 km to HSR KM 403+870)	EIA Positive Decision (12 March 2018)	Under construction	Information not available/accessible at the relevant governmental database
28	Alasehir-III Geothermal Power Plant	Energy (Geothermal)	Alkan / Alasehir / Manisa (5.7 km to HSR KM 414+500)	EIA Positive Decision (25 April 2018)	Under construction	Energy Generation License valid from 24 March 2016 (Pre-License) to 24 March 2021 (Pre-License) (5 years)
29	Sarma Dam and Irrigation	Irrigation	Davutlar / Yunusemre/ Manisa (15.3 km to HSR KM 512+100) (0.5 km to 243-Yunusemre Quarry)	EIA Positive Decision (5 April 2013)	Under construction	Not applicable
30	MIS II(2X24MWE) Geothermal Power Plant	Energy (Geothermal)	Evrenli / Alasehir / Manisa (11.1 km to HSR KM 405+855)	EIA Positive Decision (18 January 2018)	Under construction	Energy Generation License valid from 12 October 2017(Pre-License) to 12 April 2021 (Pre-License) (3 years 8 months)
31	Ozmen-1 JES (Geothermal Power Plant)	Energy (Geothermal)	Sogukyurt / Alasehir / Manisa (10.3 km to HSR KM 417+100)	Not available/applicable	Under construction	Energy Generation License valid from 14 July 2016 to 22 January 2043 (26 years 6 months)
32	Alasehir JES 2 (Geothermal Power Plant)	Energy (Geothermal)	Piyadeler, Istasyon / Alasehir / Manisa (4.4 km to HSR KM 415+200)	Not available/applicable	Under construction	Energy Generation License valid from 27 April 2016 to 12 April 2041 (25 years)
33	Karaagac Reg. and HEPP (Hydroelectrical Power Plant)	Energy (Hydroelectrical Power Plant)	Karaagac / Salihli / Manisa (7.4 km to HSR KM 440+008)	Not available/applicable	Under construction	Energy Generation License valid from 2 August 2012 to 2 August 2061 (49 years)
34	Ankara-Izmir Motorway (*)	Transportation	Ankara (Etimesgut, Sincan and Polatli districts), Eskisehir (Sivrihisar, Cifteler,	EIA Positive Decision (20 March 2017)	Official information not publicly available	Not Applicable

Project Name		Sector	Location/Distance to the Closest Project Facility	EIA Decision	Project Status ¹²⁰ (as of February 2021)	License Information (e.g. Raw Material Production License, Energy Generation License (if applicable/ available)
			Han and Seyitgazi districts) Afyonkarahisar (Ihsaniye district), Kutahya (Merkez, Altintas and Dumlupinar districts), Usak (Banaz, Merkez and Esme districts) Manisa (Kula, Salihli, Golmarmara, Ahmetli and Turgutlu districts)			
35	Afyonkarahisar-Antalya-Alanya Motorway (Afyonkarahisar - Antalya Section) (*)	Transportation	Afyonkarahisar, Antalya,Burdur, Isparta	EIA Positive Decision (16 October 2020)	Official information not publicly available	Not Applicable
36	Ozmen-3 JES (Geothermal Power Plant) (*)	Energy (Geothermal)	Alasehir / Manisa	Not available/applicable	Under construction	Energy Generation License valid from 25 July 2019 to 22 January 2043 (23 years 6 months)
37	Afyonkarahisar-Seckoy Natural Gas Pipeline (*)	Infrastructure (Natural Gas Pipeline)	Bolvadin / Afyonkarahisar	EIA Positive Decision (3 March 2018)	Under construction	Not Applicable
Future Projects – Reasonably Foreseeable						
38	Polatli Biomethanisation and Compost Facility	Energy (Biogas)	Karahamzali / Polatli / Ankara KM 0+000 (12.8 km to HSR)	EIA Positive Decision (3 March 2018)	Information not publicly available	Information not available/accessible at the relevant governmental database
39	Yesilkavak Dam	Irrigation	Poslu / Esme / Usak KM 366+545	EIA Positive Decision (9 March 2011)	Information not publicly available	Not Applicable

Project Name		Sector	Location/Distance to the Closest Project Facility	EIA Decision	Project Status ¹²⁰ (as of February 2021)	License Information (e.g. Raw Material Production License, Energy Generation License (if applicable/ available))
			(9.0 km to HSR)			
40	Biogas Facility	Energy (Biogas)	Cepnidere / Turgutlu / Manisa KM 481+878 (5.9 km to HSR)	EIA Positive Decision (11 February 2020)	Information not publicly available	Energy Generation License valid from 9 May 2019 (Pre-License) to 9 May 2021 (Pre-License) (2 years)
41	Degirmendere Dam	Water Supply	Degirmendere / Menemen-Emialem / Izmir (2.6 km to HSR KM 539+505) (1.9 km to 263-Degirmendere Quarry)	Not available/applicable	Information not publicly available	Not Applicable
42	Karahisar Wind Power Plant	Energy (Wind)	Sinanpasa (Elvanpasa village),Hocalar (Ulukoy village) / Afyonkarahisar, Balçidami / Banaz / Usak KM 207+757 (6.2 km to HSR)	EIA Positive Decision (3 July 2019)	Information not publicly available	Energy Generation License valid from 24 October 2019 to 8 July 2057 (27 years 9 months)
43	Ege Biogas Power Plant and Fertilizer Facility	Energy (Biogas)	Capakli / Salihli / Manisa KM 437+095 (8 km to HSR)	EIA Positive Decision (9 January 2020)	Information not publicly available	Energy Generation License valid from 10 December 2020 to 10 December 2069 (40 years)

(*) Digital location data for the Project was not available in the public domain at the time of the compilation of this report.

Table 15-3. Distribution of Other Projects per District

Section	Province	District	Ankara- Izmir HSR Project	Linear Projects		Natural Gas Pipeline	RenewableEnergy			Non-linear Projects			Total
				Railway	Motorway		Geo thermal	Wind	Other	Water (Dam, Irrigation)	Mining	Industry	
Section 1	Ankara	Sincan			X (34)								
		Etimesgut			X (34)								
		Polatli	X	X (R)	X (34)		4				4		
	Eskisehir	Seyitgazi			X (34)								
		Han			X (34)								
		Cifteler			X (34)								
		Gunyuzu	X										
	Afyonkarahisar	Sivrihisar	X		X (34)								
		Bolvadin				X (37)		1				1	
		Ihsaniye			X (34,35)								
		Emirdag	X										
		Bayat	X										
		Iscehisar	X										
Section 2		Afyonkarahisar	Merkez	X	X (R)	X (35)			1			1	2
	Sinanpasa		X	X (R)			1					1	
	Kutahya	Altintas			X (34)								
		Merkez			X (34)								
		Dumlupinar	X	X (R)	X (34)								
	Usak	Banaz	X	X (R)									
		Section 3	Usak	Banaz	X	X (R)	X (34)						
	Merkez			X	X (R)	X (34)			2				2
	Ulubey			X	X (R)								
	Esme			X	X (R)	X (34)				1	1		2
Manisa	Alasehir		X	X (R)			14		1			15	
	Kula		X	X (R)					2			2	
	Salihli	X	X (R)			1					1		
Section 4	Manisa	Salihli	X	X (R)					4			4	
		Golmarmara											
		Ahmetli	X	X (R)									
		Sehzadeler	X	X (R)									
		Turgutlu	X	X (R)					1			1	
		Yunusemre	X	X (R)						2		2	
	Izmir	Kemalpasa											
		Aliaga								1		1	
		Menemen	X	X (R)	X (23)					2		2	
Total						15	1	16	6	1	1	40	

Environmental drivers refer to natural drivers and other stressors, such as fires, droughts, floods, predator interactions, human migration, new settlements, etc. that may exert an influence on the VECs. For example, the fire regime in forested areas is a major driver that shapes social, ecological and economic systems (*IFC, August 2013*).

Since transportation projects contribute to further land developments in the vicinity of the route, another factor which may be considered is the future urban development potential. These may include but not limited to residential, industrial, cultural and tourism developments and thus, land use patterns, livelihood activities and socio-economic conditions in areas accessed by the Project are prone to further changes over time.

Based on the existing knowledge of the ecology and/or natural dynamics of the selected VECs, no other major environmental driver that may contribute to cumulative impacts has been identified for this CIA study.

15.2.3. Step 3: Establish Information on Baseline Status of VECs

Information on the baseline status of the VECs will be mainly based on the information gathered for each environmental and social subject in scope of the ESIA study. Thus, relevant information on the baseline status for VECs is presented in the respective chapters of this ESIA Report.

15.2.4. Step 4: Assess Cumulative Impacts on VECs

The CIA analysis is future oriented. The impact of the Project is not assessed as the difference between the expected future condition of VECs and that of a past baseline condition. It is assessed as the difference between the estimated future condition of VECs in the context of the stresses imposed by all other sources (projects and natural environmental drivers) and the estimated VEC condition in the context of the future baseline plus the development under evaluation.

The cumulative impact potential on specific VECs is assessed according to the number of the projects that are affecting the VECs along with the Project and its associated facilities. The definition of cumulative impact potential scales are given in Table 15-4. The significance of cumulative impacts would further be influenced by the nature and scale of the multiple projects affected the same VEC.

Table 15-4. Definition of Cumulative Impact Potential Scales

Cumulative Impact Scales	Potential Definition
No	VECs are only affected from the Project and its associated facilities
Low	VECs are from 1 other project/development aside from the Project and its associated facilities
Medium	VECs are affected from 2-5 other projects/developments aside from the Project and its associated facilities
High	VECs are affected from more than 5 other projects/developments aside from the Project and its associated facilities

The results of the assessment of cumulative impacts of Ankara-Izmir HSR Project together with other projects identified in the CIA Study Area are summarised in Table 15-5. The interaction of the projects considered in the CIA Study Area and VECs are presented between Figure 15-6, Figure 15-7, and Figure 15-9 for Section 1, 2, 3 and 4, respectively.

Table 15-5. Interaction of Existing and Future (Certain and Reasonably Foreseeable) Projects/Developments with the Selected VECs

Specific VECs	Ankara-Izmir HSR Project				Projects																																											Cumulative Impact Potential				
					Past	Existing																								Future - Certain												Future- Reasonably Foreseeable										
	Main Project	Quarries in the Current Design (see Chapter 1)	Borrow Sites in the Current Design (see Chapter 1)	Alternative Quarries (see Chapter 3)	0 - Industry	1 - Energy (Biogas)	2 - Energy (Biogas)	3 - Energy (Geothermal)	4 - Energy (Biogas)	5 - Energy (Geothermal)	6 - Mining	7 - Energy (Biogas)	8 - Energy (Other)	9 - Energy (Geothermal)	10 - Energy (Geothermal)	11 - Energy (Geothermal)	12 - Energy (Geothermal)	13 - Energy (Biogas)	14 - Energy (Geothermal)	15 - Energy (HPP)	16 - Energy (Biogas)	17 - Energy (Geothermal)	18 - Energy (HPP) & Irrigation	19 - Irrigation	20 - Water Supply & Irrigation	21 - Energy (Geothermal)	22 - Irrigation	23- Transportation	R - Transportation	24- Energy (Geothermal)	25 - Energy (Biogas)	26 - Energy (Biogas)	27 - Energy (Renewable)	28 - Energy (Geothermal)	29 - Irrigation	30 - Energy (Geothermal)	31 - Energy (Geothermal)	32 - Energy (Geothermal)	33 - Energy (HPP)	34 - Transportation	35 - Transportation	36 - Energy (Geothermal)	37 - Infrastructure	38 - Energy (Biogas)	39 - Irrigation	40 - Irrigation	41 - Water Supply		42 - Energy (Wind)	43 - Energy (Biogas)		
VEC #1 – Polatlı – Tigem KBA	✓	✓																											✓																						Low	
VEC #2 –Acikir Steppes KBA	✓	✓																											✓																							Low
VEC #3 –Balikdami KBA	✓																																																		No	
VEC #4 – Murat Mountain KBA	✓	✓		✓																																															No	
VEC #5 – Boz Mountains KBA	✓	✓	✓	✓																			✓							✓											✓											Medium
VEC #6 – Spil Mountain KBA		✓																																																	No	
VEC #7 – Yamanlar Mountain KBA	✓	✓																																													✓					Low
VEC#8 –Balikdami Nationally Important Wetland	✓		✓																																																No	
VEC #9 – Balikdami Natural Site	✓																																																		No	
VEC#10 – Afyon-Iscehisar Natural Site	✓																																																		No	
VEC#11 –Baskomutan Historical National Park -3	✓																												✓																						Low	
VEC#12 –Marmara Lake Nationally Important Wetland			✓																																																No	
VEC#13 –Spil Mountain National Park		✓																																																	No	
VEC#14 – Sakarya Basin	✓	✓	✓	✓		✓															✓									✓			✓					✓	✓			✓	✓								High	
VEC#15 – Akarcay Basin	✓	✓	✓	✓	✓		✓					✓																		✓									✓	✓						✓						High
VEC#16 - Buyuk Menderes Basin	✓	✓	✓	✓							✓		✓																	✓					✓		✓			✓												High
VEC#17 – Gediz Basin	✓	✓	✓	✓			✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓		✓			✓		✓	✓	✓	✓	✓	✓	✓		✓				✓			✓	✓	✓					✓		High	
VEC#18 - Settlements Local Communities in Section 1	✓	✓	✓	✓																																		✓	✓												Medium	
VEC#19 - Settlements Local Communities in Section 2	✓	✓	✓	✓																																		✓	✓			✓									Medium	
VEC#20 - Settlements Local Communities in Section 3	✓	✓	✓	✓																																		✓													Low	
VEC#21 - Settlements Local Communities in Section 4	✓	✓	✓																									✓	✓									✓													Medium	

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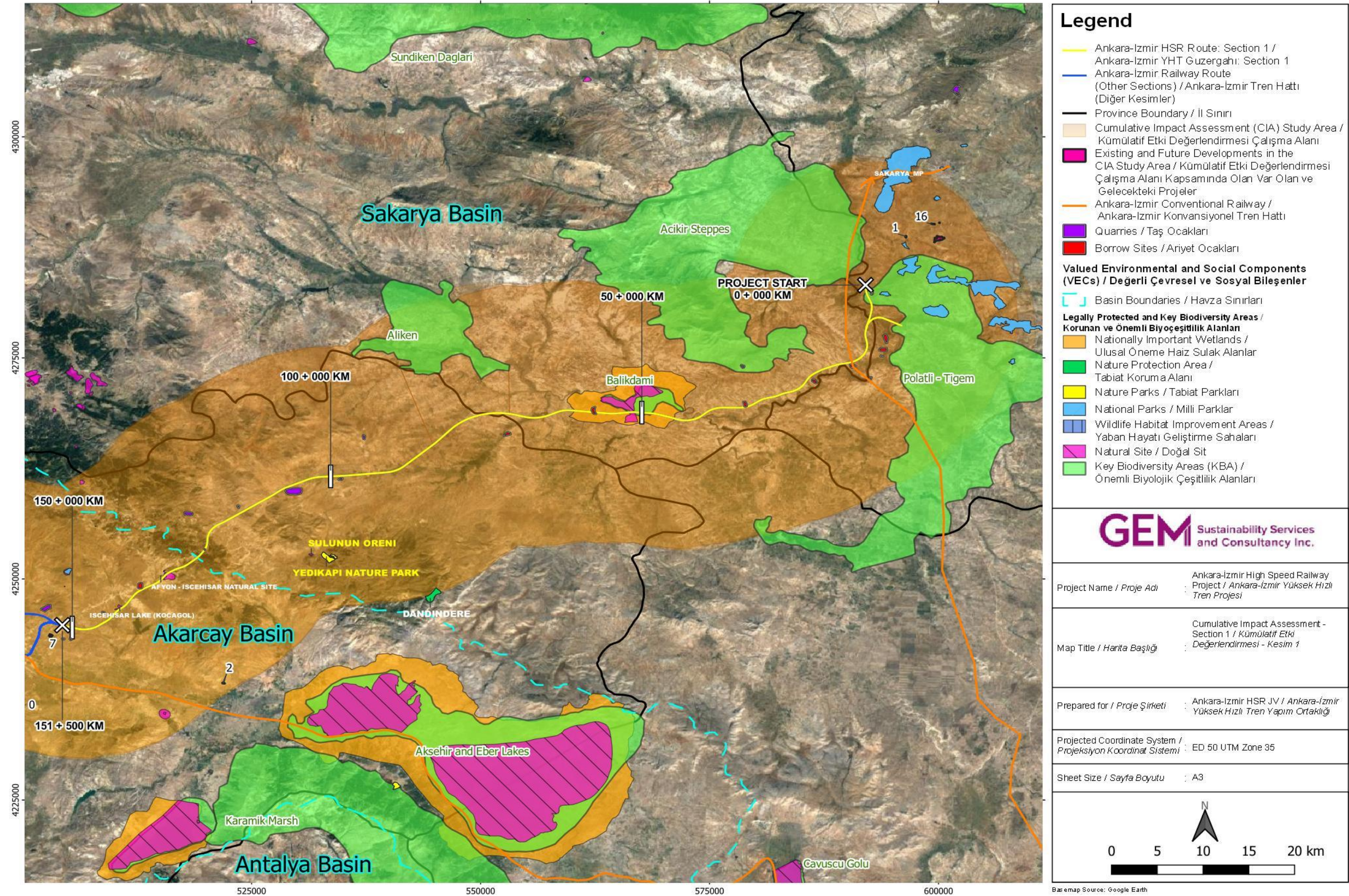


Figure 15-6. CIA Study Area, VECs and Projects Included in the CIA Study – Section 1

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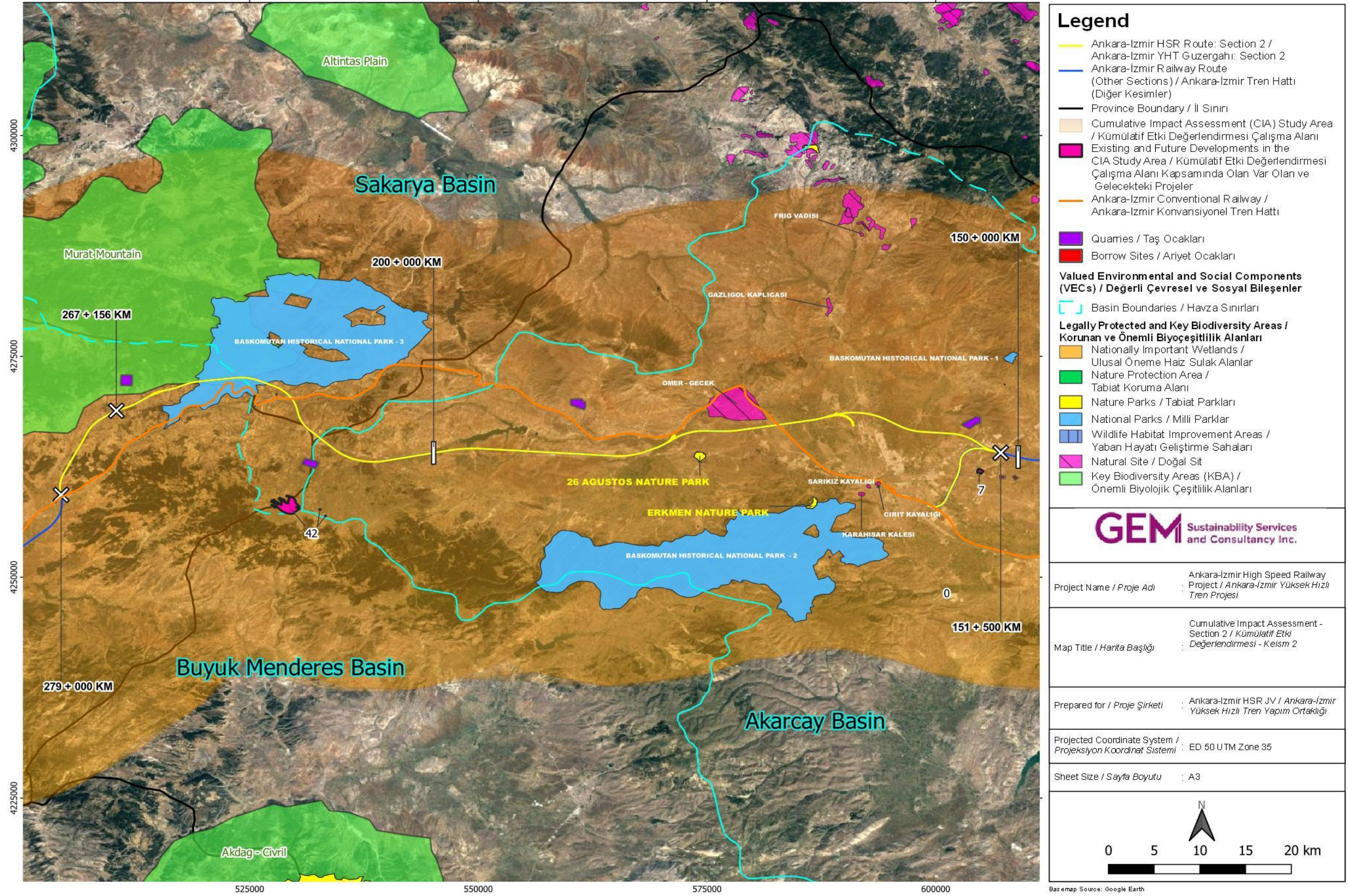


Figure 15-7. CIA Study Area, VECs and Projects Included in the CIA Study – Section 2

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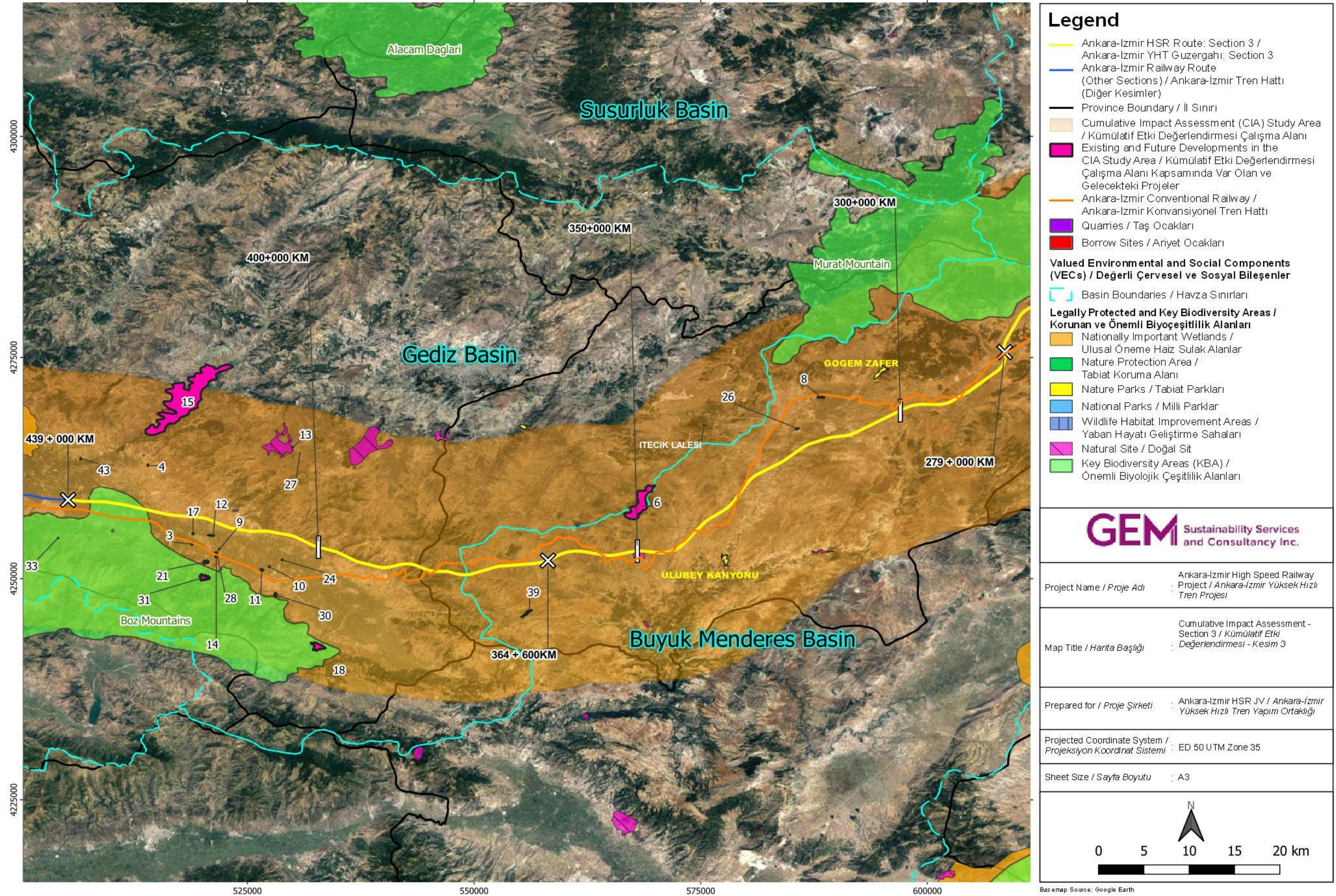


Figure 15-8. CIA Study Area, VECs and Projects Included in the CIA Study – Section 3

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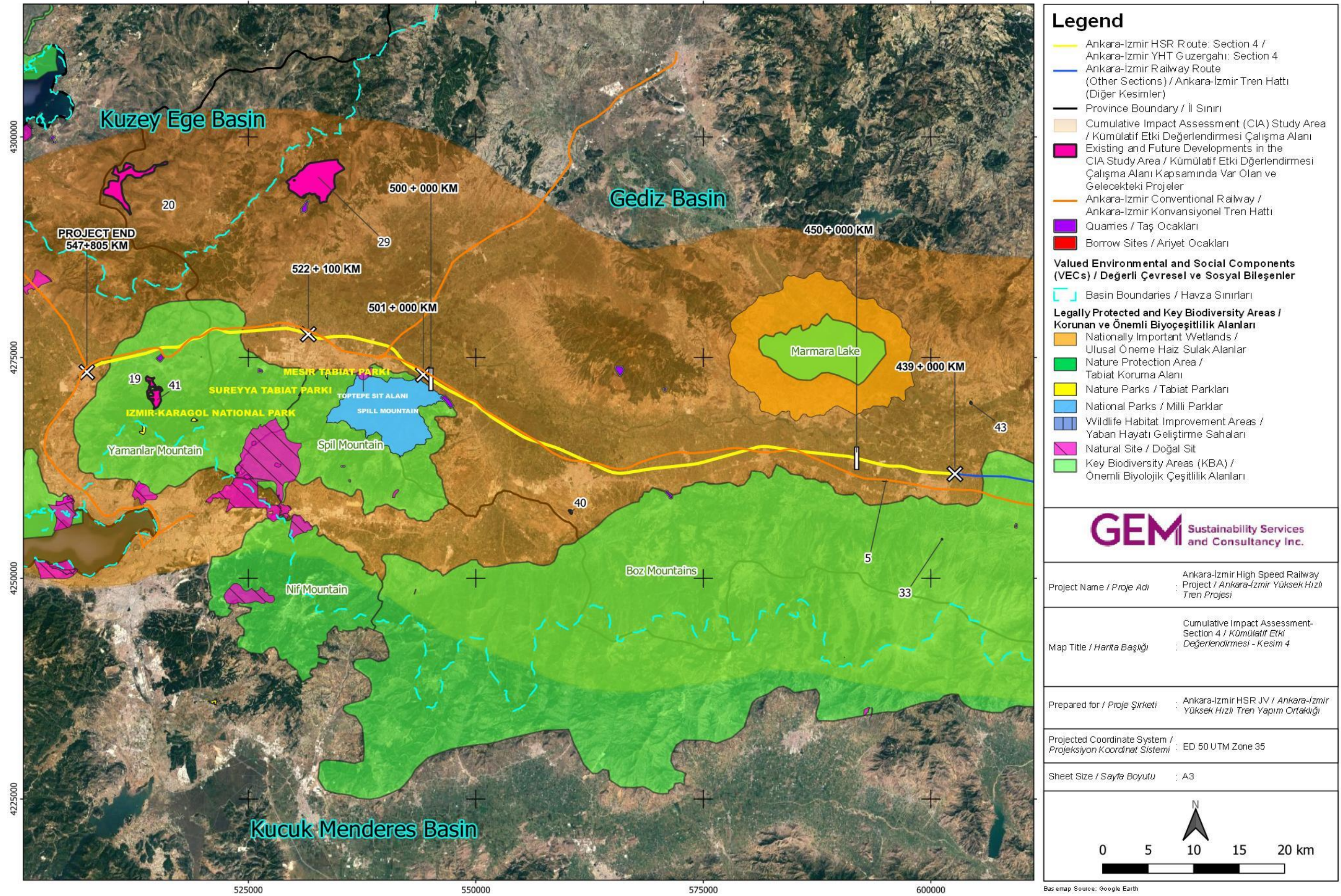


Figure 15-9. CIA Study Area, VECs and Projects Included in the CIA Study – Section 4

15.2.5. Step 5: Assess Significance of Predicted Cumulative Impacts

Given the limitations described in the previous sections, this CIA has been prepared to establish at a very broad level the types of effects that could occur as a result of the Project in addition to other projects. The previous chapters of this ESIA include assessments on the potential Project-level impacts on the specific VECs and the mitigation measures that will be put in place by the Contractor.

A key good practice for the appropriate determination of impact significance and overall agreement among affected communities and other relevant stakeholders is to strengthen mitigation measures and monitoring programs, focusing on expected probable cumulative impacts. In the ESIA process, components of impact significance (magnitude, spatial scale, duration, frequency) are typically factors in deciding whether mitigation is necessary. Consequently, the evaluation of significance and the design of management and/or mitigation are, in reality, iterative.

The significance of a cumulative impact is evaluated not in terms of the amount of change, but in terms of the potential resulting impact to the vulnerability and/or risk to the sustainability of the VECs assessed. This means evaluating cumulative impacts in the context of ecological thresholds. Determining ecological thresholds for biological and social VECs has proven to be difficult. In many cases, such thresholds may not be clearly identified until they are actually crossed, at which point recovery may take a long time with considerable cost or may simply not be possible. Consequently, a precautionary approach that explicitly considers uncertainty in ecological and sociological relationships is essential when thresholds of acceptable VEC condition are being established.

However, in reality, since such thresholds are not widely defined or available, the CIA is often hindered. There is not always an objective technique for determining thresholds and professional judgment must usually be relied upon. Good practice implies making attempts to estimate thresholds for VECs studied and applying the mitigation hierarchy to manage those impacts that may result in exceeding predicted thresholds. An alternative is to identify the limits of acceptable change, in consultation with the scientific community and the affected community. This approach focuses on the identification of VEC conditions that are deemed acceptable to stakeholders.

As per the assessment conducted through this CIA study, it has been identified that river basins crossed by the HSR route are the VECs for which cumulative impact potential is high. On the other hand, the type of Projects considered in the CIA are not anticipated to cause significant impacts on the river basins under normal operating conditions.

There are other major transportation projects in the region. These major transportation projects, together with other industrial projects, may result in adverse cumulative impacts on the biodiversity areas as well as agricultural and pasture lands affecting the land-based livelihoods of the local communities leading to a potential socio-economic transformation in the region. On the other hand, these projects, along with the Ankara – Izmir HSR Project, have the potential to attract further residential, industrial and touristic developments causing potential cumulative impacts on the socio-economic character of the district centres and villages/neighbourhoods located in the regions crossed by those projects in the long term.

Table 15-3 provides the distribution of projects (Ankara-Izmir HSR including associated facilities and other projects considered in the CIA) according to districts. There are multiple projects crossing/located in the following districts

- Polatli district (Ankara province)
- Sivrihisar district (Eskisehir province)
- Merkez and Sinanpasa districts (Afyonkarahisar province)
- Dumlupinar district (Kutahya province)
- Banaz, Merkez, Esme and Ulubey districts (Usak province)
- Salihli, Kula, Alasehir, Sehzadeler, Turgutlu and Yunusemre districts (Manisa province)
- Menemen district (Izmir province)

Settlement-based distribution (village or neighbourhood level) of linear projects cannot be identified as part of this Project-level CIA, as digital location data of linear projects is not publicly available. Non-linear projects located in the settlements affected from the Project-related land acquisition are listed below:

- Cavdarli, Merkez, Afyonkarahisar (Afyon Biogas Facility – in operation with a parcel area of app. 17 ha; 2.3 km to HSR KM 153+466)
- Kemaliye, Alasehir, Manisa (Enerjeo Kemaliye Geothermal Facility – in operation with a parcel area of app. 7.4 ha; 2.3 km to HSR KM 416+389)
- Yilmaz, Salihli, Manisa (Salihli JES 1-2-3 – in operation with an area of app. 5.3 ha; 1.6 km to HSR KM 446+214)
- Emiralem, Menemen, Izmir (Emiralem Dam – in operation with a reservoir area of app. 21 ha; 2.1 km to HSR KM 542+245 and 2.9 km to 263-Degirmendere Quarry)
- Degirmendere, Emiale, Izmir (Degirmendere Dam status and area information is not available in publicly available resources; 2.6 km to HSR KM 529+505 and 1.9 km to 283-Degirmendere Quarry)
- Elvanpasa, Sinanpasa, Afyonkarahisar with a footprint area of 29.2 ha (Karahisar Wind Power Plant; 6.2 km to HSR)

As a result of the enhanced connectivity to be provided between the cities through railways and motorways, job markets would expand at the regional level, making a positive cumulative impact on the job opportunities, employment levels and economic conditions of the settlements.

The transportation type of the Ankara-Izmir HSR will be further clarified between the Employer and the Contractor based on the ongoing discussions. If the route serves/supports transportation of loads, it is likely that the development triggers further development of the marble industry in the Iscehisar district of Afyonkarahisar province (near KM 140+000), which may lead to further industrial and residential land use supporting the enhancement of district economy.

In Afyonkarahisar province, the Afyon Kocatepe University has been providing education since November 1992. During the social surveys, it has been identified that the city population has been increasing with the number of university students increasing, causing development of the real estate sector. As the Project will enhance connectivity of the city with capital city Ankara and Izmir (the third largest city by population), the city may continue undergoing the current urbanisation process in the next decades, which would result in the transformation of the existing land use types and further development of the real estate sector. There is a gar planned to be established and operated in the Afyonkarahisar province, which will be connected to the city centre through intercity lines.

The stations/gars to be established in Emirdag district (Afyonkarahisar), Afyonkarahisar centre, Usak centre, Salihli district of Manisa province, Turgutlu district of Manisa province and Manisa centre will trigger residential and industrial development in the wider region. Local economy at the settlements located close to the station/gar sites would benefit from the developing service sectors. Thus, there will be new business and employment opportunities having the potential to provide benefits to the economy of those settlements.

The Project passes close to urban areas between Manisa and Izmir. It is likely that further residential, industrial and touristic development will be triggered by the Project in this region with the multiple effect of other infrastructure projects including the existing Istanbul-Izmir Motorway and the planned Ankara-Izmir Motorway.

The residential, industrial and touristic development supported by the Ankara-Izmir HSR together with other infrastructure projects planned in the region, will necessitate the strengthening and development of the municipal infrastructure services in the districts crossed by the HSR route. Therefore, municipal infrastructural investments may be planned and realised in the region in parallel to the HSR operation.

The Ankara-Izmir HSR Project will result in considerable amount of transportation load shifting from motorways and/or airways to HSR, leading to reduction in overall fuel consumption and subsequent reduction in greenhouse gas (GHG) emissions. The Project is part of Turkey's Vision 2023 and constitutes the final stage of the current national HSR masterplan. Together with the operational Ankara-Eskisehir HSR (in operation since 2009), Ankara-Konya HSR (in operation since 2011), Eskisehir-Konya HSR (in operation since 2013), and Ankara-Istanbul HSR (with the extension of Ankara-Eskisehir line; in operation since 2014) and with the completion of the ongoing Bursa-Bilecik and Ankara-Sivas HSR, cumulatively, it is estimated that 880 thousand tons of carbon dioxide emissions

will be avoided annually in Turkey by 2023 (*Source: Contractor, December 2020. Project Information Note*). For reference, Turkey's total GHG emissions (excluding the land use, land use change and forestry sector), were estimated to be 520.9 Mt of CO₂ equivalent (CO₂ eq.) in 2018 (*TurkStats, April 2020. Turkish Greenhouse Gas Inventory 1990-2018*). The Ankara-Izmir HSR, together with the existing HSRs and HSR projects that are to be put in operation in the next years will help support Turkey's ambitions to cut the GHG by 21% by the year 2030 as indicated in Turkey's Intended Nationally Determined Contribution (INDC). The shift to railway use for passenger and load transportation and realisation of the HSR projects are listed amongst the national policies for the transportation sector under the INDC.

15.2.6. Step 6: Management of Cumulative Impacts – Design and Implementation

The management measures needed to prevent cumulative impacts will depend on both the context in which the development impacts occur (i.e. the impacts from other projects and natural drivers that affect the VECs) and the characteristics of the development's impacts. Since cumulative impacts typically result from the actions of multiple stakeholders, the responsibility for their management is collective, requiring individual actions to eliminate or minimise individual development's contributions.

Unlike government agencies, a private sector developer or project sponsor has no control over the actions undertaken by other developers that affect similar VECs, and therefore it is unlikely to have much leverage to influence any mitigation actions by third parties.

For the management of cumulative impacts of projects/developments, it is important to underline that the responsibility of the management/mitigation of the cumulative impacts resulting from the actions of multiple stakeholders involves a collective responsibility which requires individual actions to eliminate or minimise the contribution of each action/development. Specific actions that may be needed to effectively manage cumulative impacts include the following:

- Project design changes to avoid cumulative impacts (location, timing, technology).
- Project mitigation to minimise cumulative impacts, including adaptive management approaches.
- Mitigation of project impacts by other projects (not under control of the Contractor to further minimise impacts on VECs).
- Collaborative protection and enhancement of regional areas to preserve biodiversity.
- Collaborative engagement in other regional cumulative impact management strategies.
- Participation in regional monitoring programs to assess the realised cumulative impacts and efficacy of management efforts.

As the Ankara-Izmir HSR Project will be one of the largest transportation projects in the region, Project-level mitigation and enhancement measures, as described in the respective sections of this ESIA Report, will be significant in contributing to the management of cumulative impacts and ensure resilience and sustainability of the identified VECs.

16. STAKEHOLDER ENGAGEMENT

The stakeholder engagement activities specific to the Project have started at the time of the national Environmental Impact Assessment (EIA) process carried out in 2005-2006 and conducted by the Project Owner (DLH – back then) as per the requirements of the EIA Regulation in force. Throughout the expropriation process, engagement with the affected communities was provided by TCDD through official notifications and negotiation meetings held with the owners/shareholders of the parcels located within the expropriation corridor of the Project. Following the award of the Contractor by AYGM in November 2020 and start of Project ESIA process in line with Project Standards, engagement with Project stakeholders has reinvigorated through comprehensive social surveys conducted by the ESIA Consultant with support from the Contractor.

Stakeholder engagement conducted in the previous phase of the Project is described and the Stakeholder Engagement Plan (SEP – including the external and internal grievance mechanisms) developed as part of the ESIA process in line with the requirements of EP4 (2020) and IFC PSs (2012) as a stand-alone document and planned to be implemented throughout Project is summarised in the following sections.

16.1. Project Stakeholders

As defined by the IFC in Stakeholder Engagement Handbook of 2007, stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively. Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organisations and groups with special interests, the academic community, or other businesses.

Among the stakeholders, disadvantaged or vulnerable groups/persons refer to those who may be more likely to be adversely affected by the project impacts and/or more limited than others in their ability to take advantage of a project's benefits.

The detailed list of Project stakeholders, identifying specific stakeholders under the following external and internal stakeholder groups together with their interest in/relevant to the Project, is presented in the Stakeholder Engagement Plan (SEP):

- National governmental authorities (including ministries)
- Local governmental authorities (including governorates, district governorates)
- State economic enterprises and state companies
- Settlements/local communities including elected village heads of the villages/neighbourhoods, local respected individuals, Project Affected People (PAPs)
- Vulnerable and disadvantaged groups/persons¹²¹
- Non-governmental organisations (NGOs)
- Academic/educational institutions
- Media (local and national)
- Local business and suppliers
- Other industrial projects
- Lenders
- Internal stakeholders including JV Companies and subcontractors

¹²¹ Including, but not limited to, elderly people living alone (over 65 years), illiterate people, disabled persons (with physical and/or mental disabilities), women (widow, women household heads, girls who are at school age but not going to school, etc.), youth population (between 15-24 years old), unemployed people of working age (over 18), low or no-income households (according to accepted thresholds and/or living on aid), individuals without any social security, people with chronic diseases, cancer, susceptible to COVID-19, etc., housebound people due to illness, age or disability, shepherds not owning animals, and migrants/summer migrants including people living and working outside their country of origin in long or short term, people who cannot understand and/or speak Turkish.

16.2. Stakeholder Engagement in the Pre-ESIA Phase

A full-scale national EIA study was carried out for the Project back in 2005 and an EIA Positive Decision was granted by the MoEU for the Project in March 2006 in accordance with the national EIA Regulation in force.

As part of the national EIA process, public participation meetings, required by the national EIA Regulation, were held to ensure participation of public to the scoping phase of the formal EIA process, inform the stakeholders about the Project, and receive their questions and suggestions based on the information disclosed through the EIA Application File of the Project. In this context, seven (7) public participation meetings were conducted in the provinces crossed by the planned HSR route, as summarised in Table 16-1.

Table 16-1. Public Participation Meetings within the scope of National EIA Process

Meeting Date	Province	District	Location (Neighbourhood/Village or City/District Centre)	Meeting Venue
18 July 2005	Ankara	Polatli	Yenice	Yenice Village Mansion
20 July 2005	Izmir	Menemen	Centre	Menemen Wedding-Ceremony Hall
20 July 2005	Eskisehir	Sivrihisar	Ahiler	Ahiler Village Mansion
21 July 2005	Afyonkarahisar		Centre	Chamber of Commerce and Industry Meeting Hall
21 July 2005	Manisa	Alasehir	Piyadeler	Piyadeler Village Coffeehouse
22 July 2005	Usak		Centre	Provincial Special Administration Building
22 July 2005	Kutahya	Dumlupinar	Centre	Dumlupinar Municipality Wedding-Ceremony Hall

Source: National EIA Report, 2006.

The general subjects of the questions posed during the public participation meetings are summarised in Table 16-2. As per the information provided in the national EIA Report, the participants were provided with relevant information and clarifications during the public participation meetings.

Table 16-2. General Questions Posed by Participants During the Public Participation Meetings of 2005

General Subject	Specific Question Topics
Expropriation	Expropriation values; the extent of the area to be affected by expropriation
Agricultural lands	Crossing structures planned to ensure access of people and animals between lands to be fragmented by the HSR
Stations	Station locations; proximity of stations to settlements; whether the stations will serve public use
Local infrastructure facilities	Potential impact of the Project on other existing/planned infrastructure facilities/projects of state agencies represented in the public participation meetings

Source: National EIA Report, 2006.

As part of the national EIA process, official views of the relevant governmental stakeholders were obtained to incorporate legal and institutional requirements of respective institutions to the Project. List of governmental institutions consulted during the national EIA process and the general subject of consultations is provided in Table 16-3.

Table 16-3. Governmental Stakeholders Consulted during the National EIA Process through Official Correspondence

Governmental Institution	Date of Official View	General Subject of the Official View
State Hydraulic Works - DSI	30 May 2005	Existing and planned DSI facilities overlapping with the HSR route (facility locations shared with the Project)
Ministry of Environment and Forestry (currently the Ministry of Environment and Urbanisation), General Directorate of Nature Conservation and National Parks	28 July 2005	Baskomutan Historical National Park crossed by the HSR (between 217+900-219+300 and 219+300-223+800 as per the current Project design; see Chapter 10 ("Biodiversity"); the official view confirms that the route is passing from the parts of the national park being used mostly for grazing and agricultural purposes and is not evaluated to impact the historical character of the national park.

Governmental Institution	Date of Official View	General Subject of the Official View
State Hydraulic Works - DSI	19 September 2005	Additional existing and planned DSI facilities overlapping with the HSR route (facility locations shared with the Project through relevant maps and table)
Regional Forestry Directorates of Izmir, Ankara, Eskisehir, Denizli, Kutahya	02 August 2005 12 August 2005 9 September 2005 12 September 2005 14 September 2005	Forest lands crossed by the HSR route (inspection and assessment form shared and relevant locations provided with maps and table)
Ministry of Culture and Tourism	3 September 2005	Omer Gecek Tourism Area planned in Afyonkarahisar
Eskisehir Regional Council for the Conversation of Cultural Property	20 October 2005	Kuztepe Grade 1 Natural Site Area overlapping with the HSR route

Source: National EIA Report, 2006.

The national EIA Report of 2006 also refers to the official views of Afyonkarahisar Municipality (regarding the Demirci Material Borrow Site¹²²), KGM (regarding Motorways crossed by the HSR route and requirements with respect to permitting processes - crossing permit), and DSI (regarding Akdegirmen Dam, which was under construction at the time of the national EIA process, and flood protection facilities planned by DSI¹²³).

The HSR route crosses Seydiler I. Degree Natural Site between Railway KM 131+600-131+900. The national EIA Report of 2006 states that there is no feasible Project alternative for this part and that DLH started engagement with the Regional Council for the Conservation of Cultural Property accordingly. The infrastructure works at this part of the HSR have already been completed and the relevant part of the natural sites has been passed by a series of four (4) viaducts with a total length of over 1,900 m.

As part of the expropriation process conducted by the TCDD as per the requirements of the Expropriation Law (No. 2942, 1983), official notifications were made (including information on the procedure to be followed in case of agreement and disagreement on the expropriation value to be offered within the scope of Project-related expropriation process) to and negotiation meetings were held with the owners/shareholders of the affected parcels.

16.3. Stakeholder Engagement as part of the ESIA Process

The key stakeholder engagement activities conducted by the social team as part of the ESIA process and by the Contractor in parallel to the ESIA studies are summarised in Table 16-4. Detailed information on the outcomes of the engagement activities is provided in Chapter 11 of this ESIA on "Socio-economy".

The Senior Management Team and the Contractor Expropriation Expert has been engaging with the related authorities, including AYGM and TCDD, on the planning of future land acquisition processes to be conducted by the state as per the requirement of Expropriation Law (No. 2942, 1983).

The Contractor sent an official letter to AYGM on 9 February 2021 to inform the authority on actions required to be taken to avoid potential impacts on the Project schedule and current users of the expropriated parcels.

In February 2021, the Contractor has appointed a Community Liaison Officer (CLO) in Ankara (Contractor CLO), who had community engagement responsibilities in another large-scale motorway project of the ERG Construction - one of the JV companies. The Contractor CLO has started engaging with the local communities in parallel to the ESIA social surveys.

¹²² This borrow sites has been eliminated as the borrow site, which was originally included in the national EIA Report, corresponds to a privately-owned parcel (with 13 private shareholders) located within the zoning plan boundaries of the city (see Chapter 3 "Project Alternatives").

¹²³ The official view confirms that relevant DSI facilities have already been considered in the Project design. It should be noted that Akdegirmen Dam is in operation since 2008 at distance of app. 500 m to KM197+000 of the HSR and used for drinking water and flood protection purposes (see Chapter 8 "Water and Wastewater Management").

Table 16-4. Summary of Engagement Activities Conducted as part of the ESIA Process

Engagement Activity	Participants/Parties	Date of Engagement	Engagement Method	Summary of Engagement
Scoping Field Study – Engagement with local administrators and elected village heads	<ul style="list-style-type: none"> Representative of Contractor ESIA Consultant (with participation of ESIA Project Manager, Senior Social Experts/Sociologists, Senior H&S Specialist and Environmental, Health and Safety (EHS) Specialist) 	13-14 January 2021	Face to face meeting	<p>During the Scoping Field Study, consultations were conducted with the mayors and elected village heads of the visited settlements to obtain information on the general socio-economic conditions, past expropriation processes and retrospective impacts. The settlement visited are listed below:</p> <ul style="list-style-type: none"> Afyonkarahisar, Emirdag, Gomu town municipality (Consultation with Mayor) Afyonkarahisar, Emirdag, Yuregil village (headman) Afyonkarahisar, Iscehisar, Seydiler town municipality (Hasan Basri neighbourhood) (headman) Afyonkarahisar, Merkez, Erenler neighbourhood (headman) Afyonkarahisar, Sinanpasa, Duzagac town municipality, Cumhuriyet neighbourhood (headman)
Meeting with TCDD – Head of Department of Real Estate	<ul style="list-style-type: none"> Representative of Contractor ESIA Consultant (with participation of ESIA Project Manager and senior sociologists) 	29 January 2021	Face to face meeting	A meeting was held with the Head of TCDD – Department of Real Estate in order to inform the authority about the scope of ESIA study, particularly social surveys, and obtain information mainly on the Project background, previous route changes and their reasons, past expropriation processes conducted by TCDD as per the Expropriation Law (Law No. 2942, 1983) (including constitution of servitude rights and accelerated expropriation), current status of land use and expropriation along the route, and institutional responsibilities for the future expropriation works (reported to be clarified between AYGM and TCDD).
Social surveys as part of ESIA (*)	Mukhtars of the villages /neighbourhoods affected from Project-related expropriation	February 2021	Community level interviews (by telephone)	A total of 128 Community level questionnaires (CLQs) were conducted by the social team (by telephone) with the mukhtars of the affected settlements in order to collect settlement level data on baseline socio-economic conditions and potential social impacts of the Project for ESIA and feed in to RAP studies.
	PAPs (subject to potential social impacts of land acquisition, construction and quarry operations)	February 2021	Household level surveys (by telephone)	A total of 229 Household questionnaires (HHQs) with the PAPs to collect household level data on baseline socio-economic conditions and potential social impacts of the Project for ESIA and feed in to RAP studies.
	Vulnerable PAPs Women PAPs	February 2021	Deep interviews (by telephone)	A total of 28 interviews were conducted with the vulnerable persons and women who live in settlements affected from the Project.

(*) Social surveys as part of ESIA were conducted by the social team remotely via phone calls as per IFC's Interim Advices for IFC Clients on Safe Stakeholder Engagement in the Context of COVID-19 (2020)

16.4. ESIA Disclosure Process

The ESIA Disclosure Package of the Project includes this ESIA Report including the Environmental and Social Management and Monitoring Framework Plan (ESMMFP), as well as stand-alone SEP and Non-technical Summary (NTS) documents.

In line with the international E&S standards, the Project is considered as “Category A”. The project and E&S impact information of Category A projects are published/disclosed on UKF’s website at least 30 days prior to final commitment to grant support (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909200/ukef-eau-external-process-update-june-2020.pdf).

During the ESIA disclosure period, the Contractor will conduct stakeholder engagement activities in line with the Stakeholder Engagement Program presented as part of the Project SEP¹²⁴. The ESIA Disclosure Package will be published at the Project website (ankaraizmiryht.com) (on behalf of the Employer/Operator). As per the relevant requirements of the international standards, NTS and SEP will be disclosed in Turkish language by using appropriate disclosure methods. Hard copies of the NTS and SEP will be kept at the Project site for any stakeholder to review.

The Contractor CLO appointed in February 2021 will continue engagement with the local communities. Stakeholder engagement activities will be registered in a Stakeholder Engagement Log in line with Project SEP.

16.5. Stakeholder Engagement Plan (SEP)

A stand-alone SEP has been prepared as part of the ESIA process based on the comprehensive social surveys conducted by the ESIA team and information and documentation (e.g. official correspondence) received from the General Project Management Team on previous engagement activities.

The purpose of the SEP is to establish and maintain constructive dialogue between the Project and the local communities, other stakeholders and interested groups.

The Contractor will assist and collaborate with the Employer to implement the SEP throughout the construction phase of the Project. The implementation of the SEP throughout the operation phase of the Project will be under the responsibility of the Employer/Operator.

The Project SEP, inter alia:

- Identifies all stakeholders (individuals, groups or entities) directly and/or indirectly affected by the Project or have a direct or indirect influence/impact on the Project.
- Defines mechanisms and tools for appropriate engagement with each stakeholder group during the lifetime of the Project, with the ultimate aim of establishing and maintaining constructive relationship through public consultation and information disclosure.
- Establishes external and internal mechanisms that will ensure timely and appropriate implementation of actions for the management of grievances and feedback received.

The SEP is structured as below:

- Chapter 1 – Introduction
- Chapter 2 – Regulations and Requirements
- Chapter 3 – Summary of Previous Stakeholder Engagement Activities
- Chapter 4 – Project Stakeholders
- Chapter 5 – Stakeholder Engagement Program
- Chapter 6 – Resources and Responsibilities
- Chapter 7 – Grievance and Feedback Mechanism

¹²⁴ Remote/telephone engagement will be used for meeting purposes as required during COVID-19 pandemic.

- Chapter 8 – Monitoring and Reporting
- Chapter 9 – Contact Information for Stakeholders
- Appendices

16.6. Project Grievance and Feedback Mechanism

Internal and external grievance and feedback mechanisms have been developed for the Project as part of the SEP based on Contractor's (through ERG Construction as one of the JV companies) established mechanisms being implemented within the scope of another large-scale motorway project in Turkey.

The Contractor will assist and collaborate with the Employer to implement the internal and external grievance and feedback mechanisms throughout the construction phase of the Project. The implementation of the internal and external grievance and feedback mechanisms throughout the operation phase of the Project will be under the responsibility of the Employer/Operator.

Through these mechanisms, the Contractor will seek to resolve external and internal concerns promptly, using an understandable and transparent consultative process that is culturally appropriate, and at no cost and without retribution to the external or internal party that originated the issue or concern. Stakeholders will be provided with the option of submitting grievances and feedback anonymously.

The main steps of the internal and external grievance and feedback mechanisms will comprise the following

- Step 1 – Receive and register
- Step 2 – Acknowledge
- Step 3 – Assess and assign
- Step 4 – Dialogue and investigate
- Step 5 – Respond
- Step 6 – Action (Resolve Successfully or Appeal)
- Step 7 – Follow-up and Close

The Project will target successful resolution/management of grievances within the timeframes defined in the SEP.

The judicial or administrative remedies will be applicable for the external and internal Project stakeholders as per the Constitution of the Republic of Turkey and relevant legislation.

The Social Manager and Project CLOs on site will be responsible from effective implementation of the internal grievance mechanism. The CLOs will inform the external stakeholders, including local communities, about Project's grievance and feedback collection channels and grievance and feedback mechanism as part of the SEP implementation to encourage them to submit written complaints with reassurance that written submissions will not be used in any way to intimidate those submitting the complaints. The following channels will be used to collect grievances and feedback of external stakeholders:

- Project website
- E-mail
- Mail
- Phone
- Grievance boxes and forms
- Site CLOs
- Other community-facing Project representatives, directors, managers, etc. of the Contractor and subcontractors

- Personal visits by stakeholders to construction camp sites and other work sites of the Contractor and subcontractors
- Through Project Owner and other public authorities
- Through Presidency's Communications Centre (CIMER)

The Human Resources (HR) Manager and HR team will be responsible from effective implementation of the internal grievance mechanism. All Project personnel, direct and contracted, will be informed about the internal grievance and feedback mechanism, including grievance and feedback collection channels, at the time of employment. Information of subcontractor personnel and effective implementation of the mechanism by Project subcontractors will be ensured by the Contractor through contractual requirements. Channels to be used to collect external grievances and feedback will be available for collection of internal grievance and feedback, as applicable. In addition, grievance and feedback will also be collected;

- Verbally through Project directors, managers, chiefs, H&S specialists, CLOs, etc. and subcontractors (to be conveyed to the Contract systematically)
- During monthly H&S committee meetings and other meetings with employees
- Through periodical employee satisfaction surveys

All grievances/feedback (written or verbal) will be registered electronically in the internal grievance and feedback database of the Project (referred to as Grievance and Feedback Register).

The Project Owner is responsible for the execution of the Project-related expropriation process as per the applicable legislative requirements. The grievances and objections with respect to the expropriation/land acquisition process executed by the Project Owner (AYGM) had been/will be inherently directed to and managed by the Project Owner as per the applicable legislation. During the construction phase, the Contractor will record any grievance or feedback raised by the stakeholders regarding the expropriation/land acquisition process led by the Project Owner and convey these in writing to AYGM including any grievances stemming from the past activities at the Project Area due to previous contractors.

17. HUMAN RIGHTS IMPACT ASSESSMENT (HRIA)

This Chapter of the ESIA provides an assessment of the potential Project-level adverse human rights impacts using the Guidance Note on Implementation of Human Rights Assessments under the Equator Principles (EP). This Human Rights Impact Assessment (HRIA) is conducted in line with the United Nations Guiding Principles on Business and Human Rights (UNGPs) for the following group of Project stakeholders:

- Direct workers
- Contracted workers
- Affected community members

A non-exhaustive list of potential project-related human rights risks common to infrastructure projects have been provided in Appendix A of the Guidance Note on Implementation of Human Rights Assessments under the EP. In line with this list, the following project-level human rights issues have been considered in this HRIA:

(1) Human Rights Category – Labour

- Child labour
- Collective bargaining and freedom of association
- Modern slavery (forced labour/human trafficking)
- Grievance mechanism and remedy
- Job security/right to work
- Non-discrimination
- Occupational health and safety (H&S)
- Wages (pay equity, standard of living)
- Working hours

(2) Human Rights Category – Civil and Political

- Freedom of expression
- Right to life and security of person
- Privacy

(3) Human Rights Category – Economic, Social and Cultural

- Right to education
- Right to health
- Right to participate in the cultural life of the community
- Right to water
- Social insurance

(4) Human Rights Category – Group rights/heightened risk of vulnerability

- Children's rights
- Disability rights

- Indigenous peoples¹²⁵
- Migrants' rights
- Women's rights

This Chapter should be read in conjunction with the previous ESIA chapters, which describe the existing conditions and measures to be taken as per the Project Standards to avoid/minimise the potential Project E&S risks and impacts on environmental and ecological receptors, local communities, and Project personnel (direct and contracted) that have relevance to management of human rights risks covered in this Chapter.

A stand-alone Stakeholder Engagement Plan (SEP) has been prepared for the Project in line with EP4 (2020) and IFC PSs (2012). The SEP, including an Internal and External Grievance Mechanism as per IFC PS1, will be instrumental in managing of human rights related issues, risks, and impacts.

A stand-alone Human Rights Policy will be developed and implemented in the Project.

17.1. Project Standards

The Constitution of the Republic of Turkey is the fundamental legal document guaranteeing respect to human rights as stated in Article 2 of Chapter II of the Constitution:

"The Republic of Turkey is a democratic, secular and social state governed by rule of law, within the notions of public peace, national solidarity and justice, respecting human rights, loyal to the nationalism of Atatürk, and based on the fundamental tenets set forth in the preamble."

The following national legislation and international conventions will be applicable to the Project:

- Constitution of the Republic of Turkey
- The Law on the Human Rights and Equality Institution of Turkey (TIHEK) (Law No. 6701, 2016)
- Labour Law (Law No. 4857, 2003) and related regulations
- Occupational Health and Safety Law (Law No. 6331, 2012) and related regulations
- Regulation on the Implementation of the Law Concerning Private Security Services
- International Labour Organisation (ILO) conventions ratified by Turkey

The following international standards will be applicable to the Project:

- Equator Principles 4 (2020)
- IFC Performance Standards (2012)
- Guidance Note on Implementation of Human Rights Assessments under EPs (2020)
- IFC Good Practice Note on Managing Contractors' E&S Performance (2017)
- IFC Good Practice Handbook on Use of Security Forces: Assessing and Managing Risks and Impacts (2017)
- IFC/European Bank for Reconstruction and Development (EBRD) Worker's Accommodation: Processes and Standards (2009)
- IFC Handbook for Addressing Project-Induced In-Migration (2009)
- IFC Good Practice Note on Addressing Grievances from Project-Affected Communities (2009)
- IFC Introduction to Health Impact Assessment (2009)

¹²⁵ There are no indigenous peoples in Turkey.

- IFC Stakeholder Engagement Handbook: A Good Practice Handbook for Companies Doing Business in Emerging Markets (2007)
- World Group Bank (WBG) General and Sector Specific Environmental, Health and Safety (EHS) Guidelines (2007)

For the management of COVID-19 pandemic related risks at the construction camp sites, the Ministry of Environment and Urbanisation (MoEU) published a Circular (No: 2020/9) on 20 March 2020 defining the measures to be taken at the work sites, dormitories and social facilities.

In the context of COVID-19 pandemic, the following Interim Advice Notes published by the IFC will also be applicable to the Project:

- Tip Sheet for Company Leadership on Crisis Response: Facing the COVID-19 Pandemic
- Interim Advice for IFC Clients on Preventing and Managing Health Risks of COVID-19 in the Workplace
- Interim Advice for IFC Clients on Supporting Workers in the Context of COVID-19
- Interim Advice for IFC Clients on Developing a COVID-19 Emergency Preparedness and Response Plan (EPRP)
- Addressing Increased Reprisals Risk in the Context of COVID-19
- Interim Advice for IFC and EBRD Clients on Migrant Workers and COVID-19

17.2. Human Rights Impact Assessment (HRIA) and Management

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
Rights Category – Labour							
Child Labour <ul style="list-style-type: none">ILO standards prohibit hazardous work for all persons under 18 years. They also prohibit labour for those under 15, with limited exceptions for developing countries. (Intersects with the rights of children and education).	Low to Negligible	Moderate to Low	N/A	<p><u>Context</u></p> <p>Turkey has ratified 59 ILO conventions¹²⁶ (see Chapter 2.3), which includes conventions on child labour and minimum age (https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm).</p> <p>The Labour Law (Law No. 4857, 2003) of Turkey is aligned with the international labour standards and IFC PS2 requirements regarding child labour and inherently provides the basic principles of international labour standards for the management of child labour risks. In sectors such as construction where high numbers of unskilled workforce are involved, practical alignment with the labour standards in certain areas including child labour, require further improvement to ensure full compliance with the international standards. Working age and restriction on the employment of children in Turkey is governed by Article 71 of the Labour Law (Law No. 4857, 2003). As per the Law, employment of children who have not completed the age of 15 is prohibited. However, children, who have completed the full age of 14 and their primary education, are allowed to work on light works that will not hinder their physical, mental and moral development and that will not prevent their school attendance for those who continue their education.</p> <p>In line with the Labour Law (Law No. 4857, 2003), the Regulation on the Procedures and Principles of Employing Children and Young Workers determines the types of works, where employment of children and young employees who have not completed the full age of 18 is prohibited, and the works where young employees who have not completed the age of 18 may be permitted to work, as well as the light works and working conditions in which children who have completed the age of 14 and their primary education may work.</p> <p>In the Occupational Health and Safety (OHS) Law (Law No. 6331, 2012), those who have completed the age of 15 but have not completed the age of 18 are defined as young employees.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none">Project-specific Human Resources (HR) Policy that covers, inter alia, child labour and minimum age aspects, will be developed and implemented in line with IFC Guidance Note 2.Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and labour aspects including child labour and works permitted by law for workers under the age of 18, etc. at the time of employment (refresher training will be provided annually and as required).The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor, subcontractor and -to the extent possible and through feasible methods- primary suppliers implementations with the child-labour related requirements of the following Project-specific documents:<ul style="list-style-type: none">HR PolicySubcontractor Management Plan (covering management of risks stemming from Project’s supply chain)Labour Management Plan (covering management of risks stemming from Project’s supply chain)Internal Grievance Mechanism as part of Project SEPIn consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase.	None	Low to Negligible	N/A
Collective Bargaining and Freedom of Association <ul style="list-style-type: none">Collective bargaining: Individuals have the right to form or join trade unions of their choice. Trade unions must be permitted to function freely, subject only to limitations that are in line with international Human Rights standards. Workers have the right to strike, in conformity with reasonable legal requirements. These exist in order to promote negotiation between organised workers and their employer or employers	Low	Moderate to Low	N/A	<p><u>Context</u></p> <p>Turkey has ratified 59 ILO conventions (see Chapter 2.3), which includes conventions on right and freedom of association, right to organise and collective bargaining (https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm).</p> <p>The Labour Law (Law No. 4857, 2003) of Turkey is aligned with the international labour standards and IFC PS2 requirements with regard to force labour and inherently provides the basic principles of international labour standards for the management of forced labour risks.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none">Project-specific HR Policy that covers, inter alia, aspects related to workers’ organisations, will be developed and implemented in line with IFC Guidance Note 2.Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and aspects related to workers’ organisations at the time of employment (refresher training will be provided annually and as required).The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with workers’ organisations related requirements of the following Project-specific documents:<ul style="list-style-type: none">HR Policy	Negligible	Low to Negligible	N/A

¹²⁶ Out of 59 conventions ratified by Turkey, 55 are in force, 3 Conventions have been denounced and 1 instrument has been abrogated.

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
<p>to determine wages, hours, rules, and working conditions.</p> <ul style="list-style-type: none"> Freedom of Association: Protects the right to form or join all types of associations, including political, religious, sporting/recreational, non-governmental, and trade union associations. This freedom of individuals to associate can be an end in and of itself, or as a means of pursuing common objectives. 				<ul style="list-style-type: none"> Subcontractor Management Plan Labour Management Plan Internal Grievance Mechanism as part of Project SEP In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
<p>Modern Slavery (Forced Labour/Human Trafficking)</p> <ul style="list-style-type: none"> Slavery exists when one human effectively owns another. Freedom from servitude covers other forms of severe economic exploitation or degradation, such as in the trafficking of workers or debt bondage. Rights to freedom from slavery and servitude are absolute rights. Forced or compulsory labour is defined by the ILO as all work or service that is extracted under menace of any penalty and for which the person has not voluntarily offered themselves. Providing payment does not mean that work is not forced labour if the other aspects of the definition are met. 	Low	Moderate	N/A	<p><u>Context</u></p> <p>Turkey has ratified 59 ILO conventions (see Chapter 2.3), which includes conventions on forced labour (https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm).</p> <p>The Labour Law (Law No. 4857, 2003) of Turkey is aligned with the international labour standards and IFC PS2 requirements with regard to forced labour and inherently provides for the basic principles of international labour standards for the management of forced labour risks.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> Project-specific HR Policy that covers, inter alia, forced labour aspects, will be developed and implemented in line with IFC Guidance Note 2. Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and labour aspects including forced labour at the time of employment (refresher training will be provided annually and as required). The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor, subcontractor and -to the extent possible and through feasible methods- primary suppliers implementations with the forced labour related requirements of the following Project-specific documents: <ul style="list-style-type: none"> HR Policy Subcontractor Management Plan (covering management of risks stemming from Project's supply chain) Labour Management Plan (covering management of risks stemming from Project's supply chain) Internal Grievance Mechanism as part of Project SEP In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 	None	Low to Negligible	N/A
<p>Grievance Mechanism and Remedy</p> <ul style="list-style-type: none"> All people have the right to remedy when their rights have been violated. Where business enterprises identify that they have caused or contributed to adverse Human Rights impacts, they should provide for or cooperate in their remediation through legitimate processes, whether through the company's own operational-level grievance mechanism or through cooperation with independent (non)judicial mechanisms. Providing processes to identify (e.g. grievance mechanism) and then remediate adverse Human Rights impacts which the company causes or contributes to. 	Moderate to Low	High to Moderate	High to Moderate	<p><u>Context</u></p> <p>The Constitution of the Republic of Turkey is the fundamental legal document guaranteeing the freedom and rights of the citizens with respect to communication, expression and dissemination of thought, and information request.</p> <p>The Article of the Constitution on the Right of Petition, Right to Information and Appeal to Ombudsperson specifies that the citizens and foreigners resident in Turkey, on the condition of observing the principle of reciprocity, have the right to apply in writing to the competent authorities and to the Grand National Assembly of Turkey with regard to the requests and complaints concerning themselves or the public.</p> <p>The Presidency's Communication Centre (CIMER) has been providing a centralised complaint system for Turkish citizens, legal persons and foreigners. CIMER will be available to Project stakeholders as an alternative and well-known channel for conveying their Project-related grievances and feedback directly to the state authorities.</p> <p>Stakeholders may convey their grievances and feedback about the Project directly to the Project Owner and/or other public authorities such as governorates, district governorates, municipalities, and settlement headmen.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> Project-specific HR Policy that covers, inter alia, grievance mechanism, will be developed and implemented in line with IFC Guidance Note 2. Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and aspects related to grievance mechanism at the time of employment (refresher training will be provided annually and as required). 	Low to Negligible	Low to Negligible	Low to Negligible

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
<ul style="list-style-type: none"> Ensure employees to understand/ trust the grievance mechanism. 				<ul style="list-style-type: none"> The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with grievance mechanism related requirements of the following Project-specific documents: <ul style="list-style-type: none"> HR Policy Subcontractor Management Plan Labour Management Plan Internal Grievance Mechanism as part of Project SEP <p>The internal grievance mechanism provides for the following:</p> <ul style="list-style-type: none"> Grievances/feedback can be submitted anonymously if preferred by the grievance/feedback holder, though that will mean that feedback cannot be provided to the grievant. People submitting grievances/feedback will be free of retribution or retaliation/feedback. The use of the Grievance and Feedback Mechanism does not prevent the grievance/feedback holder from having access to other mechanisms (e.g. through the courts/law). <ul style="list-style-type: none"> In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
<p>Job Security/Right to Work</p> <ul style="list-style-type: none"> The termination of an employment relationship is likely to be a traumatic experience for a worker and the loss of income has a direct impact on her or his family's well-being. As more countries seek employment flexibility and globalisation destabilises traditional employment patterns, more workers are likely to face involuntary termination of employment at some point in their professional lifetime. The employment of a worker should not be terminated unless there is a valid reason for such termination connected with the worker's capacity or conduct or based on the operational requirements of the undertaking, establishment, or service. Even where such practice may be legally permissible under local law, many stakeholders now expect companies to exhibit a higher standard of behaviour in line with international standards and good practice. 	Low to Negligible	Low	N/A	<p><u>Context</u></p> <p>The Labour Law (Law No. 4857, 2003) of Turkey requires that before terminating a continual employment contract made for an indefinite period, a notice to be served to the other party by the terminating party. The contract shall then terminate in line with the relevant provisions of the Law.</p> <p>The Law requires that the employer, who terminates the contract of an employee engaged for an indefinite period, who is employed in an establishment with thirty or more workers and who meets a minimum seniority of six months, must depend on a valid reason for such termination connected with the capacity or conduct of the employee or based on the operational requirements of the establishment or service.</p> <p>Based on the article on the justification of termination with a valid reason, the Law stipulates that the following, inter alia, shall not constitute a valid reason for termination:</p> <ul style="list-style-type: none"> union membership or participation in union activities outside working hours or, with the consent of the employer, within working hours; acting or having acted in the capacity of, or seeking office as, a union representative; the filing of a complaint or participation in proceedings against an employer involving alleged violations of laws or regulations or recourse to competent administrative or judicial authorities; race, colour, gender, marital status, family responsibilities, pregnancy, religion, political opinion, national extraction or social origin; absence from work during maternity leave when female workers must not be engaged in work, as foreseen in the relevant article of the Law; temporary absence from work during the waiting period due to illness or accident foreseen in the relevant article of the Law <p>The construction personnel will be employed by the Contractor and subcontractors for a fixed term duration covering only the construction phase activities. At the peak construction phase, the number of construction workforce, including the management and site personnel of the Contractor and subcontractors, is estimated to be 14,778, of which 67% would be non-qualified.</p> <p>Detailed planning of the operation and maintenance (O&M) workforce (direct and contracted) requirements of the Project will be done by the AYGM and TCDD in due course.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> Project-specific HR Policy that covers, inter alia, working conditions, terms of employment, retrenchment and working relationship aspects, will be developed, and implemented in line with IFC Guidance Note 2. Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and aspects related to working conditions, terms of employment, retrenchment and working relationship at the time of employment (refresher training will be provided annually and as required). All Project personnel (direct and contracted) will be provided with documented information (through employment contracts and supporting documentation) that is clear and understandable, regarding their rights under national Labour Law (Law No. 4857, 2003) and duration of works throughout Project's construction period. The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with working conditions, terms of employment, retrenchment and working relationship related requirements of the following Project-specific documents: <ul style="list-style-type: none"> HR Policy Subcontractor Management Plan 	Negligible	Negligible	N/A

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
				<ul style="list-style-type: none"> - Labour Management Plan - Internal Grievance Mechanism as part of Project SEP • Termination of employment for Contractor and subcontracted personnel will be conducted in compliance with the applicable requirements of the Labour Law (Law No. 4857, 2003) and IFC PS2. • Project-specific SEP including internal grievance mechanism will be implemented. • Contractor's HR team will monitor and check compliance of the employment termination process applied across the Project. • In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
Non-discrimination <ul style="list-style-type: none"> • The practice of ensuring equal treatment and respect for all individuals regardless of class, race, colour, sex, religion, gender, age, political or other opinion, national or social origin, property, sexual orientation, disability, employee status, marital status, familial connection, etc. • Includes ensuring employees are free from harassment. 	Moderate to Low	High to Moderate	N/A	<p><u>Context</u></p> <p>Turkey has ratified 59 ILO conventions (see Chapter 2.3), which includes conventions on equal treatment of employees, gender equality (https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm).</p> <p>The Labour Law (Law No. 4857, 2003) of Turkey is aligned with the international labour standards and IFC PS2 requirements with regard to equal treatment of employees, gender equality and inherently provides for the basic principles of international labour standards for non-discrimination. The Law adopts the principle of equal treatment and stipulates that no discrimination based on language, race, colour, gender, disability, political opinion, philosophical belief, religion and sect or similar reasons is permissible in the employment relationship.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> • Project-specific HR Policy that covers, inter alia, non-discrimination, will be developed and implemented in line with IFC Guidance Note 2. • Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and non-discrimination at the time of employment (refresher training will be provided annually and as required). • The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with non-discrimination related requirements of the following Project-specific documents: <ul style="list-style-type: none"> - HR Policy - Social Policy - Subcontractor Management Plan - Labour Management Plan - Internal Grievance Mechanism as part of Project SEP • Contractor and subcontractor personnel will be provided with training on Project's Social Policy and Contractor's Code of Conduct covering Project's approach to prevention of gender-based violence and harassment (GBVH) and sexual harassment and abuse (SHA), at the time of employment (refresher training will be provided annually and as required). • Trainings will cover, inter alia, the following: <ul style="list-style-type: none"> - Definition of violence against women in national and international documents, - Types of violence (physical, sexual, economic, emotional), and - Legal sanctions. • Project Community Liaison Officers (CLOs) and Contractor's HR team will be specially trained on GBVH and SHA. • In case GBVH or SHA is reported through the internal grievance mechanism, this will be investigated by trained investigators and responded in accordance with current GIIPs. • In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 	Low to Negligible	Low to Negligible	N/A
Occupational H&S <ul style="list-style-type: none"> • A company should provide safe and healthy working conditions to workers. ILO standards require governments to adopt, in consultation with appropriate employer and employee organisations, a national occupational health and safety ("OHS") policy aimed at reducing accidents and injuries to health arising in the course of employment, and to minimise the causes of inherent 	High to Moderate	High	N/A	<p><u>Context</u></p> <p>Turkey has ratified 59 ILO conventions⁵ (see Chapter 2.3), which includes conventions on OHS (https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm).</p> <p>The OHS Law (Law No. 6331, 2012) of Turkey regulates the duties, authority, responsibilities, rights and obligations of the employers and employees for ensuring occupational health and safety at the workplaces and improving the existing conditions. In line with the international OHS standards, including IFC PS2, the OHS Law and related secondary legislation of Turkey specifies the requirements, principles and procedures for the following key OHS aspects:</p> <ul style="list-style-type: none"> • Principles of protection from risks • OHS services • Occupational physicians and occupational safety specialists • Determining the hazard classification 	Low to Negligible	Low	N/A

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
<p>workplace hazards. That policy should address, for example, the provision of adequate OHS training regarding the use and maintenance of the 'material elements of work', including workplace environment, tools, machinery and equipment. Workers must be able to remove themselves from work situations where imminent and serious health dangers are reasonably perceived, without undue consequences (intersects with the right to enjoy just and favourable conditions of work).</p> <ul style="list-style-type: none"> Failing to address a pattern of accidents highlighting inadequate workplace health and safety. 				<ul style="list-style-type: none"> Risk assessment, control, measurement and examinations Emergency plans, fire-fighting, first aid Evacuation Rights of the workers to abstain (from work in case of serious and imminent danger) Recording and notification of occupational accidents and diseases Health surveillance Worker information (of the safety and health risks and protective and preventive measures, their legal rights and responsibilities, and workers designated to handle first aid, extra ordinary situations, disasters, firefighting, and the evacuation) Training of workers Consultation with and participation of workers Workers' Representative <p><u>Remedy</u></p> <ul style="list-style-type: none"> Project-specific H&S Policy to be developed by the Contractor and implemented by the Contractor and subcontractors (through contractual requirements). The Contractor will develop and implement a Project-specific OHS Plan and related procedures for the management of Project-related OHS risks in line with the Project Standards. Through compliance with the requirements of the OHS Law (Law No. 6331, 2012) and implementation of the OHS Plan and procedures by the Contractor and subcontractors, the potential OHS risks and/or impacts on Project personnel associated with labour and working conditions will be aimed to be managed in line with the Project Standards. Project-specific OHS Plan will cover the following subjects at minimum: <ul style="list-style-type: none"> Risk Assessment Job Hazard Analysis Permit to Work System Fitness to Work Machinery and Equipment Inspections and Control Forms Personal Protective Equipment (PPE) Health Units and Personnel Hazard-specific Measures OHS Training Near Miss Reporting Incident/Accident Reporting Root-cause Analysis Emergency Preparedness and Response Monitoring and Reporting The OHS risks due to emergency situations will be managed through development and implementation of the Project-specific Emergency Preparedness and Response Plan (EPRP). COVID-19 pandemic related risks on Project personnel, will be managed through a separate COVID-19 EPRP that will be prepared in line with the Interim Advice of IFC (May 2020) for IFC Clients on Developing a COVID-19 EPRP. Due to the high number of potential lower-tier subcontractors to be involved in the Project, additional management, training and monitoring measures are anticipated to be required to ensure, to the extent possible, that the OHS performance of the Project subcontractors consistently fulfils the requirements of Project Standards. Especially, management of subcontractors through a well-established subcontractor management system is of utmost importance to cascade Contractor's OHS requirements to main and lower tier subcontractors (through contractual requirements covering implementation, training and monitoring aspects as well as establishment and application of an adequate penalty system addressing OHS incompliances) and avoid OHS incidents/accidents that may result in significant risks and impacts for Project's direct and contracted personnel. The Contractor will develop and implement an internal audit system to check and monitor compliance of the subcontractors (main and lower-tier) and -to the extent possible and through feasible methods- primary suppliers with the requirements of OHS Plan and procedures. In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
Wages (Pay equity, standard of living)	Moderate	Moderate	N/A	<u>Context</u>	Moderate	Moderate	N/A

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
<ul style="list-style-type: none"> A company must protect the right to remuneration that provides workers with fair wages and equal remuneration for work of equal value. Remuneration must also be enough to provide workers with a decent living for themselves and their families. A minimum wage should be 'fair' and enable families to enjoy the right to a standard of living that includes adequate food, clothing and housing (connects with the right to adequate standard of living for health and well-being). 				<p>Turkey has ratified 59 ILO conventions (see Chapter 2.3), which includes conventions on minimum wage (https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm).</p> <p>The Labour Law (Law No. 4857, 2003) of Turkey is aligned with the international labour standards and IFC PS2 requirements with regard to minimum wage and inherently provides for the basic principles of international labour standards for minimum wage. The Law includes provisions on wages, their remuneration and payment conditions and stipulates that with the object of regulating the economic and social conditions of all employees working under an employment contract, either covered or uncovered by the Law, the minimum limits of wages shall be determined every two years at the latest by the related Ministry.</p> <p>At the peak construction phase, the number of construction workforce, including the management and site personnel of the Contractor and subcontractors, is estimated to be 14,778, of which 67% would be non-qualified.</p> <p>The construction personnel will be employed by the Contractor and subcontractors for a fixed term duration covering only the construction phase activities.</p> <p>Detailed planning of the O&M workforce (direct and contracted) requirements of the Project will be done by the AYGM and TCDD in due course.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> Project-specific HR Policy that covers, inter alia, aspects related to working relations, non-discrimination, equal opportunity will be developed and implemented in line with IFC Guidance Note 2. Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and aspects related to working relations, non-discrimination, equal opportunity at the time of employment (refresher training will be provided annually and as required). The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with working relations, non-discrimination, equal opportunity related requirements of the following Project-specific documents: <ul style="list-style-type: none"> HR Policy Subcontractor Management Plan Labour Management Plan Internal Grievance Mechanism as part of Project SEP In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
<p>Working Hours</p> <ul style="list-style-type: none"> The degree of flexibility for employees to start and end the workday in order to manage familial and personal obligations, while adequately fulfilling their employment duties. Working hours for employees consistent with ILO standards, which generally indicate that employees should not be required to work more than 48 hours per week, or ten hours a day, and should have one day off per seven days. 	Moderate	High to Moderate	N/A	<p><u>Context</u></p> <p>Labour Law (Law No. 4857, 2003) of Turkey includes provisions regulating working time, overtime work (duration, weekly and annual permissible hours, etc.). As per the Labour Law (Law No. 4857, 2003), wages for each hour of overtime shall be remunerated at one and a half times the normal hourly rate. The Law requires employee's consent for overtime work.</p> <p>The Labour Law (Law No. 4857, 2003) of Turkey specifies the conditions related working time. In general terms, working time is forty-five hours maximum weekly. Unless the contrary has been decided, working time shall be divided equally by the days of the week worked at the establishment. The Law specifies rules and conditions for compensatory work, principles of balancing, periods considered as hours of work, the beginning and ending of the daily working time, rest breaks, night hours and night work,</p> <p>Working hours and shifts in the Project will be regulated in compliance with the requirements of the national Labour Law (No. 4857, 2003), as summarised below:</p> <ul style="list-style-type: none"> The work week is foreseen to comprise 6 working days of 7.5 hours each for a total of 45 work hours per week, which is the legal minimum requirement for full-time labour employment as per the national Labour Law. Employees will have one rest day per week as mandated by the Labour Law. Where needed and contingent on the employee's consent, overtime work will be regulated and compensated in accordance with the Labour Law (Law No. 4857, 2003), up to the legal upper limit of 11 hours per day. Single shifts are foreseen to be used throughout the project. However, additional shifts would be organised based on need, with the employees allocated to said additional shifts working within the legal limits mentioned above. <p><u>Remedy</u></p> <ul style="list-style-type: none"> The Contractor will develop and implement a Project-specific HR Policy as well as Camp Site, Subcontractor and Labour Management Plans and Internal Grievance Mechanism in line with the requirements of IFC PS2. The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with the requirements of these documents. 	Low to Negligible	Moderate to Low	N/A

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
				<ul style="list-style-type: none"> In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
Rights Category – Civil and Political							
Freedom of Expression <ul style="list-style-type: none"> The right to hold opinions free from outside interference is an absolute right, with narrow restrictions by States only permissible when in line with international Human Rights standards. Individuals have a right to seek, receive and impart ideas in whatever media or form they choose. Allowing workers to express their opinions freely, or unfairly punishing them for doing so. 	Moderate to Low	High to Moderate	High to Moderate	<p><u>Context</u></p> <p>The Constitution of the Republic of Turkey is the fundamental legal document guaranteeing the freedom and rights of the citizens with respect to communication, expression and dissemination of thought, and information request:</p> <ul style="list-style-type: none"> Freedom of Communication (Article 22): Everyone has the right to freedom of communication. Secrecy of communication is fundamental. Communication shall not be impeded nor its secrecy be violated, unless there exists a decision duly passed by a judge in cases explicitly defined by law, and unless there exists an order of an agency authorised by law in cases where delay is deemed prejudicial. Public establishments or institutions where exceptions to the above may be applied will be defined by law. Freedom of Thought and Opinion (Article 25): No one shall be compelled to reveal his/her thoughts and opinions for any reason or purpose; nor shall anyone be blamed or accused because of his/her thoughts and opinions. Everyone has the right to express and disseminate his/her thoughts and opinions by speech, in writing or in pictures or through other media, individually or collectively. Freedom of Expression and Dissemination of Thought (Article 26): This freedom includes the liberty of receiving or imparting information or ideas without interference by official authorities Right of Petition, Right to Information and Appeal to Ombudsperson (Article 74): Citizens and foreigners resident in Turkey, on the condition of observing the principle of reciprocity, have the right to apply in writing to the competent authorities and to the Grand National Assembly of Turkey with regard to the requests and complaints concerning themselves or the public. <p>The CIMER has been providing a centralised complaint system for Turkish citizens, legal persons and foreigners. CIMER will be available to Project stakeholders as an alternative and well-known channel for conveying their Project-related grievances and feedback directly to the state authorities.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> The Project-specific SEP, including external and internal grievance mechanisms in line with the requirements of IFC PSs and EP4, developed as part of the ESIA will be implemented throughout the Project. Any grievance and feedback lodged/conveyed through CIMER and conveyed to the Project will be registered in the Project grievance and feedback database and managed as per Project SEP, as relevant. Grievances and feedback collected by the Project Owner or other related authorities and conveyed to the Contractor during the construction phase will be registered in the Project grievance and feedback database and managed as per Project SEP, as relevant. Employee satisfaction surveys will be conducted at frequencies to be set by the HR. The surveys will provide anonymous filling option. The surveys will include questions designed to collect employees' grievances and feedback with regard to subjects covered in Project HR Policy and Project's relevant implementations. In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 	Low to Negligible	Low to Negligible	Low to Negligible
Right to Life and Security of Person <ul style="list-style-type: none"> Individuals have the right not to be deprived of life arbitrarily or unlawfully. This includes the right to have one's life protected, for example, from physical attacks or health and safety risks. The use of force by security forces to protect company resources, facilities, or personnel. Operations that pose life-threatening safety risks to workers or neighbouring communities. 	Low	Moderate to Low	Moderate to Low	<p><u>Context</u></p> <p>The potential impacts of the Project on community H&S might stem from the below:</p> <ul style="list-style-type: none"> Risks on community H&S (public traffic and pedestrian) due to Project-related traffic Use of explosives and blasting operations Damage to existing local infrastructure Project infrastructure and safety risks Impacts of Project-related worker influx Community exposure to disease Risks and/or impacts due to use of hazardous materials Security personnel Emergency Preparedness and Response and Fire Risk <p>Chapter 13 on Community H&S includes detailed assessment of the above issues including the proposed mitigation measures. During the land preparation and construction, there will be security personnel appointed at the entrances and exits of the construction camp sites and as necessary other work sites as per the requirements of the Law on Private Security Services (Law No: 5188, 2004) and related secondary legislation. There may be local persons to be employed as security personnel as part of the Project. Detailed planning for the use of security forces during the operation phase will be done by the AYGM and TCDD in due course.</p>	Low to Negligible	Low to Negligible	Low to Negligible

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
				<p>As per the national law, private security officers are required to receive basic security trainings for not less than 120 hours, consisting of theoretical and practical trainings. The basic trainings are required to be renewed every 5 years. The private security basic training program includes the following courses, which includes effective communication techniques as well empathy and sympathy recommendations:</p> <ul style="list-style-type: none"> • Private Security Law and Immaterial Rights • Security Measures • Security Systems and Devices • Basic First Aid • Fire Safety and Natural Disaster Response Style • Information on Drugs • Effective Communication • Crowd Management • Person Protection (against the risk of assassination) • Relations with General Law Enforcement • Information on Weapon and Shooting Practice <p><u>Remedy</u></p> <ul style="list-style-type: none"> • Risk assessments tailored to each work activity will be conducted by certified H&S professionals (working at height, electrical works, working with hazardous materials, working in tunnels, excavation works, heavy lifting, etc.) and the precautions and mitigation measures identified in the risk assessments will be communicated by the Contractor to all direct and contracted Project personnel for site implementation. • Health unit/infirmarys will be provided at the construction camp sites as per the requirements of the applicable national legislation (e.g. workplace doctor and other health personnel will be provided in line with the legislative requirements according to hazard classes, in consideration of work shifts). • Adequate number of trained first aiders, with valid certifications from authorised institutions, will be provided at the work sites. Shifts and working arrangements will be accordingly. • Project-specific Community Health, Safety and Security Management Plan will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). • Project-specific Traffic Safety Management Procedure including both on-site and off-site traffic safety measures will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). All Project personnel/drivers, including the Contractor and subcontractors will be provided with training on the implementation of the Traffic Safety Management Procedure. These trainings will emphasise safety aspects among drivers. • Project-specific SEP including external grievance mechanism will be implemented throughout the Project. • Project-specific Emergency Preparedness and Response Plan (covering both on-site and off-site emergencies) will be developed and implemented. • In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
<p>Privacy</p> <ul style="list-style-type: none"> • Individuals have a right to be protected from arbitrary, unreasonable or unlawful interference with their privacy, family, home or correspondence and from attacks on their reputation. The State is allowed to authorise restrictions on privacy in line with international Human Rights standards, but ‘arbitrary’ restrictions are always prohibited. • Failing to protect the confidentiality of personal data held about employees or contract workers, customers or other individuals. 	Moderate to Low	High to Moderate	Moderate to Low	<p><u>Context</u></p> <p>The Law on the Protection of Personal Data (Law No. 6698, 2016) aims to protect fundamental rights and freedoms of people, particularly the right to privacy, with respect to processing of personal data and to set forth obligations, principles and procedures which shall be binding upon natural or legal persons who process personal data.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> • The Contractor will comply with and will require the subcontractors (through contractual requirements) to comply with the requirements of the Law on the Protection of Personal Data (Law No. 6698, 2016). • Project-specific HR Policy including statements on workers' right to privacy relevant to the particular business operations, will be developed and implemented in line with IFC Guidance Note 2. To this end, the Project-specific HR Policy will include the following: <ul style="list-style-type: none"> i) notification: notification to workers on the data collection process and the type of data collected; ii) purpose: the purpose of collecting the data iii) consent: data will not be disclosed without the worker's consent iv) security: data will be kept secure and confidential v) disclosure: workers will be informed as to who is collecting their data vi) access: workers will be allowed to access their data and make corrections to any inaccurate data; and 	Negligible	Low to Negligible	Low to Negligible

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
				<p>vii) accountability: workers will have a method available to them to hold data collectors accountable for following the above principles. Data will only be collected and used for reasons directly relevant to employment; all medical data remains confidential. If workers are being filmed, or will be body searched, or if other surveillance methods are to be used, they will be informed and the reasons explained for these procedures. Any such method will follow the principle stated above and will be conducted in ways that are not intimidating or harassing for the workers.</p> <ul style="list-style-type: none"> The Contractor will inform workers about the type of information that will be kept and how this information will be used. The Contractor will follow the requirements of the applicable national Law and inform workers to ensure that information is accurate, relevant and safe from improper disclosure. The Contractor will keep personnel files that reflect performance reviews and any complaints brought against the Project or individual employees. The Contractor will keep all final memoranda and correspondence reflecting performance reviews and actions taken by or against personnel in the employee's personnel file. The Contractor will require the subcontractors (through contractual requirements) to implement these measures for the personnel employed in the scope of the Project. As per IFC/EBRD's Guidance Note on Worker's Accommodation (2009), in collective rooms, which are minimised, in order to provide workers with some privacy, only a reasonable number of workers to be allowed to share the same room. In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
Rights Category – Economic, Social and Cultural							
Right to Education <ul style="list-style-type: none"> All children have the right to free and compulsory primary education. The right also includes equal access to education and equal enjoyment of educational facilities, among other aspects. The presence of child labour in a business or in its supply chain, where those children are unable to attend school (intersects with rights to be free from all forms of slavery). Limiting access to, or damaging, educational facilities through construction, infrastructure, or other projects. 	Low to Negligible	Moderate to Low	Moderate to Low	<p><u>Context</u></p> <p>The context for child labour has been presented under the Right Category (labour)</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> Project-specific Community Health, Safety and Security Plan that will identify the current access restriction issues (access to the centres of the districts, provinces, and social services, including access to educational facilities, if any) that have been caused by the previous construction works (with prioritisation in the construction schedule where needed and possible) and describe the management/resolution measures to be implemented to eliminate them, if feasible under the scope of Contractor's works and subject to the approval of the AYGM, will be developed and implemented. Project-specific SEP, including external grievance mechanism, will be implemented. The Contractor will consult and work with the mukhtars of the affected settlements to identify the locations where there are current and there may be potential future access restriction issues, including to educational facilities. These feedback and suggestions will be evaluated, and feasible measures will be planned, incorporated to the Community Health, Safety and Security Plan and implemented – subject to the approval of the AYGM – to eliminate existing access restriction impacts (if feasible under the scope of Contractor's works) and avoid/minimise access restrictions due to the Contractor's activities. Mobile schooling times will be taken into account for planning the transportation of construction materials. Work sites and access routes to be used by the contractors and subcontractors will be clearly described and communicated to avoid potential off-site impacts on local infrastructure, including educational facilities. In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 	None	Low to Negligible	None
Right to Health and Ecosystem <ul style="list-style-type: none"> Individuals have a right to the highest attainable standard of physical and mental health. This includes the right to have control over one's health and body, and freedom from interference. Failure to implement appropriate health and safety standards leads to long-term negative impacts on workers' health. Pollution from business operations can create negative impacts on the health of workers and/or surrounding communities. 	Low	High to Moderate	High to Moderate	<p><u>Context</u></p> <p>The OHS Law (Law No. 6331, 2012) of Turkey regulates the duties, authority, responsibilities, rights and obligations of the employers and employees for ensuring occupational health and safety at the workplaces and improving the existing conditions. In line with the international OHS standards, including IFC PS2, the OHS Law and related secondary legislation of Turkey specifies the requirements, principles and procedures for key health and safety aspects of the workers.</p> <p>The Environmental Law (Law No. 2872) of Turkey first came into force after being published in the Official Gazette No. 18132 dated 11 August 1983. It defines the main principles for the protection of environment in line with sustainable environment and sustainable development principles and relevant institutional responsibilities. Under its broad scope, it also provides the legislative framework for regulation of industries/facilities and their liabilities regarding the assessment and management of their potential impacts on the environment including permitting and information/declaration requirements.</p> <p>Environmental legislation has been developed under the Environmental Law to set out the procedures and principles for the management of specific environmental aspects and horizontal legislation. As part of the EU accession process, reforms including transposition of environmental legislation, enhancement of the institutional capacity and reorganisation of the institutional structure have been made to ensure harmonisation and alignment with the EU environmental acquis.</p>	Negligible	Low to Negligible	Low to Negligible

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
				<p><u>Remedy</u></p> <ul style="list-style-type: none"> The Project will have in place Occupational H&S (OHS) Plan and Community H&S (CHS) Plan. The Project-specific OHS Plan will cover Fitness to Work and Health Units and Personnel. As each construction subcontractor will be engaged in the Project activities over a limited duration for the 42 months construction period, the adverse risks or impacts of off-site accommodation on the nearby district centres, such as increased demands on infrastructure, services and utilities, development of illicit trade activities, inflation in local rent and other subsistence items or risk of GBVH, as well as the potential benefits on the economies of the nearby settlements, are anticipated to be temporary. Potential impacts of off-site accommodation during the construction phase will be managed through the development and implementation of the Project-specific Labour Management Plan covering off-site accommodation. Contractor and subcontractor personnel using off-site accommodation facilities will be provided with special training on, inter alia, Project's Social Policy and Contractor's Code of Conduct to communicate Project's approach to prevention of GBVH and raise awareness among the Project personnel. As part of internal audit system to be established and implemented by the Contractor during the construction phase, potential risks of impacts of the Project due to off-site accommodation will be monitored and managed. Such risks will further be continuously monitored, evaluated and managed through the external and internal grievance mechanisms to be operated as part of Project SEP implementation. On-site infirmary service will be provided at the construction camp sites for direct and contracted employees in order to reduce the load on public health facilities. The medical personnel and facilities to be provided on-site will meet the requirements of the applicable national legislation. COVID-19 pandemic related risks on Project personnel, will be managed through a separate COVID-19 EPRP that will be prepared by the Contractor in line with the Interim Advice of IFC (May 2020) for IFC Clients on Developing a COVID-19 EPRP. This EPRP will also be communicated and endorsed to subcontractor personnel. Medical checks will be conducted for all Project personnel (direct and contracted) at the beginning of employment and then periodically. A Project-specific Camp Site Management Plan will be developed and implemented and the accommodation conditions at the construction camp sites will meet the requirements of IFC/EBRD's Guidance Note on Worker's Accommodation (2009). Besides technical facilities, the labour-related facilities that will be provided at the construction camp sites will include the following: <ul style="list-style-type: none"> Dormitories (for engineers, foremen and workers) Water supply, waste and wastewater management facilities (water wells or water supply lines, temporary waste storage areas, package wastewater treatment units/plants or septic tanks or sewerage connection lines in areas where sewerage infrastructure is present, as appropriate) Social facilities (television room, gym, prayer rooms, etc.) Cafeteria and dining halls Infirmary Parking area With regard to pollution prevention as per the requirements of the Environmental Law (Law No. 2872, 1983) and secondary legislation including regulation on management of waste, wastewaters, noise, air emissions, etc and the international standards and GIIPs including the IFC PS3 and WBG General and Industry-specific EHS Guidelines, the following environmental management plans will be developed and implemented in the Project: <ul style="list-style-type: none"> Air Quality and GHG Management Plan Erosion Control and Management Plan Hazardous Materials Management Plan Noise and Vibration Management Plan Waste Management Plan (covering COVID-19 related wastes) Water and Wastewater Management Plan 			
<p>Right to Participate in the Cultural Life of the Community</p> <ul style="list-style-type: none"> Individuals have a right to take part in the cultural life of society and enjoy the benefits of scientific progress, especially disadvantaged groups. Project activities could impact this right by separating groups from areas of cultural importance and knowledge, or by damaging their cultural heritage. 	Moderate to Low	High to Moderate	High to Moderate	<p><u>Context</u></p> <p>As per Article 63 of the Constitution of the Republic of Turkey, "The State shall ensure the protection of the historical, cultural and natural assets, and shall take supportive and promotive measures towards that end".</p> <p>In line with the Constitution, movable and immovable cultural and natural assets are protected and shall be conserved under the Law on the Conservation of Cultural and Natural Property (Law No: 2863,1983). The Law stipulates that persons that discover movable and immovable cultural and natural property, owners, proprietors or occupants that know or have recently found out about the existence of cultural and natural property on the land they own or use shall be obliged to notify the nearest museum directorship or the village headman or the local administrators of other places within at the latest three days.</p>	Low to Negligible	Low to Negligible	Low to Negligible

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
				<p>The Project does not propose to use the cultural heritage, including knowledge, innovations, or practices of local communities for commercial purposes (examples include, but are not limited to, commercialisation of traditional medicinal knowledge or other sacred or traditional technique for processing plants, fibres, or metals).</p> <p>As part of the ESIA process, the baseline conditions of the tangible cultural heritage elements within the study area have been characterised based on the findings of the desktop review and field surveys carried out by qualified experts (senior archaeologists). To this end, registered and non-registered tangible cultural heritage elements within the cultural heritage study area (as defined in ESIA Chapter 14) have been identified.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> In line with Article 4 of the Law on Conservation of Cultural and Natural Properties (Law No. 2863, 1983), the Contractor will notify the responsible Museum Directorates or Regional Councils for the Conservation of Cultural Property about the archaeological sites and immovable cultural heritage assets, including registered and non-registered sites, identified within the study area. Following the notifications to be made by the Contractor in line with Article 4 of the Law on Conservation of Cultural and Natural Properties (No. 2863, 1983), appropriate measure(s) will be taken in line with the official decisions of the cultural heritage authorities. Project-specific Cultural Heritage Management Plan (CHMP), including the Chance Find Procedure, will be implemented by the Contractor and subcontractors (through contractual requirements) throughout the construction phase. A Project-specific Camp Site Management Plan will be developed and implemented during the construction phase. Besides technical facilities, the labour-related facilities that will be provided at the construction camp sites will include adequate social facilities. The restrictions and freedom of movement for the workers accommodating camp sites will be duly planned within the scope of the Camp Site Management Plan so as to avoid any impact on the human rights of the workers and adverse social, cultural or health, safety and security related impacts on the local communities due to potential worker-community interactions. 			
<p>Right to Water</p> <ul style="list-style-type: none"> Individuals have the right to water and sanitation. Companies cutting off access to existing water supplies, or making existing supplies non-potable, undermine the right to water (intersects with the right to health). 	Low to Negligible	Moderate to Low	Moderate to Low	<p><u>Context</u></p> <p>The Water Pollution Control Regulation (WPCR) is the key legislation establishing the legal and technical principles to prevent water pollution. There are other regulations and communiques in place for the protection of surface water and groundwater resources and management of wastewater, which will be applicable to the Project.</p> <p>Sakarya River and Gediz River are the major surface water resources in the vicinity of the Project route. All other rivers and creeks are tributaries of these rivers. The Project will cross rivers and/or creeks at several locations.</p> <p>For the characterisation of the baseline water quality of the major surface water resources along the railway route, a water quality sampling program was conducted as part of the ESIA.</p> <p>As reported in the national EIA Report of 2006, the groundwater table is usually very deep along the entire Project route. On the other hand, at certain locations, it is observed that the groundwater table is closer to the surface.</p> <p>Drinking water for Project personnel will be either supplied as bottled water or from other available permitted resources (e.g. groundwater wells) after ensuring compliance with applicable drinking water quality standards, where necessary through adequate level of treatment. Water required for construction works (for dust suppression, concrete production, preparation of fill materials, etc.) is planned to be supplied from groundwater wells in line with the groundwater utilisation permits to be obtained from DSI or purchased from nearby settlements by means of water tankers.</p> <p>Domestic wastewater to be generated by the construction workforce will be managed by means of package domestic wastewater treatment plants to be established at the construction camp sites and/or non-leaking septic tanks at work sites (e.g. quarries, concrete plants, etc.) where the number of personnel is relatively low (84 or lower). As necessary, mobile WCs will also be provided at remote works sites.</p> <p>Domestic wastewater to be generated within the high-speed trains by the passenger and personnel and at the TCDD offices, HSR control centre (in Izmir), other operational facilities including stations/gars, O&M facilities (to be operated by the TCDD) by the Project personnel and third-parties/visitors will be managed in line with the requirements of the Water Pollution Control Regulation and other applicable legislation (through connection to the sewerage system, domestic wastewater treatment plans and/or non-leaking septic tanks depending on the location of the operational facilities and number of people to be served). Detailed planning of the O&M works, including the workforce requirements (direct and contracted) at each operational facility and estimated number of passengers/people to be served at each location (e.g. stations/gars) will be done by the Employer and the Operator in due course.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> Drinking water for Project personnel will be either supplied as bottled water or from other available permitted resources (e.g. groundwater wells) after ensuring compliance with applicable drinking water quality standards, where necessary through adequate level of treatment. Domestic wastewater to be generated by the Project workforce will be treated at the package domestic wastewater treatment plant to be installed at the construction camp sites or collected in non-leaking septic tanks for further disposal. 	Negligible	Low to Negligible	Low to Negligible

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
				<ul style="list-style-type: none"> The permitting requirements (i.e. environmental permit) for treated domestic wastewater discharges will be fulfilled in line with the applicable national legislation. Domestic wastewater in septic tanks/mobile WCs will be disposed of by means of vacuum trucks as per the agreements/protocols to be executed with the related municipalities/licensed companies. Engineering structures (e.g. viaducts, culverts, bridges) will be constructed to ensure continuity flow of water along the Project route. Design of the engineering structures will be compliant with the Technical Specifications of AYGM for Infrastructure Works and other applicable standards. Groundwater utilisation permits for the use of groundwater for drinking water purposes and construction activities will be secured from the related authorities. Detailed planning for water supply within the high-speed trains and at the O&M facilities will be done by the Employer and the Operator in due course in line with the requirements of the Project Standards. 			
Social Insurance <ul style="list-style-type: none"> This right obliges the State to create and maintain a system of social security that provides adequate benefits for a range of issues (such as injury or unemployment). 	None	Moderate to Low	N/A	<p><u>Context</u></p> <p>The Social Insurance and General (Universal) Health Insurance Law (Law No. 5510, 2006) of Turkey determines the rights of beneficiaries and provides for general rules for the functioning of the insurance system and funding conditions. Also contains provisions on employers and workplaces, short-term and long-term insurances. The Law aims to provide social security coverage for workers. The Law applies to workers registered with the Social Security Institution, i.e. those with insurance premiums paid.</p> <p>The social security system in Turkey is predominantly similar to Bismarck model, one of four basic insurance systems which are Continental Model (Bismarck), Liberalistic Model (Beveridge), Northern European Model and Mediterranean Model. Bismarck Model refers to a system where the premiums paid over the wages of employees according to their insurance status are collected in a joint pool and the benefits are provided based on the paid premiums only when old-age pension is entitled. The amount of the benefits to be granted to the insurance holders in cases of retirement, accident and sickness varies by the income they previously had. The main actors in this system are employees, employers and representatives in public sector (http://www.sgk.gov.tr/wps/portal/sgk/en/detail/social_security_system).</p> <p>The Unemployment Insurance Law (Law No. 4447, 1999) provides for the establishment of the unemployment insurance scheme and requires employers to report number of workers and dismissals, and provides for payment of contributions and benefits.</p> <p>The Social Insurance and General Health Insurance Law defines an occupational accident and an occupational disease in a rather different way than the OSH Law, as its scope is compensation. The diagnostic procedure and notification of occupational diseases are described in detail in the Social Insurance Law, as well as the details of benefits and compensation of the workers in case of permanent incapacity due to occupational disease or an accident. It not only applies to occupational accidents and occupational diseases, but to all other forms of social security implementations, such as marriage, maternity, retirement and treatment of general health problems.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> Project-specific Labour Management Plan will be developed and implemented throughout the Project. The Plan will address strict requirements for the registration of the Project employees (direct and contracted) in the Social Security System of Turkey as per the Social Insurance and General Health Insurance Law (Law No. 5510, 2006). The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with the Labour Management Plan (registrations, salary and regular premium payments, etc.) during the construction phase. In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 	None	None	N/A
Rights Category – Group Rights/Heightened Risk of Vulnerability							
Children's Rights <ul style="list-style-type: none"> The Convention on the Rights of the Child establishes global standards to ensure the protection, survival, and development of all children, without discrimination. Permitting children to work in a manner that is inconsistent with international labour standards (intersects with prohibition on child labour and right to education). 	Low to Negligible	Moderate to Low	N/A	<p><u>Context</u></p> <p>Turkey has ratified 59 ILO conventions (see Chapter 2.3), which includes conventions on child labour and minimum age (https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm).</p> <p>The Labour Law (No. 4857, 2003) of Turkey is aligned with the international labour standards and IFC PS2 requirements regarding child labour and inherently provides the basic principles of international labour standards for the management of child labour risks.</p> <p>In sectors such as construction where high numbers of unskilled workforce are involved, practical alignment with the labour standards in certain areas including child labour, require further improvement to ensure full compliance with the international standards.</p> <p>Working age and restriction on the employment of children in Turkey is governed by Article 71 of the Labour Law (No. 4857, 2003). As per the Law, employment of children who have not completed the age of 15 is prohibited. However, children, who have completed the full age of 14 and their primary education, are allowed to work on light works that will not hinder their physical, mental and moral development and that will not prevent their school attendance for those who continue their education.</p>	None	Low to Negligible	N/A

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
				<p>In line with the Labour Law (No. 4857, 2003), the Regulation on the Procedures and Principles of Employing Children and Young Workers determines the types of works, where employment of children and young employees who have not completed the full age of 18 is prohibited, and the works where young employees who have not completed the age of 18 may be permitted to work, as well as the light works and working conditions in which children who have completed the age of 14 and their primary education may work.</p> <p>In the OHS Law (No. 6331, 2012), those who have completed the age of 15 but have not completed the age of 18 are defined as young employees.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> Project-specific HR Policy that covers, inter alia, child labour and minimum age aspects, will be developed and implemented in line with IFC Guidance Note 2. Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and labour aspects including child labour and works permitted by law for workers under the age of 18, etc. at the time of employment (refresher training will be provided annually and as required). The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with the child-labour related requirements of the following Project-specific documents: <ul style="list-style-type: none"> HR Policy Subcontractor Management Plan Labour Management Plan Internal Grievance Mechanism as part of Project SEP In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
<p>Disability Rights</p> <ul style="list-style-type: none"> The Convention on the Rights of Persons with Disabilities promotes global standards intended to protect the rights and dignity of people with disabilities in and outside of the workplace. 	Moderate to Low	Moderate to Low	N/A	<p><u>Context</u></p> <p>The Labour Law (No. 4857, 2003) of Turkey is aligned with the international labour standards and IFC PS2 requirements with regard to equal treatment of employees, gender equality and inherently provides for the basic principles of international labour standards for non-discrimination. The Law adopts the principle of equal treatment and stipulates that no discrimination based on language, race, colour, gender, disability, political opinion, philosophical belief, religion and sect or similar reasons is permissible in the employment relationship. The requirement to employ disabled persons is covered by the Labour Law. In establishments employing fifty or more employees, employers shall employ disabled persons, ex-convicts, and victims of terror – who must be engaged in work in accordance with the relevant provisions of the Law on Struggle Against Terrorism (Law No. 3713, 1991)- and assign them to jobs consistent with their occupational skills and physical and mental capacities.</p> <p>As part of the ESIA, a total of 28 interviews were conducted with the vulnerable persons and women who live in settlements affected from the Project in order to reflect vulnerabilities and gender-sensitive issues to the Project planning and Environmental and Social Management System (ESMS).</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> The Project-specific SEP, including external and internal grievance mechanisms in line with the requirements of IFC PSs and EP4, developed as part of the ESIA will be implemented throughout the Project. The Project SEP requires the following to ensure engagement with vulnerable groups/persons through specialised methods: <ul style="list-style-type: none"> Focus group discussions/ separate informative meetings. Grievance and feedback boxes, forms and guidance documents posted/placed at places commonly and comfortably visited by women and vulnerable persons. The construction camp site and O&M facility (including stations/gars) designs will take into consideration the basic rights of the personnel, visitors, etc. with disabilities (e.g. accessibility) 	Low to Negligible	Low to Negligible	N/A
<p>Migrants Rights</p> <ul style="list-style-type: none"> The International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families establishes how migrant workers, and their families should be protected. Providing dormitories for migrant workers that lack proper hygienic safety standards (intersects with rights to 	Low to Negligible	Moderate to Low	N/A	<p><u>Context</u></p> <p>As per ILO Turkey statistics, as of 2020, Turkey has been the highest refugee hosting country in the world for the seventh consecutive year. According to United National High Commissioner for Refugees (UNHCR), as of 31 December 2019, the number of Syrians in Turkey was 3,576,370. According to the UNHCR, a large part of Syrians in Turkey work in construction, manufacturing, and service sectors and more than 97% of the Syrians in Turkey are working informally (UNHCR, 2020. Syrian Barometer for 2019).</p>	Negligible	Low to Negligible	N/A

Human Rights Issue	Risk to Workers		Risk to Affected Community Members	Context and Proposed Remedy	Residual Risk to Workers		Residual Risk to Affected Community Members
	Direct Workers	Contracted Workers			Direct Workers	Contracted Workers	
health, safety, and adequate standard of living).				<p>The majority of refugees are employed in the manufacturing sector, mainly in the textile industry, as well as in construction and trade and hospitality sectors. 13.2% of Syrian refugees work in the construction sector. Syrian workers are concentrated in a few provinces including Istanbul (46%), Adana (9%), Bursa (9%), Gaziantep (7%), Hatay (5%), Konya (4%) and Izmir (3%)¹²⁷.</p> <p>As part of the ESIA social surveys, no Syrian population has been identified in the settlements affected from Project-related land acquisition.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> Project-specific Camp Site Management Plan, setting out the on-site accommodation conditions will be developed and implemented at Contractor and Subcontractor (main and lower-tier including subcontractors employing migrant workers, if any) construction camp sites (through contractual requirements), addressing the relevant requirements of IFC/EBRD's Guidance Note on Worker's Accommodation (2009). The Project-specific Labour Management Plan will cover off-site accommodation conditions and requirements for the Contractor and subcontractor personnel, including migrant workers, if any. The Contractor will develop and implement an internal audit system to check and monitor compliance of the subcontractors (main and lower-tier) with Project Standards on-site accommodation as set out in the Camp Site Management Plan and the requirements of the Labour Management Plan covering the off-site accommodation aspects. In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 			
<p>Women's Rights</p> <ul style="list-style-type: none"> The Convention on the Elimination of all Forms of Discrimination Against Women exists to promote women's rights and their protection. 	Moderate to Low	High to Moderate	High to Moderate	<p>As part of the ESIA, a total of 28 interviews were conducted with the vulnerable persons and women who live in settlements affected from the Project in order to reflect vulnerabilities and gender-sensitive issues to the Project planning and ESMS.</p> <p><u>Remedy</u></p> <ul style="list-style-type: none"> The Project-specific SEP, including external and internal grievance mechanisms in line with the requirements of IFC PSs and EP4, developed as part of the ESIA will be implemented throughout the Project. The Project SEP requires the following to ensure engagement with women through specialised methods: <ul style="list-style-type: none"> Focus group discussions/ separate informative meetings. Grievance and feedback boxes, forms and guidance documents posted/placed at places commonly and comfortably visited by women and vulnerable persons (the external grievance and feedback mechanism to be established as per Project SEP provides for the option of submitting grievances and feedback anonymously (see Chapter 16 on Stakeholder Engagement). There will be female members within the Contractor site CLO team. Contractor and subcontractor personnel will be provided with training on Project's Social Policy and Contractor's Code of Conduct covering Project's approach to prevention of the GBVH and SHA, at the time of employment (refresher training will be provided annually and as required). Trainings will cover, inter alia, the following <ul style="list-style-type: none"> Definition of violence against women in national and international documents, Types of violence (physical, sexual, economic, emotional), and Legal sanctions. Project CLOs and Contractor's HR team will be specially trained on GBVH and SHA. In case GBVH or SHA is reported through the internal grievance mechanism, this will be investigated by trained investigators and responded in accordance with current GIIPs. The construction camp, facility and remote work site and the O&M facility designs will take into consideration gender-related GBVH hotspots for personnel, visitors and suppliers. In consideration of the remedies to be implemented by the Contractor during the construction phase, the Employer/Operator will establish and implement necessary mechanisms for the management of human rights impacts and risks of the Project in line with the Project Standards throughout the operation phase. 	Negligible	Low to Negligible	Low to Negligible

¹²⁷ https://www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-ankara/documents/genericdocument/wcms_738618.pdf

18. ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

The Project E&S Management System (ESMS) has been developed as part of the ESIA process to provide a structured approach for the management of Project-specific environmental and social (E&S) issues in line with the Project Standards set by applicable national legislation, and IFC Policy and performance standards (PSs) on E&S Sustainability (2012), Equator Principles (EP4) (2020), OECD Common Approaches (2016) and UKEF E&S and Human Rights Policy. The Project ESMS intends to provide an appropriate approach to the management of E&S performance in line with the nature and scale of the Project.

A solid and well-functioning ESMS is made up of interrelated parts and is only valuable when it is well-implemented. The main approach in development and implementation of ESMS is to ensure consistency of all adopted E&S processes and procedures throughout the Project across all parties including direct and contracted personnel.

The key elements of an effective ESMS are listed below:

- Project-specific Policy
- Identification of Risks and Impacts
- Management Programs (ESMMFP, E&S Management/Action Plans and Procedures)
- Organisational Capacity and Competency
- Emergency Preparedness and Response
- Stakeholder Engagement
- External Communications, Grievance Mechanism and Ongoing Reporting to Affected Communities
- Monitoring and Review

The Project has an Environmental Impact Assessment (EIA) Report prepared in 2006 in line with the national EIA Regulation in force that time. The potential E&S risks and impacts of the current Project, including associated facilities, are assessed as part of this ESIA Report to develop the appropriate strategies and address the identified risks and their potential impacts. For each E&S topic, the magnitude of potential impacts has been identified through an established methodology taking into account the sensitivity of the receptor/resource and the overall magnitude of the impacts as a factor of geographic extent, duration, reversibility and frequency. The significance of residual impacts has then been identified through consideration of mitigation/management measures to be implemented (see Chapter 4 “ESIA Methodology” for further details).

The measures required for the management of potential Project E&S impacts, as per the applicable national legal requirements and international standards, have been reflected within the E&S Management and Monitoring Framework Plan (ESMMFP) of the Project, which is presented in Section 18.3. Based on the ESMMFP, subject-specific E&S management/actions plans and procedures for the construction will be developed by the Contractor as necessary for the scope of works and responsibilities of the Contractor per the Construction Contract. Similarly, the Employer/Operator will develop subject-specific E&S management/actions plans and procedures for the operation phase based on the Project ESMMFP and their institutional regulations, guidelines, specifications, etc.

The Project specific E&S policies, procedures, management/action plans as set out in the ESMMFP will be endorsed to contractors (during the operation phase), subcontractors, third parties and supply chain as relevant. During the construction phase, the Contractor is responsible for ensuring implementation of the ESMS by all Project personnel, including direct and contracted employees engaged in the Project. This will be achieved through contractual requirements. The infrastructure works ongoing under the responsibility of other contractors (as defined in the Executive Summary and Chapter 1) in Section 3a, Section 3b, Section 4a, and Section 4d as of Q2 2021 are in line with the applicable national legislation and contractual requirements of the TCDD. The Project-specific E&S Policy, procedures, management/action plans being implemented by those contractors and information on their organisational structure and ESMS teams, if any, are not available to the Contractor at the time of compilation this ESIA Report.

During the operation phase, implementation of the ESMS will be under the responsibility of the Employer/Operator.

The ESMS will allow for adaptive management of changes or unforeseen circumstances through a review and update system, to the extent possible. To this end, the ESMS will be continually improved and modified through

ongoing reviews to be conducted both periodically and in case of a major change in the Project's E&S conditions that may prompt an immediate review (e.g. change in applicable standards and legislation, design change, organisational change). The results of monitoring and review will also be reflected in management program updates.

18.1. Project-specific Policy

The cornerstone of the ESMS is the set of policies where the Project commitments on managing E&S and H&S risks and impacts are summarised. The following Project-specific E&S policies will be developed and implemented throughout the construction phase:

- Environmental Policy
- Community Health, Safety and Security Policy (CHSS) (including Use of Force Policy)
- Occupational Health and Safety (OHS) Policy
- Human Resources (HR) Policy
- Human Rights Policy
- Social Policy
- Quality Policy
- Information Protection Policy

During the construction phase, the E&S policies will be clearly communicated internally and externally through posting at work and accommodation sites, as appropriate and publishing at the Project/Contractor internet site.

Senior management commitment will be ensured for continual improvement. Policies will be referred to as rules, through which internal and external stakeholders will be informed on what is allowed and what is not allowed regarding management of Project's E&S aspects/issues such as labour and working conditions including occupational health and safety, resource efficiency and pollution prevention, community health, safety and security.

The Contractor (through ERG Construction as one of the JV companies and the JV leader) has in place Quality, Occupational Health and Safety and Environment Policy (<http://erg-insaat.com.tr/eng/Kurumsal.aspx>). This Policy commits to following for all kinds of infrastructure, superstructure and contracting activities to be performed by the company, which will set out the framework of the Project-specific E&S policies to be developed by the Contractor.

- To comply with the relevant legislation in force, administrative regulations and legal requirements,
- To ensure the highest level of customer satisfaction based on an understanding of, timely, accurate and implement completion of the work,
- To determine the Safety, Occupational Health and Environment-related hazards and their effects, emerging as a result of our activities,
- To eliminate or minimise the losses that these harmful effects cause to human and environment.
- Minimizing the pollution caused by the resulting waste and take measures to prevent pollution.
- To follow-up closely and delicately the related hazards and take measures to minimise them, in order to prevent occupational diseases, business and environmental accidents.
- To ensure the continuity of the training of our staff on quality, safety and environmental management systems. To increase their awareness on related issues and to encourage participation and teamwork. In doing so to contribute to the formation of this consciousness among the customers, suppliers and related parties.
- To ensure the continuous improvement of systems by maintaining awareness, participation, unity of purpose and effective controls.
- To carry on its activities with the purpose of leaving a healthy, liveable environment for the future generations without letting them forget the nature.

The JV companies have in place the management system certifications listed in Table 18-1.

Table 18-1. Existing Management System Certifications

JV Company	Type of Certification (see Appendix F)	Issue Date	Expiry Date	Certification Applicable to
ERG Construction	ISO 9001:2015 Quality Management System	16 April 2020	26 April 2023	Design, engineering, consultancy, construction and contracting services of infrastructure, energy superstructure, and industrial facilities
	ISO 14001:2015 Environmental Management System	16 April 2020	26 April 2023	
	ISO 45001:2018 OHS Management System	16 April 2020	26 April 2023	
SSB AG	ISO 9001:2015 Quality Management System	17 September 2019	6 September 2021	Design, engineering, consultancy, construction and contracting services of infrastructure, energy superstructure, and industrial facilities
	ISO 14001:2015 Environmental Management System	17 September 2019	6 September 2021	
	ISO 45001:2018 OHS Management System	17 September 2019	6 September 2021	

The Employer/Operator, in addition to their existing policies, will develop and implement E&S policies as necessary for compliance with Project Standards.

18.2. Identification of Risks and Impacts

A full-scale EIA process was conducted for the Project back in 2005 as per the EIA Regulation in force at that time (the current EIA Regulation is dated 2014). The relevant EIA Positive Decision was issued by the MoEU (Ministry of Environment and Forestry back then) in March 2006.

This ESIA Report has been prepared in line with the Project Standards to identify and assess the risks and impacts of the Project according to its current status and design, including Project/associated facilities to the extent information is available. The risk and impact identification process has been based on up-to-date E&S baseline data collected by qualified experts and accredited laboratories as part of the ESIA process. Baseline E&S data for relevant subjects are presented in the respective chapters of this ESIA Report.

The impact assessment as part of the ESIA Report has been conducted based on a systematic methodology compliant with internationally accepted standards as set out in Chapter 4. International Good Practice/Guidance Notes and Handbooks given in Chapter 2 ("Institutional and Legal Framework") have been taken into consideration for the identification and assessment of relevant E&S risks and impacts of the Project, as applicable.

All relevant E&S subjects covered in the national legislation as well as applicable international standards, including World Bank Group (WBG) general and sector-specific environmental, health and safety (EHS) Guidelines, are addressed in the respective chapters of the ESIA, as listed below:

- Land Use and Geology (Chapter 5)
- Noise and Vibration (Chapter 6)
- Air Quality and GHG Emissions (Chapter 7)
- Water and Wastewater Management (Chapter 8)
- Waste Management (Chapter 9)
- Biodiversity (Chapter 10)

- Socio-economy (Chapter 11)
- Labour and Working Conditions (Chapter 12)
- Community Health and Safety (Chapter 13)
- Cultural Heritage (Chapter 14)
- Cumulative Impact Assessment (Chapter 15)
- Human Rights Impact Assessment (Chapter 17)

The potential Project risks and impacts stemming from the associated facilities located within and outside the expropriation corridor have been included in the ESIA study to the extent information was made available up until ESIA design freeze during Scoping Phase. Any new facilities (e.g. quarries, subcontractor camp sites, etc.) to be included within the Project will require identification of potential site-specific E&S impacts and management measures (e.g. including field surveys to be conducted for biodiversity, cultural heritage prior to entry into such new areas).

As noted, the infrastructure works in Section 3a, Section 3b, Section 4a, and Section 4d are currently ongoing in line with the applicable national legislation by three different contractors assigned by the TCDD. The ESIA Report covers these sections to the extent information is available/applicable. Field/walkover surveys and assessments, in addition to the studies conducted as part of this ESIA as presented in the respective ESIA chapters, will be conducted once authorisation of access to these sections is in place after the sites are handed over by the Employer to the Contractor. To this end, an E&S Audit¹²⁸ will be carried out in line with IFC Performance Standards (2012) at the time these sections of the Project will be handed over to the Contractor (ERG JV) for the superstructure works. Following this audit, a Management and Corrective Action Plan will be developed and implemented for these sections of the Project.

¹²⁸ Such an E&S Audit would be devised and implemented in line with the objectives of IFC GN30. Accordingly, the E&S Audit would identify through desktop study and field surveys outstanding/ongoing/retrospective issues, impacts, risks and/or grievances in Section 3 and Sections 4a and 4d and define the management measures or corrective actions required to be implemented.

18.3. Environmental and Social Management and Monitoring Framework Plan (ESMMFP)

The Project's strategy for the management of E&S risks and impacts is founded on a mitigation hierarchy favouring the avoidance of risks and impacts over minimisation, and compensation/offset where residual impacts remain, if technically and financially feasible.

Management programs consist of Project-specific policies and management/action plans/procedures targeting avoidance, minimisation or offset/compensation of the risks and impacts identified within the ESIA process. The ESMMFP incorporates the management/mitigation measures described in the respective chapters of this ESIA Report, along with relevant monitoring/key performance indicators for successful implementation.

Based on the ESMMFP, specific E&S management plans and procedures will be developed for the construction phase by the Contractor (Contractor may delegate this to qualified experts/other parties, as appropriate) as necessary for the scope of works and responsibilities of the Contractor per the Construction Contract prior to start of construction works as demonstrated in Figure 18-1. This said, the following E&S management/action plans will be under the Employer's/Operator's responsibility:

- Biodiversity Action Plan (BAP)
- Cultural Heritage Management Plan (CHMP)
- Resettlement Action Plan (RAP)
- Stakeholder Engagement Plan (SEP)

The Employer/Operator will develop subject-specific E&S management/actions plans and procedures for the operation phase based on the Project ESMMFP and their institutional regulations, guidelines, specifications, etc.

Consistent with the Construction Contract, costs associated with the E&S management/action plans that are under the responsibility of the Employer/Operator and any costs associated with changes to scope of works (including re-alignment) arising from geological and/or geotechnical risks shall be borne by the Employer.

The Contractor (through ERG Construction as one of the JV companies and the JV leader) has in place a set of E&S management plans and procedures developed for the construction of a large-scale motorway project in Turkey. Those plans and procedures will be the basis of the specific E&S management plans and procedures to be developed for the Ankara-Izmir HSR Project as necessary for the scope of works and responsibilities of the Contractor per the Construction Contract.

The Contractor (during the construction phase) and the Employer/Operator (during the operation phase) will require all Project employees, both direct and contracted, to implement the applicable requirements of the ESMMFP and the specific E&S management plans and procedures to be developed for the Project.

As part of the adaptive management process, results of monitoring and review will be reflected in management program updates. Appropriate mechanisms (e.g. integration to contracts, training provided at the time of employment and refreshed periodically, posting at proper locations, etc.) will be established to ensure that all Project personnel are informed of and trained on the current versions of each management/action plan and procedures, as necessary.

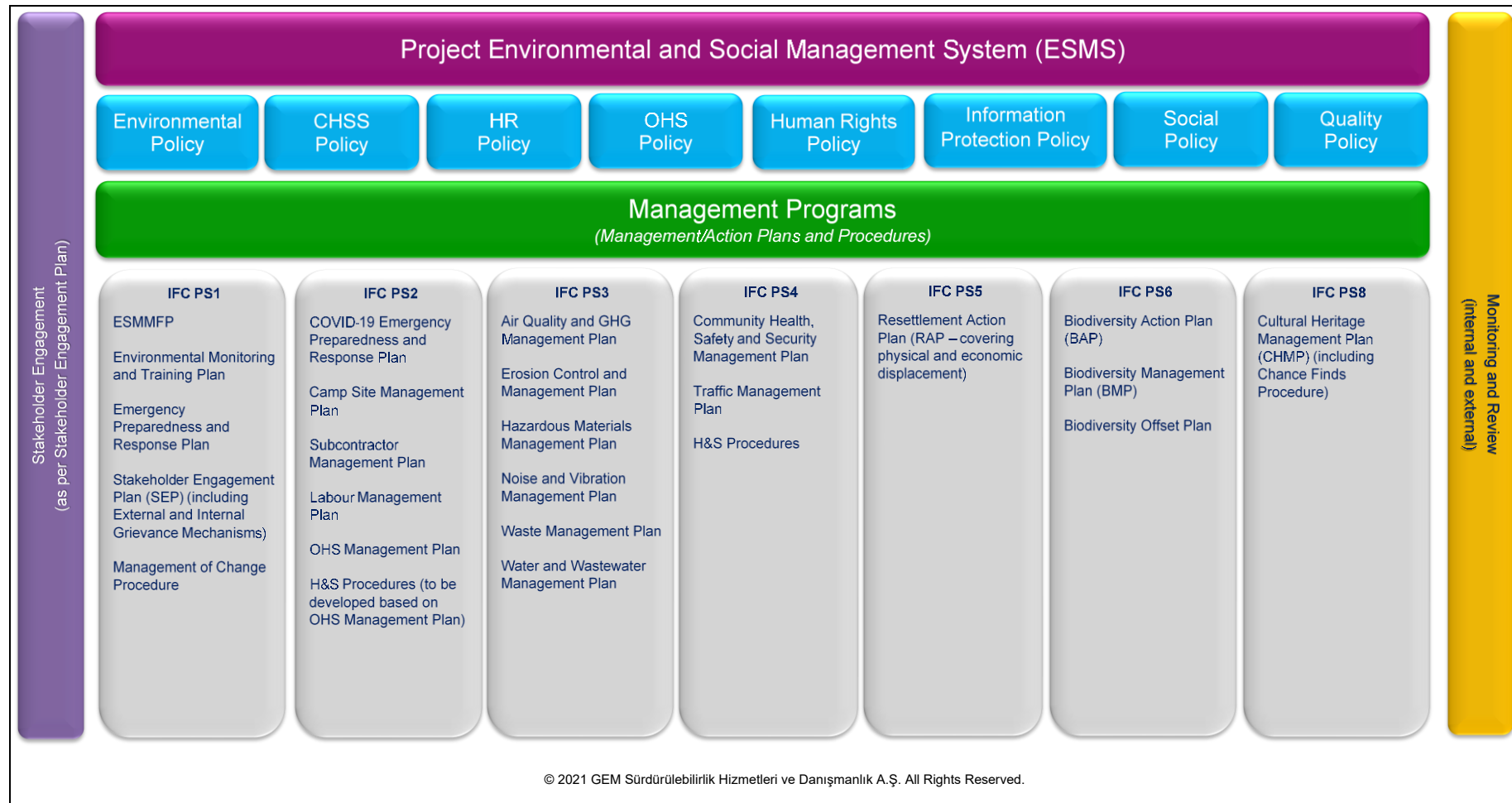


Figure 18-1. Management Programs under Project ESMS Implementation

The H&S procedures of the Contractor (through ERG Construction as one of the JV companies) to be adapted to the construction phase include, but are not limited to the following:

- Accident Incident Notification and Reporting Procedure
- Emergency Response Procedure
- Equipment Control and Maintenance Procedure
- Excavation Backfilling Procedure
- Health and Safety Discipline Procedure
- Health and Safety Trainings Implementation Procedure
- Hot Work Procedure
- Journey Safety and Safe Driving Procedure
- Lifting Work Procedure
- Machinery Protection Procedure
- Manuel Handling Procedure
- Night Work Procedure
- Permit to Work Procedure
- Personal Protective Equipment Procedure
- Scaffold and Ladder Usage Procedure
- Spill Interference and Contaminated Soil Management Procedure
- Traffic Safety Management Procedure
- Warning Signs and Barrier Procedure
- Working at Height and Fall Protection Procedure
- Working in Confined Space Procedure

The H&S procedures for the operation phase will be developed and implemented by the Employer/Operator, as necessary for the scope and nature of the O&M works.

The Environmental and Social Management and Monitoring Framework Plan (ESMMFP) is shown in Table 18-2. The responsibilities of the Employer/Operator and the Contractor (for the construction phase) based on the foregoing contractual framework are presented in the stand-alone Project ESMMFP.

Table 18-2. Project Environmental and Social Management and Monitoring Framework Plan

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
Land Use and Geology				
Changes in existing land use (agricultural, pasture and forest) due to Project infrastructure works along the Railway corridor	• Land Preparation and Construction	<ul style="list-style-type: none"> Agricultural lands Pasture lands Forest lands 	<ul style="list-style-type: none"> Land preparation and construction works will be conducted at designated sites that will be visibly and appropriately marked. Training will be provided to the construction personnel (direct and contracted) so that they maintain the pre-established construction boundaries. Project-specific Stakeholder Engagement Plan (SEP) will be implemented to address any grievance related to damage on off-site land (e.g. lands adjacent to the expropriation corridor or the access roads) and plan/take corrective actions, where necessary. In case of direct or indirect damage to adjacent state or privately owned lands as a result of Project-related activities, the Contractor will ensure that necessary corrective measures are taken as per the requirements of the related authorities and in consultation with the owners of the affected parcels. The Project-specific Resettlement Action Plan (RAP) will be implemented. 	<ul style="list-style-type: none"> Records on trainings covering designated work sites and Project boundaries Consultation records with the owners of the affected parcels Resettlement Action Plan (RAP) implemented No grievances related to damage on off-site land to be received or any and use related grievance resolved in line with Project SEP
Changes in existing land use (agricultural, pasture and forest) due to Project infrastructure works at the off-site Project/associated facilities including quarries, material borrow sites, construction camp sites, excavated material storage sites, etc. located outside the expropriation corridor	• Land Preparation and Construction	<ul style="list-style-type: none"> Agricultural lands Pasture lands Forest lands 	<ul style="list-style-type: none"> The affected areas will be rehabilitated as per the requirements of the authorities following the completion of the activities at each site. As applicable, measures defined in Chapter 10 ("Biodiversity") will be implemented at forest and/or pasture areas as part of the rehabilitation works. 	<ul style="list-style-type: none"> Biodiversity Action Plan developed and implemented
Topsoil stripping along the Project route (within the expropriation corridor) and at the off-site Project/associated facilities (at land that have not been affected by previous infrastructure works or quarry/material borrow site operations)	• Land Preparation and Construction	• Topsoil	<ul style="list-style-type: none"> The fertile topsoil will be stripped off at sufficient depth at the footprint of Project facilities prior to start of construction works. Topsoil will be stored separately from subsoil at designated topsoil storage areas along the route and other work sites at suitable conditions so as to preserve its vegetative properties. Appropriate labels will be placed at the storage sites to distinguish the topsoil and subsoil storage sites. Topsoil stripping will not be carried when soil is wet, so that soil compaction is avoided. Drainage at topsoil storage areas will be provided by open channels. If storage of topsoil will last longer than three months, upper part of fertile soil will be planted so that the organic content is conserved. In such cases, proper species and seed mixture ratios will be selected in consultation with the biodiversity specialists Organic or inorganic materials will be applied on the topsoil to improve quality and avoid erosion, desiccation or invasion of wild species. Stripped topsoil will be stored at suitable conditions for the rehabilitation of work and temporary construction sites after the completion of construction activities. Topsoil will be loosen to a depth of 15 cm before reinstatement (increase depth of loosening up to 40-50 cm for compact heavy clay soils). The depth of topsoil will be arranged to a suitable for side slopes, shrub plantation areas, tree roots etc. at necessary locations. Following the reinstatement of top soil, grading will be conducted in line with the natural slope and local drainage conditions. Any undesired materials will be removed prior to planting operations. Any excess topsoil will be utilised (e.g. distribution to local communities upon request, use in rehabilitation works along the route and at the O&M facilities) in agreement with the Employer and/or the Operator). 	<ul style="list-style-type: none"> Plans developed and implemented: <ul style="list-style-type: none"> Biodiversity Action Plan Erosion Control and Management Plan Topsoil management measures implemented (topsoil stripped off, stored at designated area and reused in rehabilitation studies) Training records
Soil disturbance and erosion	• Land Preparation and Construction	• Soils	<ul style="list-style-type: none"> Project-specific Erosion Control and Management Plan will be developed and implemented. Before the onset of construction works, erosion control measures like geotextile filters, drainage channels, settling structures, etc. will be applied as necessary in order to prevent or reduce off-site sediment transport. Topsoil stripping and excavation works will be designed so that the area to be exposed at once will be limited. Under extreme weather conditions, land preparation and construction works will be altered wherever feasible to avoid risk of erosion. Water from surrounding areas and side slopes will be diverted via temporary channels and earth banks so that non-contact and contact runoff is separated. Erosion control measures will be implemented following the completion of excavation works, also at the culvert outlets, and slopes will be improved. Around the excavated material stored at designated storage sites, dikes will be established to prevent loss of soil. Disturbed sites will be revegetated to the most possible extent in a timely manner following the completion of stripping and excavation works, in line with the specification of TCDD. 	<ul style="list-style-type: none"> Plans developed and implemented: <ul style="list-style-type: none"> Biodiversity Action Plan Erosion Control and Management Plan Topsoil management measures implemented (topsoil stripped off, stored at designated area and reused in rehabilitation studies) Training records

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures		Monitoring/Key Performance Indicators (KPIs)
Soil contamination	<ul style="list-style-type: none">Land Preparation and ConstructionOperation	<ul style="list-style-type: none">Soils	<ul style="list-style-type: none">Project-specific Hazardous Materials Management Plan will be developed and implemented.Discharge of materials into soil that would cause contamination will be prohibited.Solid wastes and wastewater to be generated as a result of land preparation and construction activities will be managed as per relevant management plan (Waste Management Plan, Water and Wastewater Management Plan, etc.).Generators will be equipped with drip trays and to be checked regularly to prevent soil contamination.Accidental spills and leakages will be managed through implementation of the Emergency Preparedness and Response Plan (EPRP).		<ul style="list-style-type: none">Plans developed and implemented:<ul style="list-style-type: none">Hazardous Materials Management PlanWaste Management PlanWater and Wastewater Management PlanEmergency Preparedness and Response Plan
Geological, Geotechnical, Seismic Risks	<ul style="list-style-type: none">Land Preparation and Construction	<ul style="list-style-type: none">Project personnelProject infrastructure	<ul style="list-style-type: none">Project-specific geological and geotechnical studies will be conducted by the Contractor (through competent/certified professional) as summarised in Chapter 5 to identify site-specific conditions and risks (including risks pertaining to the locations/structures where construction activities were previously conducted, seismic risks, etc.) and incorporate required measures into the design of the railway route and engineering structures as per the requirements of the Construction Contract, TCDD/AYGM specifications and applicable standards.The design and construction, including the infrastructure, superstructure, electrification, signalisation and structural works, will be conducted by the Contractor as per the General and Special Conditions and Technical Specifications (including the standards and regulations indicated) contained in the Construction Contract executed between the Contractor and the AYGM on 23 November 2020 (will be effective after the date of financial close).Design of the viaduct, bridge, overpass and tunnels will be in accordance with the highest Eurocodes, AASHTO and Turkish standards using a 2475-year return period.		<ul style="list-style-type: none">Geological, geotechnical and hydrogeological investigations and assessments carried out by competent/certified professional to identify site-specific conditions and risksSite-specific conditions and risks incorporated into design and construction
Risk of Sinkhole Occurrence	<ul style="list-style-type: none">Land Preparation and Construction	<ul style="list-style-type: none">Project personnelProject infrastructure	<ul style="list-style-type: none">Geological, geotechnical and hydrogeological site investigations and assessments will be conducted by competent/certified professionals to identify site-specific risks (including risks pertaining to locations/structures where construction activities were previously conducted) including factors effecting sinkhole formation. The surveys to be conducted in the Eskisehir, Sivrihisar area will focus on, inter alia, sinkhole formation. Specific measures for the management of the risks associated with sinkhole formation will be developed as necessary in collaboration with - following the start of the Construction Contract - the related governmental and non-governmental institutions (e.g. AYGM, DSI, MTA, AFAD, Chamber of Geophysical Engineers of Turkey, Chamber of Geological Engineers of Turkey - CoGE, related universities, etc.), including those performing geophysical studies along the route on the presence and risks of the sinkholes. The engagement results and proposed mitigation measures will be shared with AYGM. Subject to approval of AYGM, measures including relocation of the line will be evaluated and the Project will be constructed in accordance with those approved design measures.Construction of the railway near the sinkhole risk zones will be monitored by the Contractor at frequencies to be set based on the findings of the geological, geotechnical and hydrogeological site investigations and assessments. Monitoring results will be shared with related institutions, if requested.The Contractor will collaborate with AYGM to provide technical input on the design of geotechnical monitoring studies to be performed by AYGM or their consultants in parallel to the operation of the railway by the government.		<ul style="list-style-type: none">Geological, geotechnical and hydrogeological investigations and assessments carried out by competent/certified professional to identify site-specific conditions and risksSite-specific conditions and risks incorporated into design and constructionDocumentation on the collaboration and consultations made with the related stakeholdersMonitoring reportsWater and Wastewater Management Plan developed and implemented in consideration of the site-specific risks of water use (e.g. sinkhole formation risk near Eskisehir, Sivrihisar, Sigircik neighbourhood)
	<ul style="list-style-type: none">Operation	<ul style="list-style-type: none">HSR operations personnelHSR passenger	<ul style="list-style-type: none">Based on the technical information to be collated by the Contractor on site-specific risks through geological, geotechnical and hydrogeological site investigations and assessments, and the collaborations that will take place between the Contractor and the Employer/Operator in the pre-construction and construction periods, development and implementation of the operational plans and procedures, including long-term geotechnical monitoring studies to be conducted by the Operator and/or their consultants, that will ensure stability and integrity of the infrastructure and safety of HSR operations, will be under the responsibility of the Employer/Operator.		
Noise and Vibration					
Noise generation due to construction of HSR route and operation of quarries	<ul style="list-style-type: none">Land Preparation and Construction	<div><div>Daytime:</div><div>N-13</div><div>N-19</div><div>N-26</div></div> <div><div>Nighttime:</div><div>N-02</div><div>N-03</div><div>N-04</div><div>N-06</div><div>N-07</div><div>N-08</div><div>N-10</div><div>N-12</div><div>N-13</div><div>N-15</div><div>N-17</div><div>N-19</div><div>N-20</div><div>N-21</div><div>N-22</div><div>N-24 (Çikrikci Quarry)</div></div>	<ul style="list-style-type: none">Project-specific Noise and Vibration Management Plan will be developed implemented by the Contractor and the contractors (through contractual requirements).All Project personnel including direct and contracted workers will be trained on the implementation of Noise and Vibration Management Plan.At locations where the Project Standards are exceeded during day or night time, activities will not be conducted simultaneously and use of equipment with high noise levels will be restricted/optimised to the extent possible.At locations where the night time noise impact magnitude is anticipated to be high, noise generating activities will be avoided during night time where possible.Natural topography will be used to create a barrier against noise where feasible.Machinery, equipment and vehicles with lower sound power levels and sound reduced models will be preferred.Properly refurbished and/or new machinery, equipment and vehicles will be used to the extent possible.Maintenance of construction vehicles will be conducted regularly by means of a regular vehicle maintenance and repair program as per the recommendations of the manufacturer.The Contractor will enforce speed limits for the Project vehicles that will transport construction materials/equipment.Ancillary components (e.g. concrete plants, generators, etc.) will be positioned at the camp sites and other stationary plants by taking into account the location of noise receptors.Construction traffic through the settlements will be avoided, whenever alternative routes and/or service roads are available.Designated site access roads will be used by the Project vehicles.		<ul style="list-style-type: none">Noise and Vibration Management Plan developed and implementedNoise monitoring results not exceeding the Project StandardsNo noise related grievance to be received or any noise related grievance resolved in line with Project SEPTraining records

Impact Description	Project Phase	Receptor		Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			N-26 (Caltildere-2 Quarry) NM-01 NM-02 NM-03 NM-04 NM-22 NM-35 NM-37 NM-39	<ul style="list-style-type: none">Idling of construction vehicles will be avoided.Noise monitoring will be carried out as per the Noise and Vibration Management Plan throughout the construction phase.Project-specific Stakeholder Engagement Plan (SEP) will be implemented to address any noise-related grievance and plan/take corrective actions, where necessary.	
		<u>Daytime:</u> N-01 N-02 N-04 N-07 N-08 N-10 N-12 N-15 N-17 N-20 N-21 N-22 NM-22 NM-39	<u>Nighttime:</u> N-11 N-14 N-16 N-18 N-23 NM-12 NM-13 NM-14 NM-15 NM-17 NM-32		
		<u>Daytime:</u> N-06 N-14 N-24 NM-26	<u>Nighttime:</u> N-05 N-09		
Vibration due to blasting operations to be conducted at the quarries	<ul style="list-style-type: none">Land Preparation and Construction	<ul style="list-style-type: none">N-26 (due to operation of Caltildere Quarry)		<ul style="list-style-type: none">Project-specific Noise and Vibration Management Plan will be implemented by the Contractor and the subcontractors (through contractual requirements).All Project personnel including direct and contracted workers will be trained on the implementation of Noise and Vibration Management Plan.Project-specific SEP will be implemented to address any noise-related grievance and plan/take corrective actions, where necessary.All blasting activities will be held at least 220 meters away from receptors/settlements. If blasting activities are to be carried out at a location closer than 220 meters to a receptor/settlement, blasting pattern and explosive quantities will be optimised by increasing the hole number and/or decreasing the explosive material/hole quantity.Tunnels will be constructed by using the New Austrian Tunneling Method (NATM). To minimise tunnel blasting, excavation by means of construction machinery will be the preferred method in the tunnels. In case of necessity, soft blasting (yumusak patlatma) technique will be used. Following the determination of blasting pattern, safe blasting distances will be calculated on a case-by-case basis and site-specific measures will be taken in consideration of the locations of the nearby NSRs.Relevant records will be kept during blasting operations and blasting related impacts will be monitored. Vibrometers will be at suitable locations and keep records on charge amounts, delays and other relevant parameters.Sensitivity of nearby settlements/ buildings (within approximately 250 m) against vibration will be evaluated prior to blasting operations.Modern blasting techniques will be applied.Blasting will be carried out with millisecond delays with low charge weight by considering geological formation and characteristics of the area.Number of holes to be blasted at one shot and total charge amounts per shot will be optimised.Construction and blasting activities will be scheduled to minimise potential vibration related impacts.	<ul style="list-style-type: none">Noise and Vibration Management Plan developed and implementedSafe blasting distances maintained during blasting activitiesVibration records meeting the Project StandardsNo blasting/vibration related grievance to be received or any blasting/vibration related grievance resolved in line with Project SEPTraining records
Noise generation due to operation of the HSR	<ul style="list-style-type: none">Operation	<ul style="list-style-type: none">Residential receptors in the buildings located along the route (see Appendix A for the List of Settlements)		<ul style="list-style-type: none">Operation phase noise modelling study will be updated during the construction phase with input from the Employer/Operator regarding the information on train services, train types, etc. Through the modelling study, noise site specific mitigation measures required to be implemented to ensure compliance with the Project Standards during the operation phase of the Project will be identified.Highly sensitive receptors (if any within the operational noise impact zones) will be identified by the Contractor through site surveys in parallel to the updated noise modelling study.	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
		<ul style="list-style-type: none"> Highly sensitive receptors e.g. hospital/inpatient healthcare facilities, education facilities, rehabilitation centres, and other sensitive uses (if any within the operational noise impact zones) Receptors at commercial building, offices, industrial sites, etc. 	<ul style="list-style-type: none"> Background environmental noise measurements will be conducted at the potentially affected receptors (to be identified through the noise modelling study) in line with the applicable GIIP during the trial operations. Project-specific Noise and Vibration Management Plan will be updated following the completion of the modelling study based on the study outcomes. During the construction phase, the Contractor will apply the subballast liner and sub travers liner in line with the technical specifications of the TCDD. Modern disc brakes and rail types reducing noise will be used as per the technical specifications of the TCDD and as per the Construction Contract. The noise impact of the Project during the operation phase will be reassessed after the commissioning of the HSR based on the characteristics of the trains, rail system, etc. by taking into account the theoretical calculation results obtained through the Dutch Calculation Method and as per the applicable requirements of the regulation in force, as required by the national EIA Report. Throughout the operation phase, the environmental noise levels at the potentially affected receptors (to be identified through the updated noise modelling study) will be measured in line with the applicable GIIPs in order identify locations where Project Standards would be exceeded. The frequency of the measurements will be identified by the Employer/Operator based on the outcomes of the modelling study to be conducted during the construction phase and background environmental noise measurements to be conducted during the trial operations. The management measures compliant with the noise barrier standards defined in the regulation are committed to be implemented by the Operator in consideration of the locations where the regulatory limit values are exceeded, the number of noise sensitive residential buildings and structures and the resident population affected, as committed in the national EIA Report. Noise barriers compliant with the standards will be used at locations deemed necessary according to the results of noise measurements to be performed following the construction phase, as committed in the national EIA Report. During the operation phase, regular maintenance of wheels and tracks will be implemented by the Operator to reducing the roughness of running surfaces. As applicable and consistent with the operational procedures of the Operator, planning of the HSR speed along the route will take into consideration the locations of residential and other highly sensitive receptors. Project-specific SEP will be implemented during the operation phase (including trial operations) to address any noise-related grievance and plan/take corrective actions (e.g. soundproofing, noise barriers as necessary and feasible). 	
Vibration generation due to operation of the HSR	<ul style="list-style-type: none"> Operation 	<ul style="list-style-type: none"> Residential receptors located within 15 m distance from the HSR route in the horizontal direction Residential receptors located within 2 m distance from the HSR route in the vertical direction Residential receptors located beyond 15 m distance from the HSR route in the horizontal direction Residential receptors located beyond 2 m distance from the HSR route in the vertical direction 	<ul style="list-style-type: none"> Operation phase vibration modelling study will be updated during the construction phase with input from the Employer/Operator regarding the information on train services, train types, etc. Through the modelling study, noise mitigation measures required to be implemented to ensure compliance with the Project Standards during the operation phase of the Project will be identified. Project-specific Noise and Vibration Management Plan will be updated following the completion of the modelling study based on the study outcomes. During the construction phase, the Contractor will apply the subballast liner and sub travers liner in line with the technical specifications of the TCDD. The vibration impact of the Project during the operation phase will be reassessed after the commissioning of the HSR based on the characteristics of the trains, rail system, etc. by taking into account the theoretical calculation results obtained through the Dutch Calculation Method and as per the applicable requirements of the regulation in force, as required by the national EIA Report. Throughout the operation phase, the vibration levels at the potentially affected receptors (to be identified through the updated vibration modelling study) will be measured in line with the applicable GIIPs in order identify locations where Project Standards would be exceeded. The frequency of the measurements will be identified by the Employer/Operator based on the outcomes of the modelling study to be conducted during the construction phase and vibration measurements to be conducted during the trial operations. Compliance with the regulatory vibration limits will be verified following the commissioning of the Project and necessary management measures are committed to be implemented by the Operator in case of exceedance of the regulatory limits, as required in the national EIA Report. Project-specific SEP will be implemented during the operation phase (including trial operations) to address any vibration-related grievance and plan/take corrective actions, where necessary. 	
Air Quality and GHG Emissions				
Emissions to air due to construction activities	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Residential Receptors: A-02 (Yenice) A-03 (Turktaciri) A-06 (Yuregil) A-09 (Erenler) A-10 (Balmahmut) A-11 (Duzagac) A-12 (Guney) A-15 (Salihli) A-16 (Urganli) 	<ul style="list-style-type: none"> During the days of unfavourable meteorological conditions (e.g. extreme wind conditions, stagnant air flow conditions) preventing emission distribution, construction and material extraction works will be suspended temporarily and/or production amounts will be reduced (e.g. amount of material extracted at the quarries/borrow sites) at residential receptors with high impact magnitude. Project-specific Air Quality and GHG Management Plan swill be implemented by the Contractor and subcontractors (through contractual requirements). All Project personnel including direct and contracted workers will be trained on the implementation of Air Quality and GHG Management Plan. Dust suppression methods such as water spraying will be applied at dust generating areas (e.g. quarry access roads) especially during dry weather conditions. Water spraying frequency will be increased during dry periods and upon receipt of valid dust-related complaints from the nearby communities, as necessary. Access roads both to accommodation camp sites, construction sites and quarries/borrow sites will be upgraded, where necessary and feasible. The Contractor will avoid passage of construction traffic through the settlements, whenever alternative roads are present. 	<ul style="list-style-type: none"> Air Quality and GHG Management Plan developed and implemented Dust suppression applied in line with the Air Quality and GHG Management Plan Air quality (dust) monitoring results not exceeding the Project Standards Regular maintenance records kept for the vehicles/equipment

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
		A-17 (Cikrikci) A-18 (Turgutlu) A-05 (Emirinkoyu) A-07 (Bayat) A-13 (Banaz) A-14 (Dombayli) A-20 (Manisa) A-22 (Caltildere) A-08 (Seydiler) A-21 (Degirmendere)	<ul style="list-style-type: none">Where passage through existing settlements is unavoidable, Contractor will take all necessary measures (i.e. speed limits) to prevent/minimise transportation related emissions and inform the communities about the activities and schedule.The Contractor will enforce speed limits for the Project vehicles that will transport construction materials/equipment along the existing main access road.Construction vehicles/equipment will be prevented from idling and running unnecessarily (to be covered in the ESMS trainings and refreshed through daily toolbox trainings).Loading and unloading of material will be carried out without scattering to the extent possible.Trucks carrying fine material (excavated soil, filling material etc.) to be covered with tarpaulin where operations are held near residential areas.Conveyors of crushing screening plant and concrete batching plant to be enclosed where operations are held near residential areas.Generator working hours will be recorded.Excavated soils will be stockpiled (as necessary) at designated areas. Loose materials will be properly covered, or top layers will be kept moist on dry periods.Upper layers of the excavated material stored will be kept at a humidity level of about 10%.As part of the internal audit system to be developed and implemented by the Contractor, documentation on regular maintenance of vehicles/equipment to be used in the Project (by Contractor and subcontractors) will be checked; where necessary plans/actions will be developed and enforced.Air quality monitoring will be carried out as per the Air Quality and GHG Management Plan throughout the construction phase.Project-specific Stakeholder Engagement Plan (SEP) will be implemented to inform the local communities about the activities (e.g. activities that have high potential for dust generation and duration of activities) and address any air quality-related grievance and plan/take corrective actions, where necessary.	<ul style="list-style-type: none">No air quality related grievance to be received or any air quality related grievance resolved in line with Project SEP
Impacts related to GHG emissions (Scope 1 and Scope 2)	<ul style="list-style-type: none">Land Preparation and Construction	<ul style="list-style-type: none">Local climate	<ul style="list-style-type: none">Air Quality and GHG Management Plan will be developed and implemented. For the management of GHGs, related authorities and stakeholder will be cooperated where necessary/requested.All Project personnel including direct and contracted workers will be trained on the implementation of Air Quality and GHG Management Plan. Trainings will cover practices for reducing unnecessary equipment idling time and unnecessary operator moves/behaviours that increase fuel consumption.Maintenance of machinery/equipment will be conducted properly.GHG calculations will be periodically updated by the Contractor during the construction phase based on the actual construction machinery and vehicles involved in the activities, fuel consumption records, electricity consumed at the facilities, etc.For operation phase, GHG emissions (combined Scope 1 and Scope 2) over 100,000 tons of CO2-e annually will be publicly disclosed.	<ul style="list-style-type: none">GHG emissions (Scope 1 and Scope 2 as a minimum) quantified and reported on an annual basis including SF6 gases during the construction phase
	<ul style="list-style-type: none">Operation	<ul style="list-style-type: none">Local/regional climate		
Water and Wastewater				
Impact on the quality of surface water resources due to Project activities	<ul style="list-style-type: none">Land Preparation and Construction	<ul style="list-style-type: none">Surface water resources	<ul style="list-style-type: none">Project-specific Water and Wastewater Management Plan will be developed and implemented by the Contractor and the subcontractors (through contractual requirements) to minimise water use and wastewater generation. The Water and Wastewater Management Plan will identify the discharge locations as per the environmental permits to be secured from the related authorities and monitoring stations to be selected in line with the requirements of the IFC General EHS Guidelines. The surface water quality sampling locations will be the basis of the surface water quality monitoring (i.e. quarterly during the construction phase) to be conducted during the construction phase. Exact locations will be identified in the Plan in consideration of the locations where the Project facilities (e.g. construction camp sites) will be placed.Project-specific Waste Management Plan, Hazardous Materials Management Plan, EPRP will be developed and implemented by the Contractor and the subcontractors (through contractual requirements) to avoid/minimise impacts on the quality of water resources.Training on the implementation of the Project-specific Water and Wastewater Management Plan, Waste Management Plan, Hazardous Materials Management Plan, EPRP will be provided to all direct and contracted Project personnel as part of the induction (refresher trainings will be planned, as required).Domestic wastewater to be generated by the Project workforce will be treated at the package domestic wastewater treatment plant to be installed at the construction camp sites or collected in non-leaking septic tanks for further disposal.The permitting requirements (i.e. environmental permit) for treated domestic wastewater discharges will be fulfilled in line with the applicable national legislation.Domestic wastewater in septic tanks/mobile WCs will be disposed of by means of vacuum trucks as per the agreements/protocols to be executed with the related municipalities/licensed companies.Hazardous materials will be managed (e.g. stored in designated areas as per SDS requirements, provision of spill kits, absorbent pads/sands for management of accidental spillages etc.) in line with the Hazardous Materials Management Plan to be developed and implemented.Sedimentation ponds will be constructed at concrete plants to settle the wastewater and recirculate it to process to minimise fresh water use and avoid wastewater discharge into environment. As required, technical compliance reports will be prepared and approval will be obtained from the related Provincial Directorates of the MoEU for the reuse of wastewater in the concrete plants.Pumps and transmixers will be washed only at the concrete plants.Concrete slurry will not be discharged into environment.Project-specific Water and Wastewater Management Plan will be reviewed at least annually and updated as necessary.As per the Technical Specifications of AYGM for Infrastructure Works, required facilities (e.g. drainage and diversion ditches, water collection sumps/ponds, cofferdams, channels) will be designed and constructed to ensure control and diversion of the surface runoff flowing into and accumulating at the work sites. Design capacity of these facilities will be sufficient to ensure avoidance of impacts on work sites and adjacent parcels. Sand filters will be	<ul style="list-style-type: none">Plans developed and implemented:<ul style="list-style-type: none">Water and Wastewater Management PlanWaste Management PlanHazardous Materials Management PlanEmergency Preparedness and Response PlanNational permitting requirements fulfilled and documented (e.g. treated wastewater discharge permits, groundwater utilisation permits, as applicable)Package domestic wastewater treatment units and/or non-leaking septic tanks in place and operated as per the Project StandardsCompliance of treated domestic wastewater quality meeting the Project Standards, documented through the results of periodical analyses done by accredited laboratories, audits by the external authorities, etc.Training records

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			<p>provided depending on the soil characteristics of the work sites. Site-specific conditions will be taken into consideration in the design and construction of the surface water management facilities.</p> <ul style="list-style-type: none"> Temporary sediment traps will be installed and sedimentation basins will be provided for the collection and sedimentation of silty water arising from excavation sites, as required. 	
	<ul style="list-style-type: none"> Operation 	<ul style="list-style-type: none"> Surface water resources (in case of discharge) 	<ul style="list-style-type: none"> The operation phase Water and Wastewater Management Plan will be developed and implemented by the Employer/Operator. Detailed planning of the operation and maintenance works, workforce requirements (direct and contracted) and wastewater management methods (e.g. wastewater treatment plant/unit, connection to sewerage) at each operational facility will be done by the Employer and the Operator in due course based on their applicable standards/requirements and specifications. Types of materials to be used in maintenance, refurbishment and cleaning operations will be determined by the Employer and the Operator during the construction phase based on their applicable standards/requirements and specifications. Wastewater management methods appropriate for the characteristics of the wastewater to be produced will be determined and implemented by the Employer and the Operator. 	
Impact on surface water flow due to barrier effect of railway corridor	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Surface water resources 	<ul style="list-style-type: none"> Engineering structures (e.g. viaducts, culverts, bridges) to be constructed to ensure continuity flow of water are given in Section 1.4.2. Design of the engineering structures will be compliant with the Technical Specifications of AYGM for Infrastructure Works and other applicable standards. 	<ul style="list-style-type: none"> Engineering structures designed compliant with the technical Specifications of AYGM Maintenance records (for drainage systems, erosion control systems)
Impact on groundwater resources due to excavations, quarry operations, tunnel works, etc.	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Groundwater resources 	<ul style="list-style-type: none"> As per the Technical Specifications of AYGM for Infrastructure Works, groundwater level will be monitored to keep the work sites dry, by using piezometers where required. If water is accumulated in the excavation sites, it will be collected in sumps At locations where the construction works will reach the groundwater level, the Contractor will take necessary design and construction measures (e.g. soil improvement, use of geotextiles and geomembranes, measures against subsidence). Tunnel construction sites will be provided with adequate drainage system and water isolation will be ensured by using of geotextile and geomembrane materials as per the Tunnel Construction Method Statement of TCDD and Technical Specifications of AYGM for Infrastructure Works. Water to be collected by means of the drainage system will be diverted to natural drainage system. Groundwater utilisation permits for the use of groundwater for drinking water purposes and construction activities will be secured from the related authorities. Potential impacts of blasting on groundwater quality will be managed through appropriate blasting design and procedures, including ensuring the correct burning of explosives. Sufficient distance (foreseen as minimum 10 metres; exact distance to be identified by the Contractor during the pre-construction field surveys) will be maintained between the Karacaali Creek and the operation area of the Cikrikci Quarry to avoid any impact on the surface water resource stemming from the quarry activities. The quarry operation activities planned by the Contractor will not be conducted below the creek elevation and groundwater level and will not interfere with the creek bed. The waste rock and other wastes produced during the operations will not be discharged to the creek bed. Interception channels will be built to divert the surface runoff to natural drainage without contacting the quarry operation area. Temporary waste storage areas and hazardous material storage areas will be checked on a daily basis to ensure that there is no spill/leakage and waste management practices do not pose any risk on the quality of surface or groundwater resources. Project-specific SEP will be implemented to address any water-related grievance (related to water quality or quantity) and plan/take corrective actions, where necessary. 	<ul style="list-style-type: none"> Plans developed and implemented: <ul style="list-style-type: none"> Water and Wastewater Management Plan Waste Management Plan Hazardous Materials Management Plan Emergency Preparedness and Response Plan Monitoring records of groundwater level Blasting records
Impact on groundwater resources due to accidental/unintended spills/leakages	<ul style="list-style-type: none"> Land Preparation and Construction Operation 	<ul style="list-style-type: none"> Groundwater resources 	<ul style="list-style-type: none"> All chemical/hazardous material storage tanks, waste oil barrels and liquid waste tanks/containers will be provided with secondary containment as per WBG General EHS Guidelines, keeping absorbent pads or materials next to storage areas and keeping drums and containers containing fuel, oil or other chemicals in a containment with a capacity of up to 110% of the volume of material stored. Hazardous materials will be managed (e.g. stored in designated areas as per SDS requirements, provision of spill kits, absorbent pads/sands for management of accidental spillages etc.) in line with the Hazardous Materials Management Plan to be developed and implemented. Generators will be equipped with drip trays to be checked regularly. Project-specific EPRP will be developed and implemented by the Contractors and the subcontractors (through contractual requirements) for the construction phase. Project-specific EPRP will be developed and implemented by the Employer/Operator for the operation phase. 	<ul style="list-style-type: none"> Plans developed and implemented: <ul style="list-style-type: none"> Water and Wastewater Management Plan Waste Management Plan Hazardous Materials Management Plan Emergency Preparedness and Response Plan Temporary waste storage areas built and maintained to fulfil Project requirements Hazardous materials managed in line with the provisions of the related MP Training records
Waste Management				
Additional load on the local/regional infrastructure for the	<ul style="list-style-type: none"> Land Preparation 	<ul style="list-style-type: none"> Local/regional waste management infrastructure 	<ul style="list-style-type: none"> Project-specific Waste Management Plan for the construction phase will be developed by the Contractor and implemented by the Contractor and subcontractor personnel (through contractual requirements) to avoid or minimise (when avoidance is not possible) the amount of waste to be generated as a result of the construction activities. 	<ul style="list-style-type: none"> Waste Management Plan developed and implemented

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
management of hazardous and non-hazardous wastes (e.g. sanitary landfills, licensed reuse/recovery facilities, etc.)	and Construction • Operation		<ul style="list-style-type: none"> Project-specific Waste Management Plan for the operation phase will be developed and implemented by the Employer/Operator. This plan will be in line with the Project Standards, reflecting regulatory requirements of the waste management legislation in force throughout the operation phase as well as applicable GIIP. Waste reuse/recycling/recovery/disposal agreements with the Municipality and licensed recovery/disposal firms will be executed for the management of hazardous and non-hazardous waste. The building demolition works during the construction phase will be conducted in line with the requirements of the Regulation on Waste Management and Regulation on the Control of Excavation Soil, Construction and Demolition Waste, the Regulation on Health and Safety Measures in Working with Asbestos, Regulation on the Assessment and Management of Air Quality and Regulation on Assessment and Management of Environmental Noise. To this end, specific requirements defined for the demolition works, including occupational health and safety measures to be taken for the protection of employee health and safety, measures against dust and noise generation, management of hazardous demolition wastes will be fulfilled. 	<ul style="list-style-type: none"> Trainings provided and records kept on the implementation of Waste Management Plan Temporary waste storage areas built and maintained to fulfil Project Standards All wastes are appropriately segregated and separately stored; classified and labelled Waste storage area is locked at all times and the responsible personnel information is present No leakage/spillage is present from the waste containers. Waste logs kept and updated monthly Hazardous and non-hazardous waste management (recycling, disposal, transportation etc.) related agreements in place with the licensed companies and Municipalities National permitting requirements fulfilled and documented (e.g. temporary waste storage, approval for the waste management plans, waste declarations are made, as applicable) Detailed decommissioning plan in place prior to completion of construction phase
Potential impacts due to storage of excess excavated materials, which are not used within construction/fill works	• Land Preparation and Construction	<ul style="list-style-type: none"> Soil, surface water and groundwater environments Ecosystem Project personnel 	<ul style="list-style-type: none"> Project-specific Waste Management Plan will be developed by the Contractor and implemented by the Contractor and subcontractor personnel (through contractual requirements) to avoid or minimise (when avoidance is not possible) the amount of waste to be generated as a result of the Project activities. The amount of excavated material to be reused in the filling works will be maximised. If proper storage sites cannot be designated within the expropriation corridor, the Contractor will identify parcels, for which usage rights will be obtained from the respective right holders as per the requirements of the applicable legislation. The following criteria will be considered in the selection of excavated material storage sites that will be located out of the expropriation corridor: <ul style="list-style-type: none"> Distance to settlement areas and residential buildings will be considered. Parcels that are not used for agricultural or grazing purposes will be prioritised. Parcels that are not suitable for future agricultural purposes (e.g. parcels with high slope, stony parcels) The E&S studies to be performed prior to entry to off-site excavated material storage sites are described in Chapter 3 on Project Alternatives and Chapter 18 on ESMS. 	
Potential impacts of on-site hazardous and non-hazardous waste on environmental resources and human receptors, if not managed properly	• Land Preparation and Construction • Operation	<ul style="list-style-type: none"> Soil, surface water and groundwater environments Ecosystem Project personnel 	<ul style="list-style-type: none"> Project-specific Waste Management Plan for the construction phase will be developed by the Contractor and implemented by the Contractor and subcontractor personnel (through contractual requirements) to avoid or minimise (when avoidance is not possible) the amount of waste to be generated as a result of the Project activities. Project-specific Waste Management Plan for the operation phase will be developed and implemented by the Employer/Operator. The operation phase Waste Management Plan will promote and ensure waste recycling through placement of labelled waste containers in passenger terminals for recyclable including metals, glass, paper, and plastics. Food establishments at the stations/gars will be required to segregate compostable and other food waste for recycling. Train operators and cleaning contractors will be required to segregate waste in the trains by separating the collection of recyclables including papers, plastic, and metallic containers. Training on the implementation of the Project-specific Waste Management Plan will be provided to all direct and contracted Project personnel as part of the induction (refresher trainings will be planned, as required) during the construction and operation phases of the Project. Waste segregation and storage at temporary waste storage areas will be managed according to the standards specified by the related legislations and GIIP. Temporary waste storage areas with adequate capacity will be provided at each camp, facility and work sites and as required at operational facilities. Wastes will be classified and labelled according to their waste codes. Hazardous wastes and non-hazardous wastes will be collected and stored separately. The waste storage areas will be fenced, gated and the entrance doors will be kept locked. The keys will be kept by authorised personnel. The contact information of the personnel in charge of the waste storage area and warning signs will be posted at the temporary storage areas. Reinforced concrete or similar impermeable materials will be used on floors of temporary waste storage waste areas to prevent soil and groundwater contamination. Adequate drainage system will be provided to collect any leakages. Secondary containment will be provided for liquid wastes in line with the legislation. Periodic visual checks will be conducted to identify any leakages/spillages or emergencies. Waste/used explosives (during the construction phase) will be stored separately in waste storage areas. Removal of wastes will be ensured in appropriate frequencies so that storage capacities at the temporary waste storage areas/storage compartments are observed. Industrial Waste Management Plans for all waste generated camp and facility sites (including hazardous and non-hazardous waste) will be submitted to the relevant PDoEU as per the format defined by the MoEU. Temporary Waste Storage Permit will be obtained from the related PDoEU for temporary waste storage sites at construction camp sites/facilities generating hazardous waste of more than 1,000 kg per month. Hazardous Materials and Hazardous Waste Compulsory Liability Insurance will be executed as per the relevant provisions of the Regulation on Waste Management for the hazardous waste temporary storage areas/containers regardless of the amount of hazardous waste stored. 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			<ul style="list-style-type: none"> Hazardous wastes (except medical waste) will be temporarily stored at the waste storage areas for a maximum duration of 6 months and non-hazardous waste for a maximum duration of one year. Official waste declarations for all waste generated camp and facility sites will be submitted to the online system of MoEU, starting from January each year until the March at least. Copies of the annual waste declaration forms and national waste transport forms will be kept onsite for 5 years. As per the MoEU Circular entitled 'COVID-19 Measures for the Waste Management of Single Use Masks, Gloves and Other Personal Hygiene Materials'; <ul style="list-style-type: none"> Masks, gloves and other personal hygiene material wastes generated at the offices, dormitories and work sites will be collected separately. Waste bins will be placed at the entrances and exits of the office buildings, dormitories, cafeterias and at common areas across the accommodation facilities and work sites. The waste bins will be labelled explicitly. Waste bags will not be mixed with other wastes and the waste bags will be transported to a designated temporary storage area by securing them in a second bag via tightly closing. The wastes will be kept at designated temporary storage areas out of reach of other people and animals for at least 72 hours and then will be delivered to the municipality to be managed under 'other' domestic waste category. The temporary waste storage areas will be kept closed at all times and secured appropriately. The wastes generated in potential site quarantine/isolation units and at the site infirmaries will be managed as 'medical waste' and wastes generated from these areas will not be mixed with other wastes. Regular monitoring of the waste management practices of the direct and contracted Project employees will be conducted by means of document review (e.g. permits, waste reuse/recycling/disposal agreements) and visual checks at the work sites. Project-specific Waste Management Plan will be reviewed annually and updated as necessary. 	
Biodiversity				
Habitat loss and fragmentation due to removal of topsoil, clearance of vegetation, railway construction works including quarry operations	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Balikdami Nationally Important Wetland <p>(the railway alignment passes through the southern tip of the wetland as given in ESIA – Figure 10-5 avoiding the lake portion including engineering structures embedded into the design to ensure habitat continuity. It should be noted that the wetland area is less than 10% of the total registered Protected Area as given in ESIA - Table 10-3).</p>	<ul style="list-style-type: none"> Official authorization letters to be secured from relevant conservation authorities and measures as stipulated by the authorities to be implemented during construction works. The railway alignment passes through the southern tip of the wetland as given in ESIA - Figure 10-5. As can be seen, engineering structures are designed and some already constructed to help maintain the continuity of the aquatic ecosystem between the wetland area and the creek. The construction activities in the vicinity of the wetland area should avoid disturbance/contamination of the aquatic ecosystem through accidental discharges and/or erosion related sedimentation. If technically feasible, sediment traps could be considered to avoid further spread of sediments into to wetland area. Implementation of mitigation measures as described for waste and wastewater management in relevant chapters of this ESIA Report. Regular visual monitoring of the construction activities at the wetland area by the trained Contractor team to ensure mitigation measures are effectively implemented. Train on-site employees to avoid any impacts on this wetland. Topsoil stripping along the Project route (within the expropriation corridor) and at the off-site Project/associated facilities (at land that have not been affected by previous infrastructure works or quarry/material borrow site operations) will be implemented in line with the measures as detailed in Chapter 5 on Land Use and Geology. The potential long-term impacts of a linear project on the wetland are avoided through engineering structures to ensure habitat continuity. The potential short- to medium-term impacts due to construction phase is to be minimised through implementation of the measures listed here. Develop and implement BMP/BAP including regular monitoring of this sensitive habitat by biodiversity experts. 	<ul style="list-style-type: none"> National permitting requirements fulfilled and documented with regard to related legally protected areas overlapping with the Project facilities BAP/BMP and Biodiversity Offset Plan developed and implemented: Following plans developed and implemented: <ul style="list-style-type: none"> Waste Management Plan Water and Wastewater Management Plan Training records
		<ul style="list-style-type: none"> Legally Protected Areas and Internationally Recognised Areas Overlapping with the Railway Alignment and the Quarries (see ESIA - Table 10-37) 	<ul style="list-style-type: none"> Official authorization letters to be secured from relevant conservation authorities before entry into legally protected areas. Any mitigation measure to be stipulated by the authorities will be implemented on site during construction works. Implementation of mitigation measures as described for waste and wastewater management in relevant chapters of this ESIA Report. Topsoil stripping along the Project route (within the expropriation corridor) and at the off-site Project/associated facilities (at land that have not been affected by previous infrastructure works or quarry/material borrow site operations) will be implemented in line with the measures as detailed in Chapter 5 on Land Use and Geology. Avoid destruction of vegetation for purposes other than planned Project activities. Topsoil stripped will be stored and further used for reinstatement and rehabilitation to avoid loss of flora species of conservation importance. Avoid direct impacts on aquatic ecosystems through implementation of waste and wastewater management measures. Avoid sediment transport to aquatic ecosystems induced by erosion at construction areas. Train on-site employees to avoid impacts on protected areas. 	
		<ul style="list-style-type: none"> Gypsum Steppe Habitat (at KM 13+400-KM 76+700 in Section 1) <p>(Approximately 27% of the habitats within the DMU of Section 1 is represented by</p>	<ul style="list-style-type: none"> The local and regional endemic flora species qualifying this habitat is to be conserved through ex-situ measures (seed collection and submission to Turkey Seed Gene Bank) and implementation of in-situ measures either through transplantation of existing flora species at the footprint of the Project that will be impacted by construction activities to suitable locations within the same habitat and/or using the collected seeds for further habitat management upon finalization of construction activities at this habitat in Section 1. Develop and implement BMP/BAP including identification of endemic flora species population and distribution within this habitat. It should be noted that the existing ESIA baseline data was collected in late January 2021 and already indicates a high number of local/regional endemic flora species. Species-specific no net loss and net gain measures to be developed within Project BAP. 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
		Gypsum Steppe as given in ESIA - Table 10-18. Due to the past construction activities completed in Section 1, through satellite imagery, it is calculated that 30% of the Gypsum Steppe habitat along the railway alignment in Section 1 DMU have been disturbed. This habitat sustains the majority of the flora species of conservation importance (see ESIA - Table 10-21) including local and regional endemic flora species as shown in ESIA - Figure 10-22. Within this habitat, the spatial distribution of flora species of conservation importance is to be considered as the DMU for the development and implementation of ex-situ and in-situ measures to be identified within the Project BAP)		
		<ul style="list-style-type: none"> Juniper Forest (at Station No. Q6) 	<ul style="list-style-type: none"> If technically feasible, avoid using this area as a quarry site. The area is a natural habitat of Juniper Forests (EU Habitats Directive Annex I habitat, please see Q6 in ESIA - Table 10-15) If this area will be used as quarry, offset measures to be developed as part of the Project BAP to ensure loss of habitat is compensated through no net loss approach. Prior to any construction activity at this specific quarry location, detailed flora and fauna study need to be carried out to set a baseline for offset design and overall biodiversity management. 	
		<ul style="list-style-type: none"> Temporary facilities located on natural habitats outside the expropriation corridor (at land that have not been affected by previous infrastructure works) 	<ul style="list-style-type: none"> For potential quarries and material borrow sites considered within the scope of the Project, evaluate the existing status of the specific site. If there has been no previous production at the candidate site, avoid impacts on the natural habitat by not using the site. If not using the site is technically not possible, ensure that the permits/licenses and EIA decisions are in place. Any new sites/facilities to be included within the Project will require identification of potential site-specific E&S impacts and management measures including field surveys to be conducted for biodiversity prior to entry into such new areas. Based on the field findings, update the Project BAP and implement ex-situ and in-situ measures for habitats and species of conservation importance targeting no net loss and net gain for CH trigger biodiversity elements. The affected areas will be rehabilitated as per the requirements of the authorities following the completion of the activities at each site. 	
		<ul style="list-style-type: none"> Maquis (at Station No. Q12) 	<ul style="list-style-type: none"> Only the quarry location Q12 in Section 4 is represented by this habitat. The area also falls within Yamanlar Mountain KBA. Even in late January, one (1) local endemic species (<i>Verbascum antinori</i>) and one (1) regional endemic species (<i>Centaurea polyclada</i>) were observed at this area. The local and regional endemic flora species qualifying this habitat is to be conserved through ex-situ measures (seed collection and submission to Turkey Seed Gene Bank) and implementation of in-situ measures either through transplantation of existing flora species at the footprint of the Project that will be impacted by quarry activities to suitable locations within the same habitat and/or using the collected seeds for further habitat management at this area. Develop and implement BMP/BAP including identification of endemic flora species population and distribution within this habitat. Species-specific no net loss and net gain measures to be developed within Project BAP. 	
		<ul style="list-style-type: none"> Nests/breeding/roosting sites of small mammals, birds and bats within the Project Area Permanent and temporary water bodies where amphibians can 	<ul style="list-style-type: none"> Avoid direct impacts on aquatic ecosystems through implementation of waste and wastewater management measures. Avoid sediment transport to aquatic ecosystems induced by erosion at construction areas. Careful vegetation clearance to avoid impacts on animal nests. Nests of small mammals identified during field surveys to be checked at pre-construction and experts to be involved if removal of nests/animals are required. Train on-site employees to be aware of nests, avoid any displacement without an expert opinion on the status of the nests. Train on-site employees to avoid any impacts on the temporary water bodies. 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
		reside/breed, water birds and fish species are present and reside/breed within the Project Areas		
Impacts of Project activities on ecosystem services	• Land Preparation and Construction	• Ecosystem services along the railway alignment	<ul style="list-style-type: none"> Project-specific Stakeholder Engagement Plan (SEP) will be implemented to address any grievance related to impacts on ecosystem services (e.g. damage on agricultural lands adjacent to the expropriation corridor or the access roads, reduction in agricultural productivity in the adjacent lands due to construction activities) and plan/take corrective actions, where necessary. Implementation of mitigation measures as described for air quality, waste, and wastewater management in relevant chapters of this ESIA Report. Implement Project-specific RAP. Develop and implement BMP/BAP. 	
Damage to/loss of flora species due to Project construction activities including, but not limited to, movement of vehicles/machinery, air emissions, on-site waste and wastewater management practices	• Land Preparation and Construction	<p><u>Potential CH trigger, local endemic and CR:</u></p> <ul style="list-style-type: none"> <i>Glaucium secmenii</i> <i>Alyssum niveum</i> <i>Cephalaria aytachii</i> <i>Verbascum gypsicola</i> <i>Marrubium zeydanlii</i> <i>Acantholimon gemicianum</i> <p><u>Potential CH trigger, regional endemic and EN:</u></p> <ul style="list-style-type: none"> <i>Scabiosa hololeuca</i> <p><u>Potential CH trigger, regional endemic:</u></p> <ul style="list-style-type: none"> <i>Paronychia dudleyi</i> <i>Achillea ketenoglui</i> <i>Centaurea polyclada</i> <i>Verbascum antinori</i> <i>Scutellaria yildirimlii</i> <i>Sideritis gulendamii</i> <i>Salvia aytachii</i> <i>Thymus leucostomus</i> var. <i>argilleceus</i> <p><u>Widespread endemic:</u></p> <ul style="list-style-type: none"> <i>Alyssum pateri</i> subsp. <i>Pateri</i> <i>Gypsophila eriocalyx</i> <i>Gypsophila sphaeocephala</i> var. <i>cappadocica</i> <i>Rhamnus thymifolius</i> <i>Genista aucheri</i> <i>Astragalus acicularis</i> <i>Astragalus lydius</i> <i>Astragalus vulneraria</i> <i>Astragalus oxytropifolius</i> <i>Bupleurum sulphureum</i> <i>Inula anatolica</i> <i>Helichrysum noeanum</i> <i>Helichrysum arenarium</i> subsp. <i>Aucheri</i> <i>Anthemis pauciloba</i> var. <i>pauciloba</i> 	<ul style="list-style-type: none"> Implementation of mitigation measures as described for air quality, waste and wastewater management in relevant chapters of the ESIA Report. Limiting project activities to designated areas to prevent direct impacts. Careful siting of temporary facilities to avoid direct impacts on flora species. As an ex-situ measure collection of seeds of local and regional endemic flora species as per the time schedule given in ESIA - Table 10-19 and send the seeds to Turkey Seed Gene Bank. As an in-situ measure, ESIA - Table 10-19 provides the time schedule favourable to carry out transplantation and seed plantation for the local and regional endemic species. At areas where these species are identified to be spread and to be directly affected by Project activities by an expert botanist and be translocated to suitable habitats within the Project Area. Train on-site employees to avoid any impacts on local and regional endemic flora species. Carry out spring biodiversity survey to update the existing baseline data. Prepare and implement Biodiversity Management/Action Plan to achieve no net loss, and for CH trigger species, net gain of biodiversity elements. 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
		<ul style="list-style-type: none"> <i>Ptilostemon afer subsp. Eburneus</i> <i>Jurinea pontica</i> <i>Cousinia stapfiana</i> <i>Cirsium sipyleum</i> <i>Campanula argaea</i> <i>Campanula lyrata subsp. Lyrata</i> <i>Verbascum vulcanicum</i> <i>Stachys cretica subsp. Smyrnaea</i> <i>Nepeta congesta var. Congesta</i> <i>Salvia cadmica</i> <i>Salvia cryptantha</i> <i>Salvia wiedemannii</i> <i>Satureja wiedemanniana</i> <i>Phlomis armeniaca</i> <p><u>Not endemic but rare flora species:</u></p> <ul style="list-style-type: none"> <i>Noaea minuta</i> <p>Other flora species identified at the Project Area</p>		
Disturbance to and direct mortality of terrestrial and aquatic fauna species due to construction activities including, but not limited to, movement of vehicles/machinery, noise and air emissions, on-site waste and wastewater management practices	<ul style="list-style-type: none"> Land Preparation and Construction 	<p>(7) Endemic Terrestrial Fauna</p> <ul style="list-style-type: none"> <i>Anatololacerta anatolica</i> <i>Microtus anatolicus</i> <p>(8) Fauna species falling under Annex II and/or Annex IV of the EU Habitats Directive (see ESIA - Table 10-32)</p> <p>(9) Fauna species identified to have nests within the Project Area (see ESIA - Table 10-32)</p> <p>(10) Potential CH Trigger Avifauna Species</p> <ul style="list-style-type: none"> <i>Neophron percnopterus</i> (Egyptian Vulture) <p>(11) Potential CH Trigger Fish Species + CR + Endemic</p> <ul style="list-style-type: none"> <i>Anguilla Anguilla</i> <i>Oxynoemacheilus simavicus</i> <i>Alburnus nasreddini</i> <i>Pseudophoxinus maeandricus</i> 	<ul style="list-style-type: none"> Implementation of mitigation measures as described for air quality, noise, waste and wastewater management in relevant chapters of this ESIA Report. Limiting Project activities to designated areas to prevent direct impacts, to the extent feasible. Speed limits will be implemented for construction vehicles. Careful siting of temporary facilities to avoid direct impacts on fauna elements. During construction phase care should be taken to avoid direct impacts on water bodies through disturbance/contamination Avoid sediment transport to aquatic ecosystems induced by erosion at construction areas. Train on-site employees to avoid any impacts on the water bodies and for avoidance of direct/indirect impacts on terrestrial and aquatic fauna elements. Train on-site employees to be aware of nests, avoid any displacement without an expert opinion on the status of the nests Fauna species with low mobility to be relocated to suitable habitats through supervision of fauna experts or trained project staff. Regular visual monitoring of the construction activities at the Project Area by the trained Contractor team to ensure mitigation measures are effectively implemented. Carry out spring biodiversity survey to update the existing baseline data. Develop and implement BAP to achieve no net loss, and for CH trigger species, net gain of biodiversity elements through implementation of measures such as conservation of feeding/breeding grounds and appropriate habitat management practices. 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
		<p>(12) Potential CH Trigger Fish Species + EN + Not Endemic</p> <ul style="list-style-type: none"> <i>Barbus pergamonensis</i> <p>(6) IUCN VU Avifauna Species <i>Streptopelia turtur</i> (Turtle dove)</p> <p>(7) Water bird species</p> <p>(8) Species falling under Annex I of the EU Birds Directive (see ESIA - Table 10-32)</p> <p>(9) Endemic fish species (see ESIA - Table 10-32)</p> <p>(10) Fish species listed as VU by the IUCN <i>Barbus tauricus</i> <i>Cyprinus carpio</i></p> <p>Other terrestrial fauna, avifauna and fish species identified at the Project Area</p>		
Accidental introduction of invasive alien species during construction activities	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Natural Habitats at the Project Area Modified Habitats at the Project Area 	<ul style="list-style-type: none"> The presence and spread of invasive flora species will be monitored as part of biodiversity monitoring during the vegetative season, with attention to disturbed areas. Especially during reuse of stored topsoil for rehabilitation purposes care should be taken to avoid introduction of any invasive species. If spreading of invasive species is observed, an appropriate eradication program will be developed and implemented. Undertake a pathway analysis to identify existing and future potential pathways of IAS invasion relevant to the project. This would consider the project location, the likely sources of equipment or materials for the project and what species (both native and IAS) are present at those source sites which could become IAS at the Project Area. 	
Fauna mobility along the railway alignment leading to fauna mortality during operation phase of the Project	<ul style="list-style-type: none"> Operation 	<ul style="list-style-type: none"> Terrestrial fauna elements 	<ul style="list-style-type: none"> The entire HSR will be fenced off as per the technical specifications of the Employer/Operator. The measures required to maintain integrity of the fencing across the route and the operational measures/procedures to be followed will be identified and implemented by the Operator. 	
Impacts of vegetation growth within the track area	<ul style="list-style-type: none"> Operation 	<ul style="list-style-type: none"> Vegetative cover along the railway alignment 	<ul style="list-style-type: none"> Regular maintenance of vegetation is necessary to avoid interference with train operations and track maintenance. The track area should be kept clear. Vegetation maintenance beyond that which is necessary for safety may remove unnecessary amounts of vegetation, resulting in the continual replacement of successional species and an increased likelihood of the establishment of invasive species. 	
Socio-economy				
Impacts on population and demographics	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Communities in PASSES (see Appendix A for the list of PASSES) 	<ul style="list-style-type: none"> Subcontractors will be contractually required to maximise use of local workforce. RAP will be implemented for the management of impacts on physically displaced persons/households and to restore livelihoods of the PAPs. 	<ul style="list-style-type: none"> Resettlement Action Plan (RAP) implemented: <ul style="list-style-type: none"> - Land acquisition information for parcels (number and affected area of parcels, agreement/non-agreement levels, court cases, accelerated expropriation implementations, etc.) records kept up-to-date - RAP budget allocated and disbursed as per the approved RAP - Entitlements defined in the RAP provided to eligible PAP categories (including vulnerable groups/persons) - Stakeholder engagement and information exchange conducted as
	<ul style="list-style-type: none"> Operation 	<ul style="list-style-type: none"> Province and district centres in PASSES, especially: <p>Section 1: Emirdag district in Afyonkarahisar province</p> <p>Section 2: Afyonkarahisar city centre and districts</p>	<ul style="list-style-type: none"> Employer/Operator will collaborate with the related central and local administrations for the long-term management of the risk of unplanned urbanisation, if and when demanded. 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
		<p>Section 3: Usak city centre</p> <p>Section 4: (Salihli Station, Turgutlu Station and Manisa Gar): Manisa city centre, Salihli and Turgutlu districts</p>		<p>required by RAP and records kept in place regarding land acquisition process</p> <ul style="list-style-type: none"> - No land-acquisition related grievance to be received or any land-acquisition grievance resolved in line with Project SEP • Stakeholder Engagement Plan developed and implemented • Following plans developed and implemented: <ul style="list-style-type: none"> • Community Health and Safety Plan • Labour Management Plan (including off-site accommodation) • Camp Site Management Plan • Subcontractor Management Plan • Consultation records with the PAPs • Appropriate measures in place to improve access of PAPs to pastures, private and common lands • The suggestions of the PAPs in place in the Traffic Safety Management Procedure • Stakeholder engagement and information exchange records with local women and other communities in place • No grievances to be received or grievances resolved in line with Project SEP • Internal audit system in place and implemented by the Contractor • Local employment ratios within the total workforce meeting Project objectives • Local procurement records/reports meeting Project objectives • Training records
Impacts of Project-related worker influx	• Land Preparation and Construction	<ul style="list-style-type: none"> • Local Communities, especially women in PASs (see ESIA - Section 11.4.2.1) <p>Section 1:</p> <ul style="list-style-type: none"> • Gumusyaka neighbourhood (Ankara, Polatli) – • Sigircik neighbourhood (Eskisehir, Sivrihisar) • Bayat Merkez (Afyonkarakisar, Bayat) <p>Section 2:</p> <ul style="list-style-type: none"> • Ayvali neighbourhood (Sinanpasa, Aftonkarahisar) existing camp site used by previous contractors within the scope of the Project. • Halaclar village (Usak, Banaz) <p>Section 3:</p> <ul style="list-style-type: none"> • Asagicobanisa village (Manisa, Sehzadeler) 	<ul style="list-style-type: none"> • Project-specific SEP, including external grievance mechanism, will be implemented. In case GBVH is reported through the external grievance mechanism, this will be investigated by trained investigators and responded in accordance with current GIIPs. Through the implementation of SEP, local women will be specially informed by qualified Project personnel/representatives about the following following: <ul style="list-style-type: none"> – Project external grievance mechanism and privacy policy – Women's rights – Self-protection in cases of violence and sexual abuse – Emergency phone numbers, and – Contact information of the institutions and organisations that can be applied to • Contractor and subcontractor personnel (accommodating on-site and off-site) will be provided with training on Project's Social Policy and Contractor's Code of Conduct covering Project's approach to relations with the local communities, prevention of GBVH and SHA, at the time of employment (refresher training will be provided annually and as required). Trainings will cover, inter alia, the following <ul style="list-style-type: none"> – Definition of violence against women in national and international documents, – Types of violence (physical, sexual, economic, emotional), and – Legal sanctions. • Project CLOs and Contractor's Human Resources (HR) team will be specially trained on GBVH. • Project-specific Labour Management Plan, Camp Site Management Plan and Contractor Management Plan will be developed and implemented. • The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with the requirements of the Labour Management Plan covering the off-site accommodation aspects. • The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor implementations with the requirements of the following Project-specific documents; <ul style="list-style-type: none"> – Social Policy – HR Policy – Subcontractor Management Plan – Labour Management Plan – Internal Grievance Mechanism as part of Project SEP. • Subcontractor will be contractually required to maximise use of local workforce. 	
Impacts on life conditions: Roads, access and traffic issues	• Land Preparation and Construction	<ul style="list-style-type: none"> • Local Communities in PASs <p>See ESIA - Table 11-52 for Settlements with Retrospective Impacts on Local Roads due to Previous Project Construction Works conducted by Other Contractors (Suspended in 2018)</p>	<ul style="list-style-type: none"> • Project-specific Community Health, Safety, and Security Management Plan that will identify the current access restriction issues (access to private and public lands and access to the centres of the districts, provinces, and social services) that have been caused by the previous construction works (with prioritisaion in the construction schedule where needed and possible) and describe the management/resolution measures to be implemented to eliminate them, if feasible under the scope of Contractor's works subject to the approval of the AYGM, will be developed and implemented. • The Contractor (through ERG Construction as one of the JV companies) has in place a Traffic Safety Management Procedure developed for the construction of a large-scale motorway project in Turkey. This procedure is to be revised and adapted to the Ankara-Izmir HSR Project and implemented within the scope of Project land preparation and construction activities. • Project-specific SEP, including external grievance mechanism, will be implemented. The Contractor will engage with the local communities through the implementation of Project SEP to receive their feedback and suggestions on the engineering structures (built and to be built) designed to ensure continuity of access between fragmented lands. The Contractor will consult and work with the mukhtars of the affected settlements to identify the locations where there are current and there may be potential future access restriction issues. These feedback and suggestions will be evaluated and feasible measures will be planned, incorporated to the Community Health, Safety and Security Management Plan and implemented - subject to the approval of the AYGM - to eliminate existing access restriction impacts (if feasible under the scope of Contractor's works) and avoid/minimise access restrictions due to the Contractor's activities. • Engineering structures (see Section 1.4.2.1 for the list of Engineering Structures) will be constructed to ensure that access of PAPs to the privately-owned agricultural lands, pastures and other common lands is not hindered/restricted. • RAP will be implemented to restore livelihoods of the PAPs affected from temporary access restrictions that will stem from the infrastructure activities. 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			<ul style="list-style-type: none"> A Traffic Safety Management Procedure will be developed and implemented by all Project personnel (direct and contracted) (details are provided in Chapter 13 on Community Health and Safety). The suggestions of the PAPs (e.g. enforcement of speed limits, placing warning signs, for the management of traffic-related impacts, collected through social surveys, will be reflected in the Procedure as relevant. 	
Impacts on life conditions: Dust, noise and vibration	<ul style="list-style-type: none"> Land Preparation and Construction (including operation of quarries) (see Chapter 6 for the operation phase noise&vibration impacts) 	<ul style="list-style-type: none"> Local Communities in PASS <p>See Chapter 1 (Table 1-18 and Table 1-19) for distance of the quarries and material borrow sites to the closest buildings in the nearby settlements</p> <p>See Chapter 6 for assessment of noise and vibration impacts on receptors:</p> <ul style="list-style-type: none"> The following settlements have buildings located within 220 m distance to the EIA permit boundary of the quarry <ul style="list-style-type: none"> - Cikrikci (Turgutlu, Manisa) – the closest building in the settlement is located at 200 m distance to the EIA permit boundary. - Caltidere (Aliaga, Izmir) – the closest building in the settlement is located at 67 m distance to the EIA permit boundary. The following settlements are located within the safe blasting distance of 220 m (considered as worst case distance for soft blasting operations to be practice within the tunnels): <ul style="list-style-type: none"> - Yeni (Bayat, Afyonkarahisar) - Sagirli (Bayat, Afyonkarahisar) - Balmahmut (Sinanpasa, Afyonkarahisar) - Calislar (Sinanpasa, Afyonkarahisar) - Alaba (Banaz, Usak) - Hatipler (Banaz, Usak) <p>See Chapter 7 for assessment of air quality impacts on receptors</p>	<ul style="list-style-type: none"> Project-specific Noise and Vibration Management Plan will be developed and implemented by the Contractor and the subcontractors (through contractual requirements). For dust emissions, Project-specific Air Quality and GHG Emissions Management Plan will be developed and implemented by the Contractor and the contractors (through contractual requirements). Project-specific SEP will be implemented to inform the communities about the activities and address any dust, noise or blasting/vibration related grievance and plan/take corrective actions, where necessary. Product losses proved to be caused by Project-related dust formation will be compensated by the Project (source and extent of damage to be verified through collaboration with the mukhtars and related authorities, where necessary). 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
Impacts on infrastructure	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Communities in PASs (The Contractor is at the stage of identification of infrastructure to be affected through the pre-construction site surveys) 	<ul style="list-style-type: none"> Project-specific SEP, including the external grievance mechanism, will be implemented to inform the mukhtars and communities about potential interruptions on local infrastructure services and collect relevant concerns and grievances for further management/resolution. Work sites and access routes to be used by the contractors and subcontractors will be clearly identified to avoid potential off-site impacts on local infrastructure. Damage caused by the Project (by contractor or subcontractor) on electrical infrastructure, local water supply/irrigation infrastructure, etc. will be reinstated/repared immediately after the completion of construction activities at respective work sites in collaboration with the related authorities. Where necessary, the Contractor will enforce and monitor the corrective actions to be taken by the subcontractors RAP will be implemented to compensate temporary economic losses due to damage caused by the Project infrastructure activities on irrigation infrastructure (source and extent of damage to be verified through collaboration with the mukhtars and related authorities, where necessary). 	
Impacts on social services (education and health)	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Communities in PASs (potential for all settlements given in Appendix A for the list of PASs) 	<ul style="list-style-type: none"> Project-specific SEP, including the external grievance mechanism, will be implemented. On-site infirmary service will be provided at the construction camp sites for direct and contracted employees in order to reduce the load on public health facilities. The medical personnel and facilities to be provided on-site will meet the requirements of the applicable national legislation. Mobile schooling times will be taken into account for planning the transportation of construction materials. 	
Impacts on welfare and wages	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Communities in PASs (potential for all settlements given in Appendix A for the list of PASs) 	<ul style="list-style-type: none"> Project-specific HR Policy will be developed and implemented in line with IFC Guidance Note 2 (see Chapter 12 on Labour and Working Conditions for the scope of the HR Policy). In order to enhance Project benefits around employment opportunities, the Project will adopt the policy of localisation of workforce, where possible. 	
	<ul style="list-style-type: none"> Operation 		<ul style="list-style-type: none"> The operation phase employment strategies will be identified and implemented by the Operator 	
Impacts on local employment	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Communities and Businesses in PASs <p>(potential for the working age (15-64 years old) group in all settlements given in Appendix A for the list of PASs)</p>	<ul style="list-style-type: none"> In order to enhance Project benefits around employment opportunities, the Project will adopt the policy of localisation of workforce, where possible. The Contractor will set localisation targets for the employment of unskilled, semi-skilled and skilled workers (direct and contracted) within the Labour Management Plan to be developed and implemented. Job applications will be collected from the settlements in collaboration with the mukhtars (The local employment potential of the settlements is presented in this Chapter) Project Contractor will develop and implement Subcontractor Management Plan (covering employment, procurement and supply chain aspects in line with IFC PS2) . Project-specific SEP, including the external grievance mechanism, will be implemented. General job application forms will be collected from the settlements (The local employment potential of the settlements is presented in this report) 	
Impacts on procurement of required goods, materials and services	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Businesses in PASs <p>(potential for all settlements given in Appendix A for the list of PASs)</p>	<ul style="list-style-type: none"> Localisation of procurement of goods and services will be prioritised. Consultations will be held with local businesses to inform them about the potential local procurement of goods and services. Subcontractor procurement will be monitored by the Contractor on a monthly basis through a system to be established. 	
Impacts on livelihood activities (Economic displacement impacts)	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Owner/shareholders and users of the parcels affected from the Project-related land acquisition in PASs 	<ul style="list-style-type: none"> RAP will be implemented to restore livelihoods of the PAPs. Localisation of workforce and procurement will be prioritised. Subcontractors will be encouraged to maximise use of local workforce. Location of beehives in the vicinity of the quarries, where blasting is to be practiced, will be identified by the Contractor prior to start of quarry operations. The local communities will be communicated and consulted through the implementation of SEP, and if necessary, measures will be planned and implemented in agreement with the beehive owners. 	
Impacts on agricultural activities	<ul style="list-style-type: none"> Land Preparation and Construction (impacts described for construction phase can extend to Operation if not mitigated properly - RAP implementati 	<ul style="list-style-type: none"> Local communities (owners/users) who are engaged in agricultural activity on public and private lands located within Project's expropriation corridor in PASs <p>(see ESIA - Section11.4.4; Table 11-66; Table 11-69)</p>	<ul style="list-style-type: none"> RAP will be implemented to restore livelihoods of the PAPs (landowners and users) consistent with requirements of IFC PS5. Project-specific SEP, including the external grievance mechanism, will be implemented. Engineering structures (see Section 1.4.2.1 for the list of Engineering Structures) will be constructed to ensure that access of PAPs to the privately-owned agricultural lands, pastures and other common lands is not hindered/restricted. 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
	on will avoid operation phase impacts)			
Impacts on forestry and benefiting from natural products	<ul style="list-style-type: none"> Land Preparation and Construction (impacts described for construction phase can extend to Operation if not mitigated properly - RAP implementati on will avoid operation phase impacts) 	<ul style="list-style-type: none"> Local communities who use the affected forests in PASs (see ESIA - Section 11.4.4; Table 11-67) 	<ul style="list-style-type: none"> RAP will be implemented to restore livelihoods of the PAPs consistent with requirements of IFC PS5 (e.g. covering measures to increase the production of non-wood products in forestlands). Permanent passages will be provided to sustain lbenefiting activities.Project-specific SEP, including the external grievance mechanism, will be implemented. Engineering structures (see Section 1.4.2.1 for the list of Engineering Structures) will be constructed to ensure that access of PAPs to the forest lands is not hindered/restricted. 	
Impacts on pasturelands and livestock activities such as reduced size of the pasture lands available for livestock activity and restricted access to pasturelands due to impact of construction on access roads	<ul style="list-style-type: none"> Land Preparation and Construction (impacts described for construction phase can extend to Operation if not mitigated properly - RAP implementati on will avoid operation phase impacts) 	<ul style="list-style-type: none"> Local communities who use the impacted pasturelands in PASs (see ESIA - Section 11.4.4; Table 11-68) 	<ul style="list-style-type: none"> RAP will be implemented to restore livelihoods of the PAPs consistent with requirements of IFC PS5 (covering PAPs facing with temporary income loss affected from construction phase access restrictions through appropriate support – e.g. feed support, support to shephards). Engineering structures (see Section 1.4.2.1 for the list of Engineering Structures) will be constructed to ensure that access of PAPs to the pastures lands is not hindered/restricted. The design and location of the Engineering Structures will take into consideration the traditional use and human and animal safety. Any relevant grievance will be collected and managed through SEP implementation. If access to the pasture lands cannot be provided during the construction period, land users whose livelihood is highly dependent on livestock and pasture use will be provided with feed support through the implementation of RAP. This support can be provided in the form of direct provision and distribution of fodder in cooperation with cooperatives and related institutions. Project-specific SEP, including the external grievance mechanism, will be implemented. 	
Physical displacement impacts due to acquisition of residential buildings	<ul style="list-style-type: none"> Land Preparation and Construction (impacts described for construction phase can extend to Operation if not mitigated properly - RAP implementati 	<ul style="list-style-type: none"> Owner/shareholds and users of the houses/structures affected from the Project-related land acquisition in PASs <p>See ESIA - Table 11-78 for Distribution of Residential Buildings per project Section and Settlements</p>	<ul style="list-style-type: none"> RAP will be implemented for the management of impacts on physically displaced persons/households in line with the requirements of IFC PS5. The entitlements for the physically displaced persons will be described within the RAP (e.g. salvage of materials before demolition of buildings, moving assistances, priority in access to RAP benefits/programs). Project-specific SEP, including the external grievance mechanism, will be implemented. 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
	on will avoid operation phase impacts)			
Livelihood impacts due to acquisition of commercial buildings	<ul style="list-style-type: none"> Land Preparation and Construction (impacts described for construction phase can extend to Operation if not mitigated properly – RAP implementati on will avoid operation phase impacts) 	<ul style="list-style-type: none"> Owner/employees of the commercial buildings affected from the Project-related land acquisition in PASs <p>See ESIA Table 11-79 for Distribution of Commercial Buildings per Project Section and Settlements in Section 1,2 and 4 (excluding 4d)</p>	<ul style="list-style-type: none"> RAP will be implemented for the management of impacts on physically displaced businesses in line with the requirements of IFC PS5. 	
Impacts on vulnerable groups and persons (see ESIA - Section 11.3.4)	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Vulnerable groups in PASs <p>The list of vulnerable persons in PASs is kept in the Project database and will be updated periodically by the CLOs</p>	<ul style="list-style-type: none"> Special mitigation/enhancement measures will be designed tailored to the needs of vulnerable groups/persons in PAPs such needs will be identified by Project CLOs through implementation of Project-specific SEP, including but not limited to the following as necessary:. <ul style="list-style-type: none"> Access to legal resources with an assistance in case of a need (i.e. transportation) Assistance on acknowledging and signing official documents Assistance to access compensation payments Assistance to clear and store materials from their land. Assistance to find alternative land Assistance to obtain personal documents Job assistance Priority for job opportunity during the construction phase of the Project Temporary livelihood assistance Travel assistance The deterioration that has occurred or is likely to occur in seasonal workers' housing conditions will be eliminated. The SEP and RAP will be implemented, together with the specialised measures to be developed for the vulnerable groups, to mitigate Project's potential adverse impacts on them and enhance Project benefits. The list of vulnerable persons identified through the ESIA surveys is kept in the Project database, and will be updated as necessary throughout the Project. Vulnerable persons/groups will be specially informed about the Project activities and the external grievance mechanisms in collaboration with mukhtars. Vulnerable persons/households with vulnerable members will be given priority for Project's employment and procurement benefits, where possible. Physical and economic displacement impacts on vulnerable PAPs will be particularly focused on and managed through the implementation of specially designed RAP measures. For the avoidance and mitigation of impacts (e.g. avoiding former and informal owners/users of affected assets becoming homeless), cooperation will be madde with the Employer, other releated governmental institutions and mukhtars. Vulnerable persons/households with vulnerable members will be given priority for the community-level supports/programs. 	
Retrospective social impacts due to suspended/incomplete construction activities (such as access restrictions due to uncompleted engineering structures, damage neighbourhood/ village roads, damage	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Communities who are already affected by the activities conducted previously (before the appointment of the Contractor) <p>Section 1: <u>Ankara:</u> Gumusyaka</p>	<ul style="list-style-type: none"> In settlements, where village/ neighbourhood roads remain affected/blocked and/or health and safety risks prevail due to uncompleted construction works previously conducted in the scope of the Ankara-Izmir HSR Project, repair and improvement works will be prioritised in the construction schedule by the Contractor if feasible under the scope of Contractor's works and where permitted by the related governmental authorities. Relevant measures required for rectification of the retrospective impacts and risks (due to uncomplete construction works of previous contractors) such as completion of the suspended engineering structures, improvement of the damage village/neighbourhood roads, etc. to be identified as part of the E&S Audit to be done during the site hand over to the Contractor and will be incorporated to the Management and Corrective Action Plan and the Community Health, Safety and Security Management Plan to be developed and implemented. During the construction phase, as part of SEP implementation, the Contractor will communicate with the local authorities and village/neighbourhood mukhtar prior to entry to the Project site to ensure management of any grievances that could stem from the activities of the previous contractors. During the 	<ul style="list-style-type: none"> Community Health, Safety and Security Plan developed and implemented Appropriate measures in place for repair and improvement works regarding suspended/incomplete construction activities Consultation records with the local authorities and village/neighbourhood headmen

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
on pasture and/or agricultural lands due to disposal of excavated materials without any mutual agreement ,etc. which have been in place due to past construction activities performed by previous contractors)		<p><u>Eskisehir:</u> Ilyaspasa Ahiler Sigircik <u>Afyonkarahisar:</u> Turkmenakoren Tabaklar Yuregil Kavak</p> <p><u>Section 2:</u> <u>Afyonkarahisar:</u> Akcin Erenler Ismail Koprulu Akdegirmen</p> <p><u>Section 3:</u> <u>Uzak:</u> Buyukoturak Islam Gullucam Karahasan Ahmetler <u>Manisa:</u> Durasilli</p> <p><u>Section 4:</u> <u>Manisa (4a):</u> Kirveli Mevlutlu Kapanci Yarasli <u>Manisa(4b):</u> Seydikoy Gokkaya Derbent Mustafa Kemal Asagicobanisa <u>Izmir (4c):</u> Emialen Degirmendere</p>	construction phase, the Contractor, will record any grievance, feedback or requested received from the stakeholders regarding the retrospective social impacts due to suspended/incomplete construction activities.	<ul style="list-style-type: none"> No grievances received from the stakeholders regarding the retrospective social impacts or grievances resolved as per SEP
Labour and Working Conditions				
Risks and/or impacts associated with management of worker relationship and working conditions	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Contractor personnel (direct) Subcontractor (main and lower-tier) personnel (contracted) 	<ul style="list-style-type: none"> Project-specific HR Policy, covering the following labour aspects, will be developed and implemented in line with IFC Guidance Note 2: <ul style="list-style-type: none"> Working relationship Working conditions and terms of employment Workers' organisations Non-discrimination and equal opportunity Retrenchment Grievance mechanism Child Labour Forced Labour OHS Workers engaged by third parties 	<ul style="list-style-type: none"> HR Policy developed and implemented Plans developed and implemented: <ul style="list-style-type: none"> Camp Site Management Plan Labour Management Plan Subcontractor Management Plan OHS Management Plan Emergency Preparedness and Response Plan COVID-19 Emergency Preparedness and Response Plan

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			<ul style="list-style-type: none"> - Supply chain • The Project-specific HR Policy will be posted at the work and accommodation sites of the Contractor and subcontractors (main and lower-tier). • In line with the Project-specific HR Policy, Project-specific Labour Management Plan will be developed and implemented. • All Project personnel (direct and contracted) will be provided with documented information (through employment contracts and supporting documentation) that is clear and understandable, regarding their rights under national Labour Law (Law No.4857, 2003), applicable collective agreements, including their rights related to hours of work, duration of works throughout Project's construction period, wages, overtime, compensation, and benefits at the time of employment and when any material changes occur. • Project-specific Subcontractor Management Plan, covering the following points at minimum, will be developed and implemented. <ul style="list-style-type: none"> - E&S requirements for main and lower tier subcontractors, including responsibilities related to documentation, implementation, training (e.g. induction, job-specific and refresher), monitoring and corrective actions - Requirements and procedures related to inclusion of E&S requirements in main and lower tier subcontractor contracts/agreements - Penalty system to be applied for incompliances related to labour and working conditions including OHS • Project-specific SEP, including internal grievance mechanism, will be implemented (see stand-alone SEP for details of the mechanism). • Contractor and subcontractor personnel will be provided with training on the Project-specific HR Policy and labour aspects (including child labour, works permitted by law for workers under the age of 18, etc.) at the time of employment (refresher training will be provided annually and as required). • The Contractor will develop and implement an internal audit system and workplace inspection system to check and monitor compliance of the Contractor and subcontractor implementations with the requirements of the following Project-specific documents; <ul style="list-style-type: none"> - HR Policy - Subcontractor Management Plan - Labour Management Plan - Internal Grievance Mechanism as part of Project SEP 	<ul style="list-style-type: none"> • Contractual arrangements with subcontractors in place in line with Project Standards • Training records • Workers informed through appropriate/transparent mediums with regards to employment termination processes
Risks and/or impacts associated with on-site accommodation conditions including: <ul style="list-style-type: none"> - Health and safety risks on Project personnel accommodating at on-site facilities - Spread of diseases/COVID-19 - Reduced worker motivation - Internal grievances 	<ul style="list-style-type: none"> • Land Preparation and Construction 	<ul style="list-style-type: none"> • Contractor personnel (direct) • Subcontractor (main and lower-tier) personnel (contracted) 	<ul style="list-style-type: none"> • Project-specific Camp Site Management Plan, setting out the on-site accommodation conditions including safety and quality of catering/kitchen services, will be developed and implemented at Contractor and Subcontractor (main and lower-tier) construction camp sites (through contractual requirements), addressing the following requirements of IFC/EBRD's Guidance Note on Worker's Accommodation (2009): <ul style="list-style-type: none"> - Heating, air-conditioning and ventilation to be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time. - An adequate supply of potable water to be available in the same buildings where bedrooms or dormitories are provided. Drinking water is to meet local or WHO drinking water standards and water quality to be monitored regularly. - Wastewater treatment and effluent discharge as well as solid waste treatment and disposal are to comply with Project Standards and be adequately designed to prevent contamination of any water body, to ensure hygiene and to avoid the spread of infections and diseases, the proliferation of mosquitoes, flies, rodents, and other pest vectors. - Pest extermination, vector control and disinfection to be carried out throughout the living facilities in compliance with local requirements and/or good practice. Where warranted, pest and vector monitoring to be performed on a regular basis. - The standards of the rooms or dormitory facilities to be adequate to allow workers to rest properly and to maintain good standards of hygiene. - In collective rooms, which are minimised, in order to provide workers with some privacy, only a reasonable number of workers to be allowed to share the same room. - Density standards to ensure 10 to 12.5 cubic metres (volume) or 4 to 5.5 square metres (surface). - A minimum ceiling height of 2.10 metres to be provided. - A minimum space of 1 metre to be kept between beds. - Facilities for the storage of personal belongings for workers to be provided (e.g. individual cupboard for each worker to providing 475 litre big lockers and 1 metre of shelf unit). - Separate storage for work boots and other personal protection equipment, as well as drying/airing areas to be provided. - Shower/bathroom facilities to be provided with an adequate supply of cold and hot running water. Handwash facilities are to consist of a tap and a basin, soap and hygienic means of drying hands. - An adequate number of handwash facilities to be provided to workers. - Handwash facilities are to consist of a tap and a basin, soap and hygienic means of drying hands. - An adequate number of shower/bathroom facilities to be provided to workers. - Adequate canteen, cooking and laundry facilities and equipment to be provided. - Basic leisure and social facilities to be provided to workers to rest and socialise during their free time. - A specific fire safety plan to be prepared, including training of fire wardens, periodic testing and monitoring of fire safety equipment and periodic drills. - A number of first aid kits adequate to the number of residents to be available. First aid kits to be adequately stocked. Where possible a 24/7 first aid service/facility to be available. 	<ul style="list-style-type: none"> • Plans developed and implemented: <ul style="list-style-type: none"> - Labour Management Plan (including off-site accommodation) - Camp Site Management Plan - Subcontractor Management Plan - Waste Management Plan - Water and Wastewater Management Plan • Workers' accommodation: processes and standards compliant with IFC and EBRD requirements (2009) at contractor and subcontractor accommodation sites • Medical check records of personnel in place • No internal grievance to be received or any internal grievance resolved in line with Project SEP • Training records

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			<ul style="list-style-type: none"> - Food provided to workers is to contain an appropriate level of nutritional value; different choices of food must be served if workers have different cultural/ religious backgrounds. • The construction camp site designs will take into consideration GBVH hotspots for personnel, visitors and suppliers. • Smoke detectors will be provided separately at each dormitory room. • Pedestrian separation and security/site entry measures will be adequately taken at the construction camp sites. • Adequate shelters for resting and dining, portable toilets and waste management facilities (e.g. separate waste bins for organic waste, recyclables, hazardous waste, etc.) will be provided for Contractor and subcontractor personnel working along the railway route, remote from construction camp site locations. • Project-specific Waste Management Plan and Water and Wastewater Management Plan will be developed and implemented at the on-site accommodation facilities and at the resting and dining locations of the off-site/remote work sites. • Contractor and subcontractor personnel will be provided with training on Project's Social Policy and Contractor's Code of Conduct covering Project's approach to prevention of GBVH, at the time of employment (refresher training will be provided annually and as required). • Contractor and subcontractor personnel will be provided with training on the Camp Site Management Plan, including general waste management, good housekeeping, hygiene and food safety practices, at the time of employment (refresher training will be provided annually and as required). • The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor (main and lower-tier) with Project Standards on-site accommodation as set out in the Camp Site Management Plan. • Project-specific SEP, including internal grievance mechanism, will be implemented. • In case GBVH is reported through the internal grievance mechanism, this will be investigated by trained investigators and responded in accordance with current GIIPs. 	
OHS risks and impacts due to Project activities	• Land Preparation and Construction	• Contractor personnel (direct)	<ul style="list-style-type: none"> • Project-specific H&S Policy to be developed by the Contractor and implemented by the Contractor and subcontractors. • The Project-specific H&S Policy will be posted at the work and accommodation sites of the Contractor and subcontractors (main and lower-tier). • In line with the H&S Policy, Project-specific OHS Plan, covering the following subjects at minimum, will be developed by the Contractor and implemented by the Contractor and subcontractors (through contractual requirements). <ul style="list-style-type: none"> - Risk Assessment - Job Hazard Analysis - Permit to Work System - Fitness to Work - Machinery and Equipment Inspections and Control Forms - Personal Protective Equipment (PPE) - Health Units and Personnel - Hazard-specific Measures - OHS Training - Near Miss Reporting - Incident/Accident Reporting - Root-cause Analysis - Emergency Preparedness and Response - Occupational Hygiene Measurements - OHS Targets - Monitoring and Reporting • Based on the Project-specific OHS Plan, the following H&S procedures will be developed and implemented for specific-hazards types: <ul style="list-style-type: none"> - Accident Incident Notification and Reporting Procedure - Emergency Response Procedure - Equipment Control and Maintenance Procedure - Excavation Backfilling Procedure - Hazardous Materials Management Procedure - Health and Safety Discipline Procedure - Health and Safety Trainings Implementation Procedure - Hot Work Procedure - Journey Safety and Safe Driving Procedure - Lock-out/Tag-out Procedure - Lifting Work Procedure - Machinery Protection Procedure - Manual Handling Procedure - Night Work Procedure 	Plans developed and implemented: <ul style="list-style-type: none"> - OHS Management Plan and procedures - Emergency Preparedness and Response Plan OHS and first-aid training records in place Job specific training records in place Risk assessments prepared for each work type/activity Appropriate PPE use in place OHS plans and procedures in place Work related OHS measures in place The following systems in place: <ul style="list-style-type: none"> - Permit to work system - Near miss reporting - Fitness to work - Job hazard analysis Medical check records of personnel in place Root cause analysis conducted for incident/accidents and major near miss incidents Records of OHS services procured in place Number of first-aiders within Contractor and subcontractors Health units/infirmaries in place as per the national legislation OHS training plan in place and implemented Records of penalty/rewards in place Internal audits conducted and non-compliances identified and non-compliances closed within the specified timeframe
		• Subcontractor (main and lower-tier) personnel (contracted)		

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			<ul style="list-style-type: none"> - Permit to Work Procedure - Personal Protective Equipment Procedure - Scaffold and Ladder Usage Procedure - Traffic Safety Management Procedure - Warning Signs and Barrier Procedure - Working at Height and Fall Protection Procedure - Working in Confined Space Procedure (covering a clear and simple identification of the confined space examples within the Project, specification of legislative requirements, rescue operations, etc.) • The Contractor and subcontractors will procure required OHS services, in accordance with the scope and durations stipulated in the legislation, by certified OHS Specialists (in-house or from licensed Joint Health and Safety Units). • Health unit/infirmaries will be provided at the construction camp sites as per the requirements of the applicable national legislation (e.g. workplace doctor and other health personnel will be provided in line with the legislative requirements according to hazard classes, in consideration of work shifts). • Adequate number of trained first aiders, with valid certifications from authorised institutions, will be provided at the work sites. Shifts and working arrangements will be accordingly. • Risk assessments tailored to each work activity will be conducted by risk assessment team as specified in the Regulation on Risk Assessment for Occupational Health and Safety (working at height, electrical works, working with hazardous materials, working in tunnels, excavation works, heavy lifting, etc.) and the precautions and mitigation measures identified in the risk assessments will be communicated by the Contractor to all direct and contracted Project personnel for site implementation. • An OHS Training Plan will be developed by the Contractor and OHS trainings, including mandatory OHS training (16 hours as per national legislation), job-specific training, toolbox, refresher OHS training, first-aid, safety leadership, visitor orientation, vocational training and driving safely training will be provided to Contractor and subcontractor personnel in line with the OHS Training Plan. • Personnel who will be responsible for conduction works with specific hazards will be properly trained on the specific job type. • Job-specific toolbox trainings will be conducted at the beginning of each new work activity and at least once per week by competent personnel such as OHS Specialists and/or trained foremen. • Certified first aid trainings will be conducted with sufficient number of Project personnel (direct and contracted) in line with national legislations and the national requirements will be ensured. • Firefighting and search and rescue teams will be established with sufficient number of Project personnel (direct and indirect) in line with national legislations. • Project orientation and basic OHS training will also be provided to visitors and use of related PPEs are enforced. • Incident/accident reporting (including near miss), investigation and recording systems will be established in line with the OHS Plan. Incidents and accidents, findings of the root cause analysis and corrective actions planned for specific work sites will be communicated to OHS personnel. • The permit to work system will be established to include the definition of the work to be done, clear definition of the specific risks/hazards of the work activity, all precautions to be taken, who will be working under that specific work permit, and documentation ensuring that the people doing the job understand the risks of the activity. • Under the Health and Safety Discipline Procedure, a penalty and/or reward system will be established by the Contractor (with input from related departments such as HR, legal, etc.) in order to define the actions to be taken/processes to be followed in case of non-compliances/major E&S incidents (e.g. issuance of notices or warnings, actions to be taken in the case of repeated notices) or satisfactory/exceeding E&S performance. • Adequate and sufficient PPE will be provided by Contractor and subcontractor OHS teams for all Project personnel (direct and contracted) and visitors and replacement stocks will be kept at site in adequate numbers. The Contractor and subcontractor OHS teams will provide necessary information and training related to the effective and safe usage of the PPEs. Adequate use of PPE by all direct and contracted Project personnel for different types of work activities will be ensured through contractual requirements and monitoring by the Contractor and certified OHS specialist. • Medical checks will be conducted for all Project personnel (direct and contracted) at the beginning of employment and then periodically. • Occupational health and safety measurements will be conducted according to the risk assessments, e.g., personal dust exposure, noise, vibration, etc. • All equipment and vehicle will be checked periodically within the legally required intervals and maintained regularly. All areas prior to initiation of work for overhead electricity lines and underground services will be checked and safe distance during works will be ensured. • The following Project-specific environmental management plans, which has aspects relevant to the management of health and safety of the Project personnel, will be developed and implemented by the Project personnel (direct and contracted): <ul style="list-style-type: none"> - Air Quality and GHG Management Plan - Hazardous Materials Management Plan will be developed and implemented (including pesticide use and management, if planned in the scope of the Project) - Noise and Vibration Management Plan - Waste Management Plan - Water and Wastewater Management Plan • Project-specific Stakeholder Engagement Plan including internal grievance mechanism will be implemented throughout the Project. 	Equipment and machinery maintenance records in place

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			<ul style="list-style-type: none"> The Contractor will develop and implement an internal audit system to check and monitor compliance of the Contractor and subcontractor (main and lower-tier) with the requirements of OHS Plan and procedures. Detailed job-specific OHS measures will be described in the OHS procedures and will be implemented by the Contractor and subcontractors. These measures will include but not limited to the following: Speed limits will be set for on-site and off-site traffic and the right of way practices will be implemented. Appropriate exclusion zones will be set and maintained below any lifting and working at height activities to avoid incidents/accidents due to falling objects. Fall protection systems will be in place during works at height (e.g. fall arrest equipment, etc.). Personnel that will conduct lifting activities will be specifically trained regarding the job type. Major on-site lifting operations will be planned in scheduled and planned in advance taking into account the weather conditions. Areas for the loading/unloading of materials will be clear of traffic, pedestrian and Project personnel. Loads should be spread evenly as uneven loads can make the vehicle unstable and loads will be secured as to not slide around in/on the vehicle. Before unloading, checks will be made to make sure loads/materials have not shifted during the transit and are not likely to move or fall when restraints are removed. All tools and equipment will be appropriately positioned whilst working at height to avoid falling of objects. A traffic signalling/signalmen team will be established to work at construction sites together with heavy construction machineries to prevent any incidents and/or accidents that may result due to the limited view of machinery operators. Limits on manual lifting/handling will be implemented throughout the Project activities. Guard rails, warning signs will be installed at the work sites. Sufficient illumination will be provided at all work sites. Regular visual checks will be conducted and excavation debris and other potential risk sources such as cables and ropes will be maintained /cleaned-up after work activities. Operation of heavy machinery will be restricted to those that are trained and competent (licensed if required). Only competent and authorised personnel will be permitted using the hazardous materials and substances. Safety Data Sheets (SDS) written in the native language of the workers for each hazardous material will be kept at the hazardous materials storage areas and at work sites that the materials are used. Hazardous materials will be managed and stored in designated areas with secondary containment as per WBG General EHS Guidelines, keeping absorbent pads or materials next to storage areas and keeping drums and containers containing fuel, oil or other chemicals in a containment with a capacity of up to 110% of the volume of material stored. Spill kits will be provided, and fire detection and prevention systems will be established in hazardous materials storage areas in case of any spillage and leakage. Under the Hazardous Materials Management Plan, a Blasting Procedure, defining the principles for explosives transportation, loading/unloading, storage, communication (informing the communities, alarm system), etc., will be developed and implemented. A schedule will be established for the blasting operations in the quarries used for the material extraction requirements of the Project and for engineering structures and the proper planning will be provided for these activities. On-site operations will be scheduled and planned well in advance taking into account the weather conditions and details of the operation to be communicated to all site personnel on time. Work at height activities and lifting activities will not be conducted during heavy rain/storm and other poor/extreme weather conditions. 	
	<ul style="list-style-type: none"> Operation 	<ul style="list-style-type: none"> Operator personnel Personnel of contractors/subcontractors 	<ul style="list-style-type: none"> For the operation phase of the Project, detailed planning of the operation and maintenance (O&M) workforce (direct and contracted) requirements of the Project will be done by the Employer and the Operator in due course. Project-related labour and working conditions at the Project facilities during the operation phase will be in line with the requirements of the Labour Law (Law No. 4857, 2003). The labour-related policies, plans and procedures to be implemented during the operation phase will be decided by the Operator. Measures to be taken for the safety of the personnel who has to work on rails will be taken in line with Operator's safety procedures. Consistent with the national EIA Report; <ul style="list-style-type: none"> Access of maintenance personnel to the railroad on foot to be provided by taking appropriate safety measures (i.e. trackside walking paths). At locations where there are steps and ramps with access to the trackside walking path, flat platforms with non-slippery surfaces to be established on both sides. An automatic warning system to be installed at locations where the works are to be performed while the trains are in motion, if the setting is not suitable for the personnel to see the approaching train and have enough time to leave their work area for reaching a safe place. The locations where the personnel will not be permitted to work on the railway while trains are in motion, working prohibition will be clearly identified by means of sufficient number of warning to be posted on both sides of such sections, as well as potential access points, including all platform edges. The following measures of the WBG EHS Guidelines for Railways are applicable to the operation phase of the Project, as appropriate in line with Operator's <ul style="list-style-type: none"> Against the risk of exposure to moving trains, (i) training workers in personal track safety procedures; (ii) blocking train traffic on lines where maintenance is occurring ("green zone working") or, if blocking the line is not feasible, use of an automatic warning system or, as a last resort, human lookouts, and (iii) design and construction of rail lines with adequate clearance for workers 	<p>Operation phase plans developed and implemented:</p> <ul style="list-style-type: none"> OHS Management Plan and procedures Emergency Preparedness and Response Plan

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			<ul style="list-style-type: none"> - Training of the workers exposed to electrical hazards from electrified railways on personal track safety and permitting only workers who are specifically trained and competent in working with overhead lines to approach these systems. - Avoiding/minimising occupational electric and magnetic (EMF) field exposure through the preparation and implementation of an EMF safety program including (i) establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, and limiting access to properly trained workers; and (ii) implementation of an action plan to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE). - Against the risk of exposure of crew members to noise and vibration, (i) use of air conditioning systems to maintain cabin temperature and provide fresh air so that windows can remain closed, limiting wind and outside noise; (ii) application of available engineering controls, (iii) use of personal protective equipment (PPE) if engineering controls are not feasible or adequate to reduce noise levels; (iv) use of dampers at the seat post to reduce the vibration experienced by the operator; (v) installation of active vibration control systems as needed. - Scheduling rest period of the critical operation personal including drivers, signalers, maintenance workers, and others whose work is critical to safe operation, at regular intervals and during night hours, to the extent feasible, to maximise the effectiveness of rest breaks, and in accordance with international standards and good practices for work time. - If hazardous materials such as solvents, coolants, acids, and alkalis, are to be used in the maintenance operations. hazardous materials management strategies are to include (i) use of aqueous detergent cleaning solutions or steam cleaning, or use and recycling of cleaning solvents; (ii) Use of water-based paints; and (iii) use of track mats to retain wayside grease and other contaminants; 	
Building demolition works	<ul style="list-style-type: none"> • Land Preparation and Construction 	<ul style="list-style-type: none"> • Contractor and subcontractor personnel involved in demolition works 	<ul style="list-style-type: none"> • The building demolition works during the construction phase will be conducted in line with the requirements of the Regulation on Waste Management and Regulation on the Control of Excavation Soil, Construction and Demolition Waste, the Regulation on Health and Safety Measures in Working with Asbestos, Regulation on the Assessment and Management of Air Quality and Regulation on Assessment and Management of Environmental Noise. To this end, specific requirements defined for the demolition works, including occupational health and safety measures to be taken for the protection of employee health and safety, measures against dust and noise generation, management of hazardous demolition wastes will be fulfilled. 	Documentation on demolition works showing compliance with the requirements of the respective Turkish regulations
Community Health and Safety				
Risk on CHS (public traffic and pedestrian) due to Project-related traffic	<ul style="list-style-type: none"> • Land Preparation and Construction 	<ul style="list-style-type: none"> • Local Communities on the Transport Route • Local Communities in the Vicinity of the Project • Road Users 	<ul style="list-style-type: none"> • Project-specific Community Health, Safety and Security Management Plan will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). • Project-specific Traffic Safety Management Procedure including both on-site and off-site traffic safety measures will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). All Project personnel/drivers, including the Contractor and subcontractors will be provided with training on the implementation of the Traffic Safety Management Procedure. These trainings will emphasise safety aspects among drivers. • To minimise off-site traffic, the Contractor will prioritise designating excavated material storage sites within the expropriation corridor of the railway and selecting quarry and material borrow sites with minimum possible haul distances. • The Contractor will evaluate and approve subcontractor camp site locations in consideration of potential impacts of the camp site related traffic on nearby communities. • The Contractor will clearly define the construction zones by appropriate visual means such as reflective barriers and flashing signs. Prescribed routes for construction traffic and critical locations (including sensitive receptors such as hospitals, schools, etc.) will be identified and agreed with the relevant authorities (i.e. KGM, local police) and in consultation with the local communities, as necessary. Construction vehicles will conduct activities only within these zones and routes. • The Contractor will avoid passage of construction traffic through the settlements, whenever use of alternative roads is feasible. • Where passage through existing settlements is unavoidable, Contractor will take all necessary measures (i.e. speed limits, traffic signs, driver trainings) to prevent safety risks on local communities and will engage with community representatives to plan the traffic by taking the daily life of the communities into account (i.e. selection of routes, school transportation hours, market days, etc.) and inform the communities about the construction schedule, activities to be conducted and safety measures taken, through appropriate means such as phone calls with mukhtars, meetings and leaflets, notices, signs, etc. as part of Project SEP implementation. • Construction activities on existing roads will be initiated only after relevant permits are obtained and all required measures such as signage, barriers, fencing, lighting, etc. are taken in cooperation with the related authorities. • The Contractor will evaluate all construction areas and construction access routes for potential community interaction (with a particular attention to schools, children parks, etc.). Based on the results of this evaluation, site specific measures (i.e. improve signage, visibility, detection and redirection of trespassers, providing safe pedestrian crossing routes/procedures for locals as described in the Construction Contract) will be developed and implemented and driver/operator trainings prior to initiation of any construction work will be conducted. • As per the Technical Specifications of AYGM for Infrastructure Works, in open excavated road crossings, not more than half of the road will be occupied at the same time and the other half will be kept open to traffic by taking necessary precautions. • For night-time work activities, warning signs, signals, markings and other appropriate traffic regulation devices will be installed at all required sites. Periodic visual checks to identify signs of structural deterioration will be conducted regularly and all signage and lighting will be replaced as required. All barriers and warning signs placed in the construction work areas will be illuminated from sunset to sunrise. 	<ul style="list-style-type: none"> • Plans developed and implemented: <ul style="list-style-type: none"> - Community Health, Safety and Security Plan - Traffic Safety Management Procedure • Training records • Warning signs and visible instructions in place to ensure Project-related traffic is diverted to the improved access road • Stakeholder engagement and information exchange records with local people and local businesses in place • No external grievance related to CHS to be received or any CHS related grievance resolved in line with Project SEP

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
			<ul style="list-style-type: none"> Entry restrictions will be implemented below bridges, viaducts and other high structures to ensure community members are not affected by potential of falling objects. Deliveries by vehicles transporting hazardous materials and wastes will be planned carefully to avoid risks on the local communities. A traffic signalling team will be established to work at construction sites together with heavy construction machineries to prevent any incidents and/or accidents that may happen due to the limited view of machinery operators. Compliance of all drivers with the regulatory speed limits on public roads will be strictly monitored by using appropriate tools (e.g. random speed checks). Contractor will collaborate with local communities to raise awareness about traffic and pedestrian safety. As needed, the Contractor and subcontractors will be required to arrange service buses for the transportation of Project personnel to minimise Project-related off-site traffic. Project-specific SEP will be implemented to address any construction transport/traffic related grievance and plan/take corrective actions in line with the Grievance Mechanisms, where necessary. As part of SEP, local communities will be informed about the construction sites, traffic restrictions to be applied for health and safety purposes and duration of such restrictions. 	
	• Operation	• Local Communities in the Vicinity of the Project	<ul style="list-style-type: none"> The design and construction of the infrastructure, superstructure, electrification, signalisation, telecommunication facilities, and the buildings and structures (including the Control Centre) required for the safe operation of the Project will be done by the Contractor as per the TCDD technical specifications and the requirements of the Construction Contract. The risk of trespassers on the HSR line will be avoided as the entire HSR will be fenced off as per the technical specifications of the Employer/Operator. The measures required to maintain integrity of the fencing across the route and the operational measures/procedures to be followed to prevent the pedestrian collision risks at the stations/gars throughout the operation phase will be identified and implemented by the Operator. The stations will be designed to ensure that the authorised route to be used by the passengers/pedestrian is safe, clearly indicated, and easy to use. At the station/gar locations, potential points of entry to track areas will be identified by H&S professionals prior to start of operations and clear and prominent warning signage will be posted and other preventive measures (e.g. use of closed-circuit television to monitor stations and voice alarm systems to deter trespassers at the stations/gars) will be taken at all necessary locations. As per the national EIA Report, in urban areas (e.g. Manisa region), the fence height will be sufficiently high and will be constructed using materials that do not allow the children to climb or pass under or over the fence. If necessary/feasible, the lower edge of the fence will be buried in the ground and additional measures will be taken to deter climbing by the children. In order to prevent unauthorised/accidental entries, designated access routes will be defined and barriers will be designed for locations that will provide periodical access to the HSR route for O&M and other purposes. As per the national EIA Report, the information and warning signs and markings for the safe HSR operation will provide for the following: <ul style="list-style-type: none"> Distance signs to be eye-catching and installed at appropriate places along the line and at regular intervals. Line slope markings to be eye-catching and to be installed wherever the slope angle or direction changes significantly. Signs indicating the location of all energy lines passing over the railway and the maximum height of safe working under them to be installed along the line. Signs showing the location and depth of underground energy cables passing under the railway or running along the railway to be installed along the line. All bridges and other fixed structures to be clearly defined and descriptive signs to be visible from both road and rail. Signs indicating the direction and distance of adjacent access points or crossing roads to be installed at appropriate intervals in tunnels. Development and implementation of the management plans and procedures for safe operation of the HSR will be under the responsibility of the Employer/Operator (e.g. safety distances/buffer zones to approach the route, speed adjustments, etc.). 	
Explosives Use and Blasting	• Land Preparation and Construction	• Local Communities located in the vicinity of quarry sites (see Table 1-18)	<ul style="list-style-type: none"> Project-specific Noise and Vibration Management Plan will be developed and implemented based on the mitigation measures identified in Chapter 6 ("Noise and Vibration") of this ESIA. Project-specific Community Health, Safety and Security Management Plan will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). Project-specific Hazardous Material Management Plan will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). Under the Hazardous Materials Management Plan, a Blasting Procedure, defining the principles for explosives transportation, loading/unloading, storage, communication (informing the communities, alarm system), etc., will be developed and implemented. Project-specific SEP including external grievance mechanism will be implemented throughout the Project. The local communities at the closest settlements will be informed about the blasting schedule prior to start of blasting operations at the quarries through the mukhtars and as necessary, through direct communication with the potentially affected households (through Project Community Liaison Officers – CLOs), where possible. The blasting operations will be conducted consistently according to this schedule. If changes to the blasting schedule occur, updated information will be conveyed to the mukhtars prior to implementation of changes. Blasting-related grievances will be investigated and managed through the implemented of Project SEP and preventive/corrective measures will be planned and taken as necessary. Blasting-related measures defined in Chapter 6 on Noise and Vibration, including preconstruction surveys of the nearby settlements/buildings (within approximately 250 m distance to blasting locations), vibration measurements, record keeping, and monitoring, will be implemented. Additional structures that prevent pieces from scattering will be constructed where necessary. Additional measures to be taken before and during the blasting activities are described in Chapter 6 ("Noise and Vibration"). 	<ul style="list-style-type: none"> Plans developed and implemented: <ul style="list-style-type: none"> - Community Health, Safety and Security Management Plan - Hazardous Materials Management Plan - Emergency Preparedness and Response Plan (covering CHS aspects) - COVID-19 Emergency Preparedness and Response Plan (covering CHS aspects)

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
Damage to existing local infrastructure	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Communities Infrastructure Owners (economic losses) 	<ul style="list-style-type: none"> Detailed site surveys and measurements to identify the existing infrastructure that will be intersected will be conducted. The Contractor will cooperate with related authorities and enterprises to avoid interaction where possible or develop and implement relocation projects. The construction of the railway (at infrastructure crossing locations) will be conducted in line with the protocols signed/to be signed between the Project (where required through AYGM) and relevant authorities and enterprises and applicable technical specifications/regulations. The Contractor will inform the public of the structures and buildings that may be affected and situations (such as temporary occupation, blocking, alterations, etc.) that may arise during the Project activities. The Contractor will notify the public in advance for a suitable time to take precautions. In this notice, information such as conditions of the situation, its characteristics and when will it be remedied will be stated. Project-specific SEP including external grievance mechanism will be implemented throughout the Project. 	
Project infrastructure safety risks	<ul style="list-style-type: none"> Construction 	<ul style="list-style-type: none"> Contractor and subcontractors (during the construction phase) 	<ul style="list-style-type: none"> The design and construction, including the infrastructure, superstructure, electrification, signalisation and structural works, will be conducted by the Contractor as per the General and Special Conditions and Technical Specifications (including the standards and regulations indicated) contained in the Construction Contract executed between the Contractor and the AYGM on 23 November 2020 (will be effective after the date of financial close). The supervision, design review/approval and control works will also be performed by the competent professionals/technical consultants (third party engineers) in line with the Construction Contract (to be provided by AYGM). Assessment of the stability and safety of the previously constructed Project components will be procured by the Contractor. As a requirement of the Contract to enter into effect, technical determinations of the previously constructed works will be made and recorded. Measures necessary to ensure fulfilment of the technical requirements will be planned in consultation with and approval of AYGM. Once the construction resume by the Contractor activities, regarding the retrospective impacts on local infrastructure facilities, the Contractor will develop and implement a Community Health, Safety and Security Management Plan that will identify the ongoing infrastructure safety problems caused by the previous construction activities and describe the management/resolution measures to be implemented to eliminate them, if feasible under the scope of Contractor's works and subject to the approval of the AYGM (will result in positive impacts). Measures to be taken during the construction for the avoidance/mitigation of risk associated with sinkhole occurrence is provided in Chapter 5 ("Land Use and Geology"). 	
	<ul style="list-style-type: none"> Operation 	<ul style="list-style-type: none"> HSR operations personnel HSR passengers 	<ul style="list-style-type: none"> Trial operations/commissioning tests will be performed by the Contractor in accordance with the requirements of the Construction Contract prior to temporary acceptance of the work by the Employer. Trial operations will include: <ul style="list-style-type: none"> Pre-commissioning tests (Dry or cold function tests) including appropriate inspections and functional tests to demonstrate that each item of the facility can safely undertake the commissioning tests). Commissioning tests, which will include specified operational tests to demonstrate that the works or a part of them can be operated safely under all current operating conditions and as specified. A trial run that will demonstrate that the works or a part of them are working in accordance with the Contract and reliably. The Contractor will carry out the training of the Employer's/Operator's personnel for the execution and operation of the works as per the requirements of the Construction Contract. Based on the technical information to be collated by the Contractor on site-specific risks through geological, geotechnical and hydrogeological site investigations and assessments, and the collaborations that will take place between the Contractor and the Employer/Operator in the pre-construction and construction periods, development and implementation of the operational plans and procedures, including long-term geotechnical monitoring studies to be conducted by the Operator and/or their consultants, that will ensure stability and integrity of the infrastructure and safety of HSR operations, will be under the responsibility of the Employer/Operator. Measures for the maintenance of vegetation during the operation phase will be taken in line with the Operator's relevant procedures to keep the track area completely clear of vegetation by using biological, mechanical, and thermal vegetation control measures where practical. 	
Impacts of Project-related worker influx	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Local Communities (especially women) <p>See Table 1-17 for the local settlements located in the vicinity of the planned construction camp sites of the Contractor. Location of subcontractor construction camp sites (main and lower tier) will further be identified upon selection of subcontractors.</p>	<ul style="list-style-type: none"> See Chapter 11 on Socio-economy for the measures to be taken with regard to management of risks and impacts of worker influx. 	
Community Exposure to Disease	<ul style="list-style-type: none"> Land Preparation 	<ul style="list-style-type: none"> Local communities especially in the vicinity of the Construction Camp 	<ul style="list-style-type: none"> The following Project-specific management plans will be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements): <ul style="list-style-type: none"> Project-specific Community Health, Safety and Security Management Plan 	

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
	and Construction	<p>Sites, Project accommodation facilities/sites</p> <p>(See Table 1-17 for the local settlements located in the vicinity of the planned construction camp sites of the Contractor. Location of subcontractor construction camp sites (main and lower tier) will further be identified upon selection of subcontractors)</p>	<ul style="list-style-type: none"> Camp Site Management Plan (see Chapter 12 on Labour and Working Conditions for the detailed requirements to be fulfilled at the camp sites in line with the IFC/EBRD's Guidance Note on Worker's Accommodation (2009): Labour Management Plan (including off-site accommodation) Waste Management Plan Water and Wastewater Management Plan Project-specific EPRP and COVID-19 EPRP to be developed by the Contractor and implemented by the contractor and subcontractor personnel (through contractual requirements). Contractor will ensure that necessary medical checks for all direct and contracted employees are in place at the time of hiring, including medical checks for symptoms of COVID-19. These medical checks will be repeated as necessary. Adequate COVID-19 PPE will be provided and regular disinfection services will be conducted in accommodation facilities, offices and service buses. Isolation facilities/accommodation rooms will be provided by the Contractor in case of positive COVID-19 test results are received for the site employees. The Contractor will closely monitor potential diseases among the Project employees (direct and contracted) throughout the Project, also diseases among the nearby communities, and plan/take necessary actions accordingly. 	
Risks and/or impacts due to use of hazardous materials	• Land Preparation and Construction	• Local Communities	• Project-specific Hazardous Materials Management Plan will be developed and implemented (including pesticide use and management, if planned in the scope of the Project).	
	• Operation	• Local Communities	<ul style="list-style-type: none"> The hazardous materials to be used in the O&M activities will be determined by the Employer/Operator. Development and implementation of the Hazardous Materials Management Plan (or similar) during the operation phase will be under the responsibility of the Operator. As appropriate, the Project-specific Hazardous Materials Management Plan developed and implemented for the construction phase will be basis of the management approach during operation phase. Transportation type (passenger and/or load including dangerous goods) will further be clarified between the Employer and the Contractor based on the ongoing discussions. Depending on the decision for transportation of loads, which may include dangerous goods, risk analysis will be conducted prior to start of operations and the Hazardous Materials Management Plan (or similar) will be updated to include relevant risk management measures. 	
Security Personnel	• Land Preparation and Construction	<p>• Local Communities</p> <p>(See Table 1-17 for the local settlements located in the vicinity of the planned construction camp sites of the Contractor. Location of subcontractor construction camp sites (main and lower tier) will further be identified upon selection of subcontractors)</p>	<ul style="list-style-type: none"> Project-specific Community, Health, Safety and Security Management Plan will be developed and implemented. The security management measures will be covered in the Plan. The Contractor will obtain security services from a certified Private Security Contractor Firm or with in-house security personnel (with required training). The agreements with the Private Security Contractor Firms will include provisions related to the Contractor's requirements of the appointment of certified officers, who received basic trainings for private security officers, were subject to necessary security inquiries and fulfils the age and education standards. The Contractor will monitor the legal and special trainings provided to the private security officers and ensure that these officers receive periodical trainings on adequate use of force, appropriate conduct towards the Project employees and the local communities, gender sensitivities, cultural sensitivities (if required) and human rights in line with the requirements of national legislation as well as IFC PS 2 and PS 4. Legal inquiries during the hiring process of security personnel (or the company the security service is procured from) will be conducted to check competency and existence of any former abuse incidents. Trainings on code of conduct, gender sensitivities (including GBVH and SHA) and local cultural sensitivities will be provided to security personnel or the company the security service is procured from will provide evidence that the personnel received these trainings from qualified trainers. The trainings will ensure force is used only for preventive and defensive purposes and in proportion to the threat. The required identification, communications devices, and any other equipment required for the job will be provided to the security personnel to ensure maximum efficiency. The Contractor will investigate any grievance from local communities regarding inappropriate conduct of security forces immediately. The Contractor will ensure appropriate conduct of security personnel through incident report reviews, as well as review of grievances received. All measures regarding private security services will be included in the contractual agreements. Project-specific SEP including external grievance mechanism will be implemented throughout the Project. 	<ul style="list-style-type: none"> Community Health, Safety and Security Management Plan developed and implemented Contracts in place with reputable Private Security Contractor Firms Legal and special trainings in place for the security personnel No external grievance related to security arrangements to be received or any security arrangements-related related grievance resolved in line with Project SEP
	• Operation	<p>• Local Communities near the Stations and other O&M facilities</p> <p>• HSR passengers</p>	• The security requirements and arrangements for the operation phase for the HSR services and at the O&M facilities including the stations/gars will be determined and managed by the Operator. The Project-specific Community, Health, Safety and Security Management Plan developed and implemented for the construction phase will be basis of the management approach during operation phase, as appropriate.	
Emergency Preparedness and Response and Fire Risk	• Land Preparation and Construction	• Local Communities along the route (to be identified in the EPRP based on	<ul style="list-style-type: none"> The Project-specific EPRP (covering both on-site and off-site emergencies) will be developed and implemented by the Contractor for the construction phase. The Employer/Operator will develop and implement the EPRP for the operation phase (with special measures - e.g. crews, equipment- considered for the tunnels, bridges and viaducts to provide easy access to the HSR route, as required by the national EIA Report as well as fire safety measures including 	<ul style="list-style-type: none"> Plans developed and implemented: - Community Health, Safety and Security Management Plan

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
	<ul style="list-style-type: none"> Operation 	<ul style="list-style-type: none"> emergency zones to be defined) Project Personnel 	<ul style="list-style-type: none"> monitoring of right-of-way vegetation according to fire risk, planting and management of fire-resistant species within, and adjacent to, rights-of-way, as recommended by the GIIP). Measures/systems for collaboration with the local communities and other external parties including local governmental agencies, media, etc. will be developed, where necessary. Emergency preparedness and response information will be disseminated to the potentially affected communities (e.g. emergency notification systems and evacuation procedures). Local communities will be notify by using appropriate tools (e.g. telephone call lists, vehicle mounted speakers) in case of emergencies arising from the Project work/construction sites may pose risk on them. Where necessary, the details of the nature of the emergency, protection options, etc. will be communicated through trained community liaison officers (CLOs). The related authorities will be cooperated both for prevention of and responding to emergencies and during emergency situations, where necessary. For fire emergencies, the procedures to be applied, including the trainings to be given to Project personnel and the measures to be taken, will be planned in coordination with the fire response units of the provinces. In the event of a fire, wall-mounted, hand-held, suitable type fire extinguishers and special extinguishing systems in places where the fire response units cannot enter or reach quickly will be provided, and kept ready for use. The media will be communicated through qualified, trained persons and/or by using appropriate tools (i.e. press releases), where necessary. The Contractor will develop COVID-19 EPRP in line with national legislative requirements and IFC Interim Advice for IFC Clients on Developing a COVID-19 EPRP. The subcontractors will also be stipulated to adopt the Contractor's COVID-19 EPRP. 	<ul style="list-style-type: none"> - Labour Management Plan (including off-site accommodation) - Emergency Preparedness and Response Plan - COVID-19 Emergency Preparedness and Response Plan • Notifications made to the local communities • Cooperation with relevant authorities • Training records
	<ul style="list-style-type: none"> Operation 	<ul style="list-style-type: none"> HSR passengers Local Communities close to tunnel portals (see ESIA - Table 13-4) Local Communities close to stations/gars (see ESIA - Table 13-5) Project personnel 		
H&S risks to visitors	<ul style="list-style-type: none"> Construction Operation 	<ul style="list-style-type: none"> Visitors (e.g. auditors, consultants, other external stakeholders) 	<ul style="list-style-type: none"> All visitors will receive visitor orientation upon their arrival at the Project sites to understand and be informed about the basic H&S rules, emergency procedures and site specific H&S implementations. The visitors will be escorted at all times and will only be allowed at predetermined safe zones. Upon receipt of the orientation training, as necessary depending on the Project sites to be visited, personal protective equipment (PPE) will be provided to the visitors. The visitor orientation training will cover, at minimum, the following; <ul style="list-style-type: none"> Information on the Project sites to be visited Site-specific hazards (e.g. mobile vehicles, site traffic, etc.) and basic HSE site rules for visitors Information on site signage, communication procedures Information on usage of PPE Emergency muster points and basic emergency procedures. Records will be kept by the site teams on visitor programs, trainings and PPE provided, etc. Additional induction and H&S trainings will be provided to persons, who will be at the Project sites for extended durations (e.g. auditors, service providers, etc.). 	<ul style="list-style-type: none"> • Visitor orientation training provided for all visitors and training records are kept • No accident/incident involving the visitors takes place • Additional induction and H&S trainings provided to persons, who will be at the Project sites for extended durations (e.g. auditors, service providers, etc.) and training records are kept
Building demolition works	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Any party that may be subject to the environmental, health and safety impacts of building demolition works 	<ul style="list-style-type: none"> The building demolition works during the construction phase will be conducted in line with the requirements of the Regulation on Waste Management and Regulation on the Control of Excavation Soil, Construction and Demolition Waste, the Regulation on Health and Safety Measures in Working with Asbestos, Regulation on the Assessment and Management of Air Quality and Regulation on Assessment and Management of Environmental Noise. To this end, specific requirements defined for the demolition works, including occupational health and safety measures to be taken for the protection of employee health and safety, measures against dust and noise generation, management of hazardous demolition wastes will be fulfilled. 	<ul style="list-style-type: none"> • Documentation on demolition works showing compliance with the requirements of the respective Turkish regulations
Cultural Heritage				
One or combination of the following: <ul style="list-style-type: none"> • Physical disturbance due to land preparation and construction activities¹²⁹ • Visual impacts¹³⁰ • Impacts on the management of the Cultural Heritage Assets¹³¹ • Functional Impacts¹³² 	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> (A) - Registered Sites within the Expropriation Corridor Seydiler Eyupoglu Yunakbasi (B) - Non-registered Archaeological Sites within the Expropriation Corridor Alihoiyugu Sogutlu Mahmutozu Samangedigi Kumderesi 	<ul style="list-style-type: none"> Notify the Museum Directorate. (B), (C), (D), (E), (F), (G), (H) Mark as archaeological sensitive area in the project/construction drawings and quarry plans. (A), (B), (C), (D), (E), (G), (F), (H) Official decision of the CH Authority to be implemented (e.g. trial excavations, salvage excavations, technical drawings, etc.) (A), (B), (C), (D), (E), (F), (G), (H) Physical intervention/construction to be avoided until final decision of the CH Authority is issued. (A), (B), (C), (D), (E), (F), (G), (H) Archaeological monitoring is required. 	<ul style="list-style-type: none"> • Cultural Heritage Management Plan (CHMP) developed and implemented • Training records regarding implementation of chance finds procedure • Authorities notified and cooperation ensured as per CHMP • No physical intervention at archaeological sites • Chance finds managed as per CHMP • Archaeological monitoring results • No external grievance related to management of cultural heritage to be

¹²⁹ Indicates physical deterioration on an archaeological site as a result of construction activities.

¹³⁰ Indicates visual degradation on the landscape on or around an archaeological site.

¹³¹ Indicates impact on public areas for protection of cultural assets such as open air museums, visit sites, areas of interest, etc..

¹³² Some cultural heritage assets may be currently in use such as historic bridges. Indicates impact on the functionality of these assets.

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
<ul style="list-style-type: none"> Impacts on Conservation and Use Balance¹³³ 		Kepez Altı Eyupoglu Necropolis Cesmealti Toprakcukuru Magrabahce <ul style="list-style-type: none"> (C) - Non-registered Archaeological Potential Sites within the Expropriation Corridor Kuzviran Olukbasi Kuslubahce (D) - Non-registered Sites classified as Other within the Expropriation Corridor Oren 	(A), (B), (D), (E), (G), (H) <ul style="list-style-type: none"> Traffic caused by the Project will be restricted for the area. (D) Regular monitoring activities will be carried out by qualified cultural heritage/archaeological monitoring expert/s to avoid damage on the bridge structure due to Project construction works. (D) License boundaries– presented in this ESIA Report – have been narrowed down to mitigate the predicted impacts. There will be no Project/quarry activity within a distance of 10 metres from the archaeological site boundary. (G) Quarry activities can be accomplished within 10 meters of the archaeological site boundary. (H) 	received or any cultural heritage related grievance resolved in line with Project SEP
	<ul style="list-style-type: none"> Land Preparation and Construction (as part of quarry operation) 	<ul style="list-style-type: none"> (E) - Non-registered Archaeological Sites within the Quarry Site Calli Baba (F) - Non-registered Archaeological Potential Sites within the Quarry Site Degirmendere (G) - Non-registered Archaeological Sites within the Quarry Site Yagmurbaba (H) - Non-registered Archaeological Sites outside the Quarry Site Ahmetlidag 		
Impacts on Conservation and Use Balance	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> Mahmutozu Grave Stele (Non-registered Site – Classified as Other) within the Impact Corridor 	<ul style="list-style-type: none"> Notify the Museum Directorate. Archaeological monitoring is required. Related authorities will be applied to ensure that the artifact is transported to a secure area under the control of the museum directorate in the pre-construction period. 	
Visual Impacts	<ul style="list-style-type: none"> Land Preparation and Construction 	<ul style="list-style-type: none"> (A) - Registered Sites outside the Impact Corridor Cinkic Buyuk Kepez Palamuttepe (B) - Non-registered Archaeological Sites within the Impact Corridor Gumuskonak Tavsantepe (C) - Non-registered Archaeological Sites outside the Impact Corridor Capkininbel 	<ul style="list-style-type: none"> Notify the Museum Directorate. (B), (C), (D), (E), (F), (I), (J) Mark as archaeological sensitive area in the project/construction drawings and quarry plans. (A), (B), (C), (D), (E), (F), (H), (I), (J) Archaeological monitoring is required. (A), (B), (D), (E), (F), (H), (I), (J) Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project. (A), (B), (C), (D), (E), (F), (H), (I), (J) 	

¹³³ Indicates potential modification on the protection status of a protected area. As a result of physical damage, some archaeological sites or areas under protection might lose their historic and/or cultural features and their degree of protection may be modified. For example, if a construction causes heavy damage on a first degree protection area, its status may subsequently be modified to be under second or third degree protection. In that case, light construction under permission of the authorities may be possible.

Impact Description	Project Phase	Receptor	Proposed Mitigation Measures	Monitoring/Key Performance Indicators (KPIs)
		<ul style="list-style-type: none">• (D) - Non-registered Archaeological Sites outside the Impact Corridor Hurriyet Pirenlikuyu Dolay• (E) - Non-registered Archaeological Potential Sites within the Impact Corridor Emirinkoy Cemetery• (F) - Non-registered Sites classified as Other within the Impact Corridor Kelkaklik Alaba		
	<ul style="list-style-type: none">• Land Preparation and Construction (as part of quarry operation)	<ul style="list-style-type: none">• (H) - Registered Sites outside the Quarry Sites Guzelim Tepesi• (I) - Non-registered Archaeological Sites outside the Quarry Site Emirinkoy Caltidere• (J) – Non-registered Sites classified as Other within the Quarry Site Tabaklar		
Human Rights				
Potential Human Rights Risks and/or Impacts	<ul style="list-style-type: none">• Land Preparation and Construction	<ul style="list-style-type: none">• Project personnel (direct and contracted)• Local communities	<ul style="list-style-type: none">• The remedies defined in the ESIA Chapter 17 – HRIA will be implemented	<ul style="list-style-type: none">• No human rights risk/issues arise in the Project

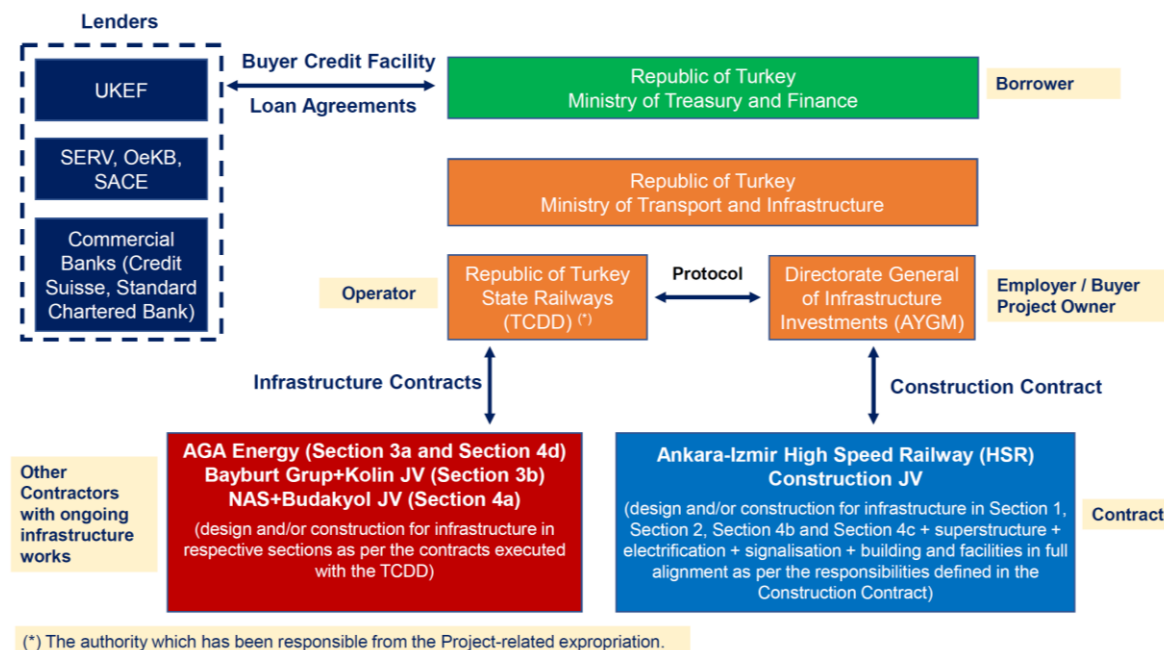
18.4. Organisational Capacity and Competency

The Project will be executed under a Conditions of Contract for Construction (FIDIC Red Book 1999 1st Edition) + Finance model (the "Construction Contract") where the Republic of Turkey – Ministry of Treasury and Finance is the Borrower and the Directorate General of Infrastructure Investments (AYGM) of the Ministry of Transport and Infrastructure is the Employer and the Project Owner. The Construction Contract is a Project financing mechanism in which the Contractor also arranges the financing for the Project, through its relationships with international financing institutions. This said, the Contractor is not a party to the loan agreement. The Contractor of the Project is the **Ankara-Izmir HSR Construction Joint Venture**.

The Construction Contract concluded between the AYGM ("Project Owner" or the "Employer") and Ankara-Izmir YHT Yapımı İş Ortaklığı (ERG Group Partnership, the "Contractor") is a unit price contract based on FIDIC Conditions of Contract for Construction (Red Book-1999). This contract as signed has no unit item for E&S requirements and any changes to the scope of works arising from E&S requirements are the responsibility of the Employer.

The State Railways of the Republic of Turkey (TCDD) will be the Operator of the Project after the commissioning and transfer of the HSR with all relevant components and infrastructure by the AYGM.

The FIDIC contract model is presented in a simplified version as below:



The Contractor takes seriously its responsibilities to implement appropriate E&S standards in all its projects including such plans as working within boundaries (footprint management), protection of biodiversity, land clearing and erosion control, traffic management, labour sources and methods of recruitment of workers, worker accommodation as well as noise and dust control. This extends to the responsibilities of the Contractor defined in the contract and assisting, within the framework of the contract, the Employer to meet its obligations to lenders under the relevant financing arrangements relating to applicable E&S requirements.

It is the Employer's (during the construction phase) and Operator's (during the operation phase) responsibility to comply with the national laws and regulations; and permits and standards; IFC Performance Standards on Environmental and Social Sustainability (PSs); relevant World Bank Group (WBG) Environmental, Health, and Safety (EHS) Guidelines requirements; loan agreement commitments; Environmental and Social Impact Assessment (ESIA) requirements; and to ensure that all contractors providing any type of services to the

Employer/Operator duly follow these requirements throughout the duration of the contract. The stand-alone ESMMFP of the Project further clarifies the roles and responsibilities of the Employer/Operator and the Contractor during the construction phase.

During the construction phase, the Senior Management Team of Ankara-Izmir HSR JV and the ESMS team under the JV ("Project ESMS Team") will assist and collaborate with the Employer (Project Owner) for effective implementation of the Project ESMS in line with the Project Standards. As per the national legislation, the Project Owner has in place inherent E&S responsibilities for the Project such as:

- Completion of national EIA process for the railway route (finalised) and the EIA process of any associated facilities
- To acquire permits and licenses of associated facilities
- To conduct the expropriation process as per the Expropriation Law (Law No. 2942, 1983) and make all the expropriation payments
- Undertake any additional works including any re-alignment, as required.

For the responsibilities of the Contractor per the Construction Contract, senior management commitment is critical in implementing a sustainable and effective ESMS. A well-implemented ESMS relies heavily on trained and committed staff supported by adequate financial resources. Senior management commitment starts with adopting the ESMS policies and leading the effort to ensure that all employees, direct or contracted, at all levels are aware that this is a commitment of the Project.

A well-balanced team including knowledgeable professionals responsible for health, safety and environment, social, HR, procurement processes supported as necessary by technical, legal, finance and other administrative managers and officers is crucial to ensure successful implementation of the ESMS.

During the construction phase, the Project ESMS Team under the JV will be the key frontline identifiers of E&S risks and potential issues stemming from the activities of the Contractor per the Construction Contract and thus they are required to work in close collaboration and consultation with the Employer (Project Owner) as well as Project employees from all levels of the Contractor and subcontractors, as well as to establish a meaningful internal engagement. During the operation phase, the Operator will have the full responsibility for the management of E&S risks and potential impacts of the O&M activities in line with the Project Standards.

The planned organisational structure for the Project ESMS Team under the JV during the construction phase is presented in Figure 18-2. Project management organisation and estimated breakdown of Contractor and subcontractor workforce is provided in Chapter 1 ("Project Description"). The General Management of the Project will be based in Afyonkarahisar (at the Construction Camp Site located in Sinanpasa at Railway KM 190+000).

The Operator will establish the Project ESMS Team for the operation phase under the organisation structure of the institution (<https://www.tcdd.gov.tr/kurumsal/organizasyon-semasi>).

The framework of the roles and responsibilities of the ESMS Team of the Contractor for the construction phase are provided in Table 18-3. In consideration of the roles and responsibilities defined by the Contractor as relevant, the Operator will define the roles and responsibilities of the ESMS team for the operation phase.

As the Project is required to be carried out in compliance with the Project Standards, the Contractor will require the higher tier (main) subcontractors to establish their ESMS teams to ensure that Project activities under their responsibilities are carried out in line with the Project Standards during the construction phase. During the operation phase, the Operator will be responsible for ensuring compliance of the O&M activities to be conducted by the direct and contracted personnel with the Project Standards.

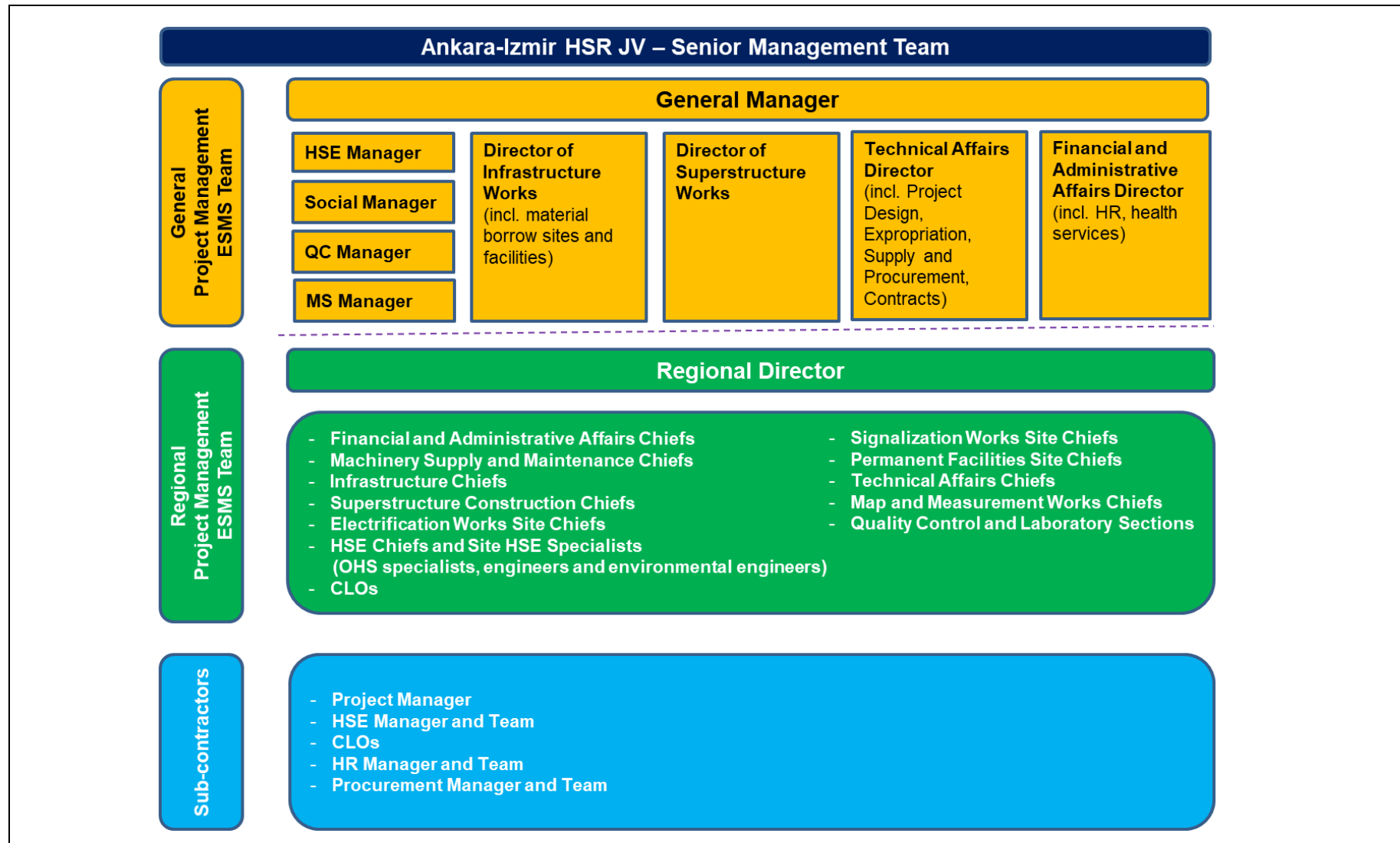


Figure 18-2. Ankara-Izmir HSR Project – ESMS Team under the JV for the Construction Phase

Table 18-3. Roles and Responsibilities of the Project ESMS Team of the Contractor for the Construction Phase

ESMS Team Member	E&S Related Roles and Responsibilities
Senior Management	
Senior Management ESMS Team	<ul style="list-style-type: none"> Assist and collaborate with the Employer for the effective implementation of ESMS throughout the construction phase of the Project. Ensure allocation of adequate financial and human resources for effective implementation of ESMS throughout the Project in line with the Project Standards. Review and approve E&S policies and key E&S management/action (i.e. Stakeholder Engagement Plan (SEP), Resettlement Action Plan (RAP), etc. including updates), whenever necessary. Approve high-level/key stakeholder engagement strategies (e.g. engagement with central and local governmental stakeholders, parliamentarians, political party representatives, non-governmental organisations (NGOs), media) before implementation. Conduct periodic reviews of ESMS implementation based on the reports submitted by the General Project Management - ESMS team.
General Project Management	
Health, Safety and Environmental (HSE) Manager	<ul style="list-style-type: none"> Oversee compliance of Project HSE implementations with the national legislation and Project Standards, as reflected in the Project ESAP and ESIA commitments. Confirm that environmental permits, licenses, approvals required by the Contractor and subcontractors are obtained by the site HSE Chiefs and responsibilities. Approve HSE management/action plans, new programs, HSE training and monitoring plans, etc. as part of Project ESMS. Conduct and/or organise internal site HSE audits. Review periodical E&S monitoring reports submitted by HSE Chiefs. Ensure competent and skilled HSE personnel are employed for implementation of the ESMS in line with Project standards and evaluate the capacity of the site HSE teams. Ensure resources are allocated to implementation the ESMS, including resources for provision of generalised and specialised HSE trainings. Work in coordination with Social Manager and HR Manager to review internal and external grievances and ensure/verify that the site teams address the grievances/corrective actions in responsive timeframes in accordance with the Project SEP; approve corrective actions to be implemented by HSE Site Chiefs. Report to the Senior Project Management Team on Project's HSE Performance and key HSE issues.

ESMS Team Member	E&S Related Roles and Responsibilities
Social Manager	<ul style="list-style-type: none"> Oversee compliance of Project's social performance (including implementation of measures/actions related to stakeholder engagement, grievance management and livelihood restoration/resettlement) with Project Standards. Prepare social management/action plan updates and training documents on the implementation of the SEP, grievance mechanism and other social management/action plans as part of Project ESMS. Work in coordination with HSE Manager, HR Manager and other relevant manager/directors to review external grievances and ensure/verify that the site teams address the external grievances/corrective actions in responsive timeframes in accordance with the Project SEP. Evaluate the capacity of the site social teams/officers. Ensure effective and periodic communication with the external stakeholders. Ensure effective and periodic communication with the external stakeholders. Ensure community grievances are registered and responded as per the Project SEP. Keep the database of public grievances. In coordination with the subcontractors as required, develop and implement additional measures for resolving community related issues, including measures aimed at resolving non-closed grievances. Ensure coordination and consistency across all stakeholder facing activities by all parties. Report to the Senior Management Team on Project's social (e.g. stakeholder engagement) Performance and key social issues. Review Project-related public grievances and ensure/verify that the site teams address the public grievances/corrective actions in responsive timeframes.
Human Resources (HR) Manager	<ul style="list-style-type: none"> Ensure Project labour management practices adhere to the Project Standards and endorsed to the Contractor and subcontractors accordingly. Ensure subcontractors implement the Project internal grievance mechanism. Support administrative and technical teams in planning and execution of the necessary E&S trainings. Work in coordination with Social Manager and HSE Manager to review internal grievances and ensure/verify that relevant directors/managers address the internal grievances/corrective actions in responsive timeframes in accordance with the Project SEP.
Quality Control (QC) Manager	<ul style="list-style-type: none"> Oversee the quality control and assurance program implementation by Contractor and subcontractors.
Management Systems Manager	<ul style="list-style-type: none"> Analyse the requirements of the Management Systems and ensure the implementation of requirements by the Contractor and subcontractors.
Director of Infrastructure and Superstructure Works	<ul style="list-style-type: none"> Ensure fulfilment of all applicable national legislative and permitting requirements in the Project. Ensure adequate resources are allocated for the implementation of the Project ESMS during the construction phase. Full ownership of the implementation of E&S management/action plans and procedures at the Project level. Ensure the Contractor and subcontractors are fully aligned with the Project policies and Project E&S Standards through contractual requirements as relevant. Ensure maximisation of the local employment and procurement for infrastructure and superstructure works to the extent possible.
Director of Technical Affairs Director	<ul style="list-style-type: none"> Ensure fulfilment of all applicable national legislative and permitting requirements in the Project. Ensure incorporation of the corporate and Project policies, E&S Standards, requirements of the ESMS and management/action plans to the contracts/agreements made with the subcontractors and vendors. Ensure Project procurement adheres to the Project standards and endorsed to the subcontractors accordingly. Develop policies to ensure localisation of procurement to the extent possible.

ESMS Team Member	E&S Related Roles and Responsibilities
Director of Financial and Administrative Affairs	<ul style="list-style-type: none"> Ensure fulfilment of all applicable national legislative and permitting requirements in the Project. Ensure required financial allocations are in place for effective implementation of Project ESMS in consistency with Project Standards.
Regional Project Management (E&S Positions)	
HSE Chief	<ul style="list-style-type: none"> Ensure management of site HSE issues in compliance with the national legislation and IFI standards, as reflected in the Project ESAP and ESIA commitments by planning, coordinating and implementing all relevant site activities. Ensure that environmental permits, licenses, approvals required by the Contractor and subcontractors are obtained from the relevant authorities. Implement, review, update and monitor the ESMS. Develop, review and update detailed and specific HSE Management Plans and related documents (in cooperation with the subcontractors). Identify the training requirements of the construction workforce (for both contractors and subcontractors) together with the HR Manager and ensure implementation of the training program as identified. Conduct internal site HSE audits and prepare periodical internal E&S monitoring reports Work in coordination with CLOs to review internal and external grievances and implement required corrective actions, if any, in responsive timeframes in accordance with the Project SEP and with approval from HSE Manager . Report to the HSE Manager on Project's HSE Performance and key HSE issues.
Community Liaison Officers (CLOs)	<ul style="list-style-type: none"> Ensure compliance of Project's social performance (including implementation of measures/actions related to stakeholder engagement, grievance management) with Project Standards. Ensure effective and periodic communication with the external stakeholders during the construction phase. In coordination with the HR team and Site HSE specialists, ensure all Project personnel (direct and contracted) receives trainings on the implementation of the internal and external grievance mechanism developed for the Project (e.g. how to submit internal grievances, how to manage external grievances, etc.) at the time of employment. Ensure community grievances are registered and responded as per the Project SEP and reported to Social Manager Support HSE Senior Specialist in the management of internal grievances as required.
Subcontractors	
Subcontractors (Project Manager, HSE Manager and Team, CLOs, HR Manager and Team, Procurement Manager and Team, and ESMS Teams including HSE/HR/Procurement Managers and Teams)	<ul style="list-style-type: none"> Ensure compliance with the Project-specific E&S policies, E&S management plans and Project Standards in line with their contractual requirements. Ensure competent and trained HSE staff is allocated to implement Project Standards. Ensure adequate resources are allocated for the implementation of the ESMS, including resources for provision of generalised and specialised HSE trainings, PPEs, etc. Ensure HSE non-compliances are recorded, reported to Contractor immediately and responded in agreement with the Contractor. Ensure internal and external grievances are recorded, reported to Contractor and responded in agreement with the Contractor as per the requirements of Project SEP. Ensure Contractor labour management practices and accommodation conditions are in line with the Project Standards. Conduct regular site inspections as per the content and frequencies to be set by Contractor. Prepare periodic HSE reports as per the content and frequencies to be set by Contractor.

18.5. Emergency Preparedness and Response

The Emergency Preparedness and Response Plan (EPRP) will be developed as stand-alone documents separately for the construction and operation phases. The EPRPs will provide preventive measures and response strategies to manage potential incidents/accidents and to protect the community health, safety and environment against potential natural hazards, fires, or sabotage.

The EPRP will include:

- Roles and responsibilities for emergency management
- Identification of potential emergencies
- Identification of existing emergency response structure and capacity along the Project route (i.e. police, fire brigades, hospitals, etc.)
- List and location of emergency response equipment (fire extinguishers, spill response, first aid kits, etc.)
- Use of the emergency equipment and facilities
- Clear identification of evacuation routes
- Procedures to respond to the identified emergency situations (preventive/preparatory measures, rescue, evacuation and response measures)
- Procedures to follow after an emergency situation (recovery and assessment measures)
- Framework for the schedule for periodic inspection, testing and maintenance of emergency equipment (e.g. rescue equipment)
- Framework for the schedule of trainings and drills
- Emergency contacts and communication protocols, including with communities when necessary, and procedures for interaction with the government authorities
- Procedures for periodic review and update of emergency response plans.

A separate COVID-19 EPRP will be prepared in line with the Interim Advice of IFC (May 2020) for IFC Clients on Developing a COVID-19 EPRP to prevent and mitigate any COVID-19 related harm to workers, operations, communities, and other stakeholders while maintaining business continuity.

18.6. Stakeholder Engagement

Systematically engaging with governmental authorities with authority and responsibilities related to the Project, affected communities, Project personnel (direct and contracted) and other stakeholders in a structured approach is at the heart of successful Project implementation.

Identification and management of E&S impacts that might negatively affect the communities in an inclusive approach contributes to building trust, credibility and local support. Some stakeholders such as NGOs may not be directly affected by the Project activities but may have an interest in the Project. Keeping such groups informed and maintaining an open communication channel is crucial to build trust amongst the wider group of stakeholders. For effective engagement with Project stakeholders, including affected communities, it is important to:

- Start as early as possible;
- Disclose meaningful and accurate information;
- Use culturally appropriate means to reach them;
- Provide opportunities for two-way dialogue;
- Document to keep track of issues raised; and
- Report back on how their input has been considered and/or incorporated, where relevant and feasible, to the Project.

The ESIA process has identified the stakeholders that would be directly or indirectly impacted by the Project activities (see Chapter 16 “Stakeholder Engagement”).

A stand-alone Project Stakeholder Engagement Plan (SEP) has been developed as part of the ESIA process based on the comprehensive social surveys conducted by the ESIA team and information and documentation (e.g. official correspondence) received from the General Project Management Team on engagement conducted with the related authorities and other stakeholders. As necessary, the SEP will be updated by the Employer/Operator prior to start of operations taking into account the stakeholders that will be relevant to the operation phase activities.

The Project SEP, inter alia:

- Identifies all stakeholders (individuals, groups or entities) directly and/or indirectly affected by the Project or have a direct or indirect influence/impact on the Project.
- Defines mechanisms and tools for appropriate engagement with each stakeholder group during the lifetime of the Project, with the ultimate aim of establishing and maintaining constructive relationship through public consultation and information disclosure.
- Establishes external and internal mechanisms that will ensure timely and appropriate implementation of actions for the management of grievances received.

Stakeholder engagement activities and means of communicating with the key stakeholders will continue under the responsibility of the Project ESMS team. During the construction phase, engagement between the Contractor and the the Borrower and Employer (Buyer of the Buyer Credit Facility) will be carried out the by the Senior Management Team. During the operation phase, engagement with all governmental and non-governmental stakeholders will continue under the responsibility of the Operator. The SEP will be regularly reviewed and updated to reflect the outcomes of the ongoing engagement activities.

The ESIA Disclosure Package of the Project includes the following:

- ESIA Disclosure Package including:
 - ESIA Report
 - Stakeholder Engagement Plan (SEP)
 - Non-Technical Summary (NTS)
 - Project E&S Management and Monitoring Framework Plan (ESMMFP) (establishing the roles and responsibilities of the Employer (AYGM), Operator (TCDD) and the Contractor for the management of construction and operation phase E&S topics, to be agreed between the Employer/Operator and the Contractor)

In line with the international E&S standards, the Project is considered as “Category A”. The project and E&S impact information of Category A projects are published/disclosed on UKF’s website at least 30 days prior to final commitment to grant support (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909200/ukf-eau-external-process-update-june-2020.pdf).

During the ESIA disclosure period, stakeholder engagement activities will be conducted in line with the SEP. The ESIA Disclosure Package will be published at the Project/Contractor internet site (on behalf of the Employer/Operator). As per the relevant requirements of the international standards, NTS and SEP as well as the Project ESMMFP will be disclosed in Turkish language by using appropriate disclosure methods. Hard copies of the NTS, SEP and the Project ESMMFP will be kept at the Project site for any stakeholder to review.

The ESIA Disclosure Package will be reviewed and the E&S Action Plan (ESAP) will be prepared by the Independent E&S Consultant (IESC) acting on behalf of the Lenders.

18.7. External Communications, Grievance Mechanism and Ongoing Reporting to Affected Communities

It is crucial to establish and maintain a publicly available and easily accessible channel for stakeholders to contact the Project team and build a proactive and responsive external communication and grievance mechanism.

CLOs will be appointed to ensure effective communication with the external stakeholders.

The procedure for external communication has been developed as part of the stand-alone SEP and describes methods to:

- Receive, register and validate external communications and requests for information from the public;
- Screen and assess the importance of the issue raised and determine how to address it;
- Provide, track, document and publish responses; and
- Adjust the E&S management program when appropriate.

The purpose of the external grievance mechanism is to establish a way for individuals, groups or communities affected by the Project to contact if they have an inquiry, a concern or a formal complaint. Grievances and details of responses will be recorded and reported internally on a regular basis. The grievance mechanism will be easily accessible for all stakeholders through disclosure activities as detailed in the SEP.

Keeping affected communities informed about the Project and the progress on a regular basis is a critical element for building and maintaining a constructive relationship. To this end, the Project activities and overall progress and the E&S performance, benchmarked against the Project Standards, will be periodically communicated to the stakeholders, as such, biannually throughout the construction phase and annually throughout the operation phase of the Project. If the Project activities change or new E&S risks emerge, the stakeholders will be communicated outside of the regular schedule to discuss these changes through communication channels as outlined in the SEP.

The scope of periodical reporting will comprise of the following subjects:

- Up-to-date information on Project and its status
- Implementation progress of related commitments provided in the Project ESIA, ESAP, and ESMMFP.
- Monitoring results for subjects the communities are interested in.
- Benefits gained by the Project in the reporting period.

The reporting to affected communities will be in Turkish, in an easily understandable, concise and non-technical way.

18.8. Monitoring and Review

As part of the ESMMFP, monitoring indicators have been defined for each monitoring subject. The indicators include quantitative or qualitative measures of progress against set goals.

The following methods will be used for monitoring Project's ESMS performance:

- Site audits/visual observations
- Interviews, questionnaires and surveys with internal and external stakeholders
- Document review
- Measuring and testing (see Table 18-4 for the framework internal environmental monitoring program during the construction phase; operation phase program will be developed by the Operator prior to start of operations based on the outcomes of the operation phase noise and vibration modelling studies as discussed in Chapter 6 on Noise and Vibration)¹³⁴

For monitoring the ESMS performance during the construction phase, the Contractor, through the Project ESMS team, will carry out internal E&S monitoring activities (on behalf of the Employer) in alignment with the frequency of Lenders' external E&A monitoring throughout the Project. This will include monitoring of subcontractor's E&S performance by the Contractor's ESMS team, as well. As necessary, monitoring works described in specific E&S management/action plans will be carried out by external consultants, academicians to be commissioned by the Contractor.

The Employer/Operator will establish and implement the internal monitoring mechanism for the operation phase in line with the monitoring requirements of the Lenders. The environmental monitoring program for the operation phase will be determined by the Operator during the construction phase upon clarification of O&M facilities and activities.

The findings of the internal monitoring studies will be incorporated to periodical E&S Internal Monitoring Reports (quarterly during the construction phase and as per the frequencies to be set by the Lenders and the Employer/Operator during the operation phase) with inputs from relevant departments and contractors/subcontractors, as necessary. The Senior Management Team of the JV (during the construction phase) and the relevant executives under the Operator's organisation (during the operation phase) will receive copies of the E&S Internal Monitoring Reports.

In addition to internal E&S monitoring activities to be conducted by the Contractor, the Lenders will also be conducting external monitoring for the E&S performance of the Project through their independent consultants at the frequencies to be determined.

As per the national EIA Regulation (Article 18) in force, the Project Owner is required to have Project Progress Report prepared by competent institutions/organizations, which are authorised by the MoEU and had not taken part in the preparation of Project's EIA Report. Governmental authorities would also conduct external monitoring as per the requirements of the applicable national legislation (e.g. Ministry of Environment and Urbanization, Ministry of Agriculture and Forest, Ministry of Family, Labor and Social Services, etc.).

Based on the outcomes of internal and external E&S monitoring activities, the ESMS will be reviewed by the Project ESMS team annually and additionally in cases, where assessed to be required in the event of important changes to Project E&S conditions and applicable legislation and standards.

¹³⁴ For the measuring and testing tool, a specific monitoring program, which will identify specific monitoring parameters, locations, frequencies and methods to be used to monitor specific E&S aspects, including but not limited to surface water quality, quality of treated wastewater from the Project, ambient air quality, noise and vibration levels at the nearby settlements, etc. Accredited laboratories or external consultants will be retained for the measuring and testing works, as necessary.

Table 18-4. Framework for the Internal Environmental Monitoring Program during the Construction Phase

Subject	Monitoring Parameter	Monitoring Station/Location (*)	Monitoring Method (with equipment meeting the requirements of applicable accreditation)	Monitoring Frequency
Surface Water Quality	Annex-5, Table 2 of the Regulation on Surface Water Quality (RSWQ)	See Table 8-4	Sampling, in-situ measurement and laboratory analyses	Quarterly
		Rivers/creeks located in the vicinity of the quarry operation sites (within 500 m distance) (monitoring locations to be identified during pre-construction surveys upon selection of quarries to be used) (see Table 8-5)		One-off for baseline prior to start of quarry operations; quarterly during the quarry operation period
Treated wastewater quality	Parameters given in Table 8-1	Outlet of the domestic wastewater treatment plants/units to be operated in the scope of the Project	Sampling, in-situ measurement and laboratory analyses	Quarterly
Drinking water quality	Applicable parameters defined in the Regulation on Waters Intended for Human Consumption (RWIHC), Chemical Parameters and Indicator Parameters – Turkish Ministry of Health, 2005 WHO Drinking Water Guidelines (edition in force as of the date of analysis)	Groundwater wells to be used for drinking water supply purposes (if any) Groundwater wells located in the vicinity of the quarry operation sites (within 500 m distance) and used by the local communities for drinking water purposes (if any; to be identified by the Contractor during pre-construction surveys)	Sampling, in-situ measurement and laboratory analyses	Monthly
Air Quality	Parameters given in Table 7-1	See Table 7-2	24 hours measurement	Quarterly
		Receptors with dust-related complaints (received and manage through SEP implementation)		Upon complaint
Noise	Environmental noise level	See Table 6-8	48 hours measurement in line with WBG General EHS Guidelines	Quarterly
		Receptors with noise-related complaints (received and manage through SEP implementation)		Upon complaint

Subject	Monitoring Parameter	Monitoring Station/Location (*)	Monitoring Method (with equipment meeting the requirements of applicable accreditation)	Monitoring Frequency
Vibration	Vibration level	Closest receptor to the Caltildere Quarry (impact with high magnitude of change is anticipated)	Instantaneous vibration measurement (covering blasting duration)	Quarterly
		Closest receptors to Cikrikci and Emirinkoyu quarries (impact with negligible magnitude of change is anticipated (may be set as one-off or periodical measurements depending on the measurement results))		
		Receptors with noise-related complaints (received and manage through SEP implementation)		Upon complaint

(*) Additional locations may be added, baseline measurement locations may be updated as necessary depending on the Project conditions (e.g. in case of identification of sensitive receptors in the vicinity of alternative quarry or construction sites – to be identified within the scope of relevant management plans).

APPENDICES

Appendix A List of Settlements Affected from Project-related Land Acquisition

Appendix B List of Engineering Structures

Appendix B.1 List of Culverts (as of January 2021)

Appendix B.2 List of Underpasses (as of January 2021)

Appendix B.3 List of Overpasses (as of January 2021)

Appendix B.4 List of Bridges (as of January 2021)

Appendix C Noise and Vibration

Appendix C.1 Noise Measurement Data Sheets

Appendix C.2 Daytime Grid Noise Maps for NSRs

Appendix C.3 Noise Modelling Results for Receptors within 500 m Distance to Noise Source

Appendix D Socio-economy

Appendix D.1 Number of Questionnaires per Settlement Affected from Project-related Land Acquisition

Appendix D.2 Settlement Based Status of Expropriation

Appendix E Cultural Heritage Management Plan (including Chance Find Procedure)

Appendix F ISO Certifications

Appendix F.1 ERG Construction ISO 9001:2015 Certification

Appendix F.2 ERG Construction ISO 14001:2015 Certification

Appendix F.3 ERG Construction ISO 45001:2018 Certification

Appendix F.4 SSB AG ISO 9001:2015 Certification

Appendix F.5 SSB AG ISO 14001:2015 Certification

Appendix F.6 SSB AG ISO 45001:2018 Certification

Appendix A – List of Settlements Affected from Project-related Land Acquisition

Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status
Section 1	Ankara	0+000.00-2+630.90	Polatli	Yenice	Neighbourhood
		2+630.90-6+521.64		Gumusyaka	Neighbourhood
		6+873.31- 11+171.30		Beskopru	Neighbourhood
		11+171.30-16+165.52		Kabakkoy	Neighbourhood
	Eskisehir	6+556.15-6+873.31	Gunyuzu	Ayvali	Neighbourhood
		16+165.52-24+891.13		Gumuskonak	Neighbourhood
		24+891.13-29+451.25		Cakmak	Neighbourhood
		29+451.25-39+201.15		Kayakent	Neighbourhood
		39+201.15-45+228.35	Sivrihisar	Ilyaspasa	Neighbourhood
		45+228.35-48+361.32		Yenidogan	Neighbourhood
		48+361.32-49+159.94		Goktepe	Neighbourhood
		49+159.94-51+439.39		Ahiler	Neighbourhood
		51+439.39-59+785.39		Kurtseyh	Neighbourhood
		59+785.39-61+058.11		Buhara	Neighbourhood
		61+058.11-66+764.12		Sigircik	Neighbourhood
		66+461.28-67+093.57		Buzluca	Neighbourhood
	Afyonkarahisar	67+093.57-72+249.30	Emirdag	Ciftlikkoy	Village
		72+249.30-78+870.72		Eskiakoren	Village
		78+870.72-80+215.53		Kiliclar	Village
		80+215.53-83+347.30		Karayatak	Village
		83+347.30-86+507.58		Adayazi	Village
		86+507.58-89+271.97		Ekizce	Village
		89+271.97-90+163.13		Suvermez	Village
		90+163.13-90+543.24		Dagilgan	Village
		90+543.24-93.898.62		Turkmenakoren	Village
		93+377.74-93+898.62		Elhan	Village
		96+678.60-98+709.97		Karaagac	Village
		94+762.00-95+399.00		Yenikoy	Village
		95+399.43-96+678.12		Incili	Neighbourhood
		98+709.97-102+960.56		Tabaklar	Village
		102+960.56-106+836.70		Emirinkoyu	Village
		106+836.70-113+376.10		Yuregil	Village
		113+376.10-125+922.54	Bayat	Merkez town municipality, Buyuk	Neighbourhood
				Merkez town municipality, Cumhuriyet	Neighbourhood
				Merkez town municipality, Yeni	Neighbourhood
				Merkez town municipality, Hurriyet	Neighbourhood
		125+922.54-126+216.30		Imralli	Village
		126+216.30-129+300.00		Sagirli	Village
		129+300.86-137+545.00	Iscehisar	Seydiler town municipality, Cumhuriyet	Neighbourhood
				Seydiler town municipality, Hasan Basri	Neighbourhood
		137+545.94-139+237.14		Kavak	Neighbourhood

Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status	
Section 2		145+349-148+637	Merkez	Gebeceler town municipality, Fatih	Neighbourhood	
				Gebeceler town municipality, İstiklal	Neighbourhood	
				Gebeceler town municipality, Kocatepe	Neighbourhood	
				Gebeceler town municipality, Yeni	Neighbourhood	
				Gebeceler town municipality , Zafer	Neighbourhood	
		149+452.79-149+597.43		Cavdarli	Village	
		148+637.00-156+231.00		Susuz town municipality, Gokhan	Neighbourhood	
				Susuz town municipality, Osmanli	Neighbourhood	
				Susuz town municipality, Sakarya	Neighbourhood	
				Susuz town municipality, Selcuklu	Neighbourhood	
				156+407.00-159+175.00	Beyyazi town municipality, Cumhuriyet	Neighbourhood
		Beyyazi town municipality, Ornek			Neighbourhood	
		Beyyazi town municipality, Ataturk			Neighbourhood	
		156+722.64-159+231.15			Akcin	Neighbourhood
		159+175.00-163+605.00			Erenler	Neighbourhood
		159+231.13-161+885.12		Ornek	Neighbourhood	
		162+608.00-163+605.00		Cayirbag town municipality, Alicetinkaya	Neighbourhood	
				Cayirbag town municipality, Fatih	Neighbourhood	
				Cayirbag town municipality, Huzur	Neighbourhood	
				Cayirbag town municipality, Ugur	Neighbourhood	
163+605.00-164+777.00	Fethibey town municipality, Fatih		Neighbourhood			
	Fethibey town municipality, Yavuzselim	Neighbourhood				
	Fethibey town municipality, Yunusemre	Neighbourhood				
	164+777.00-166+195.00	Bayaticik	Neighbourhood			
	166+777.00-169+329.00	Sarayduzu	Village			
169+329.00-170+540.00	Ismail	Neighbourhood				
170+540.00-171+550.00	Sadikbey	Neighbourhood				
171+550.00-174+550.00	Inaz (Demircevre)	Neighbourhood				
174+760.00-179+800.00	Koprulu	Village				
179+800.00-183+940.00	Sinanpasa	Balmahmut	Village			
183+940.00-188+420.00		Bulca	Village			
188+422.96-190+681.79		Ayvali	Village			
190+700-192+400		Akdegirmen	Village			

Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status
Section 3		192+400-199+200		Duzagac town municipality, Isik	Neighbourhood
				Duzagac town municipality, Zafer	Neighbourhood
				Duzagac town municipality, Cumhuriyet	Neighbourhood
				Duzagac town municipality, Fatih	Neighbourhood
		199+181.83 - 202+285.04		Karacaoren	Village
		202+285.01 - 207+421.91		Guney	Village
		207+180-208+700		Elvanpasa	Village
		208+700-210+980		Calislar	Village
	Kutahya	247+648.52 - 247+794.30	Dumlupinar	Kizilca	Village
		213+740-215+560		Turgutozal	Neighbourhood
		215+560-217+000		Zafer	Neighbourhood
		217+000-219+900		Cumhuriyet	Neighbourhood
	Usak	210+980-213+740	Banaz	Ciftlik	Village
		219+900-224+800		Buyukoturak	Village
		224+800-229+520		Halacilar	Village
		229+520-229+600		Duzluce	Village
		229+600-231+214		Dumenler	Village
		269+028.65 - 272+636.85		Alaba	Village
		272+395.50 - 277+772.40		Hatipler	Village
		277+760.80 - 279+097.50		Banaz	Village
		278+911.60 - 279+656.85		31 Agustos	Neighbourhood
		279+627.05 - 283+510		Islam	Neighbourhood
		279+724.45 - 280+971.35		Bagkonak	Village
		283+498.65-286+751.10		Gullucam	Village
		286+738.05 - 292+093.60		Oksuz	Village
		290+117.45 - 290+224.10		Gedikler	Village
		292+091.05 - 296+615.85		Kizilcasogut town municipality, Baris	Neighbourhood
				Kizilcasogut town municipality, Cumhuriyet	Neighbourhood
				Kizilcasogut town municipality, Emek	Neighbourhood
		295+451.90 - 297+175.20		Derbent	Village
		296+937.15 - 299+054.70		Kizilhisar	Village
		298+803.60 - 301+723.05	Merkez	Kirka	Village
		301+234.70 - 305+878.15		Kabaklar	Village
		305+873.30 - 311+678.90		Yapagilar	Village
		311+644.80 - 313+159.55		Koyunbeyli	Village
		313+061.10 - 316+270.90		Yavi	Village
		314+395.95 - 317+641.25		Hocalar	Village
		317+572.85 - 320+062.60		Elmacik	Village
		320+035.40 - 321+218.15		Selikler	Village
		320+178.45 - 325+365.05		Karahasan	Village
		325+237.45 - 326+135.30		Demiroren	Village
		328+049.95 - 338+909.30	Ulubey	Omurca	Village
		326+109.75 - 328+891.00		Bekdemir	Village
		328.865.40 - 332+884.20		Koseler	Village
		332+864.95 - 341+341.40		Uyukbasi	Neighbourhood
		341+315.00 - 347+264.80		Inay	Village

Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status
		347+270.30 - 350+712.60	Esme	Karacaahmet	Village
		350+641.75 - 353+133.45		Gedikler	Village
		353+077.80 - 358+604.80		Ahmetler	Village
		358+530.40 - 363+852.60		Elvanlar	Neighbourhood
		363+852-364+949		Istasyon	Neighbourhood
		368+894.17 - 370+513.65		Yaylakoy	Village
		370+513.65 - 372+962.73		Armutlu	Village
		372+962.73 - 374+029.10		Caberler	Village
		374+029.10 - 375+629.37		Guney	Village
		374+743.45 - 375+781.80		Balabanci	Village
		375+781.80 - 375+825.31		Cevizli	Village
		375+825.31 - 378+457.57		Manavli	Village
		378+457.57 - 382+318.51		Davutlar	Village
		382+318.54 - 384+973.61		Narincali	Village
	Manisa	384+973.69-387+350	Kula	Battalmustafa	Neighbourhood
		387+353.10-388+680		Carikballi	Neighbourhood
		405+241.47 - 406+165.76		Konurca	Neighbourhood
		384+527.39-384+800.00	Alasehir	Ismailbey	Neighbourhood
		388+680-389+880		Serinky	Neighbourhood
		389+880-390+960		Caberkamara	Neighbourhood
		390+960.00 - 392+926.98		Aydogdu	Neighbourhood
		392+926.98 - 394+251.69		Gumusgay	Neighbourhood
		394+251.69 - 397+069.88		Serinyayla	Neighbourhood
		397+069.88 - 400+166.70		Carikteke	Neighbourhood
		398+309.38 - 398+417.20		Caberfakili	Neighbourhood
		400+017.33 - 402+007.64		Isiklar	Neighbourhood
		402+007.64 - 403+968.87		Selce	Neighbourhood
		403+968.83 - 405+786.29		Tepekoy	Neighbourhood
		406+165.76 - 407+569.00		Turkmen	Neighbourhood
		407+568.90 - 409+016.95		Matarli	Neighbourhood
		409+016.95 - 411+410.00		Kasapli	Neighbourhood
		411+401.16 - 415+369.85		Toygarli	Neighbourhood
		415+369.85 - 419+286.57		Kemaliye	Neighbourhood
		419+286.57 - 421+088.11		Ismetiye	Neighbourhood
		423+504.40 - 424+511.09		Kavaklidere	Neighbourhood
		421+088.11 - 422+734.17	Salihli	Hacili	Neighbourhood
		424+758.68 - 426+704.27		Torunlu	Neighbourhood
		425+187.19 - 425+583.77		Koseali	Neighbourhood
		426+704.27 - 429+792.60		Yesilova	Neighbourhood
		429+792.60 - 431+898.19		Beylikli	Neighbourhood
		431+898.00 - 434+477.24		Kabazli	Neighbourhood
		432+182.78 - 436+404.80		Durasilli	Neighbourhood
		436+404.80 - 438+422.65		Karaoglanli	Neighbourhood
	Section 4	438+420.57 - 440+981.30		Kirveli	Neighbourhood
		440+981.50 - 441+477.24		Beseylul	Neighbourhood
		441+477.24 - 441+957.19		Gaziler	Neighbourhood
		441+955.69 - 442+628.11		Ataturk	Neighbourhood
		442+623.19 - 442+985.87		Zafer	Neighbourhood
		442+773.67 - 423+510.61		Mevlutlu	Neighbourhood
		423+835.03 - 424+070.47			
		424+511.09 - 424+758.68			
		442+986.99 - 444+128.44		Keli	Neighbourhood
		444+130.70 - 446+757.99		Yilmaz	Neighbourhood

Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status
		446+780.32 - 449+952.55		Hasalan	Neighbourhood
		449+975.41 - 454+200.93		Kapanci	Neighbourhood
		454+160.47 - 455+672.91		Mersindere	Neighbourhood
		445+664.22 - 458+548.98	Ahmetli	Yarasli	Neighbourhood
		455+664.22-467+619.58		Seydikoy	Neighbourhood
		462+842.28 - 463+817.29		Alahidir	Neighbourhood
		463+830.04 - 467+268.87		Gokkaya	Neighbourhood
		467+268.35 - 469+468.00	Turgutlu	Urganli	Neighbourhood
		468+724.96 - 470+206.42		Yenikoy	Neighbourhood
		470+223.30 - 474+280.82		Derbent	Neighbourhood
		474+284.65 - 476+534.59		Avsar	Neighbourhood
		475+983.69-478+978.46		(Partially former 10.Mintika)	Neighbourhood
		476+532.07 - 478+049.42		Sehitler (former 4.Mintika)	Neighbourhood
		478+986.46 - 481+241.44		Albayrak (former 2. Mintika)	Neighbourhood
				Istasyonalti (former 2.Mintika)	Neighbourhood
		481+265.22 - 484+126.67		Mustafa Kemal (former 8. Mintika and former 11. Mintika)	Neighbourhood
		483+980.44 - 488+740.25			Neighbourhood
		487+954.09 - 489+177.01		Ataturk (former 7.Mintika)	Neighbourhood
		491+597.42-494+893.46	Sehzadeler	Asagicobanisa	Neighborhood
		490+331.80-491+600		Karaoglanli	Neighbourhood
		494+200-501+056.27		Yukaricobanisa	Neighbourhood
		506+331-507+916		Sehitler	Neighbourhood
		507+916-508+170		2. Anafartalar	Neighbourhood
		508+170-508+624		Kuslubahce	Neighbourhood
		508+624-514+607	Yunusemre	Horozkoy	Neighbourhood
		521+724-522.679		Evronos	Neighbourhood
		522.679-526+838		Muradiye	Neighbourhood
		526+838-528+489		Karaali	Neighbourhood
		528+489-529+527		Gurle	Neighbourhood
		529+527-530+162		Akgedik	Neighbourhood
		530+162.55 - 530+861.88		Uzunburun	Neighbourhood
		531+517-533+200		Samar	Neighbourhood
	Izmir	533+200-536+200	Menemen	Telekler	Neighbourhood
		536+200-539+100		Suleymanli	Neighbourhood
		540+000.00 - 542+091.09		Emialem Degirmendere	Neighbourhood
		544+790-547+466		Yahselli	Neighbourhood
		547+466-547+648		Esatpasa	Neighbourhood
		547+648-547+687		Kasimpasa	Neighbourhood

Appendix B – List of Engineering Structures to be Constructed by the Contractor

B.1 List of Culverts (as of January 2021)

No.	KM	Definition	Length	Size
Section 1 (Polatli-Afyon)				
1	0+515.00	Culvert	17.19	2.50*2.50
2	1+070.00	Culvert	30	2.00*2.00
3	2+053.00	Culvert	22.19	3.00*3.00
4	3+200.00	Culvert	22.2	2.50*2.50
5	3+758.00	Culvert	24.18	3.00*3.00
6	4+416.00	Culvert	42.57	2.00*(3.00*3.00)
7	4+520.00	Culvert	36.44	2.50*2.50
8	4+862.50	Culvert	43.55	2.00*2.00
9	5+020.00	Culvert	18.2	2.50*2.50
10	5+706.00	Culvert	38.42	2.00*2.00
11	5+829.00	Culvert	53.73	2.50*2.50
12	6+266.00	Culvert	39.5	3.00*3.00
13	6+868.77	Culvert	23	2.50*2.50
14	7+175.00	Culvert	33.65	2.50*2.50
15	7+384.25	Culvert	62.25	3.00*(3.00*3.00)
16	7+750.00; 0+397.18	Culvert	50.00	2.00*2.00
17	7+750.00; 1+320.00	Culvert	33.00	3.00*(3.00*3.00)
18	7+750.00; 5+046.00	Culvert	24.00	2.00*(2.00*2.00)
19	7+750.00; 8+074.979	Culvert	50.00	2.00*2.00
20	8+075.00	Culvert	38.9	2.00*2.00
21	9+140.00	Culvert	18.19	2.50*2.50
22	9+243.82	Culvert	84.85	2.00*(3.00*3.00)
23	12+520.00	Culvert	22.2	2.00*2.00
24	13+115.67	Culvert	32.39	2.50*2.50
25	13+293.67	Culvert	29.32	2.00*2.00
26	13+818.67	Culvert	36.43	2.50*2.50
27	13+980.67	Culvert	36.85	2.00*2.00
28	14+821.67	Culvert	44.56	2.00*(3.00*3.00)
29	15+268.67	Culvert	91.02	2.00*(3.00*3.00)
30	18+395.67	Culvert	71.8	2.00*2.00
31	18+914.00	Culvert	52.67	2.00*(3.00*3.00)
32	19+410.67	Culvert	31.43	2.00*2.00
33	19+681.67	Culvert	68.67	2.50*2.50
34	20+100.67	Culvert	20.2	2.00*(2.00*2.00)
35	20+709.67	Culvert	29.45	2.00*(3.00*3.00)
36	21+435.00	Culvert	30.44	3.00*3.00
37	21+620.00	Culvert	41.42	2.00*(3.00*3.00)
38	22+405.67	Culvert	48.57	2.50*2.50
39	22+635.00	Culvert	53.56	2.00*2.00
40	23+707.67	Culvert	27.32	2.00*(3.00*3.00)
41	23+933.67	Culvert	77	2.00*(3.00*3.00)
42	24+911.00	Culvert	91.01	3.00*3.00
43	25+463.67	Culvert	76.77	3.00*3.00
44	25+825.67	Culvert	86.62	2.00*2.00
45	25+974.67	Culvert	61.08	2.00*2.00
46	26+899.67	Culvert	28.33	2.00*2.00
47	27+622.67	Culvert	86.99	2.00*(3.00*3.00)
48	28+593.00	Culvert	44.58	2.00*(3.00*3.00)
49	28+876.67	Culvert	52.67	2.00*2.00

No.	KM	Definition	Length	Size
50	29+102.67	Culvert	72.67	2.00*(3.00*3.00)
51	30+128.67	Culvert	27.34	2.00*2.00
52	31+040.00	Culvert	93	2.00*2.00
53	31+108.00	Culvert	129.33	2.00*(3.00*3.00)
54	33+630.67	Culvert	99.02	2.00*(3.00*3.00)
55	34+614.67	Culvert	30.32	3.00*3.00
56	35+144.67	Culvert	30	2.00*2.00
57	35+467.67	Culvert	90.86	2.00*2.00
58	36+139.67	Culvert	39.4	2.00*2.00
59	36+549.67	Culvert	46.56	2.00*2.00
60	36+939.67	Culvert	60.56	2.00*(3.00*3.00)
61	37+216.67	Culvert	32.33	2.00*2.00
62	37+921.67	Culvert	26.8	2.50*2.50
63	38+100.67	Culvert	30	2.00*2.00
64	38+299.67	Culvert	30	2.00*2.00
65	38+433.67	Culvert	30	2.50*2.50
66	38+799.67	Culvert	28.34	2.00*2.00
67	39+198.67	Culvert	60.56	2.00*(3.00*3.00)
68	40+682.67	Culvert	133.34	2.00*(3.00*3.00)
69	41+431.67	Culvert	60.55	2.00*2.00
70	41+772.67	Culvert	103.99	2.00*2.00
71	42+167.67	Culvert	79.9	2.00*2.00
72	47+893.67	Culvert	30.29	2.00*2.00
73	48+271.67	Culvert	100.96	3.00*3.00
74	49+173.67	Culvert	43	2.50*2.50
75	49+374.67	Culvert	48	2.00*2.00
76	50+256.67	Culvert	27	2.00*(3.00*3.00)
77	52+911.67	Culvert	81	2.00*(3.00*3.00)
78	53+528.67	Culvert	25	2.00*2.00
79	53+759.67	Culvert	38	2.00*2.00
80	54+197.67	Culvert	36	2.50*2.50
81	54+617.67	Culvert	28	2.00*2.00
82	55+322.67	Culvert	42	2.50*2.50
83	55+816.67	Culvert	71	2.00*2.00
84	56+577.67	Culvert	60.57	3.00*(3.00*3.00)
85	57+160.67	Culvert	33.5	2.00*2.00
86	57+812.67	Culvert	35	2.00*2.00
87	58+216.00	Culvert	43	2.00*2.00
88	60+591.67	Culvert	34	2.00*2.00
89	60+905.67	Culvert	23.22	2.00*2.00
90	61+227.00	Culvert	74.64	2.00*2.00
91	61+525.02	Culvert	51.97	2.50*2.50
92	61+653.90	Culvert	28	2.00*2.00
93	61+785.00	Culvert	76	2.00*2.00
94	63+148.67	Culvert	58.06	2.00*2.00
95	63+957.67	Culvert	82	2.50*2.50
96	64+530.00	Culvert	75	3.00*(3.00*3.00)
97	65+608.00	Culvert	18.2	2.00*2.00
98	67+573.00	Culvert	72.77	2.00*2.00
99	68+298.00	Culvert	54.55	2.00*2.00
100	71+978.00	Culvert	82.94	2.00*(3.00*3.00)
101	74+350.00	Culvert	37.2	2.00*2.00
102	74+978.00	Culvert	20.18	2.00*2.00
103	76+152.00	Culvert	54.7	2.50*2.50
104	76+886.00	Culvert	36.44	2.00*2.00
105	77+525.00	Culvert	24.2	2.00*2.00

No.	KM	Definition	Length	Size
106	77+710.00	Culvert	28.6	2.00*2.00
107	77+972.00	Culvert	18.9	2.00*2.00
108	78+356.00	Culvert	24.19	2.50*2.50
109	79+140.00	Culvert	32	2.00*2.00
110	80+000.00	Culvert	39.57	2.00*(3.00*3.00)
111	80+816.00	Culvert	18.2	2.00*2.00
112	81+673.00	Culvert	24.2	2.00*(3.00*3.00)
113	83+633.00	Culvert	30.45	3.00*3.00
114	85+152.00	Culvert	27.35	3.00*3.00
115	86+200.00	Culvert	18.2	3.00*3.00
116	87+695.00	Culvert	38.58	2.00*(3.00*3.00)
117	98+140.00	Culvert	42.45	2.00*2.00
118	105+839.00	Culvert	28.35	2.50*2.50
119	106+429.00	Culvert	30.45	2.00*2.00
120	106+850.00	Culvert	28.45	2.00*2.00
121	107+357.00	Culvert	26.34	2.00*2.00
122	107+544.00	Culvert	21.2	2.00*2.00
123	107+742.00	Culvert	20.2	2.00*2.00
124	108+044.00	Culvert	20.2	3.00*3.00
125	108+729.00	Culvert	35.45	2.00*2.00
126	109+064.00	Culvert	20.2	2.00*2.00
127	109+312.00	Culvert	30.43	2.00*2.00
128	110+127.00	Culvert	34.5	2.00*(3.00*3.00)
129	111+248.00	Culvert	19	3.00*(3.00*3.00)
130	111+607.00	Culvert	47	3.00*3.00
131	112+416.00	Culvert	26	2.50*2.50
132	113+360,00	Culvert	34	2.00*2.00
133	113+680,00	Culvert	31	2.00*2.00
134	113+862,00	Culvert	31	2.00*2.00
135	114+210,00	Culvert	53	2.50*2.50
136	114+420,00	Culvert	52	2.00*2.00
137	114+533,00	Culvert	60.55	2.00*2.00
138	114+986,00	Culvert	68.72	2.00*2.00
139	115+695,00	Culvert	33	2.00*2.00
140	116+016.00	Culvert	18.16	2.00*2.00
141	116+224.00	Culvert	24.19	3.00*(3.00*3.00)
142	116+597.00	Culvert	71.95	2.00*(3.00*3.00)
143	118+469.00	Culvert	77.8	2.00*2.00
144	119+315.00	Culvert	150	2.00*2.00
145	119+674.11	Culvert	96.85	2.00*2.00
146	120+137.00	Culvert	28.33	2.00*2.00
147	120+284.00	Culvert	36.45	2.00*2.00
148	120+904.00	Culvert	28.35	2.00*2.00
149	121+820.00	Culvert	68.65	2.00*2.00
150	121+887.00	Culvert	88.41	2.50*2.50
151	122+154.00	Culvert	38.41	2.00*2.00
152	122+410.00	Culvert	40.44	2.00*2.00
153	123+006.00	Culvert	30.26	2.00*(2.50*2.50)
154	128+907.00	Culvert	28	2.00*(3.00*2.00)
155	130+167.00	Culvert	29.12	2.00*2.00
156	130+890.00	Culvert	75.87	2.00*2.00
157	133+258.00	Culvert	115.39	2.00*2.00
158	133+548.00	Culvert	94.95	2.00*2.00
159	136+079.00	Culvert	69.87	2.50*2.50
160	136+716.00	Culvert	65.76	2.00*2.00
161	137+397.00	Culvert	28.26	2.00*2.00

No.	KM	Definition	Length	Size
162	137+640.00	Culvert	45.43	2.50*2.50
163	138+230.00	Culvert	41.17	2.00*2.00
164	140+328.00	Culvert	33.85	3.00*3.00
165	141+500.00	Culvert	24.29	2.00*2.00
166	141+891.00	Culvert	19.1	2.00*2.00
167	143+941.00	Culvert	18.1	2.00*2.00
168	145+345.00	Culvert	32.34	2.00*2.00
169	146+275.00	Culvert	32.26	3.00*(3.00*3.00)
170	146+956.00	Culvert	19.1	2.00*2.00
171	147+666.00	Culvert	30.44	2.00*(3.00*3.00)
172	149+757.00	Culvert	19.1	2.00*(3.00*3.00)
173	150+011.00	Culvert	30.25	2.50*2.50
174	152+730.00	Culvert	59.04	3.00*3.00
175	153+582.00	Culvert	20.3	2.00*2.00
176	154+957.00	Culvert	30.25	2.00*2.00
177	155+429.00	Culvert	31.43	2.00*2.00
178	155+630.00	Culvert	30.25	2.00*2.00
179	156+300.00	Culvert	36.45	2.00*2.00
180	157+120.00	Culvert	50.49	2.50*2.50
181	158+909.00	Culvert	42.35	2.50*2.50
182	159+400.00	Culvert	34.45	2.00*2.00
183	159+996.00	Culvert	38.45	2.00*2.00
184	161+233.00	Culvert	46.35	2.00*2.00
185	161+510.00	Culvert	38.45	2.00*2.00
186	10+000 (0+236) BY	Culvert	57.67	2.00*2.00
187	131+500 (0+036) BY	Culvert	12.09	5.00*5.00
188	133+200 (0+140) BY	Culvert	17.17	1.50*1.50
Section 2 (Afyon-Banaz)				
1	153+860.00	Culvert	84	3.00*2.00
2	154+390.00	Culvert	30	2.00*2.00
3	154+850.00	Culvert	30	2.00*2.00
4	155+520.00	Culvert	30	2.00*2.00
5	155+920.00	Culvert	30	2.00*2.00
6	156+260.00	Culvert	30	2.00*2.00
7	156+900.00	Culvert	30	2.00*2.00
8	157+280.00	Culvert	50	2.00*2.00
9	157+940.00	Culvert		2.00*(3.00*3.00)
10	158+340.00	Culvert		2.00*(3.00*3.00)
11	158+900.00	Culvert		3.00*(3.00*3.00)
12	159+770.00	Culvert	48	2.00*2.00
13	160+880.00	Culvert	46	3.00*2.00
14	161+040.00	Culvert	41	2.00*2.00
15	161+500.00	Culvert	42	3.00*3.00
16	161+840.00	Culvert	43	3.00*3.00
17	162+100.00	Culvert	44	2.00*2.00
18	162+600.00	Culvert	45	3.00*2.00
19	163+510.00	Culvert		2.00*2.00
20	163+878-8+093(BY)	Culvert		2.00*2.00
21	164+040.00	Culvert	51	2.00*(3.00*3.00)
22	164+436.85	Culvert	129.73	2.00*3.00
23	164+820.00	Culvert	55	2.00*2.00
24	165+740.00	Culvert	66.18	2.00*3.00
25	165+880.00	Culvert	44	3.00*2.00
26	166+400.00	Culvert	49.23	3.00*3.00
27	166+580.00	Culvert	38.43	2.00*(3.00*3.00)
28	167+500.00	Culvert	36.42	2.00*(3.00*3.00)

No.	KM	Definition	Length	Size
29	168+500.00	Culvert	34.42	3.00*3.00
30	169+360.00	Culvert	80.87	2.00*2.00
31	170+095.00	Culvert	112.1	2.00*3.00
32	171+211.00	Culvert	40.43	2.00*2.00
33	173+940.00	Culvert	75.24	2.00*2.00
34	175+300.00	Culvert	24	2.00*2.00
35	175+460-0+101 (BY)	Culvert	17.22	2.00*2.00
36	177+140.00	Culvert	37	2.00*2.00
37	177+240.00	Culvert	37	2.00*2.00
38	177+880.00	Culvert	66	2.00*2.00
39	178+840.00	Culvert	32	3.00*2.00
40	179+520.00	Culvert	38	2.00*2.00
41	180+380.00	Culvert	35	2.00*2.00
42	181+575.00	Culvert	60	2.00*2.00
43	181+832.00	Culvert	74.53	3.30*2.50
44	182+083.00	Culvert	50	2.00*2.00
45	183+340.00	Culvert	54	2.00*2.00
46	183+720.00	Culvert	35	2.00*2.00
47	184+470.00	Culvert	21	2.00*2.00
48	184+640.00	Culvert	20	2.00*2.00
49	185+860.00	Culvert	32	2.00*2.00
50	186+590.00	Culvert	33	2.00*2.00
51	187+900.00	Culvert	23	3.00*2.00
52	189+500.00	Culvert	43	2.00*2.00
53	190+700.00	Culvert	43	2.00*2.00
54	191+400.00	Culvert	34	2.00*2.00
55	191+640.00	Culvert	42	2.00*2.00
56	192+440.00	Culvert	78	3.00*3.00
57	198+980.00	Culvert	39	2.00*2.00
58	199+505.76-0+040 (TY)	Culvert	44.43	2.00*2.00
59	199+505.76-0+120 (TY)	Culvert	44.43	3.00*3.00
60	199+505.76-16+038 (TY)	Culvert		3.00*(3.00*3.00)
61	199+505.76-16+327 (BY)	Culvert		2.00*2.00
62	199+505.76-16+750 (BY)	Culvert		2.00*2.00
63	199+583.32	Culvert	159.2	2.00*2.00
64	199+885.00	Culvert	39	3.00*(3.00*3.00)
65	200+180.00	Culvert	42	2.00*2.00
66	201+120.00	Culvert	30	2.00*2.00
67	201+800.00	Culvert	31	3.00*2.00
68	202+242.00	Culvert	29	2.00*(3.00*2.00)
69	202+503.00	Culvert		3.00*3.00
70	202+860-1+880 (BY)	Culvert		3.00*2.00
71	203+028-0+223 (BY)	Culvert		2.00*2.00
72	203+048.00	Culvert	30	2.00*2.00
73	203+775.00	Culvert	71	2.00*2.00
74	204+377.00	Culvert	71	3.00*(3.00*3.00)
75	204+952.00	Culvert	75	3.00*3.00
76	205+504.00	Culvert	47	2.00*2.00
77	205+873.00	Culvert	52	2.00*2.00
78	206+389.00	Culvert		2.00*(3.00*3.00)
79	206+986.00	Culvert	59	2.00*2.00
80	207+273.00	Culvert		3.00*(3.00*3.00)
81	207+851.00	Culvert	44	2.00*2.00
82	208+150.00	Culvert	45	2.00*2.00
83	208+420.00	Culvert	33	2.00*2.00
84	208+785.00	Culvert	55	3.00*2.00

No.	KM	Definition	Length	Size
85	209+030+6+854 (BY)	Culvert		2.00*2.00
86	209+345.00	Culvert	53	2.00*2.00
87	211+020-0+109 (BY)	Culvert		2.00*2.00
88	211+120.00	Culvert	42	2.00*2.00
89	211+216.00	Culvert		
90	212+926.00	Culvert		2.00*2.00
91	213+135.00	Culvert	86	3.00*(3.00*3.00)
92	215+170.00	Culvert	60	2.00*2.00
93	215+486-(4+282) (BY)	Culvert	57	1.50*1.50
94	215+540.00	Culvert		2.00*2.00
95	215+960.00	Culvert	30	2.00*2.00
96	217+080.00	Culvert	46	2.00*2.00
97	217+665.00	Culvert	44.83	2.00*2.00
98	218+255.00	Culvert	46	2.00*(3.00*2.00)
99	221+100.00	Culvert		2.00*2.00
100	221+350.00	Culvert		2.00*2.00
101	221+460.00	Culvert		2.00*2.00
102	222+877.89	Culvert	55.18	2.00*2.00
103	224+733.89	Culvert	30	2.00*2.00
104	225+303.89	Culvert	76	2.00*2.00
105	225+510.00	Culvert	48	2.00*2.00
106	226+140.00	Culvert	34	2.00*2.00
107	226+340.00	Culvert	36.11	2.00*2.00
108	227+080.00	Culvert	34	2.00*2.00
109	227+204.00	Culvert	27	2.00*2.00
110	227+960.00	Culvert	82	3.00*2.00
111	228+395.00	Culvert	30.46	2.00*2.00
112	228+944.89	Culvert	26	2.00*2.00
113	229+054.89	Culvert	30	2.00*2.00
114	231+076.89	Culvert	30	2.00*2.00
115	0+035	Culvert	30.92	2.00*2.00
Section 4 (Salihli-Manisa)				
1	456+596	Culvert		
2	458+063	Culvert		
3	458+349	Culvert		
4	458+533	Culvert		
5	458+568	Culvert		
6	459+321	Culvert		
7	459+454	Culvert		
8	460+896	Culvert		
9	461+339	Culvert		
10	461+450	Culvert		
11	461+594	Culvert		
12	462+096	Culvert		
13	462+224	Culvert		
14	462+536	Culvert		
15	462+821	Culvert		
16	463+354	Culvert		
17	463+375	Culvert		
18	463+599	Culvert		
19	463+829	Culvert		
20	463+975	Culvert		
21	464+070	Culvert		
22	464+910	Culvert		
23	465+248	Culvert		
24	466+007	Culvert		

No.	KM	Definition	Length	Size
25	466+153	Culvert		
26	466+477	Culvert		
27	466+739	Culvert		
28	466+868	Culvert		
29	467+062	Culvert		
30	467+266	Culvert		
31	467+455	Culvert		
32	467+958	Culvert		
33	468+524	Culvert		
34	468+765	Culvert		
35	469+059	Culvert		
36	469+784	Culvert		
37	470+017	Culvert		
38	470+219	Culvert		
39	471+693	Culvert		
40	471+771	Culvert		
41	472+408	Culvert		
42	473+119	Culvert		
43	473+319	Culvert		
44	473+499	Culvert		
45	473+813	Culvert		
46	474+283	Culvert		
47	474+759	Culvert		
48	475+048	Culvert		
49	475+337	Culvert		
50	475+675	Culvert		
51	476+525	Culvert		
52	476+887	Culvert		
53	477+289	Culvert		
54	477+540	Culvert		
55	478+175	Culvert		
56	478+455	Culvert		
57	479+567	Culvert		
58	479+693	Culvert		
59	481+055	Culvert		
60	481+651	Culvert		
61	481+831	Culvert		
62	482+007	Culvert		
63	482+317	Culvert		
64	482+545	Culvert		
65	482+656	Culvert		
66	483+308	Culvert		
67	484+607	Culvert		
68	484+903	Culvert		
69	485+413	Culvert		
70	485+616	Culvert		
71	485+706	Culvert		
72	485+818	Culvert		
73	485+899	Culvert		
74	486+055	Culvert		
75	487+250	Culvert		
76	488+475	Culvert		
77	490+242	Culvert		
78	492+040	Culvert		
79	492+378	Culvert		
80	492+772	Culvert		

No.	KM	Definition	Length	Size
81	493+024	Culvert		
82	493+271	Culvert		
83	493+567	Culvert		
84	494+336	Culvert		
85	494+899	Culvert		
86	495+291	Culvert		
87	495+640	Culvert		
88	495+846	Culvert		
89	496+576	Culvert		
90	496+945	Culvert		
91	497+184	Culvert		
92	497+548	Culvert		
93	498+269	Culvert		
94	499+079	Culvert		
95	500+499	Culvert		
96	501+507	Culvert		
97	501+508.99	Culvert	20.60	2.00*(2.50*2.50)
98	503+341.42	Culvert	28.70	3.00*(4.00*4.00)
99	503+562.38	Culvert	25.00	3.00*2.50
100	503+964.94	Culvert	21.40	22.00
101	504+078.19	Culvert	55.90	3*(4.00*4.00)
102	504+503.97	Culvert	30.40	22.00
103	504+830.61	Culvert	42.40	22.00
104	505+371.80	Culvert	42.00	22.00
105	505+865.39	Culvert	58.60	22.00
106	506+027.19	Culvert	35.80	22.00
107	506+300 (0+279,46)	Culvert	9.40	21.00
108	506+300 (0+348,82)	Culvert	22.00	3.00*(4.00*4.00)
109	506+300 (0+545,21)	Culvert	22.00	22.00
110	506+300 (0+871,61)	Culvert	52.00	22.00
111	506+300 (1+497,06)	Culvert	34.00	22.00
112	506+302.31	Culvert	36.50	22.00
113	506+541.62	Culvert	44.00	22.00
114	507+432.86	Culvert	43.20	22.00
115	507+697.92	Culvert	41.00	22.00
116	507+887.3	Culvert	45.00	3.00*(3.00*3.00)
117	508+287.00	Culvert	46.00	22.00
118	508+720.00	Culvert	47.00	2.00*2.00
119	508+952.86	Culvert	45.60	2.00*2.00
120	509+368.76	Culvert	50.00	3.00*3.00
121	509+562.94	Culvert	48.39	33.00
122	509+772.22	Culvert	44.39	22.00
123	510+838.49	Culvert	34.26	22.00
124	511+000.22	Culvert	32.26	22.00
125	511+469.20	Culvert	38.46	53.00
126	514+373.85	Culvert	24.16	33.00

B.2 List of Underpasses (as of January 2021)

No.	KM	Definition	Description	Length	Size
Section 1 (Polatli-Afyon)					
1	0+895.92	Underpass		75	7.00*5.00
2	3+540.00	Underpass		24.19	7.00*5.00
3	4+460.00	Underpass		24.19	7.00*5.00
4	5+780.00	Underpass		24.17	7.00*5.00
5	7+750.00; 0+154.10	Underpass		40.00	7.00*5.00
6	7+750.00; 4+780.00	Underpass		24.00	7.00*5.00
7	7+750.00; 4+890.00	Underpass		24.00	7.00*5.00
8	7+750.00; 5+460.00	Underpass		26.00	7.00*5.00
9	8+317.91	Underpass		40.00	7.00*5.00
10	8+318.00	Underpass		33.6	7.00*5.00
11	12+860.00	Underpass		19.2	7.00*5.00
12	13+785.67	Underpass		31.1	7.00*5.00
13	14+645.00	Underpass		24.2	7.00*5.00
14	18+960.00	Underpass		36.44	7.00*5.00
15	21+400.67	Underpass		19.2	7.00*5.00
16	22+710.00	Underpass		20.2	7.00*5.00
17	23+880.00	Underpass		60.57	7.00*5.00
18	27+814.00	Underpass		60.58	7.00*5.00
19	28+540.67	Underpass		26.32	7.00*5.00
20	29+320.00	Underpass		48.45	10.00*6.00
21	31+220.00	Underpass		60.57	7.00*5.00
22	33+680.00	Underpass		72.68	7.00*5.00
23	36+340.00	Underpass		30.33	7.00*5.00
24	41+885.67	Underpass		38.44	7.00*5.00
25	48+359.67	Underpass		44	12.00*6.00
26	49+010.00	Underpass		40	7.00*6.00
27	51+075.67	Underpass		28	7.00*5.00
28	51+415.67	Underpass		34	7.00*6.00
29	53+040.00	Underpass		36	7.00*5.00
30	53+980.67	Underpass		20	7.00*5.00
31	55+220.00	Underpass		20	7.00*5.00
32	56+540.00	Underpass		38.44	7.00*5.00
33	63+760.00	Underpass		60	12.00*6.00
34	64+580.00	Underpass		19	7.00*5.00
35	67+420.00	Underpass		19.2	7.00*5.00
36	71+930.00	Underpass		64	7.00*5.00
37	76+112.00	Underpass		68.5	12.00*6.00
38	76+850.00	Underpass		23.1	7.00*6.00
39	80+185.00	Underpass		24.2	7.00*6.00
40	83+708.00	Underpass		19.2	7.00*5.00
41	85+175.00	Underpass		19.2	7.00*5.00
42	87+760.00	Underpass		26.32	7.00*5.00
43	89+520.00	Underpass		18.2	7.00*5.00
44	90+550.00	Underpass		20.7	7.00*6.00
45	91+400.00	Underpass		18.2	12.00*6.00
46	91+960.00	Underpass		21.2	7.00*6.00
47	92+540.00	Underpass		20.7	7.00*6.00
48	101+140.00	Underpass		18.2	4.00*3.00
49	102+500.00	Underpass		20.7	7.00*5.00
50	102+930.00	Underpass		22.3	7.00*5.00
51	103+860.00	Underpass		20.7	7.00*5.00
52	104+580.00	Underpass		20.1	7.00*5.00
53	105+880.00	Underpass		20.1	7.00*5.00

No.	KM	Definition	Description	Length	Size
54	106+640.00	Underpass		18.2	7.00*5.00
55	108+220.00	Underpass		18.2	7.00*6.00
56	109+760.00	Underpass		18.2	7.00*5.00
57	110+564.00	Underpass		48.45	10.00*6.00
58	111+680.00	Underpass		27	7.00*5.00
59	116+495.00	Underpass		25.1	7.00*5.00
60	117+558.00	Underpass		21.2	7.00*5.00
61	118+700.00	Underpass		38.45	10.00*6.00
62	118+860.00	Underpass			4.00*4.00
63	119+403.99	Underpass		169.58	2.00*(12.00*6.00)
64	121+918.00	Underpass		40.45	7.00*6.00
65	132+457.00	Underpass		84.88	12.00*6.00
66	133+200.00	Underpass		26.3	7.00*6.00
67	136+115.00	Underpass		29.3	7.00*5.00
68	145+883.00	Underpass		26.3	12.00*6.00
69	147+640.00	Underpass		20.1	7.00*5.00
70	150+420.00	Underpass		19.2	7.00*5.00
71	154+800.00	Underpass		21.1	7.00*5.00
72	155+200.00	Underpass		21.1	7.00*6.00
73	155+700.00	Underpass		20.1	7.00*5.00
74	159+260.00	Underpass		20.3	7.00*6.00
75	159+860.00	Underpass		26.3	12.00*6.00
76	160+325.00	Underpass		20.1	7.00*5.00
77	161+030.00	Underpass		64.65	12.00*6.00
78	161+140.00	Underpass		26.1	7.00*6.00
Section 2 (Afyon-Banaz)					
1	153+820.00	Underpass	Underpass - Ankara Izmir Highway Crossing	52.5	2.00*(14.00*6.00)
2	153+922.00	Underpass	Underpass Village Road	85	12.00*6.00
3	154+390.00	Underpass	Underpass Village Road	29.5	7.00*5.00
4	155+575.00	Underpass	Underpass Village Road	25	12.00*6.00
5	156+245.00	Underpass	Underpass Village Road	23.1	7.00*5.00
6	156+974.00	Underpass	Underpass Village Road		10.00*6.00
7	158+077.00	Underpass	Underpass Village Road		7.00*5.00
8	158+517.00	Underpass	Underpass Village Road		7.00*5.00
9	159+885.00	Underpass	Underpass Village Road		7.00*5.00
10	160+937.00	Underpass	Underpass Village Road		7.00*5.00
11	161+535.00	Underpass	Underpass Village Road		7.00*5.00
12	162+215.00	Underpass	Underpass Village Road		7.00*5.00
13	162+822.00	Underpass	Underpass Village Road		7.00*5.00
14	163+420.00	Underpass	Underpass Village Road	20	12.00*5.50
15	164+214.00	Underpass	Underpass Village Road	20	12.00*6.00
16	165+370.00	Underpass	Underpass Village Road		7.00*5.00
17	166+362.00	Underpass	Underpass Village Road	40	7.00*5.00
18	167+380.00	Underpass	Underpass Village Road	19.3	7.00*5.00
19	168+356.00	Underpass	Underpass Village Road	19.3	7.00*5.00
20	169+400.00	Underpass	Underpass Village Road	28.5	12.00*6.00
21	170+980.00	Underpass	Underpass Village Road	16.5	7.00*5.00
22	177+340.00	Underpass	Underpass Village Road	21.76	7.00*5.00
23	178+500.00	Underpass	Underpass Village Road	17.56	7.00*5.00
24	180+340.00	Underpass	Underpass Village Road	17.56	7.00*5.00
25	181+976.00	Underpass	Underpass Village Road	28	10.00*5.00
26	183+220.00	Underpass	Underpass Village Road	26.1	7.00*5.00
27	186+580.00	Underpass	Underpass Village Road	28	7.00*6.00
28	189+480.00	Underpass	Underpass Village Road	38	10.00*5.00
29	190+691.00	Underpass	Underpass Village Road	48	10.00*5.00

No.	KM	Definition	Description	Length	Size
30	192+320.00	Underpass	Underpass Village Road		7.00*5.00
31	198+960.00	Underpass	Underpass Village Road	16.5	7.00*5.00
32	199+505.76-16+150 (BY)	Underpass	Underpass Village Road	30	7.00*5.00
33	200+480.00	Underpass	Underpass Village Road	29.5	5.00*4.00
34	201+080-0+070 (BY)	Underpass	Underpass Village Road	32	7.00*5.00
35	203+690.00	Underpass	Underpass Village Road	28	10.00*6.00
36	204+420.00	Underpass	Underpass Village Road	44	7.00*5.00
37	204+830.00	Underpass	Underpass Village Road	16.5	7.00*5.00
38	205+960.00	Underpass	Underpass Village Road	48	7.00*5.00
39	206+590.00	Underpass	Underpass Village Road	16.5	7.00*5.00
40	207+480.00	Underpass	Underpass Village Road	40	7.00*5.00
41	208+118.00	Underpass	Underpass Village Road	18	10.00*5.00
42	208+675.00	Underpass	Underpass Village Road	18	7.00*5.00
43	209+030.00	Underpass	Underpass - Ankara Izmir Highway Crossing	77	2.00*(12.00*6.00)
44	209+225.00	Underpass	Underpass Village Road	18	7.00*5.00
45	212+550.00	Underpass	Underpass Village Road	32	7.00*5.00
46	216+995.00	Underpass	Underpass Village Road	21.3	7.00*5.00
47	225+540.00	Underpass	Underpass Village Road	32	7.00*5.00
48	228+360.00	Underpass	Underpass Village Road	26	10.00*6.00
Section 4 (Salihli-Manisa) (Dimensions TBD)					
1	433+340.00; 3+900.00	Underpass			
2	433+340.00; 6+500.00	Underpass			
3	433+340.000; 9+500.00	Underpass			
4	433+340.000; 11+300.00	Underpass			
5	433+340.000; 11+450.00	Underpass			
6	433+340.000; 13+425.00	Underpass			
7	433+340.000; 13+800.00	Underpass			
8	433+340.000; 14+080.00	Underpass			
9	433+340.000; 15+420.00	Underpass			
10	433+340.000; 15+800.00	Underpass			
11	433+340.000; 16+475.00	Underpass			
12	433+340.000; 22+090.00	Underpass			
13	433+340.000; 22+350.00	Underpass			
14	459+094	Underpass			
15	459+203	Underpass			
16	460+967	Underpass			
17	461+485	Underpass			
18	461+617	Underpass			
19	463+211	Underpass			
20	463+955	Underpass			
21	465+613	Underpass			
22	466+442	Underpass			
23	466+523	Underpass			
24	468+803	Underpass			
25	469+433	Underpass			
26	469+900	Underpass			
27	473+006	Underpass			
28	474+615	Underpass			
29	478+048	Underpass			
30	478+871	Underpass			
31	482+024	Underpass			
32	483+946	Underpass			
33	484+309	Underpass			
34	495+907	Underpass			
35	505+533.03	Underpass		54.30	105.00

No.	KM	Definition	Description	Length	Size
36	506+300 -(1+296,17)	Underpass		30.00	105.00
37	506+326.80	Underpass		50.00	75.00
38	507+728.23	Underpass		50.00	2.00*(12.50*5.00)
39	508+856.19	Underpass		40.00	55.00
40	509+441.56	Underpass		40.00	54.00
41	510+599.71	Underpass		30.00	125.00
42	511+323.96	Underpass		30.00	33.00
43	511+451.19	Underpass		30.00	5.00*4.00
44	511+935.96	Underpass		25.00	10.00*5.00
45	512+316.87	Underpass		35.00	10.00*5.00
46	512+495.39	Underpass		30.00	5.00*3.00
47	512+826.70	Underpass		35.00	3.00*3.00
48	513+411.85	Underpass		30.00	10.00*5.00

B.3 List of Overpasses (as of January 2021)

No.	KM	Definition	Length	Size
Section 1 (Polatli-Afyon)				
1	1+382.50	Overpass		12.50*8.50
2	5+280.00	Overpass	30	12.50*8.50
3	10+000.00	Overpass	30	12.50*8.50
4	11+640.00	Overpass	30	12.50*8.50
5	15+600.00	Overpass	30	12.50*8.50
6	18+460.00	Overpass		12.50*8.50
7	20+040.00	Overpass	30	12.50*8.50
8	34+358.00	Overpass	30	12.50*8.50
9	37+460.00	Overpass	30	12.50*8.50
10	39+960.00	Overpass	30	12.50*8.50
11	57+400.00	Overpass		12.50*8.50
12	61+905.00	Overpass		12.50*8.50
13	69+020.00	Overpass	24.6	12.50*8.50
14	70+120.00	Overpass	30	12.50*8.50
15	73+400.00	Overpass	30	12.50*8.50
16	75+100.00	Overpass	30	12.50*8.50
17	77+840.00	Overpass		12.50*8.50
18	83+050.00	Overpass	30	12.50*8.50
19	93+700.00	Overpass	135.05	12.50*8.50
20	95+387.00	Overpass	44.43	12.50*8.50
21	96+020.00	Overpass	30	12.50*8.50
22	98+500.00	Overpass	35.5	12.50*8.50
23	108+469.00	Overpass	30	12.50*8.50
24	121+370.00	Overpass	30	12.50*8.50
25	122+520.00	Overpass	30	12.50*8.50
26	123+080.00	Overpass	30	12.50*8.50
27	128+925.00	Overpass	38.7	12.50*8.50
28	129+920.00	Overpass	30	12.50*8.50
29	139+200.00	Overpass	30	12.50*8.50
30	142+510.00	Overpass	30	12.50*8.50
31	144+400.00	Overpass	30	12.50*8.50
32	157+025.00	Overpass	32.5	12.50*8.50
33	157+940.00	Overpass	30	12.50*8.50
Section 2 (Afyon-Banaz)				
1	175+460.00	Overpass	32	12.00*7.50
2	182+433.00	Overpass	32	12.00*7.40
3	184+367.00	Overpass	32	12.00*8.00
4	188+760.00	Overpass	32	12.00*8.00
5	195+520.00/(+320)	Overpass	32	12.00*7.40
6	198+010.00	Overpass	32	12.00*8.00
7	199+505.76	Overpass - Ankara Izmir Highway Crossing	37	13.00*7.50
8	201+080.00	Overpass	32	12.00*7.40
9	201+770.00	Overpass	32	12.00*7.40
10	202+320.00	Overpass	32	12.00*7.40
11	203+028.00	Overpass	37	12.00*7.40
12	211+020.00	Overpass	32	12.00*7.40
13	213+850.00	Overpass	32	12.00*8.00
14	214+525.89	Overpass	32	12.00*8.00
15	215+486.28	Overpass - Dumlupinar Kutahya Highway Crossing	37	13.00*7.50
16	216+255.89	Overpass	32	12.00*8.00
17	218+475.89	Overpass	32	12.00*8.00
18	221+715.89	Overpass	32	12.00*8.00
19	222+495.89	Overpass	32	12.00*8.00

No.	KM	Definition	Length	Size
20	226+251.89	Overpass	32	12.00*8.00
21	230+758.89	Overpass	32	12.00*8.00
22	0+060	Overpass	32	12.00*7.50
23	0+622	Overpass	32	12.00*7.50
Section 4 (Salihli-Manisa)				
1	433+340.00; 16+940.00	Overpass		
2	433+340.00; 17+540.00	Overpass		
3	433+340.00; 18+100.00	Overpass		
4	433+340.00; 18+620.00	Overpass		
5	433+340.00; 19+875.00	Overpass		
6	433+340.00; 20+525.00	Overpass		
7	433+340.00; 21+550.00	Overpass		
8	433+340.00; 22+980.00	Overpass		
9	433+340.00; 24+000.00	Overpass		
10	433+340.00; 24+940.00	Overpass		
11	433+340.00; 26+400.00	Overpass		
12	433+340.00; 27+870.00	Overpass		
13	456+523	Overpass		
14	457+401	Overpass		
15	458+552	Overpass		
16	459+375	Overpass		
17	460+076	Overpass		
18	460+426	Overpass		
19	464+956	Overpass		
20	467+622	Overpass		
21	470+815	Overpass		
22	472+444	Overpass		
23	473+641	Overpass		
24	476+134	Overpass		
25	481+252	Overpass		
26	482+784	Overpass		
27	483+482	Overpass		
28	485+021	Overpass		
29	485+472	Overpass		
30	488+740	Overpass		
31	490+537	Overpass		
32	491+578	Overpass		
33	492+507	Overpass		
34	494+670	Overpass		
35	495+079	Overpass		
36	496+779	Overpass		
37	498+541	Overpass		
38	499+504	Overpass		
39	503+070.60	Overpass	12.00	
40	504+174.73	Overpass	12.00	

B.4 List of Bridges (as of January 2021)

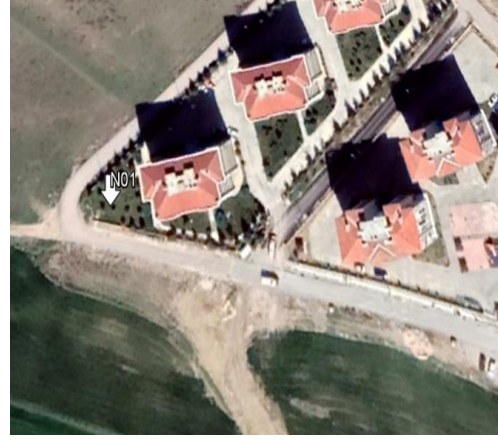
No.	Start KM	End KM	Definition	Description	Length
Section 1 (Polatli-Afyon)					
1	6+859.00	6+921.50	Bridge	Ayvali-Beskopru Village Road	62.50
2	7+567.00	7+597.00	Bridge		30.00
3	7+750.00; 0+833.00	7+750.00; 0+863.00	Bridge		30.00
4	7+750.00; 3+350.000	7+750.00; 3+440.000	Bridge		90.00
5	7+750.00; 3+940.000	7+750.00; 3+970.000	Bridge		30.00
6	7+750.00, 4+540.000	7+750.00; 4+660.000	Bridge		120.00
7	7+750.00; 5+080.000	7+750.00; 5+140.000	Bridge		60.00
8	26+123.50	26+153.50	Bridge		30.00
9	30+539.90	30+559.90	Bridge		20.00
10	48+471.00	48+601.00	Bridge	Pinarbasi Drying Channel	130.00
11	51+328.00	51+348.00	Bridge	Balikadami Stream Crossing	20.00
12	66+352.00	66+377.00	Bridge	Pinarbasi Irrigation Channel	25.00
13	66+773.00	66+793.00	Bridge	Zorlu Irrigation Channel	20.00
14	89+005.00	89+025.00	Bridge	Drying Channel	20.00
15	92+150.00	92+170.00	Bridge	Water Stream	20.00
16	93+007.00	93+027.00	Bridge	Bayat-1	20.00
17	95+128.00	95+178.00	Bridge	Bayat-2	50.00
18	96+020 (0+180) (BY)		Bridge	Connection Road Bridge	25.00
19	96+691.50	96+756.50	Bridge	Bayat-3	65.00
20	100+398.00	100+448.00	Bridge	Bayat-4	50.00
21	102+170.70	102+190.70	Bridge	Gomu-Tabaklar Village	20.00
22	105+175.10	105+195.10	Bridge	Emirinkoyu Village Road	20.00
23	116+534.00	116+564.00	Bridge	Catal Bogaz Stream	30.00
24	129+810.00	129+852.50	Bridge	DSİ Pond-1	42.50
25	138+908.95	139+003.95	Bridge		95.00
26	139+670.00	139+700.00	Bridge	Avsar Stream	30.00
27	139+885.00	139+915.00	Bridge	Iscehisar-Bahcecik	30.00
28	140+845.00	140+875.00	Bridge	Iscehisar Stream	30.00
29	148+870.00	148+890.00	Bridge	Gebeciler	20.00
30	149+828.50	149+936.50	Bridge		108.00
31	160+410.50	160+505.50	Bridge	Available Retaining Wall-Akarcay-1	95.00
32	160+760.00	160+785.00	Bridge	Available Retaining Wall-Akarcay-1	25.00
Section 2 (Afyon-Banaz)					
1	159+205.00	159+230.00	Bridge	Afyon-Beyyazi Village Railroad	25.00
2	163+060.00	163+155.00	Bridge	DDY	95.00
3	163+847.75	163+910.25	Bridge	Afyon-Gazligol Highway Crossing	62.50
4	164+777.00	164+807.00	Bridge	Afyon-Kutahya DDY	30.00
5	167+967.00	167+992.00	Bridge	Afyon-Sarayduzu Road	25.00
6	168+847.00	168+877.00	Bridge	Aksu Streamlet Hydraulic	30.00
7	179+859.58	179+889.58	Bridge	Drying Channel Hydraulic	30.00
8	181+189.59	181+252.09	Bridge	Akarcay Stream Hydraulic	62.50
Section 4 (Salihli-Manisa)					
1	433+340.00; 11+400.00	433+340.00; 11+495.00	Bridge		95.00
2	433+340.00; 14+360.00	433+340.00; 14+422.50	Bridge		62.50
3	433+340.00; 15+480.00	433+340.00; 15+510.00	Bridge		30.00
4	433+340.00; 21+390.00	433+340.00; 21+420.00	Bridge		30.00

No.	Start KM	End KM	Definition	Description	Length
5	433+340.00; 22+300.00	433+340.00; 22+330.00	Bridge		30.00
6	459+123	459+153	Bridge 6		30.00
7	462+348	462+378	Bridge 7		30.00
8	469+803	469+833	Bridge 8		30.00
9	472+916	472+978	Bridge 9		62.00
10	486+390	486+420	Bridge 11		30.00
11	490+601	490+663	Bridge 12		62.00
12	496+291	496+321	Bridge 13		30.00
13	497+760	497+790	Bridge 14		30.00
14	505+589.00	505+619.000	Bridge		30.00
15	506+300 (1+215)	506+395 (1+125)	Bridge		95.00
16	507+998.000	508+046.000	Bridge		48.00
17	508+115.000	508+165.000	Bridge		50.00
18	508+407.000	508+508.000	Bridge		101.00
19	510+125.000	510+187.500	Bridge		62.50
20	512+118.000	512+148.000	Bridge		30.00
21	514+575.000	514+605.000	Bridge		30.00

Appendix C – Noise and Vibration

C.1 Noise Measurement Data Sheets

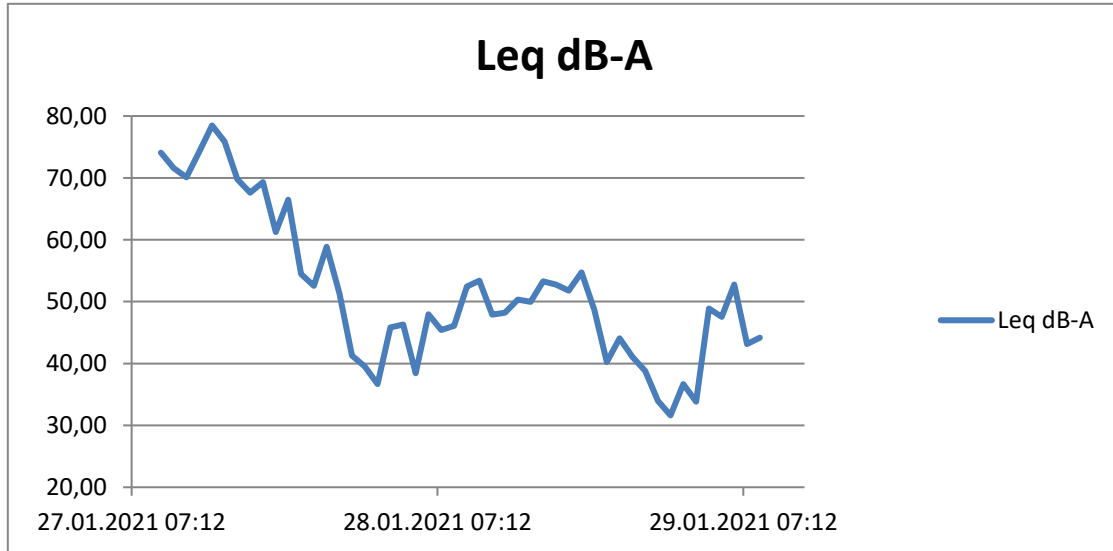
Location	Polatlı	Measurement No.	N01
Standard	ISO 1996-2	Measurement Date	27-29.01.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	423425.00 m E
SLM No	Convergence			4382376.00 m N
Data No	-		Distance to Source (m)	-
Start Date	27.01.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2 meters

Logger Graph (dBA)

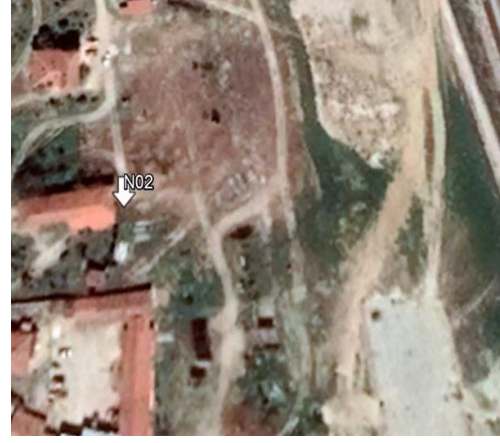


Location		Polatlı		Measurement No.		N01	
Standard		ISO 1996-2		Measurement Date		27-29.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
27.01.2021 09:30	74,1	68,7	78,2	28.01.2021 09:30	52,5	49,3	55,7
27.01.2021 10:30	71,6	66,6	75,5	28.01.2021 10:30	53,4	50,4	56,5
27.01.2021 11:30	70,1	65,3	74,0	28.01.2021 11:30	47,9	44,6	50,7
27.01.2021 12:30	74,2	70,4	77,6	28.01.2021 12:30	48,2	46,4	50,2
27.01.2021 13:30	78,5	74,8	81,7	28.01.2021 13:30	50,3	47,8	52,6
27.01.2021 14:30	75,9	72,2	79,2	28.01.2021 14:30	50,0	46,5	53,1
27.01.2021 15:30	69,8	66,1	73,0	28.01.2021 15:30	53,3	51,4	55,0
27.01.2021 16:30	67,6	64,0	70,8	28.01.2021 16:30	52,8	50,9	54,3
27.01.2021 17:30	69,3	65,7	72,6	28.01.2021 17:30	51,8	50,2	53,3
27.01.2021 18:30	61,2	58,0	64,3	28.01.2021 18:30	54,7	53,0	56,3
27.01.2021 19:30	66,5	63,3	69,4	28.01.2021 19:30	48,7	46,9	50,4
27.01.2021 20:30	54,5	50,1	58,6	28.01.2021 20:30	40,2	39,1	41,5
27.01.2021 21:30	52,6	47,1	58,2	28.01.2021 21:30	44,1	42,7	45,6
27.01.2021 22:30	58,9	53,9	63,1	28.01.2021 22:30	41,1	39,4	42,8
27.01.2021 23:30	51,3	47,1	55,2	28.01.2021 23:30	38,8	37,7	39,9
28.01.2021 00:30	41,3	40,1	42,8	29.01.2021 00:30	33,9	33,2	34,7
28.01.2021 01:30	39,5	38,5	40,6	29.01.2021 01:30	31,6	31,1	32,3
28.01.2021 02:30	36,7	34,0	40,3	29.01.2021 02:30	36,7	35,4	38,3
28.01.2021 03:30	45,8	40,9	50,0	29.01.2021 03:30	33,8	33,0	34,7
28.01.2021 04:30	46,3	41,6	50,7	29.01.2021 04:30	48,9	45,2	52,5
28.01.2021 05:30	38,4	36,5	41,2	29.01.2021 05:30	47,6	44,1	51,0
28.01.2021 06:30	47,9	46,1	49,7	29.01.2021 06:30	52,7	49,9	55,3
28.01.2021 07:30	45,4	43,0	48,3	29.01.2021 07:30	43,1	41,6	44,8
28.01.2021 08:30	46,1	44,3	48,0	29.01.2021 08:30	44,2	40,2	45,6

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Polatlı	Measurement No.	No1
Standard	ISO 1996-2	Measurement Date	27-29.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	51,6	47,2	44,2	51,3	46,6	45,9
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	50,9		46,1	50,7		45,6
From raw data extraneous noise events excluded to reach processed data						

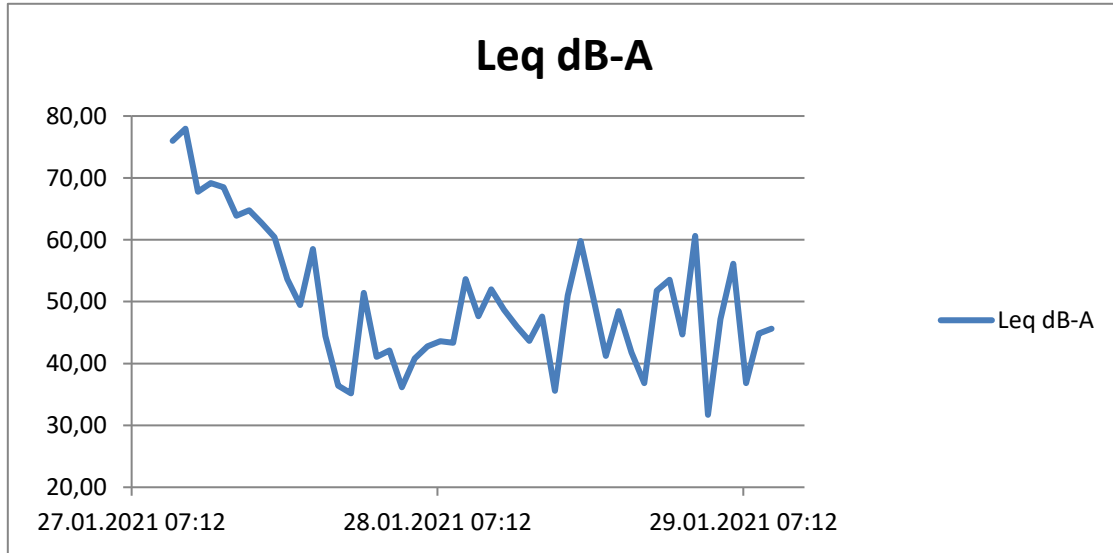
Location	Yenice	Measurement No.	No2
Standard	ISO 1996-2	Measurement Date	27-29.01.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	414220.00 m E
SLM No	Convergence			4358798.00 m N
Data No	-		Distance to Source (m)	-
Start Date	27.01.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	4 meters

Logger Graph (dBA)



Location		Yenice		Measurement No.		No2	
Standard		ISO 1996-2		Measurement Date		27-29.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
27.01.2021 10:25	76,0	70,5	80,3	28.01.2021 10:25	47,6	40,1	52,4
27.01.2021 11:25	78,0	71,5	82,5	28.01.2021 11:25	52,0	50,4	53,5
27.01.2021 12:25	67,8	60,1	73,1	28.01.2021 12:25	48,7	43,6	52,4
27.01.2021 13:25	69,2	60,7	74,8	28.01.2021 13:25	46,0	39,7	50,6
27.01.2021 14:25	68,5	59,9	74,2	28.01.2021 14:25	43,6	37,3	47,5
27.01.2021 15:25	63,9	55,8	69,5	28.01.2021 15:25	47,6	41,6	51,7
27.01.2021 16:25	64,7	56,3	70,2	28.01.2021 16:25	35,6	32,5	39,1
27.01.2021 17:25	62,7	54,6	68,0	28.01.2021 17:25	51,0	41,2	56,9
27.01.2021 18:25	60,4	55,8	64,8	28.01.2021 18:25	59,8	57,2	62,6
27.01.2021 19:25	53,6	44,5	59,1	28.01.2021 19:25	50,8	41,4	56,2
27.01.2021 20:25	49,4	34,7	55,8	28.01.2021 20:25	41,2	35,2	45,7
27.01.2021 21:25	58,5	51,0	63,2	28.01.2021 21:25	48,5	46,8	50,3
27.01.2021 22:25	44,4	41,4	47,6	28.01.2021 22:25	41,8	34,1	46,4
27.01.2021 23:25	36,4	33,2	39,9	28.01.2021 23:25	36,8	32,5	40,6
28.01.2021 00:25	35,2	31,0	39,7	29.01.2021 00:25	51,8	41,8	57,5
28.01.2021 01:25	51,4	38,9	57,5	29.01.2021 01:25	53,5	43,4	58,6
28.01.2021 02:25	41,1	35,3	46,0	29.01.2021 02:25	44,7	35,3	50,0
28.01.2021 03:25	42,1	33,4	47,6	29.01.2021 03:25	60,6	46,6	67,3
28.01.2021 04:25	36,1	32,3	40,4	29.01.2021 04:25	31,7	30,7	33,7
28.01.2021 05:25	40,8	39,1	42,5	29.01.2021 05:25	47,2	35,5	52,4
28.01.2021 06:25	42,8	40,2	45,3	29.01.2021 06:25	56,1	43,9	62,4
28.01.2021 07:25	43,6	34,7	47,9	29.01.2021 07:25	36,8	32,1	41,7
28.01.2021 08:25	43,3	41,5	45,7	29.01.2021 08:25	44,9	41,8	49,4
28.01.2021 09:25	53,6	51,0	56,4	29.01.2021 09:25	45,6	41,5	50,2

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Yenice	Measurement No.	No2
Standard	ISO 1996-2	Measurement Date	27-29.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	48,1	56,0	44,3	50,6	51,7	47,1
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	51,4		46,2	51,1		47,6
From raw data extraneous noise events excluded to reach processed data						

	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	48,1	56,0	44,3	50,6	51,7	47,1

Second Day Results(dBA)

Results Ldn

	First Day Results(dBA)		Second Day Results(dBA)	
	Day	Night	Day	Night
Time	07:00-22:00	22:00-07:00	07:00-22:00	22:00-07:00
Leq dBA	51,4	46,2	51,1	47,6

Second Day Results(dBA)

From raw data extraneous noise events excluded to reach processed data
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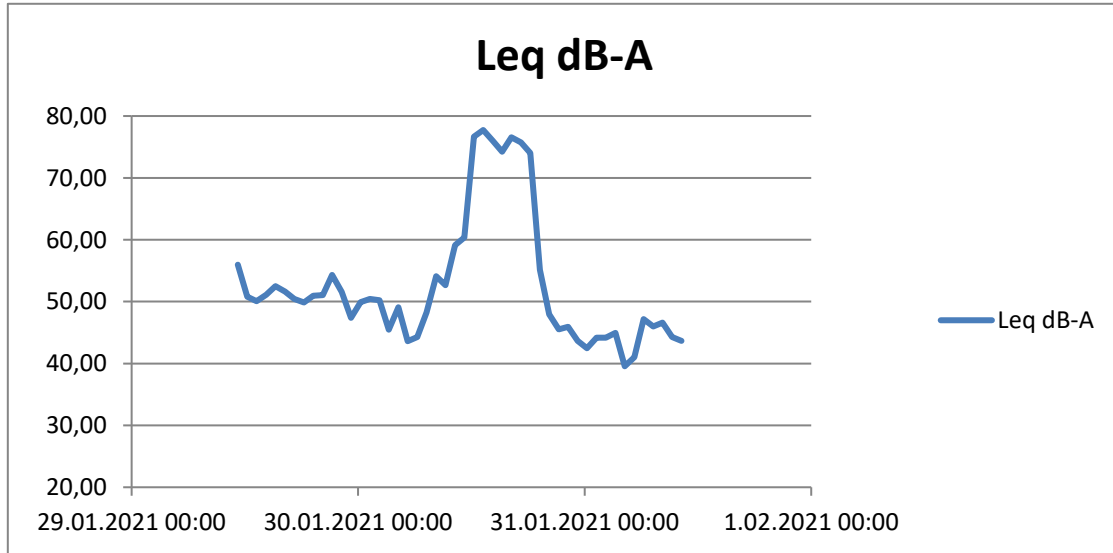
Location	Gözü	Measurement No.	No3
Standard	ISO 1996-2	Measurement Date	29-31.01.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	331544.00 m E
SLM No	Convergence			4323093.000 m N
Data No	-		Distance to Source (m)	-
Start Time	29.01.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	3 meters

Logger Graph (dBA)



Location		Gömü		Measurement No.		No3	
Standard		ISO 1996-2		Measurement Date		29-31.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
29.01.2021 11:15	56,0	53,7	58,4	30.01.2021 11:15	60,4	57,4	63,3
29.01.2021 12:15	50,8	49,1	52,5	30.01.2021 12:15	76,7	72,9	79,9
29.01.2021 13:15	50,1	48,6	51,8	30.01.2021 13:15	77,7	74,1	80,8
29.01.2021 14:15	51,1	50,0	52,3	30.01.2021 14:15	76,0	72,5	78,9
29.01.2021 15:15	52,5	51,0	54,1	30.01.2021 15:15	74,3	70,7	77,5
29.01.2021 16:15	51,6	50,1	53,4	30.01.2021 16:15	76,6	73,0	79,9
29.01.2021 17:15	50,5	48,9	52,2	30.01.2021 17:15	75,7	72,2	79,1
29.01.2021 18:15	49,9	48,0	52,1	30.01.2021 18:15	74,0	70,0	78,3
29.01.2021 19:15	51,0	48,2	54,0	30.01.2021 19:15	55,1	52,3	58,3
29.01.2021 20:15	51,1	49,0	53,2	30.01.2021 20:15	48,0	46,2	50,4
29.01.2021 21:15	54,3	51,7	57,0	30.01.2021 21:15	45,5	43,9	47,6
29.01.2021 22:15	51,6	49,6	53,6	30.01.2021 22:15	45,9	44,1	47,8
29.01.2021 23:15	47,4	45,4	49,6	30.01.2021 23:15	43,6	42,3	45,0
30.01.2021 00:15	49,9	47,5	52,3	31.01.2021 00:15	42,4	41,0	43,9
30.01.2021 01:15	50,5	48,3	52,8	31.01.2021 01:15	44,2	42,6	46,0
30.01.2021 02:15	50,2	47,6	52,8	31.01.2021 02:15	44,2	42,0	46,6
30.01.2021 03:15	45,5	43,8	47,3	31.01.2021 03:15	45,0	42,5	47,6
30.01.2021 04:15	49,1	46,9	51,3	31.01.2021 04:15	39,6	38,0	41,4
30.01.2021 05:15	43,6	41,8	45,6	31.01.2021 05:15	41,0	39,6	42,8
30.01.2021 06:15	44,3	42,8	45,9	31.01.2021 06:15	47,2	41,8	51,6
30.01.2021 07:15	48,3	45,8	50,8	31.01.2021 07:15	46,0	44,5	47,8
30.01.2021 08:15	54,1	51,9	56,5	31.01.2021 08:15	46,6	45,5	47,8
30.01.2021 09:15	52,6	50,1	55,3	31.01.2021 09:15	44,3	43,2	45,5
30.01.2021 10:15	59,1	56,3	61,8	31.01.2021 10:15	43,7	42,1	44,8

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Gözü	Measurement No.	No3
Standard	ISO 1996-2	Measurement Date	29-31.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	52,2	50,8	46,7	49,4	48,6	45,0
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	51,9		47,4	50,2		44,8
From raw data extraneous noise events excluded to reach processed data						

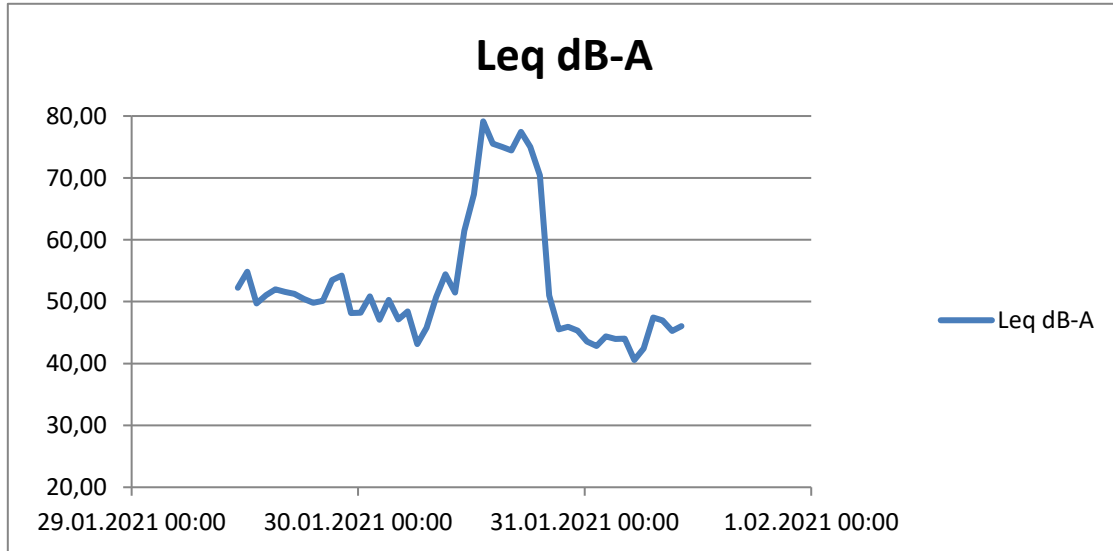
Location	Bayat	Measurement No.	No4
Standard	ISO 1996-2	Measurement Date	29-31.01.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	320579.00 m E
SLM No	Convergence			4315981.00 m N
Data No	-		Distance to Source (m)	-
Start Date	29.01.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	3 meters

Logger Graph (dBA)



Location		Bayat		Measurement No.		No4	
Standard		ISO 1996-2		Measurement Date		29-31.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
29.01.2021 11:15	52,2	50,0	54,6	30.01.2021 11:15	61,4	58,4	64,3
29.01.2021 12:15	54,8	52,7	57,1	30.01.2021 12:15	67,3	64,0	70,3
29.01.2021 13:15	49,7	48,3	51,4	30.01.2021 13:15	79,1	75,4	82,3
29.01.2021 14:15	51,1	49,6	52,8	30.01.2021 14:15	75,5	72,1	78,5
29.01.2021 15:15	52,0	50,7	53,4	30.01.2021 15:15	75,0	71,5	78,1
29.01.2021 16:15	51,6	50,4	52,9	30.01.2021 16:15	74,5	71,0	77,6
29.01.2021 17:15	51,3	49,5	53,2	30.01.2021 17:15	77,4	73,9	80,7
29.01.2021 18:15	50,5	48,7	52,5	30.01.2021 18:15	75,0	71,1	79,1
29.01.2021 19:15	49,8	47,3	52,5	30.01.2021 19:15	70,4	66,8	74,3
29.01.2021 20:15	50,1	47,8	52,8	30.01.2021 20:15	51,0	48,8	53,8
29.01.2021 21:15	53,5	51,0	56,0	30.01.2021 21:15	45,5	44,4	46,9
29.01.2021 22:15	54,2	51,8	56,6	30.01.2021 22:15	46,0	44,3	48,0
29.01.2021 23:15	48,2	46,4	50,1	30.01.2021 23:15	45,3	43,6	47,1
30.01.2021 00:15	48,2	45,9	50,6	31.01.2021 00:15	43,6	42,3	44,8
30.01.2021 01:15	50,8	48,7	53,3	31.01.2021 01:15	42,8	41,2	44,5
30.01.2021 02:15	47,1	45,0	49,2	31.01.2021 02:15	44,4	42,6	46,5
30.01.2021 03:15	50,3	47,6	52,8	31.01.2021 03:15	44,0	41,8	46,4
30.01.2021 04:15	47,1	45,3	49,1	31.01.2021 04:15	44,0	41,5	46,6
30.01.2021 05:15	48,4	46,2	50,7	31.01.2021 05:15	40,6	39,3	42,0
30.01.2021 06:15	43,2	41,6	44,9	31.01.2021 06:15	42,4	40,5	44,5
30.01.2021 07:15	45,8	43,5	48,2	31.01.2021 07:15	47,4	42,4	51,7
30.01.2021 08:15	50,8	48,3	53,3	31.01.2021 08:15	47,0	45,7	48,3
30.01.2021 09:15	54,4	52,0	57,0	31.01.2021 09:15	45,3	44,2	46,5
30.01.2021 10:15	51,5	49,5	53,6	31.01.2021 10:15	46,0	41,2	47,2

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Bayat	Measurement No.	No4
Standard	ISO 1996-2	Measurement Date	29-31.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	51,9	52,1	48,9	50,8	49,5	43,6
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	51,7		49,9	50,7		43,9
From raw data extraneous noise events excluded to reach processed data						

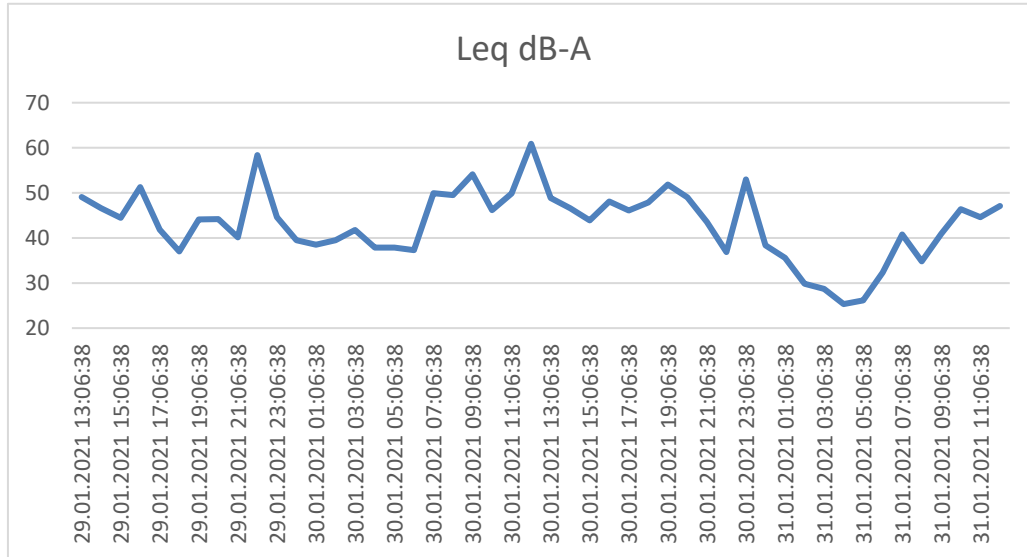
Location	SUSUZ	Measurement No.	N05
Standard	ISO 1996-2	Measurement Date	29-31.01.2021




Measurement Info

SLM	Type 1	SVAN 971	Coordinates	293118.00 m E
SLM No	FC 12			4298528.00 m N
Data No	-		Distance to Source (m)	-
Start Date	29.01.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		SUSUZ		Measurement No.		No5	
Standard		ISO 1996-2		Measurement Date		29-31.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
29.01.2021 13:06:38	49,1	29,0	78,6	30.01.2021 13:06:38	48,9	37,1	70,1
29.01.2021 14:06:38	46,6	26,7	81,6	30.01.2021 14:06:38	46,6	37,0	65,9
29.01.2021 15:06:38	44,5	26,6	63,5	30.01.2021 15:06:38	43,9	36,5	62,7
29.01.2021 16:06:38	51,3	24,8	80,7	30.01.2021 16:06:38	48,1	35,9	69,6
29.01.2021 17:06:38	41,9	24,9	71,0	30.01.2021 17:06:38	46,1	36,2	66,9
29.01.2021 18:06:38	37,0	26,3	58,3	30.01.2021 18:06:38	47,9	37,6	66,5
29.01.2021 19:06:38	44,1	27,4	71,5	30.01.2021 19:06:38	51,8	36,9	67,4
29.01.2021 20:06:38	44,2	24,0	65,7	30.01.2021 20:06:38	49,0	33,7	66,0
29.01.2021 21:06:38	40,1	28,3	56,0	30.01.2021 21:06:38	43,6	35,1	62,0
29.01.2021 22:06:38	58,4	30,4	83,5	30.01.2021 22:06:38	36,8	22,5	63,6
29.01.2021 23:06:38	44,6	29,6	71,2	30.01.2021 23:06:38	53,0	23,2	82,6
30.01.2021 00:06:38	39,5	29,9	56,0	31.01.2021 00:06:38	38,3	25,4	59,1
30.01.2021 01:06:38	38,5	27,9	55,3	31.01.2021 01:06:38	35,6	24,2	51,7
30.01.2021 02:06:38	39,5	28,5	54,9	31.01.2021 02:06:38	29,8	21,8	45,0
30.01.2021 03:06:38	41,8	26,9	59,0	31.01.2021 03:06:38	28,7	19,6	46,6
30.01.2021 04:06:38	37,9	24,7	53,1	31.01.2021 04:06:38	25,3	19,0	46,3
30.01.2021 05:06:38	37,8	24,4	56,8	31.01.2021 05:06:38	26,1	17,0	43,5
30.01.2021 06:06:38	37,3	23,9	55,9	31.01.2021 06:06:38	32,3	14,9	56,7
30.01.2021 07:06:38	49,9	24,6	72,4	31.01.2021 07:06:38	40,8	14,9	58,1
30.01.2021 08:06:38	49,5	28,2	68,1	31.01.2021 08:06:38	34,8	18,9	61,8
30.01.2021 09:06:38	54,1	36,8	72,6	31.01.2021 09:06:38	40,9	26,2	66,0
30.01.2021 10:06:38	46,2	36,3	69,1	31.01.2021 10:06:38	46,4	30,0	80,5
30.01.2021 11:06:38	49,8	36,6	67,6	31.01.2021 11:06:38	44,6	26,8	68,4
30.01.2021 12:06:38	60,9	35,0	77,1	31.01.2021 12:06:38	47,1	24,1	78,5

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	SUSUZ	Measurement No.	No5
Standard	ISO 1996-2	Measurement Date	29-31.01.2021

ANKARA-IZMIR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS

Location	SUSUZ	Measurement No.	No5
Standard	ISO 1996-2	Measurement Date	29-31.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	52,5	52,7	40,7	52,7	49,1	34,3
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	52,2		41,2	52,0		35,2
From raw data extraneous noise events excluded to reach processed data						

	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	52,5	52,7	40,7	52,7	49,1	34,3

Results Ldn

	First Day Results(dBA)		Second Day Results(dBA)	
	Day	Night	Day	Night
Time	07:00-22:00	22:00-07:00	07:00-22:00	22:00-07:00
Leq dBA	52,2	41,2	52,0	35,2

From raw data extraneous noise events excluded to reach processed data

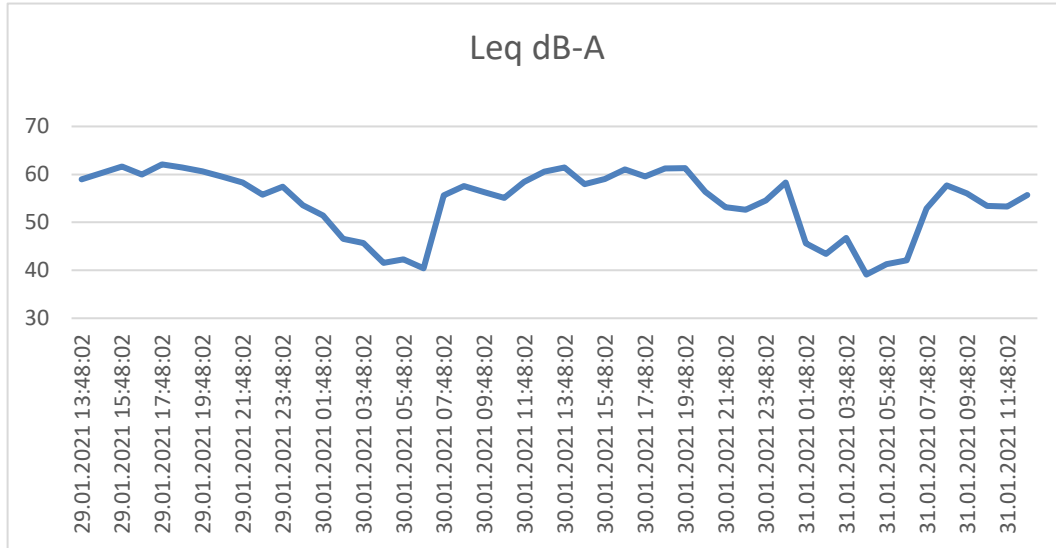
Location	BEYAZIT	Measurement No.	No6
Standard	ISO 1996-2	Measurement Date	29-31.01.2021




Measurement Info

SLM	Type 1	SVAN 971	Coordinates	291814.00 m E
SLM No	FC 12			4291327.00 m N
Data No	-		Distance to Source (m)	-
Start Date	29.01.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		BEYAZIT		Measurement No.		No6	
Standard		ISO 1996-2		Measurement Date		29-31.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
29.01.2021 13:48:02	59,0	27,7	80,7	30.01.2021 13:48:02	61,5	36,9	82,3
29.01.2021 14:48:02	60,3	26,1	80,1	30.01.2021 14:48:02	58,0	36,3	79,2
29.01.2021 15:48:02	61,6	29,4	84,2	30.01.2021 15:48:02	59,0	36,5	83,5
29.01.2021 16:48:02	60,0	29,8	79,7	30.01.2021 16:48:02	61,1	35,4	80,8
29.01.2021 17:48:02	62,1	30,2	81,6	30.01.2021 17:48:02	59,6	36,0	80,2
29.01.2021 18:48:02	61,4	33,0	81,4	30.01.2021 18:48:02	61,3	37,4	78,8
29.01.2021 19:48:02	60,6	27,4	79,2	30.01.2021 19:48:02	61,3	36,1	85,7
29.01.2021 20:48:02	59,5	31,3	83,2	30.01.2021 20:48:02	56,4	35,8	78,3
29.01.2021 21:48:02	58,3	32,3	80,4	30.01.2021 21:48:02	53,2	35,9	80,2
29.01.2021 22:48:02	55,8	32,3	77,9	30.01.2021 22:48:02	52,6	32,9	75,8
29.01.2021 23:48:02	57,4	32,3	79,6	30.01.2021 23:48:02	54,6	32,0	84,0
30.01.2021 00:48:02	53,6	28,2	77,4	31.01.2021 00:48:02	58,3	31,3	83,7
30.01.2021 01:48:02	51,4	25,8	78,9	31.01.2021 01:48:02	45,6	28,0	70,1
30.01.2021 02:48:02	46,5	24,3	72,0	31.01.2021 02:48:02	43,4	24,6	69,7
30.01.2021 03:48:02	45,7	25,5	75,4	31.01.2021 03:48:02	46,8	21,6	75,0
30.01.2021 04:48:02	41,5	22,4	72,5	31.01.2021 04:48:02	39,1	22,3	59,0
30.01.2021 05:48:02	42,3	24,9	70,2	31.01.2021 05:48:02	41,3	19,5	65,4
30.01.2021 06:48:02	40,4	26,7	65,0	31.01.2021 06:48:02	42,1	16,8	69,4
30.01.2021 07:48:02	55,7	30,7	78,5	31.01.2021 07:48:02	52,9	19,3	76,8
30.01.2021 08:48:02	57,6	36,7	77,2	31.01.2021 08:48:02	57,7	26,0	80,6
30.01.2021 09:48:02	56,3	35,5	80,9	31.01.2021 09:48:02	56,0	28,2	77,4
30.01.2021 10:48:02	55,1	32,6	79,3	31.01.2021 10:48:02	53,5	28,1	78,2
30.01.2021 11:48:02	58,4	34,3	84,7	31.01.2021 11:48:02	53,3	25,0	75,1
30.01.2021 12:48:02	60,5	38,3	87,7	31.01.2021 12:48:02	55,7	25,6	77,5

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	BEYAZIT	Measurement No.	No6
Standard	ISO 1996-2	Measurement Date	29-31.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	59,7	58,7	48,4	59,3	56,6	47,3
Results Ldn						
	First Day Results(dBA)		Second Day Results(dBA)			
	Day	Night	Day	Night		
Time	07:00-22:00		22:00-07:00		07:00-22:00	
Leq dBA	59,6		49,5		58,1	
From raw data extraneous noise events excluded to reach processed data						

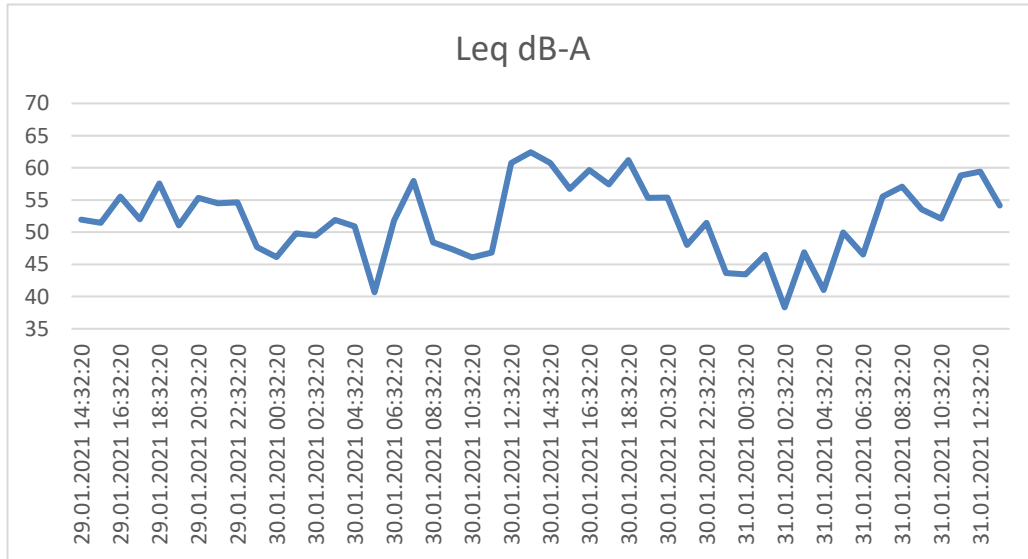
Location	BALMAHMUT	Measurement No.	N07
Standard	ISO 1996-2	Measurement Date	29-31.01.2021




Measurement Info

SLM	Type 1	SVAN 971	Coordinates	268163.00 m E
SLM No	FC 14			4297815.00 m N
Data No	-		Distance to Source (m)	-
Start Date	29.01.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		BALMAHMUT		Measurement No.		No7	
Standard		ISO 1996-2		Measurement Date		29-31.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
29.01.2021 14:32:20	52,0	30,8	72,4	30.01.2021 14:32:20	60,8	41,2	79,4
29.01.2021 15:32:20	51,4	33,6	70,4	30.01.2021 15:32:20	56,7	39,5	83,8
29.01.2021 16:32:20	55,5	33,4	73,5	30.01.2021 16:32:20	59,7	36,1	79,2
29.01.2021 17:32:20	52,0	35,6	73,1	30.01.2021 17:32:20	57,4	35,2	77,6
29.01.2021 18:32:20	57,6	39,6	88,2	30.01.2021 18:32:20	61,2	40,0	81,6
29.01.2021 19:32:20	51,1	34,4	76,6	30.01.2021 19:32:20	55,3	45,1	75,0
29.01.2021 20:32:20	55,3	35,0	74,3	30.01.2021 20:32:20	55,4	41,0	74,2
29.01.2021 21:32:20	54,5	37,7	74,0	30.01.2021 21:32:20	48,0	31,2	60,7
29.01.2021 22:32:20	54,6	39,1	73,1	30.01.2021 22:32:20	51,5	29,0	79,3
29.01.2021 23:32:20	47,7	30,6	66,6	30.01.2021 23:32:20	43,6	25,5	71,4
30.01.2021 00:32:20	46,2	30,5	69,9	31.01.2021 00:32:20	43,4	28,2	68,1
30.01.2021 01:32:20	49,8	31,6	75,2	31.01.2021 01:32:20	46,5	26,0	75,2
30.01.2021 02:32:20	49,5	21,8	73,3	31.01.2021 02:32:20	38,3	17,8	69,2
30.01.2021 03:32:20	51,9	26,0	73,6	31.01.2021 03:32:20	46,9	19,6	74,9
30.01.2021 04:32:20	50,9	25,4	72,9	31.01.2021 04:32:20	41,0	12,7	72,7
30.01.2021 05:32:20	40,7	20,8	66,9	31.01.2021 05:32:20	50,0	13,7	74,2
30.01.2021 06:32:20	51,8	23,3	75,0	31.01.2021 06:32:20	46,6	14,6	74,0
30.01.2021 07:32:20	58,0	22,8	74,6	31.01.2021 07:32:20	55,5	14,4	76,2
30.01.2021 08:32:20	48,4	29,5	73,7	31.01.2021 08:32:20	57,1	19,3	77,0
30.01.2021 09:32:20	47,3	31,9	74,8	31.01.2021 09:32:20	53,6	28,3	81,3
30.01.2021 10:32:20	46,1	29,9	67,0	31.01.2021 10:32:20	52,1	24,9	82,4
30.01.2021 11:32:20	46,8	30,8	67,0	31.01.2021 11:32:20	58,8	33,7	92,0
30.01.2021 12:32:20	60,8	35,5	76,9	31.01.2021 12:32:20	59,4	37,5	86,2
30.01.2021 13:32:20	62,4	42,4	83,6	31.01.2021 13:32:20	54,1	34,4	70,8

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	BALMAHMUT	Measurement No.	No7
Standard	ISO 1996-2	Measurement Date	29-31.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	56,4	54,0	49,5	58,4	52,6	46,9
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	55,7		49,7	57,8		47,3
From raw data extraneous noise events excluded to reach processed data						

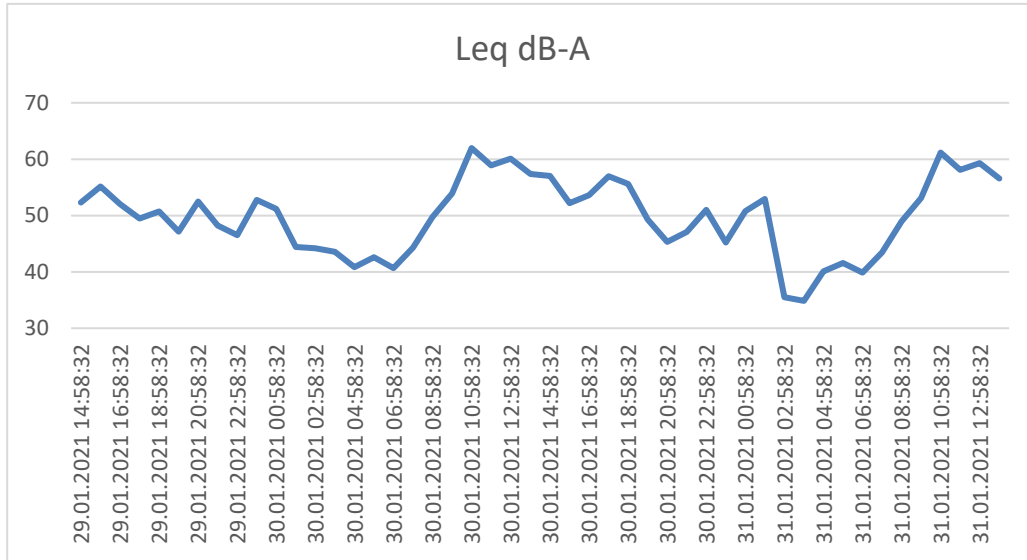
Location	DÜZAĞAÇ	Measurement No.	No8
Standard	ISO 1996-2	Measurement Date	29-31.01.2021




Measurement Info

SLM	Type 1	SVAN 971	Coordinates	253761.00 m E
SLM No	FC 13			4298520.00 m N
Data No	-		Distance to Source (m)	-
Start Date	29.01.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		DÜZAĞAÇ		Measurement No.		No8	
Standard		ISO 1996-2		Measurement Date		29-31.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
29.01.2021 14:58:32	52,3	28,4	80,4	30.01.2021 14:58:32	57,0	39,1	79,6
29.01.2021 15:58:32	55,2	27,6	82,3	30.01.2021 15:58:32	52,2	36,9	72,4
29.01.2021 16:58:32	52,0	29,3	71,7	30.01.2021 16:58:32	53,6	37,6	74,2
29.01.2021 17:58:32	49,4	29,7	74,6	30.01.2021 17:58:32	57,0	40,4	86,4
29.01.2021 18:58:32	50,7	29,7	80,6	30.01.2021 18:58:32	55,6	36,2	83,1
29.01.2021 19:58:32	47,1	32,8	73,6	30.01.2021 19:58:32	49,3	36,4	70,0
29.01.2021 20:58:32	52,5	31,7	78,1	30.01.2021 20:58:32	45,3	32,3	71,5
29.01.2021 21:58:32	48,2	29,4	66,8	30.01.2021 21:58:32	47,1	26,7	74,1
29.01.2021 22:58:32	46,5	26,0	63,1	30.01.2021 22:58:32	51,0	29,0	73,5
29.01.2021 23:58:32	52,8	27,7	80,1	30.01.2021 23:58:32	45,2	42,1	67,8
30.01.2021 00:58:32	51,2	28,3	85,1	31.01.2021 00:58:32	50,8	40,3	73,9
30.01.2021 01:58:32	44,4	24,9	67,8	31.01.2021 01:58:32	52,9	37,1	73,4
30.01.2021 02:58:32	44,2	24,0	61,7	31.01.2021 02:58:32	35,5	23,7	57,5
30.01.2021 03:58:32	43,6	24,5	61,4	31.01.2021 03:58:32	34,9	24,0	63,0
30.01.2021 04:58:32	40,8	24,0	60,6	31.01.2021 04:58:32	40,1	23,3	59,9
30.01.2021 05:58:32	42,6	25,5	60,2	31.01.2021 05:58:32	41,6	24,5	59,2
30.01.2021 06:58:32	40,7	22,8	59,7	31.01.2021 06:58:32	39,9	22,0	58,9
30.01.2021 07:58:32	44,3	25,7	62,2	31.01.2021 07:58:32	43,5	24,9	61,4
30.01.2021 08:58:32	49,8	30,4	75,0	31.01.2021 08:58:32	49,0	29,6	74,2
30.01.2021 09:58:32	53,9	34,7	76,0	31.01.2021 09:58:32	53,1	33,9	75,2
30.01.2021 10:58:32	62,0	38,1	83,4	31.01.2021 10:58:32	61,2	37,3	82,6
30.01.2021 11:58:32	58,9	38,5	85,2	31.01.2021 11:58:32	58,1	37,7	84,4
30.01.2021 12:58:32	60,1	38,5	82,4	31.01.2021 12:58:32	59,3	37,7	81,6
30.01.2021 13:58:32	57,4	42,1	81,2	31.01.2021 13:58:32	56,6	41,3	80,4

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	DÜZAĞAÇ	Measurement No.	No8
Standard	ISO 1996-2	Measurement Date	29-31.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	56,3	49,3	47,4	57,0	48,7	47,8
Results Ldn						
	First Day Results(dBA)		Second Day Results(dBA)			
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	55,6		47,3	56,2		47,1
From raw data extraneous noise events excluded to reach processed data						

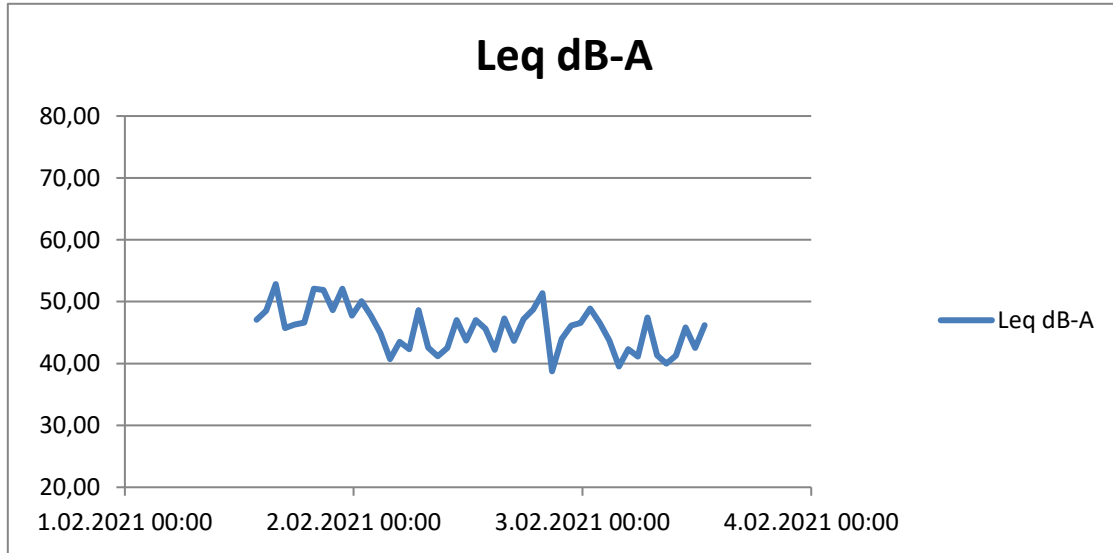
Location	Dumlupınar	Measurement No.	N09
Standard	ISO 1996-2	Measurement Date	01-03.02.2021



Measurement Info

SLM	Device Type	Type 1	Coordinates	758860.00 m E
SLM No	Convergence			4304791.00 m N
Data No	-		Distance to Source (m)	-
Start Date	1.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2 meters

Logger Graph (dBA)



Location		Dumlupınar		Measurement No.		Nog	
Standard		ISO 1996-2		Measurement Date		01-03.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
1.02.2021 13:49	47,1	43,4	51,2	2.02.2021 13:49	45,6	43,6	48,1
1.02.2021 14:49	48,5	46,0	51,5	2.02.2021 14:49	42,2	40,1	44,7
1.02.2021 15:49	52,8	50,9	55,2	2.02.2021 15:49	47,3	44,2	50,2
1.02.2021 16:49	45,7	42,9	48,6	2.02.2021 16:49	43,7	41,7	45,7
1.02.2021 17:49	46,3	43,6	48,9	2.02.2021 17:49	47,2	44,3	50,0
1.02.2021 18:49	46,6	44,2	49,2	2.02.2021 18:49	48,8	47,0	50,9
1.02.2021 19:49	52,1	43,8	57,7	2.02.2021 19:49	51,4	45,6	56,8
1.02.2021 20:49	51,9	45,4	56,7	2.02.2021 20:49	38,7	37,4	40,3
1.02.2021 21:49	48,6	42,3	53,9	2.02.2021 21:49	44,0	38,7	49,2
1.02.2021 22:49	52,1	44,2	57,6	2.02.2021 22:49	46,1	39,2	51,6
1.02.2021 23:49	47,8	45,3	50,9	2.02.2021 23:49	46,6	45,9	50,4
2.02.2021 00:49	50,1	48,2	52,3	3.02.2021 00:49	48,9	48,9	51,8
2.02.2021 01:49	47,7	45,3	50,8	3.02.2021 01:49	46,5	46,0	50,3
2.02.2021 02:49	44,9	42,6	47,6	3.02.2021 02:49	43,7	43,2	47,1
2.02.2021 03:49	40,7	39,3	42,7	3.02.2021 03:49	39,5	39,9	42,2
2.02.2021 04:49	43,5	41,5	46,1	3.02.2021 04:49	42,3	42,1	45,6
2.02.2021 05:49	42,3	40,7	44,0	3.02.2021 05:49	41,1	41,3	43,5
2.02.2021 06:49	48,6	46,4	50,7	3.02.2021 06:49	47,4	47,0	50,2
2.02.2021 07:49	42,6	40,4	45,4	3.02.2021 07:49	41,4	41,1	44,9
2.02.2021 08:49	41,2	38,5	44,9	3.02.2021 08:49	40,0	39,2	44,4
2.02.2021 09:49	42,5	40,1	45,2	3.02.2021 09:49	41,3	40,7	44,7
2.02.2021 10:49	47,0	41,8	50,7	3.02.2021 10:49	45,8	42,4	50,2
2.02.2021 11:49	43,7	41,0	46,6	3.02.2021 11:49	42,5	41,7	46,1
2.02.2021 12:49	47,0	44,2	49,9	3.02.2021 12:49	46,2	40,2	47,3

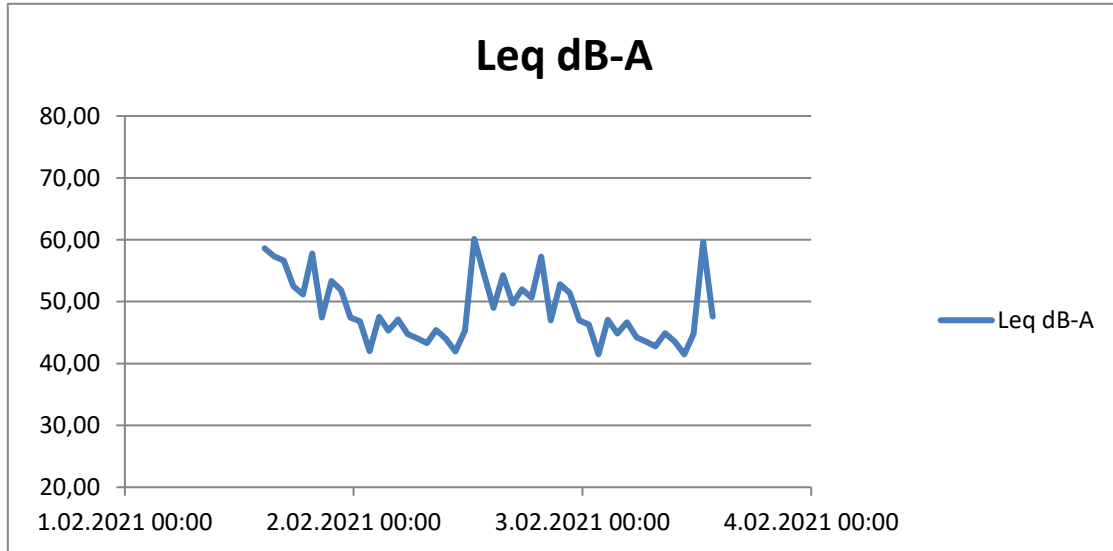
Location	Banaz(Hatipler)	Measurement No.	N10
Standard	ISO 1996-2	Measurement Date	01-03.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	741672.00 m E
SLM No	Convergence			4296991.00 m N
Data No	-		Distance to Source (m)	-
Start Time	1.01.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2 meters

Logger Graph (dBA)



Location		Banaz(Hatıplı)		Measurement No.		N10	
Standard		ISO 1996-2		Measurement Date		01-03.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
1.02.2021 14:40	58,6	52,6	62,9	2.02.2021 14:40	49,0	43,7	53,6
1.02.2021 15:40	57,3	51,9	61,6	2.02.2021 15:40	54,3	47,5	59,0
1.02.2021 16:40	56,6	51,2	60,8	2.02.2021 16:40	49,7	43,6	54,2
1.02.2021 17:40	52,5	48,5	56,3	2.02.2021 17:40	52,0	47,6	57,4
1.02.2021 18:40	51,2	41,1	56,7	2.02.2021 18:40	50,7	40,3	57,8
1.02.2021 19:40	57,8	47,7	63,5	2.02.2021 19:40	57,3	46,9	64,6
1.02.2021 20:40	47,4	43,6	51,1	2.02.2021 20:40	46,9	42,7	52,2
1.02.2021 21:40	53,3	44,5	58,6	2.02.2021 21:40	52,8	43,6	59,7
1.02.2021 22:40	51,9	44,7	56,9	2.02.2021 22:40	51,4	43,9	58,0
1.02.2021 23:40	47,5	42,5	52,1	2.02.2021 23:40	47,0	41,7	53,2
2.02.2021 00:40	46,8	44,8	49,4	3.02.2021 00:40	46,3	43,9	50,5
2.02.2021 01:40	42,0	40,3	44,6	3.02.2021 01:40	41,5	39,4	45,7
2.02.2021 02:40	47,6	42,1	52,1	3.02.2021 02:40	47,1	41,2	53,2
2.02.2021 03:40	45,3	44,1	47,1	3.02.2021 03:40	44,8	43,3	48,2
2.02.2021 04:40	47,1	44,7	50,7	3.02.2021 04:40	46,6	43,8	51,8
2.02.2021 05:40	44,7	44,0	45,6	3.02.2021 05:40	44,2	43,1	46,7
2.02.2021 06:40	44,1	42,5	45,8	3.02.2021 06:40	43,6	41,6	46,9
2.02.2021 07:40	43,3	39,7	47,8	3.02.2021 07:40	42,8	38,9	48,9
2.02.2021 08:40	45,4	44,0	47,5	3.02.2021 08:40	44,9	43,1	48,6
2.02.2021 09:40	44,0	41,5	47,2	3.02.2021 09:40	43,5	40,6	48,3
2.02.2021 10:40	42,0	40,1	45,1	3.02.2021 10:40	41,5	39,2	46,2
2.02.2021 11:40	45,3	39,0	49,7	3.02.2021 11:40	44,8	38,1	50,8
2.02.2021 12:40	60,1	47,2	66,5	3.02.2021 12:40	59,6	46,4	67,6
2.02.2021 13:40	54,5	46,1	59,8	3.02.2021 13:40	47,6	40,2	45,6

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Banaz(Hatıplı)	Measurement No.	N10
Standard	ISO 1996-2	Measurement Date	01-03.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	56,4	54,0	47,4	52,5	54,1	46,2
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	55,7		48,7	52,5		47,1
From raw data extraneous noise events excluded to reach processed data						

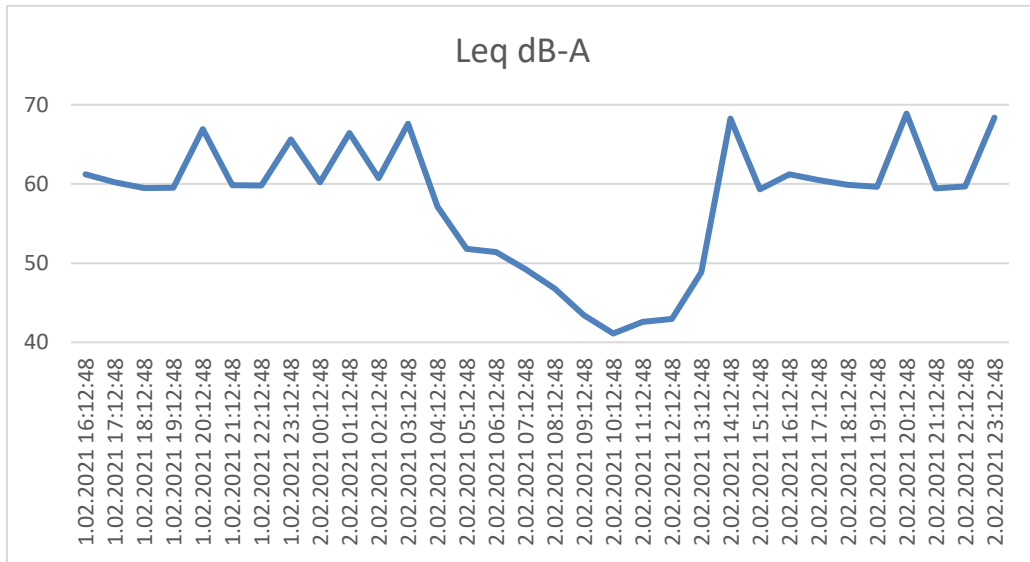
Location	BANAZ	Measurement No.	N11
Standard	ISO 1996-2	Measurement Date	12-13.11.2020




Measurement Info

SLM	Type 1	SVAN 971	Coordinates	740857.00 m E
SLM No	FC 13			4290707.00 m N
Data No	-		Distance to Source (m)	-
Start Date			Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2.5 meters

Logger Graph (dBA)



Location		BANAZ		Measurement No.		N11	
Standard		ISO 1996-2		Measurement Date		12-13.11.2020	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
1.02.2021 16:12:48	61,2	49,2	74,7	2.02.2021 16:12:48	61,2	51,9	76,0
1.02.2021 17:12:48	60,2	47,6	73,1	2.02.2021 17:12:48	60,5	46,9	73,3
1.02.2021 18:12:48	59,5	46,5	79,6	2.02.2021 18:12:48	59,9	45,8	71,3
1.02.2021 19:12:48	59,5	48,5	79,1	2.02.2021 19:12:48	59,7	49,8	72,1
1.02.2021 20:12:48	66,9	50,1	87,5	2.02.2021 20:12:48	68,9	49,5	89,1
1.02.2021 21:12:48	59,8	49,3	72,4	2.02.2021 21:12:48	59,4	48,1	70,7
1.02.2021 22:12:48	59,8	48,4	78,5	2.02.2021 22:12:48	59,7	49,0	73,4
1.02.2021 23:12:48	65,6	51,4	88,7	2.02.2021 23:12:48	68,4	51,6	86,6
2.02.2021 00:12:48	60,2	50,7	73,6	3.02.2021 00:12:48	59,6	50,1	73,0
2.02.2021 01:12:48	66,5	53,9	88,1	3.02.2021 01:12:48	65,9	53,3	87,5
2.02.2021 02:12:48	60,7	49,3	86,8	3.02.2021 02:12:48	60,1	48,7	86,2
2.02.2021 03:12:48	67,6	47,4	85,7	3.02.2021 03:12:48	67,0	46,8	85,1
2.02.2021 04:12:48	57,1	41,2	71,7	3.02.2021 04:12:48	56,5	40,6	71,1
2.02.2021 05:12:48	51,8	37,4	68,0	3.02.2021 05:12:48	51,2	36,8	67,4
2.02.2021 06:12:48	51,4	36,3	65,3	3.02.2021 06:12:48	51,9	36,8	65,8
2.02.2021 07:12:48	49,3	35,4	67,4	3.02.2021 07:12:48	49,8	35,9	67,9
2.02.2021 08:12:48	46,8	35,2	64,8	3.02.2021 08:12:48	47,3	35,7	65,3
2.02.2021 09:12:48	43,4	34,7	60,4	3.02.2021 09:12:48	43,9	35,2	60,9
2.02.2021 10:12:48	41,1	33,9	60,7	3.02.2021 10:12:48	41,6	34,4	61,2
2.02.2021 11:12:48	42,6	34,0	64,3	3.02.2021 11:12:48	43,1	34,5	64,8
2.02.2021 12:12:48	42,9	33,7	59,9	3.02.2021 12:12:48	43,4	34,2	60,4
2.02.2021 13:12:48	48,8	35,9	66,0	3.02.2021 13:12:48	49,3	36,4	66,5
2.02.2021 14:12:48	68,2	41,2	86,7	3.02.2021 14:12:48	68,7	41,7	87,2
2.02.2021 15:12:48	59,3	47,7	74,1	3.02.2021 15:12:48	59,8	48,2	74,6

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	BANAZ	Measurement No.	N11
Standard	ISO 1996-2	Measurement Date	12-13.11.2020

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	57,5	59,8	54,1	60,4	59,7	53,2
Results Ldn						
	First Day Results(dBA)		Second Day Results(dBA)			
	Day	Night	Day	Night		
Time	07:00-22:00		22:00-07:00		07:00-22:00	
Leq dBA	57,0		54,6		59,2	
From raw data extraneous noise events excluded to reach processed data						

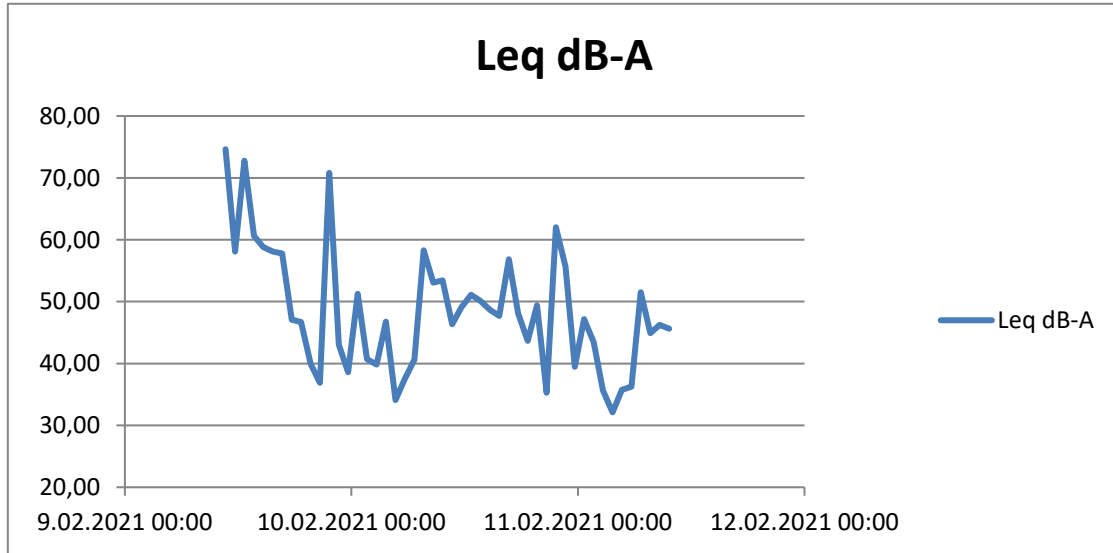
Location	Uşak(İnay)	Measurement No.	N12
Standard	ISO 1996-2	Measurement Date	09-11.02.2021



Measurement Info

SLM	Device Type	Type 1	Coordinates	692755.00 m E
SLM No	Convergence			4254626.00 m N
Data No	-		Distance to Source (m)	-
Start Date	9.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		Uşak(İnay)		Measurement No.		N12	
Standard		ISO 1996-2		Measurement Date		09-11.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
9.02.2021 10:40	74,6	59,4	79,6	10.02.2021 10:40	46,4	41,2	50,5
9.02.2021 11:40	58,1	53,8	61,7	10.02.2021 11:40	49,1	45,1	52,4
9.02.2021 12:40	72,8	61,9	78,4	10.02.2021 12:40	51,1	47,0	54,6
9.02.2021 13:40	60,6	56,7	64,1	10.02.2021 13:40	50,1	45,3	53,7
9.02.2021 14:40	58,8	54,8	62,4	10.02.2021 14:40	48,7	44,5	52,2
9.02.2021 15:40	58,1	53,2	62,0	10.02.2021 15:40	47,7	43,3	51,3
9.02.2021 16:40	57,8	53,4	61,6	10.02.2021 16:40	56,8	49,7	61,7
9.02.2021 17:40	47,1	43,2	50,4	10.02.2021 17:40	48,1	41,6	52,4
9.02.2021 18:40	46,7	43,6	49,7	10.02.2021 18:40	43,7	41,6	46,1
9.02.2021 19:40	39,9	38,7	41,2	10.02.2021 19:40	49,4	48,3	50,6
9.02.2021 20:40	36,9	32,3	40,9	10.02.2021 20:40	35,3	33,1	37,8
9.02.2021 21:40	70,8	58,6	76,4	10.02.2021 21:40	62,0	51,2	67,7
9.02.2021 22:40	43,0	36,6	47,8	10.02.2021 22:40	55,7	44,1	61,0
9.02.2021 23:40	38,6	36,8	40,5	10.02.2021 23:40	39,5	33,4	44,8
10.02.2021 00:40	51,2	46,8	55,0	11.02.2021 00:40	47,2	45,1	50,0
10.02.2021 01:40	40,7	36,1	44,8	11.02.2021 01:40	43,4	41,3	45,9
10.02.2021 02:40	39,8	38,8	40,9	11.02.2021 02:40	35,7	32,0	39,5
10.02.2021 03:40	46,8	45,6	47,8	11.02.2021 03:40	32,1	31,1	33,4
10.02.2021 04:40	34,1	31,0	37,6	11.02.2021 04:40	35,7	32,9	38,7
10.02.2021 05:40	37,5	34,8	40,0	11.02.2021 05:40	36,3	33,3	39,0
10.02.2021 06:40	40,6	36,6	44,3	11.02.2021 06:40	51,5	50,3	52,8
10.02.2021 07:40	58,3	57,4	60,5	11.02.2021 07:40	44,9	40,1	49,0
10.02.2021 08:40	53,1	51,8	55,4	11.02.2021 08:40	46,2	41,2	50,5
10.02.2021 09:40	53,4	48,7	58,5	11.02.2021 09:40	45,6	40,2	51,2

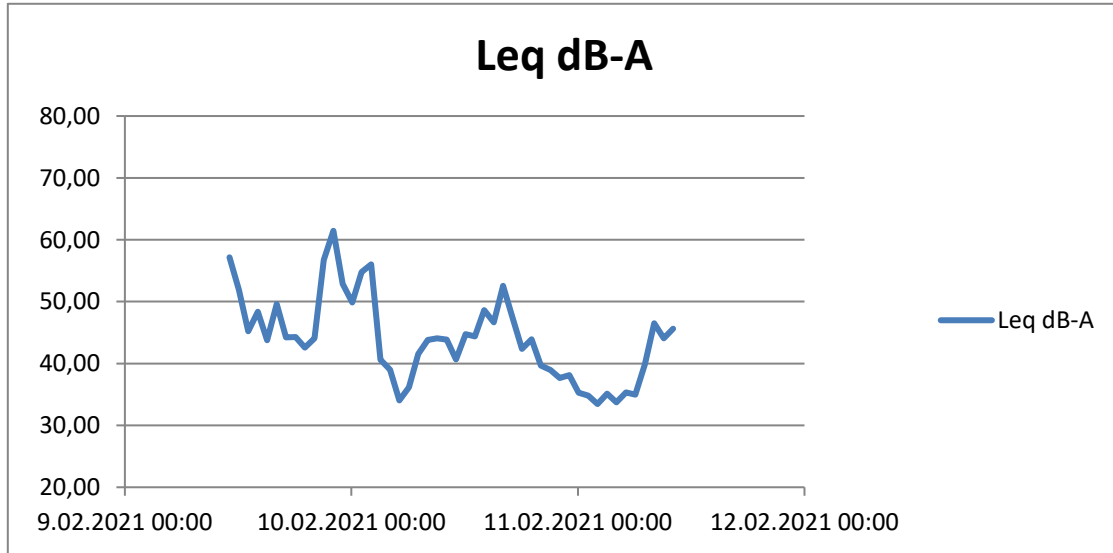
Location	Eşme	Measurement No.	N13
Standard	ISO 1996-2	Measurement Date	09-11.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	674026.00 m E
SLM No	Convergence			4251020.00 m N
Data No	-		Distance to Source (m)	-
Start Date	9.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		Eşme		Measurement No.		N13	
Standard		ISO 1996-2		Measurement Date		09-11.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
9.02.2021 11:05	57,2	50,6	61,7	10.02.2021 11:05	40,7	38,6	43,3
9.02.2021 12:05	51,9	45,3	56,5	10.02.2021 12:05	44,7	40,8	48,5
9.02.2021 13:05	45,2	41,5	48,6	10.02.2021 13:05	44,4	41,3	47,7
9.02.2021 14:05	48,4	43,1	52,6	10.02.2021 14:05	48,6	43,2	52,7
9.02.2021 15:05	43,8	39,6	47,6	10.02.2021 15:05	46,6	40,9	51,7
9.02.2021 16:05	49,6	44,0	53,8	10.02.2021 16:05	52,6	42,9	58,9
9.02.2021 17:05	44,2	40,1	47,9	10.02.2021 17:05	47,3	43,1	51,6
9.02.2021 18:05	44,3	40,4	48,3	10.02.2021 18:05	42,4	40,2	45,0
9.02.2021 19:05	42,6	40,1	45,7	10.02.2021 19:05	43,9	41,8	46,3
9.02.2021 20:05	44,1	38,4	48,5	10.02.2021 20:05	39,7	37,5	42,3
9.02.2021 21:05	56,7	49,2	61,7	10.02.2021 21:05	39,0	35,5	42,6
9.02.2021 22:05	61,5	54,2	66,2	10.02.2021 22:05	37,7	35,5	40,8
9.02.2021 23:05	52,8	46,3	57,5	10.02.2021 23:05	38,1	36,7	39,7
10.02.2021 00:05	49,9	43,0	54,9	11.02.2021 00:05	35,3	33,7	37,2
10.02.2021 01:05	54,8	47,9	59,4	11.02.2021 01:05	34,8	32,9	37,1
10.02.2021 02:05	56,0	48,5	61,1	11.02.2021 02:05	33,5	31,9	35,8
10.02.2021 03:05	40,6	36,6	44,3	11.02.2021 03:05	35,1	33,8	36,6
10.02.2021 04:05	39,0	35,7	42,3	11.02.2021 04:05	33,7	32,7	35,0
10.02.2021 05:05	34,0	31,8	36,9	11.02.2021 05:05	35,3	31,8	38,7
10.02.2021 06:05	36,2	34,2	39,0	11.02.2021 06:05	35,0	33,6	36,5
10.02.2021 07:05	41,5	39,2	44,9	11.02.2021 07:05	39,9	38,5	41,3
10.02.2021 08:05	43,8	40,9	49,6	11.02.2021 08:05	46,5	41,5	51,2
10.02.2021 09:05	44,1	42,4	46,0	11.02.2021 09:05	44,1	41,9	46,7
10.02.2021 10:05	43,8	41,2	46,9	11.02.2021 10:05	45,6	39,0	48,7

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Eşme	Measurement No.	N13
Standard	ISO 1996-2	Measurement Date	09-11.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	49,6	42,4	35,5	46,4	40,8	35,3
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	48,6		36,4	45,8		35,7
From raw data extraneous noise events excluded to reach processed data						

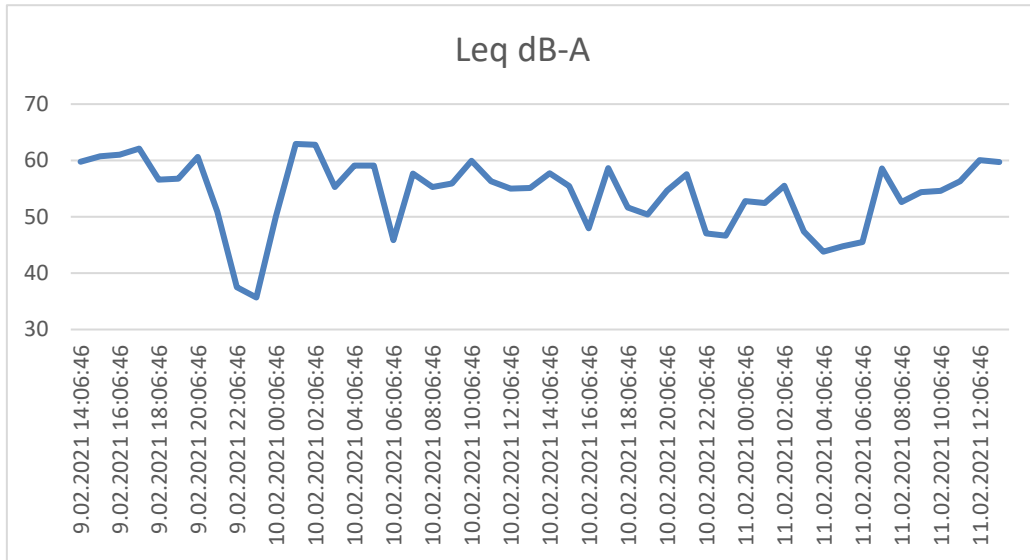
Location	KASAPLI	Measurement No.	N14
Standard	ISO 1996-2	Measurement Date	09-11.11.2021




Measurement Info

SLM	Type 1	SVAN 971	Coordinates	631048.00 m E
SLM No	FC 14			4256078.00 m N
Data No	-		Distance to Source (m)	-
Start Date	9.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		KASAPLI		Measurement No.		N14	
Standard		ISO 1996-2		Measurement Date		09-11.11.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
9.02.2021 14:06:46	59,8	27,2	78,2	10.02.2021 14:06:46	57,7	27,1	79,7
9.02.2021 15:06:46	60,7	28,9	80,8	10.02.2021 15:06:46	55,4	25,5	74,6
9.02.2021 16:06:46	61,0	29,1	83,5	10.02.2021 16:06:46	48,0	23,6	78,7
9.02.2021 17:06:46	62,1	32,2	81,3	10.02.2021 17:06:46	58,6	25,3	81,5
9.02.2021 18:06:46	56,6	30,4	78,1	10.02.2021 18:06:46	51,7	27,9	76,3
9.02.2021 19:06:46	56,8	27,8	82,1	10.02.2021 19:06:46	50,4	28,4	78,2
9.02.2021 20:06:46	60,6	21,7	85,6	10.02.2021 20:06:46	54,6	23,7	79,4
9.02.2021 21:06:46	50,9	22,8	75,1	10.02.2021 21:06:46	57,6	23,8	86,2
9.02.2021 22:06:46	37,5	20,4	66,6	10.02.2021 22:06:46	47,1	23,2	68,8
9.02.2021 23:06:46	35,7	26,9	65,1	10.02.2021 23:06:46	46,7	28,8	69,6
10.02.2021 00:06:46	50,1	25,1	74,5	11.02.2021 00:06:46	52,8	21,9	84,2
10.02.2021 01:06:46	62,9	21,3	85,8	11.02.2021 01:06:46	52,4	22,2	71,2
10.02.2021 02:06:46	62,8	19,6	87,6	11.02.2021 02:06:46	55,5	20,9	75,0
10.02.2021 03:06:46	55,3	18,4	79,1	11.02.2021 03:06:46	47,4	19,8	72,1
10.02.2021 04:06:46	59,1	20,5	80,7	11.02.2021 04:06:46	43,8	20,1	72,6
10.02.2021 05:06:46	59,1	18,5	87,8	11.02.2021 05:06:46	44,8	22,5	73,1
10.02.2021 06:06:46	45,9	19,8	73,3	11.02.2021 06:06:46	45,5	20,2	72,0
10.02.2021 07:06:46	57,7	23,8	78,2	11.02.2021 07:06:46	58,6	24,4	79,4
10.02.2021 08:06:46	55,3	36,5	76,6	11.02.2021 08:06:46	52,6	24,9	76,8
10.02.2021 09:06:46	55,9	31,5	77,0	11.02.2021 09:06:46	54,4	33,0	75,4
10.02.2021 10:06:46	59,9	29,9	89,6	11.02.2021 10:06:46	54,6	30,9	81,4
10.02.2021 11:06:46	56,3	32,8	82,5	11.02.2021 11:06:46	56,3	32,7	81,5
10.02.2021 12:06:46	55,0	34,1	79,8	11.02.2021 12:06:46	60,1	32,3	77,0
10.02.2021 13:06:46	55,1	29,7	79,9	11.02.2021 12:21:14	59,7	36,0	77,8

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	KASAPLI	Measurement No.	N14
Standard	ISO 1996-2	Measurement Date	09-11.11.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	58,7	55,1	59,0	56,1	53,8	51,7
Results Ldn						
	First Day Results(dBA)		Second Day Results(dBA)			
	Day	Night	Day	Night		
Time	07:00-22:00		22:00-07:00		07:00-22:00	
Leq dBA	58,3		58,7		55,9	
From raw data extraneous noise events excluded to reach processed data						

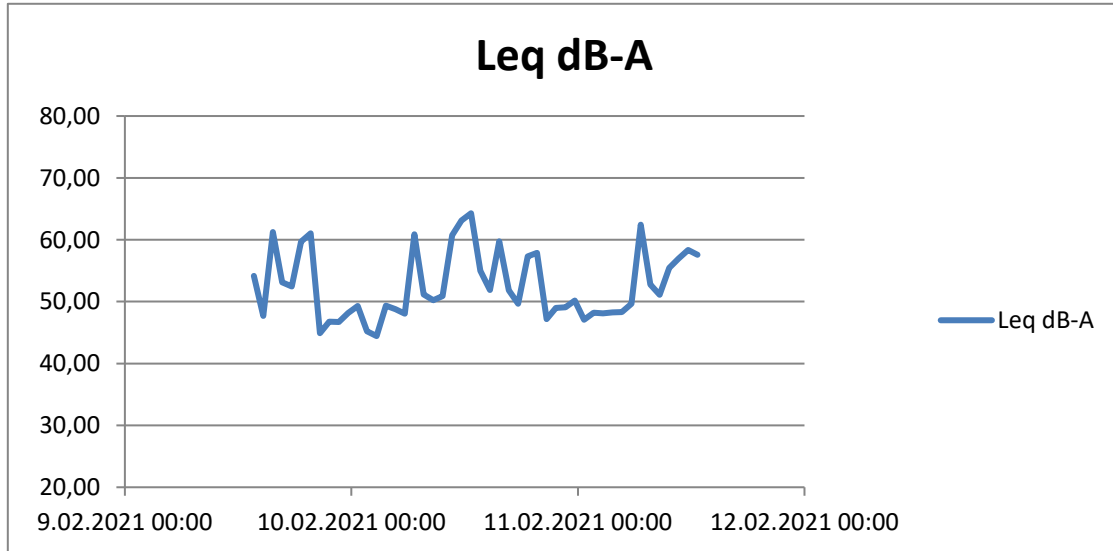
Location	Torunlu	Measurement No.	N15
Standard	ISO 1996-2	Measurement Date	09-11.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	615637.00 m E
SLM No	Convergence			4259723.00 m N
Data No	-		Distance to Source (m)	-
Start Date	9.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		Torunlu		Measurement No.		N15	
Standard		ISO 1996-2		Measurement Date		09-11.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
9.02.2021 13:40	54,1	48,8	57,7	10.02.2021 13:40	55,0	49,4	58,4
9.02.2021 14:40	47,7	44,2	51,3	10.02.2021 14:40	51,9	48,2	54,8
9.02.2021 15:40	61,2	58,5	63,5	10.02.2021 15:40	59,7	56,9	62,1
9.02.2021 16:40	53,1	48,8	56,4	10.02.2021 16:40	51,9	49,3	54,2
9.02.2021 17:40	52,4	49,0	55,8	10.02.2021 17:40	49,7	46,9	52,3
9.02.2021 18:40	59,7	56,9	62,1	10.02.2021 18:40	57,3	54,4	59,9
9.02.2021 19:40	61,1	58,0	63,5	10.02.2021 19:40	57,9	55,4	59,9
9.02.2021 20:40	44,9	44,0	45,9	10.02.2021 20:40	47,2	46,1	48,8
9.02.2021 21:40	46,8	45,8	47,9	10.02.2021 21:40	49,0	48,3	49,8
9.02.2021 22:40	46,7	45,9	47,7	10.02.2021 22:40	49,1	48,2	50,4
9.02.2021 23:40	48,2	46,8	50,0	10.02.2021 23:40	50,2	49,4	51,1
10.02.2021 00:40	49,3	47,8	51,2	11.02.2021 00:40	47,1	46,3	48,0
10.02.2021 01:40	45,2	43,7	46,8	11.02.2021 01:40	48,2	47,3	49,2
10.02.2021 02:40	44,4	40,8	48,1	11.02.2021 02:40	48,1	47,2	49,2
10.02.2021 03:40	49,3	47,5	51,3	11.02.2021 03:40	48,3	47,2	49,4
10.02.2021 04:40	48,8	47,3	51,2	11.02.2021 04:40	48,3	47,4	49,4
10.02.2021 05:40	48,1	46,5	50,1	11.02.2021 05:40	49,7	48,6	50,8
10.02.2021 06:40	60,9	58,0	63,4	11.02.2021 06:40	62,5	59,6	64,8
10.02.2021 07:40	51,2	47,6	57,5	11.02.2021 07:40	52,8	51,1	54,9
10.02.2021 08:40	50,2	47,3	54,7	11.02.2021 08:40	51,1	49,2	53,4
10.02.2021 09:40	50,9	48,2	54,6	11.02.2021 09:40	55,5	50,9	59,2
10.02.2021 10:40	60,7	55,7	63,9	11.02.2021 10:40	56,9	53,0	60,1
10.02.2021 11:40	63,1	57,8	66,5	11.02.2021 11:40	58,3	53,5	61,5
10.02.2021 12:40	64,3	59,8	67,5	11.02.2021 12:40	57,6	54,2	60,3

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Torunlu	Measurement No.	N15
Standard	ISO 1996-2	Measurement Date	09-11.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	57,4	55,5	52,9	58,5	53,3	54,5
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	57,1		52,6	57,9		54,1
From raw data extraneous noise events excluded to reach processed data						

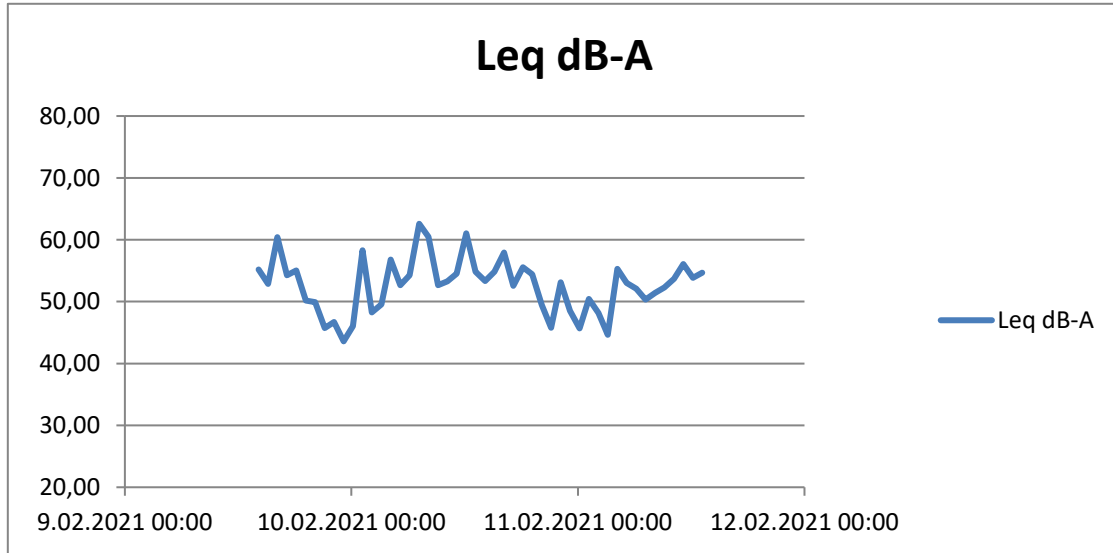
Location	Salihli	Measurement No.	N16
Standard	ISO 1996-2	Measurement Date	09-11.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	598899.00 m E
SLM No	Convergence			4261739.00 m N
Data No	-		Distance to Source (m)	-
Start Date	9.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		Salihli		Measurement No.		N16	
Standard		ISO 1996-2		Measurement Date		09-11.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
9.02.2021 14:10	55,2	52,1	58,6	10.02.2021 14:10	53,3	47,8	57,9
9.02.2021 15:10	52,9	49,0	56,8	10.02.2021 15:10	54,8	50,2	58,9
9.02.2021 16:10	60,4	54,2	65,2	10.02.2021 16:10	57,9	54,5	62,2
9.02.2021 17:10	54,2	50,6	57,8	10.02.2021 17:10	52,6	48,8	56,3
9.02.2021 18:10	55,0	52,1	58,6	10.02.2021 18:10	55,5	50,7	59,7
9.02.2021 19:10	50,2	47,1	53,8	10.02.2021 19:10	54,4	51,8	57,3
9.02.2021 20:10	49,9	46,7	53,1	10.02.2021 20:10	49,5	46,5	52,4
9.02.2021 21:10	45,7	43,2	48,8	10.02.2021 21:10	45,8	43,9	48,5
9.02.2021 22:10	46,7	45,2	48,4	10.02.2021 22:10	53,1	50,3	56,1
9.02.2021 23:10	43,6	41,0	46,5	10.02.2021 23:10	48,5	43,6	52,1
10.02.2021 00:10	46,1	42,1	49,3	11.02.2021 00:10	45,7	41,2	49,5
10.02.2021 01:10	58,3	51,4	62,9	11.02.2021 01:10	50,5	43,1	55,1
10.02.2021 02:10	48,2	44,4	51,4	11.02.2021 02:10	48,1	41,2	52,8
10.02.2021 03:10	49,6	43,8	54,4	11.02.2021 03:10	44,6	40,1	48,4
10.02.2021 04:10	56,8	48,2	61,9	11.02.2021 04:10	55,3	51,2	59,2
10.02.2021 05:10	52,6	46,5	57,2	11.02.2021 05:10	53,0	46,1	57,7
10.02.2021 06:10	54,3	52,7	56,8	11.02.2021 06:10	52,1	49,0	54,9
10.02.2021 07:10	62,6	61,7	64,4	11.02.2021 07:10	50,3	47,8	53,0
10.02.2021 08:10	60,5	59,0	61,9	11.02.2021 08:10	51,4	49,9	53,5
10.02.2021 09:10	52,7	50,1	56,1	11.02.2021 09:10	52,3	50,3	54,7
10.02.2021 10:10	53,3	48,8	58,0	11.02.2021 10:10	53,7	51,5	56,3
10.02.2021 11:10	54,5	51,9	57,6	11.02.2021 11:10	56,1	53,6	58,5
10.02.2021 12:10	61,1	57,0	64,1	11.02.2021 12:10	53,8	51,1	56,6
10.02.2021 13:10	54,8	49,5	59,6	11.02.2021 13:10	54,7	50,3	57,6

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Salihli	Measurement No.	N16
Standard	ISO 1996-2	Measurement Date	09-11.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	56,3	50,5	53,3	57,6	51,4	51,5
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	54,9		52,9	56,9		51,3
From raw data extraneous noise events excluded to reach processed data						

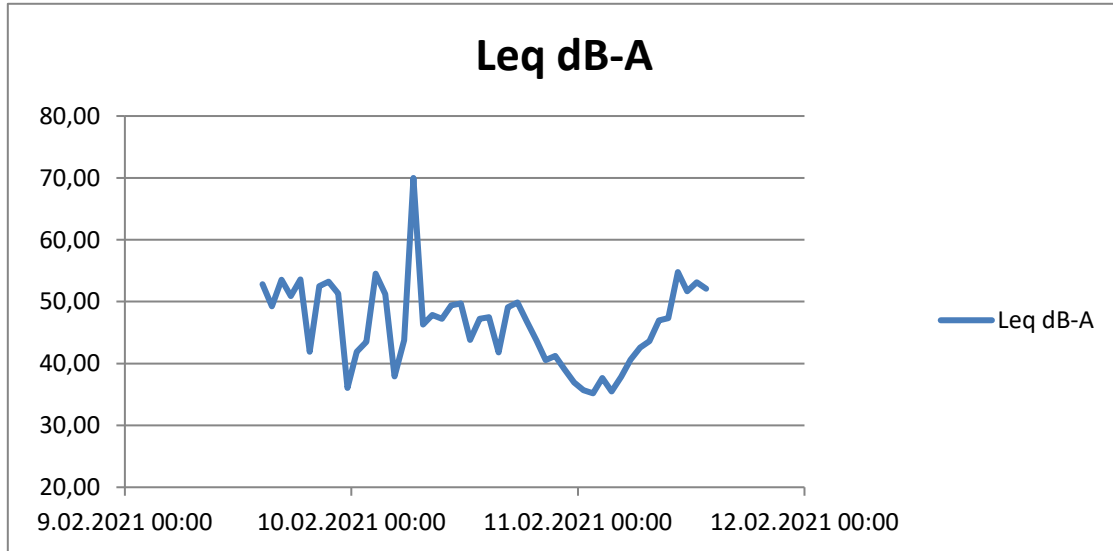
Location	Kapancı	Measurement No.	N17
Standard	ISO 1996-2	Measurement Date	09-11.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	591574.00 m E
SLM No	Convergence			4263406.00 m N
Data No	-		Distance to Source (m)	-
Start Date	9.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		Kapancı		Measurement No.		N17	
Standard		ISO 1996-2		Measurement Date		09-11.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
9.02.2021 14:35	52,8	49,3	56,5	10.02.2021 14:35	47,5	40,7	55,8
9.02.2021 15:35	49,2	45,6	52,8	10.02.2021 15:35	41,8	39,1	44,6
9.02.2021 16:35	53,5	49,9	57,1	10.02.2021 16:35	49,1	46,4	51,9
9.02.2021 17:35	50,9	45,6	55,9	10.02.2021 17:35	49,9	46,5	53,1
9.02.2021 18:35	53,6	50,0	56,9	10.02.2021 18:35	46,8	44,9	49,0
9.02.2021 19:35	41,9	38,7	45,2	10.02.2021 19:35	43,8	41,4	46,2
9.02.2021 20:35	52,5	46,3	57,6	10.02.2021 20:35	40,6	38,1	43,5
9.02.2021 21:35	53,2	45,2	58,6	10.02.2021 21:35	41,2	39,2	43,6
9.02.2021 22:35	51,3	49,3	54,2	10.02.2021 22:35	39,0	37,5	41,1
9.02.2021 23:35	36,0	34,6	38,0	10.02.2021 23:35	36,9	35,5	39,0
10.02.2021 00:35	41,9	37,8	45,7	11.02.2021 00:35	35,7	34,4	37,1
10.02.2021 01:35	43,5	39,0	47,2	11.02.2021 01:35	35,2	34,4	36,3
10.02.2021 02:35	54,5	45,9	62,0	11.02.2021 02:35	37,7	36,8	38,7
10.02.2021 03:35	51,2	43,6	57,9	11.02.2021 03:35	35,5	34,5	36,8
10.02.2021 04:35	37,9	35,6	42,6	11.02.2021 04:35	37,9	36,6	39,6
10.02.2021 05:35	43,8	37,8	51,4	11.02.2021 05:35	40,6	38,9	43,0
10.02.2021 06:35	70,0	60,4	77,8	11.02.2021 06:35	42,6	40,6	44,8
10.02.2021 07:35	46,3	43,7	50,0	11.02.2021 07:35	43,6	41,0	46,4
10.02.2021 08:35	47,9	45,7	50,5	11.02.2021 08:35	47,0	44,2	50,6
10.02.2021 09:35	47,2	44,9	50,2	11.02.2021 09:35	47,3	45,1	50,0
10.02.2021 10:35	49,4	46,8	52,0	11.02.2021 10:35	54,8	51,7	57,9
10.02.2021 11:35	49,7	46,6	52,6	11.02.2021 11:35	51,7	49,5	54,2
10.02.2021 12:35	43,8	40,7	47,0	11.02.2021 12:35	53,1	50,7	55,7
10.02.2021 13:35	47,2	45,3	49,1	11.02.2021 13:35	52,1	49,8	57,6

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Kapancı	Measurement No.	N17
Standard	ISO 1996-2	Measurement Date	09-11.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	52,0	44,6	42,0	49,0	43,2	38,2
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	51,6		42,7	48,3		38,2
From raw data extraneous noise events excluded to reach processed data						

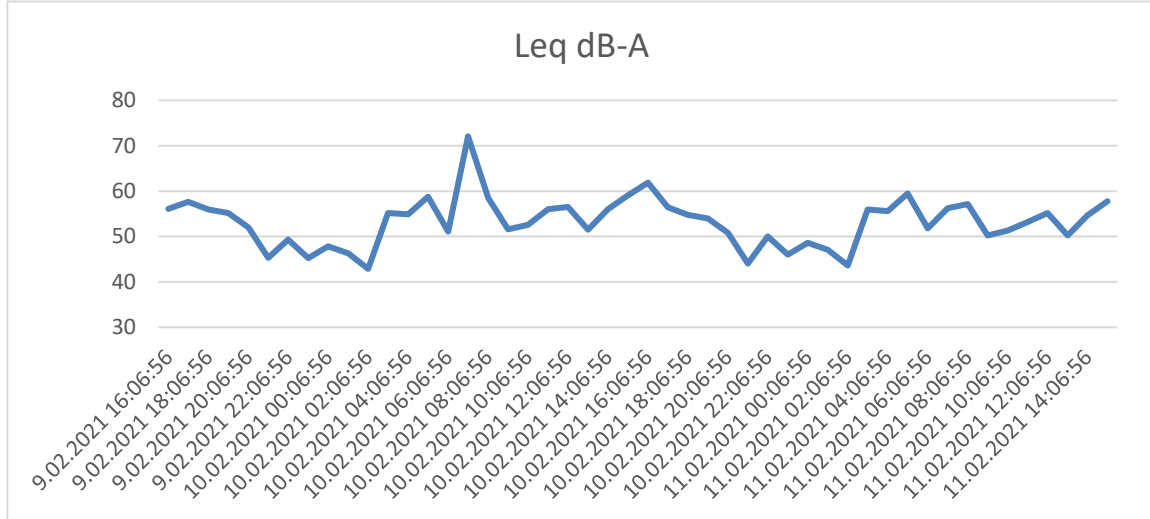
Location	AHMETLİ	Measurement No.	N18
Standard	ISO 1996-2	Measurement Date	12-13.11.2020




Measurement Info

SLM	Type 1	SVAN 971	Coordinates	581807.00 m E
SLM No	FC 13			4264483.00 m N
Data No	-		Distance to Source (m)	-
Start Date	9.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	6 meters


Logger Graph (dBA)



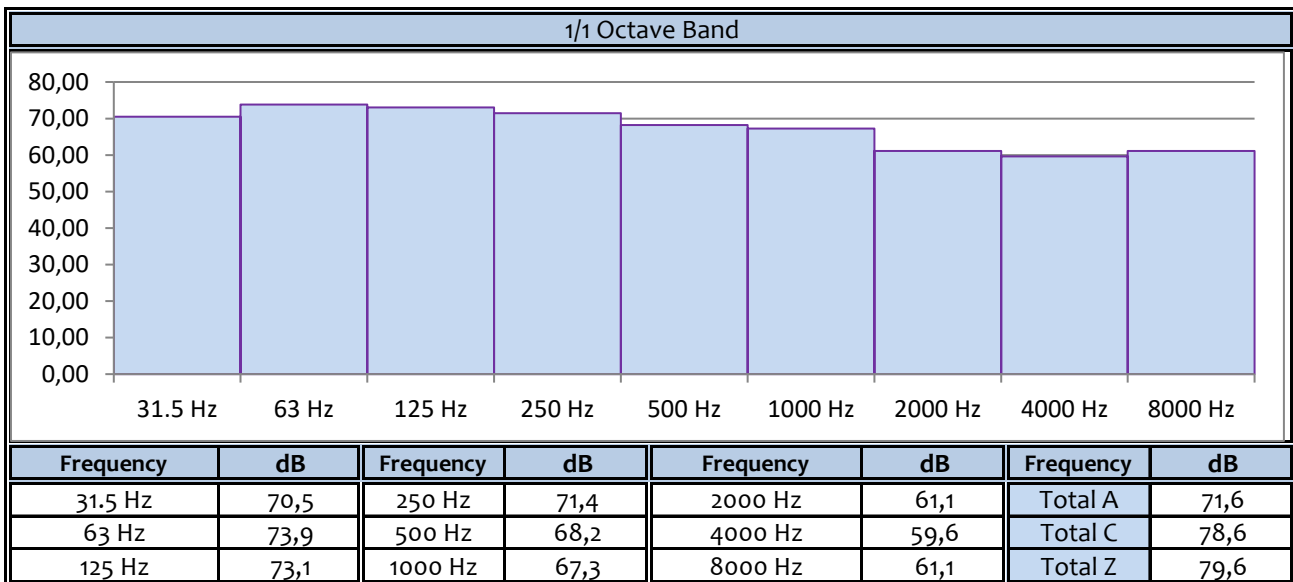
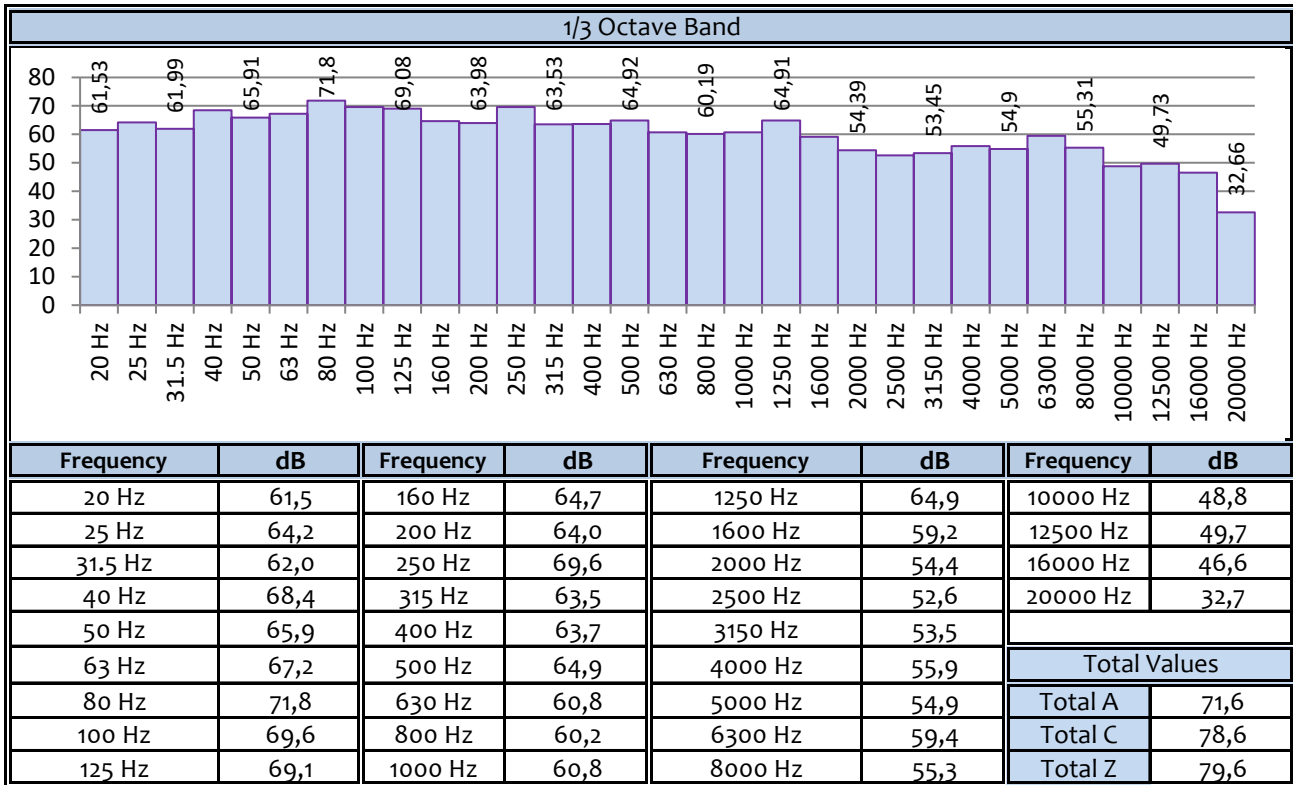
Location		AHMETLİ		Measurement No.		N18	
Standard		ISO 1996-2		Measurement Date		12-13.11.2020	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
9.02.2021 16:06:56	56,1	41,1	79,5	10.02.2021 16:06:56	61,9	41,1	82,5
9.02.2021 17:06:56	57,7	42,0	83,5	10.02.2021 17:06:56	56,5	40,8	82,3
9.02.2021 18:06:56	56,0	41,3	81,9	10.02.2021 18:06:56	54,8	40,1	80,7
9.02.2021 19:06:56	55,2	39,4	79,0	10.02.2021 19:06:56	54,0	38,2	77,8
9.02.2021 20:06:56	52,0	37,1	73,6	10.02.2021 20:06:56	50,8	35,9	72,4
9.02.2021 21:06:56	45,3	36,2	67,2	10.02.2021 21:06:56	44,1	35,0	66,0
9.02.2021 22:06:56	49,3	35,4	78,2	10.02.2021 22:06:56	50,0	36,1	78,9
9.02.2021 23:06:56	45,2	31,2	72,5	10.02.2021 23:06:56	46,0	32,0	73,3
10.02.2021 00:06:56	47,8	29,5	68,9	11.02.2021 00:06:56	48,6	30,3	69,6
10.02.2021 01:06:56	46,3	28,4	69,6	11.02.2021 01:06:56	47,1	29,2	70,4
10.02.2021 02:06:56	42,9	30,7	63,6	11.02.2021 02:06:56	43,6	31,4	64,3
10.02.2021 03:06:56	55,2	31,8	71,6	11.02.2021 03:06:56	55,9	32,5	72,3
10.02.2021 04:06:56	54,9	31,1	76,3	11.02.2021 04:06:56	55,6	31,8	77,0
10.02.2021 05:06:56	58,8	27,4	79,1	11.02.2021 05:06:56	59,5	28,1	79,9
10.02.2021 06:06:56	51,1	27,8	63,7	11.02.2021 06:06:56	51,8	28,5	64,5
10.02.2021 07:06:56	72,1	33,1	87,7	11.02.2021 07:06:56	56,3	33,8	88,4
10.02.2021 08:06:56	58,5	38,5	76,6	11.02.2021 08:06:56	57,2	37,2	75,3
10.02.2021 09:06:56	51,6	40,0	70,9	11.02.2021 09:06:56	50,3	38,7	69,6
10.02.2021 10:06:56	52,6	43,4	77,3	11.02.2021 10:06:56	51,3	42,1	76,0
10.02.2021 11:06:56	56,0	41,4	81,5	11.02.2021 11:06:56	53,2	40,1	80,2
10.02.2021 12:06:56	56,5	39,9	86,9	11.02.2021 12:06:56	55,2	38,6	85,6
10.02.2021 13:06:56	51,5	40,3	73,0	11.02.2021 13:06:56	50,2	39,0	71,7
10.02.2021 14:06:56	56,0	38,4	84,9	11.02.2021 14:06:56	54,7	37,1	83,6
10.02.2021 15:06:56	59,1	39,2	87,1	11.02.2021 15:06:56	57,8	37,9	85,8

		ANKARA-IZMIR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	AHMETLİ	Measurement No.	N18
Standard	ISO 1996-2	Measurement Date	12-13.11.2020

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	53,7	49,0	48,1	52,6	48,6	47,2
Results Ldn						
	First Day Results(dBA)		Night	Second Day Results(dBA)		Night
	Day			Day		
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	53,1		48,4	52,0		46,8
From raw data extraneous noise events excluded to reach processed data						

	ANKARA-IZMIR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS
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Location	AHMETLI	Measurement No.	Point 1
Standard	ISO 1996-2	Measurement Date	12-13.11.2020



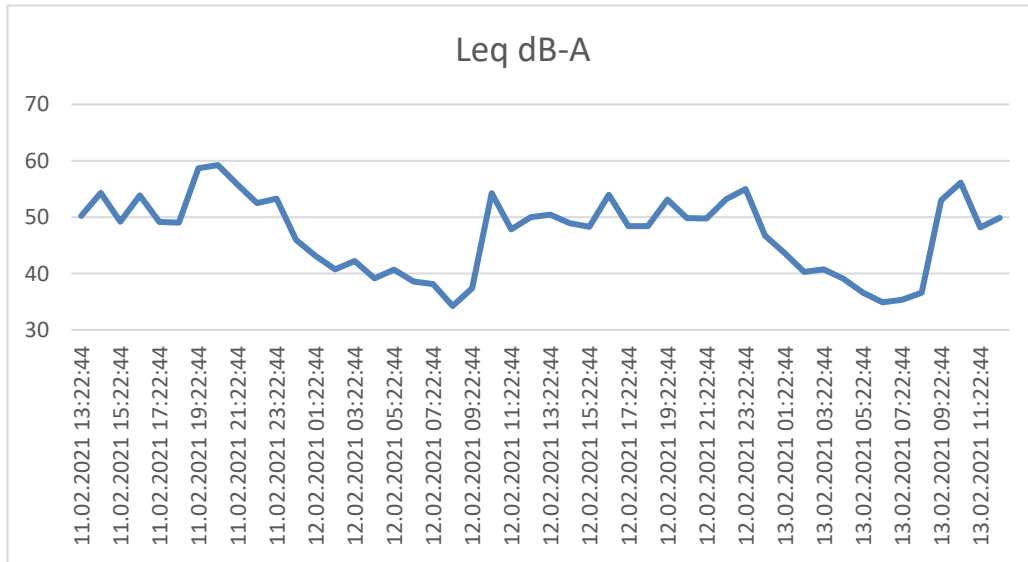
Location	YENİKÖY	Measurement No.	N19
Standard	ISO 1996-2	Measurement Date	11-13.01.2021




Measurement Info

SLM	Type 1	SVAN 971	Coordinates	573525.00 m E
SLM No	FC 13			4262461.00 m N
Data No	-		Distance to Source (m)	-
Start Date	11.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		YENİKÖY		Measurement No.		N19	
Standard		ISO 1996-2		Measurement Date		11-13.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
11.02.2021 13:22:44	50,2	39,5	71,9	12.02.2021 13:22:44	50,4	37,9	76,2
11.02.2021 14:22:44	54,3	39,2	88,8	12.02.2021 14:22:44	48,9	37,5	62,2
11.02.2021 15:22:44	49,2	37,9	63,0	12.02.2021 15:22:44	48,3	38,3	60,5
11.02.2021 16:22:44	53,9	38,8	73,8	12.02.2021 16:22:44	54,0	38,1	72,6
11.02.2021 17:22:44	49,1	38,2	68,3	12.02.2021 17:22:44	48,4	36,9	64,5
11.02.2021 18:22:44	49,0	38,8	68,1	12.02.2021 18:22:44	48,4	40,5	65,7
11.02.2021 19:22:44	58,7	39,4	97,6	12.02.2021 19:22:44	53,1	41,3	73,7
11.02.2021 20:22:44	59,2	42,0	98,1	12.02.2021 20:22:44	49,8	41,5	74,3
11.02.2021 21:22:44	55,8	40,3	82,4	12.02.2021 21:22:44	49,8	40,7	73,7
11.02.2021 22:22:44	52,5	39,9	73,3	12.02.2021 22:22:44	53,2	40,4	72,8
11.02.2021 23:22:44	53,3	39,5	78,2	12.02.2021 23:22:44	55,0	38,5	74,7
12.02.2021 00:22:44	46,0	33,7	58,6	13.02.2021 00:22:44	46,7	35,7	63,2
12.02.2021 01:22:44	43,1	31,1	72,5	13.02.2021 01:22:44	43,6	33,1	60,3
12.02.2021 02:22:44	40,7	29,3	59,3	13.02.2021 02:22:44	40,3	30,9	53,9
12.02.2021 03:22:44	42,2	28,9	62,8	13.02.2021 03:22:44	40,7	30,8	62,5
12.02.2021 04:22:44	39,2	28,5	63,4	13.02.2021 04:22:44	39,1	29,1	56,3
12.02.2021 05:22:44	40,7	27,4	58,5	13.02.2021 05:22:44	36,6	28,9	58,9
12.02.2021 06:22:44	38,6	27,5	56,2	13.02.2021 06:22:44	34,9	28,7	51,8
12.02.2021 07:22:44	38,1	27,4	56,4	13.02.2021 07:22:44	35,3	28,0	61,5
12.02.2021 08:22:44	34,2	28,5	49,8	13.02.2021 08:22:44	36,6	29,2	51,2
12.02.2021 09:22:44	37,4	29,8	55,4	13.02.2021 09:22:44	53,0	31,1	76,6
12.02.2021 10:22:44	54,3	33,0	72,4	13.02.2021 10:22:44	56,2	34,1	77,9
12.02.2021 11:22:44	47,8	36,7	62,4	13.02.2021 11:22:44	48,2	36,9	68,6
12.02.2021 12:22:44	50,0	39,4	61,0	13.02.2021 12:22:44	49,9	41,5	66,4

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	YENİKÖY	Measurement No.	N19
Standard	ISO 1996-2	Measurement Date	11-13.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	48,9	50,2	42,7	48,1	49,1	42,6
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	48,3		42,4	48,3		43,2
From raw data extraneous noise events excluded to reach processed data						

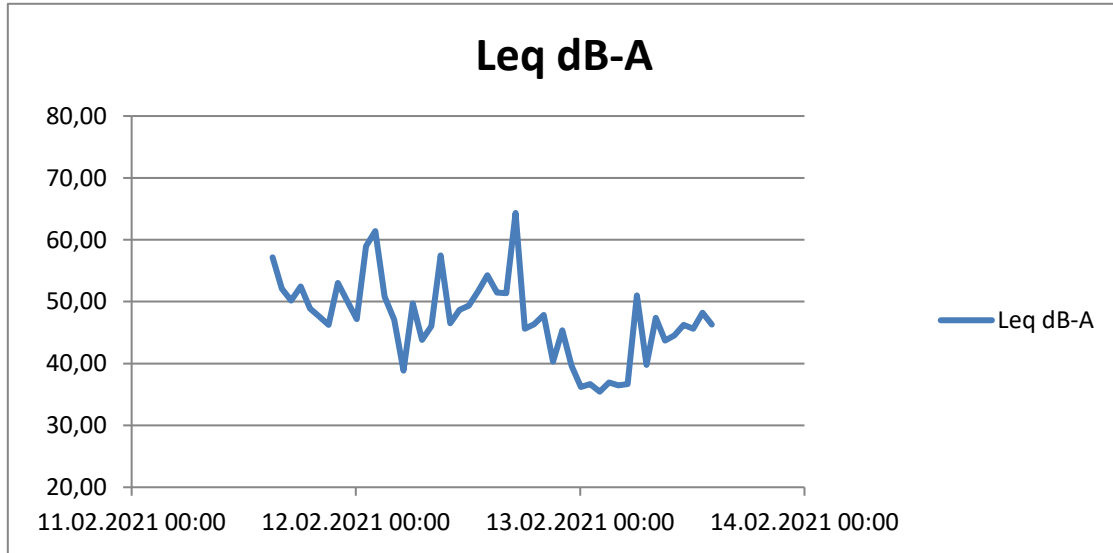
Location	Turgutlu	Measurement No.	N20
Standard	ISO 1996-2	Measurement Date	11-13.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	561072.00 m E
SLM No	Convergence			4263479.00 m N
Data No	-		Distance to Source (m)	-
Start Date	11.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	4 meters

Logger Graph (dBA)



Location		Turgutlu		Measurement No.		N20	
Standard		ISO 1996-2		Measurement Date		11-13.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
11.02.2021 15:05	57,2	48,2	62,3	12.02.2021 15:05	51,5	47,7	55,1
11.02.2021 16:05	52,1	48,1	55,6	12.02.2021 16:05	51,4	46,8	55,3
11.02.2021 17:05	50,2	46,4	54,6	12.02.2021 17:05	64,3	53,8	70,4
11.02.2021 18:05	52,5	45,5	59,3	12.02.2021 18:05	45,6	43,5	60,4
11.02.2021 19:05	48,9	46,3	51,4	12.02.2021 19:05	46,3	42,3	52,5
11.02.2021 20:05	47,6	44,6	50,3	12.02.2021 20:05	47,9	45,8	51,4
11.02.2021 21:05	46,3	42,8	50,6	12.02.2021 21:05	40,3	38,7	51,7
11.02.2021 22:05	53,0	47,8	57,2	12.02.2021 22:05	45,4	39,4	58,3
11.02.2021 23:05	50,0	45,2	53,9	12.02.2021 23:05	39,6	37,4	55,0
12.02.2021 00:05	47,2	44,7	50,5	13.02.2021 00:05	36,2	34,5	51,6
12.02.2021 01:05	59,0	53,7	63,1	13.02.2021 01:05	36,7	35,2	64,2
12.02.2021 02:05	61,4	56,2	65,6	13.02.2021 02:05	35,5	33,2	66,7
12.02.2021 03:05	50,8	45,6	54,8	13.02.2021 03:05	36,9	35,1	55,9
12.02.2021 04:05	47,1	42,4	50,9	13.02.2021 04:05	36,5	34,1	52,0
12.02.2021 05:05	38,9	36,6	41,0	13.02.2021 05:05	36,7	34,7	42,1
12.02.2021 06:05	49,7	46,8	52,2	13.02.2021 06:05	51,0	48,8	53,3
12.02.2021 07:05	43,8	40,7	46,8	13.02.2021 07:05	39,8	39,8	47,9
12.02.2021 08:05	46,0	41,9	50,5	13.02.2021 08:05	47,4	41,1	51,6
12.02.2021 09:05	57,5	56,1	59,5	13.02.2021 09:05	43,7	55,2	60,6
12.02.2021 10:05	46,5	43,7	49,9	13.02.2021 10:05	44,6	42,8	51,0
12.02.2021 11:05	48,7	44,7	53,0	13.02.2021 11:05	46,2	43,8	54,1
12.02.2021 12:05	49,4	46,5	52,3	13.02.2021 12:05	45,6	45,7	53,4
12.02.2021 13:05	51,7	47,4	55,6	13.02.2021 13:05	48,2	46,5	56,7
12.02.2021 14:05	54,3	50,3	58,1	13.02.2021 14:05	46,3	42,6	57,2

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Turgutlu	Measurement No.	N20
Standard	ISO 1996-2	Measurement Date	11-13.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	53,9	49,8	45,2	55,6	45,7	43,1
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	52,2		44,3	54,7		43,4
From raw data extraneous noise events excluded to reach processed data						

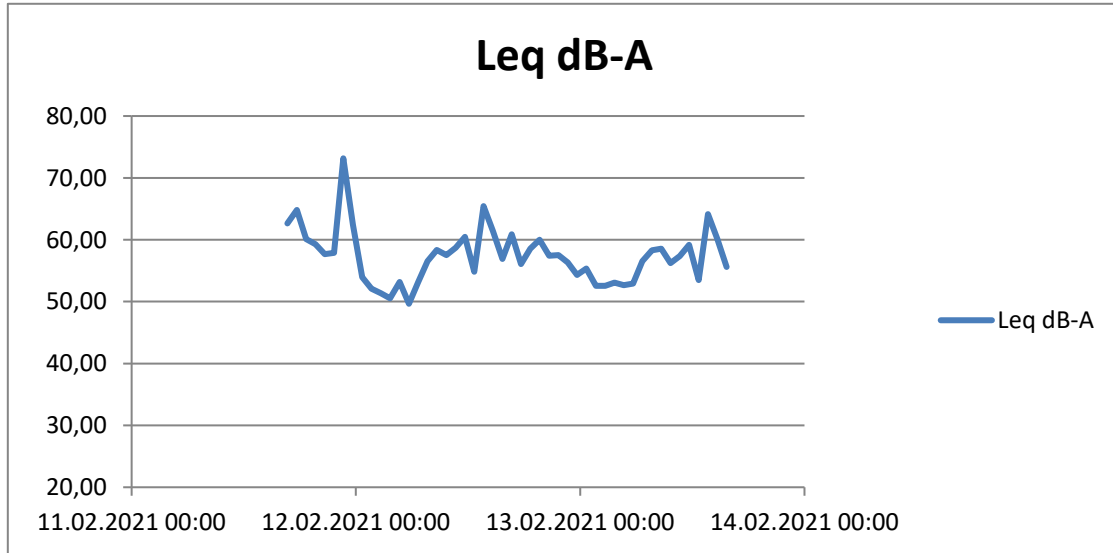
Location	Küme Evleri(Manisa)	Measurement No.	N21
Standard	ISO 1996-2	Measurement Date	11-13.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	534181.00 m E
SLM No	Convergence			4268350.00 m N
Data No	-		Distance to Source (m)	-
Start Date	11.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		Küme Evleri(Manisa)		Measurement No.		N21	
Standard				Measurement Date		11-13.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
11.02.2021 16:40	62,6	58,2	66,9	12.02.2021 16:40	60,9	57,0	64,4
11.02.2021 17:40	64,8	58,4	69,7	12.02.2021 17:40	56,1	52,7	60,2
11.02.2021 18:40	60,1	57,3	63,4	12.02.2021 18:40	58,6	54,7	63,1
11.02.2021 19:40	59,3	57,5	61,6	12.02.2021 19:40	60,0	58,8	62,7
11.02.2021 20:40	57,7	55,8	60,2	12.02.2021 20:40	57,4	56,3	61,3
11.02.2021 21:40	57,9	56,1	59,9	12.02.2021 21:40	57,5	55,3	61,0
11.02.2021 22:40	73,2	71,7	75,0	12.02.2021 22:40	56,3	55,1	76,1
11.02.2021 23:40	62,5	60,8	65,6	12.02.2021 23:40	54,3	53,3	66,7
12.02.2021 00:40	54,0	53,0	55,2	13.02.2021 00:40	55,3	52,4	56,3
12.02.2021 01:40	52,1	50,7	53,7	13.02.2021 01:40	52,5	51,5	54,8
12.02.2021 02:40	51,4	50,0	52,8	13.02.2021 02:40	52,6	50,9	53,9
12.02.2021 03:40	50,5	49,2	51,9	13.02.2021 03:40	53,1	51,5	53,0
12.02.2021 04:40	53,2	52,2	54,2	13.02.2021 04:40	52,7	51,3	55,3
12.02.2021 05:40	49,7	48,5	50,9	13.02.2021 05:40	52,9	51,2	52,0
12.02.2021 06:40	53,2	51,8	55,1	13.02.2021 06:40	56,6	55,6	56,2
12.02.2021 07:40	56,6	53,7	60,0	13.02.2021 07:40	58,3	56,8	61,1
12.02.2021 08:40	58,4	55,3	62,1	13.02.2021 08:40	58,6	54,5	63,2
12.02.2021 09:40	57,5	54,2	60,9	13.02.2021 09:40	56,2	53,4	62,0
12.02.2021 10:40	58,7	55,3	63,2	13.02.2021 10:40	57,4	54,5	64,3
12.02.2021 11:40	60,5	54,9	65,3	13.02.2021 11:40	59,2	54,1	66,4
12.02.2021 12:40	54,8	50,9	59,5	13.02.2021 12:40	53,5	50,1	60,6
12.02.2021 13:40	65,5	53,7	73,7	13.02.2021 13:40	64,2	52,9	74,8
12.02.2021 14:40	61,4	56,6	66,1	13.02.2021 14:40	60,1	55,7	67,2
12.02.2021 15:40	56,9	52,9	60,8	13.02.2021 15:40	55,6	54,6	66,2

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Küme Evleri(Manisa)	Measurement No.	N21
Standard	ISO 1996-2	Measurement Date	11-13.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	59,8	55,2	47,5	59,7	56,1	46,2
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	58,6		48,1	58,5		47,2
From raw data extraneous noise events excluded to reach processed data						

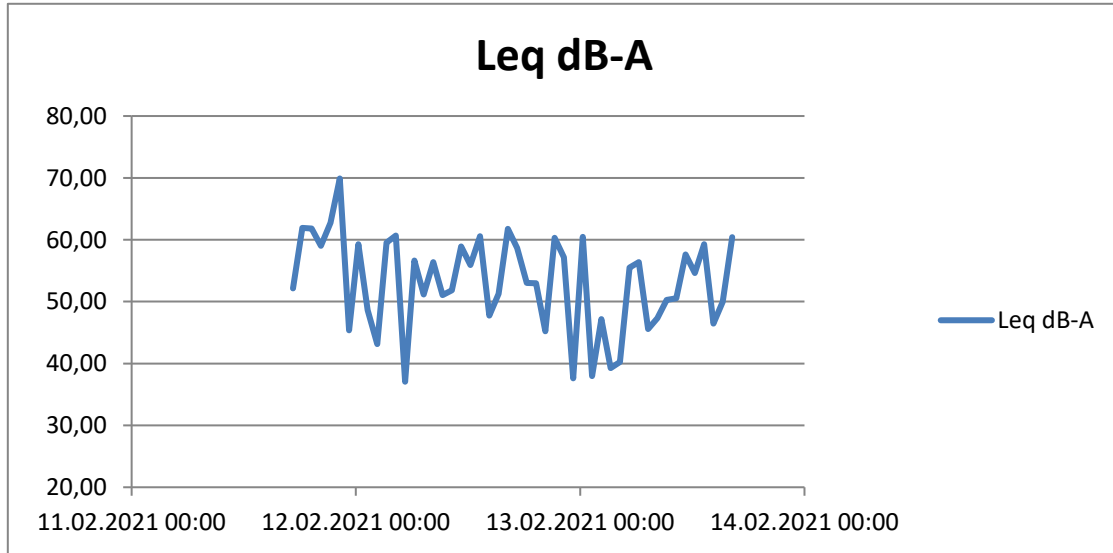
Location	Değirmendere	Measurement No.	N22
Standard	ISO 1996-2	Measurement Date	11-13.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	513036.00 m E
SLM No	Convergence		Coordinates	4275187.00 m N
Data No	-		Distance to Source (m)	-
Start Date	11.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		Değirmendere		Measurement No.		N22	
Standard		ISO 1996-2		Measurement Date		11-13.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
11.02.2021 17:16	52,2	50,1	54,6	12.02.2021 17:16	58,7	56,7	60,4
11.02.2021 18:16	61,9	58,7	65,6	12.02.2021 18:16	53,0	50,5	55,4
11.02.2021 19:16	61,8	59,0	64,8	12.02.2021 19:16	53,0	50,6	55,3
11.02.2021 20:16	59,0	55,5	63,1	12.02.2021 20:16	45,2	40,8	64,2
11.02.2021 21:16	62,7	59,0	66,7	12.02.2021 21:16	60,3	52,9	67,8
11.02.2021 22:16	69,9	60,9	75,6	12.02.2021 22:16	57,2	54,5	76,7
11.02.2021 23:16	45,4	42,7	48,0	12.02.2021 23:16	37,6	36,4	49,1
12.02.2021 00:16	59,3	56,1	63,1	13.02.2021 00:16	60,5	58,8	64,2
12.02.2021 01:16	48,6	46,6	52,7	13.02.2021 01:16	38,0	36,3	53,8
12.02.2021 02:16	43,2	42,1	44,8	13.02.2021 02:16	47,2	46,1	45,9
12.02.2021 03:16	59,6	55,6	64,7	13.02.2021 03:16	39,2	37,1	65,8
12.02.2021 04:16	60,7	55,9	67,5	13.02.2021 04:16	40,2	38,4	68,6
12.02.2021 05:16	37,1	35,9	38,6	13.02.2021 05:16	55,5	52,2	39,7
12.02.2021 06:16	56,7	54,7	58,5	13.02.2021 06:16	56,4	53,3	59,6
12.02.2021 07:16	51,2	46,0	55,3	13.02.2021 07:16	45,6	42,3	56,4
12.02.2021 08:16	56,4	54,1	58,6	13.02.2021 08:16	47,3	44,0	59,7
12.02.2021 09:16	51,1	46,2	55,0	13.02.2021 09:16	50,3	45,3	56,1
12.02.2021 10:16	51,8	49,9	54,1	13.02.2021 10:16	50,5	49,3	54,6
12.02.2021 11:16	58,9	53,2	63,1	13.02.2021 11:16	57,6	52,6	63,6
12.02.2021 12:16	55,9	53,7	58,0	13.02.2021 12:16	54,6	53,1	58,5
12.02.2021 13:16	60,6	58,4	62,5	13.02.2021 13:16	59,3	57,8	63,0
12.02.2021 14:16	47,8	45,9	49,9	13.02.2021 14:16	46,5	45,3	50,4
12.02.2021 15:16	51,3	49,5	53,3	13.02.2021 15:16	50,0	48,9	53,8
12.02.2021 16:16	61,7	54,2	66,7	13.02.2021 16:16	60,4	53,6	67,2

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Değirmendere	Measurement No.	N22
Standard	ISO 1996-2	Measurement Date	11-13.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	58,9	58,6	53,9	57,1	56,6	53,4
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	59,5		53,4	56,3		53,1
From raw data extraneous noise events excluded to reach processed data						

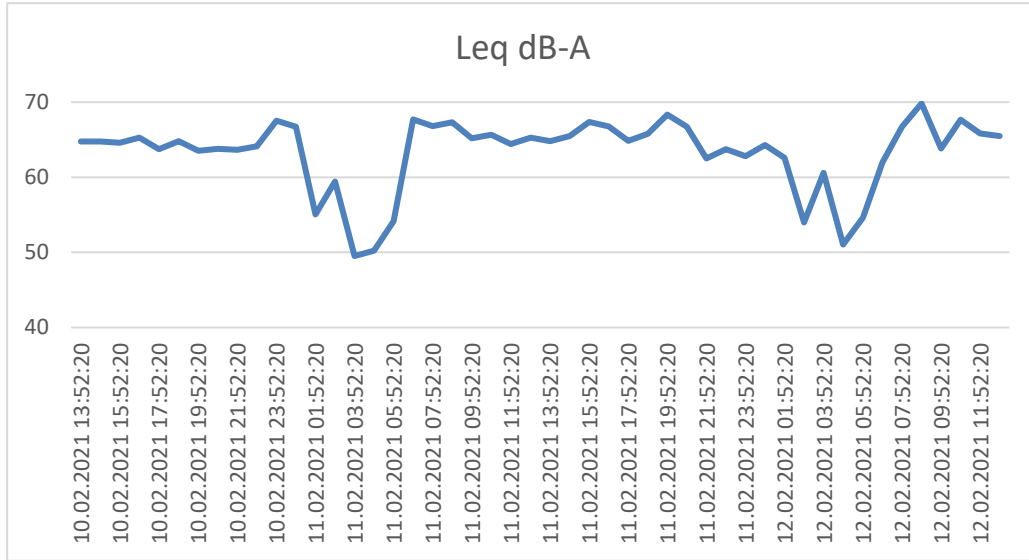
Location	MENEMEN	Measurement No.	N23
Standard	ISO 1996-2	Measurement Date	10-12.01.2021




Measurement Info

SLM	Type 1	SVAN 957	Coordinates	507275.00 m E
SLM No	FC 1			4273303.00 m N
Data No	-		Distance to Source (m)	-
Start Date	10.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		MENEMEN		Measurement No.		N23	
Standard		ISO 1996-2		Measurement Date		10-12.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
10.02.2021 13:52:20	64,7	46,6	88,1	11.02.2021 13:52:20	64,8	50,9	89,2
10.02.2021 14:52:20	64,8	47,6	89,3	11.02.2021 14:52:20	65,5	51,3	88,2
10.02.2021 15:52:20	64,6	48,6	87,1	11.02.2021 15:52:20	67,4	50,4	99,2
10.02.2021 16:52:20	65,3	49,0	87,1	11.02.2021 16:52:20	66,8	49,2	93,3
10.02.2021 17:52:20	63,7	48,1	90,3	11.02.2021 17:52:20	64,8	51,2	88,9
10.02.2021 18:52:20	64,8	46,5	86,8	11.02.2021 18:52:20	65,8	51,2	91,2
10.02.2021 19:52:20	63,5	46,3	88,5	11.02.2021 19:52:20	68,4	50,4	93,4
10.02.2021 20:52:20	63,8	43,7	87,0	11.02.2021 20:52:20	66,7	48,9	90,5
10.02.2021 21:52:20	63,6	42,1	96,0	11.02.2021 21:52:20	62,5	44,0	87,4
10.02.2021 22:52:20	64,1	42,0	90,3	11.02.2021 22:52:20	63,8	46,4	86,8
10.02.2021 23:52:20	67,5	39,5	101,6	11.02.2021 23:52:20	62,8	43,4	83,0
11.02.2021 00:52:20	66,7	38,2	93,4	12.02.2021 00:52:20	64,3	42,4	83,9
11.02.2021 01:52:20	55,0	35,5	87,0	12.02.2021 01:52:20	62,6	39,2	90,7
11.02.2021 02:52:20	59,4	35,2	86,7	12.02.2021 02:52:20	54,0	37,1	73,3
11.02.2021 03:52:20	49,5	34,4	66,0	12.02.2021 03:52:20	60,6	35,8	88,8
11.02.2021 04:52:20	50,2	35,1	66,7	12.02.2021 04:52:20	51,0	35,4	67,5
11.02.2021 05:52:20	54,2	35,4	79,8	12.02.2021 05:52:20	54,6	35,9	80,6
11.02.2021 06:52:20	67,7	40,1	94,5	12.02.2021 06:52:20	62,0	39,0	90,0
11.02.2021 07:52:20	66,8	46,2	92,9	12.02.2021 07:52:20	66,7	45,5	94,6
11.02.2021 08:52:20	67,3	49,6	92,4	12.02.2021 08:52:20	69,8	47,7	94,7
11.02.2021 09:52:20	65,2	50,2	90,8	12.02.2021 09:52:20	63,8	46,4	90,6
11.02.2021 10:52:20	65,7	50,7	91,3	12.02.2021 10:52:20	67,6	42,6	94,1
11.02.2021 11:52:20	64,4	51,1	88,8	12.02.2021 11:52:20	65,8	41,9	92,1
11.02.2021 12:52:20	65,3	50,3	86,4	12.02.2021 12:52:20	65,5	42,7	90,2

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	MENEMEN	Measurement No.	N23
Standard	ISO 1996-2	Measurement Date	10-12.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	65,3	63,8	52,6	65,9	65,9	50,8
Results Ldn						
	First Day Results(dBA)		Second Day Results(dBA)			
	Day	Night	Day	Night		
Time	07:00-22:00		22:00-07:00		07:00-22:00	
Leq dBA	65,0		53,6		65,9	
From raw data extraneous noise events excluded to reach processed data						

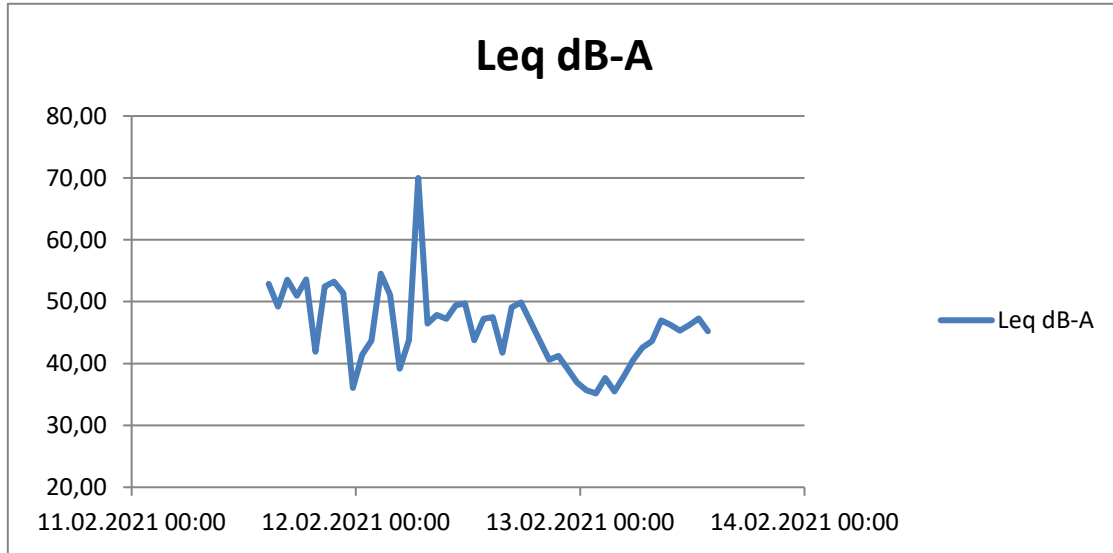
Location	Çıkırcı	Measurement No.	N24
Standard	ISO 1996-2	Measurement Date	11-13.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	571103.00 m E
SLM No	Convergence			4258195.00 m N
Data No	-		Distance to Source (m)	-
Start Date	11.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	4 meters

Logger Graph (dBA)



Location		Çikrikçı		Measurement No.		N24	
Standard		ISO 1996-2		Measurement Date		11-13.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
11.02.2021 14:40	52,9	49,4	56,6	12.02.2021 14:40	47,5	40,7	55,8
11.02.2021 15:40	49,2	45,6	52,7	12.02.2021 15:40	41,7	39,0	44,5
11.02.2021 16:40	53,5	49,9	57,1	12.02.2021 16:40	49,1	46,4	51,8
11.02.2021 17:40	50,9	45,7	55,9	12.02.2021 17:40	49,9	44,8	57,0
11.02.2021 18:40	53,6	50,0	56,9	12.02.2021 18:40	46,8	49,1	58,0
11.02.2021 19:40	41,9	38,7	45,2	12.02.2021 19:40	43,8	37,8	46,3
11.02.2021 20:40	52,5	46,2	57,5	12.02.2021 20:40	40,6	45,4	58,6
11.02.2021 21:40	53,2	45,2	58,6	12.02.2021 21:40	41,2	44,3	59,7
11.02.2021 22:40	51,4	49,3	54,2	12.02.2021 22:40	39,1	48,5	55,3
11.02.2021 23:40	36,1	34,6	38,0	12.02.2021 23:40	36,9	33,8	39,1
12.02.2021 00:40	41,4	37,3	45,2	13.02.2021 00:40	35,7	36,5	46,3
12.02.2021 01:40	43,7	39,2	47,4	13.02.2021 01:40	35,2	38,3	48,5
12.02.2021 02:40	54,5	45,9	62,0	13.02.2021 02:40	37,7	45,1	63,1
12.02.2021 03:40	51,1	43,6	57,8	13.02.2021 03:40	35,5	42,8	58,9
12.02.2021 04:40	39,1	35,7	45,2	13.02.2021 04:40	37,9	34,9	46,3
12.02.2021 05:40	43,8	37,8	51,4	13.02.2021 05:40	40,6	36,9	52,5
12.02.2021 06:40	70,0	60,4	77,8	13.02.2021 06:40	42,6	59,5	78,9
12.02.2021 07:40	46,5	43,7	50,7	13.02.2021 07:40	43,6	42,8	51,8
12.02.2021 08:40	47,8	45,7	50,4	13.02.2021 08:40	47,0	44,8	51,5
12.02.2021 09:40	47,3	44,9	50,2	13.02.2021 09:40	46,3	44,1	51,3
12.02.2021 10:40	49,4	46,8	52,0	13.02.2021 10:40	45,3	45,9	53,1
12.02.2021 11:40	49,7	46,6	52,6	13.02.2021 11:40	46,2	45,8	53,7
12.02.2021 12:40	43,8	40,6	47,0	13.02.2021 12:40	47,3	39,7	48,1
12.02.2021 13:40	47,3	45,4	49,2	13.02.2021 13:40	45,2	41,2	47,3

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Çıkrıkcı	Measurement No.	N24
Standard	ISO 1996-2	Measurement Date	11-13.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	58,4	53,2	48,2	56,4	54,0	47,2
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	59,2		49,1	56,0		49,2
From raw data extraneous noise events excluded to reach processed data						

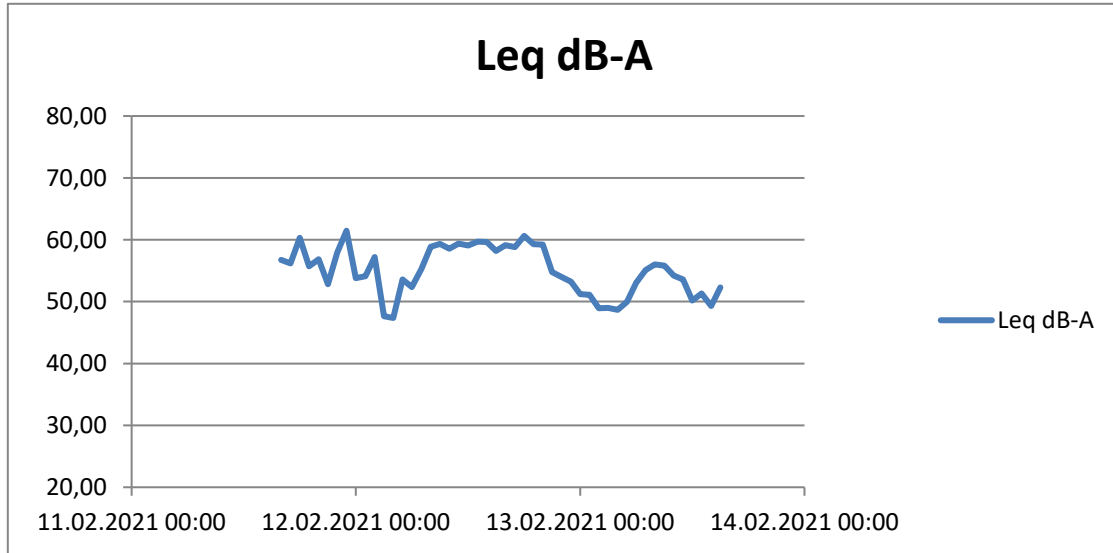
Location	Çobanisa	Measurement No.	N25
Standard	ISO 1996-2	Measurement Date	11-13.02.2021




Measurement Info

SLM	Device Type	Type 1	Coordinates	548047.00 m E
SLM No	Convergence			4268350.00 m N
Data No	-		Distance to Source (m)	-
Start Date	11.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		Çobanisa		Measurement No.		N25	
Standard		ISO 1996-2		Measurement Date		11-13.02.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
11.02.2021 16:00	56,7	54,3	59,4	12.02.2021 16:00	59,1	57,7	60,8
11.02.2021 17:00	56,2	53,4	59,0	12.02.2021 17:00	58,8	57,7	60,1
11.02.2021 18:00	60,3	54,9	64,6	12.02.2021 18:00	60,6	59,5	62,1
11.02.2021 19:00	55,7	52,3	58,8	12.02.2021 19:00	59,3	57,3	59,9
11.02.2021 20:00	56,8	54,2	59,4	12.02.2021 20:00	59,2	57,9	60,5
11.02.2021 21:00	52,8	49,7	56,8	12.02.2021 21:00	54,8	53,4	57,9
11.02.2021 22:00	58,0	53,7	61,6	12.02.2021 22:00	54,0	52,5	62,7
11.02.2021 23:00	61,5	56,8	67,5	12.02.2021 23:00	53,2	51,6	68,6
12.02.2021 00:00	53,8	51,0	58,0	13.02.2021 00:00	51,2	49,8	59,1
12.02.2021 01:00	54,1	50,2	57,4	13.02.2021 01:00	51,1	49,5	58,5
12.02.2021 02:00	57,2	52,3	63,1	13.02.2021 02:00	48,9	47,6	64,2
12.02.2021 03:00	47,6	44,3	51,3	13.02.2021 03:00	49,0	47,2	52,4
12.02.2021 04:00	47,4	43,6	51,7	13.02.2021 04:00	48,7	46,4	52,8
12.02.2021 05:00	53,6	49,2	59,5	13.02.2021 05:00	50,0	47,8	60,6
12.02.2021 06:00	52,3	50,8	53,9	13.02.2021 06:00	53,1	51,2	55,0
12.02.2021 07:00	55,3	53,9	56,7	13.02.2021 07:00	55,1	53,4	57,8
12.02.2021 08:00	58,9	57,6	60,2	13.02.2021 08:00	56,0	56,7	61,3
12.02.2021 09:00	59,3	58,0	60,9	13.02.2021 09:00	55,8	57,1	62,0
12.02.2021 10:00	58,6	57,5	59,8	13.02.2021 10:00	54,2	56,6	60,9
12.02.2021 11:00	59,4	58,2	60,6	13.02.2021 11:00	53,6	57,4	61,7
12.02.2021 12:00	59,1	57,8	60,4	13.02.2021 12:00	50,2	57,0	61,5
12.02.2021 13:00	59,7	58,1	61,5	13.02.2021 13:00	51,3	57,2	62,6
12.02.2021 14:00	59,6	57,9	61,8	13.02.2021 14:00	49,3	57,1	62,9
12.02.2021 15:00	58,2	56,9	59,9	13.02.2021 15:00	52,3	56,6	60,2

		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	Çobanisa	Measurement No.	N25
Standard	ISO 1996-2	Measurement Date	11-13.02.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	58,2	56,2	55,6	59,0	57,5	51,0
Results Ldn						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day		Night	Day		Night
Time	07:00-22:00		22:00-07:00	07:00-22:00		22:00-07:00
Leq dBA	57,0		56,0	58,9		51,5
From raw data extraneous noise events excluded to reach processed data						

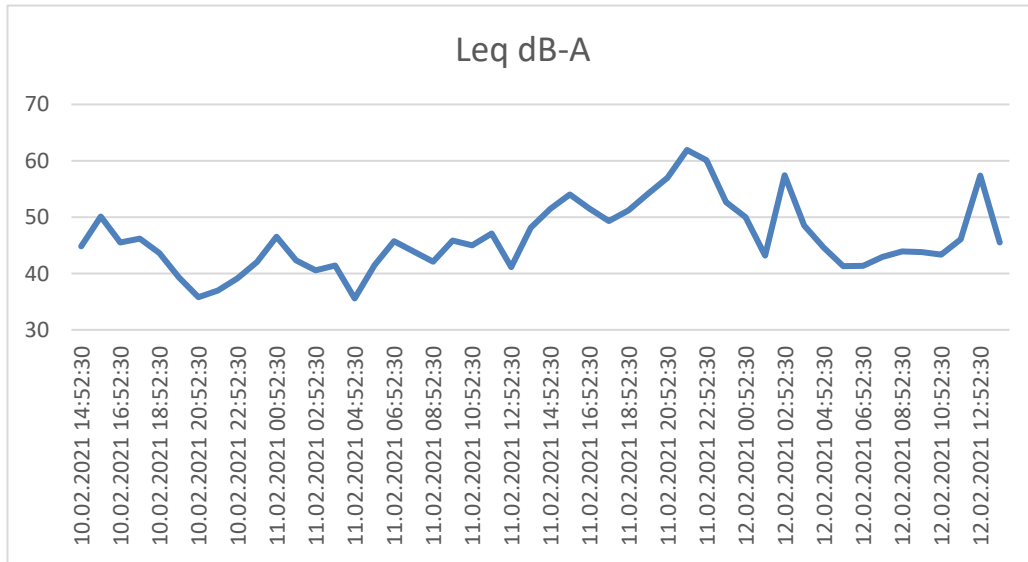
Location	ÇATLIDERE	Measurement No.	N26
Standard	ISO 1996-2	Measurement Date	10-12.01.2021




Measurement Info

SLM	Type 1	SVAN 971	Coordinates	503305.00 m E
SLM No	FC 13			4300095.00 m N
Data No	-		Distance to Source (m)	-
Start Date	10.02.2021		Time Period	Day, Evening, Night
Total Period	48 Hours		Mic. Height (m)	2,5 meters

Logger Graph (dBA)



Location		ÇATLIDERE		Measurement No.		N26	
Standard		ISO 1996-2		Measurement Date		10-12.01.2021	
Hourly Measurement Results (dBA)							
Date&Time	Leq	Lmin	Lmax	Date&Time	Leq	Lmin	Lmax
10.02.2021 14:52:30	44,8	34,6	63,4	11.02.2021 14:52:30	51,5	36,3	70,3
10.02.2021 15:52:30	50,1	34,1	74,9	11.02.2021 15:52:30	54,0	38,6	74,7
10.02.2021 16:52:30	45,5	33,9	66,0	11.02.2021 16:52:30	51,6	35,4	70,5
10.02.2021 17:52:30	46,2	34,2	77,1	11.02.2021 17:52:30	49,3	34,8	68,5
10.02.2021 18:52:30	43,6	33,4	69,9	11.02.2021 18:52:30	51,2	35,2	67,5
10.02.2021 19:52:30	39,3	27,6	71,7	11.02.2021 19:52:30	54,2	35,7	74,8
10.02.2021 20:52:30	35,8	26,5	58,6	11.02.2021 20:52:30	57,0	39,1	80,5
10.02.2021 21:52:30	37,0	24,9	63,3	11.02.2021 21:52:30	61,9	37,6	84,3
10.02.2021 22:52:30	39,1	29,6	55,1	11.02.2021 22:52:30	60,1	39,8	83,4
10.02.2021 23:52:30	42,0	27,4	65,7	11.02.2021 23:52:30	52,7	37,4	71,3
11.02.2021 00:52:30	46,5	31,7	65,1	12.02.2021 00:52:30	50,0	35,8	64,4
11.02.2021 01:52:30	42,3	28,7	62,7	12.02.2021 01:52:30	43,2	31,3	60,9
11.02.2021 02:52:30	40,6	27,7	59,0	12.02.2021 02:52:30	57,4	32,8	76,3
11.02.2021 03:52:30	41,4	28,4	60,0	12.02.2021 03:52:30	48,5	40,2	70,7
11.02.2021 04:52:30	35,6	26,7	58,3	12.02.2021 04:52:30	44,6	37,5	67,5
11.02.2021 05:52:30	41,5	26,6	58,4	12.02.2021 05:52:30	41,3	36,2	63,2
11.02.2021 06:52:30	45,8	27,5	68,8	12.02.2021 06:52:30	41,4	34,6	69,7
11.02.2021 07:52:30	43,9	28,7	64,8	12.02.2021 07:52:30	42,9	34,5	64,0
11.02.2021 08:52:30	42,1	30,4	71,7	12.02.2021 08:52:30	43,9	35,5	61,7
11.02.2021 09:52:30	45,8	32,5	70,7	12.02.2021 09:52:30	43,8	35,9	59,0
11.02.2021 10:52:30	45,0	33,7	63,1	12.02.2021 10:52:30	43,3	34,5	64,5
11.02.2021 11:52:30	47,1	31,0	68,2	12.02.2021 11:52:30	46,1	34,6	71,0
11.02.2021 12:52:30	41,1	27,8	67,2	12.02.2021 12:52:30	57,4	32,0	94,2
11.02.2021 13:52:30	48,1	30,2	72,5	12.02.2021 13:52:30	45,5	33,0	70,9

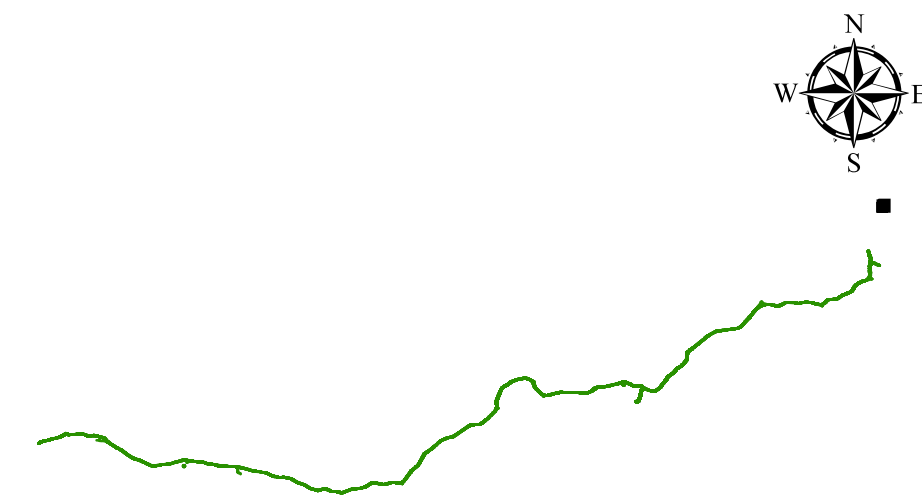
		ANKARA-İZMİR HIGH SPEED TRAIN BACKGROUND NOISE MEASUREMENT RESULTS	
Location	ÇATLIDERE	Measurement No.	N26
Standard	ISO 1996-2	Measurement Date	10-12.01.2021

Results Lden						
	First Day Results(dBA)			Second Day Results(dBA)		
	Day	Evening	Night	Day	Evening	Night
Time	07:00-19:00	19:00-23:00	23:00-07:00	07:00-19:00	19:00-23:00	23:00-07:00
Leq dBA	46,0	42,4	36,5	49,4	44,2	36,8
Results Ldn						
	First Day Results(dBA)		Second Day Results(dBA)			
	Day	Night	Day	Night		
Time	07:00-22:00		22:00-07:00		07:00-22:00	
Leq dBA	49,8		37,7		50,1	
From raw data extraneous noise events excluded to reach processed data						

C.2 Daytime Grid Noise Maps for NSRs







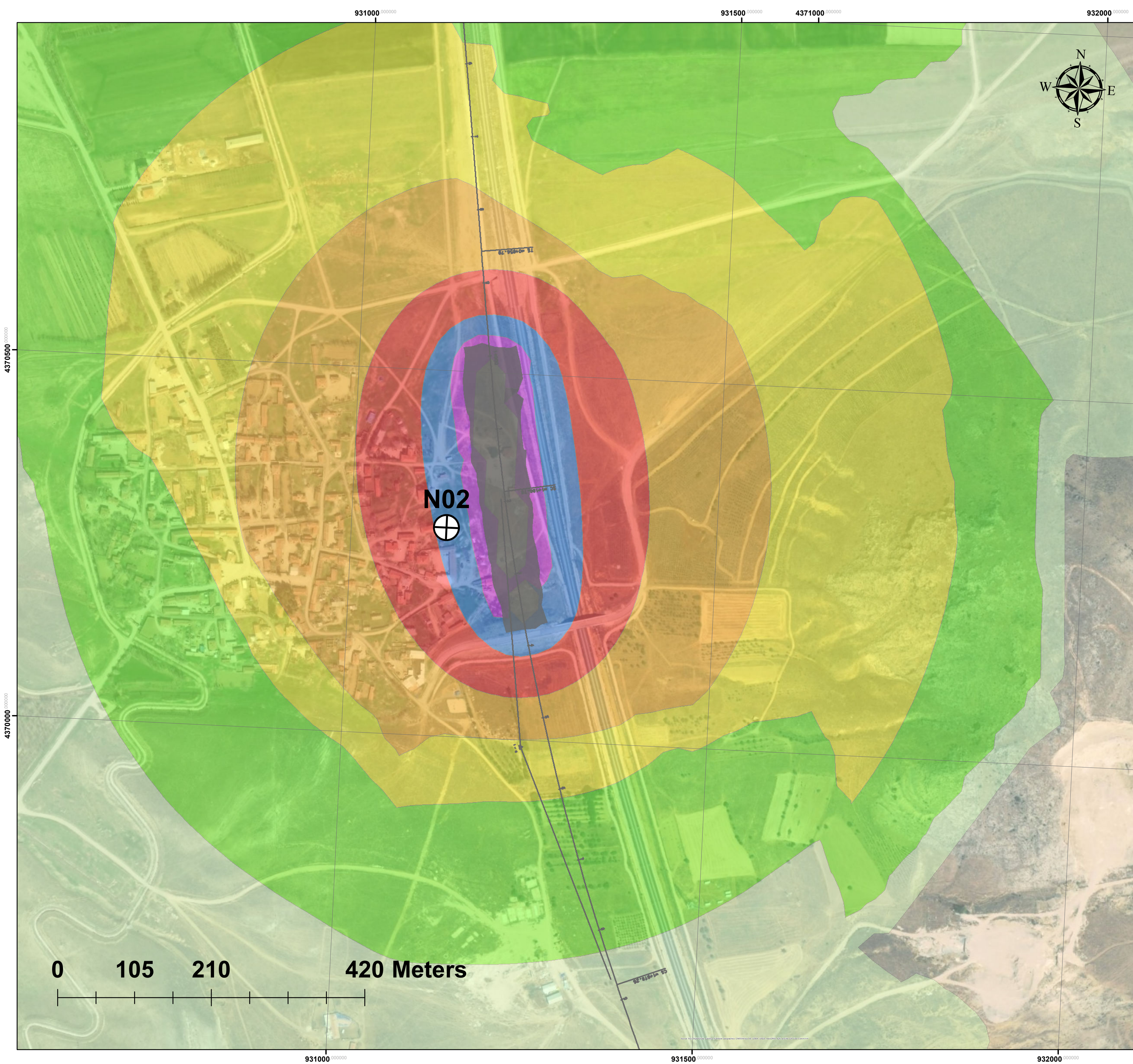
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



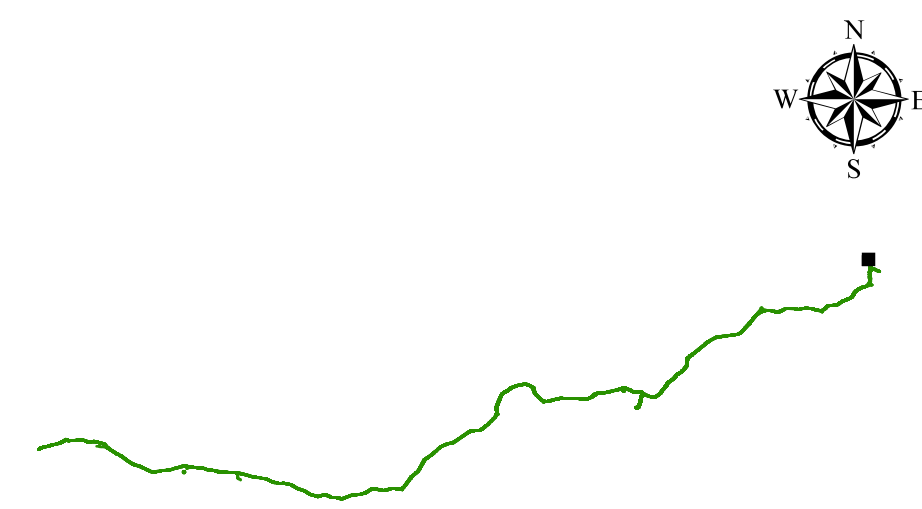
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



-  **Receiver Location**
-  **Area Source**
-  **Point Source**
-  **Quarry Location**



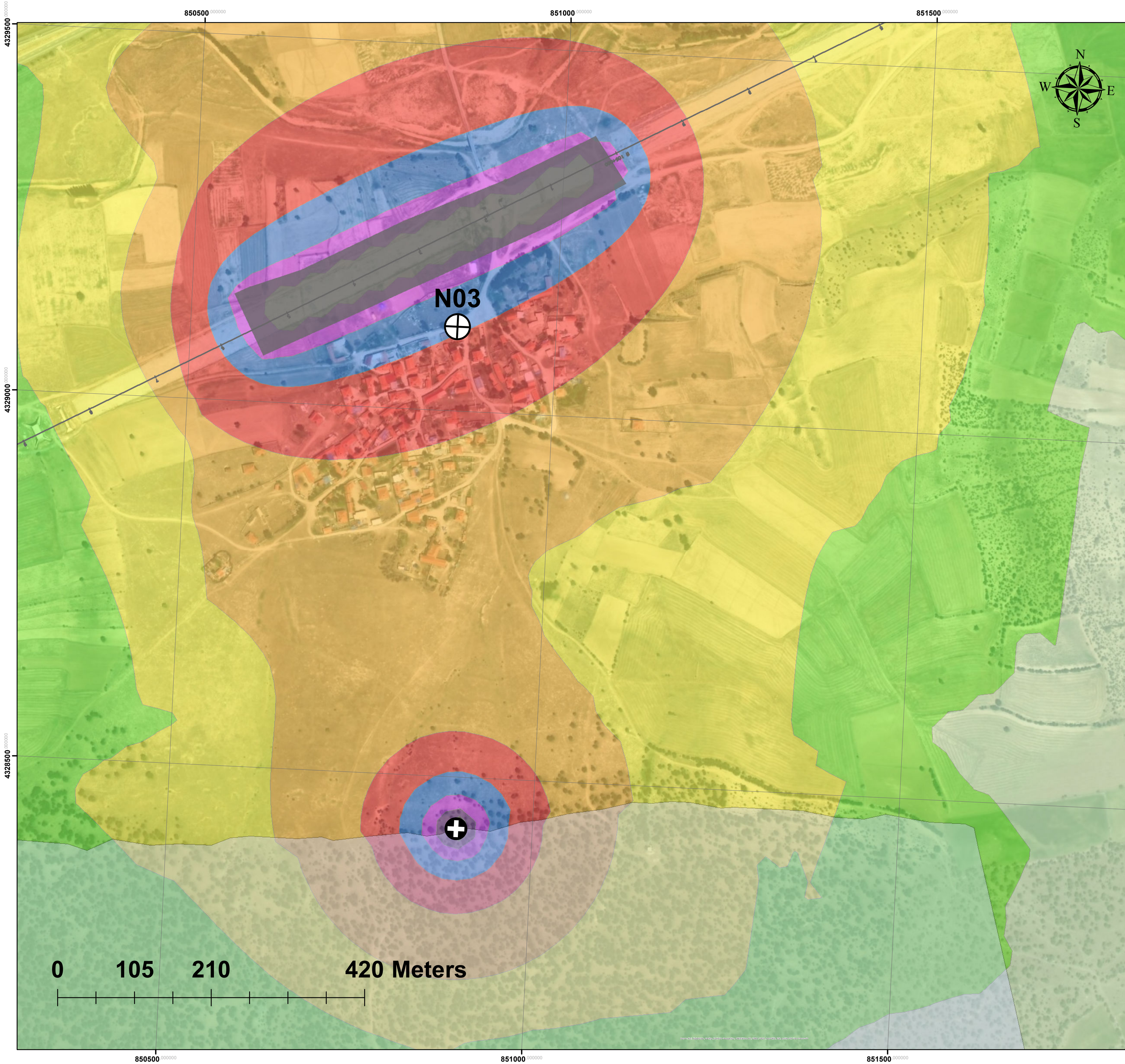
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



**Grid Noise Map, Lday, dBA
Receiver Location: N23**

- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- 80
- 85

- Receiver Location
- Area Source
- Point Source
- Quarry Location



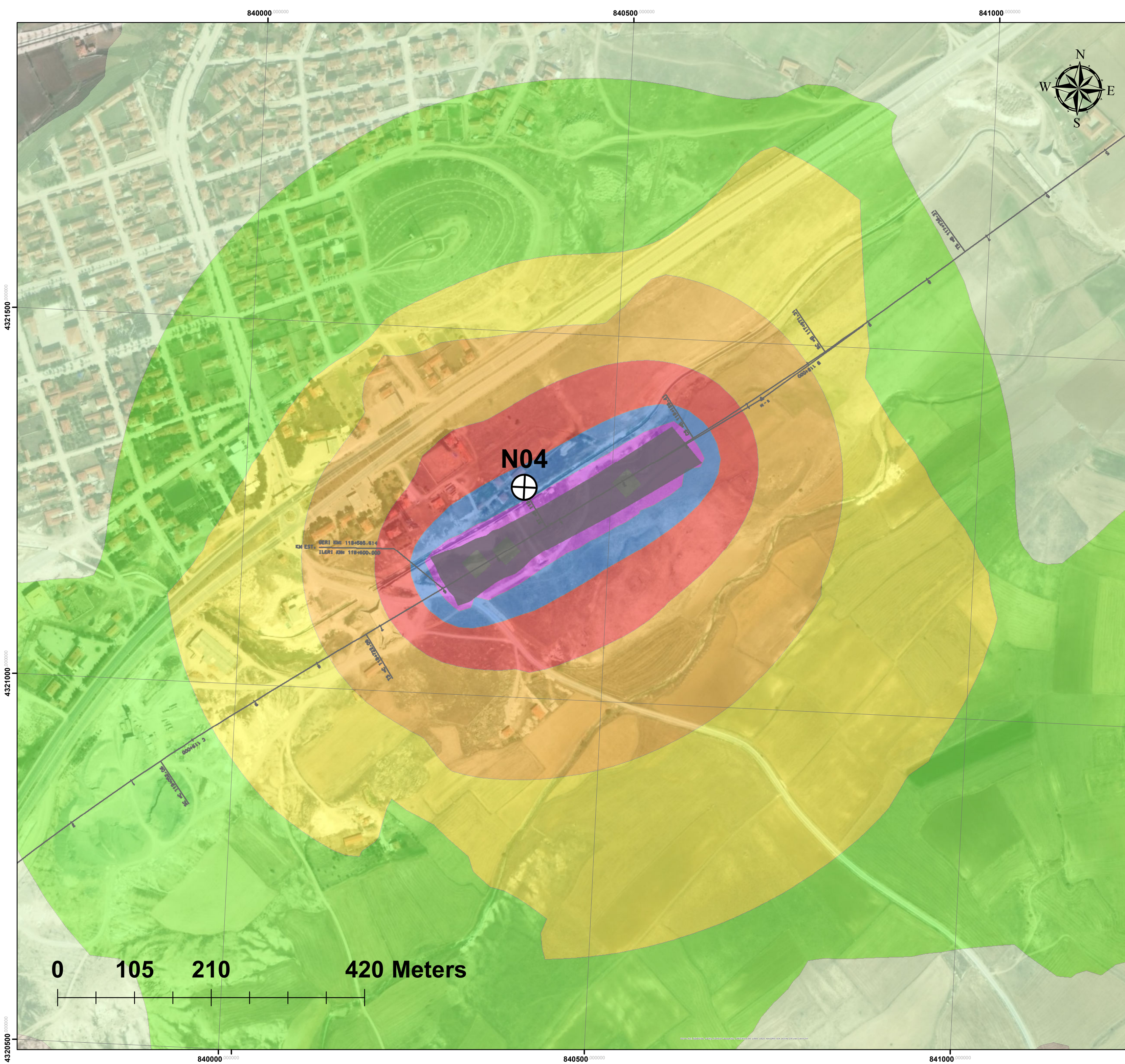
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



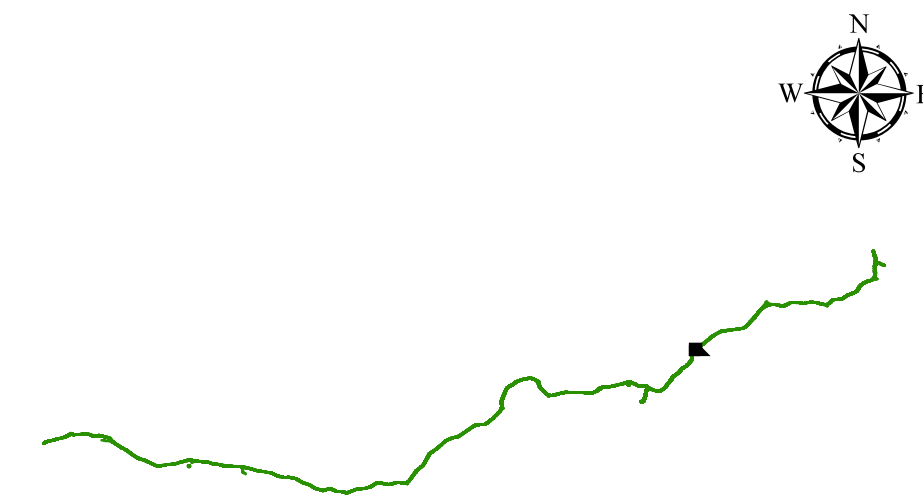
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



- Receiver Location**
- Area Source**
- Point Source**
- Quarry Location**



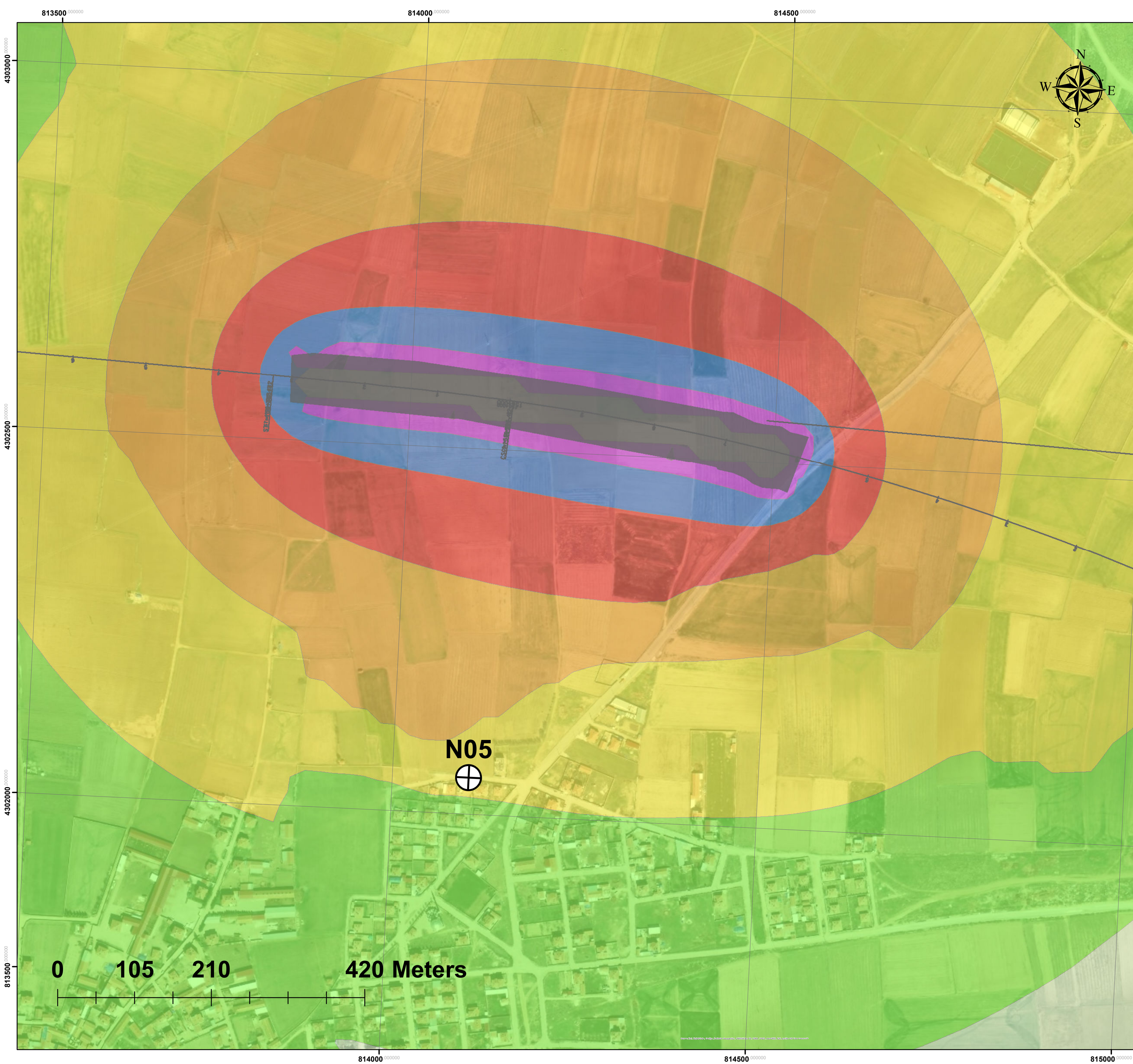
ANKARA-IZMIR HIGH SPEED RAILWAY PROJECT CONSTRUCTION NOISE MODELLING SURVEY



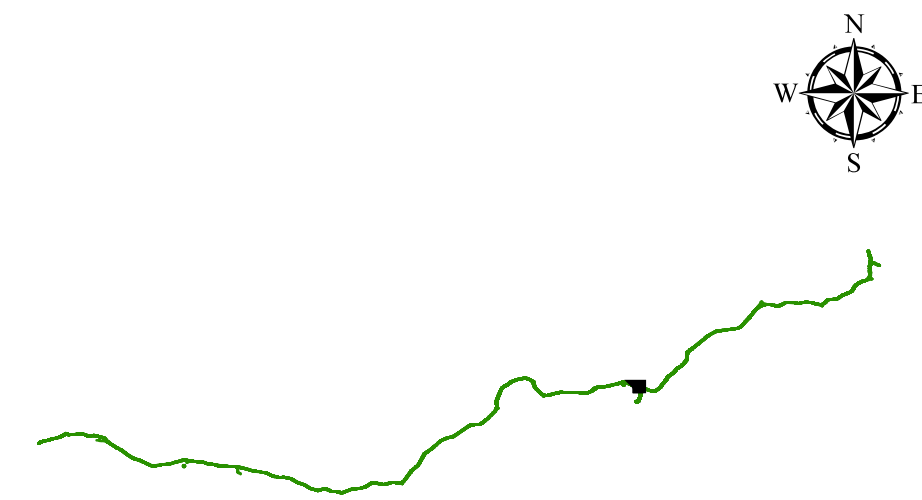
Grid Noise Map, Lday, dBA
Receiver Location: N23



- Receiver Location
- Area Source
- Point Source
- Quarry Location



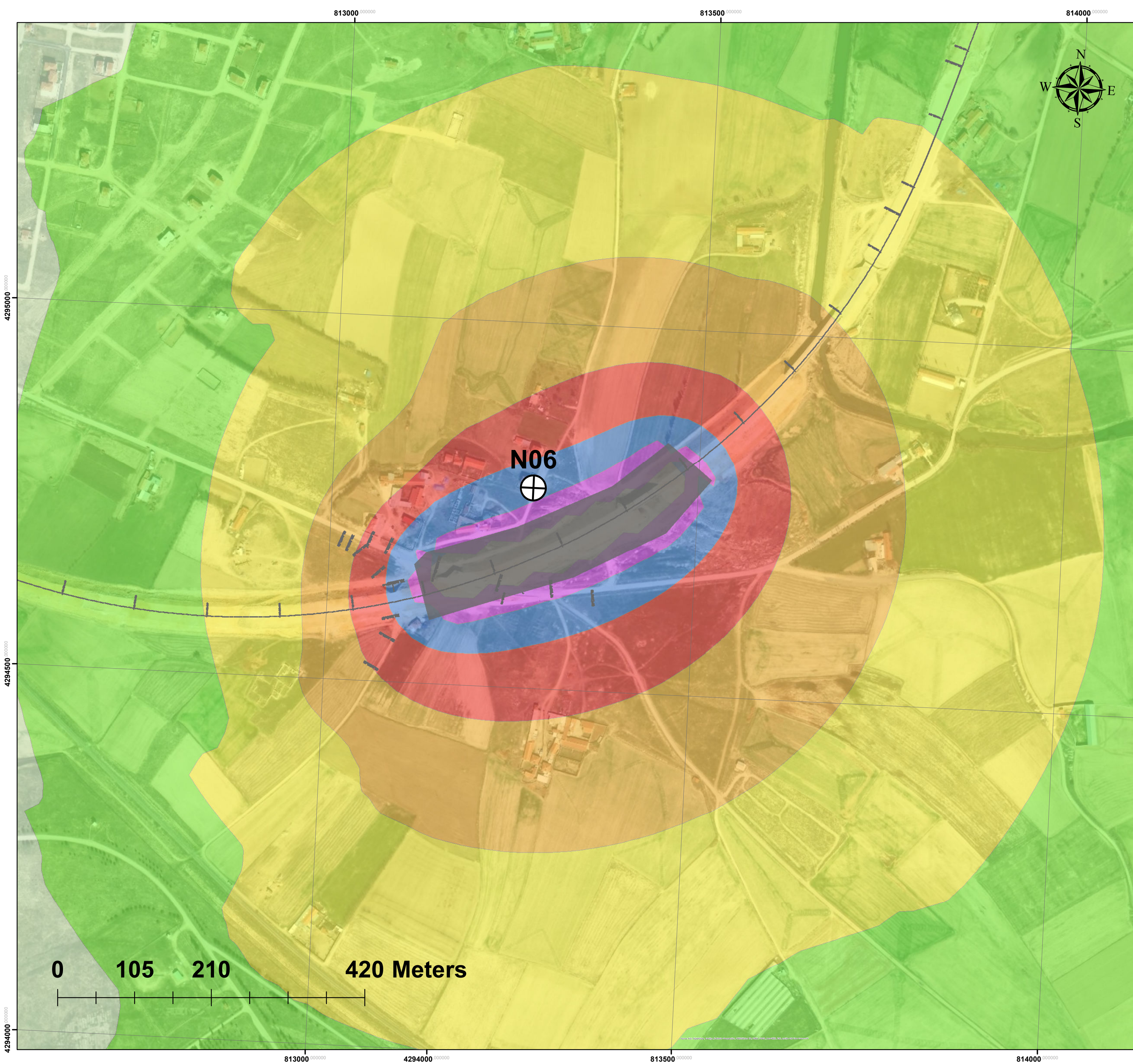
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



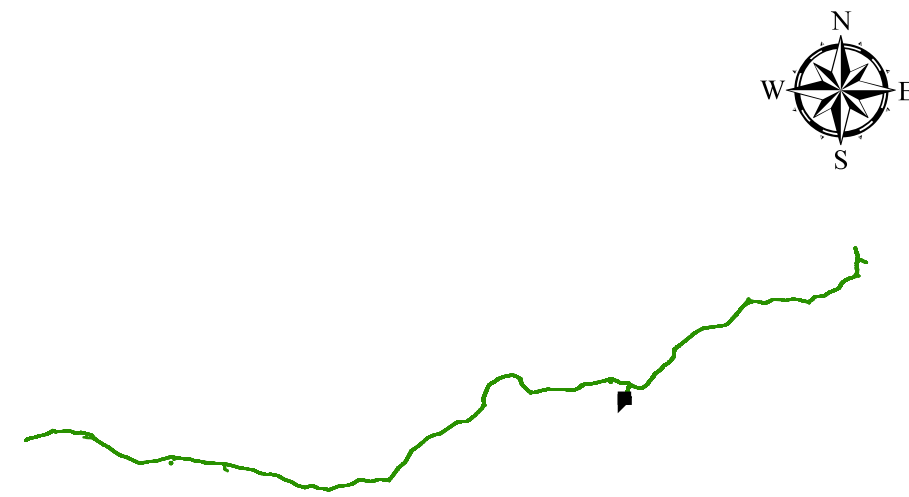
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



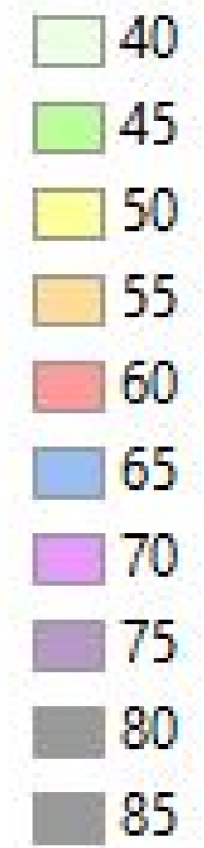
- Receiver Location**
- Area Source**
- Point Source**
- Quarry Location**





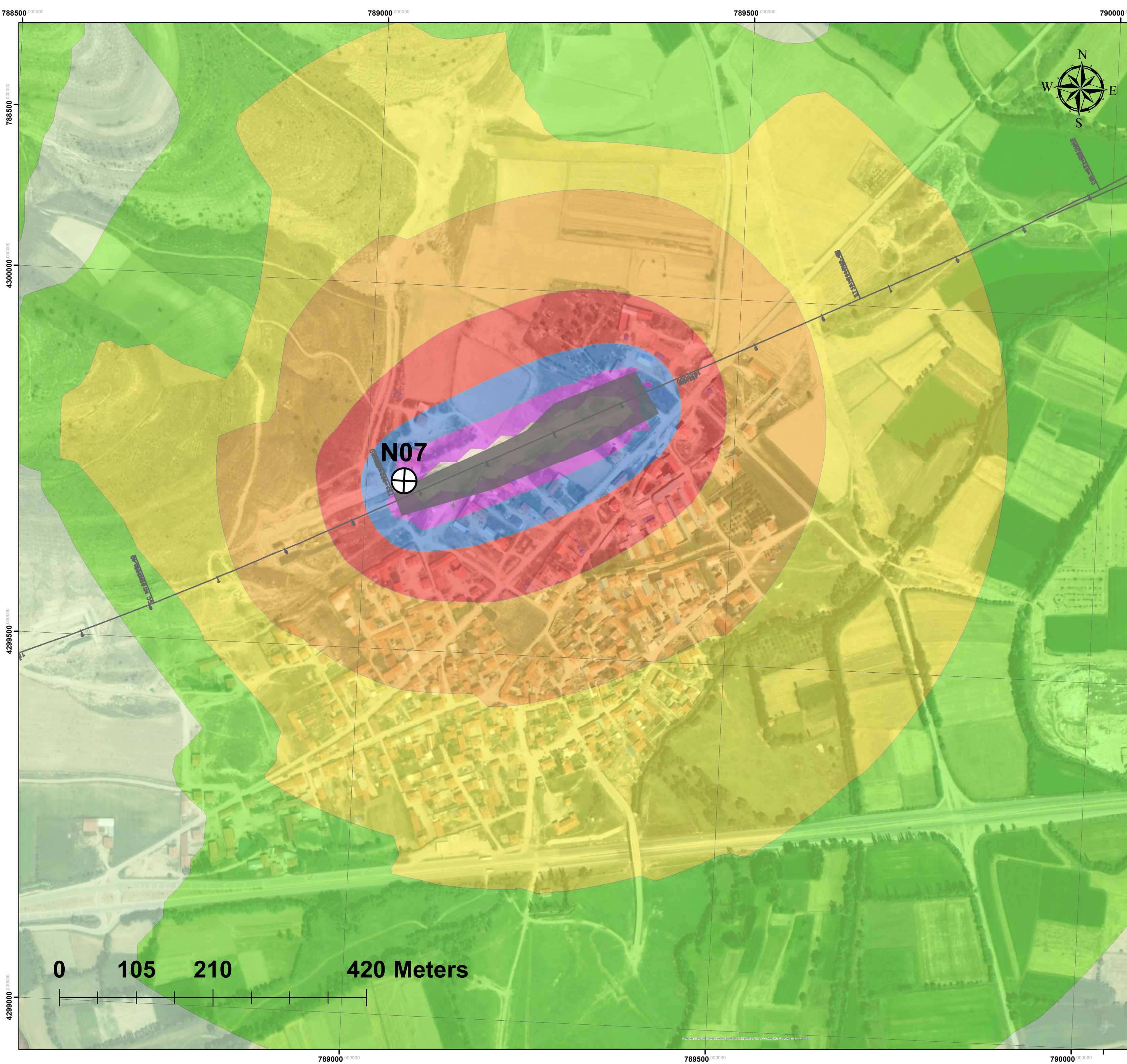
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



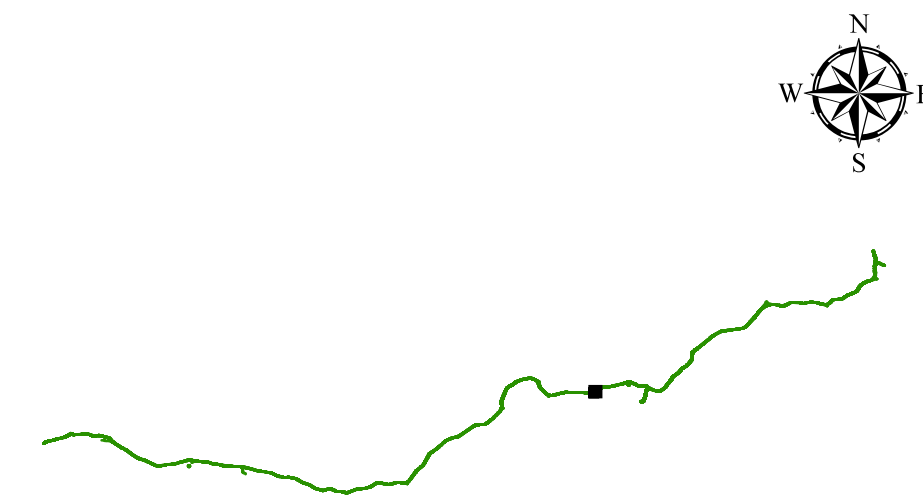
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



-  **Receiver Location**
-  **Area Source**
-  **Point Source**
-  **Quarry Location**



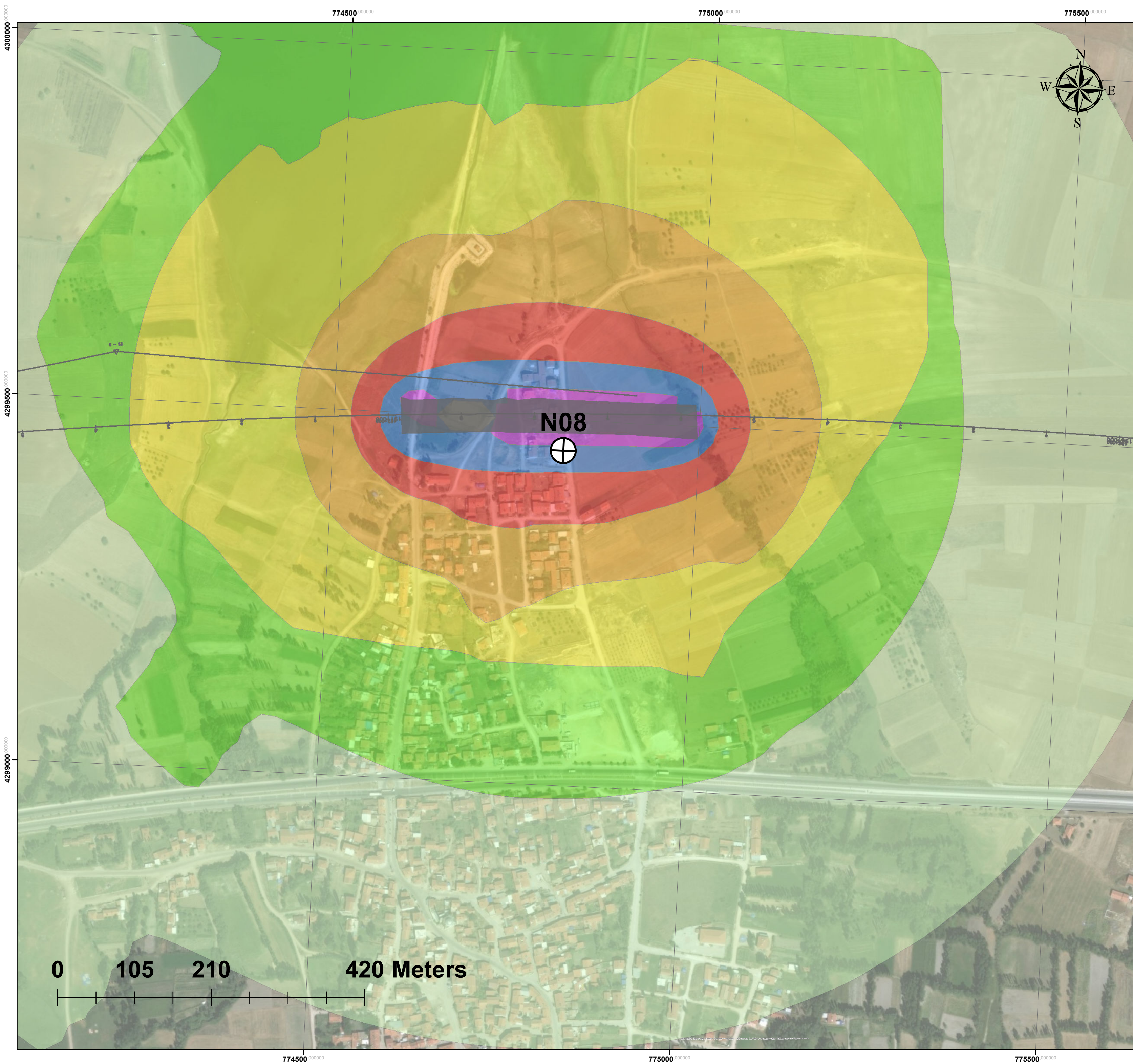
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



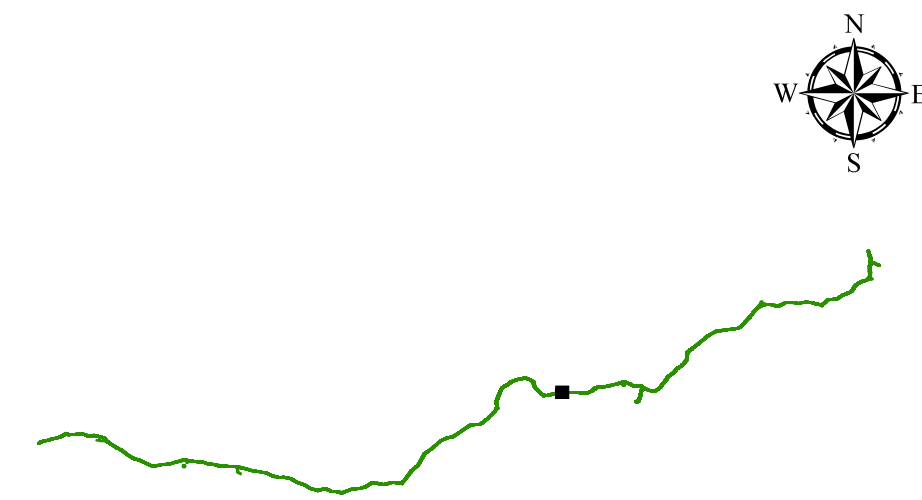
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



- Receiver Location**
- Area Source**
- Point Source**
- Quarry Location**







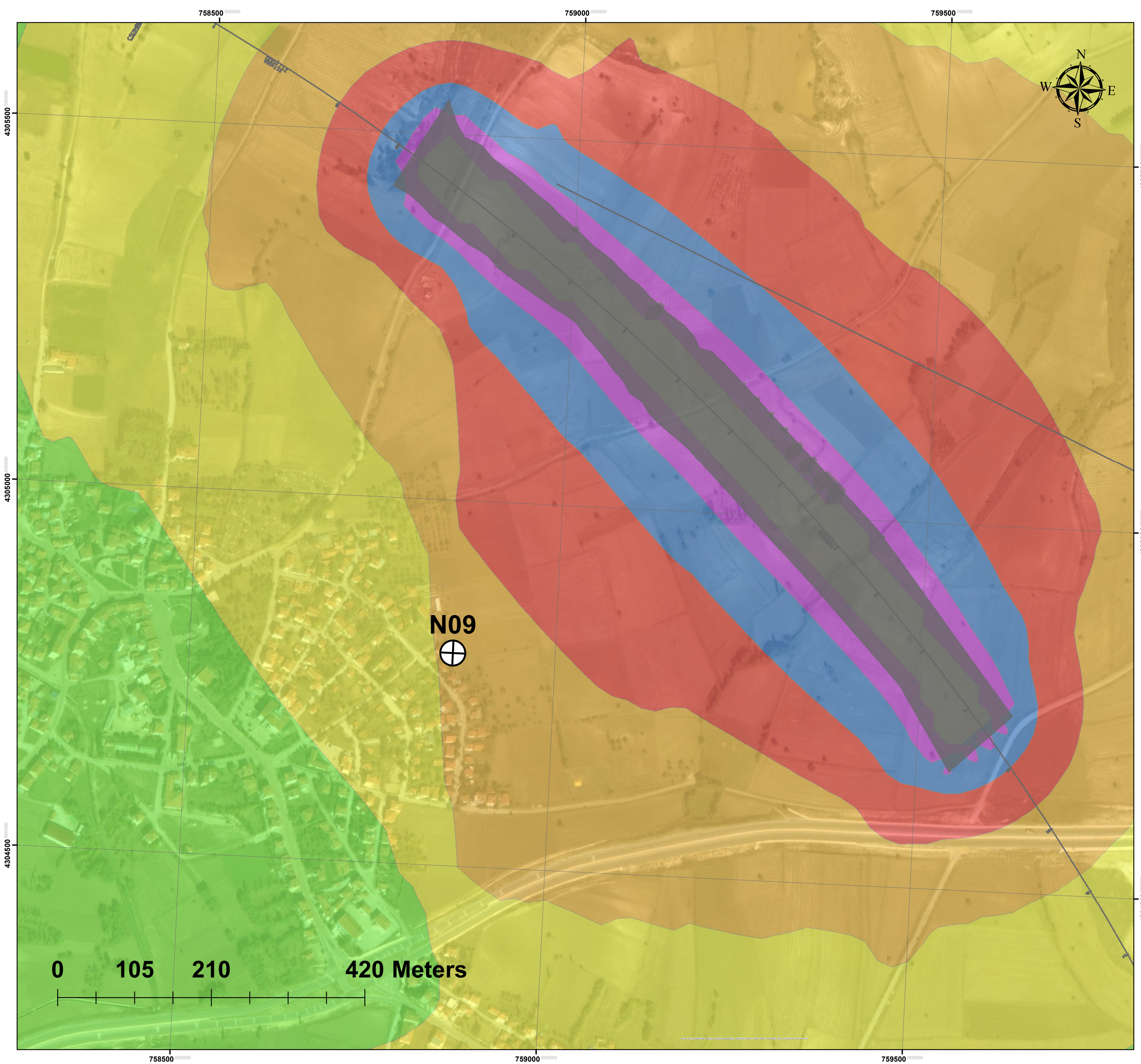
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



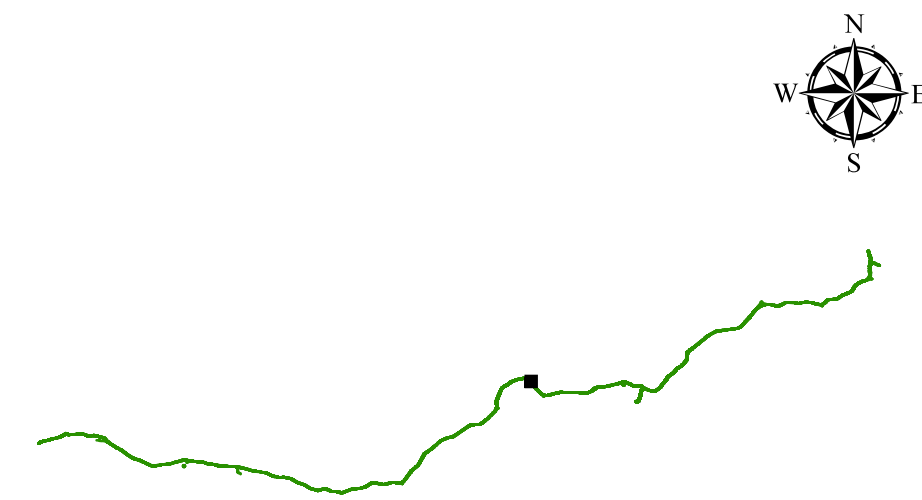
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



-  **Receiver Location**
-  **Area Source**
-  **Point Source**
-  **Quarry Location**







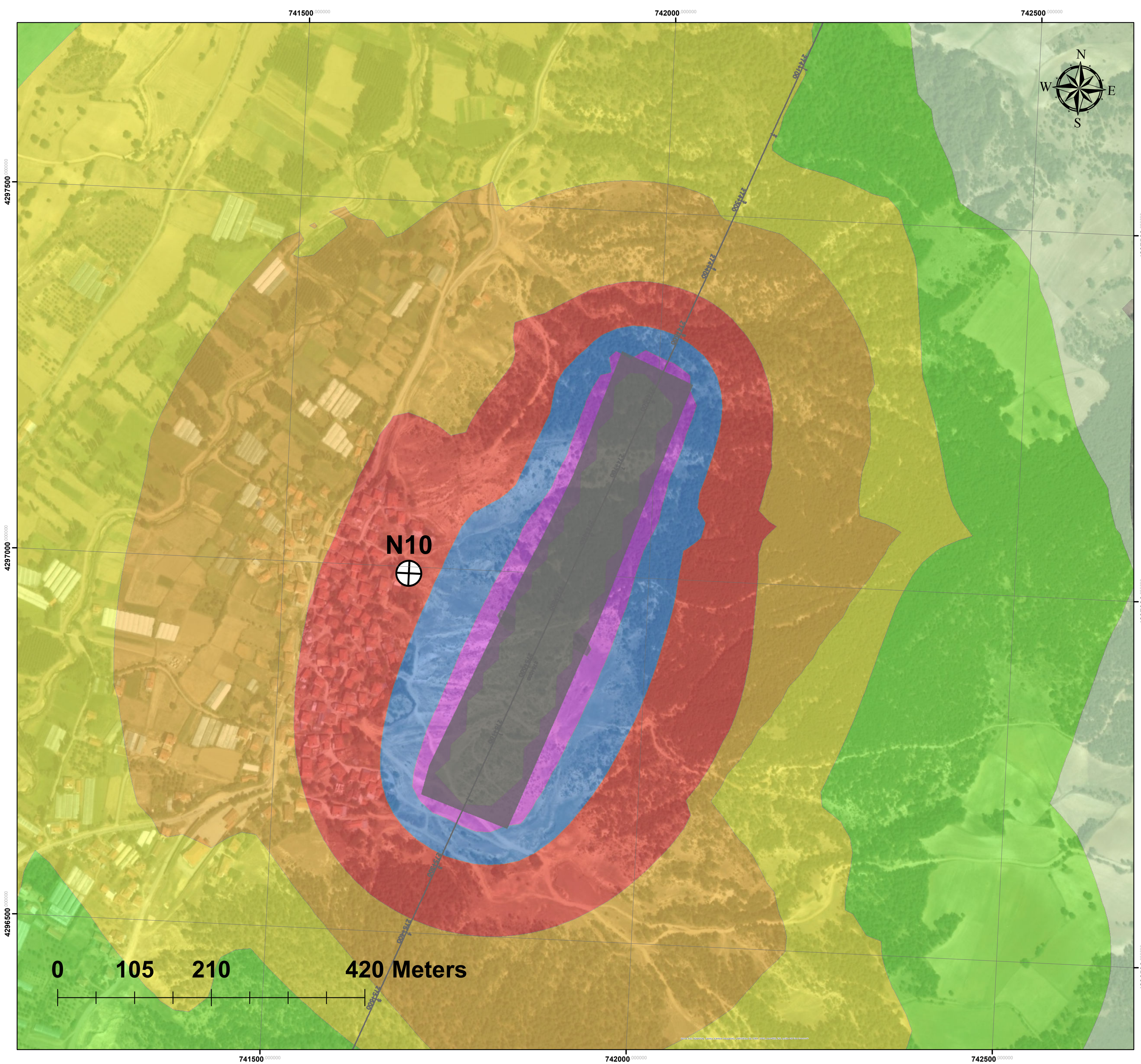
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



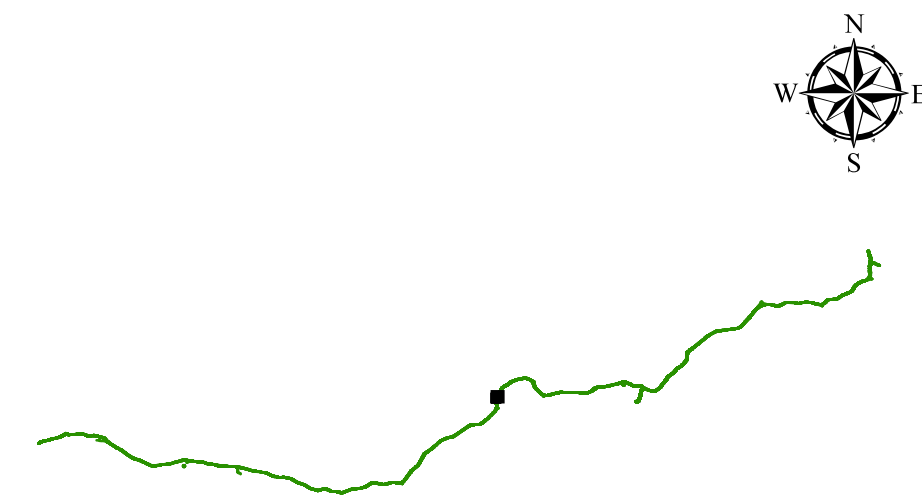
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



-  **Receiver Location**
-  **Area Source**
-  **Point Source**
-  **Quarry Location**



**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



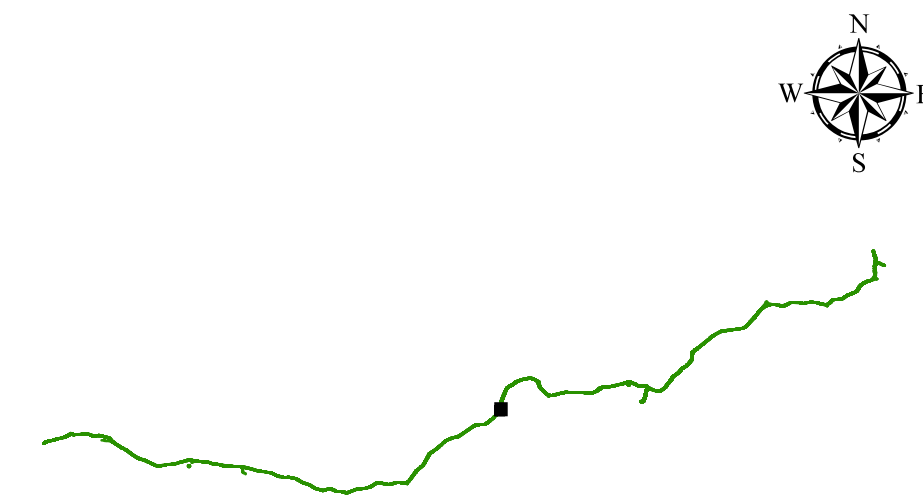
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



- Receiver Location
- Area Source
- Point Source
- Quarry Location



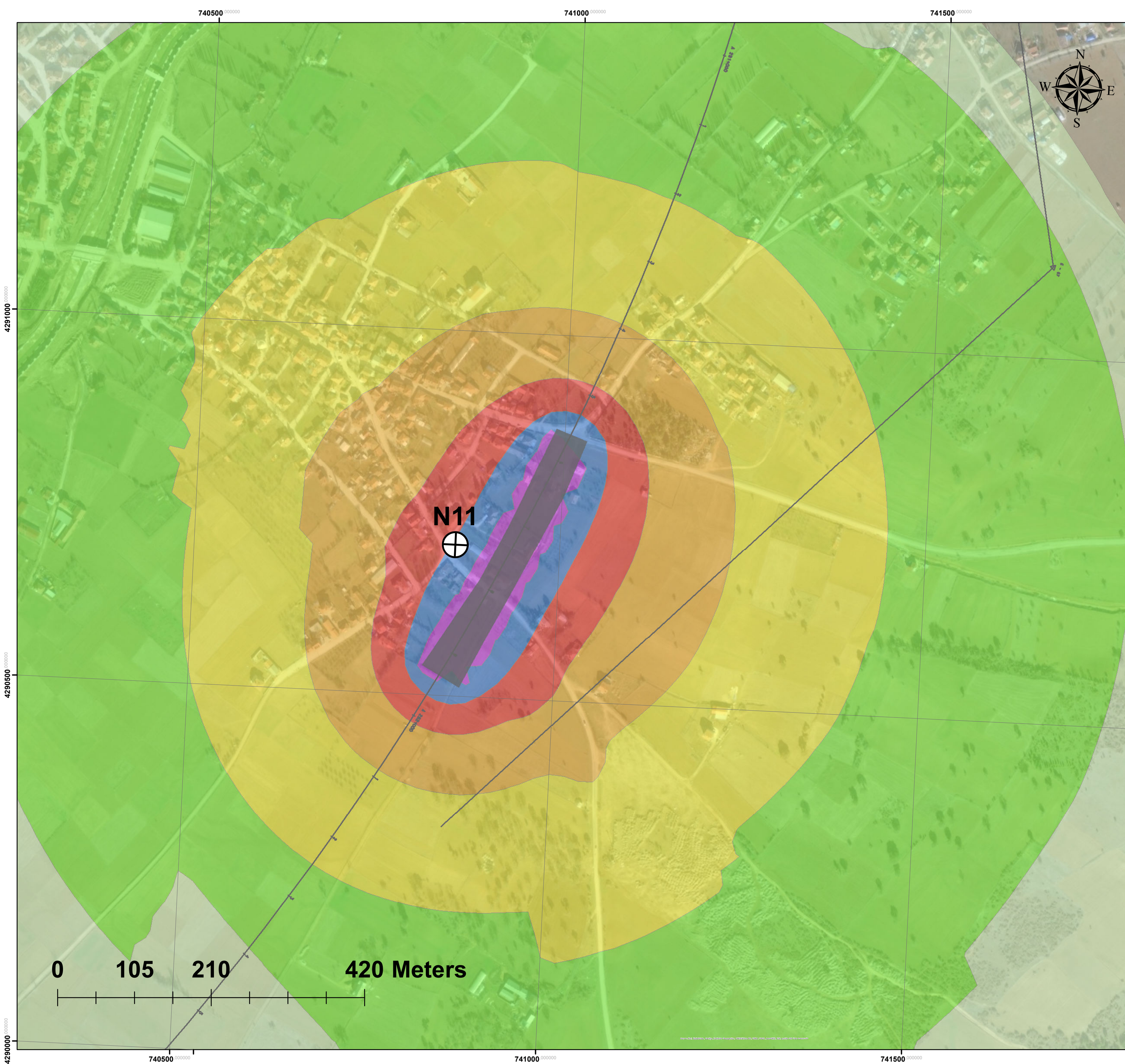
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**

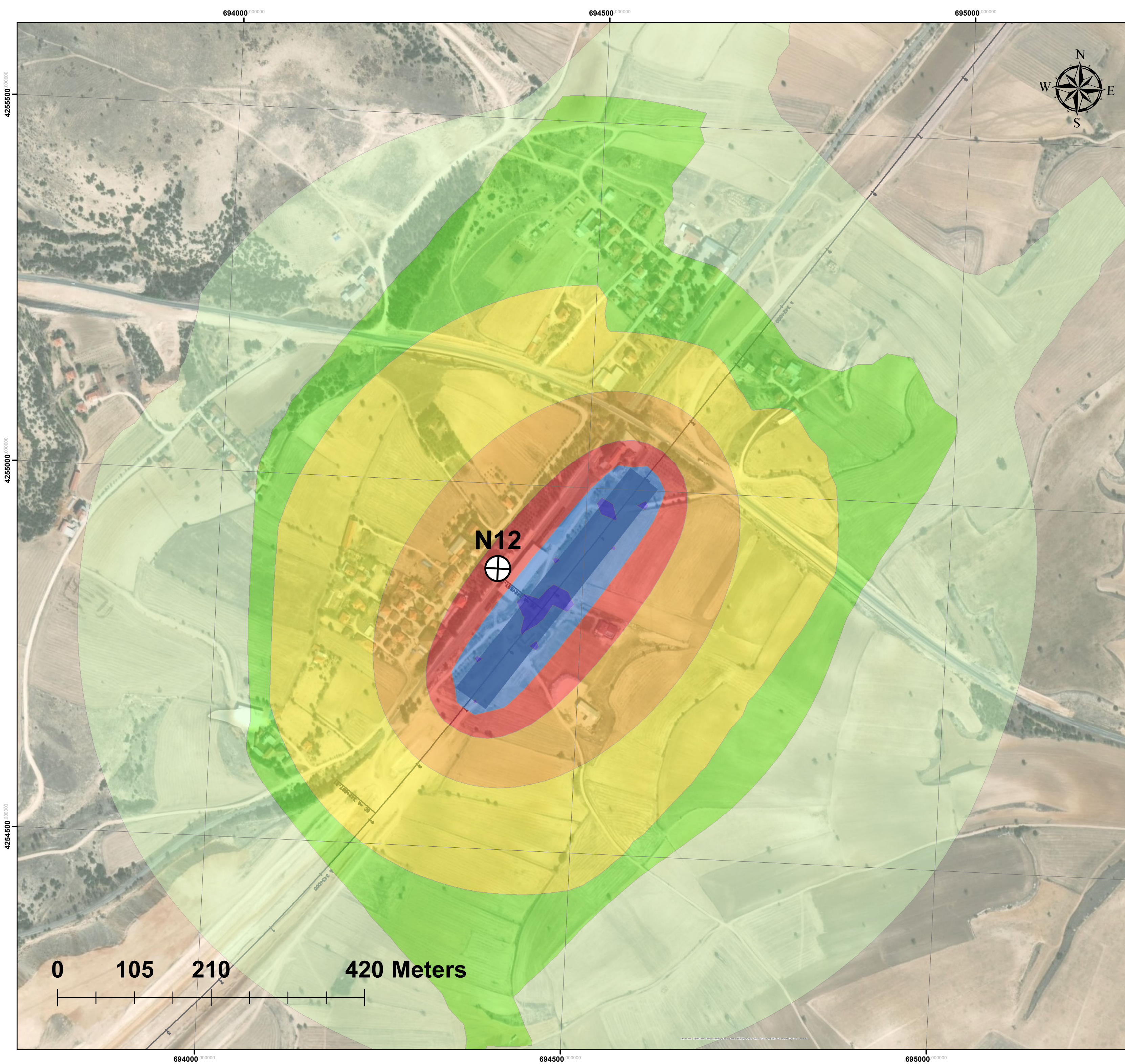


**Grid Noise Map, Lday, dBA
Receiver Location: N23**

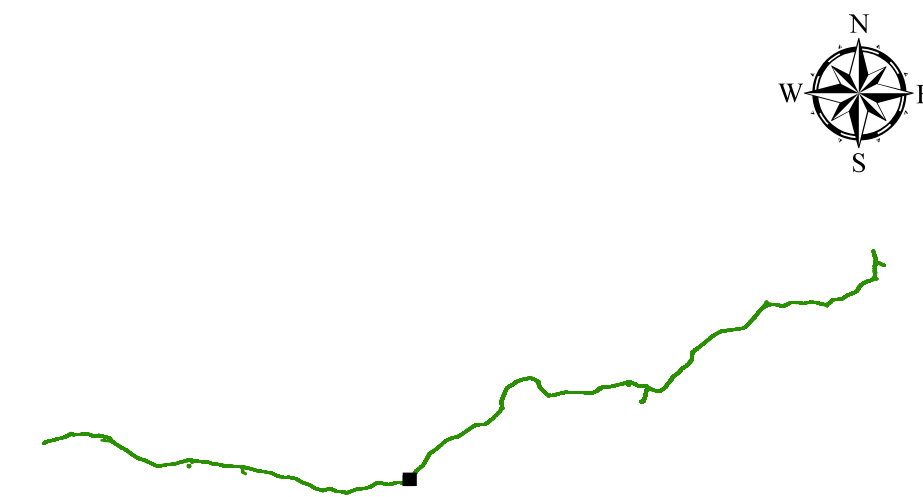


- Receiver Location
- Area Source
- Point Source
- Quarry Location









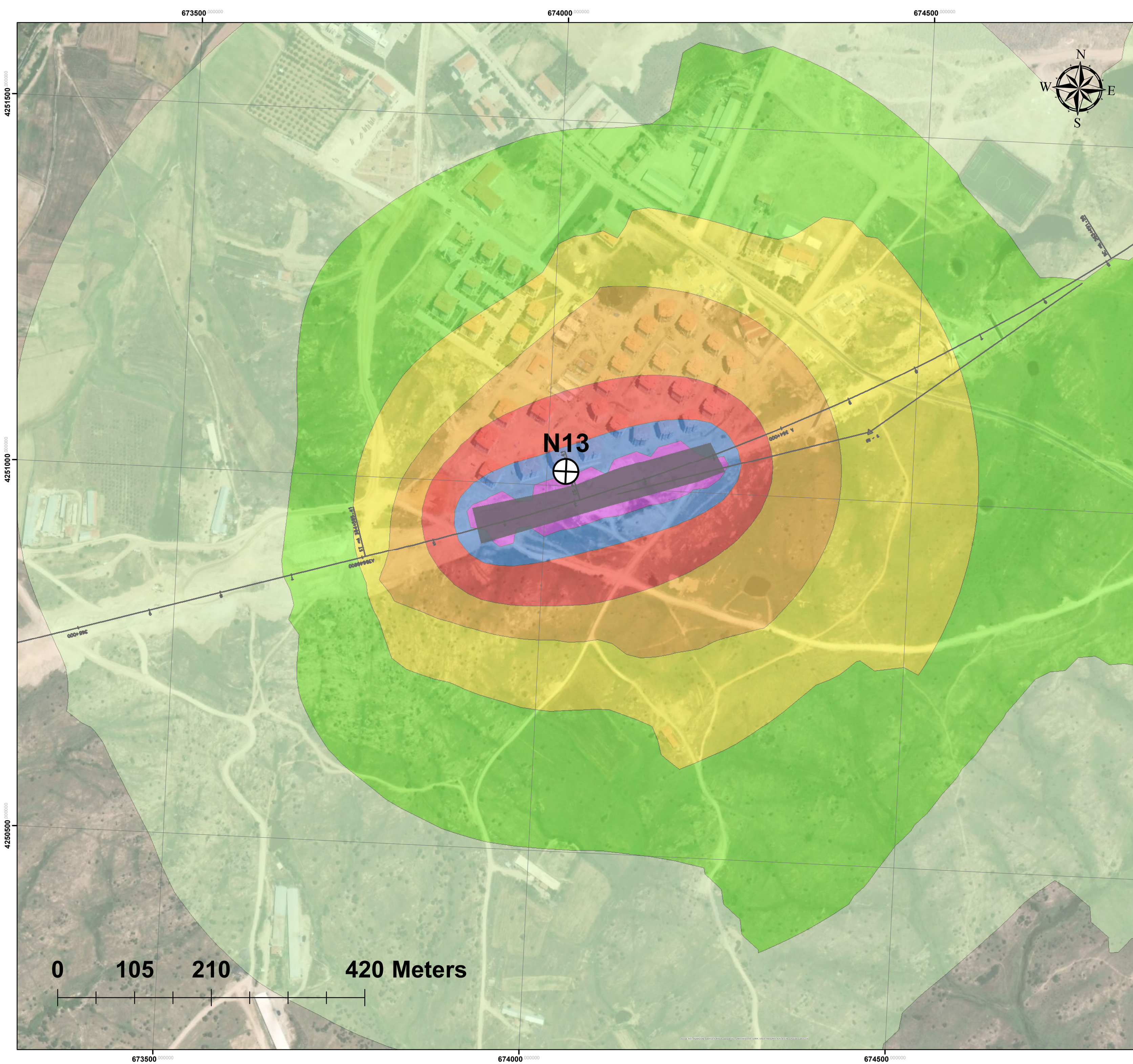
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



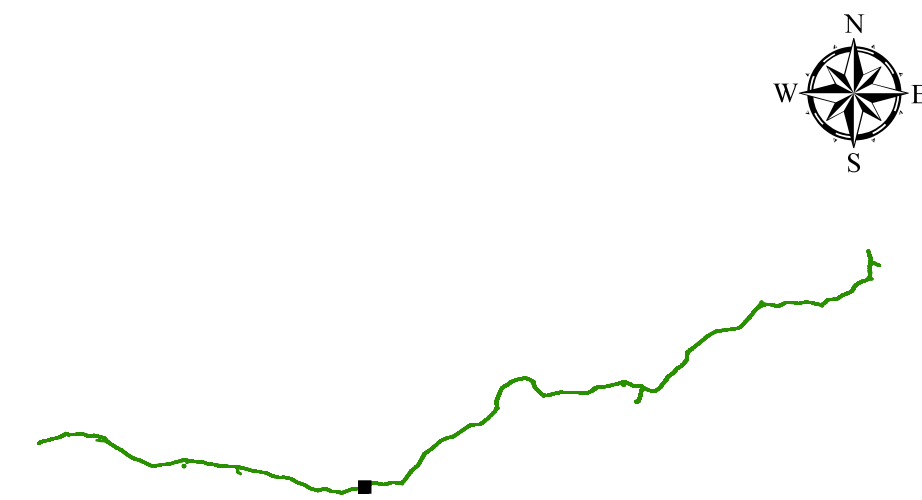
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



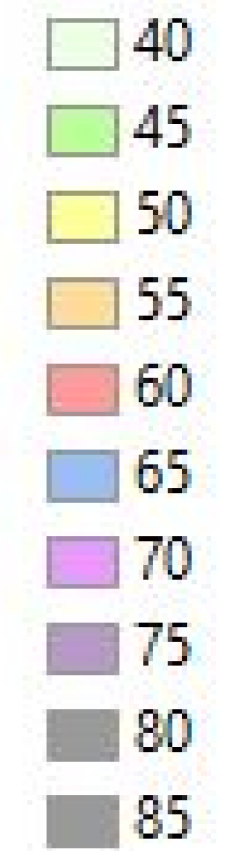
-  **Receiver Location**
-  **Area Source**
-  **Point Source**
-  **Quarry Location**







**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



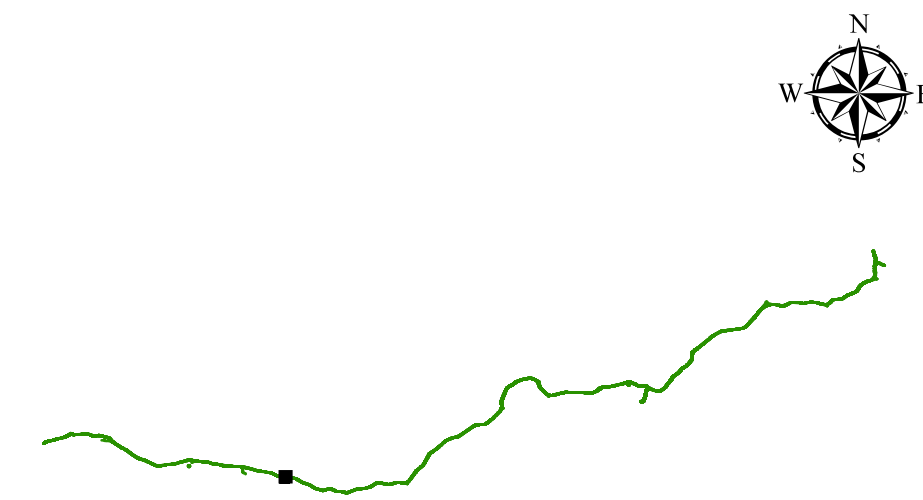
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



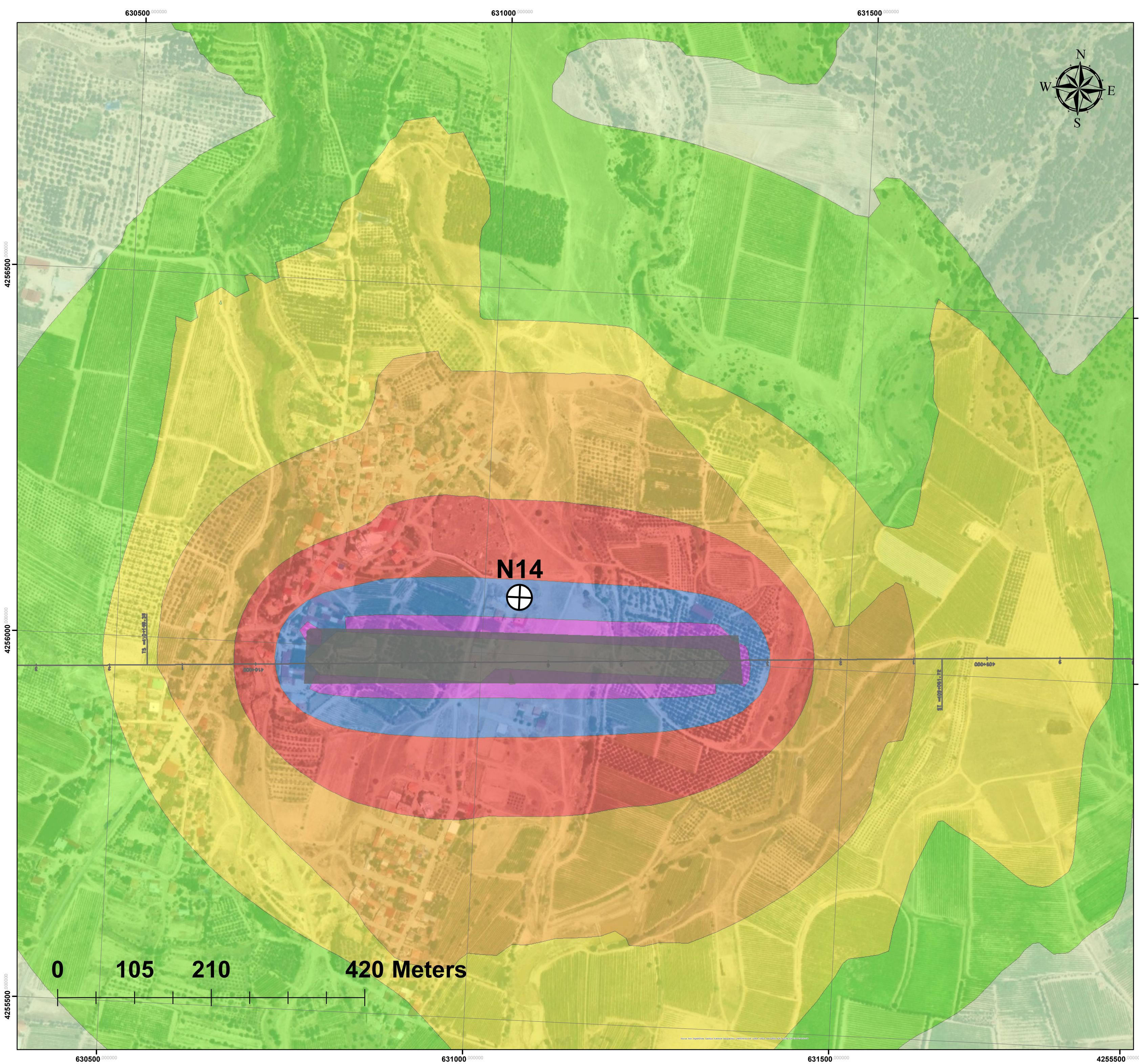
-  **Receiver Location**
-  **Area Source**
-  **Point Source**
-  **Quarry Location**



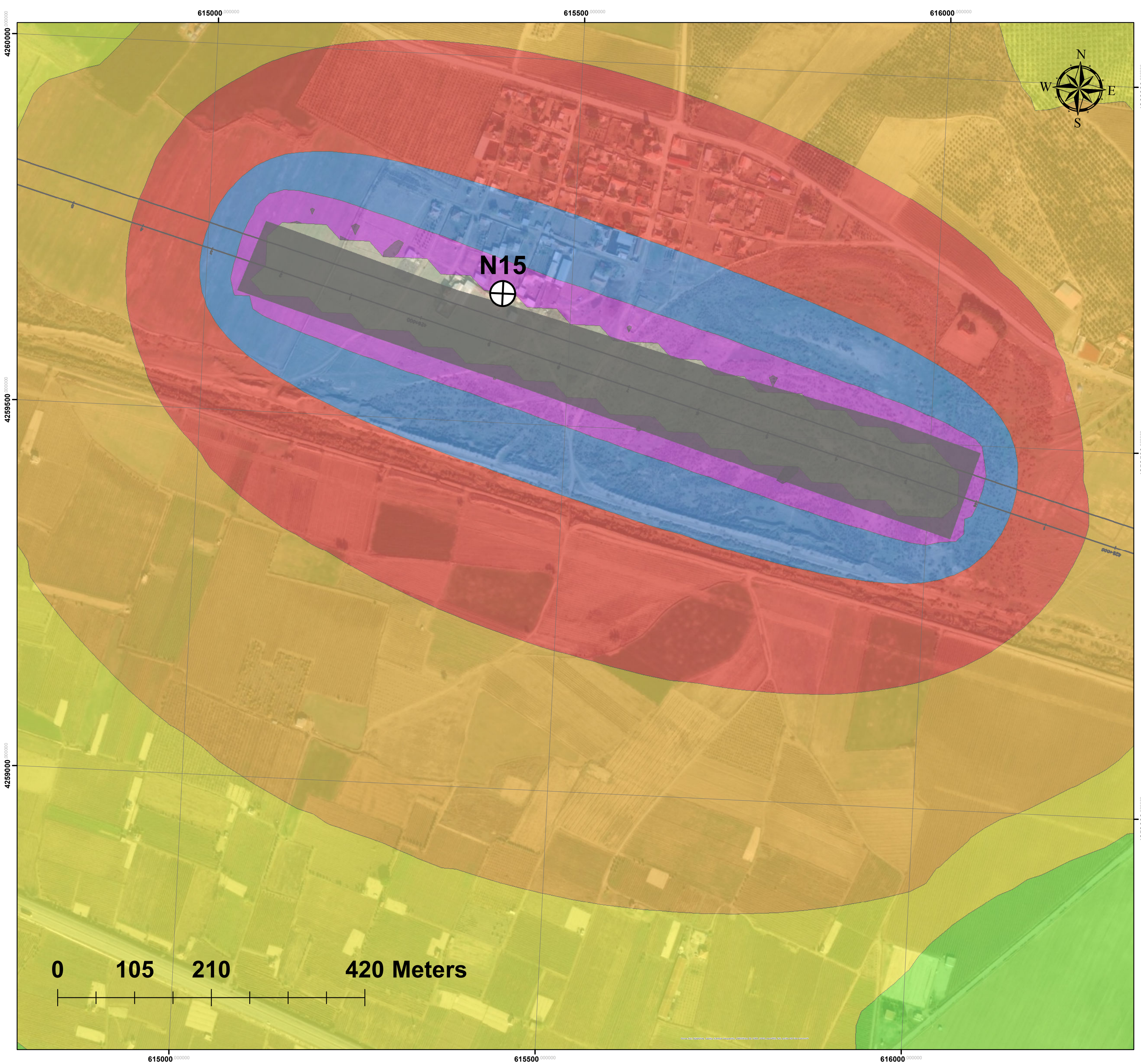
ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY



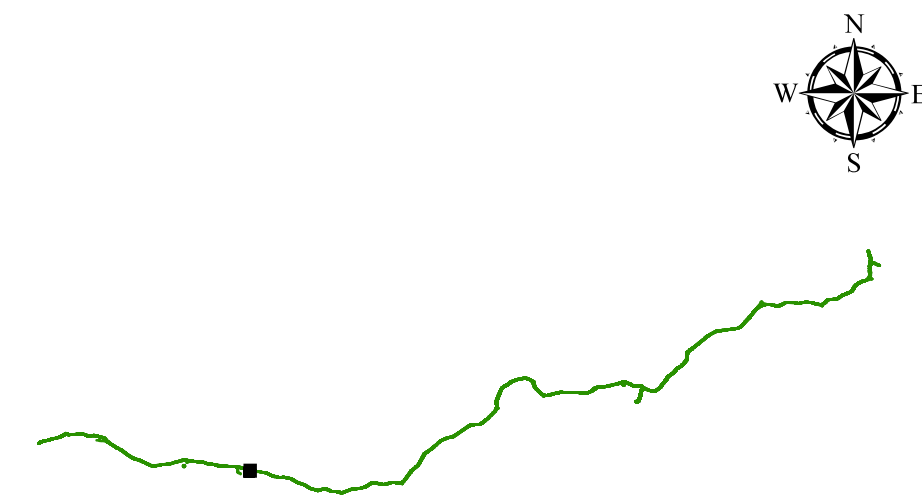
Grid Noise Map, Lday, dBA
Receiver Location: N23



- Receiver Location
- Area Source
- Point Source
- Quarry Location



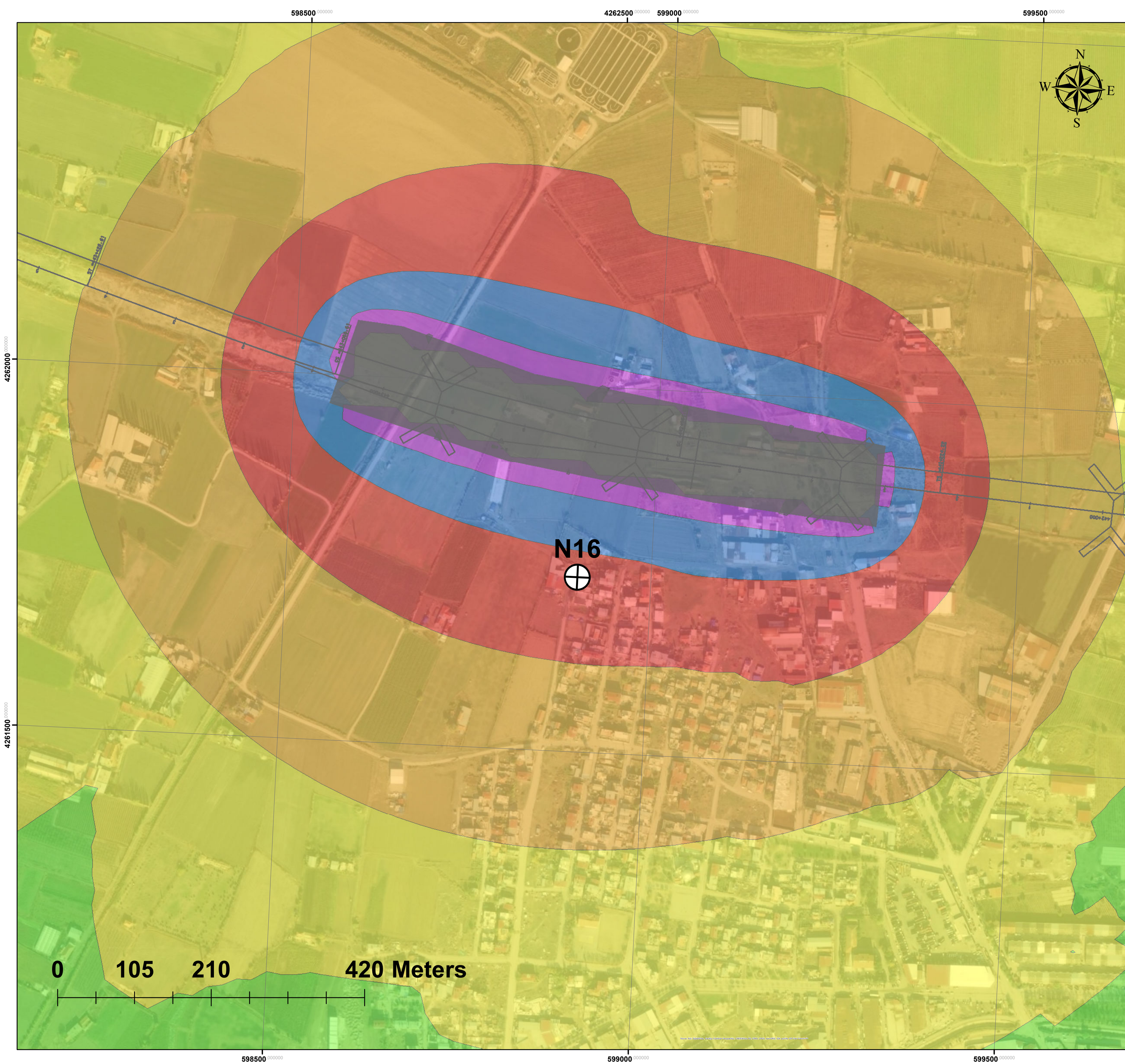
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



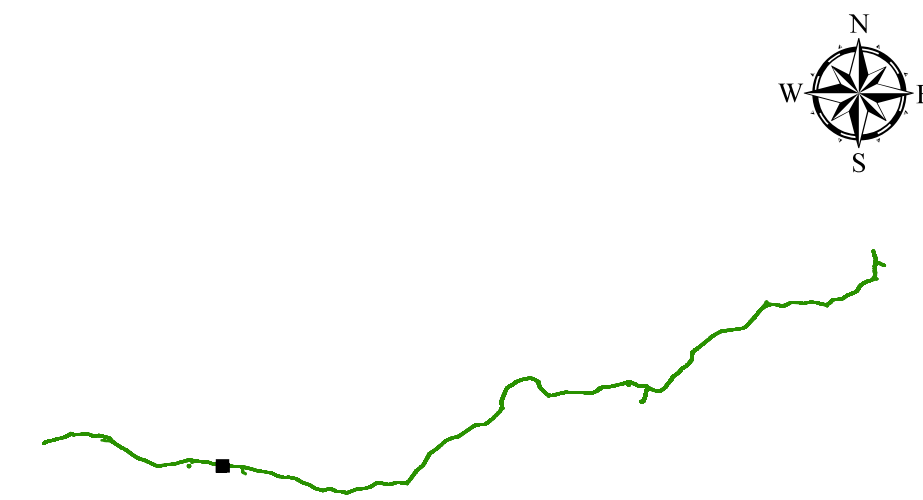
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



- Receiver Location
- Area Source
- Point Source
- Quarry Location







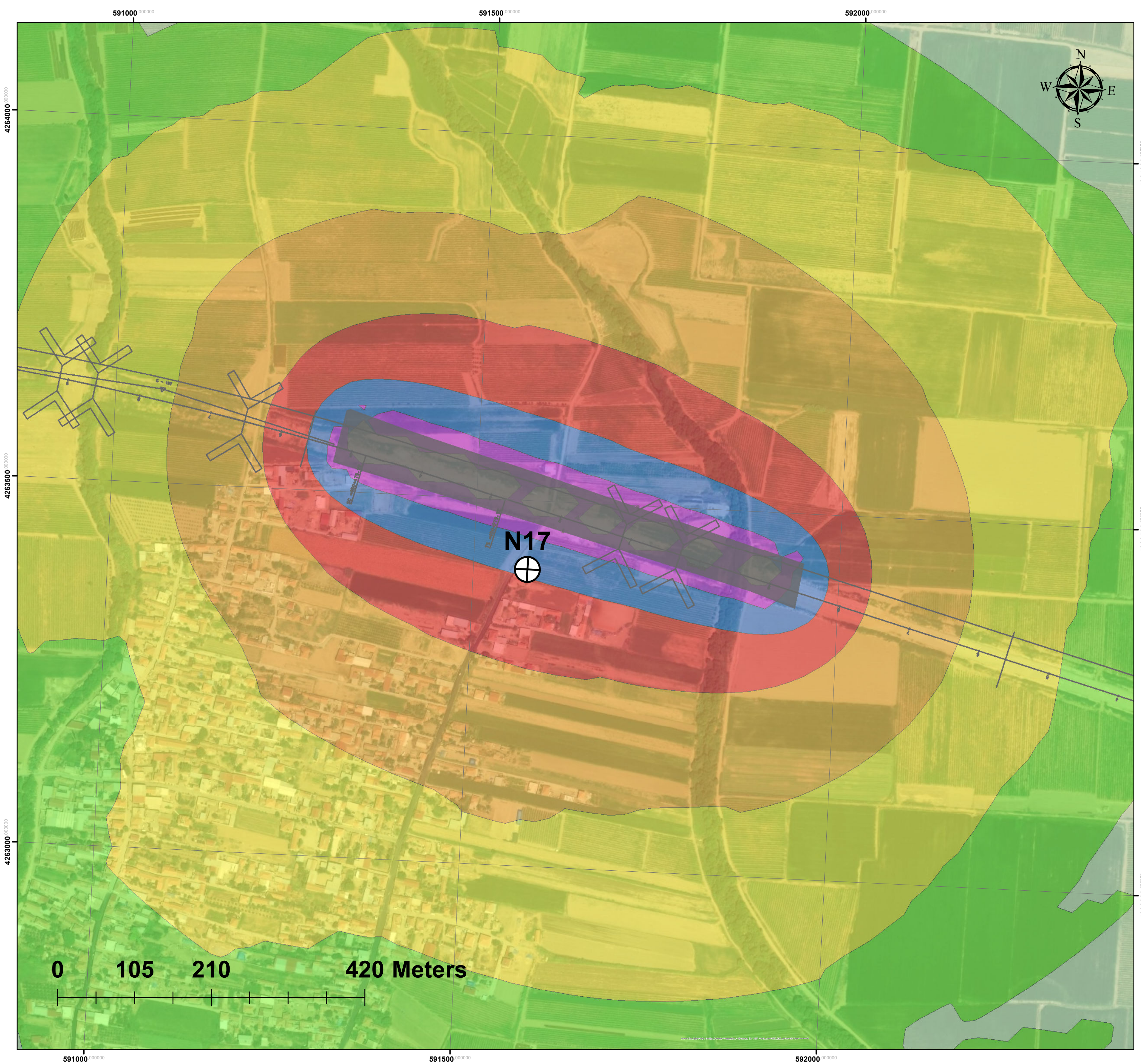
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



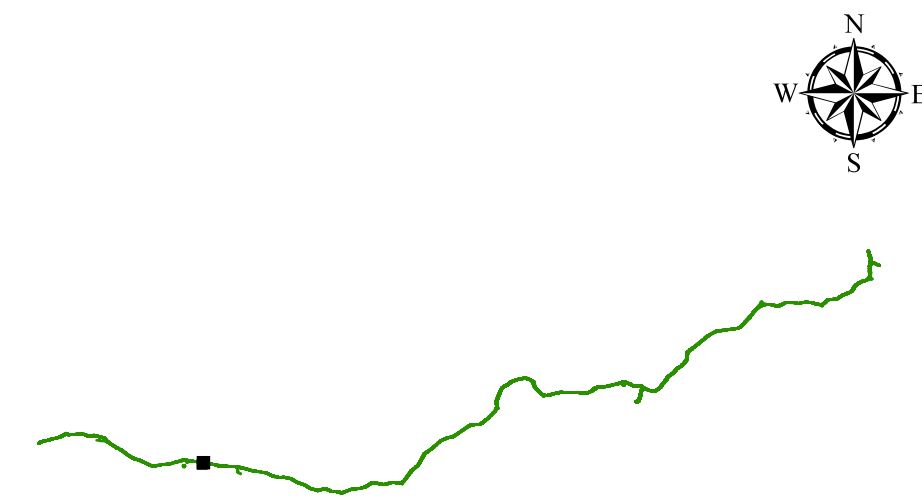
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



-  **Receiver Location**
-  **Area Source**
-  **Point Source**
-  **Quarry Location**



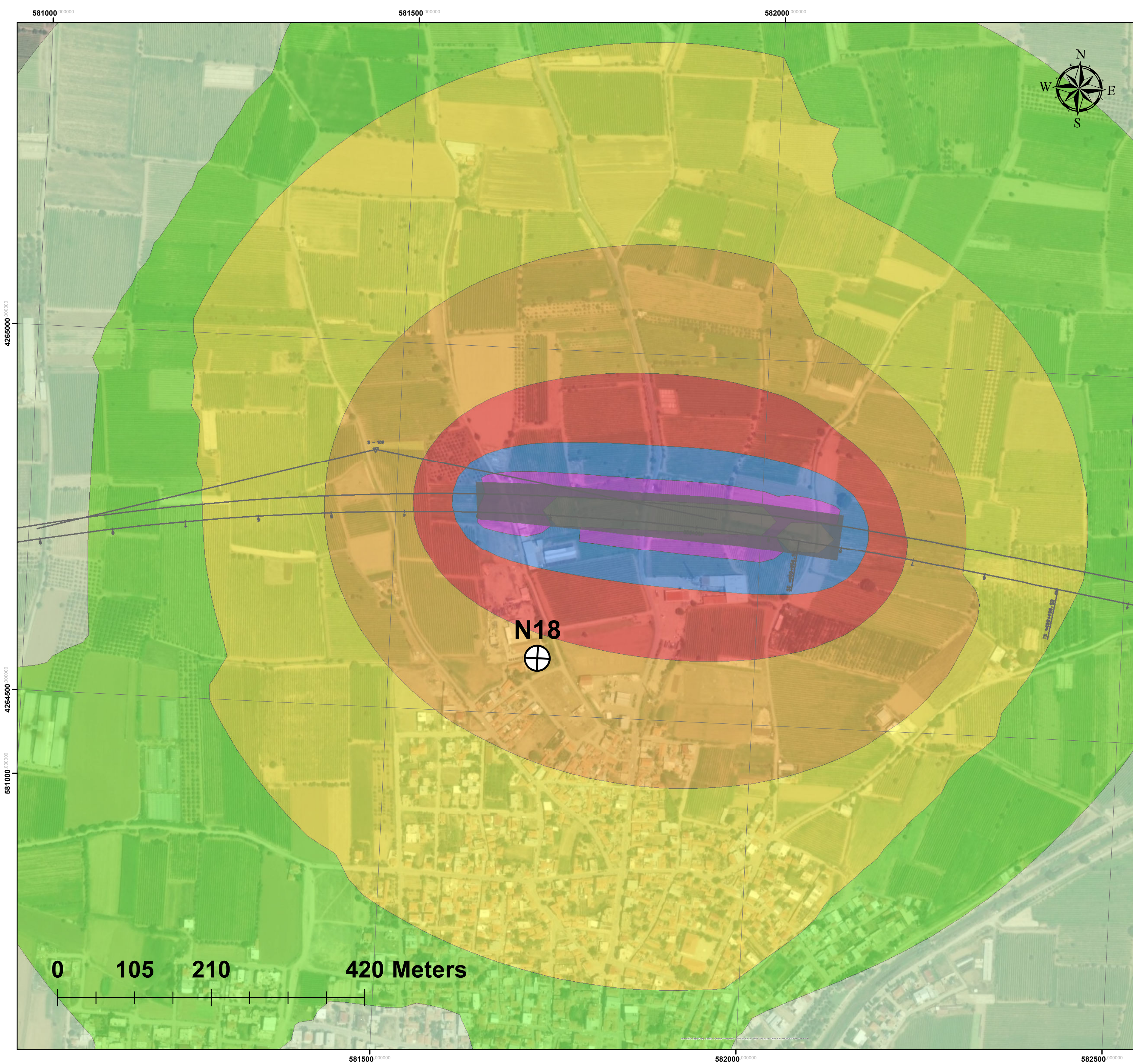
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



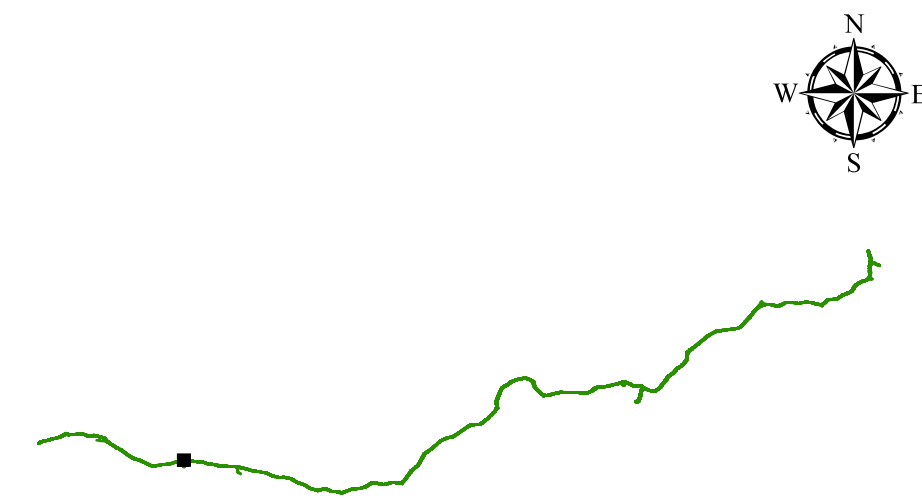
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



- Receiver Location
- Area Source
- Point Source
- Quarry Location



**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



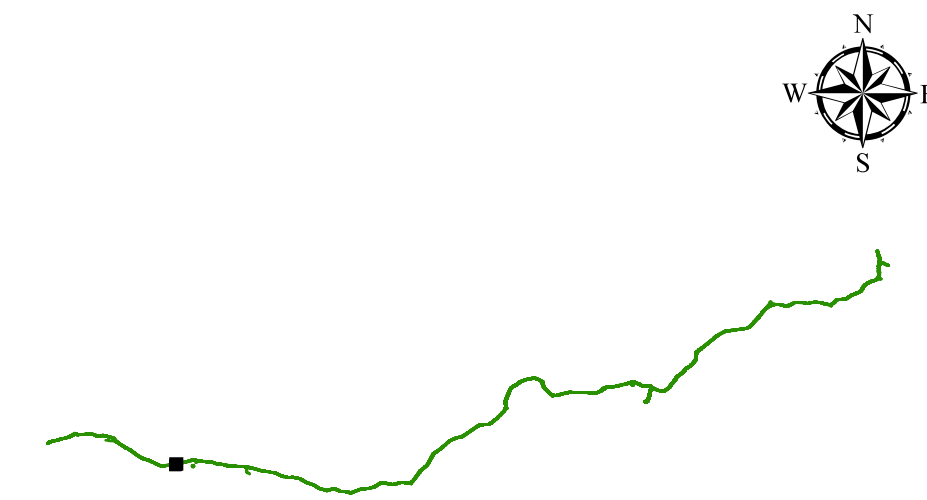
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



- Receiver Location
- Area Source
- Point Source
- Quarry Location



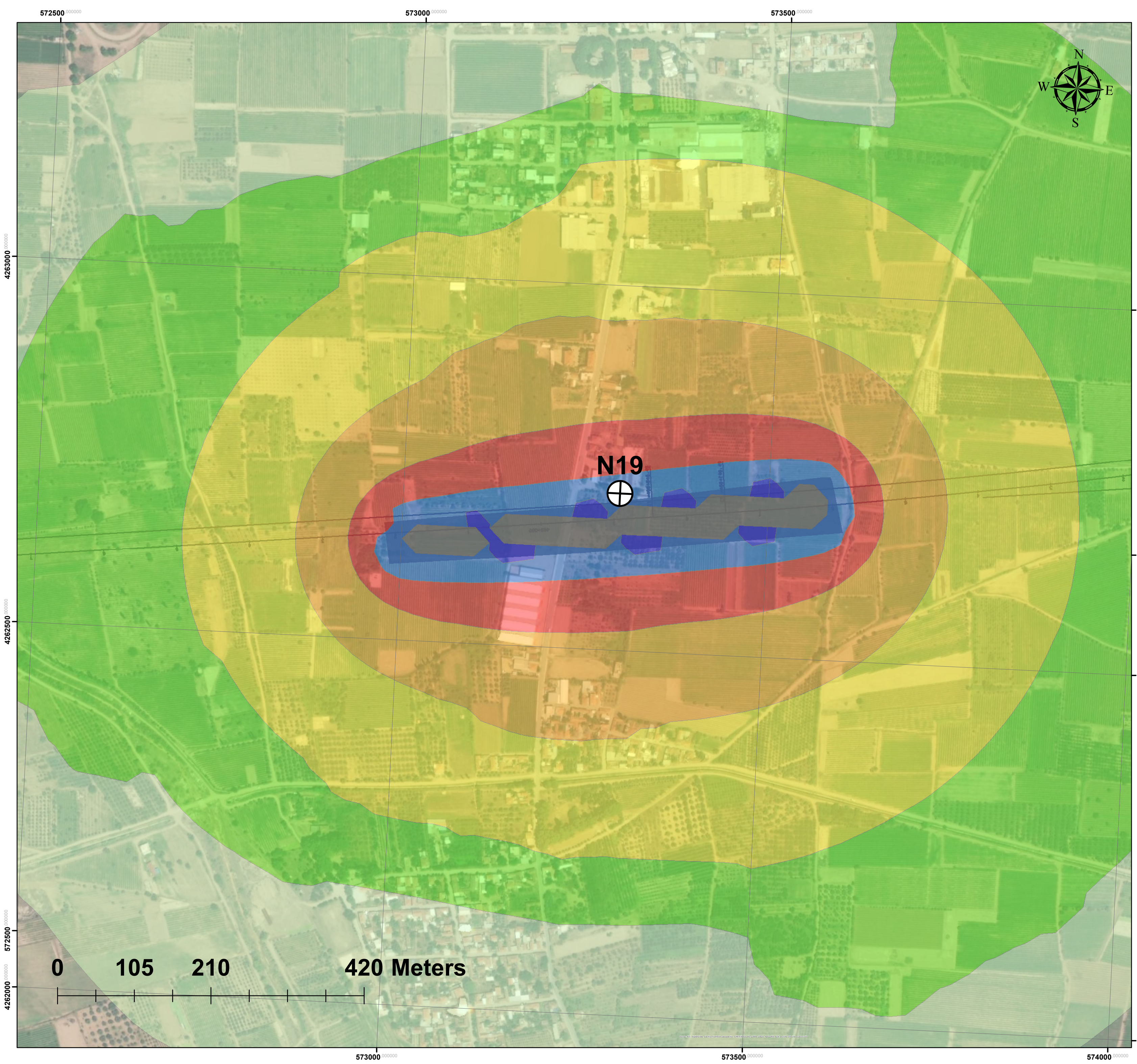
ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY

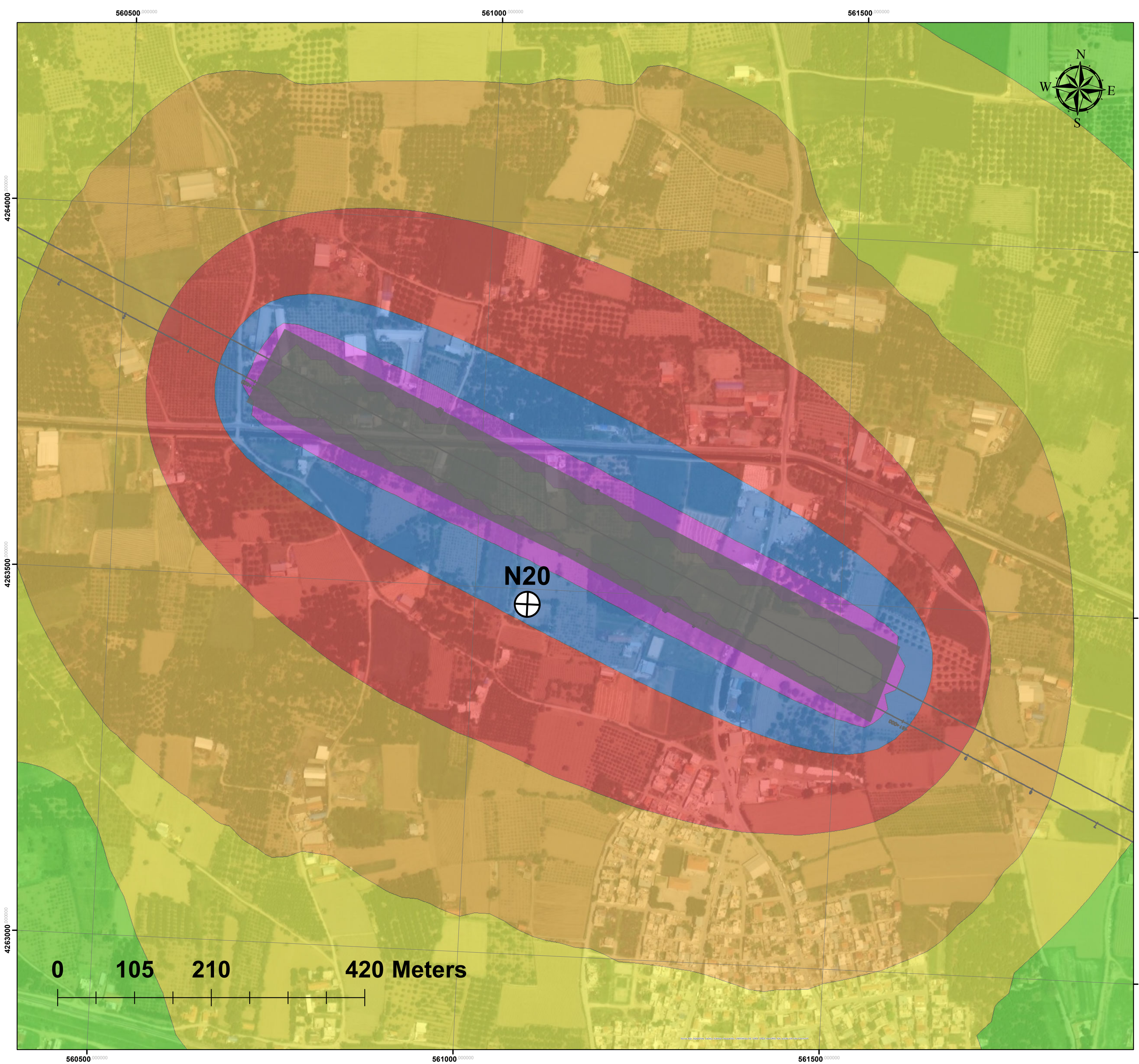


Grid Noise Map, Lday, dBA
Receiver Location: N23

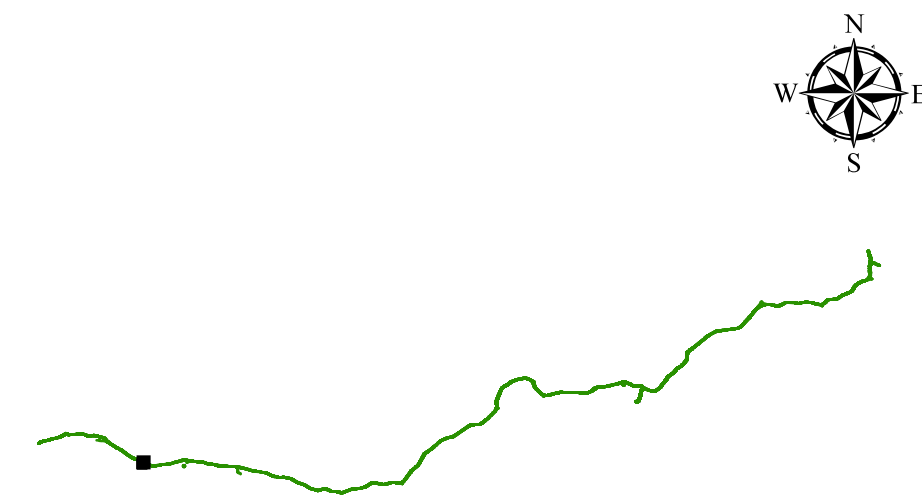


- Receiver Location
- Area Source
- Point Source
- Quarry Location









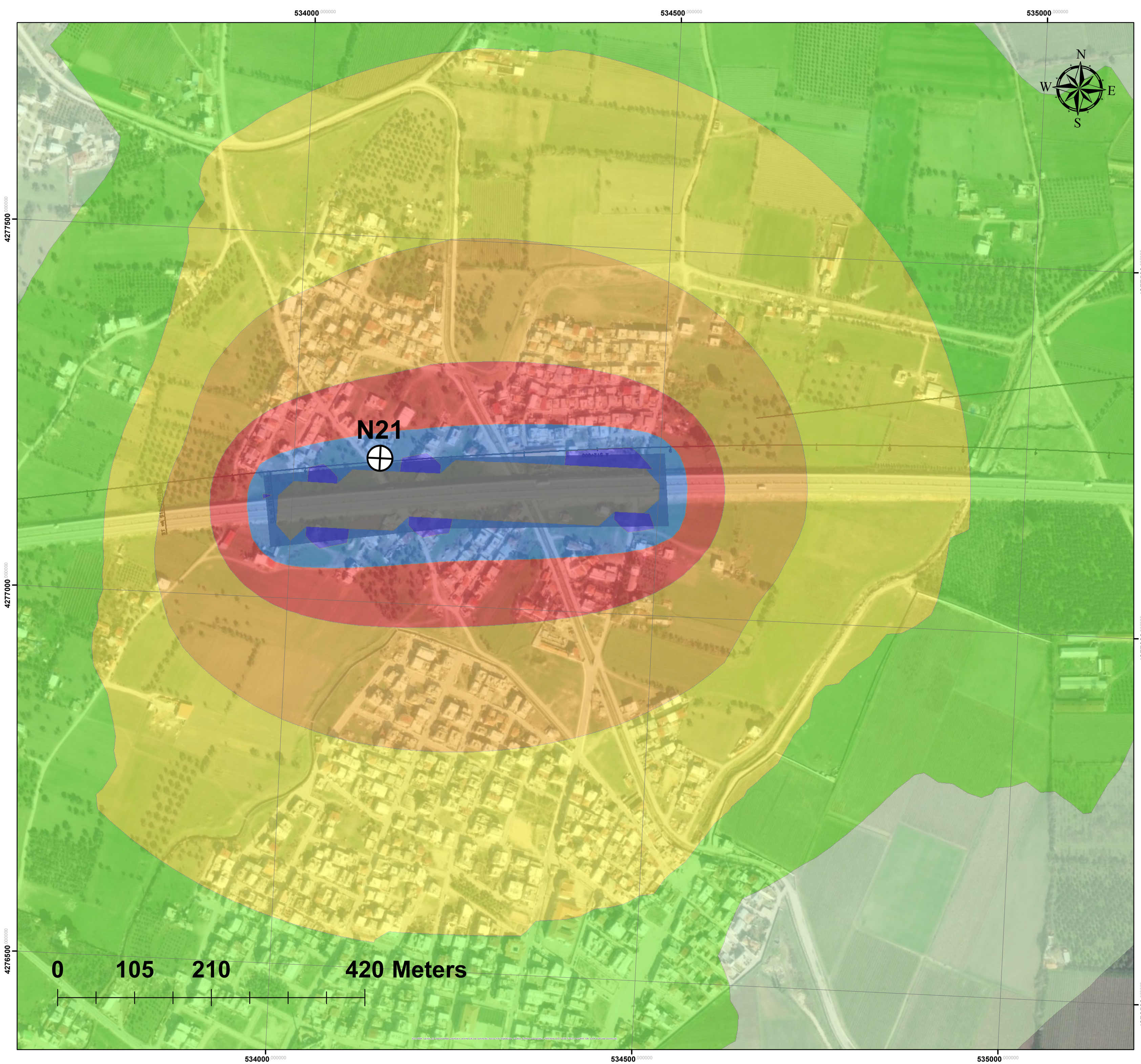
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



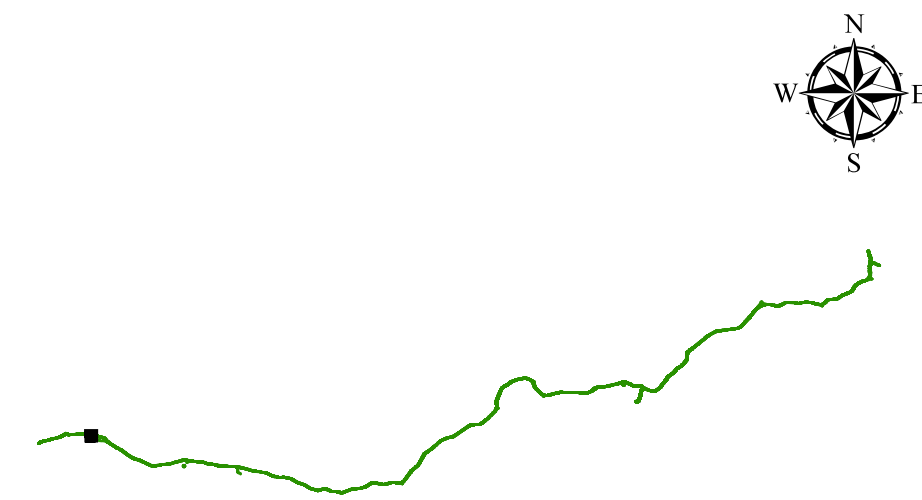
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



-  **Receiver Location**
-  **Area Source**
-  **Point Source**
-  **Quarry Location**



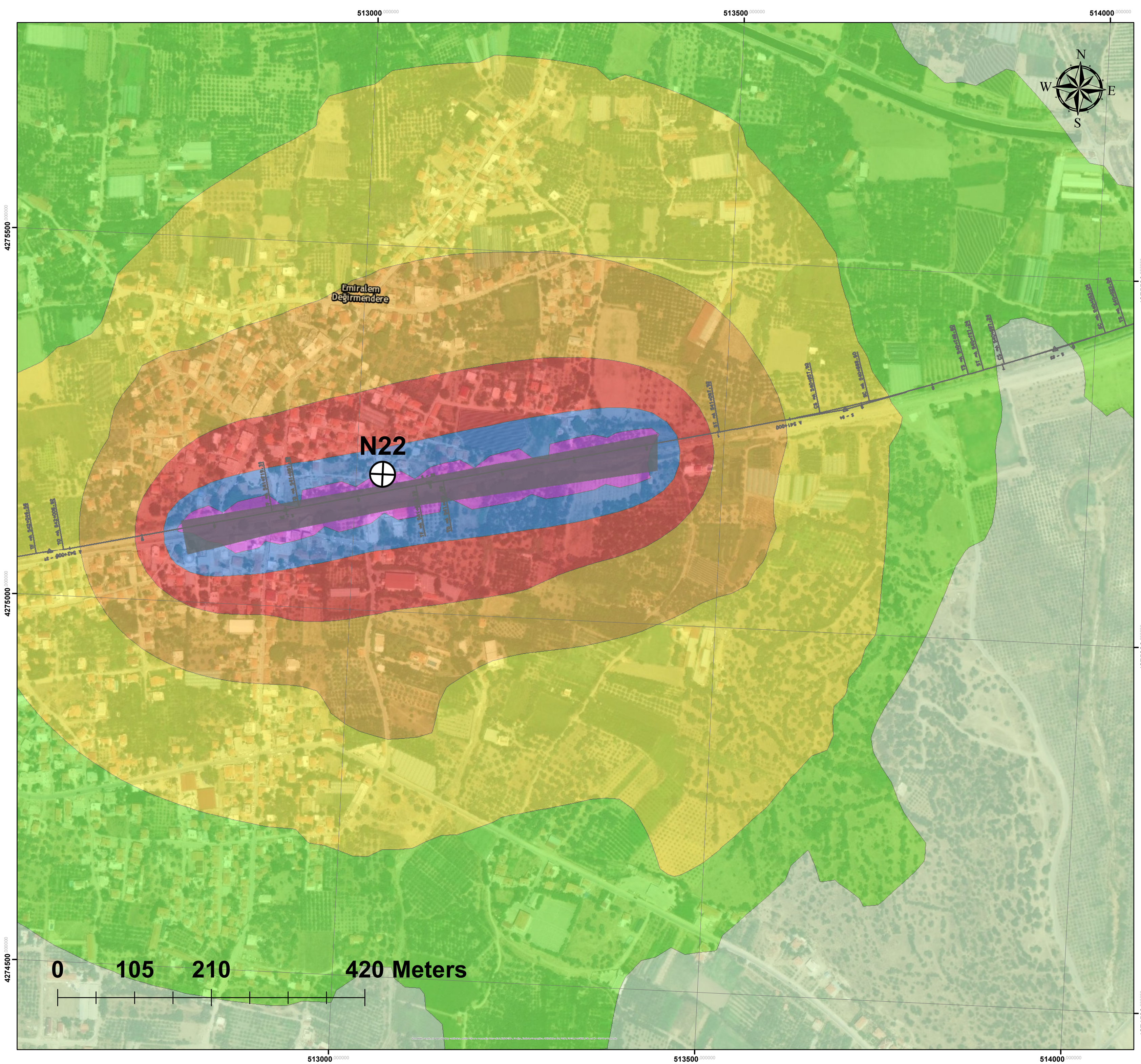
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



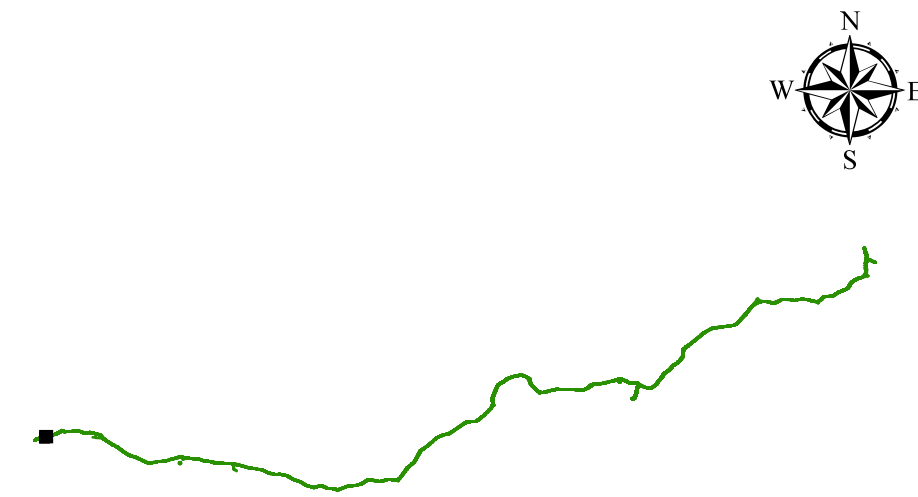
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



- Receiver Location
- Area Source
- Point Source
- Quarry Location



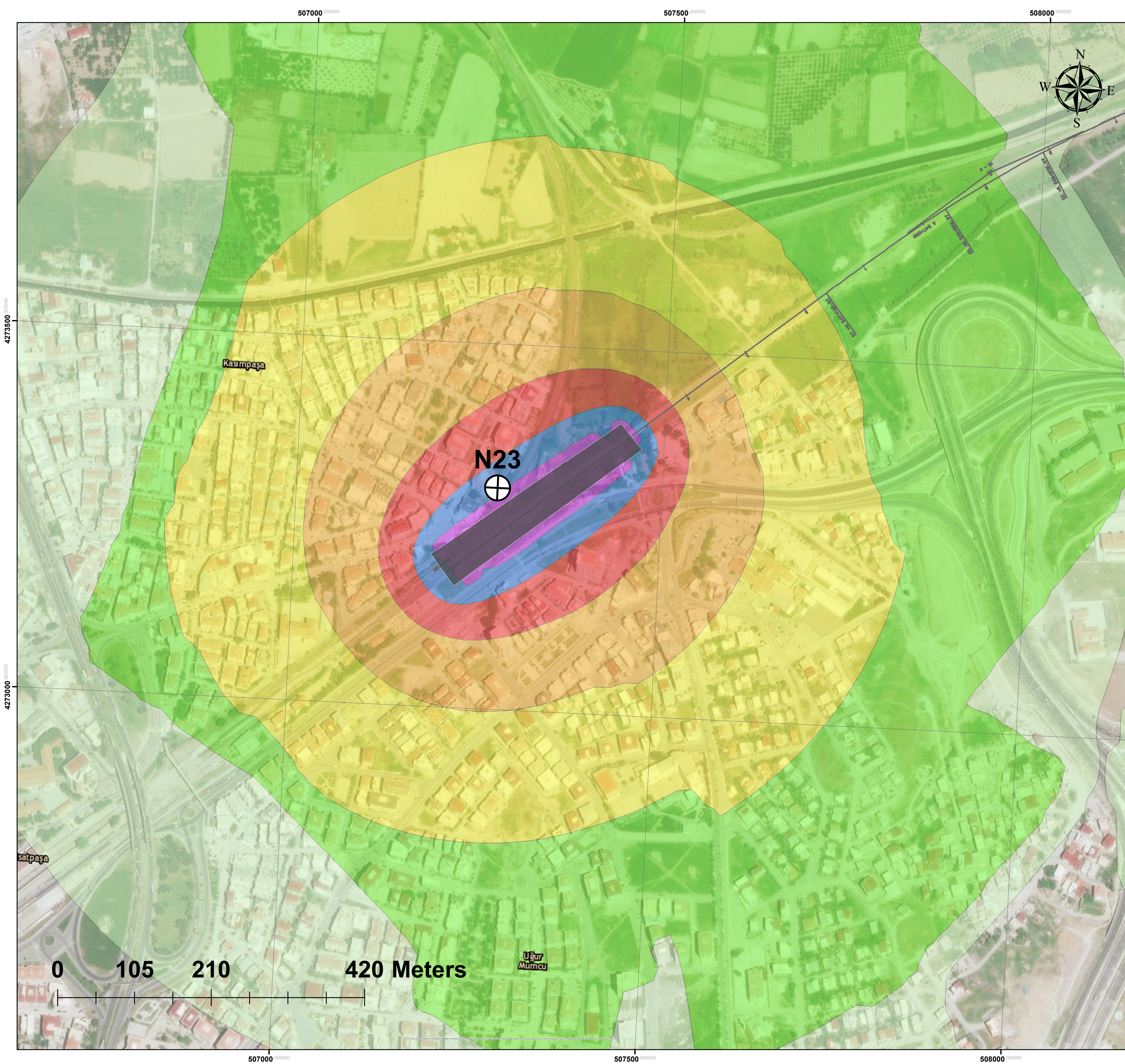
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



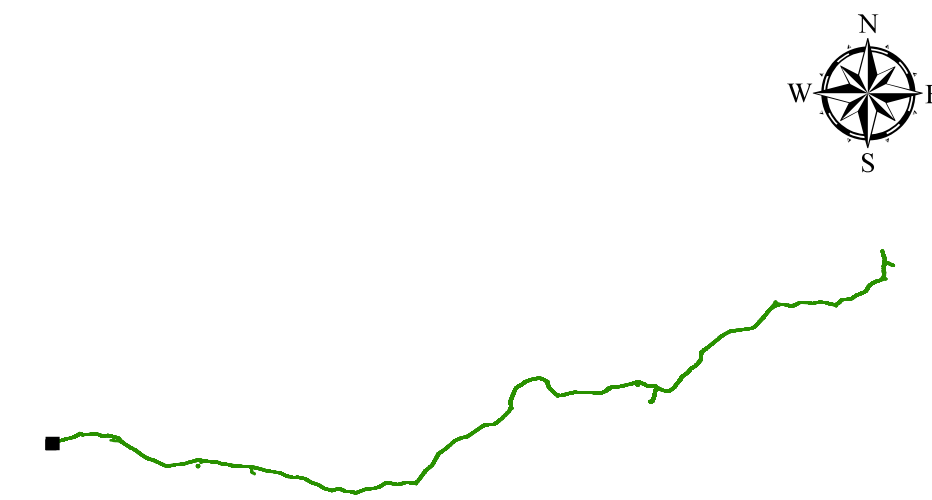
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



- Receiver Location**
- Area Source**
- Point Source**
- Quarry Location**



**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



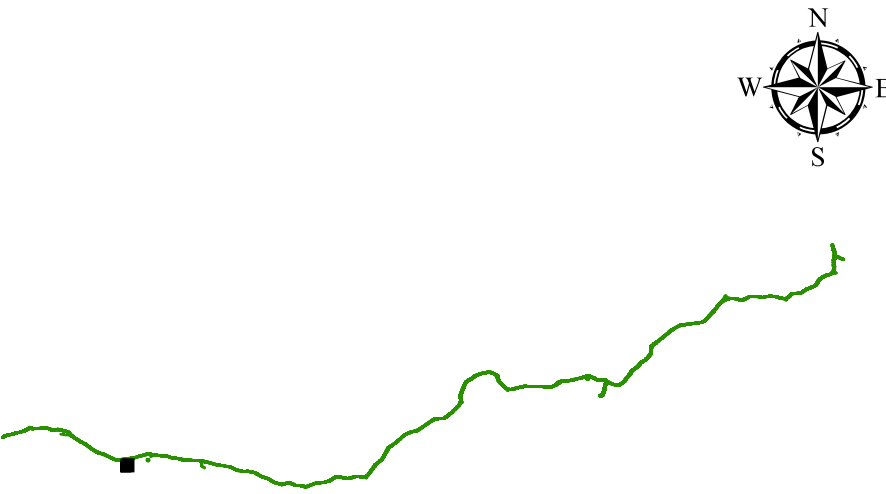
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



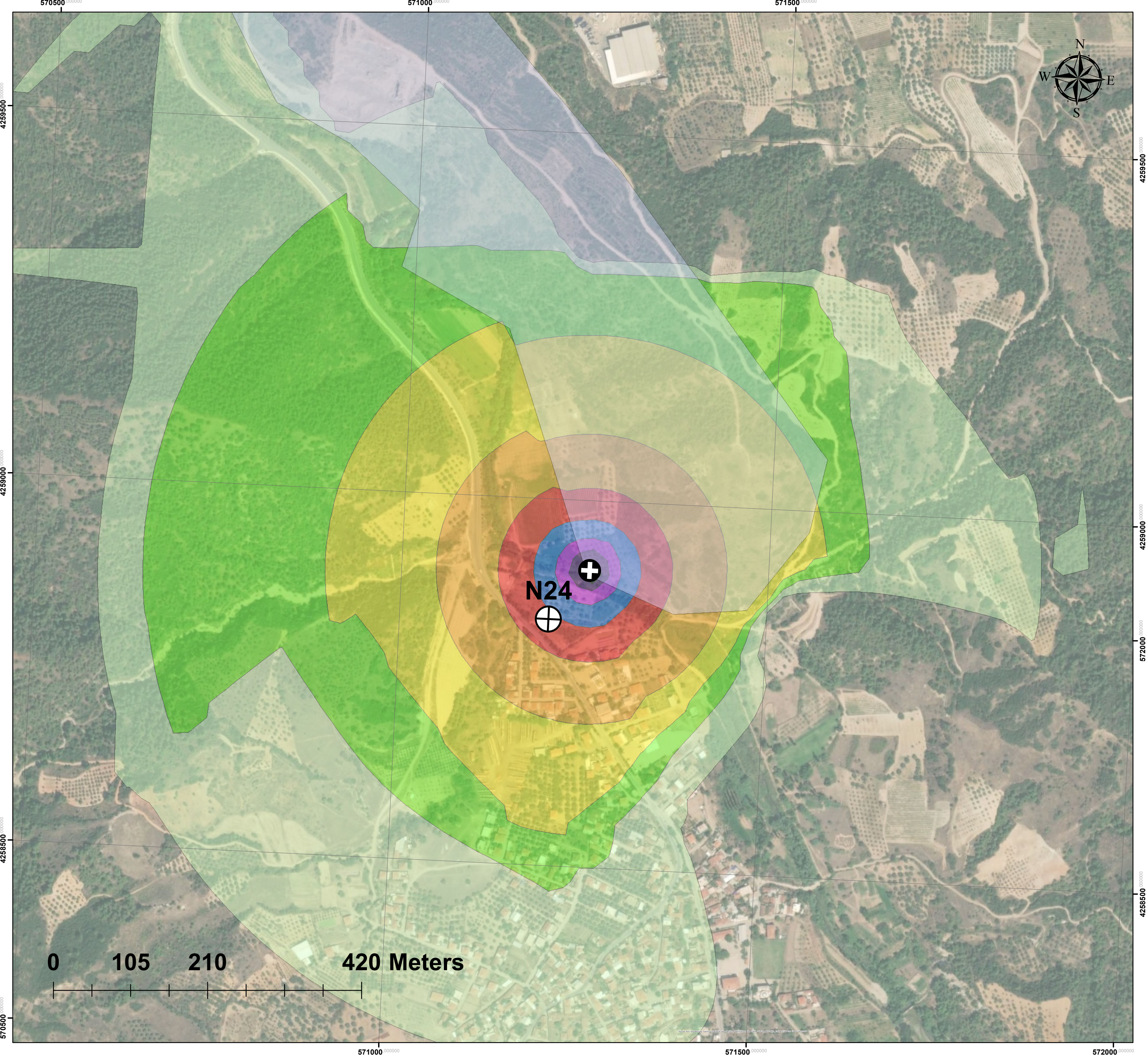
- Receiver Location**
- Area Source**
- Point Source**
- Quarry Location**



ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY

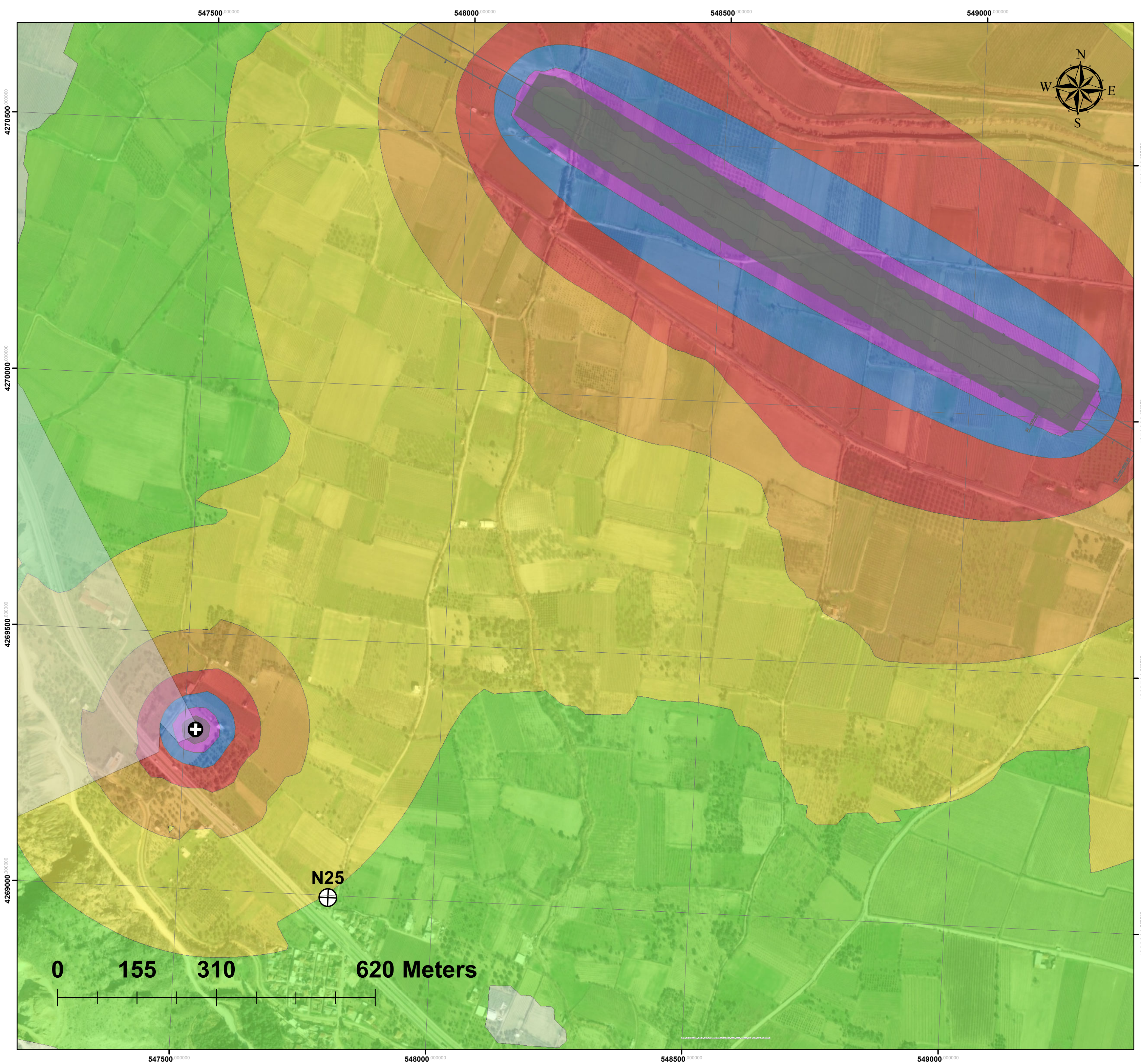


Grid Noise Map, Lday, dBA
Receiver Location: N23

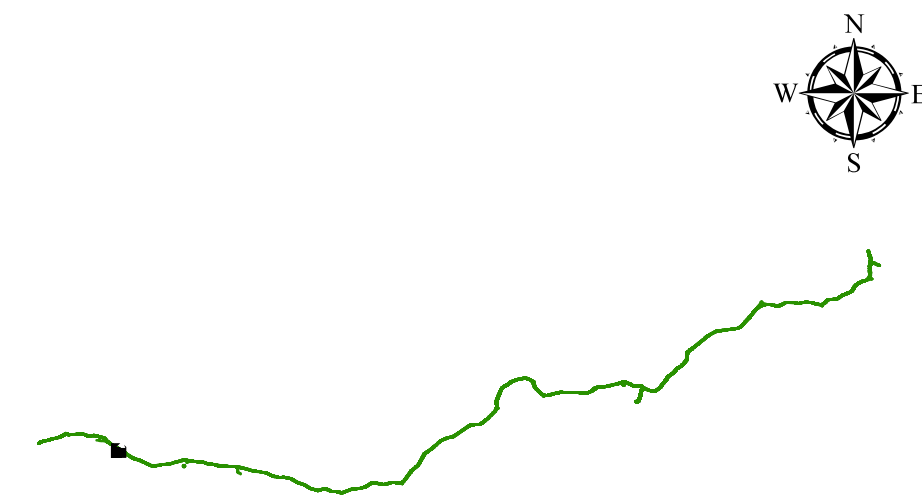


- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- 80
- 85

- Receiver Location
- Area Source
- Point Source
- Quarry Location



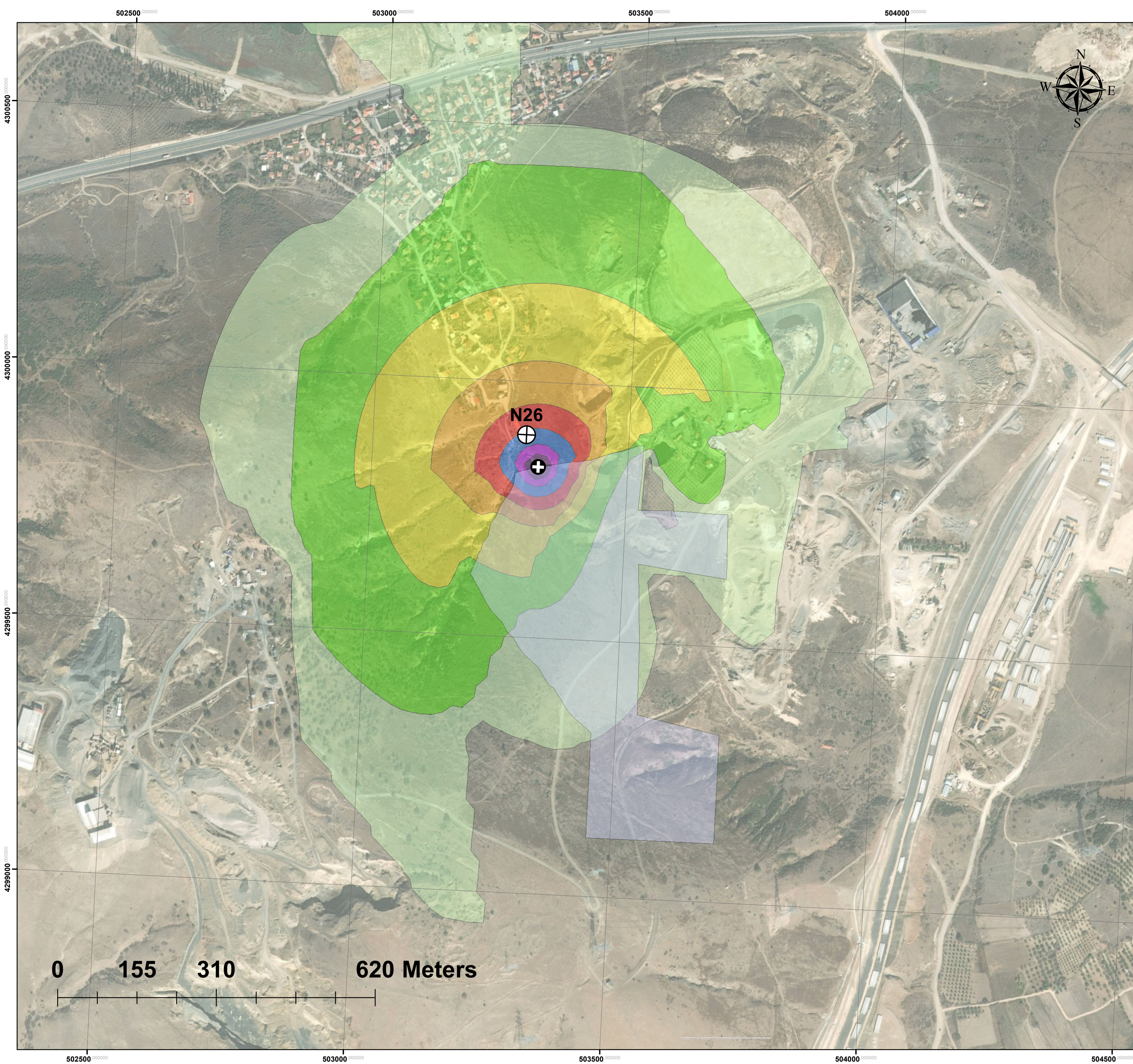
**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



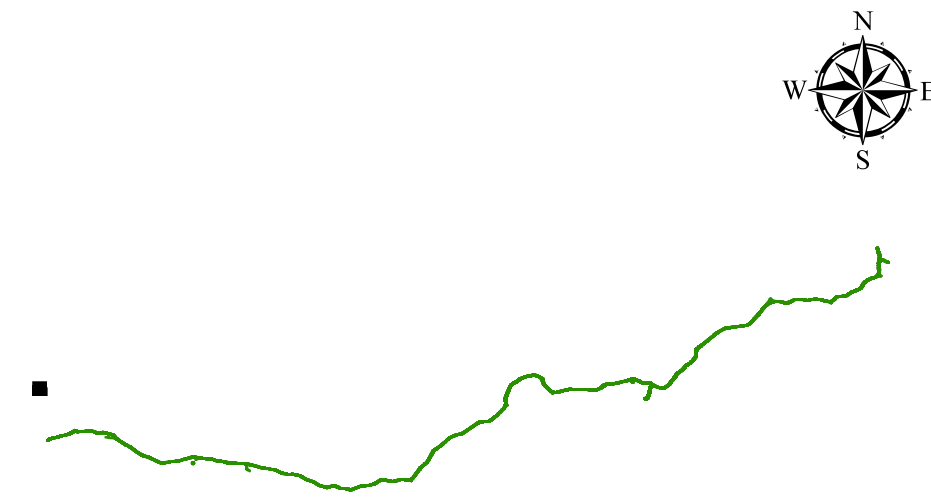
**Grid Noise Map, Lday, dBA
Receiver Location: N23**



- Receiver Location**
- Area Source**
- Point Source**
- Quarry Location**







**ANKARA-IZMIR HIGH SPEED
RAILWAY PROJECT
CONSTRUCTION NOISE
MODELLING SURVEY**



**Grid Noise Map, Lday, dBA
Receiver Location: N23**



-  **Receiver Location**
-  **Area Source**
-  **Point Source**
-  **Quarry Location**

C.3 Noise Modelling Results for Receptors within 500 m Distance to Noise Sources

NSR No.	Corresponding Railway KM/Quarry	Settlement			Modelling Results (dBA)					Noise Limits (dBA)				
		Province	District	Neighbourhood/ Village	Turkish RAMEN			WBG		Turkish RAMEN			WBG	
					L _{day} (07:00- 19:00)	L _{evening} (19:00- 23:00)	L _{night} (23:00- 07:00)	L _{day} (07:00- 22:00)	L _{night} (22:00- 07:00)	L _{day} (07:00- 19:00)	L _{evening} (19:00- 23:00)	L _{night} (23:00- 07:00)	L _{day} (07:00- 22:00)	L _{night} (22:00- 07:00)
NM-05	151+500	Afyonkarahisar	Merkez	Beyazit	64.6	64.8	64.9	64.6	64.9	70.0	65.0	60.0	55.0	45.0
NM-06	156+000	Afyonkarahisar	Merkez	Susuz	64.6	64.6	64.6	64.6	64.6	70.0	65.0	60.0	55.0	45.0
NM-07	162+000	Afyonkarahisar	Merkez	Erenler	62.5	62.8	63.0	62.5	63.0	70.0	65.0	60.0	55.0	45.0
NM-08	163+000	Afyonkarahisar	Merkez	Cayirbag	61.6	61.9	62.2	61.6	62.2	70.0	65.0	60.0	55.0	45.0
NM-09	168+000	Afyonkarahisar	Merkez	Ismail	54.4	55.0	55.6	54.4	55.6	70.0	65.0	60.0	55.0	45.0
NM-10	174+000	Afyonkarahisar	Merkez	(Inaz)Demircevre	55.9	56.6	57.2	55.9	57.2	70.0	65.0	60.0	55.0	45.0
NM-11	177+000	Afyonkarahisar	Merkez	Koprulu	63.4	63.7	63.9	63.4	63.9	70.0	65.0	60.0	55.0	45.0
NM-18	248+000	Usak	Banaz	Gullucam	54.9	55.6	56.2	54.9	56.2	70.0	65.0	60.0	55.0	45.0
NM-19	251+000	Usak	Banaz	Oksuz	63.3	63.4	63.4	63.3	63.4	70.0	65.0	60.0	55.0	45.0
NM-20	257+000	Kutahya	Dumlupinar	Kizilca	51.9	52.6	53.2	51.9	53.2	70.0	65.0	60.0	55.0	45.0
NM-21	271+000	Usak	Merkez	Yapagilar	52.6	53.3	53.9	52.6	53.9	70.0	65.0	60.0	55.0	45.0
NM-23	387+000	Manisa	Kula	Battalmustafa	55.0	55.6	56.2	55.0	56.2	70.0	65.0	60.0	55.0	45.0
NM-24	402+000	Manisa	Alasehir	Tepekoy	58.8	59.4	60.0	58.8	60.0	70.0	65.0	60.0	55.0	45.0
NM-25	407+000	Manisa	Alasehir	Turkmen	49.3	50.0	50.6	49.3	50.6	70.0	65.0	60.0	55.0	45.0
NM-27	412+000	Manisa	Alasehir	Yuvacali	49.4	50.1	50.7	49.4	50.7	70.0	65.0	60.0	55.0	45.0
NM-28	414+000	Manisa	Alasehir	Toygarli	54.6	55.2	55.8	54.6	55.8	70.0	65.0	60.0	55.0	45.0
NM-29	416+000	Manisa	Alasehir	Kemaliye	60.7	61.3	61.8	60.7	61.8	70.0	65.0	60.0	55.0	45.0
NM-30	419+000	Manisa	Alasehir	Ismetiye	55.2	55.9	56.6	55.2	56.6	70.0	65.0	60.0	55.0	45.0
NM-34	437+000	Manisa	Salihli	Karaoglanli	64.9	65.1	65.3	64.9	65.3	70.0	65.0	60.0	55.0	45.0
NM-36	456+000	Manisa	Ahmetli	Yarasli	60.9	61.2	61.5	60.9	61.5	70.0	65.0	60.0	55.0	45.0
NM-38	475+000	Manisa	Turgutlu	Avsar	55.5	56.2	56.9	55.5	56.9	70.0	65.0	60.0	55.0	45.0
NM-40	176- Elvanpasa Quarry	Usak	Merkez	Karakose	25.7	26.5	27.2	25.7	27.2	70.0	65.0	60.0	55.0	45.0
NM-41	232-Dombayli Quarry	Manisa	Salihli	Dombayli	45.0	45.7	46.4	45.0	46.4	70.0	65.0	60.0	55.0	45.0
NM-42	234-Akkoy Quarry	Manisa	Turgutlu	Akkoy	41.5	42.2	42.8	41.5	42.8	70.0	65.0	60.0	55.0	45.0
NM-43	36-Turktaciri	Ankara	Polatli	Turktaciri	38.4	39.2	39.9	38.4	39.9	70.0	65.0	60.0	55.0	45.0
NM-44	243-Yunusemre	Manisa	Yunusemre	Karakilimli	40.1	40.9	41.5	40.1	41.5	70.0	65.0	60.0	55.0	45.0
NM-45	245-Gurle	Manisa	Yunusemre	Gurle	33.8	34.5	35.2	33.8	35.2	70.0	65.0	60.0	55.0	45.0

Appendix D – Socio-economy

D.1 Number of Questionnaires per Settlement Affected from Project-related Land Acquisition

Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status	Population per Settlement (TurkStat, Dec 2020) (*)	Number of CLQ (PAs) (**)				Number of HHQ (PAPs) (**)			
							Province Level	District Level	Settlement Level	Section Level	Province Level	District Level	Settlement Level	Section Level
Section 1	Ankara	0+000.00-2+630.90	Polatli	Yenice	Neighbourhood	129	4	4	1	42	17	17	10	88
		2+630.90-6+521.64		Gumusyaka	Neighbourhood	91			1				5	
		6+873.31-11+171.30		Beskopru	Neighbourhood	124			1				2	
		11+171.30-16+165.52		Kabakkoy	Neighbourhood	172			1					
	Eskisehir	6+556.15-6+873.31	Gunyuzu	Ayvali	Neighbourhood	375	12	4	1		21	8	2	
		16+165.52-24+891.13		Gumuskonak	Neighbourhood	822			1				1	
		24+891.13-29+451.25		Cakmak	Neighbourhood	89			1				3	
		29+451.25-39+201.15		Kayakent	Neighbourhood	858			1				2	
		39+201.15-45+228.35	Sivrihisar	Ilyaspasa	Neighbourhood	86		8	1			13	3	
		45+228.35-48+361.32		Yenidogan	Neighbourhood	198			1				3	
		48+361.32-49+159.94		Goktepe	Neighbourhood	289			1					
		49+159.94-51+439.39		Ahiler	Neighbourhood	171			1				3	
		51+439.39-59+785.39		Kurtseyh	Neighbourhood	186			1				4	
		59+785.39-61+058.11		Buhara	Neighbourhood	103			1					
		61+058.11-66+764.12		Sigircik	Neighbourhood	290			1					
		66+461.28-67+093.57		Buzluca	Neighbourhood	152			1					
	Afyonkarahisar	67+093.57-72+249.30	Emirdag	Ciftlikkoy	Village	423	56	16	1		110	34	6	
		72+249.30-78+870.72		Eskiakoren	Village	78			1				3	
		78+870.72-80+215.53		Kiliclar	Village	38			1				2	
		80+215.53-83+347.30		Karayatak	Village	66			1				3	
		83+347.30-86+507.58		Adayazi	Village	692			1					
		86+507.58-89+271.97		Ekizce	Village	346			1				3	
		89+271.97-90+163.13		Suvermez	Village	284			1				2	

Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status	Population per Settlement (TurkStat, Dec 2020) (*)	Number of CLQ (PASs) (**)				Number of HHQ (PAPs) (**)				
							Province Level	District Level	Settlement Level	Section Level	Province Level	District Level	Settlement Level	Section Level	
		90+163.13-90+543.24		Dagilan	Village	83			1				4		
		90+543.24-93.898.62		Turkmenakoren	Village	292			1				4		
		93+377.74-93+898.62		Elhan	Village	299			1						
		96+678.60-98+709.97		Karaagac	Village	150			1						
		94+762-95+399		Yenikoy	Village	453			1				1		
		95+399.43-96+678.12		İncili	Neighbourhood	4,869			1						
		98+709.97-102+960.56		Tabaklar	Village	288			1						
		102+960.56-106+836.70		Emirinkoyu	Village	121			1				4		
		106+836.70-113+376.10		Yuregil	Village	678			1				2		
		113+376.10-125+922.54	Bayat	Merkez town municipality, Buyuk	Neighbourhood	866		5	1			8	6		
				Merkez town municipality, Cumhuriyet	Neighbourhood	1,556			1						
				Merkez town municipality, Yeni	Neighbourhood	475			1						
				Merkez town municipality, Hurriyet	Neighbourhood	1,199			1						
				125+922.54-126+216.30	Imralli	Village			717						
				126+216.30 - 129+300	Sagirli	Village			164						1
		129+300.86 - 137+545	Iscehisar	Seydiler town municipality, Cumhuriyet	Neighbourhood	955		2	1			6	6		
				Seydiler town municipality, Hasan Basri	Neighbourhood	1,210			1						
				Kavak	Neighbourhood	1,061									
		145+349-148+637	Merkez	Gebeceler town municipality, Fatih	Neighbourhood	666		21	1			27	2		
				Gebeceler town municipality, İstiklal	Neighbourhood	1,044									
				Gebeceler town municipality, Kocatepe	Neighbourhood	800									
				Gebeceler town municipality, Yeni	Neighbourhood	673			1						
				Gebeceler town municipality , Zafer	Neighbourhood	324									
				149+452.79 - 149+597.43	Cavdarli	Village			1,193						1
		Section 2		148+637-156+231		Susuz town municipality, Gokhan		Neighbourhood	704				1		42
Susuz town municipality, Osmanli	Neighbourhood					1,039	1								

Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status	Population per Settlement (TurkStat, Dec 2020) (*)	Number of CLQ (PASS) (**)				Number of HHQ (PAPs) (**)							
							Province Level	District Level	Settlement Level	Section Level	Province Level	District Level	Settlement Level	Section Level				
				Susuz town municipality, Sakarya	Neighbourhood	1,646			1									
				Susuz town municipality, Selcuklu	Neighbourhood	1,342			1									
		156+407-159+175		Beyyazi town municipality, Cumhuriyet	Neighborhood	906												
				Beyyazi town municipality, Ornek	Neighborhood	762												
				Beyyazi town municipality, Ataturk	Neighborhood	1,616												
				156+722.64 - 159+231.15	Akcin	Neighbourhood			1,799						1	4		
		159+175-163+605		Erenler	Neighbourhood	8,578			1						8			
		159+231.13 - 161+885.12		Ornek	Neighbourhood	762												
		162+608-163+605		Cayirbag town municipality, Alicetinkaya	Neighbourhood	1,280			1						2			
				Cayirbag town municipality, Fatih	Neighbourhood	1,473			1									
				Cayirbag town municipality, Huzur	Neighbourhood	120			1									
				Cayirbag town municipality, Ugur	Neighbourhood	1,523			1									
		163+605-164+777		Fethibey town municipality, Fatih	Neighbourhood	848			1									
				Fethibey town municipality, Yavuzselim	Neighbourhood	1,133			1									
				Fethibey town municipality, Yunusemre	Neighbourhood	796												
				164+777-166+195	Bayatcik	Neighbourhood			191						1	2		
		166+777-169+329		Sarayduzu	Village	456			1						1			
		169+329-170+540		Ismail	Neighbourhood	491			1									
		170+540-171+550		Sadikbey	Neighbourhood	2,083			1									
		171+550-174+550		Inaz (Demircevre)	Neighbourhood	540			1									
		174+760-179+800		Koprulu	Village	1,053			1						4			
		179+800-183+940		Sinanpasa	Balmahmut	Village			503						12	1	35	13
		183+940-188+420			Bulca	Village			949							1		10
		188+422.96 - 190+681.79			Ayvali	Village			175							1		
		190+700-192+400	Akdegirmen		Village	120	1	1										
			Duzagac town municipality, Isik		Neighbourhood	654	1	4										

Railway Section	Province	Railway Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status	Population per Settlement (TurkStat, Dec 2020) (*)	Number of CLQ (PASs) (**)				Number of HHQ (PAPs) (**)					
							Province Level	District Level	Settlement Level	Section Level	Province Level	District Level	Settlement Level	Section Level		
Section 3		192+400-199+200		Duzagac town municipality, Zafer	Neighbourhood	351			1							
				Duzagac town municipality, Cumhuriyet	Neighbourhood	542			1							
				Duzagac town municipality, Fatih	Neighbourhood	518			1							
				Karacaoren	Village	342			1							
				Guney	Village	2,082			1						4	
				Elvanpasa	Village	315			1						3	
				Calislar	Village	222			1							
				Kutahya	247+648.52 - 247+794.30	Dumlupinar			Kizilca						Village	241
	Turgutozal	Neighbourhood	228				1	2								
	Zafer	Neighbourhood	322				1									
	Cumhuriyet	Neighbourhood	760				1									
	Usak	210+980-213+740	Banaz	Ciftlik	Village	364	13	9	1		21	13	8			
				Buyukoturak	Village	736			1				1			
				Halaclar	Village	273			1							
				Duzluce	Village	152			1							
				Dumenler	Village	245			1							
				Alaba	Village	593			1							
				Hatipler	Village	786			1							
				Banaz	Village	574			1				2			
				31 Agustos	Neighbourhood	4,926							11			25
				Islam	Neighbourhood	997			1						2	
				Bagkonak	Village	224										
				Gullucam	Village	354										
				Oksuz	Village	376										
	Gedikler	Village	231													

Railway Section	Province	Railway Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status	Population per Settlement (TurkStat, Dec 2020) (*)	Number of CLQ (PASs) (**)				Number of HHQ (PAPs) (**)					
							Province Level	District Level	Settlement Level	Section Level	Province Level	District Level	Settlement Level	Section Level		
		292+091.05 - 296+615.85		Kizilcasogut town municipality, Baris	Neighbourhood	619										
				Kizilcasogut town municipality, Cumhuriyet	Neighbourhood	804										
				Kizilcasogut town municipality, Emek	Neighbourhood	468										
				295+451.90 - 297+175.20	Derbent	Village			1,438							
				296+937.15 - 299+054.70	Kizilhisar	Village			1,231							
		298+803.60 - 301+723.05	Merkez	Kirka	Village	205		1				1				
		301+234.70 - 305+878.15		Kabaklar	Village	400										
		305+873.30 - 311+678.90		Yapagilar	Village	855										
		311+644.80 - 313+159.55		Koyunbeyli	Village	695										
		313+061.10 - 316+270.90		Yavi	Village	234			1				1			
		314+395.95 - 317+641.25		Hocalar	Village	102										
		317+572.85 - 320+062.60		Elmacik	Village	308										
		320+035.40 - 321+218.15		Selikler	Village	132										
		320+178.45 - 325+365.05		Karahasan	Village	193										
		325+237.45 - 326+135.30		Demiroren	Village	58										
		328+049.95 - 338+909.30	Ulubey	Omurca	Village	493		3				7				
		326+109.75 - 328+891.00		Bekdemir	Village	78			1				5			
		328.865.40 - 332+884.20		Koseler	Village	204			1				2			
		332+864.95 - 341+341.40		Uyukbasi	Neighbourhood	933										
		341+315.00 - 347+264.80		Inay	Village	666			1							
		347+270.30 - 350+712.60		Karacaahmet	Village	240										
		350+641.75 - 353+133.45		Gedikler	Village	320										
		353+077.80 - 358+604.80	Esme	Ahmetler	Village	1,032		0								
		358+530.40 - 363+852.60		Elvanlar	Neighbourhood	2,143										
		363+852- 364+949		Istasyon	Neighbourhood	4,863										

Railway Section	Province	Railway Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status	Population per Settlement (TurkStat, Dec 2020) (*)	Number of CLQ (PAs) (**)				Number of HHQ (PAs) (**)			
							Province Level	District Level	Settlement Level	Section Level	Province Level	District Level	Settlement Level	Section Level
		368+894.17 - 370+513.65		Yaylakoy	Village	44								
		370+513.65 - 372+962.73		Armutlu	Village	918								
		372+962.73 - 374+029.10		Caberler	Village	53								
		374+029.10 - 375+629.37		Guney	Village	143								
		374+743.45 - 375+781.80		Balabanci	Village	208								
		375+781.80 - 375+825.31		Cevizli	Village	88								
		375+825.31 - 378+457.57		Manavli	Village	67								
		378+457.57 - 382+318.51		Davutlar	Village	129								
		382+318.54 - 384+973.61		Narincali	Village	51								
	Manisa	384+973.69-387+350	Kula	Battalmustafa	Neighbourhood	118	31	1	1		52	4	4	
		387+353.10-388+680		Carikballi	Neighbourhood	1,119								
		405+241.47 - 406+165.76		Konurca	Neighbourhood	265								
		384+527.39-384+800.00	Alasehir	Ismailbey	Neighbourhood	135		3				11		
		388+680.00-389+880.00		Serinkoy	Neighbourhood	105								
		389+880.00-390+960.00		Caberkamara	Neighbourhood	356								
		390+960.00 - 392+926.98		Aydogdu	Neighbourhood	417			1				3	
		392+926.98 - 394+251.69		Gumusday	Neighbourhood	768								
		394+251.69 - 397+069.88		Serinyayla	Neighbourhood	836								
		397+069.88 - 400+166.70		Carikteke	Neighbourhood	170								
		398+309.38 - 398+417.20		Caberkakili	Neighbourhood	583								
		400+017.33 - 402+007.64		Isiklar	Neighbourhood	716								
		402+007.64 - 403+968.87		Selce	Neighbourhood	279								
		403+968.83 - 405+786.29		Tepekoy	Neighbourhood	2,068								
		406+165.76 - 407+569.00		Turkmen	Neighbourhood	199			1				2	
		407+568.90 - 409+016.95		Matarli	Neighbourhood	94								

Railway Section	Province	Railway Chainage (according to Expropriation Itinerary)	KM	District	Neighbourhood/Village	Settlement Status	Population per Settlement (TurkStat, Dec 2020) (*)	Number of CLQ (PASs) (**)				Number of HHQ (PAPs) (**)				
								Province Level	District Level	Settlement Level	Section Level	Province Level	District Level	Settlement Level	Section Level	
Section 4		409+016.95 - 411+410.00	-		Kasapli	Neighbourhood	659			1				6		
		411+401.16 - 415+369.85	-		Toygarli	Neighbourhood	462									
		415+369.85 - 419+286.57	-		Kemaliye	Neighbourhood	1,371									
		419+286.57 - 421+088.11	-		Ismetiye	Neighbourhood	239									
		423+504.40 - 424+511.09	-		Kavaklidere	Neighbourhood	4,731									
		421+088.11 - 422+734.17	-	Salihli	Hacili	Neighbourhood	39		11	1			19			
		424+758.68 - 426+704.27	-		Torunlu	Neighbourhood	204									
		425+187.19 - 425+583.77	-		Koseali	Neighbourhood	823									
		426+704.27 - 429+792.60	-		Yesilova	Neighbourhood	739									
		429+792.60 - 431+898.19	-		Beylikli	Neighbourhood	748									
		431+898.00 - 434+477.24	-		Kabazli	Neighbourhood	1,066									
		432+182.78 - 436+404.80	-		Durasilli	Neighbourhood	6,809			1						
		436+404.80 - 438+422.65	-		Karaoglanli	Neighbourhood	745									
		438+420.57 - 440+981.30	-		Kirveli	Neighbourhood	3,242			1				25		37
		440+981.50 - 441+477.24	-		Beseylul	Neighbourhood	1,999			1					2	
		441+477.24 - 441+957.19	-		Gaziler	Neighbourhood	1,480									
		441+955.69 - 442+628.11	-	Ataturk	Neighbourhood	3,026	1			1						
		442+623.19 - 442+985.87	-	Zafer	Neighbourhood	3,944	1			1						
		442+773.67 - 423+510.61	-	Mevlutlu	Neighbourhood	658	1			3						
		423+835.03 - 424+070.47	-													
		424+070.47 - 424+511.09	-													
		424+511.09 - 424+758.68	-													
		442+986.99 - 444+128.44	-	Keli	Neighbourhood	2,386	1			2						
		444+130.70 - 446+757.99	-	Yilmaz	Neighbourhood	6,243	1			2						
		446+780.32 - 449+952.55	-	Hasalan	Neighbourhood	241	1			1						
		449+975.41 - 454+200.93	-	Kapanci	Neighbourhood	893										

Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status	Population per Settlement (TurkStat, Dec 2020) (*)	Number of CLQ (PASs) (**)				Number of HHQ (PAPs) (**)			
							Province Level	District Level	Settlement Level	Section Level	Province Level	District Level	Settlement Level	Section Level
		454+160.47 - 455+672.91	Ahmetli	Mersindere	Neighbourhood	1,328		3	1				7	
		445+664.22 - 458+548.98		Yarasli	Neighbourhood	326			1					
		455+664.22- 467+619.58		Seydikoy	Neighbourhood	111			1					
		462+842.28 - 463+817.29		Alahidir	Neighbourhood	1,205								
		463+830.04 - 467+268.87		Gokkaya	Neighbourhood	1,048			1					
		467+268.35 - 469+468.00	Turgutlu	Urganli	Neighbourhood	4,388		9	1			6		
		468+724.96 - 470+206.42		Yenikoy	Neighbourhood	335			1					
		470+223.30 - 474+280.82		Derbent	Neighbourhood	1,800			1				1	
		474+284.65 - 476+534.59		Avsar (Partially former 10.Mintika)	Neighbourhood	2,562			1				2	
		475+983.69- 478+978.46			Neighbourhood									
		476+532.07 - 478+049.42		Sehitler (former 4.Mintika)	Neighbourhood	9,851			1					
		478+986.46 - 481+241.44		Albayrak (former 2. Mintika)	Neighbourhood	5,124			1				3	
				Istasyonalti (former 2.Mintika)	Neighbourhood	5,368			1					
		481+265.22 - 484+126.67		Mustafa Kemal (former 8. Mintika and former 11. Mintika)	Neighbourhood	9,894			1					
		483+980,44 - 488+740.25			Neighbourhood									
		487+954.09 - 489+177.01		Ataturk (former 7.Mintika)	Neighbourhood	9,113			1					
		491+597.42- 494+893.46	Sehzadeler	Asagicobanisa	Neighborhood	3,049		3	1			12	8	
		490+331.80- 491+600		Karaoglanli	Neighbourhood	1,697								
		494+200- 501+056.27		Yukaricobanisa	Neighbourhood	443			1				4	
		506+331- 507+916		Sehitler	Neighbourhood	10,893			1					
		507+916- 508+170		2. Anafartalar	Neighbourhood	6,104								
		508+170- 508+624		Kuslubahce	Neighbourhood	5,022								
		508+624- 514+607	Yunusemre	Horozkoy	Neighbourhood			1						
		521+724- 522.679		Evronos	Neighbourhood	358								
		522.679- 526+838		Muradiye	Neighbourhood	29,214								

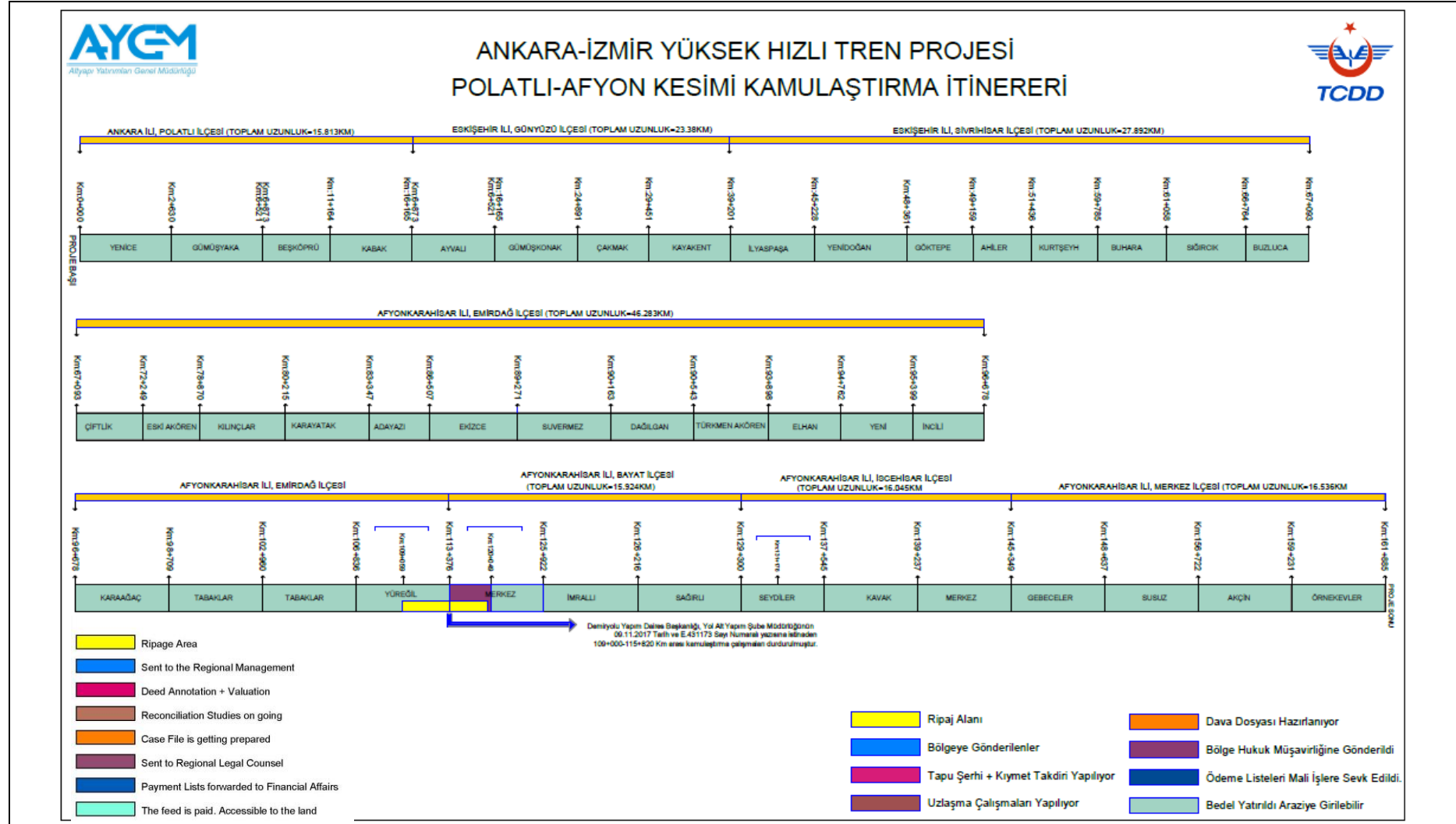
Railway Section	Province	Railway KM Chainage (according to Expropriation Itinerary)	District	Neighbourhood/Village	Settlement Status	Population per Settlement (TurkStat, Dec 2020) (*)	Number of CLQ (PASS) (**)				Number of HHQ (PAPs) (**)			
							Province Level	District Level	Settlement Level	Section Level	Province Level	District Level	Settlement Level	Section Level
		526+838-528+489		Karaali	Neighbourhood	613								
		528+489-529+527		Gurle	Neighbourhood	129								
		529+527-530+162		Akgedik	Neighbourhood	5,793								
		530+162.55 - 530+861.88		Uzunburun	Neighbourhood	174			1					
		531+517-533+200		Samar	Neighbourhood	109								
	Izmir	533+200-536+200	Menemen	Telekler	Neighbourhood	157								
		536+200-539+100		Suleymanli	Neighbourhood	525								
		540+000.00 - 542+091.09		Emialem Degirmendere	Neighbourhood	1,172	0	0		0	0			
		544+790-547+466		Yahselli	Neighbourhood	4,582								
		547+466-547+648		Esatpasa	Neighbourhood	9,310								
		547+648-547+687		Kasimpasa	Neighbourhood	15,258								
Total						294,939	120	120	120	120	223	223	223	223

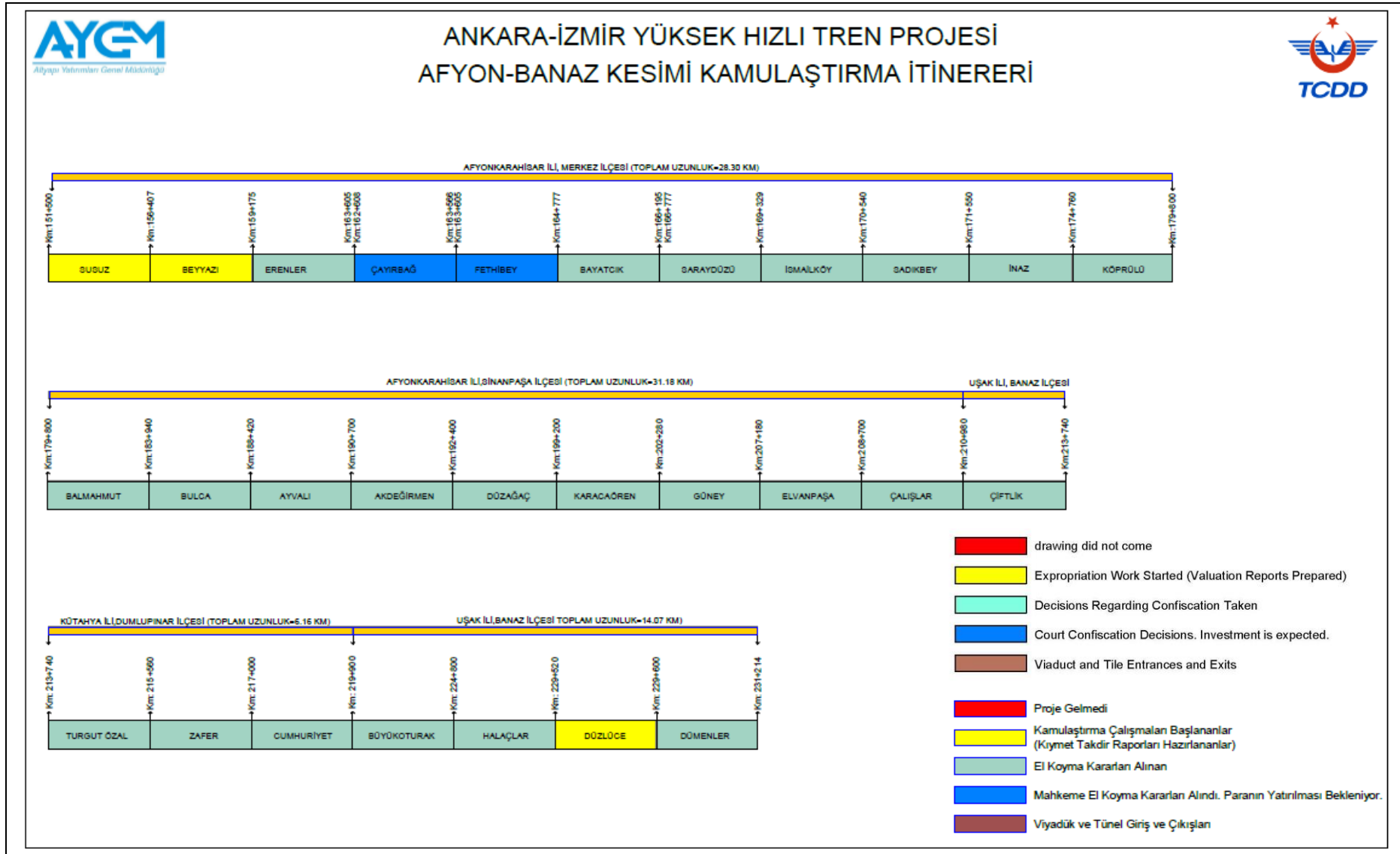
(*) Source: (TurkStat), T., December 2020. Turkish Statistical Institute Addressed-based Population Registration System Findings. [online] Turkstat.gov.tr. Available at: <<https://biruni.tuik.gov.tr/medas/?kn=95&locale=tr>> [Accessed February 2021].

(**) In addition to PAs affected from Project-related land acquisition, CLOs and/or HHQs have been conducted in the following settlements:

- Turktaciri (Polatli, Ankara): CLQ
- Pasacik (Suhut, Afyonkarahisar): CLQ
- Balcidam (Banaz, Usak): CLQ
- Karakose (Banaz, Usak): CLQ and HHQ
- Sart (Salihli, Manisa): CLQ and HHQ
- Gaffur Okan (Salihli, Manisa): CLQ
- Cikrikci (Turgutlu, Manisa): CLQ
- Yenikoy (Sehzadeler, Manisa): CLQ

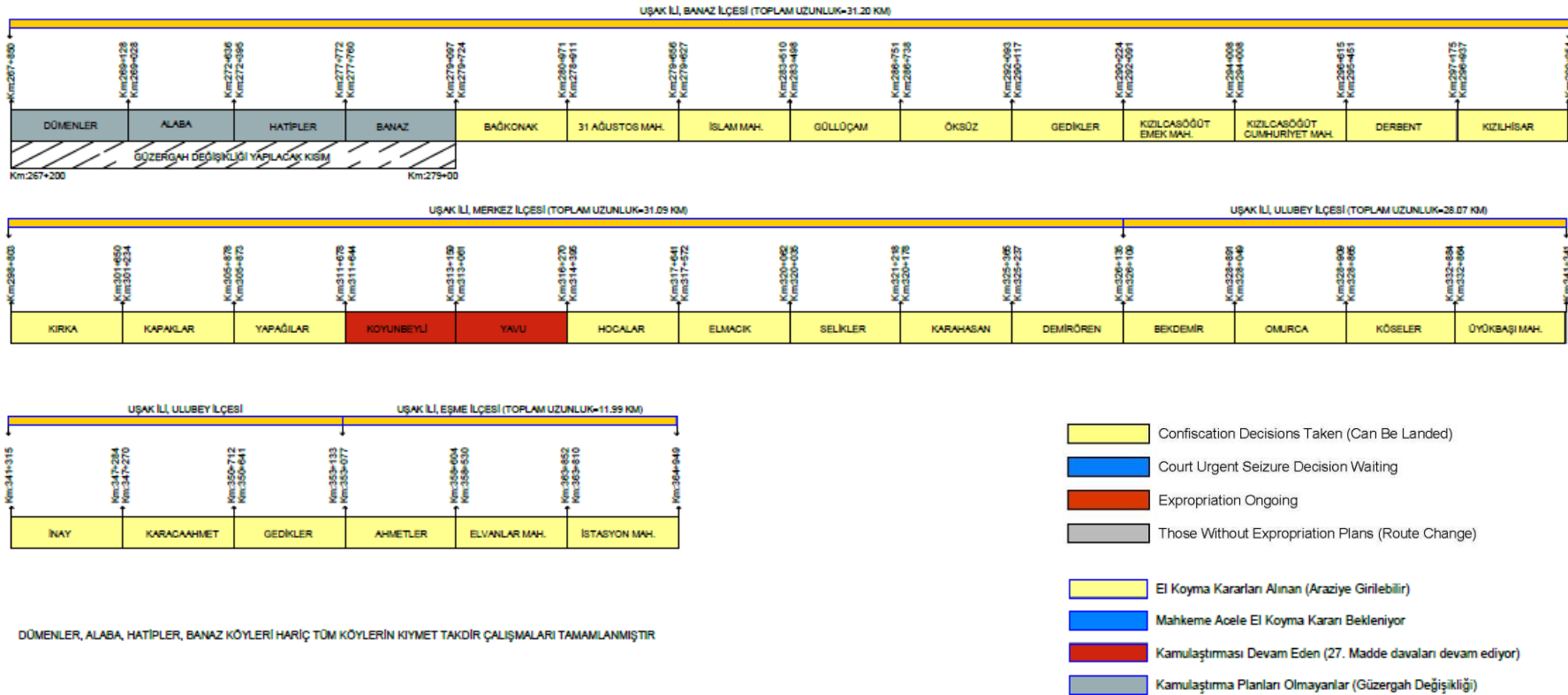
D.2 Settlement Based Status of Expropriation

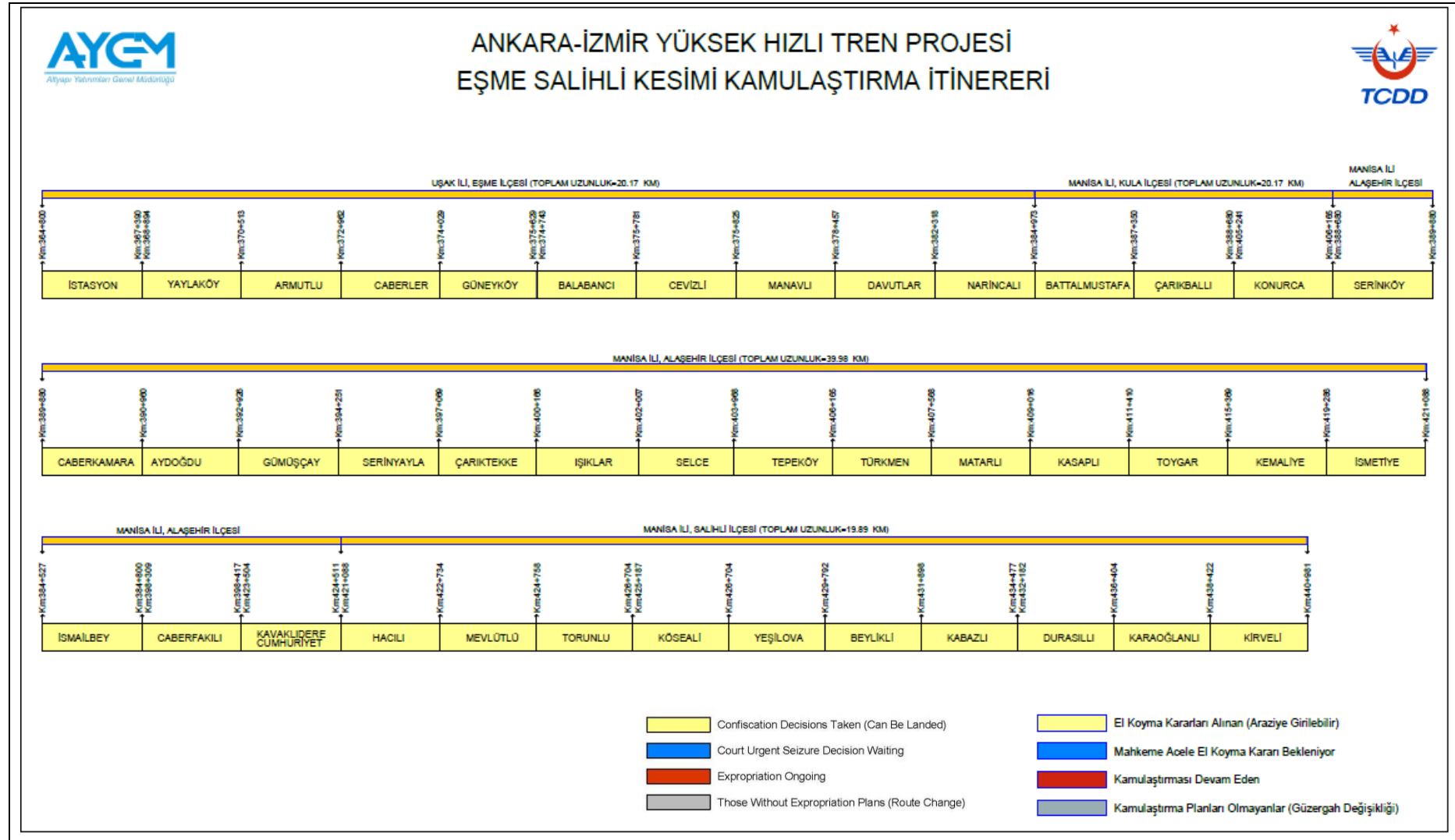


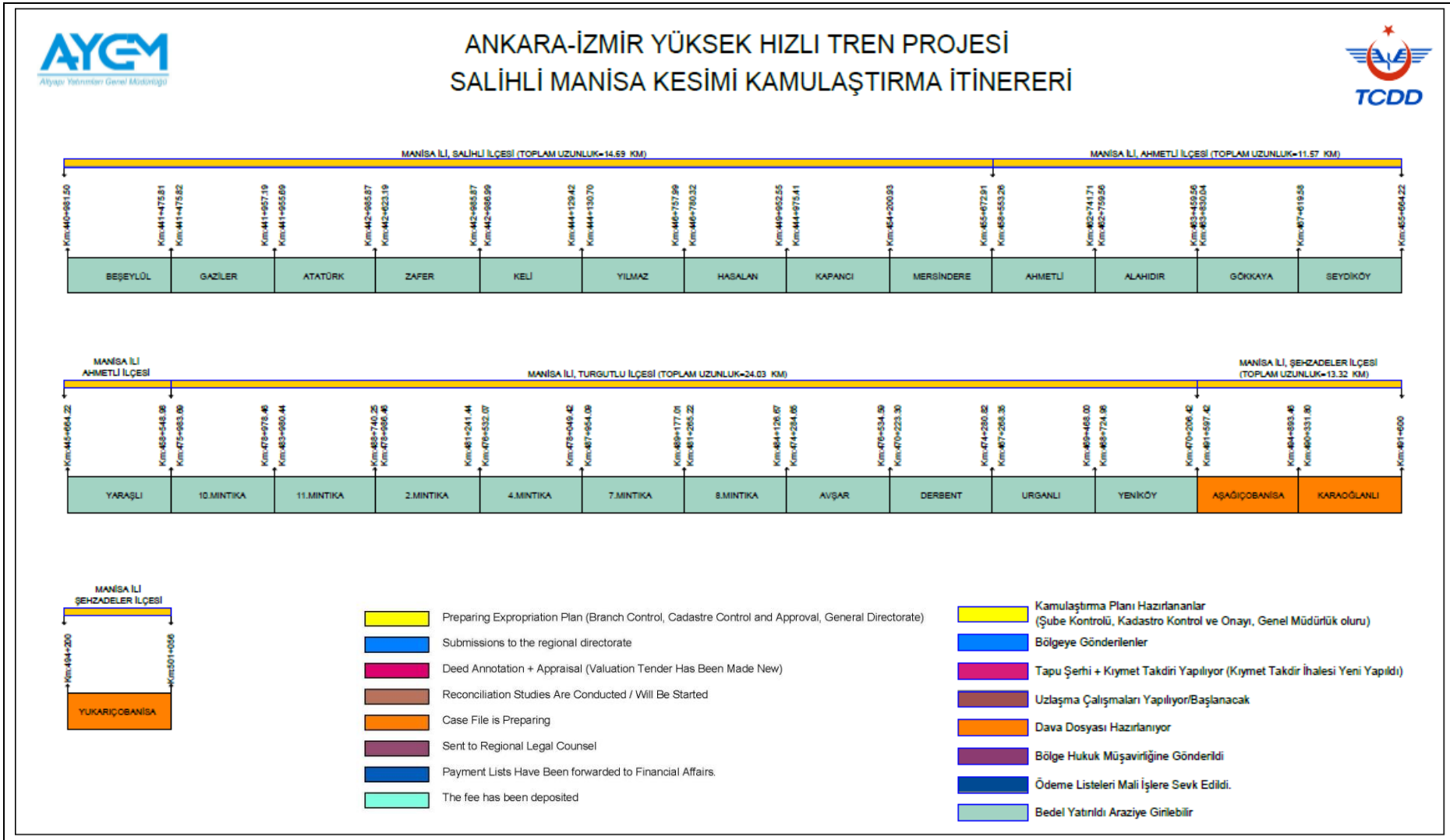


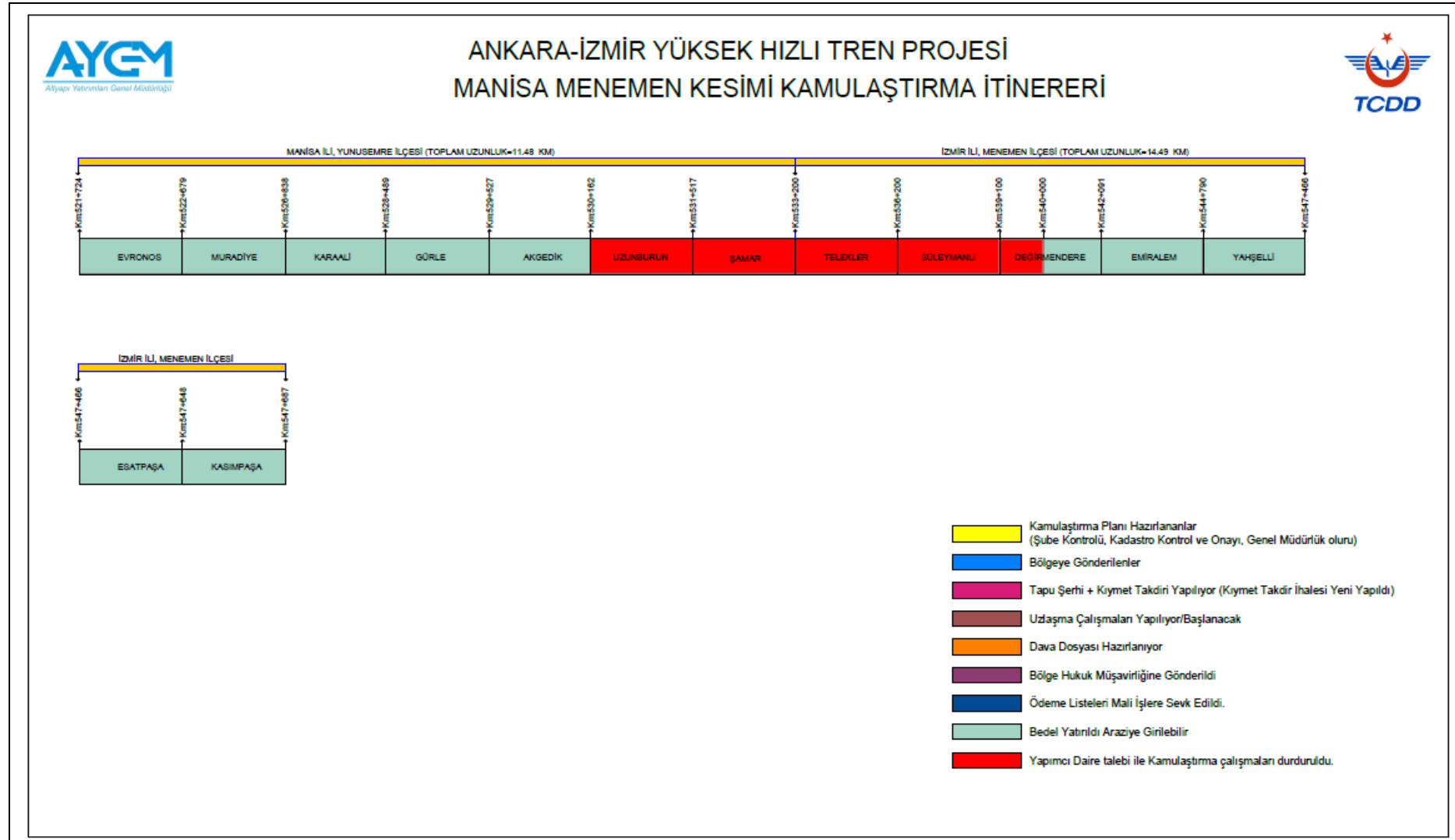


ANKARA-İZMİR YÜKSEK HIZLI TREN PROJESİ BANAZ-EŞME KESİMİ KAMULAŞTIRMA İTİNERERİ



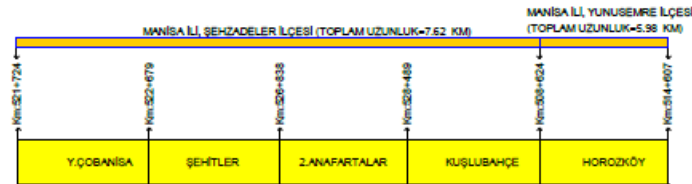








ANKARA-İZMİR YÜKSEK HIZLI TREN PROJESİ MANİSA KUZEY GEÇİŞİ KAMULAŞTIRMA İTİNERERİ



- Kamulaştırma Çalışmalarının ikmal edilmesi 07.08.2019 t. ve 2671412 sayılı yazı ile 3. Bölge Müdürlüğüne Emirlenmiştir. (3. Bölge Müdürlüğüne herhangi bir çalışma başlatılmamıştır.)
- Bölgeye Gönderilenler
- Tapu Şerhi + Kıymet Takdiri Yapılıyor (Kıymet Takdir İhtalesi Yeni Yapıldı)
- Ulaşma Çalışmaları Yapılıyor/Başlanacak
- Dava Dosyası Hazırlanıyor

Appendix E – Cultural Heritage Management Plan (including Chance Find Procedure)

Ankara Izmir High Speed Railway Project
Cultural Heritage Management Plan
(CHMP)

Rev	Status	Date	Status Description	Issued by	Checked by	Approved by
Rev B	IDC	12.03.2021	Inter-Discipline Check	OZAH	DAGU	ARAM

LIST OF ABBREVIATIONS

CHMP	Cultural Heritage Management Plan
Contractor	Ankara-Izmir HSR Construction Joint Venture
HSR	High Speed Railway
ICOMOS	International Council of Monuments and Sites
IFA	Institute of Field Archaeologists
UNESCO	United Nations Educational, Scientific and Cultural Organization

1. Introduction

This Cultural Heritage Management Plan (CHMP) has been developed for the Ankara-Izmir High Speed Railway (HSR) Project based on the outcomes of the Environmental and Social Impact Assessment (ESIA) study.

The purpose of this CHMP is to set out the mitigation measures developed based on the mitigation hierarchy to address and manage potential impacts on the cultural heritage (tangible) in accordance with the requirements of the Law on the Conservation of Cultural and Natural Property (Law No: 2863,1983), international conventions regarding the cultural heritage to which Turkey is a party and the guiding principles of the IFC Performance Standard 8 on Cultural Heritage and the Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, ICOMOS 2011.

This CHMP applies to all Project activities that have the potential to cause an impact on the cultural heritage.

The CHMP will be implemented throughout the construction phase to avoid and -where avoidance is not possible- minimise and mitigate impacts of the activities on the registered and non-registered archaeological and cultural heritage sites within the Project impact area, consisting of the Project expropriation and cultural heritage impact corridor¹³⁵ along the HSR route (including routes connecting the HSR to other HSRs and conventional railway lines) and footprint of the off-site facilities (e.g. quarries, material borrow sites, access roads, etc.) located outside the Project expropriation corridor.

This CHMP has been prepared in consideration of the Project facilities included in the ESIA Report and outcomes of the cultural heritage surveys conducted as part of the Project ESIA. The CHMP will be applicable to all Project facilities (inside and outside the Project expropriation corridor including quarries and material borrow sites and their access routes that may be required for Project construction with approval of the related governmental authorities). Following the final selection of the alternative Project facilities, field surveys will be conducted by qualified cultural heritage experts prior to site entry so as to identify site-specific impacts and management measures.

The CHMP includes a Chance Finds Procedure for managing chance finds that may be unexpectedly encountered during Project implementation. It intends to support the conservation of cultural heritage in the context of applicable international standards, protect cultural heritage from potential adverse impacts of the Project activities, promote the equitable sharing of benefits from the use of cultural heritage; and promote the awareness of, and appreciation of, cultural heritage where possible.

This CHMP is a living document and will be updated as necessary (e.g. based on additional field data to be collected at Project facility sites).

¹³⁵ Cultural heritage impact corridor represents the 50 meter-wide corridor at each side of the Project expropriation boundary (making a total of 100 m corridor beyond the expropriation corridor, referred to as 100 m impact corridor or impact corridor throughout the CHMP).

2. Objectives

The general objectives of this CHMP are to:

- Outline the applicable standards with regards to the protection of cultural heritage;
- Identify the actual and potential sources of impact on Cultural Heritage;
- Establish effective plans and procedures for managing and mitigating impacts to cultural heritage sites.
- Define roles and responsibilities;
- Define monitoring and reporting procedures;
- Define training requirements.

3. Project Standards

The Project will comply with the national legislative requirements, international conventions and agreements ratified by Turkey, and international standards applicable to the protection and management of cultural heritage, as summarised in the following sections.

3.1. National Legislation

As per Article 63 of the Constitution of the Republic of Turkey, "The State shall ensure the protection of the historical, cultural and natural assets, and shall take supportive and promotive measures towards that end".

In line with the Constitution, movable and immovable cultural and natural assets are protected and shall be conserved under the Law on the Conservation of Cultural and Natural Property (Law No: 2863,1983).

Immovable cultural and natural property to be protected by legislation are specified under Article 6 of the Law as below:

- Natural property to be protected and the immovable property built until the end of the 19th century,
- The immovable property created after the mentioned date that the MoCT deems necessary to be protected considering its importance and characteristics,
- Immovable cultural property situated in the conservation site¹³⁶,
- Buildings that were stages of great historic events during the National War of Independence and the Foundation of the Republic of Turkey that are not subject to time and registration rules due to their importance for national history, areas to be identified as such and houses used by Mustafa Kemal Atatürk,
- However, the immovable property not decided to be protected by the Conservation Councils on the basis of their architectural, historical, aesthetic, archaeological and other important characteristics shall not be regarded as immovable cultural property to be protected.
- Rock-cut tombs, stones with inscription, painting, and relief, cave paintings, mounds (höyük), tumuli, archaeological sites, acropolis and necropolis, castle, fortress, tower, wall, historic barrack, bastion and fortification with their fixed weaponry, ruins, caravanserai, khan, public bath and madrasah, cupola, tomb and tablets, bridges, aqueducts, waterways, cisterns and wells, ancient road ruins, stones indicating distance, stones with holes delineating ancient borders, obelisks, altars, shipyards, quays, ancient palaces, pavilions, dwellings, waterside residences and mansions, mosques, masjids, musallahs, namazgahs, fountains and sebils, imarethane (communal kitchen), mint, şifahane (hospital), muvakkithane (room for the mosque timekeeper), simkeşhane (silver shop), tekke (dervish lodge) and zaviyahs, cemeteries, hazire (graveyard), arasta, bedesten, bazaar, sarcophagi, stelae, synagogue, basilica, church, monasteries, külliye (complex of buildings adjacent to a mosque), ancient monuments and mural ruins, frescoes, reliefs, mosaics, chimney rocks and similar immovable are examples of immovable cultural property.
- Historic rock shelters, tree and tree populations with special characteristics and such are examples of immovable natural property.

¹³⁶ As per the Law on Conservation of Cultural and Natural Properties (Law No. 2863, 1983), conservation site shall be the cities and remains of cities that are product of various prehistoric to present civilisations that reflect the social, economic, architectural and similar characteristics of the respective period, areas that have been stages of social life or important historical events with a concentration of cultural property and areas the natural characteristics of which have been documented to require protection.

The relevant requirements of the Law on Conservation of Cultural and Natural Property (Law No. 2863, 1983) applicable to the Project construction works are listed below:

Article	Provision
Article 4 – Obligation to Notify	<p>Persons that discover movable and immovable cultural and natural property, owners, proprietors or occupants that know or have recently found out about the existence of cultural and natural property on the land they own or use shall be obliged to notify the nearest museum directorship or the village headman or the local administrators of other places within at the latest three days.</p> <p>If such property is in military garrisons and restricted areas, the relevant command levels shall be notified in line with the relevant procedure.</p> <p>The village headman, the local administrator receiving such notification or the relevant authorities that are directly notified of such property shall take the necessary measures to protect and secure such property. The village headman shall notify the nearest local administrator as of the situation and the measures taken on the same day. The local administrator and other authorities shall notify in writing the MoCT and the nearest museum directorship within ten days.</p> <p>Upon receiving this notification, the Ministry and Museum Director shall instigate due proceedings as soon as possible in line with the provisions of this law.</p>
Article 5 – Quality of state property	<p>Immovable property belonging to the state, public institutions and organisations and movable and immovable cultural and natural property to be protected that is known to exist or will be discovered on an immovable property owned by real and legal persons subject to civil law shall have the quality of state property.</p> <p>Registered and annexed foundation property subject to a separate status due to its special qualities shall not be covered by this provision.</p>
Article 25 – Transfer to Museums	<p>MoCT shall classify and register based on scientific principles movable cultural and natural property declared to MoCT according to article four and movable cultural and natural property to be protected as specified in article 23. Antiquities that need to be conserved in state museums shall be duly transferred to museums.</p> <p>The criteria, procedures and principles for classification, registration and transfer to museums of movable cultural and natural property to be protected shall be specified in a regulation.</p> <p>The historical features of all kind of weapons and materials concerning Turkish military history shall be surveyed, examined and evaluated by the General Staff at the location they are found or are reported to be found.</p> <p>Antiquities excluded from the classification and registration and not needed to be placed in museums shall be returned with a document to their owners. The cultural property that has been returned with a document shall be at the discretion of their owner. Antiquities not taken back within one year by their owners can be kept at the museum or sold duly by the State.</p>

In addition to the Law on Conservation of Cultural and Natural Property (Law No: 2863, 1983), secondary legislation (e.g. regulations, principal decisions) govern the procedures about the conservation of cultural and natural assets. The most prominent one being the Principal Decision No. 658 issued on 5 November 1999, which states that all archaeological sites need to be classified and protected according to their significant features. Three main categories are determined relevant to archaeological sites as:

Site Category	Definition
1st Degree Archaeological Sites	Areas requiring highest level of protection. They shall be preserved except for scientific excavations. The area shall be free of any type of buildings and construction. All kinds of construction, excavation, and modification activities are prohibited. However, for exceptional cases such as the necessity for essential infrastructure construction, Regional Preservation Boards may permit such activities based on the approval of the relevant museum and the head of the scientific excavation team.
2nd Degree Archaeological Sites	Areas requiring medium level of protection. They shall be preserved based on the conditions of protection and utilisation set by the Regional Preservation Boards. Additional construction is prohibited. As the 1st Degree Sites, for exceptional cases such as necessity for infrastructure construction among others, Regional Preservation Boards may permit such activities based on the approval of the relevant museum and the head of the scientific excavation team.
3rd Degree Archaeological Sites	Lowest level of protection area. Construction is permitted based on the decisions of Regional Preservation Boards. Before applying for a construction permit, test pit excavations shall be conducted, and the outcomes of these excavations shall be reviewed by the relevant museum and, if present, the head of the scientific excavation team. Reviews shall be submitted to Regional Preservation Boards. The Boards may ask for extension of the coverage of test pits before taking any decision.

Furthermore, Implementation Guidelines for Field Surveys, Test Pits and Excavation Works on Cultural and Natural Properties (Ministry approval number 94949537-160.99-51264, dated 13 March 2013) define the procedures for salvage excavations, archaeological test pits and other studies.

3.2. International Conventions

Turkey has ratified the following key international conventions regarding the cultural heritage, which are applicable to the Project:

- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention on the Protection and Promotion of the Diversity of Cultural Expressions. Paris, 20 October 2005
- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention for the Safeguarding of the Intangible Cultural Heritage. Paris, 17 October 2003.
- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention concerning the Protection of the World Cultural and Natural Heritage. Paris, 16 November 1972.
- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. Paris, 14 November 1970.

3.3. International Standards and Guidelines

The guiding principles of the following international standards are also applicable to the Project:

- The IFC Performance Standards on Environmental and Social Sustainability (2012), PS 8 on Cultural Heritage.
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, ICOMOS 2011.

The objectives of PS 8 are:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits from the use of cultural heritage.

4. Roles and Responsibilities

The Republic of Turkey Ministry of Transport and Infrastructure (MoTI), Directorate General of Infrastructure Investments (AYGM) is the employer ("Employer") as per the FIDIC contract model applicable to the Project and the owner of the Project.

The authorities responsible from the management of cultural heritage within the scope of the Project and their respective responsibilities are described below:

- The Ministry of Culture and Tourism, related Museum Directorates and Regional Councils for the Conservation of Cultural Property are the responsible authorities regarding all archaeological and cultural heritage related issues.
- The related Museum Directorates are responsible from taking the necessary measures to protect and secure such property. The Museum Directorates are to dispatch experts to the sites within the shortest possible time after being informed and to officially identify the chance finds. The Museum Directorates are responsible for the management of further studies within the chance find areas. The Museum Directorate will follow the directions and decisions of the related Regional Councils for the Conservation of Cultural Property (see Annex 1 for the contact information of the related Museum Directorates).
- The related Regional Councils for the Conservation of Cultural Property have responsibilities on any intervention which would be made on the site after the chance find (see Annex 1 for the contact information of the related Regional Councils).

The Contractor will assist and collaborate with the Employer for the management of all cultural heritage properties during the construction phase of the Project and implementation of related management plan and the chance find procedure. All employees involved in construction works will be trained for the implementation of the procedure.

The roles and responsibilities of the Project Environmental and Social Management System (ESMS) team related to cultural heritage within the scope of the Project are summarised below:

ESMS Team Member	Cultural Heritage Related Roles and Responsibilities
Senior Management ESMS Team	<ul style="list-style-type: none"> • Assist and collaborate with the Employer for the effective implementation of the CHMP throughout the construction phase of the Project.
HSE Manager	<ul style="list-style-type: none"> • Assist and collaborate with the Employer for overseeing compliance of Project cultural heritage implementations with the national legislation and Project Standards, as reflected in the Project ESAP and ESIA commitments and reporting the Project implementations with regard to cultural heritage management. • Confirm that necessary approvals required by the Contractor and subcontractors for the management of cultural heritage are obtained from the cultural heritage authorities. • Approve HSE training plans, including training on CHMP and Chance Find Procedure implementation by Project personnel. • Conduct and/or organise internal site audits covering cultural heritage management across the Project. • Review reports submitted by the Cultural Heritage/Archaeological Monitoring Expert/s • Work in coordination with Social Manager and HR Manager to review internal and external grievances concerning cultural heritage management, if any, and ensure/verify that the site teams address the grievances/corrective actions in responsive timeframes in accordance with the Project SEP; approve corrective actions to be implemented by site personnel. • Participate to meetings related to cultural heritage issues. • Report to the Senior Project Management Team on Project's HSE Performance and key HSE issues including implementation of CHMP and Chance Find Procedure.

ESMS Team Member	Cultural Heritage Related Roles and Responsibilities
Cultural Heritage/Archaeological Monitoring Expert/s	<ul style="list-style-type: none"> Provides advice in the form of a 'preliminary assessment' to the site chiefs and ESMS team members on the significance and implications of new archaeological discoveries in the project activity areas. Ensures Chance Find Procedure is followed, Conducts and documents pre-construction/pre-activity surveys Records archaeological features discovered during pre-construction and ground disturbance activities. Determines the needs for cultural heritage resources protection and implement mitigation measures. Has the authority to stop ground disturbance activities to investigate potential chance finds. Ensures that the relevant cultural heritage signs are displayed where and when required. Implements chance find procedure and provides expertise during a chance find. Delivers cultural heritage preservation trainings to all project staff. Issues non-compliances when required and ensures all corrective actions are completed in a timely manner Provides daily field and monitoring reports to the HSE manager Conforms to all requirements of the archaeological/cultural heritage properties recommendations in the ESIA

Cultural heritage authorities (Regional Councils for the Conservation of Cultural Property and Museum Directorates) responsible in the provinces and districts crossed by the Project are listed below:

Cultural Heritage Authority	Province	District	Responsibility Area - Railway KM	
			From	To
Regional Council for the Conservation of Cultural Property				
Ankara Regional Council No: 1	Ankara	Polatli	0+000	7+050
Eskisehir Regional Council	Eskisehir	Gunyuzu	7+050	37+241
		Sivrihisar	37+241	70+595
	Afyonkarahisar	Emirdag	70+595	114+077
		Bayat	114+077	124+715
			127+824	129+027
		Iscehisar	124+715	127+824
			129+027	143+785
		Merkez	143+785	179+546
		Sinanpasa	179+546	210+845
			210+845	212+057
Kutahya Regional Council	Usak	Banaz	221+018	227+865
	Kutahya	Dumlupinar	212+057	221+018
Izmir Regional Council No.2	Manisa	Salihli	443+000	454+867
		Ahmetli	454+867	467+104
		Turgutlu	467+104	490+000
		Sehzadeler	490+000	506+000
		Yunusemre	506+000	533+491
			533+491	547+805
	Izmir	Menemen	533+491	547+805
Related Museum Directorate				
Anatolian Civilisation Museum	Ankara	Polatli	0+000	37+241
Eskisehir Museum	Eskisehir	Gunyuzu	7+050	37+241
		Sivrihisar	37+241	70+595
Afyonkarahisar Museum	Afyonkarahisar	Emirdag	70+595	114+077
		Bayat	114+077	124+715
			127+824	129+027
		Iscehisar	124+715	127+824
			129+027	143+785
		Merkez	143+785	179+546
		Sinanpasa	179+546	210+845
			212+057	221+018
Kutahya Museum	Kutahya	Dumlupinar	212+057	221+018
Usak Museum	Usak	Banaz	210+845	212+057
			221+018	227+865
Manisa Museum	Manisa	Salihli	443+000	454+867
		Ahmetli	454+867	467+104
		Turgutlu	467+104	490+000
		Sehzadeler	490+000	506+000
		Yunusemre	506+000	533+491
Izmir Museum	Izmir	Menemen	533+491	547+805

5. Training, Reporting and Monitoring

5.1. Training

The cultural heritage/archaeological monitoring expert/s will provide cultural heritage training to all Project staff including the implementation of the chance find procedure.

These trainings will be repeated periodically.

The expert/s and the site management will periodically **meet** once a month or when deemed necessary. The records of the training such as attendee list, the presentation made during the training, etc. will be kept by the experts as hard copy and electronical copy.

5.2. Reporting

The cultural heritage/archaeological monitoring expert/s will record all chance finds on the Chance Find Report Form (see Annex 2) and the Chance Find Register (see Annex 3) as per the Chance Find Procedure described in this CHMP. The register will be kept up to date by the experts. The Chance Find Report Form will be kept in hard copy and as electronical copy (scanned version) at the Project construction camp sites. A summary of the status of chance finds will be reported by the experts to the HSE Manager on a weekly basis.

5.3. Monitoring

The function of the archaeological monitoring process will be as follows:

- Provide advice to define the areas where the construction activities may continue or shall be stopped due to archaeological/movable/immovable cultural heritage findings.
- To record archaeological/cultural heritage features observed on, and close to the existing project related areas.
- To record archaeological/cultural heritage features discovered during project construction activities.
- To provide advice in the form of a 'preliminary assessment' to the relevant department on the significance and implications of new archaeological discoveries on the project construction areas.

All ground disturbance activities will be monitored by cultural heritage/archaeological monitoring expert/s during the construction activities. In case of encountering any archaeological/cultural heritage findings, the Chance Find Procedure will be initiated as described in Chapter 7.

The schedule for monitoring will be developed in coordination with the construction schedule. Monitoring activities will be implemented daily. The monitoring schedule will be dictated by the construction schedule as determined by the construction/operation management.

6. Archaeological/Cultural Heritage Findings

The procedure given in Chance Find Procedure will be followed in case of encountering a chance find is based on national legislation and provisions of international standards and best practices. Description of the significance levels of the findings is given below.

The significance of the archaeological/cultural heritage finding may vary upon the assessment of the related Museum Directorates (see Annex 1). Regardless of the level of significance, in case of a finding the construction activities will be ceased in the field where the finding is discovered, and the findings will be reported to the relevant museum expert. Following the completion of investigation of the relevant Museum Directorate, the necessary arrangements, such as the identification of the boundaries of the archaeological/cultural heritage property/site (finding), its protection by taking necessary measures, notification of workers in order to prevent any physical intervention, will be implemented.

6.1. Minor Significance

This type of findings is comprised of a finding isolated from its environment or findings in notably small sizes which may be found by chance. In this case, Chance Find Procedure will be followed.

6.2. Moderate Significance

This type of findings is small scale findings in groups or single findings with medium size architectural elements such as tombs. In this case, Chance Find procedure will be followed. In order to prevent a possible damage, necessary arrangements must be made to determine the boundaries of the archaeological remains to keep the construction equipment out of access.

6.3. Major Significance

This type of findings is comprised of findings with great importance such as a settlement area, a tumulus, a mound or a big necropolis (wide graveyard areas with archaeological characteristics) and the construction activities must be immediately stopped and Chance Find Procedure will be followed. This type of chance find may cover the entire construction site and the relevant project areas such as camp sites, quarries, soil stock area etc. that the entrance and exit of the construction equipment and vehicles cannot be managed without giving any damage to the archaeological remains.

Table 6-1. Archaeological and Cultural Heritage Site List within Project Construction and Project Impact Area

Site No.	Site Name (*)	District, Province	Neighbourhood / Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites			Description Features	Site Position					Approximate Distance to the Land Acquisition Corridor (m)	Mitigation Measures					
					Yes	No	Archaeological Site	Potential Archaeological Site	Other		Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site		Notify the Museum Directorate	Mark as Sensitive Area in the Project/Construction Drawing and Quarry Plans	Official Decision of the CH / Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required	Other Site-Specific Mitigation Measures
1	Yagmurbaba	Polatlı, Ankara	Yagmurbaba	Yagmurbaba-4 Quarry Site		x	x			Tumuli				x		0	x	x	x	x	x	License boundaries– presented in this ESIA Report – have been narrowed down to mitigate the predicted impacts. There will be no Project/quarry activity within a distance of 10 metres from the archaeological site boundary.
2	Callı Baba	Polatlı, Ankara	Yagmurbaba	Yagmurbaba-4 Quarry Site		x	x			Flat Settlement				x		0	x	x	x	x	x	
3	Gumuskonak	Gunyuzu, Eskisehir	Gumuskonak	20+500 - 20+590		x	x			Pastoral Settlement		x				20	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
4	Capkininbel	Sivrihisar, Eskisehir	Yenidogan	45+155 – 45+203		x	x			Tumuli			x			290	x	x				Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
5	Alihoyugu	Sivrihisar, Eskisehir	Ahiler	50+860 - 50+980		x	x			Hoyuk	x					0	x	x	x	x	x	
6	Sogutlu	Sivrihisar, Eskisehir	Kurtseyh	56+700 – 57+000		x	x			Slope Settlement	x					0	x	x	x	x	x	
7	Mahmutozu Grave Stele	Sivrihisar, Eskisehir	Sigircik	64+140		x			x	Grave Stele		x				0	x				x	The Contractor will apply to the related authorities to ensure that the artifact is transported to a secure area under the control of the museum directorate in the pre-construction period.
8	Mahmutozu	Sivrihisar, Eskisehir	Sigircik	65+900 – 66+400		x	x			Flat Settlement/ Old Cemetery	x					0	x	x	x	x	x	
9	Samangedigi	Emirdag, A.Karahisar	Ciftlik	67+600 - 68+150		x	x			Flat Settlement	x					0	x	x	x	x	x	
10	Kelkaklik	Emirdag, A.Karahisar	Karaagac	98+010 – 98+065		x			x	Stone Bridge		x				5	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
11	Tabaklar	Emirdag, A.Karahisar	Hurriyet	Tabaklar Quarry Site		x			x	Smelting Furnace Complex					x	0	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may

Site No.	Site Name (*)	District, Province	Neighbourhood / Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites			Description Features	Site Position					Approximate Distance to the Land Acquisition Corridor (m)	Mitigation Measures					
					Yes	No	Archaeological Site	Potential Archaeological Site	Other		Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site		Notify the Museum Directorate	Mark as Arch. Sensitive Area in the Project/ Construction Drawings and Quarry Plans	Official Decision of the CH / Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required	Other Site-Specific Mitigation Measures
																						occur/happen outside the Impact Corridor of the Project.
12	Hurriyet	Emirdag, A.Karahisar	Hurriyet	99+300 – 99+450		x	x			Tumuli			x			417	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
13	Emirinkoy	Emirdag, A.Karahisar	Emirinkoy	Emirin Koyu Quarry Site		x	x			Slope Settlement					x	0	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
14	Emirinkoy Cementery	Emirdag, A.Karahisar	Emirinkoy	105+250 – 105+400		x			x	Modern/ Old Cemetery		x				35	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
15	Kumderesi	Emirdag, A.Karahisar	Yuregil	107+900 - 108+250		x	x			Flat Settlement/ Hoyuk	x					0	x	x	x	x	x	
16	Tavsantepe	Bayat, A.Karahisar	Merkez	115+300 – 115+420		x	x			Watch Tower		x				12	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
17	Cinkic	Bayat, A.Karahisar	Merkez	119+500 – 119+605	x					Hoyuk			x			112		x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
18	Seydiler	Iscehisar, A.Karahisar	Seydiler	131+650 – 132+770	x					Flat Settlement	x					0		x	x	x	x	
19	Buyuk Kepez	Merkez, A.Karahisar	Gebeciler	145+360 – 145+745	x					Hilltop Settlement			x			148		x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
20	Kepez Altı	Merkez, A.Karahisar	Gebeciler	145+437 – 145+515		x	x			Tumuli	x					0	x	x	x	x	x	
21	Pirenlikuyu	Merkez, A.Karahisar	Gebeciler	146+220 – 146+420		x	x			Hoyuk		x				16	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
22	Kuzviran	Merkez, A.Karahisar	Susuz - Sakarya	149+460 – 149+620		x		x		Necropolis	x					0	x	x	x	x		

Site No.	Site Name (*)	District, Province	Neighbourhood / Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites			Description Features	Site Position					Approximate Distance to the Land Acquisition Corridor (m)	Mitigation Measures					
					Yes	No	Archaeological Site	Potential Archaeological Site	Other		Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site		Notify the Museum Directorate	Mark as Sensitive Area in the Project/ Construction Drawing s and Quarry Plans	Official Decision of the CH / Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required	Other Site-Specific Mitigation Measures
23	Eyupoglu	Merkez, A.Karahisar	Susuz - Sakarya	149+810 – 149+960	x					Hoyuk	x					0		x	x	x	x	
24	Eyupoglu Necropolis	Merkez, A.Karahisar	Susuz - Sakarya	150+030 – 150+174		x	x			Necropolis	x					0	x	x	x	x	x	
25	Cesmealti	Merkez, A.Karahisar	Susuz - Sakarya	150+865 – 150+982		x	x			Tumuli	x					0	x	x	x	x	x	
26	Yunakbasi	Merkez, A.Karahisar	Beyazit	Afyonkarahisar Connection Line	x					Hoyuk	x					0		x	x	x	x	
27	Guzelim Tepesi	Merkez, A.Karahisar	Beyyazi	Beyyazi Quarry Site	x					Historical Site					x	31		x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
28	Oren	Sinanpasa, A.Karahisar	Guney Asagi	204+413 – 204+443		x			x	Stone Bridge	x					0	x	x	x	x	x	Traffic caused by the project will be restricted for the area. Regular monitoring activities will be carried out to avoid damage on the bridge structure due to Project construction works.
29	Dolay	Sinanpasa, A.Karahisar	Gunay Asagi	205+930 – 206+137		x	x			Hoyuk			x			195	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
30	Olukbasi	Dumlupinar, Kutahya	Cumhuriyet	217+087 – 217+237		x		x		Pastoral Settlement	x					0	x	x	x	x		
31	Alaba	Banaz, Usak	Alaba	270+600 – 270+850		x			x	Modern Cemetery		x				18	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.
32	Ahmetlidag	Esme, Usak	Kolankaya	Kolankaya Quarry Site		x	x			Hilltop Settlement				x		0	x	x	x	x	x	Quarry activities can be accomplished within 10 meters of the archaeological site boundary.
33	Toprakcukuru	Turgutlu, Manisa	Urganli	468+055 – 468+445		x	x			Flat Settlement	x					0	x	x	x	x	x	
34	Kuslubahce	Sehzadeler, Manisa	Kuslubahce	508+520 – 508+668		x		x		Flat Settlement	x					0	x	x	x	x		
35	Magrabahce	Yunusemre, Manisa	Horozkoy	510+724 – 510+875		x	x			Flat Settlement	x					0	x	x	x	x	x	
36	Degirmendere	Menemen, Izmir	Degirmendere	Degirmendere Quarry Site		x		x		Old Cemetery				x		0	x	x	x	x		

Site No.	Site Name (*)	District, Province	Neighbourhood / Village	Approximate Railway Kilometre (KM)/Name of the Quarry Site	Registration Status		Classification of registered Sites			Description Features	Site Position					Approximate Distance to the Land Acquisition Corridor (m)	Mitigation Measures					
					Yes	No	Archaeological Site	Potential Archaeological Site	Other		Within the Land Acquisition Corridor	Outside the Land Acquisition Corridor, within 100 m Impact Corridor	Outside Impact Corridor	Within the Quarry Site	Outside the Quarry Site		Notify the Museum Directorate	Mark as Arch. Sensitive Area in the Project/Construction Drawing and Quarry Plans	Official Decision of the CH / Authority to be Implemented (e.g. trial excavations, salvage excavations, technical drawings, blasting restrictions, etc.)	Physical Intervention to be Avoided Until Final Decision of the CH Authority is Issued	Arch. Monitoring is Required	Other Site-Specific Mitigation Measures
37	Caltidere	Aliaga, Izmir	Caltidere	Caltidere-2 Quarry Site		x	x			Castle/Slope Settlement					x	30	x	x			x	Avoid any accidental impact due to Project-related traffic, material disposal, etc. that may occur/happen outside the Impact Corridor of the Project.

7. Chance Find Procedure

This Chance Find Procedure has been prepared as a guideline for defining the process to be followed in case of a “Chance Find” during the construction phase of the Project.

The Chance Find Procedure applies to all Project activities to be implemented over the area affected by the Project (temporary construction facilities, underground cable network, access roads and wind turbine foundations, etc.).

This procedure will be updated as necessary throughout the course of the Project.

The following table outlines the step by step process to be followed upon a chance find discovery.

Table 7-1. Steps of the Chance Find Procedure

Steps	Actions		
STEP 1 – After the discovery of a chance find:	<ul style="list-style-type: none"> All work will cease at the location where discovery is made A temporary buffer zone around the chance find will be put in place Cultural Heritage/Archaeological Monitoring Expert/s will be on site during all construction or ground disturbance activities The Cultural Heritage/Archaeological Monitoring Expert/s contacts site management and museum archaeologist immediately The Cultural Heritage/Archaeological Monitoring Expert/s properly secures chance find site: flagging, no-entry signs etc. Protection of site: chance find should not be moved, removed or further disturbed 		
STEP 2 – Recording	<ul style="list-style-type: none"> The Cultural Heritage/Archaeological Monitoring Expert/s fills out Chance Find Form Part A and sends a copy to E&S manager within 24 hours The Cultural Heritage/Archaeological Monitoring Expert/s retains a copy of Chance Find form for his/her record 		
STEP 3 – Contact with local authority	<ul style="list-style-type: none"> The Cultural Heritage/Archaeological Monitoring Expert/s notifies the relevant Museum Directorate for the chance find (Contact information is provided in Annex 1) 		
STEP 4 – Authority's decision	<ul style="list-style-type: none"> The relevant Museum archaeologist decides on one of the following actions for chance find area. <table border="1"> <tr> <td> <p>STEP 4 A – No significance to site</p> <ul style="list-style-type: none"> The museum archaeologist declares that the site is considered to be of no significance The Cultural Heritage/Archaeological Monitoring Expert/s informs relevant managers The Cultural Heritage/Archaeological Monitoring Expert/s records the decision on Part B of Chance Find form and sends a copy to the HSE Manager within 24 hours The Cultural Heritage/Archaeological Monitoring Expert/s retains a copy of Chance Find form for his/her record No further actions required This step closes out the chance find procedure <p>Construction activities may resume</p> </td><td> <p>STEP 4 B – Significance to site</p> <ul style="list-style-type: none"> The museum archaeologist declares that the site is considered to be of significance Museum directorate archaeologist decides on further actions and informs the Cultural Heritage/Archaeological Monitoring Expert/s The Cultural Heritage/Archaeological Monitoring Expert/s informs relevant managers. Cultural Heritage/Archaeological Monitoring Expert/s records the decision on Part B of Chance Find form Proceed to Step 5 </td></tr> </table>	<p>STEP 4 A – No significance to site</p> <ul style="list-style-type: none"> The museum archaeologist declares that the site is considered to be of no significance The Cultural Heritage/Archaeological Monitoring Expert/s informs relevant managers The Cultural Heritage/Archaeological Monitoring Expert/s records the decision on Part B of Chance Find form and sends a copy to the HSE Manager within 24 hours The Cultural Heritage/Archaeological Monitoring Expert/s retains a copy of Chance Find form for his/her record No further actions required This step closes out the chance find procedure <p>Construction activities may resume</p>	<p>STEP 4 B – Significance to site</p> <ul style="list-style-type: none"> The museum archaeologist declares that the site is considered to be of significance Museum directorate archaeologist decides on further actions and informs the Cultural Heritage/Archaeological Monitoring Expert/s The Cultural Heritage/Archaeological Monitoring Expert/s informs relevant managers. Cultural Heritage/Archaeological Monitoring Expert/s records the decision on Part B of Chance Find form Proceed to Step 5
<p>STEP 4 A – No significance to site</p> <ul style="list-style-type: none"> The museum archaeologist declares that the site is considered to be of no significance The Cultural Heritage/Archaeological Monitoring Expert/s informs relevant managers The Cultural Heritage/Archaeological Monitoring Expert/s records the decision on Part B of Chance Find form and sends a copy to the HSE Manager within 24 hours The Cultural Heritage/Archaeological Monitoring Expert/s retains a copy of Chance Find form for his/her record No further actions required This step closes out the chance find procedure <p>Construction activities may resume</p>	<p>STEP 4 B – Significance to site</p> <ul style="list-style-type: none"> The museum archaeologist declares that the site is considered to be of significance Museum directorate archaeologist decides on further actions and informs the Cultural Heritage/Archaeological Monitoring Expert/s The Cultural Heritage/Archaeological Monitoring Expert/s informs relevant managers. Cultural Heritage/Archaeological Monitoring Expert/s records the decision on Part B of Chance Find form Proceed to Step 5 		
STEP 5 –	<ul style="list-style-type: none"> Project personnel follows the relevant Archaeology Museum directorate archaeologist's instructions 		

Steps	Actions		
Field investigation	<p>Step 5A</p> <ul style="list-style-type: none"> After field investigation, Museum archaeologist declares <u>the site has minor significance</u> The Cultural Heritage/Archaeological Monitoring Expert/s inform their managers The Cultural Heritage/Archaeological Monitoring Expert/s records the decision on Chance Find Form Part C and sends a copy to HSE manager within 24 hours The Cultural Heritage/Archaeological Monitoring Expert/s retains a copy of Chance Find form for his/her records No further action is required This step closes out the chance find procedure <p><i>Construction activities can resume</i></p>	<p>Step 5B</p> <ul style="list-style-type: none"> After field investigation, Museum archaeologist declares <u>the site has moderate significance</u> Further studies (e.g. test pit / salvage excavations or remote sensing investigation) are to be completed as required by the Museum Directorate Museum directorate archaeologist provides instructions, and/or supervision for the studies The Cultural Heritage/Archaeological Monitoring Expert/s informs their managers Under the supervision of the museum archaeologist, project management provides a study team for the execution of the required studies. The team will be composed of qualified archaeologist(s), other experts and workers. Once the required study is completed, the study team provides a report to the museum directorate, The museum directorate reports the study outcomes to the relevant Regional Council for the Conservation of Cultural Properties. The relevant Regional Council for the Conservation of Cultural Properties officially confirms completion of recovery and informs the project management. The Cultural Heritage/Archaeological Monitoring Expert/s records the decision on Chance Find Form Part C and sends a copy to HSE manager within 24 hours 	<p>Step 5C</p> <ul style="list-style-type: none"> After field investigation, Museum archaeologist declares <u>the site has major significance</u> Site is to be managed according to Turkish archaeological regulations "Law on the Conservation of Cultural and Natural Property (2863) 21.07.1983 Salvage excavation or other actions required by the authorities are to be completed Museum directorate archaeologist provides instructions, and/or supervision for salvage excavation or other required actions. The Cultural Heritage/Archaeological Monitoring Expert/s inform their managers Under the supervision of the museum archaeologist, project management provides a salvage excavation team. The team will be composed of qualified archaeologist and workers. Once the excavation is completed, salvage excavation team provides a report to museum directorate The relevant Regional Council for the Conservation of Cultural Properties officially confirms completion of recovery and informs the project management. Site will be officially recorded and protected according to Turkish legislation. The Cultural Heritage/Archaeological Monitoring Expert/s inform to the related managers.

Steps	Actions
	<ul style="list-style-type: none"> The Cultural Heritage/Archaeological Monitoring Expert/s retains a copy of Chance Find form for his/her record No further action is required This step closes out the chance find procedure <p>Construction activities can resume</p>
	<ul style="list-style-type: none"> The Cultural Heritage/Archaeological Monitoring Expert/s records the decision on Chance Find Form Part C and sends a copy to HSE manager within 24 hours The Cultural Heritage/Archaeological Monitoring Expert/s retains a copy of Chance Find form for his/her record No further action is required This step closes out the chance find procedure <p>Construction activities can resume or preventive further actions are required to be taken</p>

It is important to note that in case human remains are found, all Project team and the local authorities will be immediately notified.

REFERENCES

- Directorate General of Cultural Assets and Museums, "Law on the Conservation of Cultural and Natural Property (1) Law No. 2863", 1983.
- ICOMOS (International Council of Monuments and Sites) "Guidance on Impact Assessment for Cultural World Heritage", January 2011.
- IFA (Institute of Field Archaeologists) Standard and Guidance for the Collection, "Documentation, Conservation and Research of Archaeological Materials", 2001.
- IFA (Institute of Field Archaeologists) 1994, "Standard and Guidance for an Archaeological Desk Based Assessment" (revised 1999)
- IFA (Institute of Field Archaeologists) 1994, "Standard and Guidance for an Archaeological Watching Brief" (revised 1999)
- IFA (Institute of Field Archaeologists) 1994, "Standard and Guidance for an Archaeological Field Evaluation" (revised 1999)
- UNESCO, "Convention Concerning the Protection of the World Cultural and Natural Heritage", November 1972.

Annex 1 – Contract Information of the Cultural Heritage Authorities

Museum Directorate	Address	Phone	Fax	E-Mail
Anatolian Civilisation Museum	Gözcü Sokak No:2 Ulus / Ankara	0 312 324 31 60/61	0 312 311 28 39	anadolumedmuzesi@ kultur.gov.tr
Eskişehir Museum	Akarbaşı Mahallesi, Atatürk Bulvarı No: 64 Odunpazarı / Eskişehir	0 222 230 13 71	0 (222) 230 17 49	muze2603@ kultur.gov.tr
Afyonkarahisar Museum	Zafer Mahallesi, Kurtuluş Caddesi No: 92 Merkez / Afyonkarahisar	0 276 212 18 41	0 272 213 39 75	afyonmuzesi@ ktb.gov.tr
Kutahya Museum	Fatih mah. Orhan Dengiz Bulvarı no:29/D Merkez / Usak	0 276 212 18 41	0 276 224 26 38	ereglimuzesi@ kultur.gov.tr
Usak Museum	Fatih mah. Orhan Dengiz Bulvarı no:29/D Merkez / Usak	0 276 212 18 41	0 276 2273981	usakmuzesi@ kultur.gov.tr
Manisa Museum	Çarşı Mah.Murat Cad. No:107 Merkez / Manisa	0 236 231 10 71	0 236 231 03 30	manisamuzesi@ kultur.gov.tr
Izmir Museum	Mithatpaşa Cad. Selimiye Mah. No:4 Konak / Izmir	0 232 489 07 96	0 232 483 28 37	izmirmuzesi@ kultur.gov.tr

Relevant Regional Council for the Conservation of Cultural Property	Responsibility Areas	Address	Phone	Fax	E-mail
Ankara Regional Council No: 1	Ankara- Bolu- Cankırı- Corum- Kastamonu- Kirikkale	Konya Sokak No: 46 Ulus, Altındağ/ Ankara	0 312 310 42 96	0 312 310 43 41	ankarakurul@ kultur.gov.tr
Eskişehir Regional Council	Afyon- Bilecik- Eskişehir	Cunudiye Mah. Kasabalılar Sk. No:6 Odunpazarı/ Eskişehir	0 222 230 63 32	0 222 221 43 70	eskisehirkurul@ kultur.gov.tr
Kutahya Regional Council	Kutahya- Usak	Cumhuriyet Mah. Esnaf Cad. Esnaf ve Sanatkarları Birliği Binası (Metem Tesisleri) Kat:4 Kutahya	0 274 271 80 90	0 274 271 79 00	kutahyakurul@ kultur.gov.tr
Izmir Regional Council No.2	Izmir (Aliaga, Bergama, Dikili, Foca, Kemalpaşa, Kinik, Menemen)- Manisa	Umurbey Mah. TCDD Alsancak Yerleşkesi 1491 Sokak No: 4 Alsancak/Izmir	0 232 464 81 60	0 232 464 81 29	izmir2kurul@ kultur.gov.tr

Annex 2 – Chance Find Report Form

CHANCE FIND REPORT FORM RASTLANTISAL BULUNTU RAPOR FORMU			
PART A / BÖLÜM A			
Project Location: <i>Proje Sahası</i>	District (İlçe): <i>Village (Köy):</i>	Date: <i>Tarih</i>	Form No:
Name of person reporting chance find: <i>Rastlantısal buluntuyu rapor eden kişinin ismi</i>			
Was work stopped in the immediate vicinity of the chance find? <i>Rastlantısal buluntunun tam çevresinde iş durduruldu mu?</i>		<input type="checkbox"/> Yes <i>Evet</i>	<input type="checkbox"/> No <i>Hayır</i>
Was a buffer zone created to protect the chance find? <i>Rastlantısal buluntuyu korumak için tampon bölge oluşturuldu mu?</i>		<input type="checkbox"/> Yes <i>Evet</i>	<input type="checkbox"/> No <i>Hayır</i>
NOTIFICATION BİLDİRİM			
Site chief and HSE manager contacted <i>Saha Müdürü ve Çevre, Sağlık ve Güvenlik müdürü ile irtibata geçildi</i>		<input type="checkbox"/> Yes <i>Evet</i>	<input type="checkbox"/> No <i>Hayır</i>
CHANCE FIND DETAILS RASTLANTISAL BULUNTU AYRINTILARI			
GPS coordinates <i>GPS koordinatları</i>		Photo record <input type="checkbox"/> Yes <input type="checkbox"/> No (HD quality – no cell phone photos) <i>Fotoğraf kaydı Evet Hayır</i> (HD kalitesinde – cep telefonu fotoğrafı değil) If not, explain why: <i>Yok ise nedenini açıklayınız</i> Other records <input type="checkbox"/> Yes <input type="checkbox"/> No Specify (drawings, HD quality videos, etc.): <i>Diğer kayıtlar Evet Hayır</i> Belirtin (çizimler, HD kalite videolar, vb.)	
Description of chance find: <i>Rastlantısal buluntunun tanımı</i>			
Description of site and vegetation: (e.g. surface sediment type, ground surface visibility, distance to closest watercourse, etc.) <i>Sahanın ve bitki örtüsünün tanımı: (örn. Yüzey sediman türü, yüzey zemin görünürlüğü, en yakın su yoluna olan mesafe, vb.)</i>			

PART B / BÖLÜM B**NOTIFICATION OF MUSEUM DIRECTORATE ARCHAEOLOGIST****MÜZE MÜDÜRLÜĞÜ ARKEOLOĞUNA BİLDİRİ**

Monitoring archaeologist contacted museum directorate archaeologist
Arkeolog müze müdürlüğü arkeoloğu ile irtibata geçti.

☐ Yes
Evet

☐ No
Hayır

Date of notification:
Bildirim tarihi

Name of museum directorate and Name of museum archaeologist:
Müze müdürlüğü ve Müze müdürlüğü arkeoloğunun ismi

Contact number of museum directorate archaeologist:
Müze müdürlüğü arkeoloğunun iletişim numarası

DECISION OF MUSEUM DIRECTORATE ARCHAEOLOGIST**MÜZE MÜDÜRLÜĞÜ KARARI**

Date of site visit:
İlk saha ziyaret tarihi:

☐ Site of no significance - Construction to proceed with no further action – End of chance find procedure
Önemsiz saha – İnşaat daha fazla araştırma yapılmadan devam edilebilir – rastlantısal buluntu prosedürün sonu.

Date of notice to resume work:
İşe başlama tarihi bildirisi

☐ Site of significance - Further actions required
Önemli saha – Ek araştırma gerekmektedir

Please Fill out Part C
Lütfen Bölüm C'yi doldurun.

Name of museum directorate archaeologist:
Müze müdürlüğü arkeoloğunun ismi

Contact information:
İletişim numarası

Site chief and HSE manager contacted
Saha Müdürü ve Çevre, Sağlık ve Güvenlik müdürü ile irtibata geçildi

☐ Yes
Evet

☐ No
Hayır

PART C BÖLÜM C		
FURTHER FIELD INVESTIGATION EK SAHA ARAŞTIRMASI		
<input type="checkbox"/> Site of minor significance <i>Önemsiz saha</i>	<input type="checkbox"/> Site of moderate significance <i>Az önemli saha</i>	<input type="checkbox"/> Site of major significance <i>Çok önemli saha</i>
Describe additional work to be conducted: <i>Yapılması gereken ek işlerin tanımları</i>		
Date started: <i>Başlangıç tarihi</i>		Date completed: <i>Bitiriş tarihi</i>
Date of notice to resume work: <i>İşe başlama tarihi bildirisi</i>		
Name of museum directorate archaeologist: <i>Müze müdürlüğü arkeoloğunun ismi:</i> Contact information: <i>İletişim numarası</i>		
Construction manager contacted <i>İnşaat müdürü ile irtibata geçildi</i>	<input type="checkbox"/> Yes <i>Evet</i>	<input type="checkbox"/> No <i>Hayır</i>

Annex 3 – Chance Find Register

Date of Find	Summary of Chance Find	Name of the Cultural Heritage Authority Notified	Action Taken	Chance Find Form Completed	Status (Open or Closed)	Remarks

Appendix F – ISO Certifications

F.1 ERG Construction ISO 9001:2015 Certification



F.2 ERG Construction ISO 14001:2015 Certification



F.3 ERG Construction ISO 45001:2018 Certification



F.4 SSB AG ISO 9001:2015 Certification



F.5 SSB AG ISO 14001:2015 Certification



F.6 SSB AG ISO 45001:2018 Certification



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