REPUBLIC OF TURKEY
MINISTRY OF TRANSPORT
AND INFRASTRUCTURE

AYGM
Altyapı Yatırımları Genel Müdürlüğü

ÇINAR®
ENGINEERING
CONSULTANCY INC.



DİVRİĞİ-KARS-GEORGIA BORDER RAILWAY LINE REHABILITATION AND MODERNIZATION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

CNR-ETMIC-ESIA-001

(Final)

Bağlıca Mah. Çambayırı Cad. Çınar Plaza No:66/5 06790 Etimesgut/ ANKARA

Tel: +90 312 472 38 39 Fax: +90 312 472 39 33

Web: cinarmuhendislik.com

E-mail: cinar@cinarmuhendislik.com

All rights of this report are reserved.

All or part of this report cannot be reproduced, copied, electronically reproduced, traded, transmitted, sold, rented, used for any purpose, or used in any form and method in digital and/or electronic media without written permission from Çınar Engineering Consultancy Inc. as per the Law No. 5846 on Intellectual and Artistic Works amended with the Law No. 4110.

Project Owner	**T. C. Ministry of Transport and Infrastructure** **Directorate General of Infrastructure Investments**
Address	**Hakkı Turayliç Cad. No: 5 06338** **Emek/Çankaya/ANKARA**
Telephone and Fax Numbers	**+90 (312) 203 10 00**
Project Title	**Divriği-Kars-Georgia Border Railway Line Rehabilitation and Modernization Project**
Project Location	**Divriği-Erzincan-Erzurum-Kars-Georgia Border**
Consultant	**Çınar Engineering Consultancy Inc.**
Address	**Bağlıca Mah. Çambayırı Cad.** **Çınar Plaza No: 66/5** **06790 Etimesgut / ANKARA**
Telephone and Fax Numbers	**Phone: +90 (312) 472 38 39** **Fax: +90 (312) 472 39 33**
Report Submission Date	**10.12.2024**

TABLE OF CONTENTS

TABLE OF CONTENTS **4**
LIST OF TABLES **8**
LIST OF FIGURES **12**
ABBREVIATIONS AND ACRONYMS **15**
APPENDICES **18**
EXECUTIVE SUMMARY **19**
1 INTRODUCTION **25**
1.1 Project Background 25
1.2 Project Location 26
1.3 Implementation Arrangements 28
1.4 Purpose of the Environmental and Social Impact Assessment 29
1.5 Limitations and Uncertainties 29
1.6 Structure of the ESIA Report 30
2 LEGAL AND INSTITUTIONAL FRAMEWORK **32**
2.1 Institutional Framework 32
2.1.1 Central Administrations 32
2.1.2 Provincial, Regional and District Level Administrations 33
2.1.3 Local Administrations 33
2.2 National Legislation 33
2.2.1 Environmental and Social Legislation 33
2.2.2 Requirements for Environmental Licenses, Permits and Approvals 44
2.3 International Agreements, Conventions and Protocols 44
2.4 World Bank Environmental and Social Standards 46
2.5 Asian Infrastructure Investment Bank's Environmental and Social Framework 49
2.6 Islamic Development Bank (IsDB)'s Environmental and Social Safeguards Policy (Feb 2020) … 49
2.7 Other Guidelines 50
2.8 Gap Analysis 51
2.9 Project Environmental and Social Categorization 58
3 PROJECT DESCRIPTION **59**
3.1 Project Components 59
3.2 Project Route 59
3.2.1 Settlements Along the Route 60
3.2.2 Stations and Sidings Along the Project Route 62
3.2.3 Land Use Characteristics and Land Ownership 70
3.2.4 Legally Protected and Internationally Recognized Areas of High Biodiversity Value 70
3.3 Project Activities 73
3.3.1 Land Preparation and Construction Activities (within the scope of Component-1) 73

3.3.2 Operation and Maintenance Activities 77
3.4 Project Workforce 79
3.5 Implementation Program 80
4 ENVIRONMENTAL & SOCIAL BASELINE, IMPACT ASSESSMENT AND MITIGATION MEASURES 82
PHYSICAL ENVIRONMENT 82
4.1 Land Use, Soils and Geology 82
4.1.1 Project Standards and Methodology 82
4.1.2 Baseline Conditions 83
4.1.3 Impact Assessment 101
4.1.4 Potential Impact Significances and Mitigation Measures 103
4.2 Noise 107
4.2.1 Project Standards and Methodology 107
4.2.2 Baseline Conditions 108
4.2.3 Impact Assessment 112
4.2.4 Potential Impact Significances and Mitigation Measures 115
4.3 Air Quality and Greenhouse Gas Emissions 117
4.3.1 Project Standards and Methodology 117
4.3.2 Baseline Conditions 119
4.3.3 Impact Assessment 128
4.3.4 Potential Impact Significances and Mitigation Measures 133
4.4 Water Resources, Water Quality and Wastewater Management 135
4.4.1 Project Standards and Methodology 135
4.4.2 Baseline Conditions 137
4.4.3 Impact Assessment 144
4.4.4 Potential Impact Significances and Mitigation Measures 147
4.5 Resource and Waste Management 149
4.5.1 Project Standards and Methodology 149
4.5.2 Baseline Conditions 151
4.5.3 Impact Assessment 157
4.5.4 Potential Impact Significances and Mitigation Measures 162
4.6 Cultural Heritage 169
4.6.1 Project Standards and Methodology 169
4.6.2 Baseline Conditions 174
4.6.3 Impact Assessment, Significance and Mitigation Measures 193
BIOLOGICAL ENVIRONMENT 207
4.7 Project Standards and Methodology 207
4.7.1 Project Standards 207
4.7.2 Methodology for Biodiversity Studies 213
4.7.3 Biodiversity Study Area 213

4.7.4 Protected Areas 214
4.8 Baseline Conditions 234
4.8.1 Habitat Classification 234
4.8.2 Critical Habitat Assessment 284
4.8.3 Ecosystem Services Review 290
4.9 Impact Assessment 291
4.9.1 Land Preparation and Construction Phase 291
4.9.2 Operation Phase 293
4.9.3 Mitigation Hierarchy 294
4.9.4 Receptor Sensitivity 295
4.10 Potential Impact Significances and Mitigation Measures 296
SOCIO-ECONOMIC ENVIRONMENT 299
4.11 Project Standards and Methodology 299
4.11.1 Project Standards 299
4.11.2 Methodology 299
4.12 Baseline Conditions 323
4.12.1 Population 323
4.12.2 Economic Activities 328
4.12.3 Education 341
4.12.4 Health 344
4.12.5 Agriculture, Husbandry and Beekeeping 348
4.12.6 Housing 356
4.12.7 Technical Infrastructure 357
4.12.8 Transportation 357
4.12.9 Ethnic origin, Language, and Belief 360
4.13 Findings and Observations 363
4.13.1 Ardahan Province 363
4.13.2 Kars Province 368
4.13.3 Erzurum Province 385
4.13.4 Erzincan Province 399
4.13.5 Tunceli Province 418
4.13.6 Sivas Province 419
4.14 Vulnerable Groups 420
4.15 Social Impact Assessment 424
4.15.1 Land Preparation and Construction Phase 424
4.15.2 Operation Phase 426
4.15.3 Potential Impact Significances and Mitigation Measures 426
4.16 Labor and Working Conditions 431
4.16.1 Methodology and Project Standards 431
4.16.2 Child Labor & Forced Labor 431

4.16.3 Discrimination 432
4.16.4 Right of Association 432
4.16.5 Labor Influx 432
4.17 Occupational Health and Safety 433
4.17.1 Project Standards 433
4.17.2 Impact Assessment 433
4.17.3 Potential Impact Significances and Mitigation Measures 435
4.18 Community Health and Safety 440
4.18.1 Project Standards and Methodology 440
4.18.2 Impact Assessment 441
4.18.3 Potential Impact Significances and Mitigation Measures 442
5 CUMULATIVE IMPACT ASSESSMENT 448
5.1 Methodology and Project Standards 448
5.2 Cumulative Impact Assessment 449
5.2.1 Step 1: Scoping Phase I-VESCs, Spatial and Temporal Boundaries 449
5.2.2 Step 2: Scoping Phase II- Environmental Drivers 454
5.2.3 Step 3: Establish Information on Baseline Status of VESCs 454
5.2.4 Step 4: Assess Cumulative Impacts on VESCs 454
5.2.5 Step 5 and Step 6: Assessment of Significance of Predicted Cumulative Impacts and Management of Cumulative Impacts 459
6 PROJECT ALTERNATIVES 461
6.1 Route Selection and Optimization 461
6.2 Technology Selection 462
6.3 Accommodation Camps (Camp Sites) 463
6.4 No Project Alternative 463
7 STAKEHOLDER ENGAGEMENT 465
7.1 Preliminary Stakeholder Participation Activities 465
7.2 List of the Interviewed Stakeholders 465
7.3 Planned Engagement 466
7.4 Stakeholder Consultation Meetings for Information Disclosure 466
7.5 Grievance Mechanism 467
8 REFERENCES 468

LIST OF TABLES

Table 1. Structure of ESIA Report 30
Table 2. The main government institutional stakeholders of the Project 32
Table 3. Highlighted Laws Covered by National Legislation 33
Table 4. Prominent Regulations Covered by National Legislation 34
Table 5. Applicable Requirements of the Law No. 2863 41
Table 6. International Agreements, Conventions and Protocols 45
Table 7. Gap Analysis 52
Table 8. Existing Line Details 60
Table 9. Current Station List and Scope of Work for Each Station 63
Table 10. Existing and the Proposed Track Plans-1 68
Table 11. Existing and the Proposed Track Plans-2 69
Table 12. Legally Protected Areas within the AoI 71
Table 13. Internationally Recognized Areas within the AoI 71
Table 14. Construction Machinery to be used 80
Table 15. Land Use and Soil Sensitivity/Value Criteria for Resource/Receptors 82
Table 16. Land Use Types in the Project Study Area 84
Table 17. Land Use Capability Classes Descriptions 84
Table 18. Suitable Land Uses According to the Land Use Capability Classes 85
Table 19. Land Use Capability Classes of the Project 85
Table 20. Major Soil Groups of the Project Route 86
Table 21. Erosion Degree Classification of the Construction Area 88
Table 22. Information on Soil Sampling Points 89
Table 23. Analysis Results of Soil Samples 91
Table 24. Earthquake Data with M≥ 5 Occurred Between 1900-2023 98
Table 25. Land Use, Soils and Geology-Related Impact Significances and Proposed Mitigation Measures 105
Table 26. Limit Values in Regulation on Environmental Noise Control 107
Table 27. Noise Limits in WBG General EHS Guidelines 107
Table 28. WHO Guideline Values for Community Noise in Specific Environments 107
Table 29. Noise Measurement Results 110
Table 30. Cumulative Evaluation of Modeling Results with Baseline Measurement Results 113
Table 31. Operation Phase Cumulative Evaluation of Modeling Results with Baseline Measurement Results (for Daytime) 114
Table 32. Operation Phase Cumulative Evaluation of Modeling Results with Baseline Measurement Results (for Nighttime) 115
Table 33. Noise-Related Impact Significances and Proposed Mitigation Measures 116
Table 34. Air Quality Limit Values of 2019-2023 and after 2024 117
Table 35. Health Concern Levels According to Air Quality Index Value 118
Table 36. National Air Quality Index Values 119
Table 37. WBG– WHO – Ambient Air Quality Guideline Values 119
Table 38. Ambient Air Quality between 01.01.2022 – 1.11.2023 120
Table 39. Air Quality Analysis Results 122
Table 40. Greenhouse gas emissions between 1990-2020 (CO_2 equivalent) 124
Table 41. Distribution of Greenhouse Gases by Sectors (million tons) 125
Table 42. GHG emission by transport type (kilotons CO_2 equivalent) 127
Table 43. Emission Factors to be used in Dust Emission Mass Flow Calculations 129

Table 44. Emission Factors and Dust Emission Mass Flow Calculations 130
Table 45. Air Modelling Study Results 132
Table 46. Comparison of Cumulative Air Quality Values with Limit Values 132
Table 47. Air Quality-Related Impact Significances and Proposed Mitigation Measures 134
Table 48. National and International Limit Values for Water Resources 136
Table 49. Classification of Surface Waters in Terms of General Chemical and Physico-Chemical Parameters According to the Surface Water Quality Regulation 136
Table 50. Limit Values for Treated Wastewater Discharge to Receiving Body 137
Table 51. Surface Water and Groundwater Sources Along Railway Line 139
Table 52. Surface Water Sampling Locations 141
Table 53.The Analysis Results of Surface Water Samples 143
Table 54. Water-Related Impact Significances and Proposed Mitigation Measures 148
Table 55. Key Standards / Terms Defined by National Waste Management Legislation 150
Table 56: Waste Statistics of Project Locations (kg/day/person) (2020) 156
Table 57. General List of Wastes for Land Preparation and Construction Phase 157
Table 58. Waste to be Generated 158
Table 59. Municipal Waste Components and Amounts Estimation (Land Preparation and Construction Phase) 159
Table 60. Wastes to be Generated during Operation 161
Table 61. Municipal Waste Components and Amounts Estimation (Operation Phase) 161
Table 62. Resource and Waste Management-Related Impact Significances and Proposed Mitigation Measures 167
Table 63. Geographical Scope of Tangible and Intangible Cultural Heritage Studies 170
Table 64. Example Guide for Assessing Value of Heritage Assets (ICOMOS CHIA Guidance – Appendix 3A) 171
Table 65. Criteria for Evaluating the Magnitude of Impact (ICOMOS CHIA Appendix 3B) 172
Table 66. Cultural Heritage Impact Significance Assessment Matrix (ICOMOS 2011) 173
Table 67. Criteria for the Sensitivity of Intangible Cultural Heritage Receptors and Magnitude of Impact 173
Table 68. Cultural Heritage Sites and Assets in Study Area Registered by MoCT 178
Table 69. Site Classification Criteria 180
Table 70. Provincial Distribution of Registered and Non-registered Sites 180
Table 71. Intangible Cultural Heritage Elements in the Provinces Crossed by the Project 183
Table 72. Intangible Cultural Heritage Elements of the Provinces Crossed by the Project as Registered in the National Inventory 187
Table 73. Internationally Recognized Cultural Heritage Areas 190
Table 74. Legally Protected (Registered) Cultural Heritage Sites and Assets 193
Table 75. Sources of Impacts on Cultural Heritage Receptors during the Land Preparation and Construction Phase 193
Table 76: Sensitivity Levels of the Registered and Non-registered Tangible Cultural Heritage Sites Identified within the Impact Corridor 194
Table 77. Cultural Heritage Authorities Responsible in the Provinces Crossed by the Project 196
Table 78. General Management Measures Applicable to Different Types of Sites 196
Table 79. Construction Impacts, Proposed Mitigation Measures and Residual Impacts (Cultural Heritage) 198
Table 80. Legally Protected Areas near the Project Route 215
Table 81. Internationally Recognized Areas near the Project Route 224
Table 82. Habitats of the Biodiversity Study Area 236
Table 83. Survey locations along the project route, their coordinates, and habitat types 243
Table 84. Flora List of the Project Route and Surrounding Areas 245

Table 85. High Conservation Concern Flora Species of the Biodiversity Study Area 273
Table 86. The populations of local and regional endemic and rare species, the percentage of their total populations to the total population in Türkiye, and threats/suggestions 276
Table 87. Seed Collection Periods for Local and Regional Endemic Plants 281
Table 88. High Conservation Concern Mammal Species of the Biodiversity Study Area 282
Table 89. High Conservation Concern Bird Species of the Biodiversity Study Area 282
Table 90. High Conservation Concern Reptile Species of the Biodiversity Study Area 282
Table 91. High Conservation Concern Fish Species of the Biodiversity Study Area 282
Table 92. High Conservation Concern Invertebrate Species of the Biodiversity Study Area 283
Table 93. Sensitivity Criteria for Biodiversity Receptors 295
Table 94. Impacts on Biodiversity Receptors, Mitigation Measures and Significance of Residual Impacts 297
Table 95. Phase of Social Research 305
Table 96. Social Team Composition 306
Table 97. Settlements around the stations and sampling size 307
Table 98. Mukhtar Survey around the stations and result of the interview 309
Table 99. Mukhtar Survey around the railway line and result of the interview 311
Table 100. Interviewed Stakeholders 316
Table 101. Completed Focus Group Meetings 318
Table 102. Information about First Phase of Social Survey (October-November 2023) 320
Table 103: Age distribution, as adapted from the mukhtar survey 325
Table 104: Who can benefit the most positively from the project activities? as adapted from the household survey 326
Table 105: General distribution of income sources, as adapted from the household survey 329
Table 106: Primary and secondary income sources, as adapted from Household survey 331
Table 107: General distribution of income sources, as adapted from the mukhtar survey 333
Table 108: Primary and secondary income sources, as adapted from Mukhtar survey 334
Table 109: Most important issues based on economic problems, as adapted from the household survey 338
Table 110: Distribution of Social Aid Users, as adapted from the mukhtar survey 340
Table 111: Distribution of disabled people, as adapted from Mukhtar survey 345
Table 112: Primary and Secondary Chronic Diseases, as adapted from Mukhtar survey 345
Table 113: Number of Households engaged in agriculture and husbandry, as adapted from the mukhtar survey 348
Table 114: User of the agricultural and grazing areas 350
Table 115: Concerns related to agricultural activities and agricultural areas 354
Table 116: Concerns related to husbandry and grazing areas 355
Table 117: Concerns related to both agriculture and husbandry 355
Table 118: Railway-related agriculture and husbandry problems in settlements 355
Table 119: Who can be most affected and harmed by the project activities? as adapted from the household survey 359
Table 120. Canbaz Station 366
Table 121. Population information of Kars region 369
Table 122. Taşbaşı Station 372
Table 123. Güvercin Station 373
Table 124. Kars / BTK Line and Kars Logistic Centre 374
Table 125. Dikme Abandoned Station 377
Table 126. Benliahmet Station 377
Table 127. Selim Station 379

Table 128. Çatak Abandoned Station 380
Table 129. Sarıkamış Station 381
Table 130. Topdağı Station 383
Table 131. Süngütaşı Station 384
Table 132. Population information of Erzurum region 385
Table 133. Horasan Station 388
Table 134. Karaçuha Abandoned Station 390
Table 135. Köprüköy Station 391
Table 136. Hasankale Station 392
Table 137. Uzunahmet Station 393
Table 138. Erzurum Main Station 394
Table 139. Kaplıca (Ilıca) Station 396
Table 140. Kandilli Station 397
Table 141. Aşkale Station 398
Table 142. Population information of Erzincan region 399
Table 143. Çadırkaya Station 402
Table 144. Mercan Station 403
Table 145. Altınkent Abandoned Station 405
Table 146. Demirkapı Station 406
Table 147. Tanyeri Station 407
Table 148. Erzincan Main Station 408
Table 149. Alp Station 409
Table 150. Kemah Station 410
Table 151. Eriç Station 412
Table 152. İliç Station 413
Table 153. Bağıştaş Station 415
Table 154. Çaltı Station 416
Table 155. Population information of Tunceli region 418
Table 156. Geçit Station 418
Table 157. Population information of Sivas region 419
Table 158. Sensitive issues for both internal and external stakeholders 421
Table 159. Socioeconomic-Related Impact Significances and Proposed Mitigation Measures 429
Table 160. Community Health and Safety-Related Impact Significances and Proposed Mitigation Measures 444
Table 161. Valued Environmental and Social Components (VESCs)* 450
Table 162. Criteria for Magnitude of Cumulative Impact Potential 454
Table 163. Cumulative Impacts on VESCs* 455
Table 164. Criteria for the Determination of Significance of Cumulative Impacts 459
Table 165. Significance of TabCumulative Impacts on VESCs 459
Table 166. Information about the Stakeholder Consultation Meetings 467

LIST OF FIGURES

Figure 1. Proposed Project Location and Route 27
Figure 2. EIA Process in Türkiye 39
Figure 3. Settlements Along the Project Route 61
Figure 4. Distribution of the Stations on the Railway Line 66
Figure 5. Distribution Map related to Construction and Rearrangement of the Sidings 67
Figure 6. Protected Areas & KBAs 72
Figure 7. Transformer Stations to be Establish Along the Railway Line 74
Figure 8.Installation of Catenary in Tunnels 75
Figure 9. Arrangements to be Performed in Erzincan Station 75
Figure 10. Arrangements to be Performed in Erzurum Station 76
Figure 11.Arrangements to be Performed in Kars Station 76
Figure 12.Arrangements to be Performed in Canbaz Station 77
Figure 13. Soil Sampling Locations Map 90
Figure 14. Generalized stratigraphic columnar section of Eastern Anatolia Region 93
Figure 15. Active Fault Map Along Railway Route 95
Figure 16. Earthquake Hazard Map of Türkiye 97
Figure 17. Project Railway Line on Earthquake Hazard Map of Türkiye with Maximum ground acceleration for the 475 Year Recurrence Period (PGA 475) 97
Figure 18. Earthquakes (M ≥ 5) that occurred within the region that railway line is passing through between 1900 and 2023 98
Figure 19. The landslide risk inventory at and around the Railway Line 100
Figure 20. Distribution of Geosites / Geological Heritage Sites at and around the Railway Line 101
Figure 21. Noise Measurement Locations 111
Figure 22. Air Quality Sampling Points around the Railway Route 121
Figure 23. P-7 Location 123
Figure 24. P-11 Location 123
Figure 25. Distribution of Sector Based GHG Emissions in 1990-2020 126
Figure 26. Sector-based CO_2 emissions in Türkiye (1990 – 2021) 127
Figure 27. Distribution of CO_2 Emissions in Transport Sector in Türkiye as of 2021 128
Figure 28. Surface Water Quality Sampling Locations 142
Figure 29. Waste Management Hierarchy 151
Figure 30. Quarries in Sivas Province 152
Figure 31. Quarries in Erzincan Province 153
Figure 32. Quarries in Erzurum Province 154
Figure 33. Quarries in Kars Province 155
Figure 34. Percentage of Municipal Waste Distribution in the East Anatolia Region (GDEM, 2017) . 159
Figure 35. Location of Cultural Heritage Sites and Assets in Study Area Registered by MoCT 179
Figure 36. Locations of the Registered Archaeological Sites and Non-registered Sites within the Study Area 181
Figure 37. Internationally Recognized Cultural Heritage Sites Around the Project Area 192
Figure 38. IUCN Red List Categories 207
Figure 39. Legally Protected Areas (Sivas) 217
Figure 40. Legally Protected Areas (Erzincan) 218
Figure 41. Legally Protected Areas (Tunceli) 219
Figure 42. Legally Protected Areas (Erzurum) 220
Figure 43. Legally Protected Areas (Kars) 221

Figure 44. Legally Protected Areas (Ardahan) 222
Figure 45. Internationally Recognized Areas (Sivas) 226
Figure 46. Internationally Recognized Areas (Erzincan) 227
Figure 47. Internationally Recognized Areas (Tunceli) 228
Figure 48. Internationally Recognized Areas (Erzurum) 229
Figure 49. Internationally Recognized Areas (Kars) 230
Figure 50. Internationally Recognized Areas (Ardahan) 231
Figure 51. G1.7 : Thermophilous deciduous woodland 239
Figure 52. E1.2 : Perennial calcareous grassland and basic steppes 239
Figure 53. H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity 240
Figure 54. G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix 240
Figure 55. E1.2E : Irano-Anatolian steppes 241
Figure 56. E1.2B : Serpentine steppes 241
Figure 57. G3.4 : *Pinus sylvestris* woodland south of the taiga 242
Figure 58. D5.3 : Swamps and marshes dominated by Juncus effusus or other large *Juncus spp.* .. 242
Figure 59. E4.3 : Acid alpine and subalpine grassland 243
Figure 60. *Campanula munzurensis* (IUCN: VU) 257
Figure 61. *Plantago euphratica* (IUCN: VU) 258
Figure 62. *Centaurea derderifolia* (IUCN: VU) 258
Figure 63. *Echinophora chrysantha* (IUCN: EN) 259
Figure 64. *Tchihatchewia isatidea* (basal leaf) (IUCN: VU) 259
Figure 65. *Silene nerimaniae* (IUCN: VU) 260
Figure 66. *Physoptychis haussknechtii* (IUCN: EN) 260
Figure 67. *Verbascum alyssifolium* (IUCN: CR) 261
Figure 68. *Verbascum alyssifolium* (IUCN: CR) 261
Figure 69. *Ebenus macrophylla* (IUCN: VU) 262
Figure 70. *Centaurea huber-morathii* (IUCN: VU) 262
Figure 71. *Glaucium cappadocicum* (IUCN: VU) 263
Figure 72. *Salvia euphratica* subsp. *Leiocalycina* (IUCN: VU) 263
Figure 73. *Onosma erzincanica* (IUCN: CR) 264
Figure 74. *Allium purpureoviride* (IUCN: VU) 264
Figure 75. *Beta macrorhiza* (IUCN: VU) 265
Figure 76. *Paronychia arabica* subsp. *Euphratica* (IUCN: VU) 265
Figure 77. *Campanula yildirimlii* (IUCN: EN) 266
Figure 78. *Hesperis breviscapa* (IUCN: EN) 266
Figure 79. *Thymus cappadocicus* var. *cappadocicus* (IUCN: VU) 267
Figure 80. *Achillea pseudoaleppica* (IUCN: VU) 267
Figure 81. *Asphodeline tenuior* var. *puberulenta* (IUCN: VU) 268
Figure 82. *Centaurea aucherana* (IUCN: EN) 268
Figure 83. *Cousinia sintenisii* (IUCN: VU) 269
Figure 84. *Hyacinthella acutiloba* (IUCN: VU) 269
Figure 85. *Limoniopsis owerinii* (IUCN: VU) 270
Figure 86. *Origanum haussknechtii* (IUCN: VU) 270
Figure 87. *Reseda armena* var. *scabridula* (IUCN: VU) 271
Figure 88. *Verbascum tunae-ekimii* (IUCN: CR) 271
Figure 89. *Gladiolus hamzaoglui* (IUCN: VU) 272
Figure 90. *Hedysarum yilmazunalii* (IUCN: CR) 272

Figure 91. Critical Habitat for Flora Species 289
Figure 92. The Mitigation Hierarchy 295
Figure 93: Gender distribution, as adapted from the mukhtar survey 324
Figure 94: Age distribution, as adapted from the household survey 324
Figure 95: Elderly individuals, as adapted from the household survey 325
Figure 96: Opinions on the groups benefiting from the project, as adapted from the household survey 326
Figure 97: Primary and secondary income sources, as adapted from Household survey 330
Figure 98: Primary and secondary income sources, as adapted from Mukhtar survey 334
Figure 99: Unemployment rates based on Households, as adapted from Household survey 336
Figure 100: Most important problems, as adapted from Mukhtar survey 337
Figure 101: Education and Literacy, as adapted from the household survey 342
Figure 102: Students, as adapted from the Mukhtar survey 342
Figure 103: Educational Level, as adapted from the Mukhtar survey 343
Figure 104: Areas related to agriculture and grazing, as adapted from the mukhtar survey 349
Figure 105: Most Produced Primary, secondary, and tertiary agricultural products, as adapted from the mukhtar survey 351
Figure 106: Most Produced Primary, secondary, and tertiary animal products, as adapted from the mukhtar survey 352
Figure 107: Evaluation of impact on agricultural and husbandry livelihood, as adapted from the mukhtar survey 353
Figure 108: Evaluation of project impact on agricultural activities, as adapted from the household survey 354
Figure 109: Evaluation of project impact on grazing activities, as adapted from the household survey 354
Figure 110: Opinions on housing, as adapted from the household survey 356
Figure 111: Trains as mean of transportation, as adapted from the mukhtar survey 358
Figure 112: According to you, who can benefit the most from the Project activities? as adapted from the mukhtar survey 358
Figure 113: Distribution of Languages other than Turkish, as adapted from the mukhtar survey 361
Figure 114: Distribution of Ethnic Origins other than Turkish, as adapted from the mukhtar survey.. 362
Figure 115: Distribution of religious areas other than mosque, as adapted from the mukhtar survey 363
Figure 116. Illustration of Cumulative Impacts 448
Figure 117. Six-Step CIA Approach 449
Figure 118. Cumulative Impact Assessment Study Area 453

ABBREVIATIONS AND ACRONYMS

#	Number
ABPRS	Address Based Population Registration System
ADR	Age Dependency Ratio
AIIB	Asian Infrastructure Investment Bank
AKAKP	Ardahan-Kars-Artvin Development Project
ANFO	Ammonium nitrate / fuel oi
AoI	Area of Influence
AQI	Air Quality Index
Aras EDAŞ	Aras Electricity Distribution Inc.
ASHİ	Emergency Health Services Station
AYGM	Directorate General of Infrastructure Investments
BMP	Biodiversity Management Plan
BOTAŞ	Petroleum Pipeline Corporation
BTC	Baku-Tbilisi-Ceyhan
BTK	Baku-Tbilisi-Kars
CBAM	Carbon Border Adjustment Mechanism
CBD	Convention on Biological Diversity
CCDR	Country Climate and Development Report
C-ESMP	Contractor's ESMP
CHC	Community Health Center
CHMP	Cultural Heritage Management Plan
CHSMP	Community Health and Safety Management Plan
CIA	Cumulative Impact Assessment
CİMER	The Presidency's Communication Center
ÇINAR	Çınar Engineering Consultancy Inc.
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	Community Liaison Officer
CLRTAP	Convention on Long Range Transboundary Air Pollution
CO_2	Carbon dioxide
CoC	Code of Conduct
CR	Critically Endangered
DAS	Distributed Acoustic Sensing
DD	Data Deficient
DLH	General Directorate of DLH Construction
DMU	Diesel Multiple Unit
DSİ	General Directorate of State Hydraulic Works
DTM	Digital Terrain Model
DVIG	Disadvantaged / Vulnerable Individuals or Groups
E&S	Environmental and Social
EDR	Elderly Dependency Ratio
EHS	Environmental, Health and Safety
EHSG	Environmental, Health, and Safety Guidelines
EIA	Environmental Impact Assessment
EN	Endangered
ENCR	Environmental Noise Control Regulation
EOO	Extent of occurrence
EPRP	Emergency Preparedness and Response Plan
ESCP	Environmental and Social Commitment Plan

ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESR	Ecosystem Services Review
ESRC	Environmental and Social Risk Classification
ESSs	Environmental and Social Standards
ETMIC	The Eastern Türkiye Middle Corridor Railway Development Project
EU	European Union
EUNIS	European Nature Information System
EW	Extinct in the Wild
EX	Extinct
FHC	Family Health Center
GBV	Gender-Based Violence
GBVH	Gender-Based Violence and Harassment
GEF	Global Environment Fund
GHG	Greenhouse Gas
GIIP	Good International Industry Practices
GIS	Geographical Information Systems
GISD	Invasive Species Database
GISP	Global Invasive Species Program
GLC	Ground Level Concentration
GN	Guidance Note
GRIIS	Global Register of Introduced and Invasive Species
GRM	Grievance Redress Mechanism
HEPP	Hydroelectric Power Plant
IAS	Invasive Alien Species
IBA	Important Bird and Biodiversity Area
ILO	International Labor Organization
INA	Important Nature Area
IPA	Important Plant Area
IPF	Investment Project Financing
IsDB	The Islamic Development Bank
IUCN	International Union for Conservation of Nature
KADÜ	Kars Region Natural Product Growers Association
KBA	Key Biodiversity Area
kg	Kilogram
KLC	Kars Logistics Center
km	Kilometer
km²	Square Kilometer
KP	Kilometer point
KUDAKA	Northeast Anatolia Development Agency
KVKK	Personal Data Protection Law
LC	Least Concern
LM Plan	Labor Management Plan
LMP	Labor Management Procedures
LPI	Logistics Performance Index
LTV	Long Term Value
m	Meter
m²	Square meter
MA	Millennium Ecosystem Assessment

MGM	General Directorate of Meteorology
MoAF	Ministry of Agriculture and Forestry
MoCT	Ministry of Culture and Tourism
MoENR	Ministry of Energy and Natural Resources
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MoH	Ministry of Health
MoLSS	Ministry of Labor and Social Security
MoTI	Ministry of Transport and Infrastructure
MTA	General Directorate of Mineral Research and Exploration
NATO	Organisation Du Traité De l'Atlantique Nord / North Atlantic Treaty Organization
NE	Not Evaluated
NGO	Non-Governmental Organization
NT	Near Threatened
O.G.	Official Gazette
OHS	Occupational Health and Safety
OIP	Other Interested Parties
OIZ	Organized Industrial Zone
ORAN	Central Anatolia Development Agency
OUV	Outstanding Universal Value
PAPs	Project-Affected Parties
PPWMP	Pollution Prevention and Waste Management Plan
RCIAP	Regulation on the Control of Industrial Regulation on Control of Industrial Air Pollution
REGIO	REGIO Cultural Heritage Management Consultancy
RF	Resettlement Framework
RP	Resettlement Plan
RWIHC	Regulation on Water Intended for Human Consumption
SEA/SH	Sexual Exploitation, Abuse, and Harassment
SERKA	Serhat Development Agency
SIA	Social Impact Assessment
STV	Short Term Value
SWQR	Surface Water Quality Regulation
TANAP	Trans Anatolian Natural Gas Pipeline Project
TCDD	The Republic of Türkiye Directorate General of State Railways
TEDAŞ	Electricity Distribution Company
TEİAŞ	Turkish Electricity Transmission Corporation
TMİ	Traffic Management Center
TMO	Agricultural Products Office
TMP	Traffic Management Plan
TRA2	Development Region Comprising Ağrı, Ardahan Iğdır, and Kars
TurkStat	Turkish Statistical Institute
VESC	Valued Environmental and Social Component
VU	Vulnerable
WB	World Bank
WBG	World Bank Group
WGM	Workers' Grievance Mechanism
WH	World Heritage
WHO	World Health Organization
WPRC	Turkish Water Pollution Control Regulation
WRI	World Resources Institute

APPENDICES

Appendix-1	List of the individuals or organizations that prepared or contributed to the ESIA
Appendix-2	Impact Assessment Methodology
Appendix-3	Project Layout Plans
Appendix-3.1	Existing Situation of the Route
Appendix-3.2	Stations Along the Route
Appendix-3.3	Sidings Along the Route
Appendix-3.4	Proposed Project Plan
Appendix-4	Maps
Appendix-4.1	Land Use Map
Appendix-4.2	Major Soil Groups Map
Appendix-4.3	Erosion Map
Appendix-4.4	Geological Map
Appendix-4.5	Hydrogeological Map
Appendix-5	Analyses Reports and Modeling Results
Appendix-5.1	Analyses Reports of the Environmental Measurements
Appendix-5.2	Noise Modeling Results
Appendix-5.3	Air Quality Modeling Results
Appendix-6	Archaeological Status Table
Appendix-7	Cultural Heritage – Site Visit Photographs
Appendix-8	EUNIS Habitat Maps
Appendix-9	Social Site Visit Summary & Photographs
Appendix-10	Stakeholder List
Appendix-11	Second Phase of Social Survey

EXECUTIVE SUMMARY

The Eastern Türkiye Middle Corridor Railway Development Project (ETMIC) aims to improve the rail connectivity of eastern Türkiye along the Divriği-Kars-Georgia border railway section of the Middle Corridor.

The project, financed by the World Bank (WB), Asian Infrastructure Investment Bank (AIIB) and Islamic Development Bank (IsDB) is developed around two main components as follows:

Component 1: Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line

This component, with a total cost of US$1,339.2 million, aims to rehabilitate and modernize the existing 667 km railway line between Divriği and the Türkiye-Georgia border. It includes comprehensive design and construction works to renew railway infrastructure and superstructure, electrify the line, and install advanced signaling systems compliant with EU standards. The project will significantly enhance the line's cargo capacity, increasing it from 750,000 tons per year to 20 million tons per year, while improving resilience to climate hazards through updated engineering standards and the integration of a Distributed Acoustic Sensing (DAS) early-warning system.

Sub-component 1.1: Design, Infrastructure and Superstructure Works, Electrification, and Signalization of the Divriği-Kars-Georgia Border Railway Line

The major portion of the budget, US$1,317.4 million, will be allocated to detailed engineering design and extensive civil works. This includes the renewal of 143 km of railway, electrification of the entire line, installation of a European Train Control System, and construction of new sidings and extension of existing ones. Additional improvements include tunnel clearance and drainage works, construction of bridges and controlled level crossings, and station renovations. These enhancements will not only increase capacity and speed but also significantly reduce GHG emissions by transitioning from diesel to electric trains.

Sub-component 1.2: Design Supervision and Construction Supervision Services for the Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line

This sub-component allocates US$21.8 million for supervision services, ensuring high-quality implementation of the design and construction works. It includes oversight of the procurement process and the supervision of the entire project execution to guarantee robust construction standards and adherence to resilience measures against climate and natural hazards. This component will enhance the project's overall efficiency and effectiveness, ultimately delivering a modernized, higher-capacity railway line that meets international standards and supports Türkiye's strategic logistics and environmental goals.

Component 2: Project Management

This component, with a budget of US$5.5 million, focuses on the mobilization of a specialized firm to manage the project. It covers various aspects such as construction, engineering, social and environmental monitoring, citizen engagement, and results monitoring and evaluation. The objective is to ensure seamless project implementation under the Project Implementation Unit (PIU), enhancing project management capacity and ensuring that all project activities align with the intended outcomes and sustainability goals.

At this stage, no associated facilities have been identified. However, the details on the associated facilities will be determined after the contractors update/finalize the sub-project designs under “Design and Build” modality of contracting and relevant ES Study are conducted based on the updated design.

Environmental and social (E&S) risk of ETMIC is assessed as “Substantial” according to the Environmental and Social Framework (ESF) of the World Bank.

A contract was signed between AYGM and Çınar Engineering Consultancy Inc. (ÇINAR) in November 2023, for conducting the Environmental and Social Impact Assessment (ESIA) in accordance with the WB standards. The project will be carried out with the co-financing of the World Bank, AIIB and IsDB. The E&S management process will continue only according to WB ESF.

In October 2023, ÇINAR conducted a site reconnaissance along the entire Project route and study area with participation of the E&S experts. Within the scope of the overall ESIA Process, the following documents were prepared by ÇINAR:

- Environmental and Social Impact Assessment Report (ESIA)
- Environmental and Social Management Plan (ESMP) & management Sub-Plans:
  - Community Health and Safety Management Plan (CHSMP)
  - Emergency Preparedness and Response Plan (EPRP)
  - Pollution Prevention and Waste Management Plan (PPWMP)
  - Traffic Management Plan (TMP)
  - Biodiversity Management Plan (BMP)
  - Cultural Heritage Management Plan (CHMP)
  - Occupational Health and Safety Management Plan (OHSMP)
- Labor Management Procedures (LMP)
- Resettlement Framework (RF)
- Stakeholder Engagement Plan (SEP)

The aforementioned reports and plans were prepared in accordance with the following framework and guidelines:

- World Bank’s ESF and Borrower’s Guidance Notes
- World Bank Group’s General Environmental, Health, and Safety (EHS) Guidelines
- World Bank Group’s EHS Guidelines for Railways
- World Bank Group’s EHS Guidelines for Electric Power Transmission and Distribution

In the ESIA studies, project alternatives were examined, and the most appropriate and environmentally friendly alternative was selected. The alternatives for the project area and the route are limited, alternatives such as no-project alternative and optimization of the engineering structures were evaluated. The most important criteria during the selection of the possible route and structure alternatives were to "avoid" all E&S impacts.

In a meticulous analysis of alternatives, it was discerned that, given the nature of the project centered around the rehabilitation of an existing railway route, no viable route alternatives were available for consideration. Attention was judiciously directed towards the establishment of new stations along the route, emphasizing criteria such as accessibility, economic viability, and environmental impact.

The ESIA adopted a holistic approach, meticulously examining the physical, biological, and social environment. The scrutiny of the physical environment spanned assessments of land use, soil quality, geological characteristics, noise, air quality, greenhouse gas emissions, water resources, and material management. Encouragingly, these assessments did not reveal any significant adverse impacts. Furthermore, a Cumulative Impact Assessment took into account the combined effects of the project, associated quarries, existing highways, and the Trans-Anatolian Natural Gas Pipeline (TANAP). To ensure the utmost responsibility in project execution, an Environmental and Social Management Plan was crafted.

In order to have proper ESIA approach, significance of each impact was assessed considering the sensitivity of the receptor and the overall magnitude of the Project’s impact on that specific receptor. The impact magnitude is identified via quantitative approach, if possible, if not, qualitative methods based mainly on professional judgement were conducted. Thus, to identify each impact in a suitable manner an impact area was identified in a way to include all receptors.

During social impact assessment, the sensitivity of the receptor was determined considering the baseline information, while also evaluating the public interest, designations, legal requirements, acceptability, sustainability, etc., and also where relevant, in consultation with the affected communities.

The overall magnitude of the impacts was evaluated by considering:

- Geographical extent (wide, local or restricted)
- Reversibility (long term reversible/irreversible, medium-term reversible or short-term reversible)
- Duration (long term, medium term or short term)
- Frequency (continuous, recurrent, intermittent or one-off)

In essence, the comprehensive considerations and analyses undertaken in these aspects illuminate the project's dedication to sustainability, aligning with the principles of responsible E&S practices. The Divriği-Kars-Georgia Border Railway Line Rehabilitation and Modernization Project is not merely an infrastructural endeavor but a beacon of progress, connecting regions and fostering sustainable development.

The construction and operation of the railway project will inevitably affect the soil. During construction, soil disturbance, excavation, and material handling can lead to soil contamination. Chemical spills, leaks from machinery, and improper disposal of construction waste may introduce pollutants such as heavy metals and hydrocarbons.

The excavation of earth and the creation of embankments can disrupt natural drainage patterns. Soil erosion due to rainfall or runoff can result in sedimentation in nearby water bodies. Implementing erosion control measures, such as retaining walls, vegetative cover, and sediment basins, is crucial to prevent soil loss.

The project will have direct and indirect effects on air quality. Dust generated during construction activities (earthmoving, blasting, etc.) can degrade air quality. Additionally, emissions from construction machinery and vehicles contribute to air pollution. Dust suppression techniques, emission controls, and adherence to emission standards are necessary.

Once operational, locomotives and maintenance facilities emit pollutants (e.g., nitrogen oxides, particulate matter) into the air. Regular maintenance, fuel quality standards, and electrification options can minimize these emissions.

Noise is an inevitable consequence of railway infrastructure. Pile driving, track laying, and other construction activities generate noise. Noise barriers, scheduling restrictions, and proper equipment maintenance can mitigate construction-related noise. Train movements, braking, and horn signals contribute to noise pollution. Noise barriers along tracks, optimized train schedules, and quieter train technologies (e.g., electric trains) can reduce operational noise.

The railway project’s water use can affect local water resources. Construction activities require water for dust control, concrete curing, and equipment cooling. Efficient water management practices can minimize water consumption. Operational water use mainly includes train washing, station facilities, and maintenance yards consume water. Implementing water-efficient technologies and monitoring water usage are essential.

The project generates various types of waste and wastewater. Construction waste (excavated soil, demolished structures, and packaging materials) contributes to construction waste. Proper sorting, recycling, and disposal at authorized sites are critical. During the construction phase, waste and wastewater management will involve systematic collection, segregation, and disposal of construction debris, hazardous materials, and domestic waste generated on-site. Contractors will implement waste minimization strategies, such as recycling and reusing materials where possible, and will adhere to strict protocols for the disposal of hazardous substances to prevent environmental contamination. Wastewater from construction activities, including runoff and equipment wash-downs, will be collected in impermeable septic tanks and

sent to a licensed wastewater treatment plant for final disposal or treated on-site using sedimentation and filtration systems if there is a discharge to the receiving environment before being discharged to prevent soil and water pollution. Domestic wastewater generated at site will be collected in impermeable septic tanks and sent to a licensed wastewater treatment plant for final disposal. In the operation phase, waste and wastewater management will focus on maintaining cleanliness and environmental standards across railway facilities, including stations and maintenance depots. Regular waste collection, proper disposal, and the implementation of wastewater treatment systems, such as septic tanks or connection to municipal sewage systems, will ensure that the railway operations do not negatively impact local ecosystems or communities. Train washing, maintenance, and station facilities produce wastewater containing oil, grease, and cleaning chemicals. Treatment systems (such as oil-water separators) and compliance with discharge standards are necessary. Comprehensive monitoring and maintenance plans will be established to ensure continuous compliance with environmental regulations and standards throughout the project lifecycle.

No land acquisition is required at this stage, but since detailed engineering designs will be prepared by the contractor, land acquisition might be required due to modifications in the initial design which this ESIA is based on. Therefore, a Resettlement Framework (RF) was prepared. In case of land acquisition, a Resettlement Plan (RP) will be developed based on the project's RF following the ESS5 requirements. ESS5 requirements prioritize avoiding involuntary resettlement, but if unavoidable, measures to mitigate adverse impacts on displaced people should be taken. Before land acquisition processes begin, recognition of the rights of legal landowners, partners, heirs, and all individuals using the land is crucial. Special attention should be given to vulnerable groups to prevent disproportionate adverse impacts. Efforts must be made to include women in the process and ensure fairness and transparency in compensation and assistance measures before the start of physical work.

Biodiversity surveys were performed in Area of Influence (AoI) to identify endemic/ rare species and possible impacts on high concern species and habitats. 40 endemic plant species, 3 mammal species, 9 bird species, 2 reptile species, 3 fish species, and 7 invertebrate species were determined within the study area. Also, a critical habitat assessment was conducted. Mitigation measures were identified, and a BMP was prepared. Due to seasonal restrictions fauna species could not be fully observed. The construction works will be conducted on the existing railway route; therefore, no adverse impact is anticipated on critical habitats, species and natural habitats.

The project impact areas include 58 tangible cultural assets, with 1 registered in the national inventory and 57 unregistered. The provinces where the project will be constructed have 105 intangible cultural heritage elements, while the UNESCO Representative List has 14 in these provinces.

The railway project's rehabilitation, land preparation, and construction phases pose several risks to tangible cultural heritage, including architectural and archaeological sites, as well as other historical assets. Activities such as line infrastructure works, topsoil stripping, excavations, and construction traffic could cause physical damage to these sites through noise, vibration, dust, and spills. Additionally, there could be noise and visual intrusion, disruption of access to cultural heritage sites, and increased risk of looting or illicit removal of artifacts due to enhanced access. To mitigate these potential impacts, a project specific Cultural Heritage Management Plan (CHMP) and Chance Find Procedure (CFP) have been prepared. Measures include avoiding physical intervention, notifying cultural heritage authorities, archaeological monitoring, and following decisions of the relevant Regional Council. The project aims to ensure that both known and chance finds are protected and managed appropriately, involving active stakeholder engagement and potentially promoting rural tourism to support and preserve intangible cultural heritage.

The social impact assessment field research was conducted in two separate phases: station staff interviews (October and November 2023) and household survey, mukhtar (or village

headman, or local administrator of village / neighborhood) survey, stakeholder meetings with governmental agencies, and focus group meetings (March 2024). A research methodology was developed according to the project stakeholders identified as station staff (0 m), households living around stations (within 0-500 m), and households living along the railway line (within distance of 0-5 km). The key findings emerging from the social research conducted through quantitative and qualitative research methods are as follows: Opinions regarding improvement works are mostly positive. The anticipated positive impact of the project is related to the improvement of transportation facilities. Young people, students, and tourists are expected to benefit the most from these improvements.

In the findings of the field research, unemployment has been highlighted as a significant issue in both the settlements around the station and those near the railway line. However, the railway project is not seen as a solution to the unemployment problem in the region. This is an important finding from the social field survey. Among the anticipated negative effects of the project, emphasis is placed on the adverse impact on livestock farming and grazing activities. The existing train line is already seen as a source of problems due to the inadequacy of animal crossings. Concerns are raised not only for people involved in livestock farming but also for the animals themselves.

Another issue is related to road transportation. Given the perception that the project activities will improve railway transportation, firms in the road transportation sector, local minibus-bus operators, and drivers are indicated as parties that will be negatively affected by this development. This particular result of the social research was not previously identified as an expected impact. In summary, the anticipated negative impact on road transportation, as an indirect effect of the project's positive impacts, has now made this sector a stakeholder in the project.

In light of the findings from the first part of the social research (there are serious concerns regarding public health and safety along the railway line, especially in stations' surroundings. The concerns and worries stem from the following factors: 1) Inadequate or insufficient controlled crossings. 2) Lack or insufficiency of safety measures such as protective barriers in areas within settlements where pedestrian and school traffic is heavy. 3) Inadequate or insufficient level crossings and culverts/underpasses for livestock crossings.

The highlighted concerns, particularly regarding public health, safety, and traffic security, should be carefully considered within the scope of the planned development projects. In this regard, involving stakeholders and obtaining support from the local community can be instrumental in identifying sensitive areas that require attention. By engaging stakeholders and seeking input from residents, the planning process can better address the specific needs and concerns of the community. This collaborative approach ensures that improvement efforts are tailored to the local context and contribute effectively to enhancing overall safety and well-being. Use of regional languages should be taken into account to enhance local participation.

Many stations and their surroundings already carry security vulnerabilities due to drug and alcohol use, as well as incidents of theft. In this regard, efforts should be made to prevent gender-based violence, harassment, and abuse in such areas, involving both local residents and station staff.

Stakeholder participation meetings were held in the provinces of Kars, Erzurum, and Erzincan on September 25 and 26, 2024, to inform stakeholders about the project's planned activities, to explain the environmental and social impact assessment process based on the project's planned activities, and to introduce the grievance mechanism. These meetings also provided an opportunity for stakeholders to share their opinions, suggestions, and complaints. The key outcome of the meetings was the decision to include TCDD personnel in the design and supervision processes to ensure close monitoring of the project's progress based on their experiences in operational activities and awareness of current deficiencies.

AYGM will establish and manage an information system in compliance with the World Bank policies and will request this from possible contractors. In addition, AYGM and the contractor

firm will gather public opinions through an effective and active grievance mechanism and stakeholder engagement.

Within the scope of the ESIA Studies an ESMP was drafted as well. The ESMP delineates the measures and controls that have been developed in accordance with the mitigation hierarchy to manage the impacts that were identified during the impact assessment process. It also establishes the implementation schedule, roles and responsibilities, and reporting and monitoring requirements. The Environmental &Social (E&S) mitigation measures and management controls to be implemented in order to ensure compliance with the Project Standards presented under the ESIA Report on relevant E&S issues are detailed in each of the management plans included in the appendices of the ESMP.

During the construction phase of the project, once the Project Implementation Unit (PIU) is established within AYGM, the Construction Contractors, who will be responsible for the execution of the land preparation and construction works within the scope of the Project, will be able to manage environmental and social issues and natural resources in compliance with the ESIA and ESMP. The Supervision Consultant will regularly monitor construction activities to ensure they are carried out according to the approved designs, plans, and specifications. They will oversee quality assurance and quality control processes to ensure that construction work meets required standards and specifications. On the other hand, third party Environmental and Social Consultant will monitor and assess the implementation of environmental and social mitigation measures to ensure effectiveness and compliance. Environmental and social performance and compliance with the Project standards will be reported to regulatory authorities and the Bank. During the operation phase, Turkish State Railways (TCDD) will be the primary responsible body for the implementation of the project.

The ESIA consists of the following chapters:

1. Introduction: Provides an overview of the project and its objectives.
2. Legal and Institutional Framework: Outlines the relevant legal and institutional context, including international requirements and a gap analysis between national frameworks and World Bank standards, specifying applicable standards.
3. Project Description: Details the project design, activities, and components.
4. Environmental and Social Baseline, Impact Assessment, and Mitigation Measures: Covers impacts and mitigation measures for the physical, biological, and socio-economic environments.
5. Cumulative Impact Assessment: Evaluates the combined effects of the project with other existing or planned activities.
6. Project Alternatives: Analyzes alternative scenarios and their impacts, justifying the chosen approach.
7. Stakeholder Engagement: Explains the consultations and the grievance mechanism through a stakeholder engagement process conducted via face-to-face meetings and telephone conversations with individuals affected by the project.
8. References: Lists all sources used in the preparation of the ESIA.

1 INTRODUCTION

1.1 Project Background

As a trading nation at the crossroads of East and West, a large domestic market, and a manufacturing base for major overseas markets like the European Union (EU), Türkiye's economy relies heavily on its transportation and logistics system as a facilitator of economic growth.Yet Türkiye's freight transport task is lopsided, with a dominant trucking share and scant participation of rail which generates avoidable transport costs, increases the logistics costs of some—especially bulk commodity—supply chains, and is inconsistent with the country's climate aspirations—in terms of the economic value of greenhouse gas (GHG) emissions, Turkish trucks generate 2.6x more well-to-wheel carbon dioxide (CO_2) emissions per ton-km transported than diesel rail freight and 6.3x more well-to-wheel CO_2 emissions per ton-km transported than electric rail freight.

In Türkiye, as in much of the rest of the world, it is not possible to decarbonize the economy without decarbonizing the transport sector. In turn, Türkiye's transport sector cannot be decarbonized without decarbonizing the transportation of freight, as the latter accounts for half of transportation emissions. For Türkiye, decarbonizing freight transport means, above all, reducing emissions from the transportation of goods by trucks, particularly heavy-duty trucks. During the early period in the runup to the 2053 net zero target—e.g., over the next 10-15 years—facilitating the use of rail freight, and shifting long-haul truck freight to rail, are among the most effective ways to decarbonize freight transport, while also reducing local pollution, road accidents, and road infrastructure wear and tear by taking trucks off the roads.

However, shortcomings in Türkiye's railway infrastructure, both at the last mile and, increasingly, in the main line network, including cross-border connections pose significant challenges towards realizing modal shift in practice. In recognition of this, The Ministry of Transport and Infrastructure (MoTI) calls for the railway network to be modernized (e.g., fully signalized and electrified), as well as expanded by more than 8,550 km of mostly non-high-speed rail lines—nearly doubling the current main line network—by 2053 in its Transport and Logistics Master Plan 2053 (U2053), which was adopted in 2022.

In this respect, the Divriği-Kars-Georgia border railway line stands out as a crucial segment in Türkiye's efforts to modernize its rail infrastructure. This is an international access line, linking Türkiye with the South Caucasus via the Baku-Tbilisi-Kars (BTK) railway line and, via the Caspian Sea, onwards with Central and East Asia. It is also intended as a vital domestic link, connecting the four provinces of eastern Türkiye that host the line—Sivas, Erzincan, Erzurum, and Kars—with the country's main economic poles to the west. One of the oldest sections in the network, with portions that predate the founding of the Turkish Republic, this line is operated with an outdated, manual traffic control system of line dispatchers, paper-based train orders, and telephone communication known as Central Administration by Telephone, or TMI in the Turkish acronym. This decreases the line's freight carrying capacity, makes it more prone to delays and less safe, and generates avoidable costs in infrastructure maintenance and service provision. Moreover, the line is not electrified and relies solely on diesel-powered equipment, is constrained in terms of train speeds and station lengths and is in urgent need of rehabilitation after decades of deferred maintenance.

Furthermore, the development relevance of the Divriği-Kars-Georgia border railway line goes beyond its technical obsolescence and need for rehabilitation: it is an integral part—and major bottleneck—of the Trans-Caspian Middle Corridor ("Middle Corridor" or MC) which is a multimodal, intercontinental trade corridor linking China, Central Asia, the South Caucasus, Türkiye, and the European Union through rail and short sea shipping connections MC has also attractive growth and performance improvement prospects.

In line with the country and the sectoral context summarized above, the World Bank (WB) Group, the Asian Infrastructure Investment Bank (AIIB) and the Islamic Development Bank (IsDB) agreed to provide fund to the Government of Türkiye to implement the Eastern Türkiye Middle Corridor Railway Development Project (ETMIC) which aims to improve the rail connectivity of eastern Türkiye along the Divriği-Kars-Georgia border railway section of the Middle Corridor.

The Project has two components as follows:

- Component-1. Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line
  - Sub-component 1.1. Design, Infrastructure and Superstructure Works, Electrification, and Signalization of the Divriği-Kars-Georgia Border Railway Line
  - Sub-component 1.2. Design Supervision and Construction Supervision Services for the Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line
- Component-2. Project Management

While the Borrower is the Republic of Türkiye, the Implementing Agency of the ETMIC is the Directorate General of the Infrastructure Investments (AYGM) of the MoTI. The project activities are expected to start in 2025 and be completed in 2030.

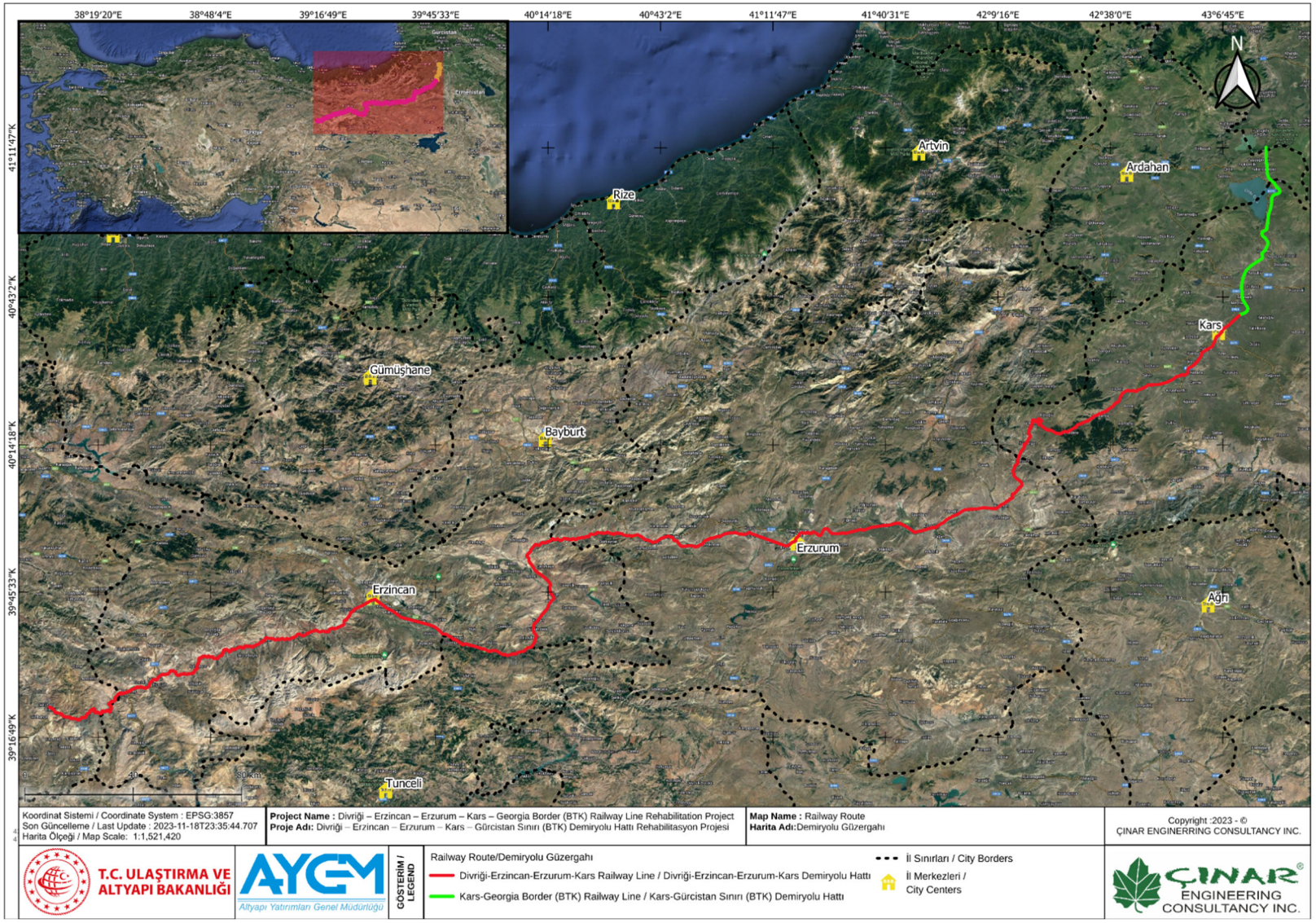
The total operation cost is US$1,615.21 million—US$660.00 million (41%) of which will be provided by International Bank for Reconstruction and Development (IBRD) as WB Group financing, US$454.51 million (28%) by the national government of the Republic of Türkiye as counterpart funding, and US$250.00 million (15%) by the AIIB and US$250.70 million (16%) by the IsDB as other sources.

1.2 Project Location

The railway corridor traverses several provinces in eastern Türkiye, each with unique characteristics (see Figure 1). Starting in Divriği in Sivas Province, the corridor extends through Erzincan, Tunceli, Erzurum, and Kars provinces, finally reaching the border with Georgian border in Ardahan province. These provinces collectively represent a blend of historical significance, economic activities, and natural landscapes, making them integral to the project's overall context. The route passes through:

- *Sivas (Divriği)* Province: Renowned for historical sites like the UNESCO-listed Great Mosque and Hospital of Divriği. The province has a diverse economy. The project is poised to stimulate local activity and address economic disparities.
- *Erzincan* Province: Known for its seismic activity, Erzincan has a strong industrial focus, comprising 39% of its GDP. The project's aims to modernize transportation infrastructure, benefiting both industry and the local population.
- *Tunceli* Province: Tunceli Province in eastern Turkey is renowned for its mountainous terrain and the Munzur Valley National Park, which hosts diverse wildlife and natural beauty. The province is culturally rich, with a strong heritage, and remains one of Turkey's more remote and less populated regions.
- *Erzurum* Province: Erzurum, with significant industrial production and a rich cultural heritage, will benefit economically and socially from the corridor's passage.
- *Kars* Province: Characterized by a high reliance on agriculture and historical significance, Kars's economic conditions are expected to improve with the enhanced connectivity provided by the railway project.
- *Ardahan* (Border with Georgia) Province: Marking the corridor's culmination at the Georgian border, Ardahan's geopolitical importance and environmental considerations make it a vital endpoint for the railway project.

Figure 1. Proposed Project Location and Route



1.3 Implementation Arrangements

The project owner, MoTI, is the primary governmental body responsible for overseeing and developing the nation's transport and logistics infrastructure. MoTI plays a crucial role in formulating policies, implementing projects, and ensuring the efficient functioning of Türkiye's transportation network, which includes roads, railways, maritime, and aviation sectors. With a strategic vision outlined in the Transport and Logistics Master Plan 2053 (U2053), MoTI is committed to modernizing Türkiye's transport infrastructure, promoting sustainable and cost-effective logistics solutions, and enhancing the country's connectivity both domestically and internationally. The MoTI's comprehensive approach to infrastructure development aims to boost economic growth, reduce environmental impacts, and improve the quality of life for Turkish citizens, making it a pivotal entity in driving Türkiye's progress towards a more integrated and efficient transport system.

The General Directorate of Infrastructure Investments (AYGM) which is a public institution affiliated with the MoTI with a special budget for finance, is the implementing agency of the project. AYGM's duties and powers include to prepare and approve the plans and projects of railways, logistic villages, centers or bases, ports, shelters, coastal structures, airports, or have them prepared, and to build these transportation infrastructures and/or have them built, then transfer the completed ones to the relevant organizations.

A Project Implementation Unit (PIU) has already been established under AYGM for the ongoing World Bank-financed Rail Logistics Improvement Project – P170532 (RLIP). For this Project, an ETMIC-dedicated PIU sub-unit will be established under this PIU. This PIU sub-unit will be led by the Deputy Director General of AYGM as PIU Director, and by the Director of AYGM's Railway Construction Department as Deputy PIU Director. The ETMIC sub-unit will be staffed by a total of 10 members, including a sub-unit leader, engineering and construction specialist, procurement specialist, financial management specialist, Environmental, Social, Health and Safety (ESHS) manager, Social Development specialist, Environmental specialist, Occupational Health and Safety (OHS) specialist, and two Community Liaison Officers. These staff are expected to be recruited during project implementation through the engagement of a specialized firm with expertise in project management, construction, engineering, and monitoring. The Terms of Reference (ToR) for the selection of these services have been prepared by AYGM and confirmed by the World Bank as responsive to the Bank's Procurement Framework, Financial Management requirements, and ESF principles.

After the completion of the construction works, the project will be handed over to The Republic of Türkiye Directorate General of State Railways (TCDD) and the operational activities will be performed by TCDD.

TCDD serves as the primary authority for managing, maintaining, and expanding Türkiye's railway infrastructure. Tasked with overseeing the nation's extensive network of tracks, stations, and signaling systems, TCDD plays a pivotal role in ensuring the smooth operation of both passenger and freight services. It operates a comprehensive passenger train network, connecting major cities and regions across Türkiye, while also facilitating the efficient movement of goods through its freight transport services. Additionally, TCDD spearheads development projects aimed at modernizing and expanding the railway network, employing advanced technologies to enhance safety, efficiency, and environmental sustainability.

With its regulatory oversight responsibilities, TCDD ensures compliance with safety standards and operational regulations within the railway sector. This entails monitoring adherence to stringent safety protocols, managing operational procedures, and enforcing regulatory requirements to safeguard both passengers and cargo. Through its multifaceted efforts, TCDD contributes significantly to Türkiye's transportation infrastructure, fostering economic growth, regional connectivity, and sustainable mobility. As Türkiye continues to invest in its railway

network, TCDD remains at the forefront of initiatives aimed at advancing the nation's transportation capabilities and enhancing its position within the global logistics landscape.

1.4 Purpose of the Environmental and Social Impact Assessment

The environmental and social (E&S) risk of the Project is assessed as "Substantial" by the World Bank at the appraisal stage of the Project due to key E&S risks which are (i) air pollution and noise from construction machinery and quarries and operation phase noise and vibration impacts, (ii) soil disturbance and loss during earth-moving, (iii) loss of vegetation, (iv) impacts related to improper waste management, (v) impacts related to improper construction camp management, (vi) risks to community health and safety (traffic safety, earthquakes, avalanches etc.), (vii) risks associated with improper occupational health and safety (OHS), (viii) potential impacts on culturally and naturally protected areas, (ix) land acquisition beyond the existing right-of-way, (x) physical relocation and livelihood impacts, (xi) labor conditions and labor influx, (xii) potential impacts on community health and safety and; (xiii) risk of sexual exploitation and abuse and sexual harassment (SEA/SH) due to the project being implemented across five provinces including in hard-to-reach areas.

Therefore, per ESS1 *on Assessment and Management of Environmental and Social Risks and Impact* of World Bank's Environmental and Social Framework (ESF), this Environmental and Social Impact Assessment (ESIA) was prepared to identify and assess the potential E&S impacts of the project, evaluate alternatives, and design appropriate mitigation, management, and monitoring measures.

The scope of the ESIA is based on the Project activities detailed in Section 3.3. The Project has no associated facilities.

The status of the Project under national Environmental Impact Assessment (EIA) legislation is provided in Section 2.2.1.1. When the detailed design of the 154kV power transmission lines is finalized (since design and build approach will be used for the Project, some design elements are missing, see Section 1.5), the national EIA process will be initiated based on the status of the activities listed in Annex-1 and Annex-2 of the EIA Regulation by AYGM by also considering other related/auxiliary facilities which are planned to be used within the scope of the project.

The environmental and social assessment of the related and/or auxiliary facilities such as power transmission lines, material borrow pits/quarries, crushing and screening plants, and ready-mixed concrete plants will be conducted before commencement of construction works in line with both national and WB ESF requirements once the specific locations and technical details of these facilities are known. These assessments will be carried out by the ETMIC sub-unit of PIU, who will be responsible for identifying potential risks and impacts, as well as developing and implementing the necessary mitigation measures. Additionally, any additional E&S assessments and site-specific findings for these facilities will be incorporated into the Contractor's ESMP along with sub-management plans before the commencement of construction works, once the construction consultant is selected, in alignment with the World Bank Environmental and Social Framework (WB ESF).

1.5 Limitations and Uncertainties

- This ESIA Report was prepared based on the railway route provided to ÇINAR by AYGM. During the preparation of ESIA Report, information in the General Technical Specification of "Divriği-Kars-Border (BTK) Railway Rehabilitation, Electrification and Signalization Project" and its appendices were used. Nevertheless, due to possible force majeures to be faced during the construction phase, unexpected changes might occur, which may result in technology and design changes which might require additional E&S assessments.

- The Project will utilize design-build procurement method (FIDIC Yellow Book) to reduce the time between project approval and the commencement of the civil works. The contractor will finalize the design of the 154kV power transmission lines and quarries, borrow areas, access roads, crushing and screening plants, ready-mixed concrete plants (and other similar plants/facilities) and may make some other modifications that differ from those outlined in the ESIA report. Therefore, if needed, ETMIC sub-unit of PIU will carry out additional E&S assessments and the results of these assessments will be reflected in sub- management plans and Contractor's ESMP (C-ESMP).
- Blasting is a possibility that contractor might consider during construction. Since no information is available regarding the location of the blasting, amount and type of the explosives and timeframe of the blasting, relevant assessment could not be performed in the scope of ESIA studies.
- Access roads to be used in the land preparation and construction stages of the project have not been determined yet. A detailed logistics study and/or site-specific traffic management plan (TMP) needs to be established before commencing the construction works by the contractors.

To sum up, the following areas of concerns were faced during the establishment of this ESIA Report.

Time Constraints for Biodiversity Assessment: The stringent reporting schedule imposes limitations on the conduct of seasonal biodiversity baseline assessments, restricting the comprehensive understanding of ecological dynamics throughout the year. This may result in a partial representation of biodiversity patterns and behaviors, potentially overlooking certain species' presence or migration patterns during unobserved seasons. Due to seasonal constraints, it has not been possible to fully identify fauna species.

Insufficient Historical Data: Limited availability of historical E&S data may pose challenges in accurately predicting long-term impacts. Without a robust historical context, anticipating cumulative effects and evaluating changes over time becomes inherently uncertain, impacting the thoroughness of the impact assessment.

Weather-Dependent Field Studies: Field studies, critical for accurate data collection, are susceptible to weather conditions. Unforeseen adverse weather events or seasonal variations can impede the effectiveness of on-site investigations, affecting the reliability of gathered information on flora, fauna, and local communities.

Limited Alternatives Assessment: The abbreviated timeframe may constrain the exploration of alternative project designs and locations, impacting the depth of analysis on potential environmentally and socially sustainable alternatives, ultimately influencing decision-making.

Challenges in Cumulative Impact Assessment: Time limitations and existence of various stakeholders may hinder a thorough examination of cumulative impacts arising from the project in conjunction with other regional developments. The cumulative impact assessment may lack the depth necessary for a comprehensive understanding of potential synergies or conflicts.

1.6 Structure of the ESIA Report

The general outlines of the ESIA report covering the important E&S issues related to the Project are given in Table 1.

Table 1. Structure of ESIA Report

Chapter	Name	Description
Chapter 1	Introduction	Overview of the Project and its objectives
Chapter 2	Legal and Institutional Framework	Description of the legal and institutional context of the project , international requirements including WB

Chapter	Name	Description
		requirements, a gap analysis between national framework and WB ESF, along with specifications of the standards to be applied for this project
Chapter 3	Project Description	Details of the project design, project activities and components
Chapter 4	Environmental and Social Baseline, Impact Assessment and Mitigation Measures ▪ Physical Environment ▪ Biological Environment ▪ Socio-Economic Environment	Subdivided into various sections addressing different environmental and social aspects such as the physical environment, biological environment, socio-economic environment, and cultural heritage
Chapter 5	Cumulative Impact Assessment	Assessment of the cumulative impacts
Chapter 6	Project Alternatives	Evaluation of alternative project scenarios and their impacts
Chapter 7	Stakeholder Engagement	Description of the methods and outcomes of engaging with stakeholders
Chapter 8	References	List of all references used in the preparation of the ESIA

List of the individuals or organizations that prepared or contributed to this ESIA Report is given in Appendix-1. The methodological approach used during the ESIA process is given in Appendix-2.

As a part of the ESIA study, an Environmental and Social Management Plan (ESMP) including the sub-management plans was also prepared, listing all management measures and commitments proposed in the ESIA Report and monitoring provisions and key indicators for the success of the identified implementation.

2 LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 Institutional Framework

The administrative structure in Türkiye encompasses both central and local administrations. The central administrative units are represented by ministries which extend services to local through their respective local branches. These branches encompass provincial organizations under the governor's jurisdiction, as well as district organizations under the oversight of district governors. Furthermore, Türkiye is comprised of various provinces, each managed by smaller local administrations that include municipalities and villages/neighborhoods. The administrative leadership within these units is vested in mayors for municipalities and mukhtars for villages/neighborhoods.

2.1.1 Central Administrations

Ministries are central administrative units. Ministries provide services to local areas through their local branches including provincial organizations affiliated with governor and district organizations affiliated with district governors.

MoTI is the main central administration in the scope of the Project. The national institution responsible for implementation of the project is AYGM of the MoTI.

MoEUCC is the key authority regulating policies and procedures related to conservation and protection of natural environment, management of natural resources and sustainable cities and settlements. MoEUCC fulfills those activities with its organization structure composed of General Directorates.

Environmental impacts, permits, management and inspection of the project is under the scope of authority of MoTI along with MoEUCC, Ministry of Agriculture and Forestry (MoAF), Ministry of Energy and Natural Resources (MoENR), Ministry of Labor and Social Security (MoLSS), and Ministry of Health (MoH).

The main government institutional stakeholders of the Project are listed in Table 2.

Table 2. The main government institutional stakeholders of the Project

Ministry of Environment, Urbanization and Climate Change
General Directorate of Environmental Management
General Directorate of Environmental Impact Assessment, Permit and Inspection
General Directorate of Spatial Planning
General Directorate of Protection of Natural Assets
General Directorate of Land Registry and Cadastral
General Directorate of National Estate
Ministry of Transport and Infrastructure
General Directorate of Infrastructure and Investments
General Directorate of Highways
Ministry of Agriculture and Forestry
General Directorate of State Hydraulic Works
General Directorate of Nature Conservation and National Parks
General Directorate of Water Management
General Directorate of Forestry
General Directorate of Meteorological Services
General Directorate of Agricultural Reform
Ministry of Culture and Tourism
General Directorate of Cultural Heritage and Museums

Ministry of Energy and Natural Resources
General Directorate of Energy Affairs
General Directorate of Mining and Petroleum Affairs
General Directorate of Mineral Research and Exploration
General Directorate of Turkish Electricity Transmission Corporation
Ministry of Labor and Social Security
General Directorate of Occupational Health and Safety
Ministry of Health
General Directorate of Health Affairs

2.1.2 Provincial, Regional and District Level Administrations

In Türkiye, the ministries provide services to local areas through provincial and district organizations.

The project is within the scope of Governorates, Provincial Directorates of Environment, Urbanization and Climate Change, Provincial Directorates of Agriculture and Provincial Directorates of Culture and Tourism of Sivas, Erzincan, Tunceli, Erzurum, Kars and Ardahan provinces, DSİ Erzurum (8th), DSI Elazığ (9th), Sivas (19th), and Kars (24th) Regional Directorate, Kayseri, Elazığ and Erzurum Malatya Regional Directorates of Forestry, and General Directorate of Highways Erzurum 12th, Elazığ 8th, Sivas 16th, and Kars 18th Regional Directorates.

2.1.3 Local Administrations

Administrations at provincial, regional and district levels are field organizations of ministries and related institutions. The Project-specific stakeholder list is given in Appendix-10.

2.2 National Legislation

National legislation in relation to E&S, health and safety management, forming the legal basis for the Project, is explained in the following sections.

2.2.1 Environmental and Social Legislation

Turkish Environmental Law No. 2872, which was issued in the Official Gazette (OG) No. 18132 on August 11, 1983, describes the fundamental principles required to protect the environment in accordance with sustainable development and sustainable environmental goals. The Environmental Law provides a legal framework for the development of environmental regulations in accordance with national and international standards.

In addition to Environmental Law and associated regulations, several laws in relation with environmental protection, pollution prevention and control, the human rights and safety are listed below:

Table 3. Highlighted Laws Covered by National Legislation

Law	Law Number
Agricultural Reform Law on Land Rearrangement in Irrigated Areas	3083
Electricity Market Law	6446
Energy Efficiency Law	5627
Expropriation Law	2942
Forestry Law	6831
Groundwater Law	167
Highway Traffic Law	2918
Labor Law	4857

Law	Law Number
Law on Conservation of Cultural and Natural Assets	2863
Law on Measures to be taken and Aids to be provided for Disasters Effective in Public Life	7269
Law on Right to Information	4982
Law on Soil Conservation and Land Use	5403
Mining Law	3213
Municipality Law	5393
National Parks Law	2873
Occupational Health and Safety Law	6331
Pasture Law	4342
Public Health Law	1593
Settlement Law	5543

Environmental regulations, by-laws and communiques that are valid within the above-mentioned laws are listed in Table 4.

Table 4. Prominent Regulations Covered by National Legislation

Regulation Name	OG Date	Issue
Environmental Permits and Licenses (General)		
Regulation on Environmental Impact Assessment	29.07.2022	31907
Regulation on Environmental Permits and Licenses	10.09.2014	29115
Regulation on Environmental Audit	12.06.2021	31509
Regulation Concerning Environmental Management Services	01.11.2022	32000
Climate Change		
Regulation on Minimization of Ozone Depleting Substances	07.04.2017	30031
Regulation on Monitoring of Green House Gas Emissions	17.05.2014	29003
Land Use and Soils		
Regulation on Control of Soil Pollution and Point Source Contaminated Sites	08.06.2010	27605
Regulation on Protection, Use and Planning of Agricultural Lands	09.12.2017	30265
Regulation on the implementation of articles 17 and 18 of the Forest Law No. 6831	30.11.2021	31675
Regulation on Land Consolidation and On-farm Development Services Implementation	07.02.2019	30679
Regulation Concerning the rehabilitation of the Lands Disturbed by Mining Activities	23.01.2010	27471
Regulation on Pastures	31.07.1998	23419
Water		
Regulation on Surface Water Quality	30.11.2012	28483
Regulation on Water Pollution Control	31.12.2004	25687
Regulation Concerned Water Intended for Human Consumption	17.02.2005	25730
Regulation on Urban Wastewater Treatment	08.01.2006	26047
Regulation Concerning Protection of Groundwater against Pollution and Deterioration	07.04.2012	28257
Monitoring of Surface and Groundwater Regulation	11.02.2014	28910
Regulation on Fishery Products	10.03.1995	22223
Regulation on Control of Pollution Caused by Hazardous Substances in and around Water Bodies.	26.11.2005	26005
Communique on Sampling of Surface Water, Ground Water and Sediment and Biological Sampling	21.02.2015	29274
Regulation on Protection of Drinking-Potable Water Basins	28.10.2017	30224
Waste Management		
Regulation on Control of Packaging Wastes	26.06.2021	31523
Regulation on Waste Management	02.04.2015	29314
Regulation on the Control of Excavation Soil, Construction and Demolition Wastes	18.03.2004	25406
Regulation on the Control of Medical Wastes	25.01.2017	29959
Regulation on the Management of Waste Oils	21.12.2019	30985
Regulation on the Control of Vegetable Waste Oils	06.06.2015	29378

Regulation Name	OG Date	Issue
Regulation on the Control of Waste Batteries and Accumulators	31.08.2004	25569
Regulation on the Control of End-of-Life Tires	25.11.2006	26357
Regulation on Mining Wastes	15.07.2015	29417
Regulation on the Landfill of Wastes	26.03.2010	27533
Regulation on the Control of Waste Electrical and Electronic Equipment	26.12.2022	32055
Regulation on the Control of End-of-Life Vehicles	30.12.2009	27448
Regulation on Zero Waste	12.07.2019	30829
Notice on Fuel, Auxiliary Fuel and Alternative Raw Material Derived from Waste	20.06.2014	29036
Regulation on the Control of Collecting Wastes from the Vessels	26.12.2004	25682
Regulation on Recovery of Some Non-Hazardous Wastes	17.11.2011	27967
Air Quality		
Regulation on the Control of Industrial Air Pollution	03.07.2009	27277
Regulation on Assessment and Management of Air Quality	06.06.2008	26898
Regulation on the Control of Exhaust Gas Emissions	11.03.2017	30004
Management of Chemicals		
Regulation on Classification, Labelling and Package of Materials and Mixtures	11.12.2013	28848
Regulation on Safety Information Forms on Hazardous Substances and Mixtures	13.12.2014	29204
Regulation Regarding Prevention of Major Industrial Accidents and Mitigation of Their Effects	02.03.2019	30702
Regulation Regarding Transport of Hazardous Materials on Highways	18.06.2022	31870
Community and Occupational Health and Safety and Labor and Working Conditions		
Regulation on Occupational Health and Safety Risk Assessment	29.12.2012	28512)
Regulation on Occupational Health and Safety Services	29.12.2012	28512
Regulation on Duties, Authority, Responsibilities and Trainings of Occupational Health and Safety Specialists	29.12.2012	28512
Regulation on Procedures and Principles of Occupational Health and Safety Training of Employees	15.05.2013	28648
Regulation on the Occupational Health and Safety Committees	18.01.2013	28532
Regulation on the Health and Safety Measures to be taken in Workplace Buildings and Additions	17.07.2013	28710
Regulation on Protection of Buildings from Fire	19.12.2007	26735
Regulation on Emergency Cases in Workplaces	18.06.2013	28681
First Aid Regulation	29.07.2015	29429
Regulation on Protection of Workers from Dangers of Explosive Environments	30.04.2013	28633
Communique on Hazard Classes List related to Occupational Health and Safety	26.12.2012	28509
Regulation Concerning the Protection of Workers from Risks Associated with Noise	28.07.2013	28721
Regulation Concerning the Protection of Workers from Risks Associated with Vibration	22.08.2013	28743
Regulation on Health and Safety Conditions in the Use of Work Equipment	25.04.2013	28628
Regulation on Occupational Health and Safety on Construction Works	05.10.2013	28786
Regulation on Health and Safety Regarding Temporary and Time Limited Works	23.08.2013	28744
Regulation on Health and Safety Precautions Regarding Working with Chemicals	12.08.2013	28733
Regulation on Health and Safety Signs	11.09.2013	28762
Regulation on Dust Management	05.11.2013	28812
Regulation on Safety Information Forms Regarding Hazardous Materials and Mixtures	13.12.2014	29204
Regulation on Personal Protection Equipment	01.05.2019	30761
Regulation on Usage of Personal Protective Equipment in Workplaces	02.07.2013	28695
Regulation on Vocational Training of the Employees Working in Dangerous and Highly Dangerous Workplaces	13.07.2013	28706
Regulation on the Provisions of Occupational Health and Safety Training of Employees	29.12.2012	28512
Regulation on the Control of Polychlorinated Biphenyl and Polychlorinated Terphenyls	27.12.2007	26739
Regulation on Transportation of Explosives via Highways	24.04.2019	30754

Regulation Name	OG Date	Issue
Act on the Procedures and Principles on Manufacture, Import, Transportation, Storing, Sales, Usage, Disposal and Control of Explosive Materials, Hunting Equipment and Similar Exempted from Monopoly	29.09.1987	19589
Regulation on the Implementation of Law Concerning Private Security Services	07.10.2004	25606
Noise		
Regulation on Environmental Noise Control	30.11.2022	32029
Regulation on Environmental Noise Emission Caused by Equipment Used Outdoors	30.12.2006	26392
Social		
Regulation on Implementation of Resettlement Law	02.12.2007	26718
Regulation on the Implementation of Law Concerning Private Security Services	07.10.2004	25606
Others		
Regulation on Traffic in Highway	18.07.1997	23053 (Duplicate)
Regulation on Railway Security	19.11.2015	29537
Regulation on Critical Duties Concerning Railway Security	31.12.2016	29935
Regulation on Earthquake Technique in Construction of Coastal and Harbor Structures, Railway and Airport	18.08.2007	26617

2.2.1.1 Environmental Impact Assessment

An EIA is a systematic approach to figure out the favorable and adverse impacts/risks of a defined project on the environment. This process is not a decision-making process in itself; it is a process that progresses in parallel with the decision-making process and acts as a supporting mechanism. It is the analysis and assessment of environmental impacts resulting from new projects and developments, including the social consequences and alternative solutions of all direct or indirect, permanent, or transient potential impacts.

EIA studies have been granted legal status through Article 10 of the Environmental Law No. 2872, which was published in the Official Gazette dated August 11, 1983 and numbered 18132. On February 7, 1993, the EIA Regulation was put into force and has undergone amendments many times to date, and it has been completely amended 8 times in total, all aimed at aligning with the European Union (EU) Legislation and the EU EIA Directive for harmonization purposes. Currently, the Environmental Impact Assessment Regulation, published in the Official Gazette dated July 29, 2022 and numbered 31907, is in force.

With the introduction of the online EIA Process Management System known as “e-çed”, institutions and organizations authorized by the MoEUCC can submit EIA applications through this digital platform.

The EIA process consists of three phases:

i. Environmental baseline studies
ii. EIA Studies
iii. Establishment of environmental and social management plans and monitoring activities

EIA studies commence following environmental baseline studies. These baseline studies involve the following steps.

- Identifying facilities and settlements within the project area,
- Assessing existing environmental conditions,
- Determination of the methods and means for the determination of environmental impacts, determination of possible environmental (direct and indirect) impacts,
- Setting standards related to environmental impacts and determination of future distribution (investment and operation periods),
- Determination of analysis criteria in terms of quantity and quality,
- Determining and examining the existing transportation system,

- Taking the necessary images both in the project area and the environment in the field with the digital camera,
- Identifying and investigation of the nearest protected areas and sensitive ecosystems to the project area. In the case of the presence of National Parks, Nature Parks, Wetlands Wildlife Protection Areas. Natural Heritage, Nature Conservation Areas, Reserve Areas. Biogenetic Reserves, Natural Sites and Monuments, Biosphere Archaeological, Historical, Cultural Mass, Special Environmental Protection Areas Special Protected Areas, Tourism Documents etc. in the activity area, further study should be done in this regard.

In Türkiye, the procedures for EIA studies differ based on whether the projects are listed in Annex I or Annex II of the EIA Regulation. For activities in the Annex-I list, an EIA Report is prepared. For activities in the Annex-II list, a Project Introduction File (PIF) is compiled.

A summarized representation of the EIA process in Türkiye is provided in Figure 2.

Status of the Project under National EIA legislation

The first section of the Project (Divriği-Kars) has been in operation since 1936. Since the construction of this section predates the first EIA Regulation which was put into force in 1993, no EIA report was prepared.

However, for the second section of the Project (Kars-Georgia border or BTK section), an EIA Report was prepared based on the Article 8 of the EIA Regulation, which was published in the Official Gazette dated December 16, 2003 and numbered 25318 since it was included in the Annex-1 as “Intercity railway lines”. In this context, the EIA Report was prepared by Vadi Engineering—an environmental consultancy firm—in December 2006 and an EIA Positive Decision, dated December 28, 2006 and numbered 1193, was obtained from MoEUCC (the repealed Ministry of Environment). This section was completed in 2012 as a single-track superstructure on the double-track platform and infrastructure of the planned double-track railway.

For this Project, since there will be no major change in the main railway line of Divriği-Kars Section and only a single-track superstructure will be built on the existing platform and infrastructure in BTK section, it is envisaged that there is no need to prepare an EIA Report or PIF Report. Nevertheless, EIA decisions (“EIA Exemption” or “EIA Out of Scope” decision) will be obtained by AYGM to reflect planned changes before the construction works commence and after final design is determined. On the other hand, for the related/auxiliary facilities, the requirements of the EIA Regulation must be implemented before the construction works commence and after the final design is determined by considering the following EIA requirements.

<u>For Energy Transmission Lines:</u>

- Electric energy transmission lines with a voltage of 154 kV (kilovolt) and above and a continuous length of 15 km and above (Article 44 in the Annex-1 list)
- Electric energy transmission lines with a voltage of 154 kV (kilovolt) and above and a continuous length of 5 km and above (Article 37 in the Annex-2 list)

<u>For Quarries/borrow sites:</u>

- Within the scope of mining projects, open mines are planned for land surfaces of 25 hectares and above, including excavation and dumping areas (Article 25-a in the Annex-1 list)
- Extraction of minerals within the scope of mining projects (those not included in the Annex-1 list) (Article 45-a in the Annex-2 list)
- Facilities that carry out at least one of the crushing, screening, washing, drying, or ore preparation processes within the scope of mining projects (Article 45-e in the Annex-2 list)

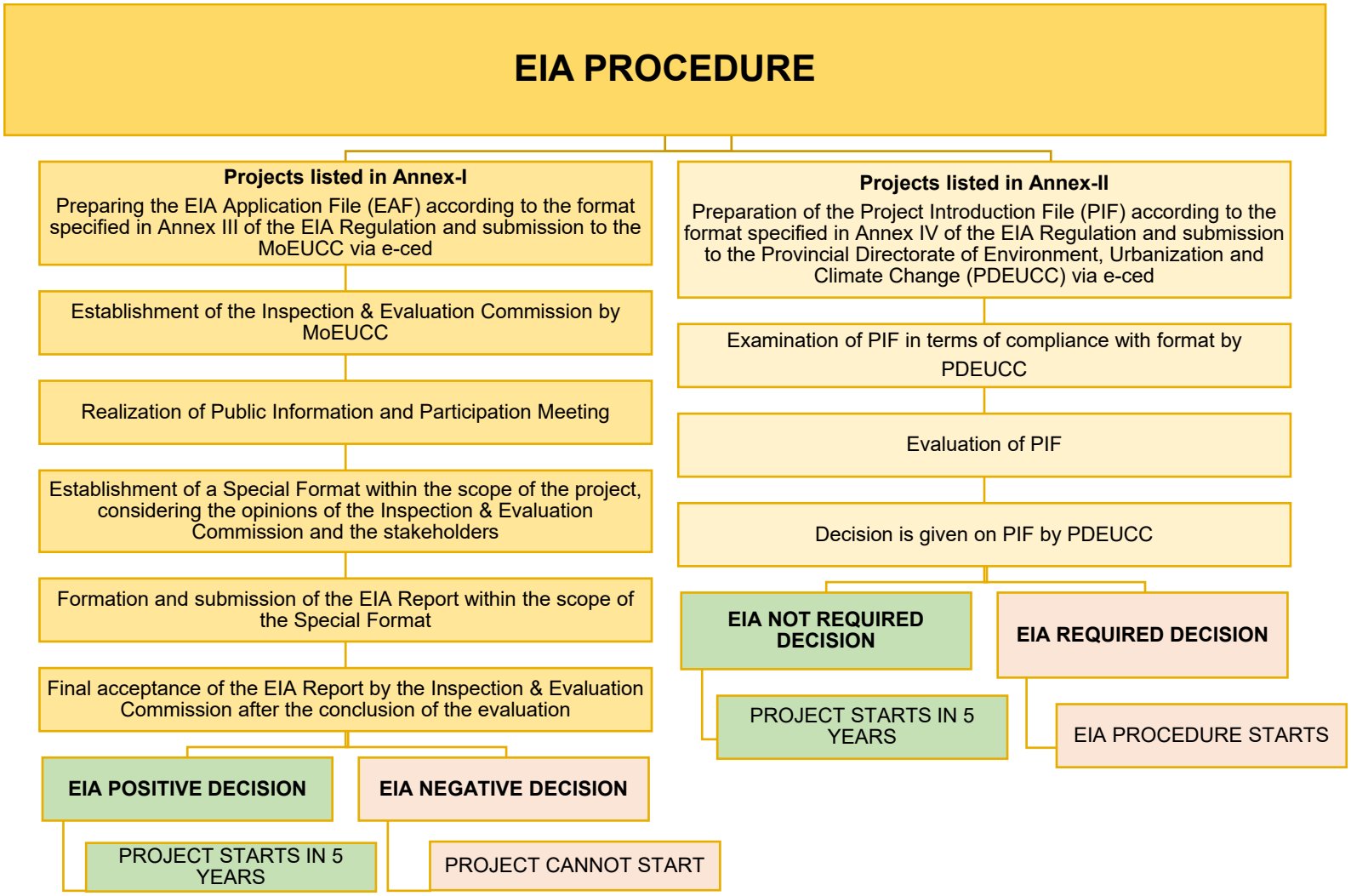
For asphalt plants:

- Asphalt plant facilities (Article 22 in the Annex-2 list)

For concrete plants

- Ready-mixed concrete facilities with a production capacity of 100 m^3/hour or more (Article 18-b in the Annex-2 list)
- Facilities with a production capacity of 5 tons/hour and above, producing shaped materials using cement or other binding materials (Article 18-c in the Annex-2 list)

Figure 2. EIA Process in Türkiye



2.2.1.2 Biodiversity and Sensitive Areas

Article 9 of the Environment Law focuses on safeguarding the environment, with a key emphasis on preserving the rich biological variety constituting the natural surroundings, the interconnected ecosystem supporting this diversity, and the delicate zones within it. National laws and regulations (including national plans, programs and strategies) regarding protection of habitats and species are listed below.

- Forestry Law No. 3071 and Implementation Regulations
- Law (5042-08.01.2004) and regulations on the Protection of Plant Breeders' Rights for New Plant Varieties
- Law for the Protection of Animals (5199-24.06.2004)
- Law on Fisheries (1380-22.03.1971)
- Law on National Parks (2873-11.08.1983)
- Law on Plant Protection and Agricultural Quarantine (6968-15.05.1957)
- National Agenda 21 Programme (2001)
- National Biological Diversity Strategy and Action Plan (2007)
- National Environmental Action Plan (1998)
- National Environmental Strategy (2006)
- National Plan for In-Situ Conservation of Plant Genetic Diversity (1998)
- National Rural Development Strategy (2006)
- National Science and Technology Policies 2003-2023 Strategy Document (2004)
- National Wetland Strategy (2003)
- Pasture Law (4342-25.02.1998) and Regulation
- Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (27126-30.01.2009)
- Regulation on Conservation of Wetlands (28962-04.04.2014)
- Regulation on Dismantling, Production and Export of Natural Flower Bulbs
- Regulation on Fisheries (22223-10.03.1995)
- Regulation on Identification, Registration and Approval of Protected Areas (28358-19.07.2012)
- Regulation on Protection of Wildlife and Wildlife Development Areas (25976-24.10.2005)
- Regulation on the Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora
- Seed Law (5553-31.10.2006)
- Terrestrial Hunting Law (4915-01.07.2003)
- Turkish National Action Programme Against Desertification (2005)
- Turkish National Forestry Programme (2004)

2.2.1.3 Cultural Heritage

As per Article 63 of the Constitution of the Republic of Türkiye, “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 site (As per the Law on Conservation of Cultural and Natural Properties (No. 2863, 1983), conservation site shall be the cities and remains of cities that are product of various prehistoric to present civilizations 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.).
- Buildings that were stages of great historic events during the National War of Independence and the Foundation of the Republic of Türkiye 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 (huyuk), 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.

The relevant requirements of the Law on Conservation of Cultural and Natural Property (No. 2863, 1983) applicable to the Project construction works are listed in Table 5.

Table 5. Applicable Requirements of the Law No. 2863

Article	Provision
Article 4 – Obligation to Notify	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.** If such property is in military garrisons and restricted areas, the relevant command levels shall be notified in line with the relevant procedure. 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 **within ten days.** 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.
Article 5 – Quality of state property	Immovable property belonging to the state, public institutions and organizations 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. Registered and annexed foundation property subject to a separate status due to its special qualities

Article	Provision
	shall not be covered by this provision.
Article 25 – Transfer to Museums	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. 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. The historical features of all kinds of weapons and materials concerning Turkish military history are carried out by Turkish General Staff.

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:

- **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 utilization 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.
- UNESCO put into effect the “Convention for the Safeguarding of the Intangible Cultural Heritage” in the 32nd General Conference held in Paris between September 29th and October 17th, 2003. The convention was officially accepted by the Republic of Türkiye with the “Law No. 5448 Regarding the Approval of the Convention of Safeguarding of Intangible Cultural Heritage on January 19th, 2006”. The intangible cultural heritage legally safeguarded by the relevant law was defined as follows:

  > “Cultural products and production processes such as oral narratives and oral traditions created by the folk in oral culture environments and included in folklore studies, performance arts, social practices, rituals and festivals, folklore, practices related to the universe and nature, handcraft traditions.”

2.2.1.4 Land Acquisition and Resettlement

The process of expropriation of the necessary lands for the railway route intended for the Project will follow relevant laws and regulations, in addition to complying with the ESS5 of the World Bank’s ESF.

National Legislation Related to Expropriation

The Turkish Constitution, Article 46, under Subsection 3 of the Section 3 with the heading of "Social and Economic Rights and Responsibilities", addresses expropriation issues. The article states that whenever a development project serves the public interest, the government is authorized to initiate and execute an expropriation process. All hydropower, airport, highway and other roads, and similar large-scale infrastructure projects are considered to be in public interest and provide the basis for Article 46. The Article refers to the Expropriation Law.

Expropriation Law

Procedures set by the Expropriation Law that was published in the Official Gazette No. 18215 dated November 8, 1983, are explained as follows:

Expropriation Law sets the procedures to be followed during; if and when it is required for public interest;

- The expropriation of immovable owned by real persons or legal identities subject to private law,
- The calculation of the expropriation fee,
- Registration of the immovable asset and its appurtenances in the name of the expropriation administration,
- Reclamation of the unused immovable assets, mutual rights and obligations as well as the procedures and methods for the settlement of the conflicts pertaining to them.

National Legislation Regarding Resettlement

Resettlement Law

Resettlement activities are regulated by Resettlement Law that was published in the Official Gazette No.26301 dated September 19, 2006 and Regulation for the Execution of Resettlement Law.

Resettlement Law deals with the families applying to related governmental agencies in the 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 the project area. According to the Article 3 of the Law, three types of resettlements can be applied as for that the choices and requests of affected families. Article 3 of the Law reads this point as follows;

Agricultural resettlement: Agricultural resettlement is implemented through providing a family with the following: agricultural land at the amount envisaged in special resettlement project prepared by MoEUCC, house, management building, animal, agricultural devices and tools, workbench and credits one or more.

Non – agricultural resettlement: This type of resettlement is implemented through providing a family with the following: building plot at the amount provisioned in special resettlement project, house, devices, tools, workbench and loans one or more.

Physical resettlement: This type of resettlement is implemented through providing construction credit support to a family within the amount of loan determined by the Ministry (MoEUCC) for the aim of re-building (moving) of villages because of unsuitability of a village centers or consolidating of villages because of dispersed settlement or villages which are fragmented as a result of disasters; after selling land (house plot) from village development areas to people in need".

2.2.1.5 Labor Law and Regulations

Regarding occupational health and safety related issues are governed by the Occupational Health and Safety Law No. 6331 which was published in the Official Gazette No.28339 and dated June 30, 2012. This law forms the basis of legal framework that determines roles,

obligations and responsibilities of employers and employees providing rules of health and safety in workplaces.

Additionally, business and labor issues are regulated by Labor Law (No: 4857) that was published in the Official Gazette No: 25134 dated July 10, 2003.

Prominent regulations covered by national legislation regarding occupational health and safety and labor and working conditions are also given in Table 4.

2.2.2 Requirements for Environmental Licenses, Permits and Approvals

During construction and operation phases of the project, environmental permits and/or licenses are obtained for activities identified in Annex-1 (Activities generating high levels of pollution) and Annex-2 (Activities generating pollution) of Regulation on Environmental Permits and Licenses. In accordance with regulations, “Environmental Permit” and/or “Environmental Permit and License” processes are carried out.

Forestry Law (No. 6831), Law on Soil Conservation and Land Use (No.5403) and Pasture Law (No.4342) are to be taken into consideration for the forest, agriculture and pasture areas located on the project route.

To complete the project with the least impact possible considering health, safety, environment and society, all procedures are to be carried out as stated in the Labor Law (No. 4857), published in the Official Gazette No. 27601 dated June 4, 2010.

Relevant fundamental environmental permits and/or licenses are listed below.

Land Use

- Permit for the use of agricultural lands for non-agricultural purposes (Law on Soil Conservation and Land Use Law No: 5403)
- Permit for the use of pasturelands (Pasture Law No.4342)
- Land use agreements with government authorities for state owned lands (Relevant Laws according to land use type)
- Approval of Expropriation Plans (Expropriation Law, Law No: 2942)

Construction Site

- Permits and approvals for roads, railways, water bodies, canals, power supply lines, pipelines etc.
- Workplace notification for construction site
- Permit of fuel storage
- Environmental Permit for concrete structures
- Environmental Permit for asphalt structures

Water and Wastewater Management

- Water usage
- Environmental permit for wastewater discharge
- Environmental permit for package wastewater treatment plants, if any

Wastes

- Approval of waste management plan
- Agreements with licensed waste management and disposal facilities

2.3 International Agreements, Conventions and Protocols

The legal framework that governs the Project also includes international conventions. The following is a list of the international agreements that are pertinent to the Project and to which Türkiye is a party.

Table 6. International Agreements, Conventions and Protocols

International Agreements, Conventions and Protocols Names (Official Gazette Date, Issue)
Environment
Vienna Convention for the Protection of the Ozone Layer
Montreal Protocol on Substances Depleting Ozone Layer, including the Kigali Amendment to the Montreal Protocol
United Nations Framework Convention on Climate Change (UNFCCC) (O.G. 21.10.2003, No: 25266)
Kyoto Protocol (O.G. 17.02.2009, No: 27144)
Paris Agreement (O.G 07.10.2021, No:31621)
United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, particularly in Africa (O.G. 14.02.1998 No:23258)
Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) (O.G. 14.11.1980, No: 17150)
Protocol for the prevention of pollution of the Mediterranean Sea by dumping from ships and aircraft (Dumping Protocol) (O.G. 22.8.2002, No:24854)
Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal (Hazardous Wastes Protocol) (O.G. 14.1.2002, No:25346)
Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities (O.G. 18.3.1987, No: 19404)
Mediterranean Sea Protocol Concerning Specially Protected Areas and Biodiversity (ratification date 6.11.1986) (O.G. 23.10.1988, No: 19968)
Convention on the Control of Transboundary Movements of Hazardous Wastes (Basel Convention) (O.G. 30.12.1993, No: 21804)
Stockholm Convention on Persistent Organic Pollutants
Convention on Long Range Transboundary Air Pollution (CLRTAP) (O.G. 23.3.1983, No: 17996)
International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND)
International Convention on Civil Liability for Oil Pollution Damage
Rotterdam Convention on Prior Informed Consent for Certain Hazardous Chemicals and Pesticides in International Trade
Minamata Convention on Mercury
Biodiversity
Convention for the Conservation of European Wildlife and Natural Habitats (Bern Convention) (O.G. 20.2.1984, No: 18318)
International Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar) (O.G. 17.5.1994, No: 21937)
Convention on Biodiversity (O.G. 27.12.1996, No: 22860)
Cartagena Protocol on Biosafety (O.G. 24.06.2003, No: 25148)
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (O.G. 20.06.1996, No: 22672)
International Convention for the Protection of Birds, Paris 1959 (O.G. 17.12.1966, No: 12480)
Cultural Heritage
UNESCO, Convention on the Protection and Promotion of the Diversity of Cultural Expressions. Paris, 20 October 2005
UNESCO Convention on the Protection of the World Cultural and Natural Heritage, Paris 16 November 1972 (O.G. 14.2.1983, No: 17959)
Convention for the Safeguarding of the Intangible Cultural Heritage. Paris, 17 October 2003.
UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. Paris, 14 November 1970.
UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage. Paris, 17 October 2003.
In addition, the “Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, ICOMOS 2011” has been taken into consideration.
Occupational Health and Safety
ILO Safety and Health in Construction Convention (O.G. 29.11.2014, No: 29190)
ILO Agreement on Occupational Health and Safety and the Working Environment (O.G. 13.01.2004, No: 25345)

International Agreements, Conventions and Protocols Names (Official Gazette Date, Issue)
ILO Worst Forms of Child Labor Convention (O.G. 03.02.2001, No: 24307)
ILO Abolition of Forced Labor Convention (O.G. 27.01.1998, No: 23243)
ILO Minimum Age Convention (O.G. 02.06.1959, No: 10220)
ILO Right to Organize and Collective Bargaining Convention (O.G. 22.12.1992, No: 21432)
ILO Worker's Representatives Convention (O.G. 11.12.1992, No: 21432)
ILO Human Resources Development Convention (O.G. 12.12.1992, No: 21433)
ILO Employment Policy Convention (O.G. 20.11.1976, No: 15769)
ILO Social Security (Minimum Standards Convention (O.G. 10.08.1971, No: 13922)
ILO Equal Remuneration Convention (O.G. 22.12.1966, No: 12484)
ILO Discrimination (Employment and Occupation) Convention (O.G. 22.12.1966, No: 12484)
ILO Abolition of Forced Labor Convention (O.G. 21.12.1960, No: 10686)
ILO Right to Organize and Collective Bargaining Convention (O.G. 14.08.1951, No: 7884)

2.4 World Bank Environmental and Social Standards

Projects supported by the World Bank through Investment Project Financing are required to meet Environmental and Social Standards (ESSs) of the World Bank's Environmental and Social Framework.[1] Among the ten ESSs, ESS7 on *Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities* and ESS9 on *Financial Intermediaries* are not relevant to the Project since there is no community in Türkiye that meets the definition under ESS7, and the Project does not involve any financial intermediary. The requirements of the relevant ESSs and their relevance to the Project are summarized below:

ESS1: Assessment and Management of Environmental and Social Risks and Impacts:

This Standard sets out Borrower's responsibilities for assessing, managing, and monitoring E&S risks and impacts related with each phase of the project supported by the World Bank through Investment Project Financing (IPF), so as to accomplish E&S results consistent with the ESSs.

ESS1, paragraph 26 states that all relevant E&S risks and impacts as the result of the project should be covered in the assessment, including:

1. Environmental risks and impacts covering the following issues:

- The ones defined by Environmental Health and Safety Guidelines (EHSG)
- Community safety concerns
- Climate change and other transboundary or global risks and impacts
- Materials threat to the protection, conservation, maintenance and restoration of natural habitats and biodiversity
- Ecosystem services and the use of living natural resources (fisheries, forests etc.)

2. Social risks and impacts covering the following issues

- Threats to human security;
- Risks that project impacts fall disproportionately on individuals or groups who, because of their particular circumstances, may be disadvantaged or vulnerable;
- Any prejudice or discrimination toward individuals or groups in providing access to development resources and project benefits, particularly in the case of those who may be disadvantaged or vulnerable;
- Negative economic and social impacts relating to the involuntary taking of land or restrictions on land use;
- Risks or impacts associated with land;

[1] https://www.worldbank.org/en/projects-operations/environmental-and-social-framework

- Impacts on the health, safety and well-being of workers and project-affected communities;
- Risks to cultural heritage.

ESS1 is one of the main standards guiding the assessment of the E&S risks, and this ESIA study is conducted to identify the E&S risks and determine relevant mitigation measures.

ESS2: Labor and Working Conditions

This standard perceives the importance of employment creation and income generation for the aim of comprehensive financial development and poverty reduction. Borrowers can promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions.

In interviews conducted with current employees of stations, who are considered as individuals affected by the project, deficiencies in accommodation, transportation, heating, electricity, communication, and security of existing stations have been highlighted. The working conditions of the personnel planned to be employed in the project need to be evaluated in collaboration with these employees.

ESS3: Resource Efficiency and Pollution Prevention and Management

These standard points out the requirements to highlight resource efficiency and pollution prevention and management with a holistic approach to project implementation. The objective is to minimize pollution stemming from the project while ensuring the sustainable use of resources.

This ESS is applicable to the Project as materials will be needed during the construction phase. Aggregate Material will be required and potential borrow areas and quarries near project area. Moreover, noise, air emissions, waste and wastewater production, will be in question during both construction and operation phases. Detailed impact assessment has been provided within this ESIA.

The ESMP Document was also prepared within the scope of the ESIA Studies. The measures and controls that have been developed in accordance with the mitigation hierarchy to manage the impacts that were identified during the impact assessment process are delineated in this ESMP. It also establishes the implementation schedule, roles and responsibilities, and reporting and monitoring requirements. Each of the sub-management plans (including Pollution Prevention and Waste Management Plan) detailed in the appendices of this ESMP outlines the E&S mitigation measures and management controls that must be implemented to guarantee adherence to the Project Standards as outlined in the ESIA Report regarding pertinent E&S issues.

ESS4: Community Health and Safety

ESS 4 emphasizes issues of health, safety, and security risks and impacts on communities resulting from project activities. Borrower specifically consider people who may be vulnerable due to impacts and risks of the project.

This ESS is applicable as security personnel usage and community exposure to health problems are highly relevant. Hence, Emergency Preparedness and Response needs to be assessed. In addition, during operation, Emergency Preparedness and Response is also a necessity for traffic and pedestrian safety and railway accidents.

ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

ESS5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons. Project-related land acquisition or restrictions on land use may cause physical displacement (relocation, loss of residential land, or loss of shelter), economic displacement (loss of land, assets, or access to assets leading to loss of income sources or other means of livelihood), or both. The term “involuntary resettlement”

refers to these impacts. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in displacement. The objectives of ESS5 are:

- To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives.
- To avoid forced eviction.
- To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement cost; and (b) assisting displaced persons in their efforts to improve, or at least restore their livelihoods and living standards in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.
- To improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure.
- To conceive and execute resettlement activities as sustainable development programs, providing sufficient investment resources to enable displaced persons to benefit directly from the project, as the nature of the project may warrant.

Although no land acquisition is required at this stage, as stated in Section 1, the detailed engineering designs will be prepared by the contractor. Therefore, land acquisition may be required due to modifications in the initial design which this ESIA is based on. So, this ESS is relevant.

A Resettlement Framework (RF) was prepared to guide the Resettlement Plans (RPs) if needed. In line with the RF, when land use through temporary or permanent purchase or lease is considered for project activities, the rights of legal owner of the land, legal partners, all heirs, and all individuals using the land through official or unofficial means will be recognized. During this assessment, special attention will be given to vulnerable individuals such as the elderly, illiterate, and those whose native language is not Turkish, in order to prevent any disproportionate adverse impact and loss of rights. Efforts should be made to prevent the exclusion of women who are landowners/partners or users from participating in the process by male members of the family. Before initiating land acquisition processes, information will be shared with and dialogue will be established with rights holders and users. All of these information and objection processes will be completed before land acquisition begins. The RPs will be developed in consultation with affected households. The compensation and assistance measures will be ensured to be fair and transparent, and compensations will be paid before the commencement of physical works.

ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Protection and conservation of biodiversity and sustainability of natural resources are the fundamental component of sustainable development. Biodiversity supported by ecological functions including forests should be protected.

This standard also points out to sustainable management of primary production and harvesting of living natural resources and recognizes the need to consider the livelihood of project-affected parties whose access to, or use of, biodiversity or living natural resources may be affected by a project.

This ESS is applicable as the areas in the vicinity of the railway route are characterized by the presence of a number of biologically and ecologically valuable and sensitive hotspots. The biodiversity impacts of the project have been analyzed and mitigation measures defined by this ESIA and ESMP. A Biodiversity Management Plan has also been developed in this respect.

ESS8: Cultural Heritage

This standard points out that cultural heritage provides continuity between tangible and intangible forms between past, present and future. In the implementation of the project, necessary measures should be taken to protect cultural heritage. Therefore, this ESS is relevant and necessary assessments have been conducted in this ESIA in this respect. A cultural heritage management plan (including Chance Finds Procedure for managing accidently discovered or chance find cultural artifacts) has also been prepared within the scope of ESIA/ESMP.

ESS10: Stakeholder Engagement and Information Disclosure

Importance of information disclosure, consultations and open and transparent engagement between Borrower and stakeholders are emphasized as it is a necessary element of good international practice. Impactive stakeholder engagement contributes to the projects in terms of improvement of E&S sustainability, enhancement of project acceptance and successful project design.

2.5 Asian Infrastructure Investment Bank's Environmental and Social Framework

AIIB incorporates its own policy addressing E&S impacts into ESF which was approved in February 2016 and amended through February 2019, May 2021 and November 2022. The AIIB's ESF consists of three (3) ESSs which are indicated below:

- ESS1: Environmental and Social Assessment and Management
- ESS2: Land Acquisition and Involuntary Resettlement
- ESS3: Indigenous Peoples

AIIB **ESS1: Environmental and Social Assessment and Management**

This standard requires to conduct an E&S impact assessment relating to the proposed project's adverse E&S risks and impacts, and design appropriate measures to avoid, minimize, mitigate, offset or compensate for them.

AIIB **ESS2: Land Acquisition and Involuntary Resettlement**

If the project is likely to involve Involuntary Resettlement, it is required to address this situation in the social section of the assessment report as required under ESS2.

AIIB **ESS3: Indigenous Peoples**

This standard is not relevant for the Project.

2.6 Islamic Development Bank (IsDB)'s Environmental and Social Safeguards Policy (Feb 2020)

The Environmental and Social Safeguards Policy of the Islamic Development Bank (IsDB), as of February 2020, outlines the institution's commitment to promoting sustainable development while minimizing adverse E&S impacts associated with its projects. Here's a summary of its key components:

Policy Objectives: The policy aims to integrate E&S considerations into all stages of project planning, implementation, and monitoring. It seeks to ensure that IsDB-funded projects contribute to sustainable development, biodiversity conservation, and social inclusion.

Scope and Applicability: The policy applies to all projects financed, supported, or implemented by the IsDB, including those funded through loans, grants, and technical assistance. It encompasses a wide range of sectors and activities, from infrastructure development to capacity building initiatives.

Environmental and Social Assessment: The policy requires a systematic assessment of potential E&S risks and impacts associated with proposed projects. This assessment helps identify measures to avoid, minimize, or mitigate adverse effects and enhance positive impacts.

Environmental and Social Management Plan (ESMP): Based on the findings of the E&S assessment, an ESMP is developed for each project. The ESMP outlines specific measures, actions, and responsibilities for managing E&S risks throughout the project cycle.

Stakeholder Engagement: The policy emphasizes the importance of engaging with stakeholders, including affected communities, civil society organizations, and government agencies, throughout the project lifecycle. Meaningful consultation and participation help ensure that project decisions consider local needs, preferences, and concerns.

Capacity Building and Training: The policy promotes capacity building and training programs to enhance the E&S management capabilities of IsDB staff, project implementers, and relevant stakeholders. These initiatives aim to strengthen institutional capacity and promote best practices in E&S sustainability.

Monitoring and Reporting: The policy establishes mechanisms for monitoring project implementation and compliance with E&S requirements. Regular reporting on project performance, including E&S indicators, enables transparency, accountability, and learning.

2.7 Other Guidelines

The World Bank Group General Environmental, Health and Safety (EHS) Guidelines and Good Practice/Guidance Notes and Handbooks

The World Bank Group (WBG) General EHS Guidelines have been prepared as technical reference documents aimed at providing examples of Good International Industry Practices (GIIP), with general and industry-specific aspects.

In addition to the WBG General EHS Guidelines including the subjects of “environment”, “occupational health and safety”, “community health and safety” and “construction and decommissioning”, the WBG has published sector specific guidelines for a variety of industries. Relevant aspects of the WBG EHS Guidelines are applicable to the Project and are considered in the scope of the ESIA Report. In the case project country regulations differ from the provisions of related WBG EHS Guidelines, the more stringent of the standards are required to be complied with. The WBG sector-specific Guidelines regarding this Project are described below.

WBG EHS Guidelines for Railways

This guide prepared for railway activities concerning infrastructure projects to be built for passenger and freight transportation. The guide consists of two main parts covering the construction phase of railway operations and maintenance of the railway infrastructure, locomotive and engine services and other maintenance activities.

WBG EHS Safety Guidelines for Electric Power Transmission and Distribution

This guide includes information relevant to power transmission between a generation facility and a substation located within an electric grid, in addition to power distribution from a substation to consumers located in residential, commercial and industrial areas.

Other IFC guideline documents to be used where necessary in the E&S assessments are as follows.

- IFC’s Stakeholder Engagement Handbook: A Good Practice Handbook for Companies Doing Business in Emerging Markets (2007)
- IFC’s Good Practice Note on Addressing Grievances from Project-Affected Communities (2009)

- IFC's Handbook for Addressing Project-Induced In-Migration (2009)
- IFC's Introduction to Health Impact Assessment (2009)
- IFC and EBRD's Guidance Note on Workers' Accommodation: Processes and Standards (2009)
- IFC's Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (2013)
- IFC's Environmental and Social Management System Implementation Handbook: Construction (2014)
- IFC's Environmental and Social Management System Implementation Handbook: General (2015)
- IFC's Good Practice Note on Managing Contractors' Environmental and Social Performance (2017)
- IFC's Good Practice Handbook on Use of Security Forces: Assessing and Managing Risks and Impacts (2017)

Canada Environmental Law and Standards

This Act, respecting pollution prevention and the protection of the environment and human health to contribute to sustainable development, is used to compare with the soil quality standards within the scope of this project. Aforementioned soil quality standards were used in the assessment of soil quality and to classify the baseline conditions in terms of soil quality.

2.8 Gap Analysis

Within the scope of this ESIA Report a Gap Analysis Study has been carried out to identify the scale and gaps of the National ES legislation in relation to the requirements of the WB ESSs relevant to the project, and the measures to bridge these gaps within this project (i.e. which standards to be followed) (see Table 7).

Table 7. Gap Analysis

ESS	Requirements	Coverage by National Legislation	Identified Gaps	Actions to Bridge the Gaps
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	Conduct ESIA for the project. Identify potential risks and impacts of the project on the physical, biological, and social environments during construction and operation phases. Develop mitigation measures.	Turkish Environmental Law No. 2872 mandates environmental impact assessments (EIAs) for projects.	The main gaps between the national EIA and the ESS1 are as follows: • The process of integrating social impact assessment into the Turkish EIA has started in recent years. Especially with the EIA Regulation published in the Official Gazette dated 29.07.2022 and numbered 31907, social impact assessment has started to be included in Turkish EIA. Turkish EIA process is currently open for improvement but requires a fully integrated process to reach ESS1. • In addition, the requirement to address cumulative impacts of other concurrent other projects is limited in Turkish EIA legislation. Under ESS1, cumulative impact assessment is in a more important position. Additionally, where the project involves specifically identified physical elements, aspects, and (associated) facilities that are likely to generate impacts, environmental and social risks and impacts have to be identified in the context of the project's area of influence under ESS1. • The preparation of Environmental and Social Management Plans together with the Stakeholder Engagement Plan (during the EIA application process) has been included in Turkish legislation with the latest regulation. However, the management plans prepared are less comprehensive than the ones required under ESS1. • In addition, ESS1 supports the use of an effective grievance mechanism that can facilitate early indication and prompt remediation for those who believe that they have been harmed by a client's actions. • Supply chain management is also highlighted in ESS1.	To bridge the identified gaps between national EIA and ESS1 requirements, the project has adopted a proactive approach by implementing recommended actions. Firstly, an expanded scope of ESIA has been undertaken, aligning with ESS1 standards. This comprehensive assessment encompasses both direct and indirect impacts, ensuring a thorough understanding of potential E&S ramifications throughout the project lifecycle. By addressing cumulative effects and considering long-term impacts on local communities and ecosystems, the project aims to minimize adverse consequences and promote sustainable development. The ESIA prepared for the Project also includes ESMP and relevant E&S sub-management plans to address identified gaps. Additionally, the project has developed an enhanced Stakeholder Engagement Plan (SEP) to foster transparent and continuous dialogue with affected stakeholders. This plan goes beyond regulatory requirements, incorporating regular consultations, information dissemination, and a grievance mechanism (GM) to address concerns promptly. By prioritizing stakeholder involvement and feedback, the project seeks to build trust, mitigate conflicts, and ensure that the diverse perspectives and needs of stakeholders are integrated into decision-making processes. Through these proactive measures, the project endeavors to meet ESS1 standards and uphold environmental and social sustainability principles.

ESS	Requirements	Coverage by National Legislation	Identified Gaps	Actions to Bridge the Gaps
			The procedures related to social issues/assessments are limited and include only generic information based on secondary data collection. It does not have definitions regarding the area of influence, solid social baseline, stakeholder definitions, procedures for meaningful stakeholder engagement, social impacts and mitigations, cumulative impacts, and an E&S monitoring plan.	
ESS2: Labor and Working Conditions	Ensure fair labor practices and safe working conditions for all workers involved in the project. Comply with national labor laws and regulations. Provide training and capacity building for workers.	Turkish Labor Law provides regulations on labor rights and working conditions. Occupational Health and Safety Law has provisions on OHS.	Despite the overall alignment with GIIPs labor risks under construction projects stem from not sufficient enforcement of OHS measures, over-time work and related non-payment, unequal treatment of men and women, and child labor / forced labor. In addition, under the national labor and working conditions legislation, there is no specific requirement for a Workers' GM that allows workers to communicate their complaints to the employer.	Confirm that project contractors adhere to labor laws and regulations, especially regarding working hours, wages, and occupational health and safety. Monitor compliance throughout project implementation. The contractor is required to prepare its own Labor Management Plan (LM Plan) according to the Project's LMP. This document will include a Code of Conduct (CoC), which has provisions on prevention of Sexual Exploitation, Abuse, and Harassment (SEA/SH) incidents. A Workers' Grievance Mechanism (WGM) must be established ensuring it is open to anonymous reporting for SEA/SH. In addition, AYGM will establish a monitoring system for child and forced labor incidents covering primary suppliers. Labor Influx Management Plan and Workers' Camp Management Plan will be prepared by the contractor under the supervision of AYGM to submit ETMIC sub-unit of PIU.
ESS3: Resource Efficiency and Pollution Prevention	Minimize resource use, waste generation, and pollution during project implementation. Implement measures to reduce energy	Turkish environmental legislation includes regulations on pollution prevention and resource management.	Most Turkish national laws and regulations are in line with European Union (EU) directives. There is no major gap between ESS3 and Turkish national legislation. National EIA process is quite successful in identifying impacts but does not require provision of a detailed overview of mitigation methods and monitoring.	To address these identified gaps, the project has implemented several recommended actions aimed at enhancing resource efficiency and pollution prevention measures. Firstly, comprehensive sub-management plans have been developed, integrating ESS3

ESS	Requirements	Coverage by National Legislation	Identified Gaps	Actions to Bridge the Gaps
	consumption, water usage, and emissions.		However, within the scope of ESS3, the client needs to consider alternatives and implement technically and financially feasible and cost-effective options to reduce project related GHG emissions during the design and operation of the project. Sub-management plans and monitoring programs have started to be integrated into Turkish legislation with the recent EIA Regulation. Furthermore, there are no major gaps between the impacts and mitigation methods in the national legislation and ESS3 on major environmental issues such as waste, air pollution, water resources, wastewater, noise level. On the other hand, ESS3 requires application of pollution prevention and control technologies and practices under the Project consistent with international good practice, as reflected in internationally recognized standards, such as the World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines.	standards to minimize resource consumption and pollution generation throughout the project lifecycle. These plans outline specific strategies, technologies, and best practices for reducing waste generation, optimizing resource use, and mitigating pollution risks. Additionally, the project has invested in advanced pollution control technologies and treatment systems to ensure compliance with stringent pollution prevention standards. Regular monitoring and reporting mechanisms have also been established to track resource consumption, waste generation, and pollution levels, enabling timely interventions and continuous improvement. Through these proactive measures, the project aims to align with ESS3 requirements, mitigate environmental risks, and promote sustainable resource management practices. Besides, the relevant requirements of the WBG EHS Guidelines have been applied to the Project in accordance with the ESS3. In cases where the Turkish requirements differ from the levels and measures presented in the WBG EHS Guidelines, the more stringent one (such as the most stringent discharge and emission standards) will be applied in the project specifications.
ESS4: Community Health and Safety	Protect the health and safety of communities living near project sites. Identify potential health and safety risks associated with project activities. Develop measures to minimize risks and respond to emergencies.	Turkish Occupational Health and Safety Law addresses workplace safety.	In Turkish national legislation, the general principles of community health, safety and security are fragmented under different regulations. The general principles are like ESS4. However, social issues such as labor influx, gender-based violence risks are more prominent under the ESS4 along with cumulative assessment and communication activities with stakeholders. There is neither identified risk to use force of security personnel nor mitigation measures to prevent by considering community, health, and safety.	Community health assessments to identify potential risks from project activities were conducted. The community health and safety management plan to mitigate identified risks was prepared. *Security personnel* • Screening and Training: Security personnel should be vetted for past behavior and trained to respect

ESS	Requirements	Coverage by National Legislation	Identified Gaps	Actions to Bridge the Gaps
				human rights and avoid escalation of violence. • Code of Conduct: Security forces must follow a code of conduct that protects community members and upholds local laws. • Community Engagement: The community should be informed about the security measures, with mechanisms in place to address concerns. • Monitoring and Accountability: Systems should be in place to monitor security personnel and respond to any grievances or incidents.
ESS5: Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement	Avoid or minimize involuntary resettlement and land acquisition. If unavoidable, provide compensation and assistance to affected communities. Respect the rights and interests of indigenous peoples and vulnerable groups.	Turkish Land Law governs land acquisition and compensation procedures.	Turkish legislation primarily focuses on formal landowners and registered property, providing compensation based on market value, which is generally limited to landowners. Resettlement assistance is minimal and mainly involves cash compensation. Public consultations are not always mandatory, leading to limited stakeholder engagement. While there are mechanisms for grievances, they are often not well-publicized or accessible to all affected people. Additionally, there are limited provisions for monitoring and evaluation of resettlement processes, with a stronger focus on physical displacement rather than economic displacement. The needs of vulnerable groups are not specifically addressed, and there are limited provisions for transitional support to affected persons.	Review project plans to assess potential impacts on land use and communities. Develop resettlement plans in consultation with affected communities. Ensure that compensation and assistance measures are fair and transparent. There is no land acquisition activity planned within the scope of the project. Never-the-less a Resettlement Framework (RF) has been prepared in case land acquisition is required during the implementation of the project. In case of any type of land acquisition is required, a RP will be prepared based on the RF. Land acquisition encompasses all transactions, whether temporary or permanent purchase or lease. Prior to commencing these transactions, all shareholders, landowners, users, both official and unofficial, should be informed and consulted. And compensation will be based on replacement value, and without depreciations and transaction costs.

ESS	Requirements	Coverage by National Legislation	Identified Gaps	Actions to Bridge the Gaps
ESS6: Biodiversity Conservation and Sustainable Natural Resource Management	Protect and conserve biodiversity and habitats. Apply mitigation hierarchy and precautionary approach in the design and implementation of projects that could have an impact on biodiversity and promote sustainable management of living natural resources.	Turkish legislation includes provisions for biodiversity conservation and protected areas.	There is no gap in terms of policy level but internationally recognized areas of high biodiversity value including key biodiversity areas, important nature areas, important bird areas and important plant areas are not fully assessed/considered under national legislation. There is no clear requirement for habitat assessment in national legislation as well.	To fulfill this gap, biodiversity assessments made within the scope of ESIA covered internationally recognized areas of high biodiversity value and habitat assessment. A biodiversity management plan has also been prepared.
ESS8: Cultural Heritage	Identify and protect cultural heritage sites and artifacts affected by project activities. Avoid or minimize impacts on cultural heritage (tangible and intangible). Implement measures to mitigate adverse impacts and promote cultural heritage preservation.	Law on the Conservation of Cultural and Natural Property (Nº 2863) includes provisions for the protection of cultural heritage sites and artifacts.	The national legislation covers most of the requirements of the ESS8. However, the projects' impacts on intangible cultural heritage are not required to be thoroughly assessed. In addition, while national legislation covers only registered cultural heritage, ESS8 applies to all cultural heritage regardless of whether it has been legally protected.	• Cultural heritage assessments covering both registered and unregistered tangible and intangible cultural heritage was made during the preparation of ESIA. • Accordingly, a Cultural Heritage Management Plan was prepared and will be included in all construction contracts. • A chance find procedure was prepared and will be included in all construction contracts. • Project activities will be monitored by experienced cultural heritage expert(s). In case of a need, the site-specific mitigation measures will be defined, and the construction works will be supervised by the cultural heritage expert(s). • A gap analysis on the cultural heritage assets legislation has been carried on in line with the ESIA studies. In terms of ESS 8 and National legislation and the proposed actions for these gaps are presented in ESIA Chapter 4.6 (Cultural Heritage). The recommendations in the aforementioned section should be taken into account regarding the cultural heritage assets that are within the scope of the project and may be affected by the project.

ESS	Requirements	Coverage by National Legislation	Identified Gaps	Actions to Bridge the Gaps
ESS10: Stakeholder Engagement and Information Disclosure	Engage with stakeholders throughout the project lifecycle. Provide timely and relevant information about project activities, risks, and impacts. Address stakeholder concerns and grievances effectively.	Turkish legislation may include provisions for grievance mechanisms, but specific guidance for project-specific mechanisms may be needed.	Development of the project-specific mechanisms and consultation with affected communities throughout the lifecycle of project are crucial according to the ESS10.	A stakeholder engagement plan to identify and engage with relevant stakeholders was developed, including plans for disclosure of information regarding project E&S risks and impacts. The stakeholder engagement will be continuous – from before project start and throughout all phases of the project. The mechanisms for information disclosure and feedback collection were established. A project-specific grievance mechanism in consultation with affected communities and stakeholders was developed.

2.9 Project Environmental and Social Categorization

The project has been assessed as "**Substantial**" in terms of both E&S risks. Several factors contribute to this assessment, and these are summarized below:

i. **Scope and Scale of Construction:** The project involves large-scale civil works, including the rehabilitation and modernization of a 667km railway corridor. The extensive nature of these activities increases the potential for E&S impacts.
ii. **Brownfield Nature:** Although the project is considered brownfield, meaning it involves existing infrastructure, the substantial nature of the civil works within the existing railway corridor still poses potential risks and impacts, such as air and noise pollution, soil disturbance, and vegetation loss.
iii. **Geographical Vulnerability:** The project is located in provinces highly exposed to extreme weather events, natural hazards, and critical habitats. This geographical vulnerability raises the stakes for potential E&S risks.
iv. **Critical Habitats:** The railway corridor intersects with critical habitats identified during the Trans-Anatolian Natural Gas Pipeline Project (TANAP). This intersection adds complexity to the project, requiring special attention to protect these ecologically sensitive areas.
v. **Community Impacts:** Although no land acquisition is required at this stage, since the detailed engineering designs will be prepared by the contractor, land acquisition might be required in case of modifications in the initial designs. The diverse impacts on community health and safety, including traffic safety, further contribute to the substantial categorization. The project will require major labour input and establishment of labor camps will be required. However, the workers will be skilled technical workers and thus no significant labor influx is expected. Main impacts can be observed during construction period near the settlements. They will be related to noise, dust, and vibration.
vi. **Institutional Capacity:** While AYGM as the implementing agency and the TCDD as the operating agency, have experience with large infrastructure projects, there is a need for enhanced collaboration and capacity building, particularly regarding compliance with the World Bank's ESF.

Given these factors, the project is classified as "**Substantial**", indicating a need for comprehensive assessment, management, and mitigation measures to address the potential E&S associated with its implementation.

3 PROJECT DESCRIPTION

3.1 Project Components

The Eastern Türkiye Middle Corridor Railway Development Project (ETMIC) is developed around two main components: Component 1 – Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line and Component 2 – Project Management.

Component 1: Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line

This component aims to rehabilitate and modernize the existing 667 km railway line between Divriği and the Türkiye-Georgia border. It includes comprehensive design and construction works to renew railway infrastructure and superstructure, electrify the line, and install advanced signaling systems compliant with EU standards. The project will significantly enhance the line's cargo capacity, increasing it from 750,000 tons per year to 20 million tons per year, while improving resilience to climate hazards through updated engineering standards and the integration of a Distributed Acoustic Sensing (DAS) early-warning system.

Sub-component 1.1: Design, Infrastructure and Superstructure Works, Electrification, and Signalization of the Divriği-Kars-Georgia Border Railway Line

The major portion of the budget will be allocated to detailed engineering design and extensive civil works. This includes the renewal of 143 km of railway, electrification of the entire line, installation of a European Train Control System, and construction of new sidings and extension of existing ones. Additional improvements include tunnel clearance and drainage works, construction of bridges and controlled level crossings, and station renovations. These enhancements will not only increase capacity and speed but also significantly reduce GHG emissions by transitioning from diesel to electric trains.

Sub-component 1.2: Design Supervision and Construction Supervision Services for the Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line

This sub-component comprises supervision services, ensuring high-quality implementation of the design and construction works. It includes oversight of the procurement process and the supervision of the entire project execution to guarantee robust construction standards and adherence to resilience measures against climate and natural hazards. This component will enhance the project's overall efficiency and effectiveness, ultimately delivering a modernized, higher-capacity railway line that meets international standards and supports Türkiye's strategic logistics and environmental goals.

Component 2: Project Management

This component focuses on the mobilization of a specialized firm to manage the project. It covers various aspects such as construction, engineering, social and environmental monitoring, citizen engagement, and results monitoring and evaluation. The objective is to ensure seamless project implementation under the Project Implementation Unit (PIU), enhancing project management capacity and ensuring that all project activities align with the intended outcomes and sustainability goals.

It should be noted that this ESIA focuses on Component 1.

3.2 Project Route

The project's route spans approximately 667km, starting at Divriği in Sivas Province and continuing through Erzincan, Tunceli, Erzurum, and Kars provinces before reaching the border with Georgia in Ardahan. This corridor includes the Turkish segment of the Baku-Tbilisi-Kars

(BTK) railway, establishing an intercontinental railway and multimodal route connecting East Asia, Central Asia, the South Caucasus, and Europe. The proposed rehabilitation, electrification, and modernization of this route aim to not only enhance transportation efficiency and contribute to economic development, international trade, and environmental sustainability across the provinces and beyond.

Currently, on the Divriği- Kars-Georgia Border railway line, which extends approximately 667km, the segment from Divriği to Kars is equipped with a single track. In contrast, the section between Kars and the Georgia Border (BTK section) has been constructed as a double-track system. However, the superstructure of this segment remains incomplete. Additionally, it should be noted that one track on the BTK section has already been operationalized, contributing to the existing railway infrastructure.

Existing railway line details are explained in Table 8 and given in Appendix-3.1.

Table 8. Existing Line Details

Existing Line Details	
Divriği – Kars Section	**BTK Section**
587 km Mainline (Single Track)	80 km Mainline (Single Track)
75 km Siding Track	6.8 km Siding Track
Project speed: max. 70-120 km/h	Project speed: max. 160 km/h
31 stations, 13 stops	3 stations
40,476 m tunnel (162 pcs)	17.766 m tunnel (17 pcs)
7,441 m bridge & overpass (231 pcs)	745 m bridge & overpass (8 pcs)
161 level crossings	No data

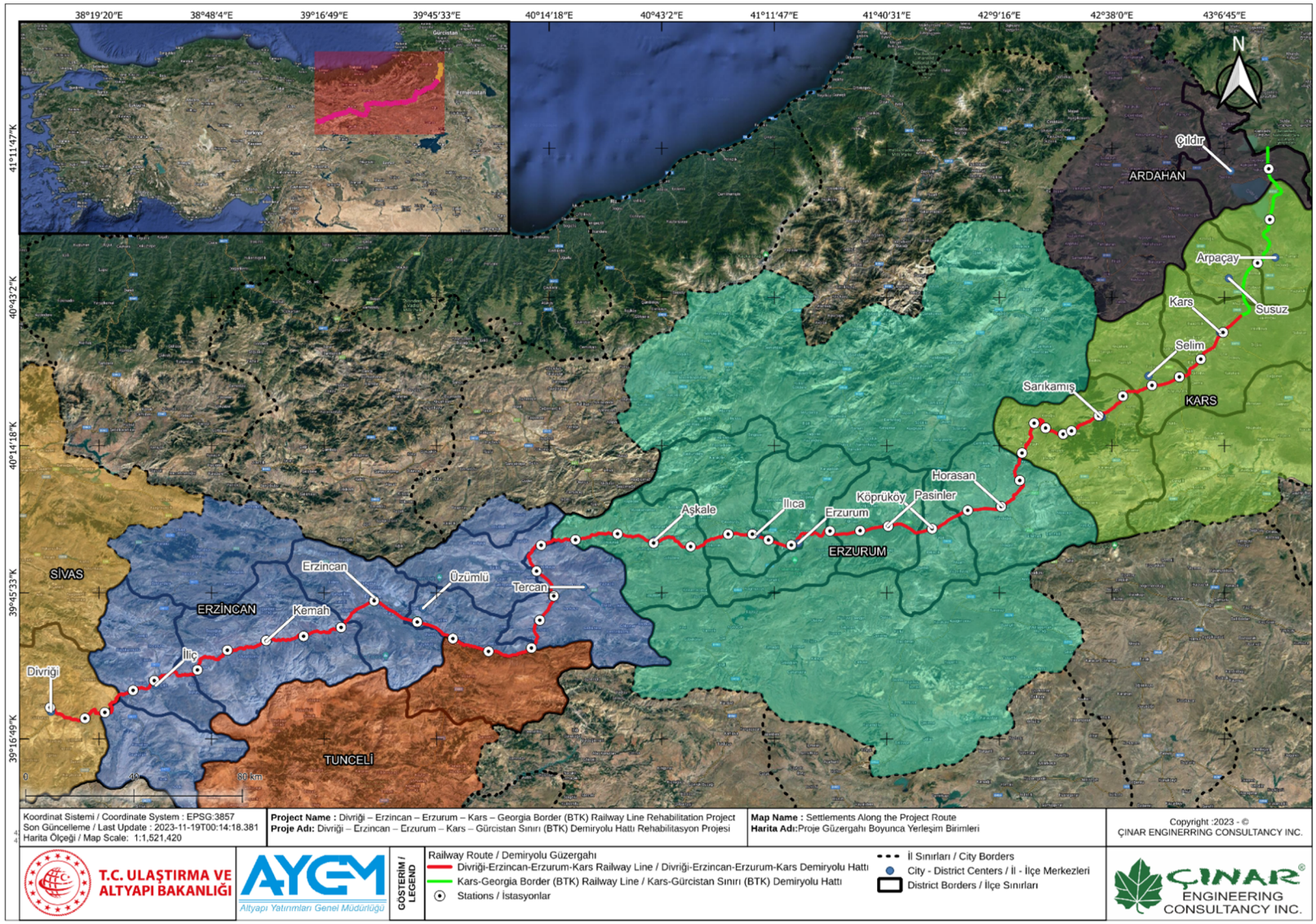
3.2.1 Settlements Along the Route

The project route spans approximately 667 km, connecting Sivas Province (specifically, Divriği) with the border of Georgia, passing through multiple provinces in eastern Türkiye.

The proposed railway corridor cuts across diverse regions in Türkiye, passing through multiple provinces and districts. In Sivas Province, the route commences in the historically significant Divriği District. Moving along Erzincan and Tunceli Provinces, the corridor spans Kemah, İliç, Pülümür and Üzümlü Districts. Erzurum Province hosts several districts along the route, including Tercan, Aşkale, Çayırlı, Yakutiye, Aziziye, Palandöken, Köprüköy, and Pasinler. Continuing into Kars Province, the railway corridor passes through Horasan, Sarıkamış, Selim, Susuz, Arpaçay and Çıldır Districts. The settlements along the Project route are shown in Figure 3.

The proposed route contributes to regional connectivity, economic development, and the enhancement of transportation infrastructure across these provinces. The ESIA will further delve into the specific characteristics of each district, evaluating potential impacts and proposing mitigation measures to ensure sustainable development along the railway corridor.

Figure 3. Settlements Along the Project Route



3.2.2 Stations and Sidings Along the Project Route

The Divriği-Kars-Georgia border railway line has a total of 47 railway stations, 13 of which are abandoned and currently not in operation. The information on existing railway stations and the scope of the work for each station is listed in Table 9.

Distributions of the stations and sidings that will be either constructed or rearranged within the scope of the project are indicated in Figure 4 and Figure 5, respectively. Comprehensive depictions of the stations and sidings are presented grid by grid in Appendix-3.2 and Appendix-3.3.

Moreover, existing and proposed station tracks arrangements are shown in between Table 10 and Table 11. Moreover, the layout plan of the Divriği-Kars-Georgia border railway line is given in Appendix-3.4.

Table 9. Current Station List and Scope of Work for Each Station

No	Name of Station	Km	Number of Sidings	Max Useful Mesh Length (m)	Remarks	Scope of the Work
-	Divriği	777+708	9	950	Station	Out of the scope
1	Dazlak	793+500	-		Abandoned stop/station	The construction of additional sidings will be arranged to accommodate 700m trains, with the main line + 2 sidings.
2	Çaltı	804+599	3	498	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 3 sidings. The dead-end track will be canceled.
3	Bağıştaş	821+802	2	424	Station	The existing station will be rearranged to accommodate 750m trains with the main line + 2 sidings
4	İliç	832+434	2	432	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 2 sidings.
5	Güllübağ	851+457	2	424	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 1 siding. The second secondary line will be canceled.
6	Eriç	868+650	2	709	Station	The existing station will be rearranged to accommodate 750m trains with the main line + 2 sidings.
7	Kemah	885+765	2	410	Station	The existing track alongside the main line will be extended to make it suitable for 750m trains. The other track will be preserved.
8	Alp	901+798	2	406	Station	The existing station will be arranged to accommodate 750m trains with the main line + 2 sidings.
9	Dumanlı	921+002	-		Abandoned stop/station	The construction of additional sidings will be arranged to accommodate 1050m trains, with the main line + 2 sidings at the station.
10	Erzincan	933+784	8	893	Station	The main line and the single track adjacent to it will be extended to accommodate 750m trains. All other lines will be preserved.
11	Altınbaşak	951+338	-		Abandoned stop/station	The construction of additional sidings will be arranged to accommodate 1050m trains, with the main line + 2 sidings at the station.
12	Tanyeri	966+648	2	428	Station	The existing station will be reconfigured to accommodate 1050m trains with the main line + 1 siding. The second secondary line will be canceled.
13	Geçit	981+650	2	430	Station	The existing station will be reconfigured to accommodate 700m trains with the main line + 1 siding. The second secondary line will be canceled.
14	Demirkapı	998+831	2	430	Station	The existing station will be arranged to accommodate 1050m trains with the main line + 2 sidings.
15	Altınkent	1011+460	-		Abandoned stop/station	The construction of additional sidings will be arranged to accommodate 1050m trains, with the main line + 1 siding at the station.
16	Mercan	1021+812	3	436	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 3 sidings. The dead-end line will be canceled.
17	Çadırkaya	1033+998	3	436	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 2 sidings; the single siding will be canceled.
18	Erbaş	1047+637	3	429	Station	The single secondary line alongside the main line will be arranged to accommodate 750m trains, while the other two sidings will be preserved.

No	Name of Station	Km	Number of Sidings	Max Useful Mesh Length (m)	Remarks	Scope of the Work
19	Karasu	1061+852	4	590	Station	The station is not suitable for extension. All lines will be preserved.
20	Saptıran	1080+463	-		Abandoned stop/station	The construction of additional sidings will be arranged to accommodate 750m trains, with the main line + 1 siding at the station.
21	Aşkale	1093+221	3	617	Station	The main line + 2 sidings will be extended to accommodate 700m trains, while the third siding, connections to branch lines, and the dead-end line will be preserved.
22	Kandilli	1108+989	2	427	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 2 sidings, and the dead-end line will be canceled.
23	Çiçekli	1124+500	-	417	Abandoned stop/station	The construction of additional sidings will be arranged to accommodate 750m trains, with the main line + 1 siding at the station.
24	Kaplıca (Ilıca)	1133+496	3	752	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 3 sidings, and the dead-end lines will be canceled.
25	Palandöken	1139+800	-		Erzurum Logistics Center has been established in its place. The old siding tracks, switches, and station building have been abandoned.	It will be left as it is.
26	Erzurum	1148+672	10	749	Station	The station will be rearranged to make the two tracks on the left side of the main line, in the direction of increasing kilometers, suitable for 750m trains.
27	Uzun Ahmet	1167+219	3	679	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 3 sidings, and the dead-end line will be canceled.
28	Alvar	1180+762	-		Abandoned stop/station	The construction of an additional siding will be arranged to accommodate 750m trains, with the main line + 1 siding at the station.
29	Hasankale	1189+298	2	555	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 2 sidings, and the dead-end lines will be canceled.
30	Köprüköy	1206+485	2	528	Station	The existing station will be reconfigured to accommodate 1050m trains with the main line + 2 sidings, and the dead-end line will be canceled.
31	Karaçuha	1219+943	-		Abandoned stop/station	The construction of an additional siding will be arranged to accommodate 1050m trains, with the main line + 1 siding at the station.
32	Horasan	1233+879	4	696	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 4 sidings, and one dead-end line will be canceled.
33	Hızır İlyas	1248+408	-		Abandoned stop/station	The construction of an additional siding will be arranged to accommodate 750m trains, with the main line + 1 siding at the station.
34	Süngütaşı	1260+280	2	591	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 1 siding, and one siding along with the dead-end line will be canceled.

No	Name of Station	Km	Number of Sidings	Max Useful Mesh Length (m)	Remarks	Scope of the Work
35	Topdağı	1273+531	2	575	Station	The station is not suitable for extension. All lines will be preserved.
36	Sayding	1283+000	-	-	This siding does not exist.	No work will be carried out.
37	Soğanlı	1288+850	2	455	Station	The existing station will be reconfigured to accommodate 700m trains with the main line + 2 sidings.
38	Aşit	1293+750	-	417	Abandoned stop/station	No work will be carried out.
39	Sarıkamış	1305+615	6	650	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 5 sidings. The dead-end line and connections will be canceled.
40	Çatak	1319+875	-	417	Abandoned stop/station	No work will be carried out.
41	Selim	1329+945	3	529	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 2 sidings. The third siding will be canceled.
42	Benli Ahmet	1340+550	3	547	Station	The existing station will be reconfigured to accommodate 750m trains with the main line + 1 siding. The second and third sidings will be canceled.
43	Dikme	1352+150	-	417	Abandoned stop/station	The construction of additional sidings will be arranged to accommodate 700m trains, with the main line + 2 sidings at the station.
44	Kars	1364+775	6	765	Station	In continuation of the BTK double track, an arrangement will be made within the existing station to have a double main line. One of the double main lines, continuing in the decreasing kilometer direction, will be extended to create the connection to Kars Logistics Center.
45	Güvercin	1397+149	2	765	Station	The existing main line will be duplicated, and 1 additional siding will be arranged to accommodate 1050m trains. Four additional crossovers will be established between the existing and new lines.
46	Taşbaşı	1416+349	2	765	Station	The existing main line will be duplicated, and 1 additional siding will be arranged to accommodate 1050m trains. Four additional crossovers will be established between the existing and new lines.
47	Canbaz	1432+349	2	765	Station	The existing main line will be duplicated, and 2 additional sidings will be arranged to accommodate 1050m trains. Four additional crossovers will be established between the existing and new lines.
-	Hudut	1444+479				

Source: General Technical Specification of “Divriği-Kars-Border (BTK) Railway Rehabilitation, Electrification and Signalization Project”, MoTI

Figure 4. Distribution of the Stations on the Railway Line

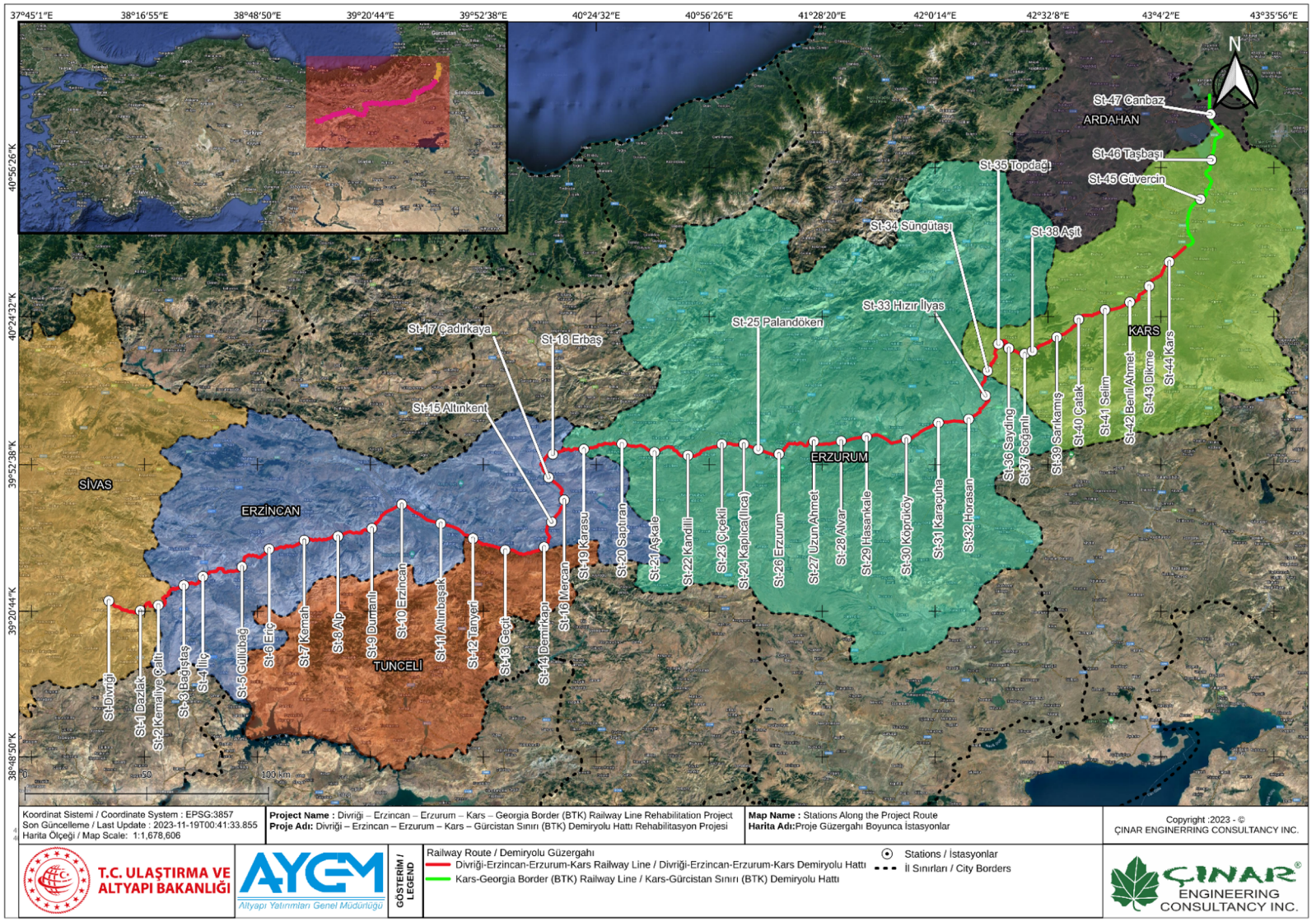


Figure 5. Distribution Map related to Construction and Rearrangement of the Sidings

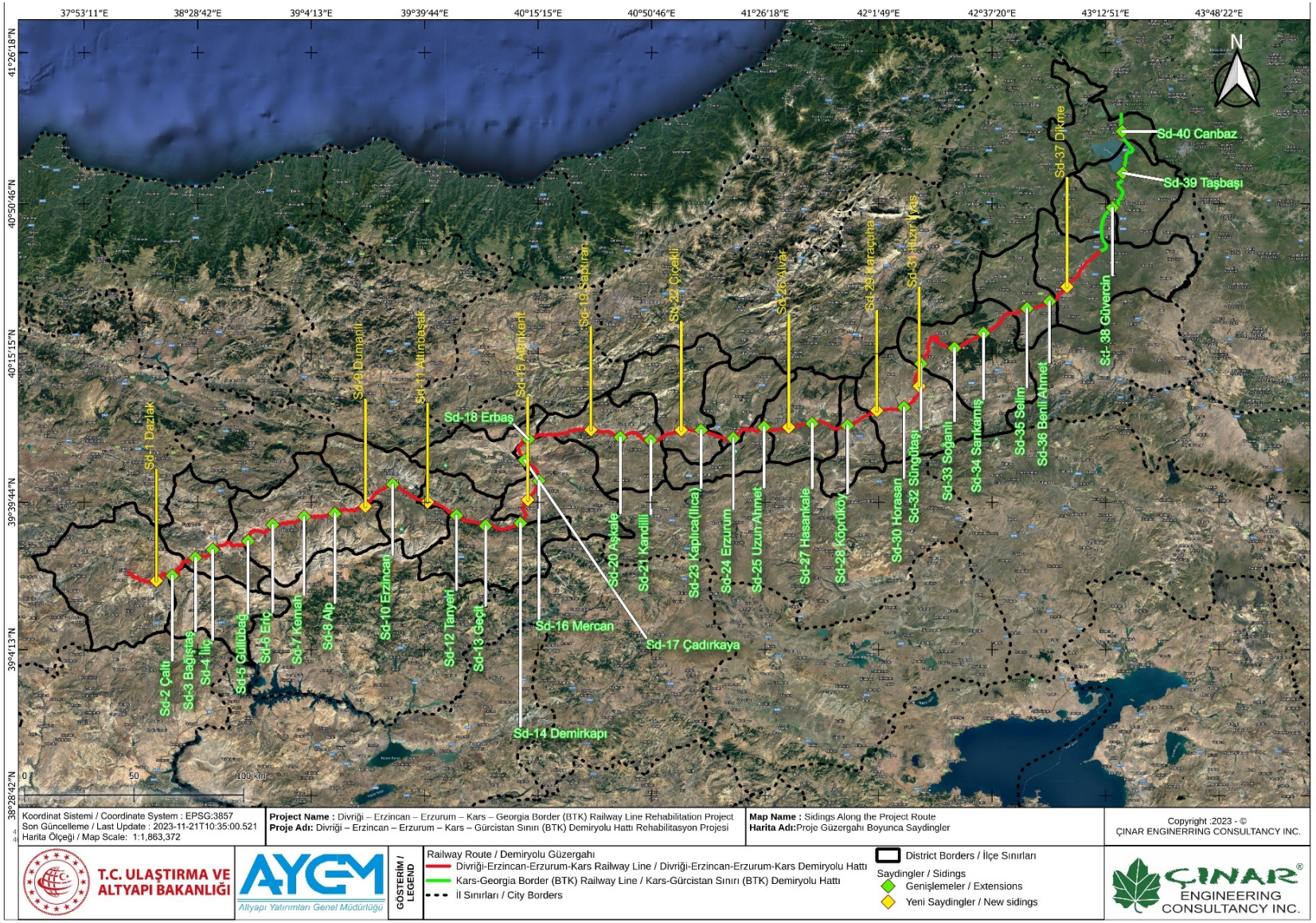


Table 10. Existing and the Proposed Track Plans-1

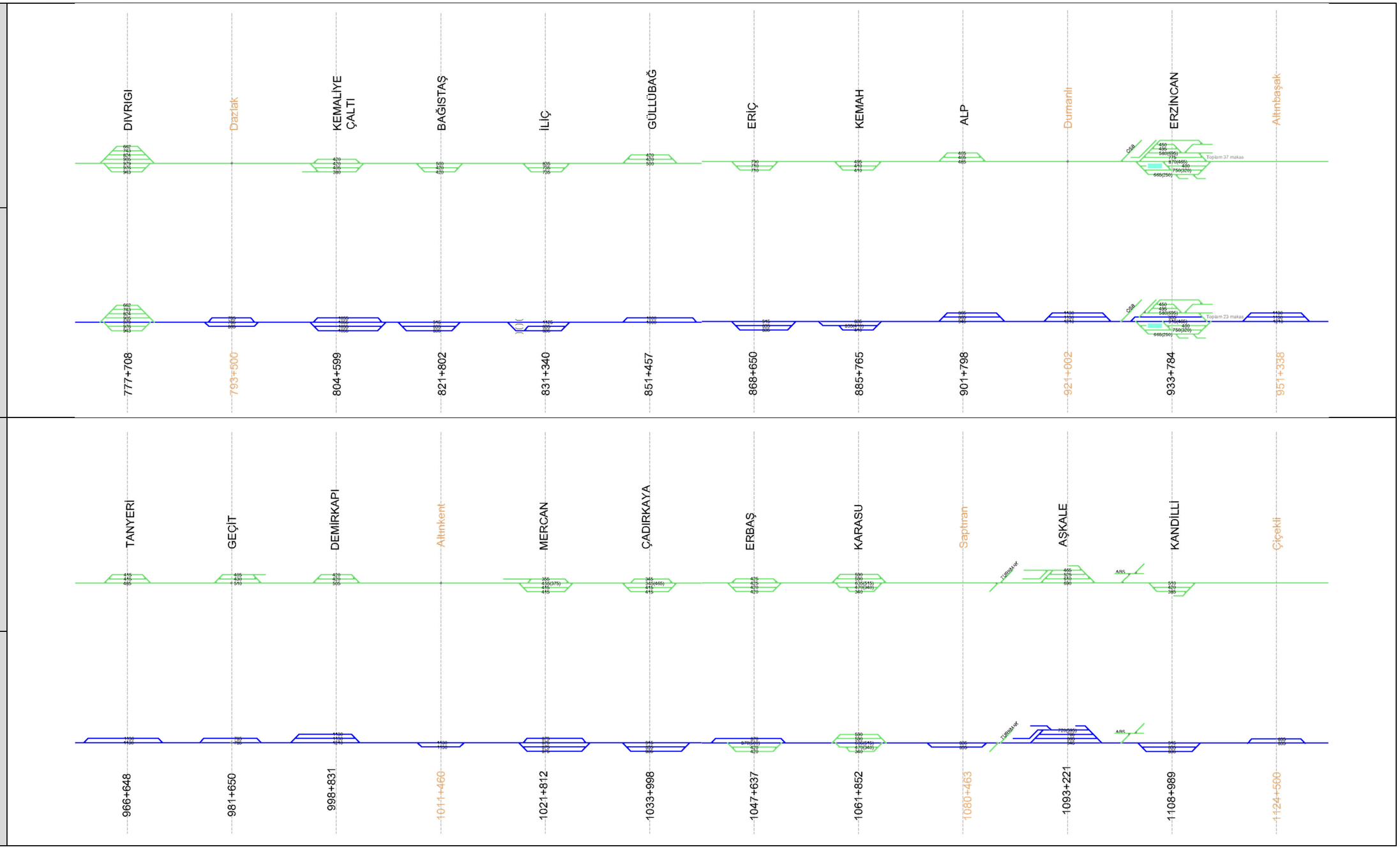
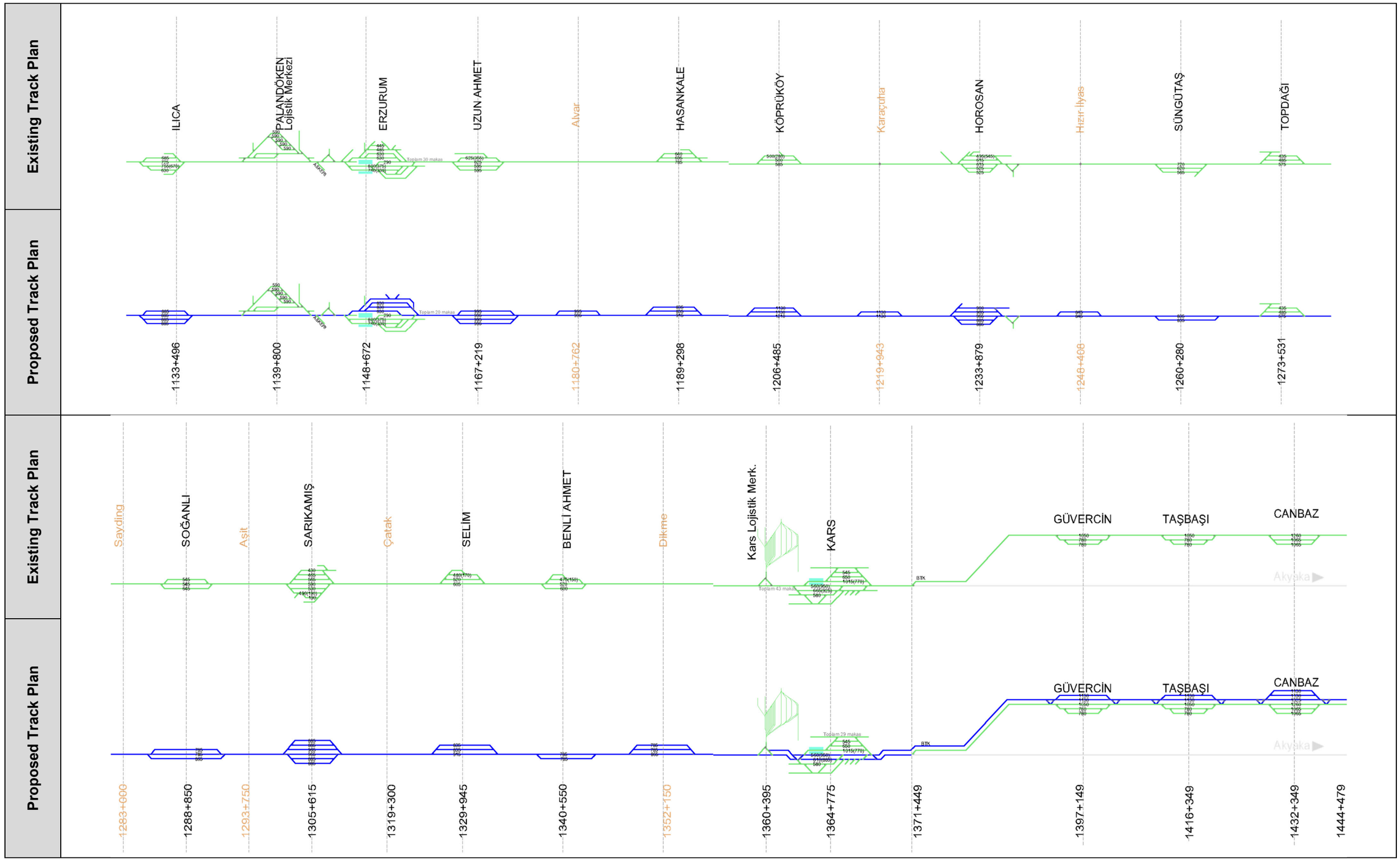


Table 11. Existing and the Proposed Track Plans-2



3.2.3 Land Use Characteristics and Land Ownership

The land use characteristics along the proposed railway route exhibit a mix of agricultural, residential, and natural areas, reflecting the diverse landscapes of the regions it traverses. In Sivas Province's Divriği District, the initial segment of the corridor likely encounters a blend of agricultural lands used for cultivation, contributing to the local economy. As the route extends into Erzincan Province, particularly through Kemah, İliç, and Üzümlü Districts, agricultural activities may persist, interspersed with residential areas and natural landscapes.

Moving into Erzurum Province, the corridor encompasses a variety of land uses in districts such as Tercan, Aşkale, Çayırlı, Yakutiye, Aziziye, Palandöken, Köprüköy, and Pasinler. Agricultural lands, including pastures and cultivated fields, are likely to coexist with residential zones, especially in district centers. Erzurum's diverse topography, from mountainous terrains to fertile plains, contributes to a mosaic of land uses along the route.

In Kars Province, which includes districts like Horasan, Sarıkamış, Selim, Susuz, and Arpaçay, the land use characteristics may vary based on the specific geographical features of each district. Agriculture, including livestock grazing and crop cultivation, remains a prominent land use, particularly in the plains. The presence of natural habitats, forests, and protected areas further adds to the complexity of land use patterns.

Within the scope of the ESIA studies, a 500-m corridor (250-m extending from each side of the proposed railway) was examined, and it was determined that the majority of the current land use is pastureland (30%). Additionally, there are significant dry agriculture (21%) and wet agriculture activities (15%) as well. There are also surface waters, shrubberies, and other land use practices as well.

The ESIA conducts a thorough analysis of these characteristics, identifying potential impacts on land use and proposing measures to mitigate adverse effects, ensuring sustainable land management practices along the railway corridor. The detailed information on land use characteristics along the proposed railway corridor is given in Section 4.1. Land Use, Soils and Geology.

Although no land acquisition is required at this stage, as stated in Section 1, the detailed engineering designs including power transmission lines and access roads will be prepared by the contractor. Therefore, a Resettlement Framework, which provides the guidelines for the preparation of a Resettlement Plan in case land acquisition is needed and such one will comprise a census of all affected lands and landowners and -users was prepared.

3.2.4 Legally Protected and Internationally Recognized Areas of High Biodiversity Value

Legally protected areas include National Parks, Nature Parks, Nature Reserves, Wildlife Development Areas, Wetlands of Local Importance, Wetlands of National Importance, Ramsar areas, and Special Environmental Protected Areas; whereas internationally recognized areas includes World Heritage Natural Sites, Biosphere Reserves, Ramsar Wetlands of International Importance, Key Biodiversity Areas, Important Nature Areas, Important Plant Areas, Important Bird Areas, and Alliance for Zero Extinction Sites, among others.

The Project Route passes through various legally protected and internationally recognized areas of high biodiversity value which are presented below in Figure 6. The details regarding the Legally Protected Areas and Internationally Recognized Areas of high biodiversity value are given in Section 4.7.4. The Protected Areas within the Project Area of Influence (AoI) is given Table 12 and Table 13, respectively.

Table 12. Legally Protected Areas within the AoI

Province	Legally Protected Area	IUCN Protected Area Category
Erzincan	Ekşisu Reedbeds Wetland of National Importance	IV
Erzurum	Erzurum Marshes Wetland of Local Importance	IV
Ardahan	Çıldır Lake Wetland of National Importance	IV

Source: https://saybis.tarimorman.gov.tr/Home/Detay
http://www.turkiyesulakalanlari.com/
https://www.tarimorman.gov.tr/DKMP

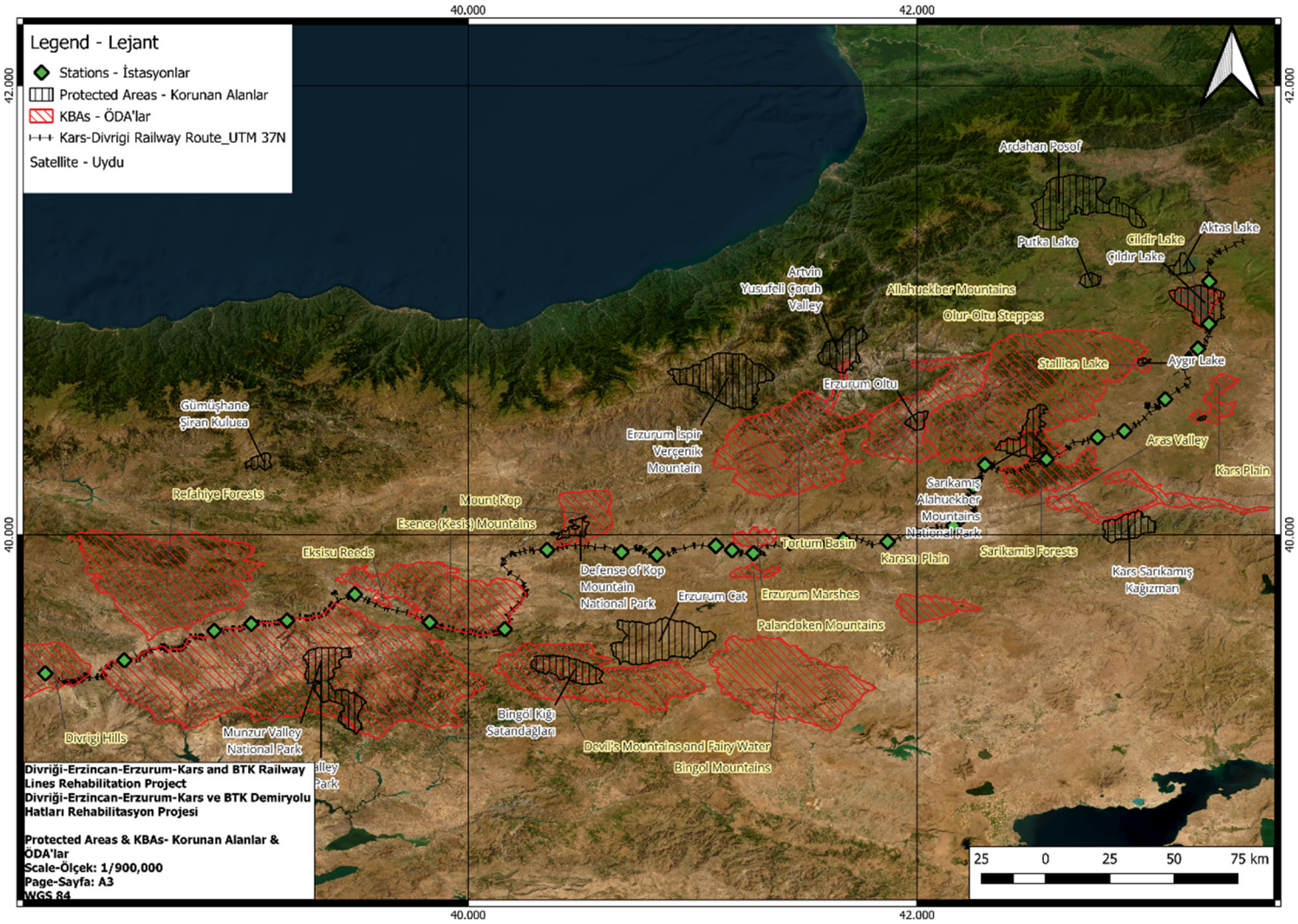
Table 13. Internationally Recognized Areas within the AoI

Province	Internationally Recognized Areas	Province	Internationally Recognized Areas
Sivas	Divriği Hills Important Nature Area (INA)	**Erzurum**	Kop Mountains Important Plant Area (IPA)
Erzincan	Munzur Moutains INA	**Kars**	Sarıkamış Forests INA
	Esence (Keşiş Mountains) INA	**Ardahan**	Çıldır Lake INA
	Munzur Moutains IPA		Çıldır Lake IPA

Source: Eken, G., Bozdoğan, M., İsfendiyaroğlu, S., Kılıç, D. T., & Lise, Y. (2006). Türkiye'nin önemli doğa alanları. Ankara: Doğa Derneği.

Yarar, M. (1997). Türkiyenin Önemli Kuş Alanları. İstanbul: Doğal Hayatı Koruma Derneği (2003). Önemli bitki alanları atlası = atlas of important plant areas: Tehlike altındaki bitki türlerinin ekosistemlerinin korunması ve yönetimi projesi = ecosystem conservation and management for threatened plant species projects. [y.y.]: Tarım ve Köyişleri Bakanlığı Tarımsal Araştırmalar Genel Müdürlüğü Tarla Bitkileri Merkez Araştırma Enstitüsü.

Figure 6. Protected Areas & KBAs



3.3 Project Activities

3.3.1 Land Preparation and Construction Activities (within the scope of Component-1)

Pre-Construction Survey and Marking:

- A pre-construction survey of the entire railway corridor will be conducted.
- During the process, assurance will be provided for timely response to community concerns by organizing stakeholder engagement activities that can communicate the E&S risks and impacts of the project to stakeholders.
- Boundaries, critical habitats, and culturally sensitive areas identified in the ESIA will be marked.
- Once the construction contractor is selected, the design of the Project will be finalized and if necessary, relevant E&S assessment studies will be carried out by AYGM (via ETMIC sub-unit of PIU) for infrastructure/facilities such as access roads, camp site(s), concrete plants, etc. before the commencement of construction works in line with both national and WB ESF requirements, with findings of these studies to be reflected in respective sub-management plans and Contractor's ESMP (C-ESMP).

Vegetation Clearing:

- Phased vegetation clearing using environmentally sensitive methods will be implemented.
- Impacts on local flora and fauna, especially in critical habitats and biodiversity hotspots, will be avoided or mitigated.

Land Grading and Earthworks:

- Land grading and earthworks along the railway corridor commenced.
- Erosion control measures will be employed to prevent soil runoff and sedimentation in nearby water bodies.

Excavation and Material Sourcing:

- Excavation activities for the construction of new railway lines and associated structures will be undertaken.
- Construction materials will be sourced from licensed operators, ensuring sustainable extraction practices. Material will be gathered from licensed facilities (production license and having EIA certification). Additional operation of a quarry will be decided prior to construction if considered needed.
- Once the construction contractor is selected, the details of the quarries (including any crushing and screening plants, concrete plants, etc.) will be identified, and the relevant E&S assessment studies will be carried out by ETMIC sub-unit of PIU before commencement of construction works in line with both national and WB ESF requirements, with findings of these studies to be reflected in respective sub-management plans and C-ESMP.

Water Management:

- Measures for efficient water use during construction, considering both drinking water supply for workers and non-drinking water for construction processes, will be established.
- Strategies to prevent water pollution and ensure compliance with water quality standards will be implemented.

Installation of Signaling and Telecommunication Systems:

- State-of-the-art signaling and telecommunication systems will be installed along the entire corridor.

- Systems will be ensured to be compatible with international standards to enhance railway safety and efficiency.

Electrification Systems:

- Electrification systems, including the establishment of power substations, neutral zones, and power transmission lines, will be implemented (see Figure 7). The length and routes of the ETLs will be decided after an agreement is reached by TEIAS.
- Prior to commencement of construction works, the details of the ETLs will be identified, and the relevant E&S assessment studies in line with both national and WB ESF requirements will be carried out by ETMIC sub-unit of PIU, with findings of these studies to be reflected in respective sub-management plans and C-ESMP.
- In the case of land acquisition, an RP will be developed based on the project's RF.

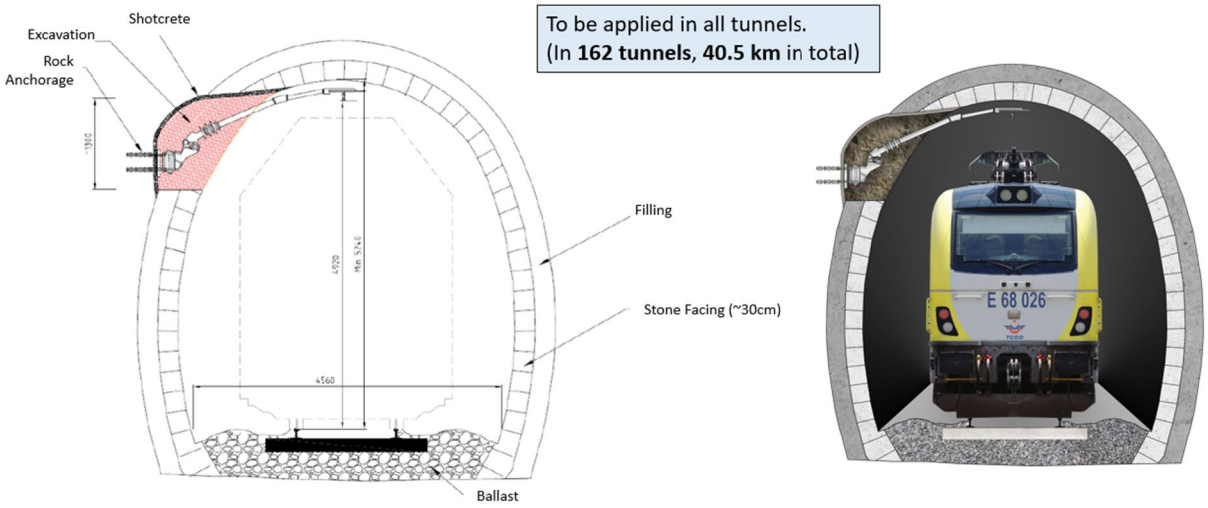
Access Roads:

- Location and design of the access roads to the Project area including the construction site will be done prior to construction. The shortest path will be selected as much as possible and minimum expropriation and avoiding critical habitats will be considered.
- The relevant E&S assessment studies will be carried out by ETMIC sub-unit of PIU before commencement of construction works in line with both national and WB ESF requirements, with findings of these studies to be reflected in respective sub-management plans and C-ESMP.
- In the case of land acquisition, an RP will be prepared based on the project's RF.

Figure 7. Transformer Stations to be Establish Along the Railway Line



Figure 8.Installation of Catenary in Tunnels



- Tunnel clearance works for electrification will be conducted to meet safety and operational standards (see Figure 8).

Construction of Sidings and Station Facilities:

- New sidings will be constructed, and existing ones will be extended at railway stations.
- Station buildings, facilities, and platforms will be renovated and upgraded, ensuring accessibility and safety standards.

Some of the arrangements to be carried out in main stations are illustrated in the following figures.

Figure 9. Arrangements to be Performed in Erzincan Station

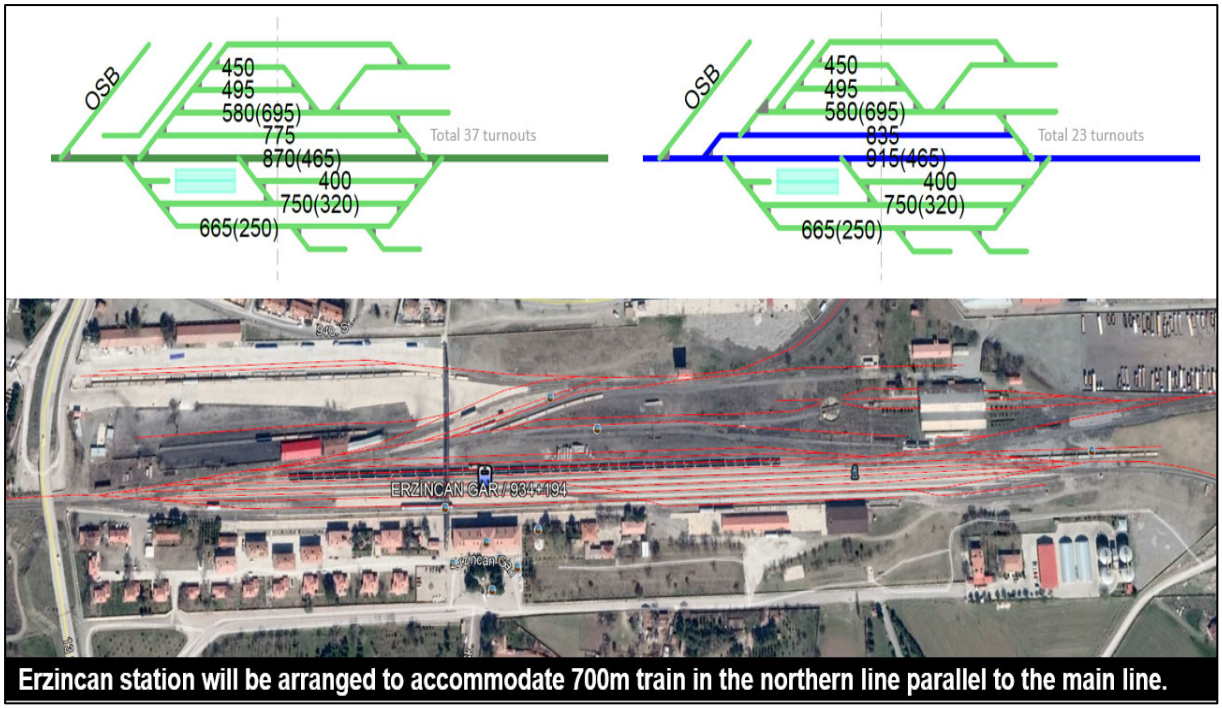


Figure 10. Arrangements to be Performed in Erzurum Station

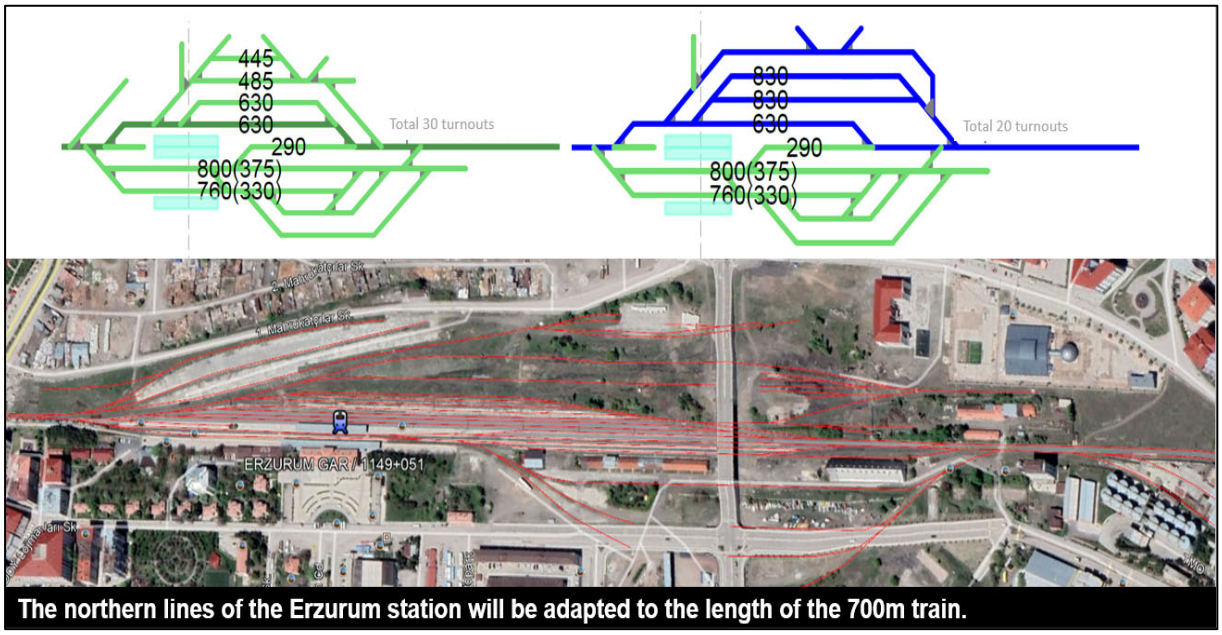


Figure 11.Arrangements to be Performed in Kars Station

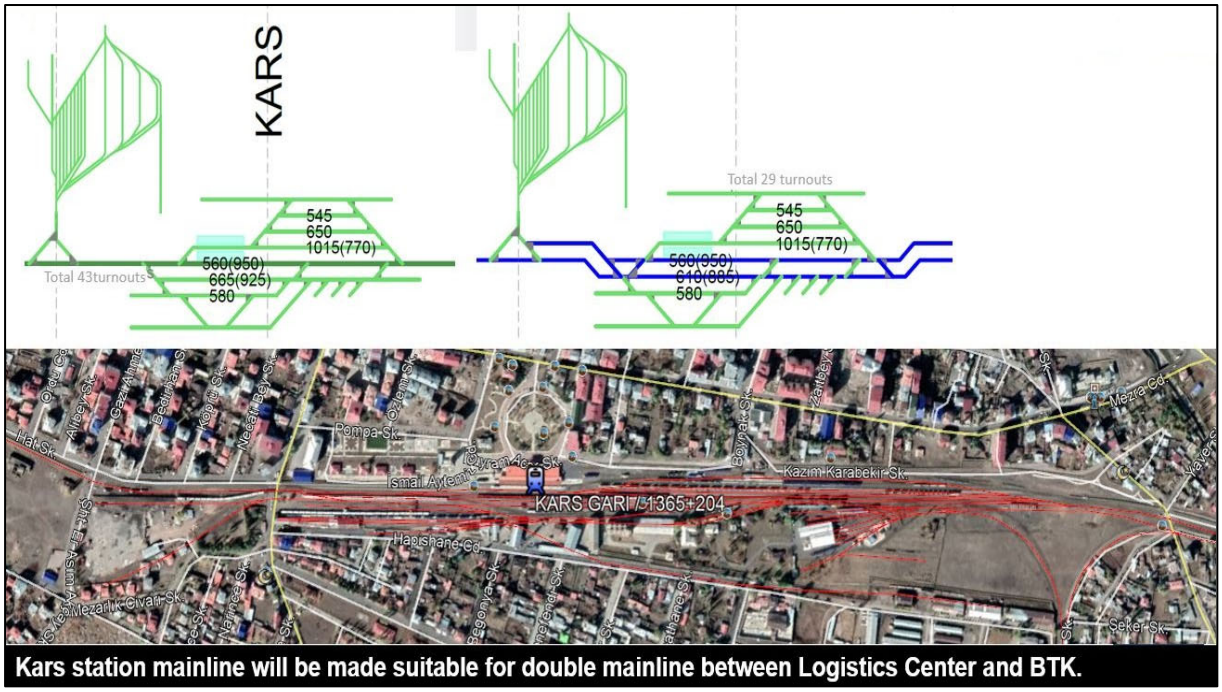
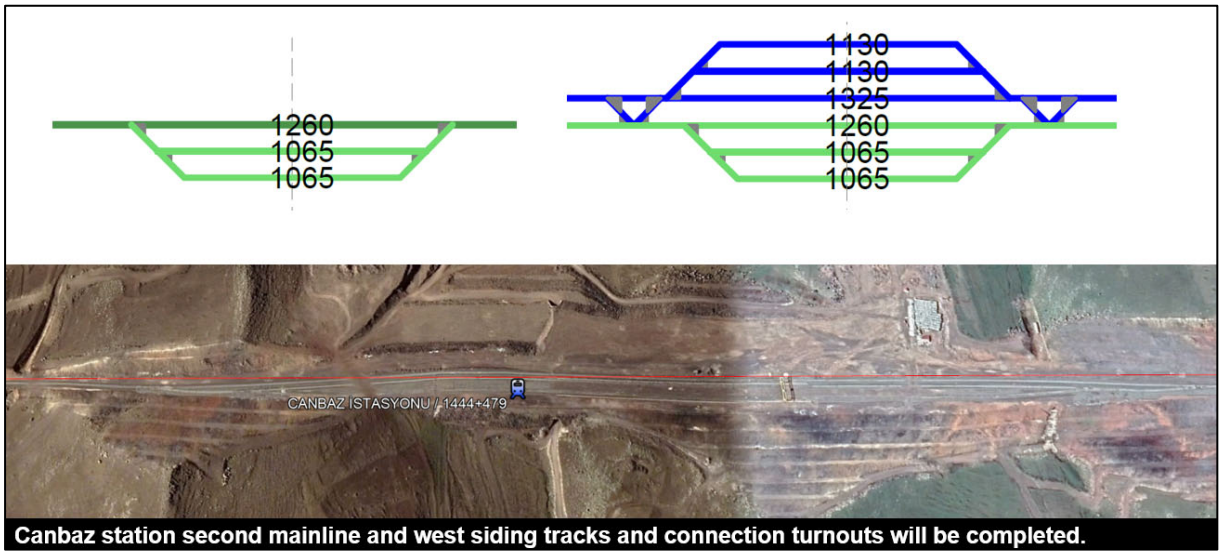


Figure 12.Arrangements to be Performed in Canbaz Station



Bridges and Culverts Construction:

- New bridges will be built, existing ones will be renewed, and culverts will be constructed as needed.
- Designs will consider environmental impacts on water flow and aquatic ecosystems.

Controlled Level Crossings and Overpasses:

- Controlled level crossings for road-rail intersections will be established.
- Overpasses will be constructed to facilitate safe passage for wildlife and mitigate potential traffic congestion.

Snow Barriers and Retaining Walls:

- Snow barriers will be installed along the corridor to address winter weather challenges.
- Retaining walls will be constructed where needed for slope stabilization and erosion control.
- A Railway Information, Early Warning, and Digital Maintenance system will be deployed.
- Data collection systems and smart sensor equipment will be integrated to enhance network-wide management and resilience.

Waste Management:

- Comprehensive waste management plans for both hazardous and non-hazardous waste will be developed.
- Proper disposal and recycling of construction-related waste materials will be ensured.

Occupational Health and Safety Measures:

- Strict occupational health and safety measures for all construction workers will be implemented.
- Regular safety training sessions and necessary personal protective equipment will be provided.

3.3.2 Operation and Maintenance Activities

Railway Operation:

- The operational phase will commence with the commissioning of the rehabilitated and electrified railway corridor.

- Train services will be established, facilitating the transportation of goods and passengers along the upgraded route.

Routine Maintenance:

- Ongoing routine maintenance activities will include regular inspections of tracks, signaling systems, and electrification infrastructure.
- Preventive maintenance measures will be employed to ensure the efficient and safe operation of the railway.

Vegetation Management:

- Vegetation along the railway corridor will be managed to prevent encroachment on tracks and maintain clear sightlines for signaling systems.
- Environmentally friendly methods will be employed to minimize impacts on local flora and fauna.

Track and Infrastructure Upkeep:

- Continuous monitoring of track conditions will be conducted to identify and address issues promptly.
- Infrastructure, including bridges, culverts, and tunnels, will undergo periodic inspections and maintenance.

Electrification System Maintenance:

- The electrification systems, including substations and power transmission lines, will undergo regular maintenance to ensure uninterrupted power supply.
- Technological upgrades will be considered to enhance system efficiency.

Data Systems and Early Warning Maintenance:

- The Railway Information, Early Warning, and Digital Maintenance system will be continually maintained and updated.
- Data collection systems and smart sensor equipment will undergo regular checks to ensure accurate and timely information.

Emergency Preparedness and Response Drills:

- Periodic emergency preparedness and response drills will be conducted to ensure effective responses to unforeseen incidents.
- Collaboration with local emergency services will be maintained for coordinated response efforts.

Stakeholder Engagement:

- Ongoing stakeholder engagement will be integral to address community concerns related to operational impacts.
- Feedback mechanisms will be established to encourage continuous communication with local communities.

Waste Management:

- Comprehensive waste management practices for both operational and maintenance activities.
- Recycling and responsible disposal of waste materials to minimize environmental impact.

Occupational Health and Safety:

- Ongoing strict adherence to occupational health and safety measures for all personnel involved in maintenance activities.
- Regular safety training sessions and provision of necessary protective equipment.

Continuous Improvement:

- Continuous improvement initiatives based on monitoring results and stakeholder feedback.
- Technological advancements and best practices in railway operation and maintenance will be considered for implementation.

Winter Weather Preparedness:

- Specialized measures for winter weather preparedness, including snow removal and maintenance of snow barriers.
- Planning for potential disruptions due to adverse weather conditions.

Rail Traffic Management:

- Continuous optimization of rail traffic management systems to enhance efficiency and safety.
- Collaboration with relevant authorities to address any challenges related to increased rail traffic.

Community Livability Initiatives:

- Initiatives to enhance community livability in areas near the railway corridor.
- Collaboration with local communities for mutually beneficial projects and improvements.

Energy Efficiency Considerations:

- Exploration of energy-efficient technologies and practices for railway operation.
- Adoption of measures to reduce the carbon footprint associated with electrified rail transport.

3.4 Project Workforce

The exact number of individuals to be employed during the various phases of the project is contingent on factors such as the construction timeline, the intensity of work during different stages, and the use of mechanized versus manual labor. A comprehensive estimate of the workforce requirements, including skilled and unskilled workers, will be determined during the detailed planning and design phase of the project. It is estimated that approximately 225 people—25 of them will be direct workers and 200 of them will be contracted workers—will work during the construction phase of the project and 35 people—15 of them will be direct workers and 10 of them will be contracted workers—during the operation phase. Since the project is a linear project, the 225 people who will work during the construction phase will not work in just one area, will disperse along the line.

Once the construction contractor is selected, the details of the camp sites will be identified, with due consideration of sensitive areas to be avoided for siting the camp facilities, and the relevant E&S assessment studies will be carried out by ETMIC sub-unit of the PIU. The findings of these site-specific E&S assessments will be duly reflected in respective sub-management plans and C-ESMP, before commencement of construction works in line with both national and WB ESF requirements.

It should be noted that the location of the camp site is not selected yet. During the selection of the relevant site, the first step is to assess the ecological value of potential sites. Avoiding areas with high biodiversity, critical or natural habitats (such as wetlands or forests), or endangered species will be considered. Locations with minimal impact on flora and fauna will be prioritized.

The soil stability, drainage, and geotechnical conditions will be evaluated. The sites prone to erosion, landslides, or soil contamination will be avoided. Stable, well-drained areas will be favored.

The proximity to water bodies (rivers, lakes, or aquifers) will be considered. The sites that could disrupt water flow, cause sedimentation, or contaminate water sources will be avoided.

Locations away from sensitive receptors (residential areas, schools) will be considered so that the dust emissions and air pollution during construction will be avoided as well as adverse social impacts. Preferably, public land that is out of use will be utilized for all related or auxiliary facilities, if available, by avoiding land acquisition for these facilities.

The construction machinery anticipated to be used at each excavation area of concern (bridges, tunnels etc.) are planned as follows:

Table 14. Construction Machinery to be used

MACHINERY AND EQUIPMENT	MACHINERY AND EQUIPMENT QUANTITY
Water Truck	1
Concrete Mixer	4
Concrete Pump	4
Truck	10
Pickup Truck	6
Backhoe Loader	6
Water Tanker	2
Trailer	6
Fuel Tanker	2

3.5 Implementation Program

The project schedule entails a phased approach to construction and commencement, with key milestones outlined as follows:

i. Preparation Phase (Year 1):
- Detailed design development.
- E&S assessments.
- Procurement of necessary materials and equipment.
- Establishment of project management structures.

ii. Construction Phase (Years 2-4):
- Commencement of infrastructure rehabilitation.
- Implementation of signaling system upgrades.
- Initiation of electrification works.
- Execution of last-mile connectivity enhancements.
- Integration of technology solutions.
- Expansion of capacity through track additions and yard upgrades.

iii. Testing and Commissioning (Year 4):
- Integration testing of newly installed systems.
- Verification of signaling and safety measures.
- Trial runs for passenger and freight services.
- Finalization of operational procedures and protocols.

iv. Commencement of Operations (Year 5):
- Official launch of passenger and freight services.
- Transition from construction to full operational status.
- Monitoring and evaluation of system performance.
- Ongoing maintenance and optimization activities.

This schedule is subject to adjustment based on various factors such as weather conditions, procurement timelines, and unforeseen challenges encountered during implementation. Regular reviews and updates will be conducted to ensure adherence to the project timeline and successful completion within the specified timeframe.

4 ENVIRONMENTAL & SOCIAL BASELINE, IMPACT ASSESSMENT AND MITIGATION MEASURES

This chapter outlines the E&S baseline, impact assessment and mitigation measures which are categorized into three main sections;

- Physical Environment,
- Biological Environment, and
- Socio-Economic Environment.

PHYSICAL ENVIRONMENT

4.1 Land Use, Soils and Geology

4.1.1 Project Standards and Methodology

Project Standards

Assessment of land use, soils and geology impacts arising from the Project activities have been conducted in line with the World Bank ESSs, by assessing the significance of impacts, considering characteristics of the baseline properties, and developing impactive measures to avoid, reduce and where necessary offset significant impacts in line with the mitigation hierarchy adopted for the Project ESIA studies.

According to the data of the Ministry of Agriculture and Forestry, there are grasslands, shrubs, rivers, pasture areas, irrigated agricultural areas, non-irrigated agricultural areas, residential areas and industrial areas, and insufficient irrigated agricultural areas in the AoI. Accordingly, the activities to be carried out under the Project will be subject to the provisions of the national laws and regulations listed below:

- Agricultural Reform Law on Land Rearrangement in Irrigated Areas
- Law on Soil Conservation and Land Use
- Pasture Law
- Expropriation Law
- Regulation on Protection of Agricultural Lands and Land Consolidation
- Governing Regulation on Soil Conservation and Land Use
- Regulation on the Control of Soil Pollution and Lands Polluted by Point Sources
- Dutch Pollution Standards, Soil Quality Intervention Values

Methodology

Expert's judgment is integrated to methodology for determination of overall magnitude by taking the factors: geographic extent, duration, reversibility, magnitude, and frequency of the impact.

Within the aspect of determination of the sensitivity/value of the associated resource/receptor, the specific sensitivity/value criteria considered in assessing the impacts on land use and soils is provided below.

Table 15. Land Use and Soil Sensitivity/Value Criteria for Resource/Receptors

Subject	High	Medium	Low	Negligible
Arable lands	Lands having land use capability of Class I-II according to database of the Ministry of Agriculture and Forestry	Lands having land use capability of Class III-IV according to database of the Ministry of Agriculture and Forestry	Lands having land use capability of Class V-VII according to database of the Ministry of Agriculture and Forestry	Lands having land use capability of Class VIII according to database of the Ministry of Agriculture

Subject	High	Medium	Low	Negligible
	(agricultural lands suitable for agricultural soil cultivation)	(agricultural lands suitable for agricultural soil cultivation)	(agricultural lands not suitable for soil cultivation)	and Forestry (Non-arable lands)
Topsoil	Lands having land use capability of Class I-II according to database of the Ministry of Agriculture and Forestry (agricultural lands suitable for agricultural soil cultivation) where topsoil is located	Lands having land use capability of Class III-IV according to database of the Ministry of Agriculture and Forestry (agricultural lands suitable for agricultural soil cultivation) where topsoil is located	Lands having land use capability of Class V-VII according to database of the Ministry of Agriculture and Forestry (agricultural lands not suitable for soil cultivation) where topsoil is located	Land with no topsoil
Soil (Pollution)	Nationally and internationally protected areas, areas with ecologically critical habitat status	Lands having national importance, Lands having Class I-II land use capability, residential areas	Lands having Class III-IV land use capability	Lands having Class V-VIII land use capability, industrial and mining areas
Soil Erosion	Lands with Class 4^{th4} degree Erosion Vulnerability	Lands with Class 3rd degree Erosion Vulnerability	Lands with Class 2nd degree Erosion Vulnerability	Lands with Class 1st or higher degree Erosion Vulnerability

To be able to assess the baseline conditions of the soil quality, soil quality sampling and analysis has been carried out. The details of sampling location selection, methodology and analysis results are provided in Section 4.1.2 in more detail. For the sampling, parameters and threshold limits specified in Regulation on Soil Pollution Control and Point Source Contaminated Areas and Dutch Pollution Standards Soil Quality Intervention Values were selected as Project Standards. Additionally, to assess the baseline asbestos levels, additional asbestos parameter was also included in the sampling and analysis study.

4.1.2 Baseline Conditions

4.1.2.1 Land Use

A fundamental aspect of the Project is its impact on land use, which encompasses a wide range of activities related to the allocation, management, and utilization of land resources. The careful consideration of land use is crucial to address the evolving needs of the railway corridor while simultaneously preserving and protecting the environment, communities, and natural resources that the project traverses. The details regarding current land ownership and actual land use (agricultural pattern livestock activities) are provided in Socio-Economic Environment Chapter.

Land use is a cornerstone of the project's planning and execution, playing a pivotal role in defining how the railway corridor interacts with the surrounding landscape. The rehabilitation and modernization of the existing railway line necessitates thoughtful land use strategies to accommodate track realignment, construction of new facilities, and improved access to logistical and transportation hubs. These land use decisions are made with an eye towards optimizing the project's operational efficiency while also minimizing impacts on local communities and the environment. Balancing the utilization of land resources with E&S considerations is a key objective of the project.

To evaluate the current land usage of the project route, an AoI which consist of 250m-corridor extending on each side of the proposed route was identified. The land use data was calculated by using the land asset data of the Ministry of Agriculture and Forestry and the “Land Use Map of the Project Area” is given in Appendix-4.1.

Based on the mentioned land asset data, total AoI was calculated as 33,230.00 ha and the land use distribution of the Project is given in Table 16. The land use type of a small portion (0.09%) of the AoI could not be classified due to the insufficient data.

Table 16. Land Use Types in the Project Study Area

Land Use Type	Total Area (ha)	Percentage
Grassland	1451.09	4.37
Naked Rock and Rubble	1820.62	5.48
Shrubbery	464.97	1.40
Lake	0.04	0.01
River	1056.69	3.18
Riverbed	1726.13	5.19
Non-Irrigated Agriculture (rain-fed)	7079.81	21.31
Pasture	10072.26	30.31
Forest	1399.10	4.21
Irrigated Agriculture	5107.37	15.37
Irrigated Agriculture (inadequate)	601.94	1.81
Derelict Area	31.77	0.10
Residential Area	2189.89	6.59
Industrial Area	199.42	0.60
No data	29.02	0.09
Total	**33,230.00**	**100.0%**

As it can be seen from Table 16, large portion of the AoI consists of pastural areas (30.31%) and non-irrigated rain-fed farming lands (21.31%). Besides, there are irrigated lands (15.37%), residential areas (6.59%) and naked rock and rubbles (5.48%), grassland (4.37%) and forest (4.21%) on the project route and AoI.

Land Use Capability (LUC)

Land use capability refers to the inherent potential of a piece of land to support specific human activities and land uses based on its physical, environmental, and ecological characteristics. It involves an assessment of the land's suitability for various purposes, such as agriculture, infrastructure development, conservation, or recreational use. Evaluating land use capability is essential for this project because it provides a comprehensive understanding of how the proposed railway infrastructure can be integrated into the existing landscape while respecting the natural attributes and limitations of the land. By assessing land use capability, the project can make informed decisions on land allocation, site selection, and infrastructure design to ensure that the railway corridor harmonizes with its surroundings, minimizes environmental impacts, and contributes to sustainable development. This assessment is integral to responsible land use planning and management, ensuring that the project's objectives align with the preservation of ecological integrity and the well-being of local communities. Land use capability classes that are defined by the Ministry of Agriculture and Forestry are presented below.

Table 17. Land Use Capability Classes Descriptions

Arability Status	Capability Class	Definition	Factors Restricting Agriculture
Agricultural lands suitable for soil cultivation	I	It is arable for many crop types.	There is no or little limitation.
	II	It is suitable for long term cultivation of several types of crops.	Special mitigation measures are required for soil and water loss.

Arability Status	Capability Class	Definition	Factors Restricting Agriculture
	III	It is suitable for the cultivation of specific crops that provide special mitigation measures. Generally, it needs special care during agricultural use.	It is prone to erosion and artificial drainage is required during cultivation.
	IV	With suitable ploughing, some special agricultural crops can be cultivated. Generally, it needs special care during agricultural use.	There are serious limitations related with soil depth, stone content, humidity and inclination.
Agricultural lands not suitable for soil cultivation	V	This class includes soils that are even or slightly inclined, stony or very moist. These are not suitable for ploughing and cultivation. Generally, they are used for meadow or forestry area.	They have weak drainage and a structure not suitable for ploughing.
	VI	This is not suitable for ploughing and cultivation. They are mostly used as pasture and forestry area.	Very serious limitations are present owing to inclination and shallow soil.
	VII	It is not economic for agricultural activities; however, it is suitable for weak pasture or Afforestation areas.	There are limitations owing to shallow soil, stone content, inclination, and erosion.
Non-arable lands	VIII	It is not suitable for vegetation. It can be used for recreational purposes or as wildlife protection area.	There is no soil.

Suitability conditions in terms of cultivation, pasture and forestry activities by land classes were defined by former Ministry of Agriculture and Rural Affairs in 2008 within the scope of “Technical Procedure on Soil and Land Classification Standards” and presented in Table 18.

Table 18. Suitable Land Uses According to the Land Use Capability Classes

Land Use Capability	——— Increase in Land Use Intensity ———►								
	Wildlife	Forestry	Grazing			Agriculture			
			Limited	Moderate	Intensive	Limited	Moderate	Intensive	Very Intensive
Class I									
Class II									
Class III									
Class IV									
Class V									
Class VI									
Class VII									
Class VIII									

To assess the land use capability, an AoI of 500 meter (250 meter to each side) was selected, and the land use capability of the Project route was identified according to the land use data as provided in Table 19.

When the AoI was assessed, it is seen that 51.6 percent of the area consists of agricultural lands where soil is suitable for cultivation (see Table 19). The land use capability of 8.80% of the AoI could not be classified due to insufficient data.

Table 19. Land Use Capability Classes of the Project

LUC Class	Area (ha)	Percentage (%)
No Data	2922.77	8.80
I	5684.35	17.11

LUC Class	Area (ha)	Percentage (%)
II	4246.02	12.78
III	3373.14	10.15
IV	3794.47	11.42
VI	2461.77	7.41
VII	7200.82	21.67
VIII	3546.75	10.67
Total	**33,230.00**	**100.0%**

4.1.2.2 Soil

4.1.2.2.1 Major Soil Groups

In the ESIA Report for the proposed project, a critical aspect of the evaluation pertains to the assessment of major soil groups within the area of influence extending 250 meters from the railway route (making 500 meters in total). The assessment of major soil groups is paramount in understanding and mitigating the potential impacts of the project on soil quality and, by extension, the broader environment and local communities.

The assessment of major soil groups is a fundamental component of the ESIA, as it provides critical insights into the soil composition, quality, and characteristics within the area of influence. Soil serves as the foundation for various ecosystems, agricultural activities, and natural processes. By categorizing and analyzing major soil groups, the project can identify potential soil-related risks and opportunities. Understanding the existing soil types and their distribution helps in assessing the suitability for various land uses, including construction activities and potential agricultural developments. Furthermore, the assessment assists in identifying soil conservation and erosion control measures, as well as soil-related constraints that may impact project implementation.

According to the land asset data of the Ministry of Agriculture and Forestry, the main soil types on the AoI were determined. The Major Soil Groups Map is given in Appendix-4.2 and the major soil groups in the AoI are Alluvial Soils (A), Brown Soils (B), Colluvial Soils (K), Chestnut Colored Soils (CE), Brown Forest Soils (M), Basaltic soils (X), Non-calcareous Brown Forest Soils (N) (see Table 20).

Table 20. Major Soil Groups of the Project Route

Major Soil Group	Abbreviation	Area (ha)	Percentage (%)
No data	-	6524.66	19.63
Alluvial Soils	A	5364.64	16.14
Brown Soils	B	5425.35	16.33
Chestnut Colored Soils	CE	6035.19	18.16
Colluvial Soils	K	2892.55	8.70
Brown Forest Soils	M	1242.11	3.74
Basaltic Soils	X	1089.53	3.28
Non-calcareous Brown Forest Soils	N	4656.07	14.01
Total		**33,230.00**	**100.0%**

Major soil groups determined within the AoI are defined as follows:

Alluvial Soils (A)

These soils are young soils that are formed on the transported and stored materials by streams rarely belonging to A-C horizons. Mineral compositions depend on the lithological composition

of the river basin and the periods of transportation and accumulation during the soil development in geological periods and have a heterogeneous structure. In alluvial areas, the upper soil imperceptibly penetrates to the lower soil. In areas with fine texture and high ground water, the vertical permeability rate is low, the surface is moist and rich in organic matter. As the rough textured soils are well drained, the surface dries quickly. Vegetation on soils depends on the current climate. They are productive soils suitable for the cultivation of all kinds of plants that can adapt to their climate.

Alluvial soils are classified according to their structures, regions, or their evolution. In alluvial areas, the upper soil imperceptibly penetrates to the lower soil. In areas with fine texture and high ground water, the vertical permeability rate is low, the surface is moist and rich in organic matter. A mild reduction event takes place in the subsoil. The rough floors are well-drained, so the surface layers dry quickly. Vegetation on soils depends on the current climate. They are productive soils suitable for the cultivation of all kinds of plants that can adapt to their climate.

Brown Soils (B)

It is a semi-angular block structure ranging from light brown to dark brown. Lime deposition in the lower part of the B horizon is typical. Accumulation zone. It can start from 40 or 90 cm from the surface according to the conditions. It is deeper than lime accumulation due to the higher solubility of gypsum.

Chestnut Colored Soils (CE)

Maroon soils, also known as clayey soils, have a high clay content, making them water-retentive and fertile. They are characterized by a reddish or maroon color due to iron oxides. Maroon soils are suitable for a wide range of agricultural activities, particularly for crops that benefit from good moisture retention, such as rice and sugarcane. Proper drainage management is essential to prevent waterlogging, but with proper care, maroon soils can be highly productive for crop cultivation.

Colluvial Soils (K)

Colluvial soils are typically found on sloping landscapes where material has moved downhill due to gravity. These soils often contain a mixture of rock fragments and organic matter and vary in texture, from sandy to clayey. Colluvial soils are well-drained but may be subject to erosion, making them suitable for certain types of agriculture with proper management. The presence of rocks and stones can pose challenges for cultivation, but these soils can be agriculturally productive when appropriately treated and managed.

Brown Forest Soils (M)

These soils were formed on the main substance with high lime content. They have poorly developed layers. Their reactions are neutral or calevous. Lime accumulation occurs in the lower parts of the subsoil. Their drainage is good.

Basaltic Soils (X)

Basaltic soils are formed from the weathering of basalt rock and are typically found in volcanic regions. They are well-drained and have good fertility due to the mineral content derived from basalt. These soils often have a dark color and are rich in essential nutrients like potassium. Basaltic soils are well-suited for a variety of crops, including fruits, vegetables, and grains. They provide excellent support for agriculture and are highly valued for their fertility.

Non-Calcareous Brown Forest Soils (N)

Limeless brown forest soils are characterized by a brown or reddish-brown color and are typically found in forested regions. These soils have moderate organic matter content and are usually acidic in nature due to the absence of calcium carbonate. While limeless brown forest soils may require pH adjustment for certain crops, they are generally suitable for forestry and

the cultivation of acid-loving plants like pine trees and blueberries. These soils are often found in temperate or boreal forest regions and are essential for maintaining forest ecosystems and supporting specific plant species.

4.1.2.2.2 Soil Erosion

Erosion is the phenomenon of soil clusters being transported by factors such as water and wind and consequently accumulating in different environments from where they belong. Soil erosion is a two-step process that involves breaking up clumps of soil into individual or portable particles and transporting them with water and air streams.

Erosion affects agricultural productivity negatively and creates a sedimentation-based pollution in the surface water basin where it is located.

Soil erosion degree in Türkiye is evaluated based on the erosion classification scheme put forward by the U.S. Department of Agriculture, adopted by several national authorities. Accordingly, the Ministry of Agriculture and Forestry has a four-degree classification as the following[2]:

- Degree 1: None or very low level of erosion
- Degree 2: Moderate level of erosion
- Degree 3: Severe level erosion
- Degree 4: Very severe erosion

The distribution of soils on AoI by erosion degrees is presented in Table 21 and the erosion map of the project study area is given in Appendix-4.3.

Accordingly, 28.52% of the area is 1st degree, 24.02 % 2nd degree, 20.95% of the area is 3rd degree and 6.25 % is 4th degree. Approximately 20.26% of the area could not be evaluated due to insufficient data.

Table 21. Erosion Degree Classification of the Construction Area

Erosion Degree	Area (ha)	Percentage (%)
No Data	6731.96	20.26
Degree 1	9478.48	28.52
Degree 2	7981.06	24.02
Degree 3	6963.12	20.95
Degree 4	2075.47	6.25
Total	**33,230.00**	**100.0%**

4.1.2.2.3 Soil Quality

To determine the baseline soil quality around the project area, three (3) sample points were selected from the project route. The soil sampling points are listed in Table 22 and shown in Figure 13. It shall be noted that the sampling locations were selected at the points where the major activities such as blasting, tunneling etc. are likely to happen. As majority of the route is existing infrastructure, no additional sampling is considered to be necessary. During the site survey no trace of significant soil contamination (historical pollution) along the railway route was encountered. Nevertheless, it should be noted that, before, during and after the construction, in case of a location suspected of a contamination, a sampling and analysis study will be carried out.

2 https://www.tarimorman.gov.tr/Belgeler/Mevzuat/Talimatlar/ToprakAraziSiniflamasiStandartlariTeknikTalimativellgiliMevzuat_yeni.pdf

While determining the parameters to be analyzed in soil samples, soil pollution indicator parameters listed in Soil Pollution Control and Point Source Contaminated Sites Regulation – Annex-2 Table-1 Pollution Indicator Parameters List were taken into consideration.

Soil samples taken are reference samples. In other words, the results of the analysis of soil samples are supposed to be used as reference during the construction, in case of a suspicion of soil pollution.

Table 22. Information on Soil Sampling Points

No	Sampling Location	Sampling Date	Coordinates	
S-1	Güvercin	05.11.2023	40.82936	43.25177
S-2	Taşbaşı	05.11.2023	40.93922	43.30068
S-3	Canbaz	05.11.2023	41.12711	43.29685

The results of the analysis of soil samples were compared with the limit values defined in the *Table-1 for the relevant pollutants in Section 15.1 of the Canadian Environmental Protection Law* to determine the baseline contamination status in the soil structure. The analysis reports are given in Appendix-5.1 and the analysis results of soil samples and related limit values are given in Table 23. It should be noted that for the parameters that do not have a threshold limit according to the national or international limits, the baseline level will be the Project Standard. Additionally, asbestos was also checked within the scope of the sampling and analysis study as well.

According to the analysis results no trace of soil contamination was observed at the sampling points except for the Barium parameter, which has a slight exceedance according to the Dutch Pollution Standards at Points S-2 and S-3. Barium is a parameter which is likely to be found in soil due to geological processes or atmospheric deposition. Even though, two of these points show exceedances according to the Dutch Pollution Standard, considering the fact that the exceedance level is low, the soil quality can be said to be in good conditions. In addition, no traces of asbestos were found either. To sum up, no historical soil pollution can be stated.

Figure 13. Soil Sampling Locations Map

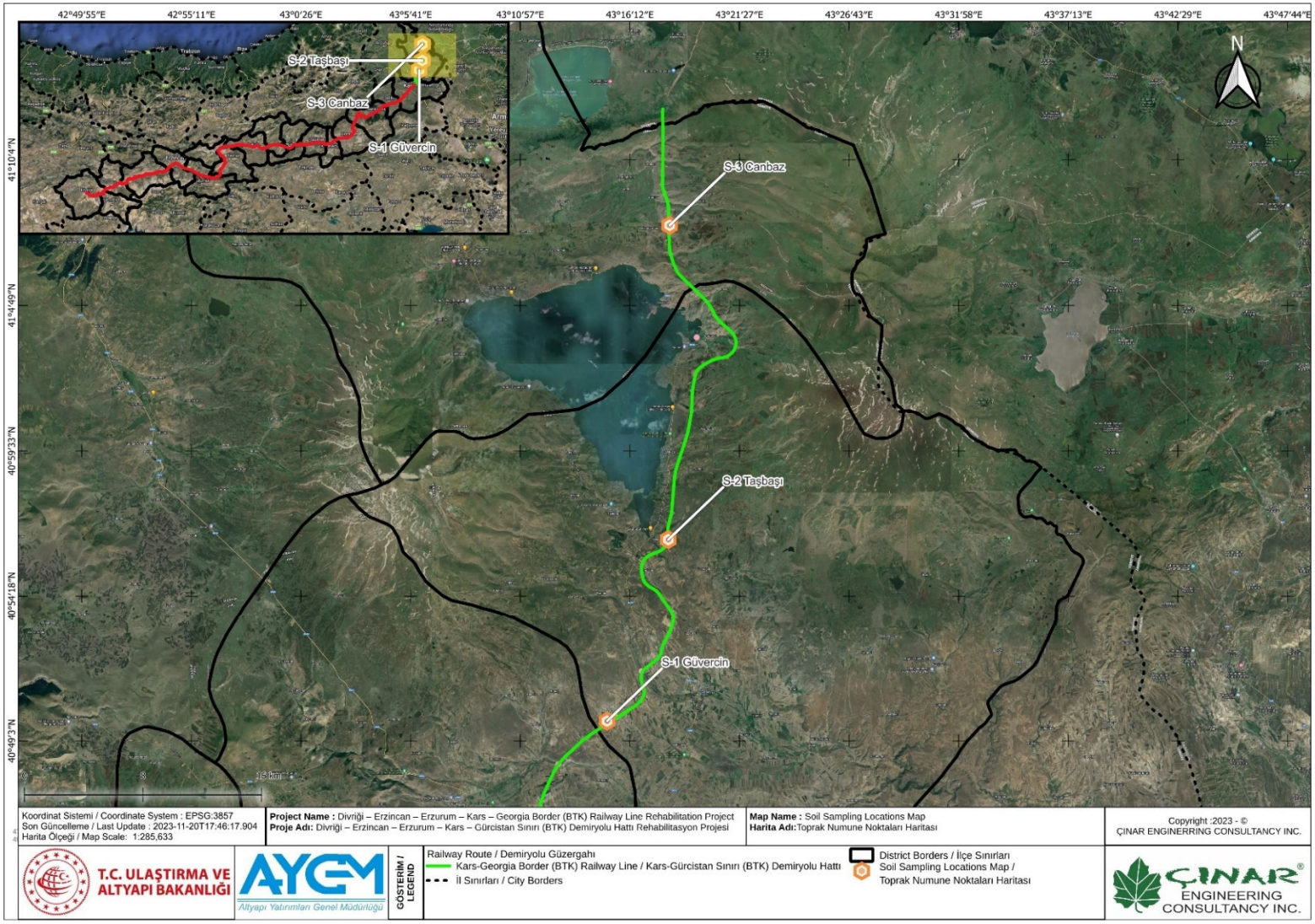


Table 23. Analysis Results of Soil Samples

Parameter	Unit	S-1 Güvercin	S-2 Taşbaşı	S-3 Canbaz	Soil Quality Standards[3]				Dutch Pollution Standards[4]
					Agricultural Use (mg/kg)	Use for Residential / Parking Areas (mg/kg)	Use for Commercial Purposes (mg/kg)	Use for Industrial Purposes (mg/kg)	
pH	-	7.86	7.70	7.93	6 - 8	6 - 8	6 - 8	6 - 8	
Antimony (Sb)	mg/kg	0.558	<0.05	0.696	20	20	40	40	15
Arsenic (As)	mg/kg	2.85	2.93	6.51	12	12	12	12	55
Copper (Cu)	mg/kg	24	19.2	21.5	63	63	91	91	190
Barium (Ba)	mg/kg	93.7	**164**	**188**	750	500	2.000	2.000	160
Beryllium (Be)	mg/kg	0.28	0.335	0.356	4	4	8	8	30
Boron (B)	mg/kg	4.94	<2	9.65	2	-	-	-	
Mercury (Hg)	mg/kg	<0.1	<0.1	<0.1	6.6	6.6	24	50	10
Zinc (Zn)	mg/kg	32	40.4	47.6	250	250	410	410	720
Silver (Ag)	mg/kg	0.176	0.586	1.52	20	20	40	40	15
Cadmium (Cd)	mg/kg	0.164	0.188	0.302	1,4	10	22	22	12
Tin (Sn)	mg/kg	0.86	0.092	1.491	5	50	300	300	900
Cobalt (Co)	mg/kg	7.71	12.2	10.6	40	50	300	300	240
Lead (Pb)	mg/kg	5.01	13.4	29.5	70	140	260	600	530
Molybdenum (Mo)	mg/kg	0.532	<0.05	0.626	5	10	40	40	200
Nickel (Ni)	mg/kg	36.9	38	40.1	45	45	89	89	210
Selenium (Se)	mg/kg	0.626	0.993	1.12	1	1	2,9	2,9	100
Thallium (Tl)	mg/kg	0.332	0.213	0.366	1	1	1	1	15
Titanium (Ti)	mg/kg	730	18	718	-	-	-	-	-
Uranium (U)	mg/kg	0.505	0.561	0.713	23	23	33	300	-
Vanadium (V)	mg/kg	28.1	16	37.8	130	130	130	130	250
Chromium (Cr)	mg/kg	16.6	16.2	23.2	64	64	87	87	380
Oil and Grease	%	0.03	0.051	0.034	-	-	-	-	-
BTEX	mg/kg	<0.1	<0.1	<0.1	-	-	-	-	-
TVOCs	mg/kg	<0.1	<0.1	<0.1	-	-	-	-	-
TPH	mg/kg	140	<100	<100	-	-	-	-	-
TOX	mg/kg	26	<10	<10	-	-	-	-	-
Asbestos	mg/kg	None	None	None	-	-	-	-	-

[3] Soil Quality Standards set by the Canadian Council of Environment Ministers for the Protection of the Environment and Human Health

[4] Dutch Pollution Standards, Soil Quality Intervention Values

4.1.2.3 Geology

In summary, four periods (Şaroğlu and Güner, 1981) are mentioned in the geological evolution of the Eastern Anatolia Region, where the Divriği-Kars-Georgia border railway line is located.

A) Metamorphites are the oldest units of the region. In terms of main rock types they are gneiss, micaschist, granite, metavolcanics and marble, and they belong to the Paleozoic period, and it is interpreted that their upper levels may be of Lower Mesozoic age (Perinçek, 1980; Savcı et al., 1979).

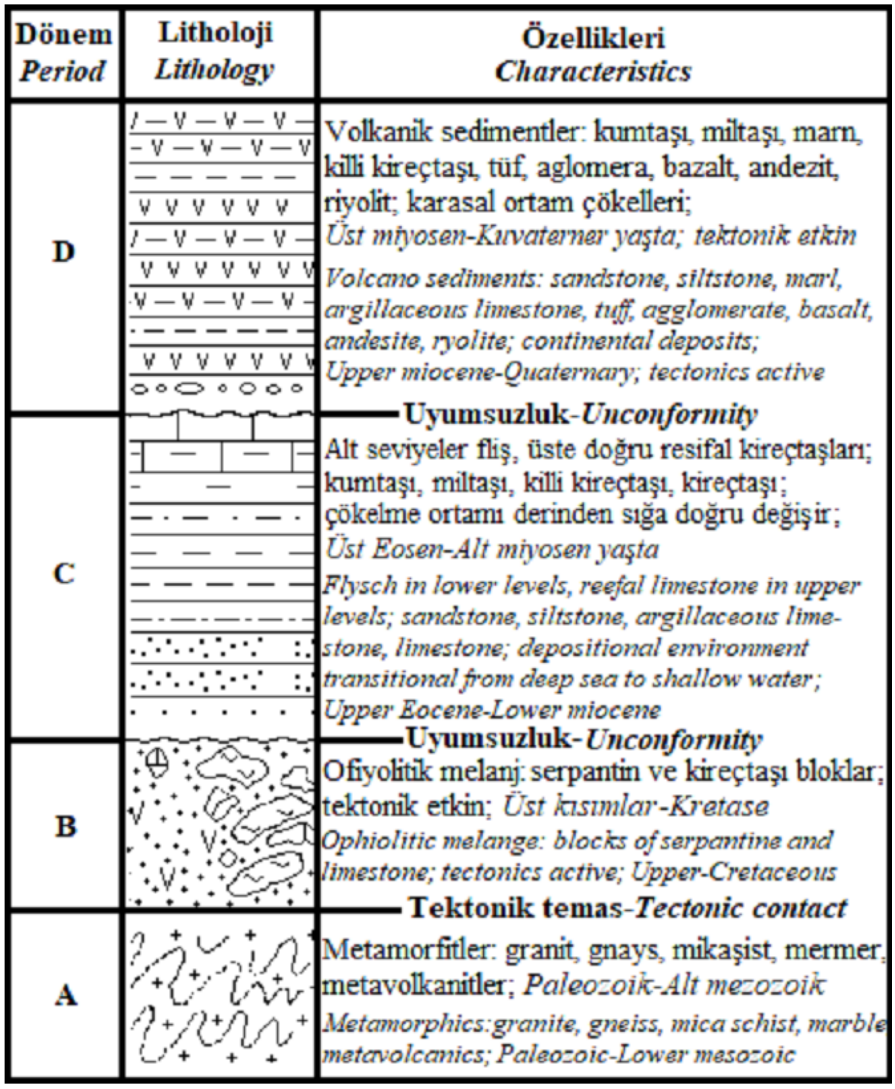
B) It is the period of formation of ophiolitic mélange, it is located above the metamorphites with tectonic contact. It consists of sandstone, limestone, tuff and limestone blocks with basic and ultrabasic rock content. This unit, which is widespread in Eastern Anatolia, is of Upper Cretaceous age and is the product of the northern branch of the new Tethys Sea (Şengör, 1980; Şengör et al., 1980).

C) It is considered a feature of this period to include marine and rock types that determine a certain depositional environment and where volcanism is not active. These rocks consist of flysch and reef limestones from bottom to top. They are of Eocene-Lower Miocene age (Şaroğlu and Güner, 1981). It is of the Eocene flysch type. Although the Oligocene has a flysch appearance in places, it is understood from the limestone and gypsum levels it covers that it developed in a shallower environment compared to the Eocene. Lower Miocene clayey limestone has a limestone lithology, has reef characteristics and is quite common. An important feature of the Lower Miocene is that it covers rock types with the same characteristics throughout its wide area.

D) The important geological events of this period, which continues until today, are terrestrial sediments, volcanism and effective tectonic activities (Yılmaz et al., 1981). There are stratigraphic gaps and overhangs within the unit.

The generalized stratigraphic columnar section of Eastern Anatolia Region is given in Figure 14.

Figure 14. Generalized stratigraphic columnar section of Eastern Anatolia Region



Source: Şaroğlu & Güner,1981, Bulletin of the Geological Society of Türkiye

Rock Types Formed in Eastern Anatolia During the Neotectonic Period

The sedimentary bedrock of the Neotectonic (D) period generally consists of sandstone, siltstone, marl, conglomerate, limestone, tuff and agglomerate. Contemporary with sedimentary rocks, there are acid magmatic rocks (volcanics) such as basalt, andesite, rhyolite and dacite. Sedimentary rocks contain cross-bedding, graded bedding, wave wrinkles, coal levels, gypsum and abundant macrofossils. These contents show that the neotectonic (D) period bedrocks have the characteristics of a continental environment and are found in lacustrine and fluvial facies (Şaroğlu and Güner, 1981).

Volcanic activities produced products at their origins faster than tectonics, erosion and sedimentation, and enabled the formation of today's landforms. High hills were formed at the exit points, and the depressions between the hills were preserved in the form of basins or lakes. Ardahan basin and Çıldır lake are such formations (Şaroğlu and Güner, 1981). Young alluviums in the region are located in Iğdır, Erzincan, Erzurum, Pasinler, Muş, Elazığ, Malatya, Ağrı, Doğubeyazıt, Muradiye, Çaldıran, Özalp, Yüksekova and similar alluvial plains. Colluvium is seen in large areas around Erzurum, in the south of Erzincan and December (Iğdır) and in the north of Ovacık.

The geological map of the project route and its surroundings is given at Appendix-4.4.

4.1.2.3.1 Tectonism

At the Eastern Anatolia where the Divriği-Kars-Georgia border railway line is located, at the end of the ocean closure in the Bitlis Suture zone, the neotectonic period began in Eastern Anatolia with the continent-continent collision (Şengör, 1980). The collision was a compression in Eastern Anatolia and roughly depending on this compression tectonics:

- Folds in E - W direction,
- High-angle thrusts in E-W direction and inclined towards N or S,
- Left-lateral strike-slip faults in NE - SW, NNE - SSW directions,
- WNW - ESE, NW - SE directional dextral strike-slip faults.
- Expansion cracks in N - S direction have developed.

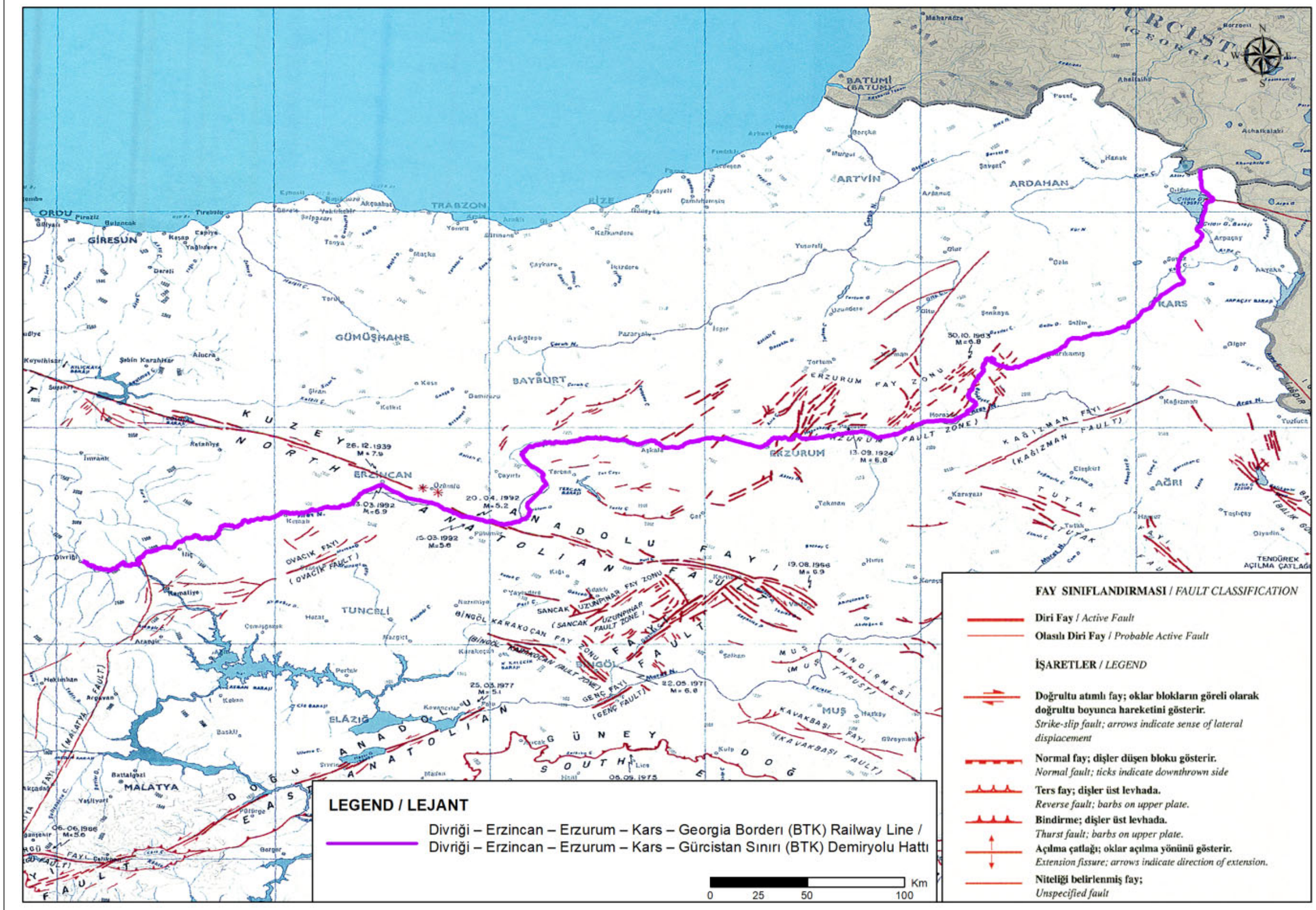
As a result of all these structural shapes, Eastern Anatolia shortens in the N-S direction and its crust thickens (Şengör and Kidd, 1979; Canıtez and Toksöz, 1980). Inclination of Quaternary rocks, 1966 Varto,1971 Bingöl, 1975 Lice and 1976 Çaldıran earthquakes movements show that tectonics are active in Eastern Anatolia.

The region located to the east of the Bingöl-Karlıova triple junction and under the influence of the north-south compressional tectonic regime is defined as the Eastern Anatolia Compression Zone. Left-handed and right-handed EAFs, which intersect parallel to the North and East Anatolian Fault zones, are the most characteristic structures of this region (Bozkurt, 2001).

Muş, Lake Van and Pasinler basins are basins with east-west trending compression origin. These basins show that the Eastern Anatolian plateau is under the influence of north-south compression (Şaroğlu and Güner, 1979, 1981; Atalay 1983).

The active fault map along the Divriği-Kars-Georgia border railway line is given at Figure 15.

Figure 15. Active Fault Map Along Railway Route



Source: MTA,1992

North Anatolian Fault Zone (NAFZ)

It is a 1500 km long, right-lateral, forward-slip fault extending in the form of an arc from Bingöl-Karlıova to Saros Gulf in the west, with a width ranging from a few 100 m to 40 km. Morphologically distinct and seismically highly active, it is one of the best-known faults in the world.

Geological data about the NAFZ: a) Formation in the Miocene or before the Early Miocene, b) Right-handed movement starting from the Middle Miocene, c) Movement starting in Eastern Anatolia in the Late Miocene, moving to the Marmara Sea in the Pliocene. arrival, d) Reported to be older than 16 my (million years) in the east but younger than 3 my in the west.

East Anatolian Fault Zone (EAFZ)

The Eastern Anatolian Fault Zone, whose borders were shown from Bingöl-Karlıova to the Gulf of İskenderun by Mc Kenzie (1972) based on topography and fault plane solutions, and was extended to Cyprus towards the southwest, and was combined with the Dead Sea Fault (DSF) by Allen (1965). EAFZ is a strike-slip, 650 km long (it may continue further under the sea), NE-SW trending fault. EAFZ consists of a series of faults parallel, semi-parallel and obliquely oriented to this main trend.

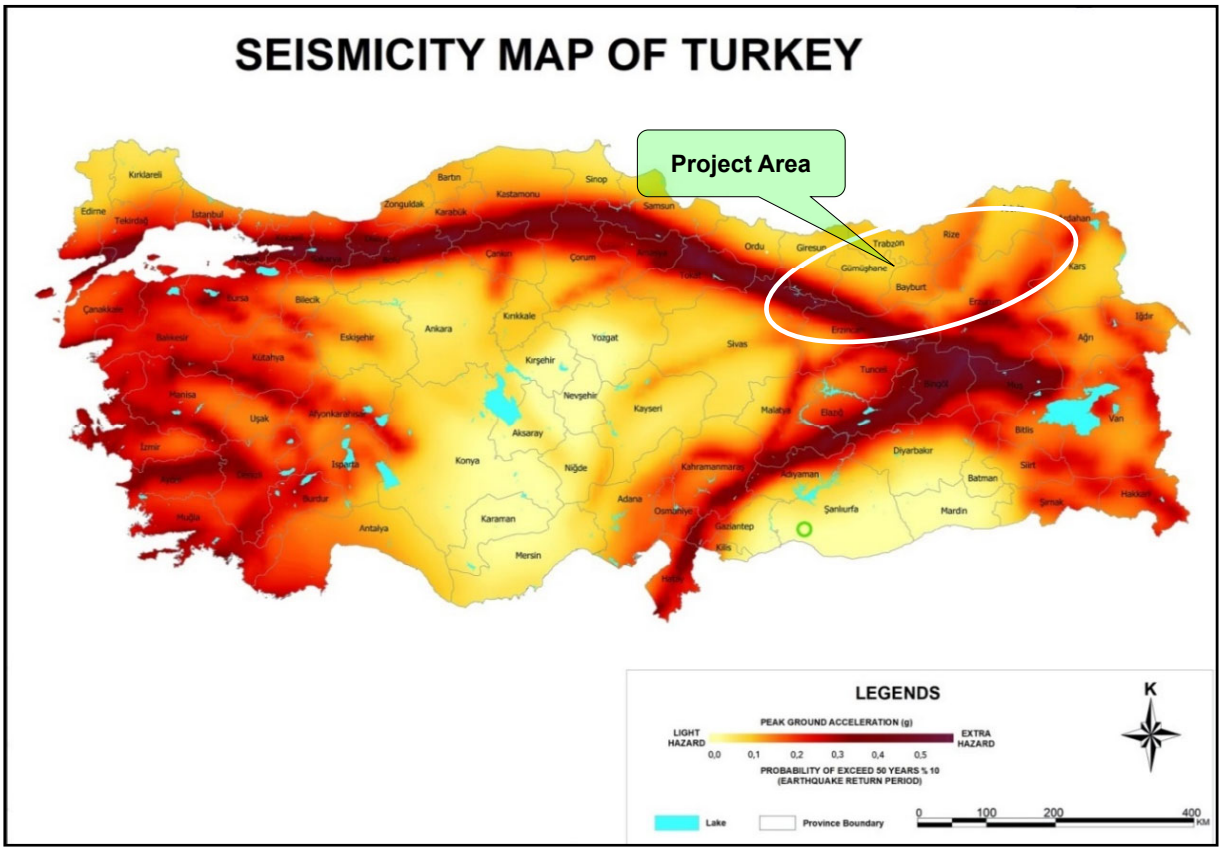
EAFZ starts at Bingöl-Karlıova, forming a triple junction with NAFZ, and extends southwest until Bingöl. The fault trace is quite evident around Palu and extends to the northeastern end of the Hazar Lake. It reappears at the southern end of the lake. The course of the fault further southwest is not clear.

4.1.2.3.2 Seismicity

The renewed "Türkiye Earthquake Hazard Map", published in the Official Gazette dated 18.03.2018 and numbered 30364 (duplicate) and entered into force as of 01.01.2019, is given with the Project Area in Figure 16. The project route was examined on the interactive earthquake hazard map that was published by AFAD on the basis of provinces at which the Divriği-Kars-Georgia border railway line passes.

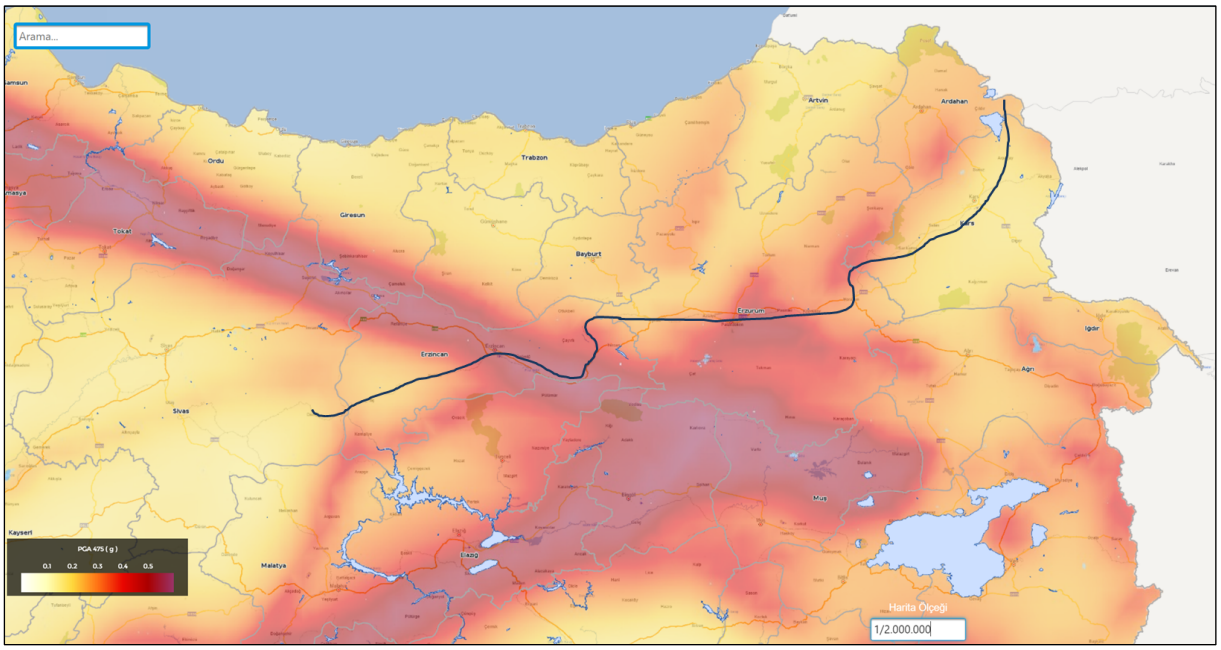
The largest ground acceleration value (PGA 475) for the 475 Year Recurrence Period was determined between 0.212-0.273 g at Sivas, 0.219-0.740 g at Erzincan, 0.257-0.536 g at Erzurum and 0.190-0.382 g at Kars transitions (see Figure 17).

Figure 16. Earthquake Hazard Map of Türkiye



Source: AFAD, 2018, Türkiye Earthquake Hazard Map

Figure 17. Project Railway Line on Earthquake Hazard Map of Türkiye with Maximum ground acceleration for the 475 Year Recurrence Period (PGA 475)

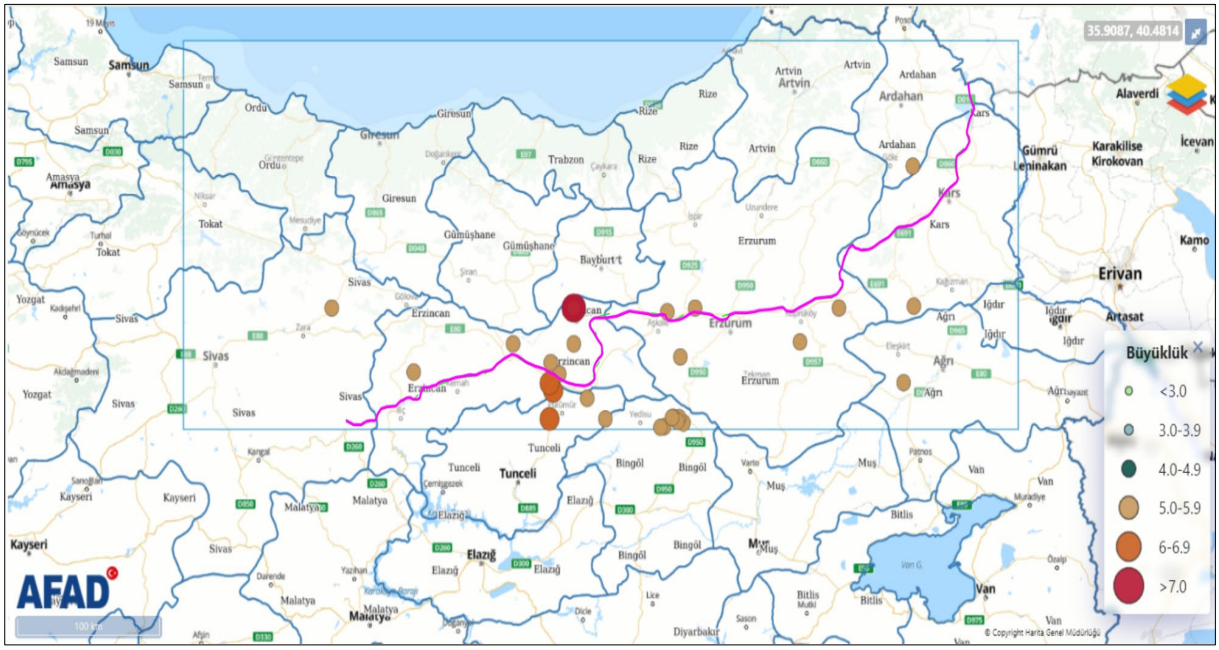


Source: AFAD, Türkiye Earthquake Hazard Maps, Interactive Web Application

The locations of earthquakes with a magnitude of 5 and greater that occurred between 1900 and 2023 in the region that the Divriği-Kars-Georgia border railway line is passing are shown in Figure 18.

Within the region in question, 34 earthquake records with magnitude M ≥ 5, which occurred between 1900-2023, were identified and the records of these earthquakes are given in Table 24.

Figure 18. Earthquakes (M ≥ 5) that occurred within the region that railway line is passing through between 1900 and 2023



Source: https://deprem.afad.gov.tr/event-catalog

Table 24. Earthquake Data with M≥ 5 Occurred Between 1900-2023

Date*	Latitude	Longitude	Depth (km)	Magnitude	Location
27/09/2022 14:08:31	42.801	40.748	9.45	5	Göle (Ardahan)
19/11/2021 12:40:52	41.868	39.8208	5.18	5.1	Köprüköy (Erzurum)
15/06/2020 06:51:29	40.7435	39.3678	7.01	5.6	Karlıova (Bingöl)
14/06/2020 14:24:27	40.714	39.365	8	5.7	Karlıova (Bingöl)
22/09/2011 03:22:33	38.6777	39.6597	7.18	5.4	İliç (Erzincan)
21/01/2007 07:38:57	42.7255	39.6032	5.32	5.1	Tutak (Ağrı)
10/12/2005 00:09:46	40.8547	39.3976	18.94	5.2	Karlıova (Bingöl)
06/06/2005 07:41:30	40.9038	39.3888	10.5	5.1	Karlıova (Bingöl)
23/03/2005 21:44:52	40.8094	39.4164	12	5.4	Karlıova (Bingöl)
14/03/2005 01:55:57	40.8183	39.4186	9.95	5.9	Karlıova (Bingöl)
12/03/2005 07:36:10	40.8672	39.4165	7.2	5.6	Karlıova (Bingöl)
28/03/2004 03:51:09	40.77	39.98	2.15	5.3	Aşkale (Erzurum)
25/03/2004 19:30:46	40.8779	39.7402	2.6	5.1	Aşkale (Erzurum)
27/01/2003 05:26:23	39.8	39.41	15.9	6.4	Pülümür (Tunceli)
05/12/1995 18:52:38	40.11	39.52	13	5	Pülümür (Tunceli)
05/12/1995 18:49:29	40.26	39.41	12	5.2	Pülümür (Tunceli)
29/01/1995 04:16:57	41	40	21	5	Aziziye (Erzurum)

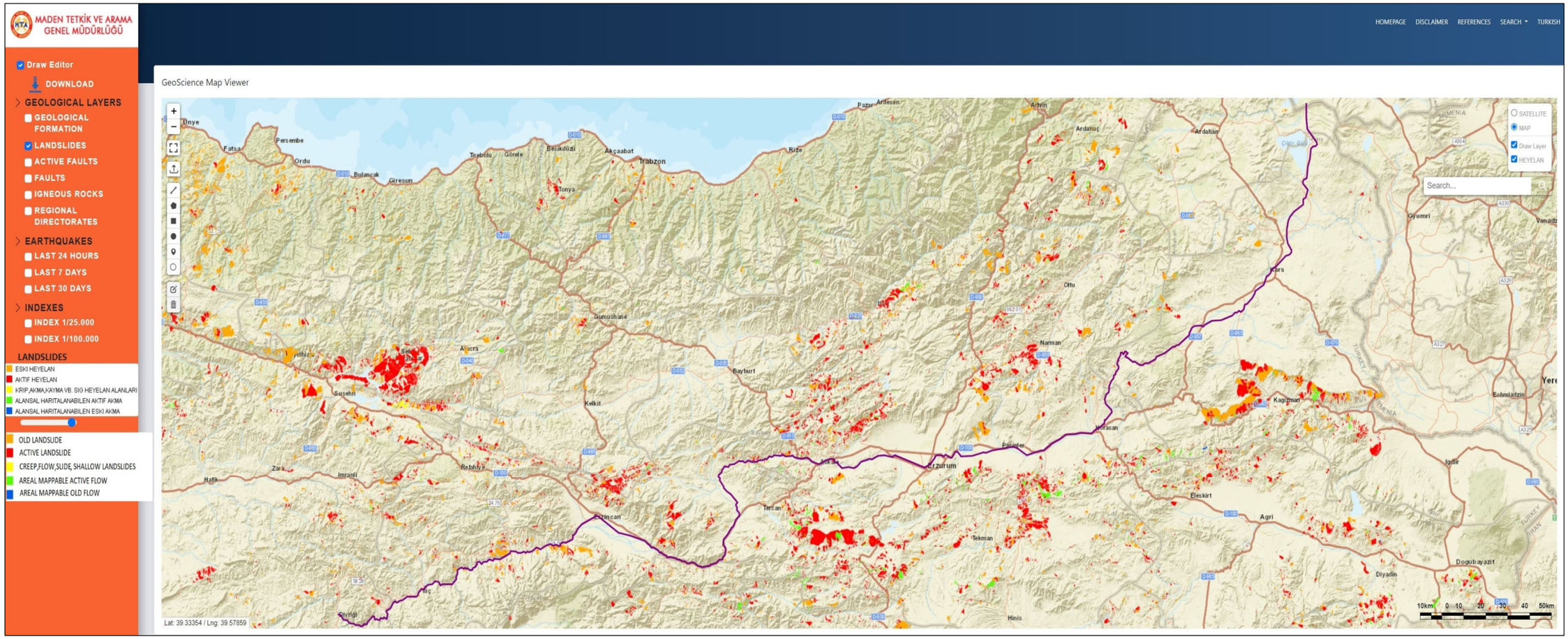
Date*	Latitude	Longitude	Depth (km)	Magnitude	Location
28/04/1992 07:16:27	40	40	10	5	Otlukbeli (Erzincan)
28/04/1992 07:16:26	39.83	39.56	14	6	Pülümür (Tunceli)
02/04/1992 12:26:12	40	40	2	5	Otlukbeli (Erzincan)
22/03/1992 17:41:42	40	40	2	5	Otlukbeli (Erzincan)
21/03/1992 23:15:50	39.88	39.65	2	5	Üzümlü (Erzincan)
15/03/1992 16:16:26	39.8	39.6	11	6.1	Pülümür (Tunceli)
14/03/1992 01:24:34	40	40	11	5	Otlukbeli (Erzincan)
14/03/1992 00:30:06	40	40	11	5	Otlukbeli (Erzincan)
13/03/1992 22:47:41	39.81	39.71	6	5	Üzümlü (Erzincan)
13/03/1992 20:49:28	40	40	11	5	Otlukbeli (Erzincan)
13/03/1992 20:15:20	40	40	11	5	Otlukbeli (Erzincan)
13/03/1992 18:37:56	39.5	39.81	11	5.1	Merkez (Erzincan)
13/03/1992 17:18:41	40	40	11	7	Otlukbeli (Erzincan)
27/01/1992 12:21:00	42.19	40	3	5	Horasan (Erzurum)
03/06/1991 10:22:45	42.81	40.01	10	5	Kağızman (Kars)
03/05/1990 21:05:19	38	40	1	5	Suşehri (Sivas)
20/04/1990 23:30:05	40	39.81	21	5.2	Çayırlı (Erzincan)

**Given in Türkiye Local Time TS.*
Source: https://deprem.afad.gov.tr/event-catalog

4.1.2.3.3 Landslide

The status of the landslide areas along the project route and surrounding areas was examined on the MTA General Directorate Earth Sciences Map Viewer (see Figure 19). Accordingly, there are no active / or passive landslide areas or creeps, flows or slides on the railway route that could affect the line. However, there are small and medium-scaled active and old landslide areas on the high slopes in the north and south of the route between Divriği-Erzincan and the north of Tercan - Aşkale, where the route passes through mountainous areas.

Figure 19. The landslide risk inventory at and around the Railway Line

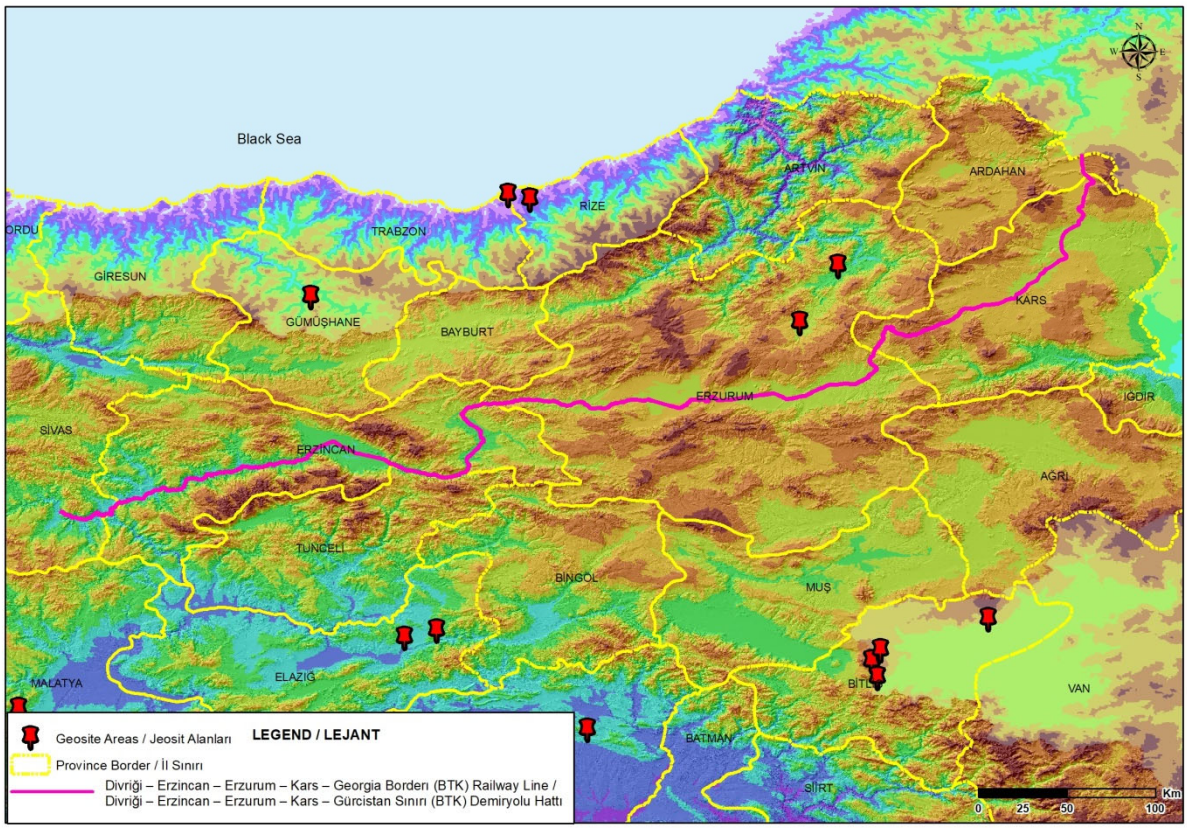


Source: http://yerbilimleri.mta.gov.tr/home.aspx

4.1.2.3.4 Geosite / Geological Heritage

The distribution of geosite areas at the region where project route is passing through is given in Figure 20. As seen at below figure there is no geosites / geological heritage area along the project route and at AoI.

Figure 20. Distribution of Geosites / Geological Heritage Sites at and around the Railway Line



Source: https://www.jemirko.org.tr/turkiye-jeolojik-miras-envanteri/

4.1.3 Impact Assessment

4.1.3.1 Land Preparation and Construction Phase

Land Use

The land preparation and construction phase of the project may temporarily disrupt the existing land use patterns. Excavation, construction of new structures, and installation of rail-related infrastructure may alter the visual landscape of the project area during this phase. However, these changes are anticipated to be temporary, and efforts will be made to minimize the duration of disruption.

The project involves the rehabilitation and enhancement of an existing railway corridor. Since, the rehabilitation primarily focuses on upgrading and modernizing the existing railway, utilizing the footprint of the current corridor, the impact on land use is expected to be minimal compared to the development of entirely new infrastructure. However, since the detailed engineering designs including the access roads and transmission lines will be prepared by the contractor, land acquisition might be required. In this case, RP(s) will be prepared based on the project's RF.

The construction of embankments and bridges can significantly alter the visual landscape. Elevated tracks may dominate the scenery, affecting aesthetics and scenic viewpoints. Excavation and earthmoving activities during construction can lead to soil erosion. Proper

erosion control measures are essential to prevent sediment runoff into nearby water bodies. The current railway route and corridor were previously selected by taking into account the landslide areas in the region, and there is no active or passive landslide area, creep, flow or slide within the railway route and study area. The works within the scope of the project include the rehabilitation and modernization of the existing railway corridor, and no deep excavation or blasting will be carried out within the scope of the works. Therefore, there is no triggering of any landslide during the works, and only the excavation, filling and slopes to be created in the sections corresponding to the soft alluvial soils and decomposed parts of and rocks will be excavated, filled and sloped by taking into account the cohesion and friction angle, which are the strength parameters of the ground, together with groundwater status and regional earthquake loads.

In all buildings to be built, the provisions of the "Türkiye Building Earthquake Regulation" of the Disaster and Emergency Management Presidency, which came into force on 01.01.2019 after being published in the Official Gazette dated 18.03.2018 and numbered 30364, will be strictly complied with.

There is no geosite area on the railway route and corridor, and no geosite area will be affected or lost by the works. The nature of the project, emphasizing rehabilitation rather than expansion, aligns with conservation principles. Efforts will be made to protect and preserve the natural environment and biodiversity surrounding the railway corridor. This includes implementing measures to prevent soil erosion, maintain water quality, and protect ecologically sensitive areas.

The rehabilitation project aims to enhance the efficiency and safety of the existing railway, contributing to improved transportation networks. This, in turn, can have positive economic and social impacts by facilitating the movement of goods and passengers, supporting local businesses, and enhancing connectivity within and between regions.

In summary, while temporary disruptions during construction are expected, the rehabilitation nature of the project, coupled with the utilization of an existing railway corridor, ensures that the impacts on land use are minimal. The project is designed to balance the need for modernization with the preservation of the surrounding environment and the socio-economic benefits associated with an upgraded railway system.

Soils

Soil is a vital component of the environment, and any significant changes or disturbances can have far-reaching effects on ecosystems, agriculture, and human livelihoods. Within the context of the proposed railway infrastructure project, several possible impacts on soil quality and composition must be considered.

One of the primary impacts on soil involves potential erosion and sedimentation. Construction activities, such as excavation and earthmoving, can disrupt the natural topography, leading to increased soil erosion. Eroded soil particles may be transported by runoff into nearby water bodies, affecting water quality and aquatic ecosystems. Sedimentation in water bodies can also impact their ecological health and lead to the accumulation of pollutants. Effective erosion control measures, such as the use of silt fences, terracing, and revegetation, will be necessary to mitigate these impacts.

In addition, loss of topsoil is in question where new facilities or infrastructure construction is in question. This can result loss of vegetative soil, which is vital for agricultural activities. Construction machinery and heavy equipment can exert substantial pressure on the soil, leading to compaction. Soil compaction can reduce porosity, limit root growth, and hinder water infiltration, negatively affecting soil quality for future land use, including agriculture.

Construction activities, including fuel and chemical storage, can pose risks of soil contamination. Spills and leaks of hazardous substances can lead to soil pollution, making it

unsuitable for agricultural or ecological purposes. Moreover, improper disposal of waste materials can introduce pollutants into the soil. Robust management of hazardous materials and waste disposal practices is crucial to prevent soil contamination. Soil testing and monitoring can detect contamination early and guide remediation efforts.

In summary, the potential impacts on soil within the context of the railway infrastructure project encompass a range of soil-related challenges, including erosion, compaction, contamination, land use changes, and habitat fragmentation. Effective mitigation and management measures are essential to protect soil quality, preserve ecosystems, and ensure the project aligns with responsible land use practices and environmental sustainability.

4.1.3.2 Operation Phase

Soil

Operation phase of the Project is not expected to cause any direct impacts on soils. Yet, operation-phase mitigation measures that will be in place to minimize the risk of erosion and contamination can be listed as the following:

- Erosion control structures will be monitored and maintained regularly to ensure that they are functioning properly.
- Embankment and cutting slopes will also be checked regularly to identify and respond to any risks that may be associated with erosion, landslide, etc.
- Paving of the highway connection line will also be done by applying appropriate erosion and sediment control measures.
- In case of road accidents that may result in spills and leakages, Emergency Preparedness and Response Plan will be implemented to manage any potential contamination effectively.
- More environmentally friendly products will be used to prevent the possibility of any soil pollution in removing icing of road connection line.
- The operation of trains along the railway corridor may further contribute to soil compaction. Mitigation measures, such as limiting heavy equipment traffic on vulnerable areas and implementing proper soil compaction management, are essential to mitigate this impact and preserve soil health.
- Active and passive landslide areas in the region, especially in the sections where the railway route passes through mountainous areas, will be observed and controlled after earthquakes and excessive rainfall that may occur in the region.

4.1.4 Potential Impact Significances and Mitigation Measures

As indicated in Section 4.1.3, the scope of the Project is rehabilitation, electrification and modernization of the existing railway. Due to the nature of the work, the Project will not include as much construction work as building a railway from scratch.

The general mitigation measures listed below will be taken by considering the scope of the Project.

<u>General mitigation measures:</u>

- The Project activities will adhere to applicable legal and project safety regulations to prevent leaks from on-site storage facilities of hazardous materials, such as chemicals and liquids.
- For fuel/oil storage and the storage of other fluids and hazardous substances, sufficient and well-maintained tanks, paved ground, spill containment materials, and proper secondary containment systems will be provided to prevent soil contamination.
- The use of machinery/vehicles will be limited to construction sites and appropriate access roads.

- Routine maintenance of vehicles and equipment will be conducted to ensure prevention of oil/fuel or any hazardous material leaks.
- Vehicle and equipment maintenance, if required, will be carried out in designated areas with impermeable surfaces, such as a concrete floor, and a secondary containment system if necessary.
- Impervious surfaces, such as concrete, will be designated for machinery/vehicle refueling. If not feasible based on the project's nature, all refueling tankers and heavy machinery at the site will be equipped with iron plate trays and spill response kits. These trays will be positioned under the pipe connection points during refueling operations to prevent accidental soil leakage.
- Portable spill cleanup materials (spill kits) will be readily available at the construction site, complete with instructions on their usage. Training on spill response, as well as the use of spill kits, will be provided to all workers, including subcontractor personnel.
- Wastewater from field activities (e.g., excavations, drillings, refueling, and vehicle/equipment washing) will be appropriately managed.
- In the event of accidental leakages, polluted water will be collected or managed to prevent topsoil/soil pollution.

The land use, soil and geology-related risks and impacts, proposed mitigation measures and residual impact significances are given in Table 25.

Table 25. Land Use, Soils and Geology-Related Impact Significances and Proposed Mitigation Measures

Potential 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	Reversibility	Duration	Frequency	Impact Magnitude				
Land occupation*	Land preparation and construction	Arable lands Pasture lands	Restricted	Irreversible	Long-term	One-off	Medium	Medium	**Moderate**	▪ Land preparation and construction areas will be designated that will be visible and appropriately marked. Also, the worksites will be minimized to the smallest extent as much as possible. ▪ Training will be provided to the construction personnel so that they maintain the pre-established construction boundaries. ▪ A grievance mechanism will be established to ensure any complaints/comments regarding the Project will be received and responded to in a timely manner, providing solutions and taking corrective measures as appropriate. ▪ AYGM will ensure that necessary corrective measures are taken by the Contractor from its own budget, in case of direct or indirect damage to adjacent properties that are state-owned or private property due to project-related activities. ▪ To mitigate fragmentation impacts, agricultural/pasture underpasses and culverts are either available or will be constructed throughout the entire Project route. ▪ Trainings and information sharing will be performed with community members who are using pastureland during land preparation before construction.	**Minor**
		Local communities	Restricted	Irreversible	Long-term	One-off	Medium	Medium	**Moderate**		**Minor**
Topsoil stripping	Land preparation and construction	Arable lands Pasture lands	Restricted	Irreversible	Medium-term	One-off	Medium	Medium	**Moderate**	▪ Strip fertile topsoil along the Project area (where required) including the new sidings and existing sidings extension areas, electrification systems installation areas at sufficient depth suitable for local soil conditions prior to construction activities. ▪ Store topsoil separately from subsoil at designated topsoil storage areas along the route and other work sites at suitable conditions to preserve its vegetative properties. ▪ Do not carry out stripping when soil is wet, so that soil compaction is avoided. ▪ Provide drainage at topsoil storage areas by open channels. ▪ If storage of topsoil will last longer than three months, plant upper part of fertile soil temporarily so that the organic content is conserved. Select proper species and seed mixture ratios. ▪ Apply organic or inorganic materials on the topsoil to improve quality and avoid erosion, desiccation or invasion of wild species. ▪ Reuse topsoil stored at suitable conditions for the rehabilitation of temporary construction sites after the completion of construction activities, for the finalization of side slopes and in landscape activities. ▪ Loosen topsoil to a depth of 15 cm before reinstatement (Increase depth of loosening up to 40-50 cm for compact heavy clay soils) ▪ Keep the depth of topsoil for areas to be planted suitable for side slopes, shrub plantation areas, tree roots etc. ▪ Conduct grading operation in line with the natural slope and drainage conditions following the reinstatement of topsoil.	**Negligible**
		Ecological receptors	Restricted	Irreversible	Medium-term	One-off	Medium	Medium	**Moderate**		**Negligible**
Soil Erosion	Land preparation and construction	Lands with Erosion Degree 4	Local	Irreversible or long-term reversible	Long-term	Intermittent	High	High	**Major**	▪ Before the onset of land preparation and construction works, erosion control measures like drainage channels, settling structures, etc. will be implemented. ▪ To eliminate the risk of erosion in periods of excessive rainfall, the waters from the project surroundings and slopes will be separated from surface run-off by directing through temporary channels and soil embankments. ▪ 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. ▪ All the disturbed sites will be restored to the most possible extent in a timely manner following the completion of stripping and excavation works.	**Moderate**
		Lands with Erosion Degree 3	Local	Irreversible or long-term reversible	Long-term	Intermittent	Medium	Medium	**Moderate**		**Minor**
		Lands with Erosion Degree 2	Local	Irreversible or long-term reversible	Long-term	Intermittent	Low	Low	**Negligible**		**Negligible**
		Lands with Erosion Degree 1	Local	Irreversible or long-term reversible	Long-term	Intermittent	Negligible	Negligible	**Negligible**		**Negligible**
Soil Contamination		Lands with Class I-II LUC	Local	Short-term reversible	Short-Term	One-off	Low	Medium	**Minor**	▪ Discharge of materials into soil that would cause contamination will be prohibited.	**Negligible**

Potential 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	Reversibility	Duration	Frequency	Impact Magnitude				
	Land preparation and construction	Lands having Class III-IV LUC	Local	Short-term reversible	Short-Term	One-off	Low	Low	**Negligible**	▪ Accidental spills and leakages will be managed through implementation of the Emergency Preparedness and Response Plan. ▪ Solid wastes, hazardous wastes and wastewater to be generated as a result of land preparation and construction activities along the Project route will be further managed through implementation of the related management plans. ▪ In case of a location to be suspected of a contamination before or during construction works, a sampling and analysis study will be carried out.	**Negligible**
		Project Personnel Local Communities Residential Areas	Local	Short-term reversible	Short-Term	One-off	Low	Medium	**Minor**		**Negligible**
General Geotechnical Risks	Land preparation and construction, Operation	Project personnel, Railway users	Wide	Irreversible	Long-term	Intermittent	High	High	**Major**	▪ Additional durability and structural measures in fills and cuts will be developed and implemented. ▪ Conducting periodic inspections and maintenance activities along the routes, particularly after natural disasters such as earthquakes and post-flood events by focusing on addressing issues such as cracks, ruptures, sliding, settling, deformation, etc., that may occur in fills and cuts. ▪ Excavation and filling slopes will be designed taking into account ground strength parameters (cohesion, friction angle, etc.), groundwater condition and regional earthquake loads. ▪ Only the materials that will come out of the formation that comply with the filling material standards will be used as filling material.	**Minor**
Seismicity Related Risks	Land preparation and construction, Operation	Project personnel, Railway users	Wide	Irreversible	Long-term	Intermittent	High	High	**Major**	▪ All engineering structures and superstructures to be established within the scope of the project will be designed and constructed taking into account the earthquake resistant design parameters and criteria. ▪ In the structures to be constructed within the scope of the project, provisions of “Regulations for the Structures to be Built in Disaster Areas” published in the Official Gazette No. 26582 dated 14.07.2007 and “Türkiye Building Code” of Disaster and Emergency Management Administration published in the Official Gazette No.30364 and dated 18.03.2018 that came into force in 01.01.2019 will be strictly followed. ▪ Development and implementation of additional durability and structural measures in fills and cuts, by performing periodic inspections and maintenance activities along the routes, especially when necessary (after natural disasters such as earthquakes and post-flood events) will be provided. This includes addressing issues such as cracks, ruptures, sliding, settling, deformation, etc., that may occur in fills and cuts. ▪ Emergency response plans for railway operations in the event of an earthquake will be developed and implemented.	**Minor**
Landslide Risk	Land preparation and construction, Operation	Project personnel, Railway users	Wide	Irreversible	Long-term	Intermittent	High	Medium	**Major**	▪ Natural vegetation on slopes should be maintained and established to stabilize soil. ▪ Erosion control measures should be implemented, such as retaining walls and bioengineering techniques, to reduce soil erosion and landslide potential. ▪ Retaining structures should be designed and constructed, such as retaining walls or embankments, to stabilize slopes. ▪ Drainage systems are implemented to control groundwater and surface water, reducing the risk of soil saturation and landslides. ▪ Early warning systems that can detect ground movement and trigger alarms should be installed to stop train operations in the event of an impending landslide. ▪ Emergency response plans will be developed and implemented for landslides, including evacuation procedures and communication protocols.	**Minor**

*Impacts and mitigation measures regarding land acquisition was described in Social Environment Chapter in more detail. This chapter assess physical environment features of land, erosion and geological elements only.

4.2 Noise

4.2.1 Project Standards and Methodology

Project Standards

In the scope of noise and vibration impacts, the project is evaluated according to the following international standards and national regulation.

- Environmental Noise Control Regulation (ENCR)
- WBG General EHS Guidelines – 1. Environmental – 1.7: Noise
- World Health Organization (WHO) Guidelines for Community Noise

ENCR sets different limits for specific noise sources such as industrial facilities, workplaces that broadcast music etc. The limit values stated in ENCR – Table 1 of Annex-2 are given in Table 26.

Table 26. Limit Values in Regulation on Environmental Noise Control[5]

Noise Sources	Measured Parameters	Environmental Noise Levels		
		Daytime (07.00-19.00)	Evening (19.00-23.00)	Night (23.00-07.00)
Industrial facilities, sources of transport	**$LA_{eq,5min.}$**	**65 dB(A)**	**60 dB(A)**	**55 dB(A)**
Workplaces that broadcast music	$LA_{eq\ 63\text{-}250\ Hz}$	60 dB(A)	55 dB(A)	50 dB(A)
Workplaces	$LA_{eq,5min.}$	Background + 5 dB(A)		Background + 3 dB(A)
In case of more than one workplace	$LA_{eq,5min.}$	Background + 7 dB(A)		Background + 5 dB(A)
All sources	LC_{max}	100 dB(C)		

While the ENCR establishes noise limits according to the noise sources, the WBG General EHS Guidelines on Environmental Noise Management determine noise limits based on the receptors of the noise. WBG General EHS Guidelines divides receptors into two categories as residential areas and industrial/commercial areas and divides the time periods into two as daytime and nighttime. Limit values stated in the guideline are given in Table 27. Besides, noise impacts should not result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site. It should be noted that there are no defined limits for the construction activities within the scope of WBG General EHS Guidelines.

Table 27. Noise Limits in WBG General EHS Guidelines

Receptor	One Hour LAeq (dBA)	
	Daytime (07:00-22:00)	Nighttime (22:00-07:00)
Residential; institutional; educational	55	45
Industrial; commercial	70	70

On the other hand, WHO guideline values for community noise in specific environments are given in the following table.

Table 28. WHO Guideline Values for Community Noise in Specific Environments

Specific environment	Critical Health	Effect Sound Level LAeq [dB(A)]	Time base (hours)
Outdoor Living Areas	Annoyance	50-55	16

[5] Table 1.1 in Annex-2 of Regulation on Environmental Noise Control

Specific environment	Critical Health	Effect Sound Level LAeq [dB(A)]	Time base (hours)
Indoor Dwellings	Speech intelligibility	35	16
Bedrooms	Sleep disturbance	30	8
School classrooms	Disturbance of communication	35	During class
Industrial, commercial and traffic areas	Hearing impairment	70	24
Music through Earphones	Hearing impairment	85	1
Ceremonies and Entertainment	Hearing impairment	100	
Hospital, ward rooms, indoors	Sleep disturbance, nighttime	30	8
	Sleep disturbance, daytime and evenings	30	16

Methodology

Environmental noise measurements were carried out by Çınar Laboratory Group Inc. (ÇINAR LAB) in accordance with TS ISO 1996-1 (Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures) and TS ISO 1996-2 (Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels standards). A total of 48 hours of noise measurements were performed at each point on weekdays and weekends, with the measurements in 10-minute periods.

The SoundPLAN 8.1 program was utilized to determine the total noise level during the construction and operation activities of the project.

Noise modeling studies were conducted in 12 separate models for the construction and operation phases, each including the 12 points where baseline measurements were taken. While the model was run during the daytime for the construction period, noise modeling was performed for both day and night during the operation phase.

The resulting noise emission distribution maps from these studies are provided in Appendix 5.2.

After digitizing the elevations, a Digital Terrain Model (DTM) was created for the program to detect the digitized elevation. Following the creation of the DTM, the noise source was drawn in the software by entering the data according to the standard.

As a result of these studies, the calculation area where the noise level will be calculated was defined, and after defining the receiver points, the noise levels caused by the machines and equipment working within this area for the receiver points were calculated.

The machinery and equipment to be used during the construction period will operate in a certain sequence and it is unlikely that all of them will operate at the same time. Within the scope of the noise modeling studies, the worst-case scenario has been assessed assuming that all machinery and equipment needed during construction activities are operated at the same time.

4.2.2 Baseline Conditions

For the environmental noise measurement activities, twelve (12) points were selected from the noise-sensitive receptors along the railway route that might be adversely affected by construction and operation activities. Background noise measurements were conducted for 48 hours to assess hourly noise levels. L_{min}, L_{max} and L_{90} values were recorded in 10 minutes logs with L_{eq} at 12 points for 48 hours on weekdays and weekends.

The noise measurement locations are shown in Figure 21. The noise measurement results and details related to measurement locations are given in Table 29 (see Appendix-5.1 for noise measurement reports).

The results of background noise measurements are evaluated within the scope of Environmental Noise Control Regulation (ENCR) limit values and WBG EHS Guidelines for Environmental Noise Management as Daytime (07:00-22:00) and Night-time (22:00-07:00).

It can be seen from Table 29, the results of the measurements carried out in the noise-sensitive locations are all below the limits set forth by WBG EHS Guidelines and ENCR.

Table 29. Noise Measurement Results

Measurement Locations				Date	Results (dBA)				
					Turkish Regulation (ENCR)			WBG EHS Guidelines	
No	Coordinates (WGS 84 – UTM)	District/Province	Type of Receptor & distance to railway		Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)	Day (07:00-22:00)	Night (22:00-07:00)
N1	37 S 443595 D 4357719 K	Kemaliye/Erzincan	Settlement & 150 m	27.10.2023	52.6	51.9	41.0	53.6	44.3
				28.10.2023	52.1	50.4	44.8	52.9	44.8
N2	37 S 454034 D 4365663 K	İliç/Erzincan	Settlement & 85 m	27.10.2023	47.2	48.5	42.2	48.5	43.1
				28.10.2023	49.2	48.3	42.8	49.7	42.8
N3	37 S 530308 D 4388807 K	Kemah/Erzincan	Settlement & 140 m	27.10.2023	40.0	39.9	38.2	40.1	38.5
				28.10.2023	39.0	39.5	40.9	39.5	40.9
N4	37 S 558101 D 4390705 K	Üzümlü/Erzincan	Settlement & 50 m	27.10.2023	43.4	43.2	44.2	43.9	44.1
				28.10.2023	39.0	38.5	41.6	40.6	41.5
N5	37 S 603068 D 4392107 K	Tercan/Erzincan	Settlement & 85 m	29.10.2023	39.6	41.4	39.1	41.7	39.5
				30.10.2023	39.9	41.3	38.0	40.3	38.4
N6	37 S 667662 D 4423180 K	Aziziye/Erzurum	Settlement & 38 m	29.10.2023	51.8	49.0	42.2	51.7	43.0
				30.10.2023	48.2	48.9	42.5	49.2	42.8
N7	37 S 679756 D 4424279 K	Aziziye/Erzurum	Settlement & 100 m	29.10.2023	42.0	41.8	39.7	42.1	40.1
				30.10.2023	38.2	38.9	38.9	38.3	39.1
N8	38 T 245749 D 4435245 K	Horasan/Erzurum	Settlement & 75 m	29.10.2023	52.8	51.7	44.1	53.2	44.3
				30.10.2023	49.6	50.5	40.9	51.1	42.6
N9	38 T 263908 D 4446325 K	Horasan/Erzurum	Settlement & 45 m	03.11.2023	41.3	40.9	42.1	41.3	42.7
				04.11.2023	41.0	39.7	41.6	40.9	41.5
N10	38 T 331905 D 4487528 K	Merkez/Kars	Industrial & 35 m	03.11.2023	35.8	35.5	35.1	35.8	35.1
				04.11.2023	37.4	38.3	38.6	37.6	38.7
N11	38 T 334035 D 4493662 K	Merkez/Kars	Settlement & 600 m to Kars Logistic Center and 3,200 m to the railway*	03.11.2023	51.6	48.5	43.3	51.4	43.5
				04.11.2023	50.5	48.6	41.6	50.6	42.8
N12	38 T 356548 D 4554203 K	Arpaçay/Kars	Settlement & 840 m	03.11.2023	50.9	48.9	40.3	50.9	41.7
				04.11.2023	47.6	48.5	42.5	48.5	43.2
Turkish Regulation (ENCR) Environmental Noise Limit Values					**65**	**60**	**55**	**-**	**-**
World Bank Group EHS Guidelines Environmental Noise Limit Values					**-**	**-**	**-**	**55**	**45**

*The modeling study was conducted with both noise sources taken into consideration.

Figure 21. Noise Measurement Locations



4.2.3 Impact Assessment

4.2.3.1 Land Preparation and Construction Phase

Excavation and grading activities are expected to produce increased noise levels due to the operation of heavy machinery such as excavators and bulldozers. The noise generated during these activities may impact nearby residential areas and ecosystems. Clearing and vegetation removal activities and utilizing equipment have the potential to introduce elevated noise levels into the project area. This could affect both local wildlife and nearby communities.

The establishment of construction camps involves various activities requiring the use of equipment for setting up temporary facilities. These activities may introduce noise into the surrounding environment, impacting nearby settlements.

The rehabilitation of the railway corridor, involving the use of heavy machinery for track replacement and infrastructure improvements, is likely to result in increased noise levels along the project route. Activities related to the installation of signaling and electrification systems, such as drilling and construction, may contribute to localized noise impacts in the vicinity of railway stations and tracks.

The construction and rehabilitation of bridges involve activities such as pile driving and concrete work, potentially generating substantial noise. This may affect nearby water bodies and communities. Tunnel clearance works, essential for electrification, may involve activities like blasting or mechanical excavation, leading to potential noise disturbances in the tunnel surroundings and nearby areas.

The construction of controlled level crossings involves heavy machinery and construction activities, contributing to increased noise levels in the vicinity of road-rail intersections. The construction of new sidings requires the use of heavy equipment and various construction activities that may result in elevated noise levels. This could impact nearby communities and ecosystems.

The construction of station buildings and related facilities involves various activities that can introduce noise into the immediate surroundings, affecting nearby residents and businesses. The construction of snow barriers may involve activities such as earthmoving and installation, potentially generating noise impacts in areas prone to snow accumulation.

Building new overpasses requires construction activities such as piling and concrete work, contributing to increased noise levels in the vicinity of road-rail intersections. The renewal of culverts involves construction equipment and activities that may generate noise, potentially affecting nearby water bodies and ecosystems.

The development of rail yards includes various construction activities that may contribute to noise generation, impacting nearby residential areas. The construction of road access points to project sites involves heavy machinery and excavation, potentially leading to increased noise levels in the surrounding areas. Activities related to the handling and stockpiling of construction materials may generate noise, particularly in areas designated for storage.

The establishment of temporary construction facilities, such as workshops and storage areas, may involve activities producing noise that could affect nearby communities.

Facilities for worker accommodation may contribute to noise impacts, especially during construction camp establishment and daily operations. The transportation of construction materials, involving heavy vehicles and equipment, may generate noise along transportation routes, impacting nearby settlements and ecosystems.

The noise emissions calculated, considering the above-mentioned activities, with SoundPlan 8.1 were compared with the baseline measurement averages, then cumulatively summed logarithmically to calculate the cumulative noise emissions. As described in Chapter 4.2.1

WBG EHS Guidelines limit values have been considered as project standards as they are more stringent than the national limit, since the construction activities are planned to take place only between 07:00-22:00, the WBG EHS Guidelines daytime limit values have been used. The results are provided in Table 30.

Table 30. Cumulative Evaluation of Modeling Results with Baseline Measurement Results

Receptors	Modeling Value L_{day} (dBA) (07:00-22:00)	Measurement Value Average. L_{day} (dBA) (07:00-22:00)	Cumulative Value L_{day} (dBA) (07:00-22:00)	WBG EHS Guidelines Day (07:00-22:00)
N1	37,3	53,3	53,4	55
N2	44,0	49,1	50,3	55
N3	47,3	39,8	48,0	55
N4	41,1	42,3	44,8	55
N5	44,4	41,0	46,0	55
N6	47,2	50,5	52,2	55
N7	39,7	40,2	43,0	55
N8	47,3	52,2	53,4	55
N9	46,4	41,1	47,5	55
N10	48,2	36,7	48,5	55
N11	22,0	51,0	51,0	55
N12*	<20	49,7	49,7	55

* At the point of N12, impact of the modelled noise generation is so low (due to the distance factor) that they do not contribute (increase) the baseline level, the impact magnitude is negligible.

As seen in Table 30, the modeling results do not exceed the limit values at any point individually.

The noise impact assessment for the proposed project involves a detailed examination of potential noise generation during the land preparation and construction phases. The assessment considers various project activities and their respective impacts on the acoustic environment.

The construction-related noise associated with the proposed project is inherently temporary in nature. The increased noise levels during the land preparation and construction phases are a direct result of specific activities and the operation of heavy machinery. Once construction is completed, the ongoing noise generated by the operational phase of the railway system is expected to be significantly lower, with the overall acoustic environment reverting to pre-construction conditions. Therefore, the anticipated noise impacts are limited to the construction period, and measures can be implemented to minimize and mitigate these short-term disturbances.

The nature of the railway electrification and rehabilitation project, which focuses on upgrading existing infrastructure and improving transportation efficiency, does not inherently involve continuous or substantial noise generation. Unlike industrial facilities or manufacturing plants that may operate continuously, the primary function of the railway is transportation, resulting in intermittent and localized noise events during specific construction activities. The significance of noise generated by the project is further mitigated by the adherence to established ENCR, ensuring that the impacts remain within acceptable limits.

To address the temporary nature of construction-related noise and minimize its significance, comprehensive mitigation measures will be incorporated into the project planning and execution. These measures may include scheduling noisy activities during designated hours, implementing noise barriers, and utilizing noise-reducing technologies on construction

equipment. By proactively addressing noise concerns and considering the project's transient nature, the aim is to ensure that any potential disturbances are temporary, localized, and fall within acceptable limits outlined by relevant environmental standards and regulations.

4.2.3.2 Operation Phase

The operational phase of the railway system may introduce noise generated by train movement and associated vibrations. The interaction between the train wheels and tracks can produce a continuous low-frequency hum and occasional higher-frequency noises, particularly during acceleration and deceleration.

Noise may arise from stationary train activities such as idling, braking, and coupling. These activities can produce intermittent sounds that may be audible in the vicinity of railway stations and operational areas.

Regular maintenance activities, including track inspections and repairs, may generate noise from machinery and equipment used for these purposes. However, such activities are typically intermittent and localized.

Audible warning signals at railway crossings and stations are essential for safety. While necessary, these signals contribute to the overall noise environment during train operations. The noise generated during train operations may interact with the surrounding environment, including natural terrain and urban structures, influencing the propagation and perception of sound.

The presence of a functional railway system may lead to increased human activity, such as traffic flow, around railway stations and related infrastructure, potentially contributing to elevated ambient noise levels.

Noise from the rolling stock, including wheels on the tracks and aerodynamic effects, can contribute to the overall acoustic environment during train movement. The operational phase may involve train movements during nighttime hours, potentially impacting communities in proximity to the railway line.

The cumulative effect of various noise sources associated with train operations may contribute to the overall noise exposure experienced by communities along the railway route.

Daytime and nighttime noise modelling studies have been conducted for the operation phase, considering above-mentioned activities. The results are provided in Table 31 and Table 32. During the operational phase, noise levels were calculated to be quite low due to the electric nature of the train and the distance of receiver points from the train route.

Table 31. Operation Phase Cumulative Evaluation of Modeling Results with Baseline Measurement Results (for Daytime)

Receptors	Modeling Value L_{day} (dBA) (07:00-22:00)	Measurement Value Average. L_{day} (dBA) (07:00-22:00)	Cumulative Value L_{day} (dBA) (07:00-22:00)	WBG EHS Guidelines Day (07:00-22:00)
N1	37,7	53,3	53,4	55
N2	38,9	49,1	49,5	55
N3	46,2	39,8	47,1	55
N4	37,1	42,3	43,4	55
N5	42,7	41,0	44,9	55
N6	42,2	50,5	51,1	55
N7	37,3	40,2	42,0	55
N8	44,3	52,2	52,9	55
N9	43,3	41,1	45,3	55

Receptors	Modeling Value L_{day} (dBA) (07:00-22:00)	Measurement Value Average. L_{day} (dBA) (07:00-22:00)	Cumulative Value L_{day} (dBA) (07:00-22:00)	WBG EHS Guidelines Day (07:00-22:00)
N10	42,7	36,7	43,7	55
N11*	<20	51,0	51,0	55
N12*	<20	49,7	49,7	55

* At the points N11 and N12 impact of the modelled noise generation is so low (due to the distance factor) that they do not contribute (increase) the baseline level, the impact magnitude is negligible.

Table 32. Operation Phase Cumulative Evaluation of Modeling Results with Baseline Measurement Results (for Nighttime)

Receptors	Modeling Value L_{night} (dBA) (22:00-07:00)	Measurement Value Average. L_{night} (dBA) (22:00-07:00)	Cumulative Value L_{night} (dBA) (22:00-07:00)	WBG EHS Guidelines Night (22:00-07:00)
N1	38,5	44,6	45,6	45
N2	39,9	43,0	44,7	45
N3	47,2	39,7	47,9	45
N4	37,5	42,8	43,9	45
N5	43,7	39,0	45,0	45
N6	42,6	42,9	45,8	45
N7	37,7	39,6	41,8	45
N8	44,8	43,5	47,2	45
N9	43,7	42,1	46,0	45
N10	43,1	36,9	44,0	45
N11*	<20	43,2	43,2	45
N12*	<20	42,5	42,5	45

* At the points N11 and N12 impact of the modelled noise generation is so low (due to the distance factor) that they do not contribute (increase) the baseline level, the impact magnitude is negligible

Upon examining the modelling results, noise levels at certain points were found to slightly exceed the limit value due to already elevated baseline measurements. At some locations, noise levels were observed to have increased by 3 dB above the current levels. Since the cumulative values are relatively close to the limit, it is anticipated that no significant impact will occur with the effective implementation of mitigation measures (see Table 33).

The significance of noise impacts during the operational phase is expected to be mitigated by the adoption of newer and more advanced technologies. Modern railway systems incorporate soundproofing measures, improved train design, and quieter propulsion technologies, resulting in reduced noise emissions compared to older counterparts. Additionally, adherence to noise regulations and the implementation of best practices will further ensure that the noise impacts remain within acceptable limits. Overall, the introduction of advanced technologies underscores the commitment to minimizing the environmental footprint of the railway system, including its acoustic effects.

4.2.4 Potential Impact Significances and Mitigation Measures

Potential noise related impacts, mitigation measures and residual impacts are given in Table 33 as a result of the evaluation based on E&S Impact Assessment Methodology (see Appendix-2).

Table 33. Noise-Related Impact Significances and Proposed Mitigation Measures

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	Reversibility	Duration	Frequency	Overall Magnitude				
Increase in noise levels	Land Preparation and Construction	Settlements Biodiversity	Local	Short Term Reversible	Short-term	Continuous	Medium	Medium	**Moderate**	▪ All construction activities will be carried out in compliance with the provisions of the ENCR and noise limit values specified in the ENCR and WBG General EHS Guidelines. ▪ Project Grievance Mechanism will be implemented. If any comment related with noise is received through the Grievance Mechanism, evaluate the complaint and where necessary plan and implement corrective actions. ▪ Construction activities will be carried out during the daytime only. ▪ Machinery, equipment and vehicles with lower sound power levels and sound reduced models will be preferred, using newer and electrically driven models. ▪ Maintenance of construction vehicles will be conducted regularly by means of a regular vehicle maintenance and repair program which is also recommended by the manufacturer. ▪ Speed limitations for construction vehicles will be defined and obeyed. Relevant trainings will be conducted and instructions on the driving speed limits will be provided to drivers/operators of construction vehicles. ▪ Driving of construction vehicles through settlements will be avoided where possible. ▪ Designated site access roads will be used. Construction of access roads will be evaluated where required to avoid traffic through residential areas. ▪ Keeping the construction vehicles running will be prohibited while waiting on the construction site. ▪ Noise monitoring will be carried out quarterly during the construction phase and also upon complaint by means of noise measurements in accordance with both national legislation and the WBG EHS Guidelines. Additional noise mitigation measures (such as use of noise barrier structures/panels, etc.) will be implemented if noise measurements conducted are above noise limit values. ▪ Site personnel with necessary environmental training will be provided that aims at reducing noise caused by Project activities. ▪ When necessary, to protect the employees from the noise caused by machinery and equipment; work will be carried out in accordance with the provisions of the "Occupational Health and Safety Law No. 6331" and necessary measures (such as providing ear protection PPE) will be taken to protect workers from risks that may arise from health and safety, especially hearing risks, as a result of exposure to noise. ▪ Communities/settlements will be notified about the noise levels that may be created during construction phase due to heavy machinery use. ▪ Pollution prevention and waste management plan will be implemented.	**Negligible**
	Operation	Settlements Biodiversity	Local	Irreversible	Long-term	Intermittent	Medium	Medium	**Moderate**	▪ Physical barriers, such as sound walls or acoustic fencing, along the railway corridor will be installed to block or absorb sound waves if needed. Locations and capacity of the noise barriers will be decided by the TCDD if deemed necessary after a grievance or stakeholder engagement. ▪ The use of natural barriers like earth berms or vegetation should be considered by the TCDD to help reduce noise transmission. ▪ Tracks should be maintained regularly to minimize irregularities that can contribute to increased noise levels. ▪ The use of noise-reducing track materials, such as noise-dampening rail pads, should be explored to mitigate vibrations and sound propagation. ▪ Measures should be implemented to reduce wheel and rail friction, such as applying friction modifiers or using lubricated track. ▪ It should be ensured that wheels and rails are regularly inspected and maintained to prevent excessive noise due to wear and tear. ▪ Implementing speed restrictions should be considered in sensitive areas to reduce the noise generated by trains, particularly during nighttime hours when noise impacts can be more pronounced. ▪ Engagement with local communities will be performed to understand their concerns and gather feedback on noise-related issues. ▪ Collaboration will be made with regulatory authorities to address noise-related concerns and seek approval for noise mitigation measures. ▪ Noise monitoring will be conducted once in a three month in the first year of the operation, after one year, monitoring will be done in every two years. Noise monitoring will also be conducted upon complaint.	**Minor**

4.3 Air Quality and Greenhouse Gas Emissions

4.3.1 Project Standards and Methodology

Methodology

The impact assessment has been performed based on the E&S Impact Assessment Methodology provided in Appendix-2.

Within the scope of the Project, AERMOD Air Dispersion Modeling Program [AERMOD Version: Breeze 9.0 (Trinity Consultants, 19191 Executable)] was used to determine the PM10 emissions and their distribution during the improvement works to be carried out on the existing line and construction-maintenance works on the new lines. Since electric trains are planned to be used, no modeling study was performed for operational emissions. Since there are no limit values for PM2.5 in the local legislation and PM10 emissions include PM2.5 emissions, Air Dispersion Modeling was performed only for PM10 emissions. Maps of the scatter plots resulting from the modeling are given in Appendix 5.3.

Project Standards

In Türkiye, significant strides in air management policy have been made with the adoption of the Integrated Environmental Strategy, in alignment with the European Union (EU) guidelines. As a result, Türkiye's legislation corresponds to the EU Air Quality Framework Directive, along with its associated directives, such as the Large Combustion Plants Directive, and others related to climate change. The current laws enforced in Türkiye concerning air quality and emissions from incinerators is Regulation on Control of Industrial Air Pollution (RCIAP) published in the Official Gazette No. 27277 dated 03.07.2009 (Amended: OG-20/12 / 2014-29211). Besides, Regulation on Assessment and Management of Air Quality, which was published in the Official Gazette No. 26898 dated 06.06.2008, is also in force to define and establish air quality targets to prevent or reduce the harmful effects of air pollution on the environment and human health.

The main objective of the RCIAP is to manage emissions, which are generated from the industrial activities, in the form of smoke, dust, gas, steam and aerosols emitted into the atmosphere. Its objectives encompass managing these emissions to safeguard both people and the environment from the risks posed by contamination in the breathable atmosphere. Additionally, the regulation strives to mitigate adverse impacts that result in significant environmental damage and strained relations with neighboring countries due to air pollution, with the ultimate goal of preventing these negative consequences. Consequently, the regulation establishes specific limit values for gas contaminants and particulate matter. Limit values to be followed between 2019 - 2023 and after 2024 are given below according to this regulation are given in Table 34.

Table 34. Air Quality Limit Values of 2019-2023 and after 2024

Parameter	Time	Unit	2019-2023	2024 and after
SO_2	Hour (cannot exceed more than 24 times annually)	µg/m^3	350	350
	LTV*		60	60
NO_2	Hour (cannot exceed more than 18 times annually)	µg/m^3	250	200*
	Annual		40*	40
PM_{10}	24-hour (cannot exceed more than 35 times annually)	µg/m^3	50	50

Parameter	Time	Unit	2019-2023	2024 and after
	Annual		40	40
Settling Dust	STV**	mg/m^{2}day	390	390
	LTV		210	210
CO	Maximum daily 8 hours average	mg/m^3	10	10
VOC	Hourly	µg/m^3	280	280
	STV		70	70
Pb	Annual	µg/m^3	0,5	0,5
CO	Maximum daily 8-hour average	mg/m^3	10	10
Cd	LTV	µg/m^3	0.02	0,02
HCl	STV	µg/m^3	150	150
	LTV		60	60
HF	Hour	µg/m^3	30	30
	STV		5	5
H_2S	Hour	µg/m^3	100	100
	STV		20	20
Total Organic Compounds (In terms of carbon)	Hour	µg/m^3	280	280
	STV		70	70

**LTV: Long Term Limit Value*
***STV: Short Term Limit Value*

In addition to the table above, in order to protect human health, the long-term target for ozone concentration has been defined as 120 µg/m^3 in the Regulation on Assessment and Management of Air Quality.

The National Air Quality Index was created by adapting the EPA Air Quality Index to our national legislation and limit values. According to this index, the level of health concern caused by air quality is evaluated as good, moderate, and unhealthy for vulnerable groups, unhealthy, very unhealthy and hazardous. Health concern levels and their explanations are explained in Table 35.

Table 35. Health Concern Levels According to Air Quality Index Value

Index Value	Health Concern Levels	Colors	Definitions
0 - 50	Good	Green	Air quality is satisfactory and poses little or no health risk.
51 - 100	Medium	Yellow	Pollution in this range may pose a moderate health concern for a very small number of individuals. People who are unusually sensitive to ozone or particle pollution may experience respiratory symptoms.
101- 150	Unhealthy for Vulnerable Groups	Orange	Members of vulnerable groups may experience health effects, but the general public is unlikely to be affected.
151 - 200	Unhealthy	Red	Everyone may begin to experience health effects. Members of vulnerable groups may experience more serious health effects.
201 - 300	Very Unhealthy	Purple	This level triggers a health alert, meaning everyone may experience more serious health effects.
301 - 500	Hazardous	Maroon	Health warnings of emergency conditions: The entire population is even more likely to be affected by serious health effects.

Air quality index is calculated for five (5) pollutants. These are particulate matter (PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and ozone (O_3). The air quality index comparison is also given in Table 36.

Table 36. National Air Quality Index Values

Index*	AQI**	SO_2 [µg/m³]	NO_2 [µg/m³]	CO [µg/m³]	O_3 [µg/m³]	PM_{10} [µg/m³]
		1 Hour average	1 Hour average	8 Hours average	8 Hours average	24 Hours average
Good	0 - 50	0-100	0-100	0-5.500	0-120	0-50
Medium	51 - 100	101-250	101-200	5,501-10,000	121-160	51-100
Unhealthy for Vulnerable Groups	101 – 150	251-500	201-500	10,001-16,000	161-180	101-260
Unhealthy	151 – 200	501-850	501-1.000	16,001-24,000	181-240	261-400
Very Unhealthy	201 – 300	851-1100	1.001-2.000	24,001-32,000	241-700	401-520
Hazardous	301 – 500	>1101	>2001	>32,001	>701	>521

*Source: https://www.havaizleme.gov.tr/
** For the calculation, see https://www.airnow.gov/sites/default/files/2020-05/aqi-technical-assistance-document-sept2018.pdf

The WBG standards and requirements are applicable to the Project. According to the WBG General EHS Guidelines for Environmental Air Emissions and Ambient Air Quality, projects that release a lot of air pollutants and could significantly affect the air quality should work on preventing or reducing these effects. This can be done by making sure that the emissions do not go beyond the limits set in the relevant national laws. If those laws do not exist, then the WHO Ambient Air Quality Guidelines should be followed.

Thus, following compliance requirement with relevant national legislation, the WBG General EHS Guidelines for Environmental Air Emissions and Ambient Air Quality refers to the WHO Ambient Air Quality Guidelines. Ambient air quality guideline values recommended by the World Bank Group are presented in Table 37.

Table 37. WBG– WHO – Ambient Air Quality Guideline Values

Parameter	Duration	Guideline Value (µg/m³)
SO_2	10-minute	500
	24-hour	20
NO_2	1-hour	200
	1-year	40
Particulate Matter (PM_{10})	24-hour	50
	1-year	20
Particulate Matter ($PM_{2.5}$)	24-hour	25
	1-year	10
O_3	8-hour daily maximum	100

4.3.2 Baseline Conditions

4.3.2.1 Air Quality

Today, air pollution is one of the increasing environmental problems, threatens the World's future and confronts ecological hazards. Increasing air pollution in line with the rapid increase in the World's population, caused by increasing energy consumption, development of the industry and urbanization, have negative effects on human health and other living organisms.

Air pollution is the change of the natural composition of the air for various reasons, the presence of solid, liquid and gaseous foreign substances in the air in different concentrations and timescales that may be harmful to human health, life, ecological balance and goods.

Besides the presence of foreign substances, location, topography and meteorological factors such as pressure, precipitation, wind, humidity and radiation are also contributing the air pollution. Unplanned urbanization and insufficient green spaces and the fuels used also affect air pollution. Due to air pollution, local, regional and global level problems are observed.

It is therefore essential to develop an appropriate tool to understand the levels of pollutants in a region. While this tool provides accurate and understandable information about the level of air pollution of the public, it should also be used for the relevant authorities to take measures to protect public health[6].

For this purpose, developed standard values can be presented by transforming them into a common index, both in terms of being cautionary and understandable. This index, used for characterization of air quality in a region that can be adapted to countries is referred as Air Quality Index (AQI). The index is expressed in different categories using different definitions and colors and is regulated separately for each pollutant measured (Yavuz, 2010)[7].

Within the scope of the project, information obtained from Official website of air monitoring center by taking the average concentration values into account. RCIAP Limit values (2019-2023) and air quality index classification of these measurement results are as shown in Table 38.

Table 38. Ambient Air Quality between 01.01.2022 – 1.11.2023

Station/Parameter	PM_{10} (µg/m³)	SO_2 (µg/m³)	NO_2 (µg/m³)	CO (µg/m³)	O_3 (µg/m³)*
Sivas- İstasyonkavşağı	52.92	-	75.52	852.85	-
Erzurum	35.05	8.45	37.90	-	57.34
Erzincan – Trafik	47.74	9.05	54.94	1,015.17	-
Kars – Istasyon Mah.	38.66	8.58	23.68	689.85	51.60
RCIAP Limit Value (2019-2023)	40	60	40	10	-

**According to Regulation on Assessment and Management of Air Quality, the long-term target is 120 µg/m³ for O_3 concentration.*

According to the AQI Assessment, air quality is assessed as good at each province except Sivas station, which assessed as medium, in terms of PM_{10} parameter.

Within the scope of the ESIA studies, ambient air quality measurements have been performed at the closest receptors in order to determine the baseline air quality.

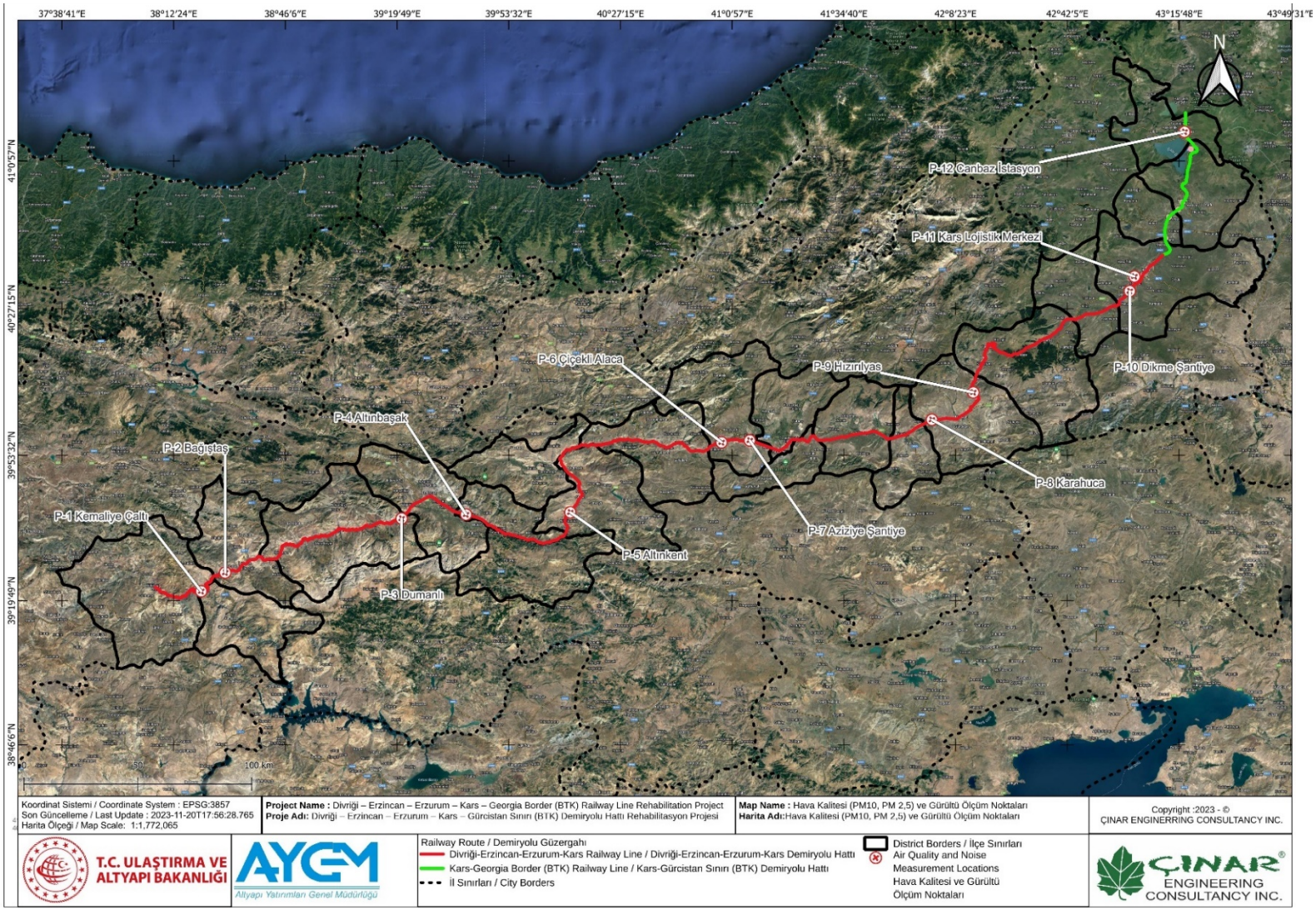
The twelve (12) sampling points have been chosen adjacent to the emission sources based on nearest settlements and topographic conditions within the 250-meter buffered Air Quality Study Area (to each side of the railway corridor, making an assessment corridor of 500 meters). $PM_{2.5}$ and PM_{10} parameters were measured for 24 hours and analyzed by Çınar Laboratories.

The map showing the air quality sampling points are indicated in Figure 22. The analysis results are summarized in Table 39 and relevant air quality reports are given in Appendix-5.1.

[6] Kyrkilis, G., Chaloulakou, A. and Kassomenos, P.A. (2007) Development of an Aggregate Air Quality Index for an Urban Mediterranean Agglomeration: Relation to Potential Health Effects. Environment International, 33, 670-676. http: //dx.doi.org/10.1016/j.envint.2007.01.010

[7] https: //sim.csb.gov.tr/Home/HKI?baslik=HAVZA%20%C4%B0ZLEME%20S%C4%B0STEM%C4%B0

Figure 22. Air Quality Sampling Points around the Railway Route



Results of the baseline air quality measurements are summarized in Table 39.

Table 39. Air Quality Analysis Results

Measurement Location				Measurement Date	Measurement Results (µg/Nm³)	
No	Coordinates (37S) (UTM/WGS84)	Location	Province		PM_{10}	$PM_{2.5}$
P-1	443595 E; 4357719 N	Kemaliye Çaltı	Erzincan	27.10.2023 – 05.11.2023	19.37	14.60
P-2	454034 E; 4365663 N	Bağıştaş	Erzincan		24.22	16.43
P-3	530308 E; 4388807 N	Dumanlı	Erzincan		37.40	18.07
P-4	558101 E; 4390705 N	Altınbaşak	Erzincan		27.03	12.39
P-5	603068 E; 4392107 N	Altınkent	Erzincan		15.34	10.77
P-6	667662 E; 4423180 N	Alaca	Erzurum		29.35	19.20
P-7	679756 E; 4424279 N	Aziziye	Erzurum		45.96	**26.09**
P-8	245749 E; 4435245 N	Karahoca	Erzurum		44.99	15.03
P-9	263908 E; 4446325 N	Hızırilyas	Erzurum		29.54	13.93
P-10	331905 E; 4487528 N	Dikme	Kars		31.09	18.58
P-11	334035 E; 4493662 N	Kars Logistics Center	Kars		45.50	**31.27**
P-12	356548 E; 4554203 N	Canbaz Station	Kars		31.63	12.75
Turkish Air Quality Standards					**50**	**-**
WBG-WHO Ambient Air Quality Standards					**50**	**25**

When the analysis results are examined, it is seen that all PM_{10} measurements comply with the national air quality standards. However, in terms of $PM_{2.5}$, limit value of 25 µg/Nm³ was exceeded at two points which were symbolized as P-7 and P-11 according to the WBG-WHO ambient air quality standards. It shall be noted that the location P-7 is at a remote location where almost no vegetation exists and also it is located near the Erzincan-Erzurum Road (see Figure 23). So, it is assumed that the exceedance at the P-7 is caused by the wind erosion nearby and traffic load in the Erzincan-Erzurum Road. Moreover, P-11 where the other exceedance is observed located in an urban area where traffic is in question; thus, the exceedance is assumed to be in question due to traffic load.

Figure 23. P-7 Location

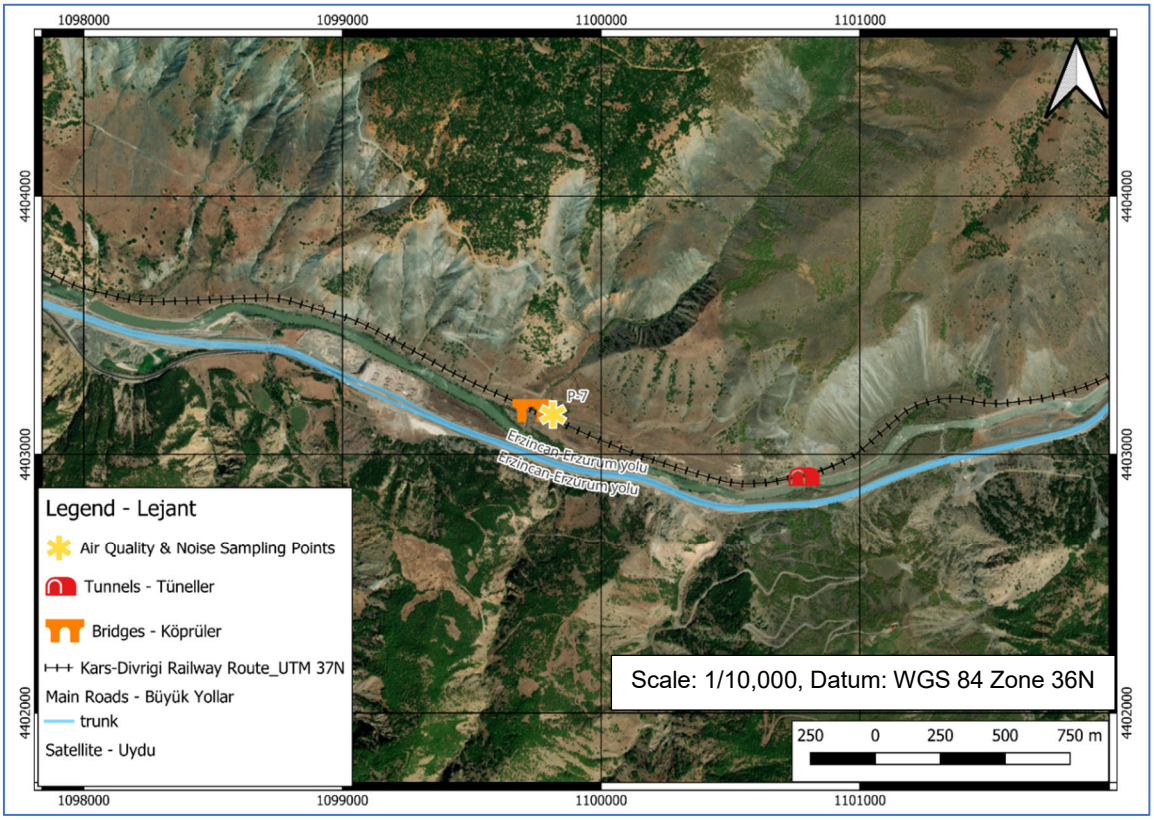
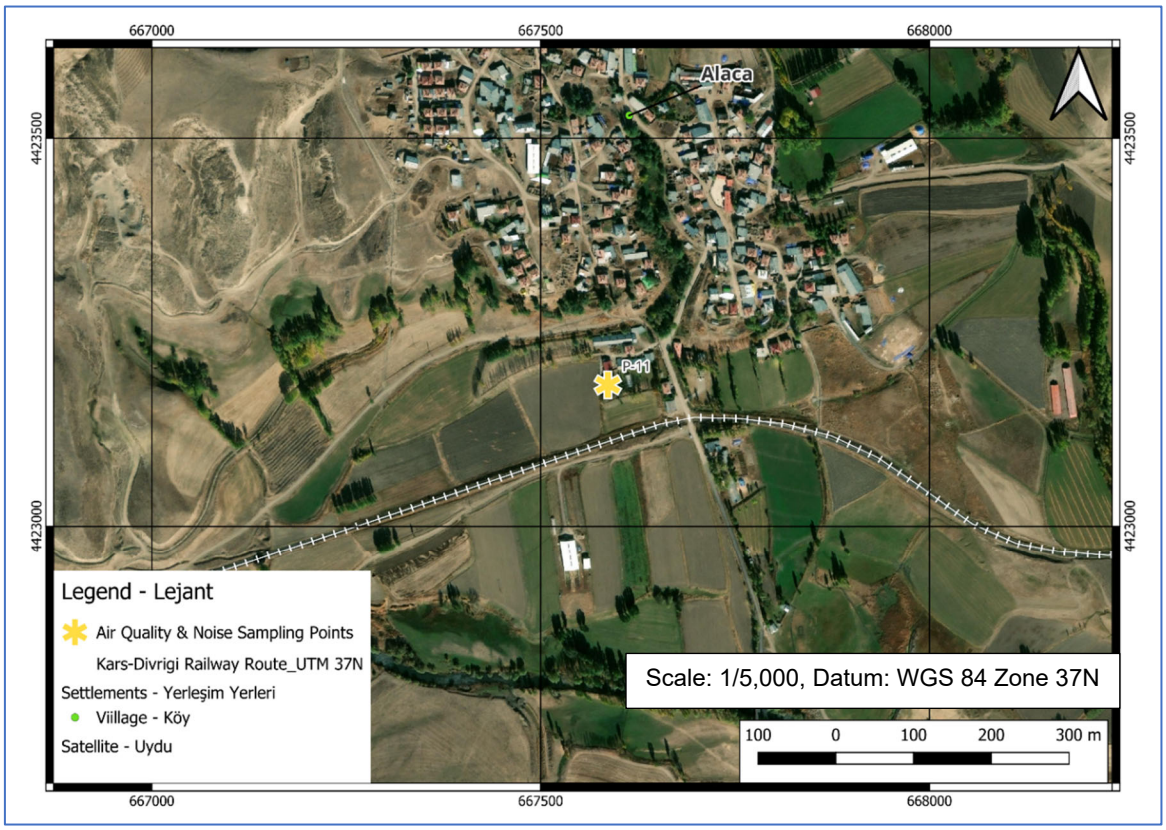


Figure 24. P-11 Location



4.3.2.2 Greenhouse Gases

Greenhouse gases are natural and anthropogenic (human origin) gases that cause the greenhouse effect by absorbing and spreading the thermal infrared radiation emitted from the surface of the earth to the atmosphere and by increasing the temperature above the temperature that would be possible without the atmosphere. Increasing greenhouse gas effect causes global warming.

Major greenhouse gases listed.

- Natural greenhouse gases:
  - Carbon dioxide (CO_2)
  - Nitrous oxide (N_2O)
  - Methane (CH_4)
  - Ozone (O_3)
- Anthropogenic greenhouse gases (fluorinated gases):
  - Sulphur hexafluoride (SF_6)
  - Hydrofluorocarbons (HFCs)
  - Perfluorocarbons (PFCs)

Since 1990, the total greenhouse gas emissions generated in Türkiye are given in the table below (TurkStat, Greenhouse Gas Emissions Statistics, 1990 - 2020).

Table 40. Greenhouse gas emissions between 1990-2020 (CO_2 equivalent)

Year	CO_2	CH_4	N_2O	F-gases	Total
1990	151.7	42.5	25.0	0.6	219.7
1991	158.1	43.4	24.7	0.9	227.1
1992	164.1	43.3	25.3	0.7	233.3
1993	171.1	43.1	26.0	0.4	240.6
1994	167.6	42.8	23.6	0.7	234.6
1995	181.5	42.6	23.9	0.6	248.6
1996	199.6	43.0	24.5	0.6	267.7
1997	212.0	42.2	24.0	0.6	278.9
1998	212.1	42.4	25.3	0.6	280.4
1999	207.9	43.8	25.6	0.6	277.9
2000	229.9	43.7	24.8	0.7	299.0
2001	213.5	42.9	22.6	0.8	279.8
2002	221.1	40.9	22.6	1.0	285.7
2003	236.7	42.9	24.0	1.2	304.9
2004	244.7	43.5	24.8	1.5	314.5
2005	264.8	45.2	25.3	1.7	337.0
2006	282.3	46.6	27.2	1.9	358.0
2007	313.6	49.1	26.3	2.3	391.3
2008	310.5	50.1	24.8	2.4	387.9
2009	316.3	49.9	26.6	2.4	395.1
2010	316.0	51.6	27.4	3.6	398.7
2011	341.9	54.1	28.5	4.0	428.5
2012	355.9	57.8	29.6	4.7	448.0
2013	347.2	56.6	31.5	4.8	440.0
2014	363.9	58.5	31.7	5.3	459.4

Year	CO_2	CH_4	N_2O	F-gases	Total
2015	384.3	52.8	32.3	5.0	474.5
2016	405.3	55.6	34.4	5.5	500.8
2017	430.2	56.8	35.6	5.7	528.3
2018	422.6	60.3	35.5	5.7	524.0
2019	401.7	63.1	37.0	6.2	508.1
2020	413.4	64.0	40.5	6.0	523.9

*TurkStat, Greenhouse Gas Emissions Statistics, 1990 - 2020

According to the results of the greenhouse gas emission inventory, total greenhouse gas emission in 2020 was calculated as 523.9 million tons (Mt) as CO_2 equivalent (see Table 41 and Figure 25). While the largest share of CO_2 emissions in 2020 emissions was energy-related emissions with 70.2%, industrial processes and product use with 12.7%, agricultural activities with 14.0% and waste with 3.1%, respectively according to TurkStat, Greenhouse Gas Emissions Statistics.

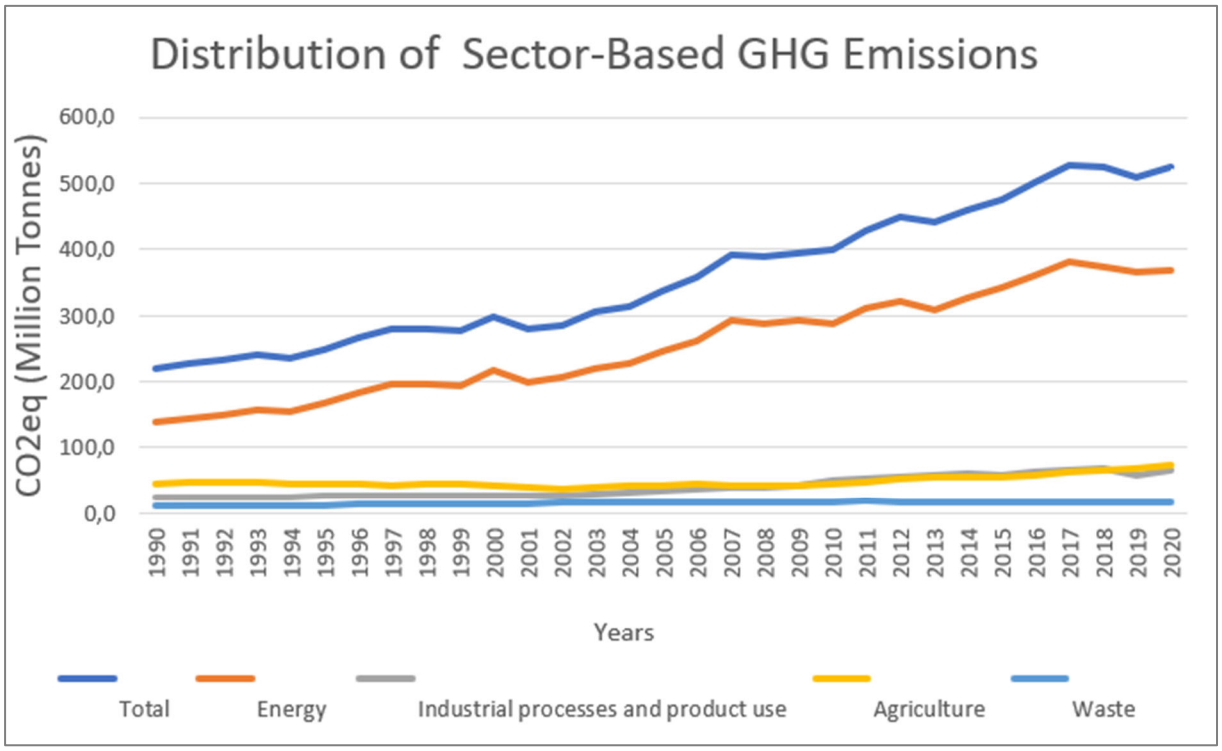
Table 41. Distribution of Greenhouse Gases by Sectors (million tons)

Year	Change Since 1990 (%)	Energy	Industrial processes and use of products	Agricultural activities	Waste	Total
1990	-	139.6	23.0	46.1	11.1	219.7
1991	3.4	144.0	24.9	46.9	11.3	227.1
1992	6.2	150.3	24.5	47.0	11.5	233.3
1993	9.5	156.8	24.7	47.4	11.8	240.6
1994	6.8	153.3	24.3	44.9	12.0	234.6
1995	13.1	166.3	25.9	44.1	12.3	248.6
1996	21.8	184.0	26.3	44.8	12.7	267.7
1997	26.9	196.1	27.1	42.5	13.2	278.9
1998	27.6	195.8	27.5	43.7	13.5	280.4
1999	26.5	193.8	25.9	44.3	13.9	277.9
2000	36.1	216.0	26.3	42.3	14.3	299.0
2001	27.3	199.2	25.9	39.9	14.8	279.8
2002	30.0	205.9	26.9	37.6	15.2	285.7
2003	38.7	220.4	28.3	40.6	15.6	304.9
2004	43.1	226.3	30.8	41.3	16.1	314.5
2005	53.4	244.4	33.7	42.4	16.4	337.0
2006	62.9	260.5	36.7	43.9	16.8	358.0
2007	78.1	291.5	39.3	43.4	17.1	391.3
2008	76.5	288.3	41.1	41.3	17.2	387.9
2009	79.8	292.9	43.0	42.0	17.2	395.1
2010	81.4	287.8	49.0	44.4	17.4	398.7
2011	95.0	309.9	53.9	46.9	17.8	428.5
2012	103.9	321.6	56.2	52.7	17.6	448.0
2013	100.3	308.3	59.2	55.9	16.7	440.0
2014	109.1	326.8	59.9	56.2	16.5	459.4
2015	115.9	342.0	59.2	56.1	17.1	474.5
2016	127.9	361.7	63.5	58.9	16.7	500.8
2017	140.4	382.4	66.4	63.3	16.3	528.3
2018	138.5	374.1	68.0	65.3	16.6	524.0

Year	Change Since 1990 (%)	Energy	Industrial processes and use of products	Agricultural activities	Waste	Total
2019	131.2	365.4	58.6	68.0	16.1	508.1
2020	138.4	367.6	66.8	73.2	16.4	523.9

**TurkStat, Greenhouse Gas Emissions Statistics, 1990 – 2020*

Figure 25. Distribution of Sector Based GHG Emissions in 1990-2020



**TurkStat, Greenhouse Gas Emissions Statistics, 1990 – 2020*

The transport sector accounts for more than half of global oil demand and approximately one-quarter of global CO_2 emissions stemming from fuel combustion. Thus, alterations in transportation play a pivotal role in achieving global energy transitions. Despite, while rail is among the most energy efficient modes of transport for freight and passengers, often goes overlooked in public debate. In percentages, the rail sector carries 8% of the world's passengers and 7% of global freight transport, it represents only 2% of total transport energy demand.

Today, three-quarters of passenger rail transport activity takes place on electric trains, which is an increase from 60% in 2000. The rail sector is the only mode of transport that is widely electrified today. This reliance on electricity means that the rail sector is the most energy diverse mode of transport.

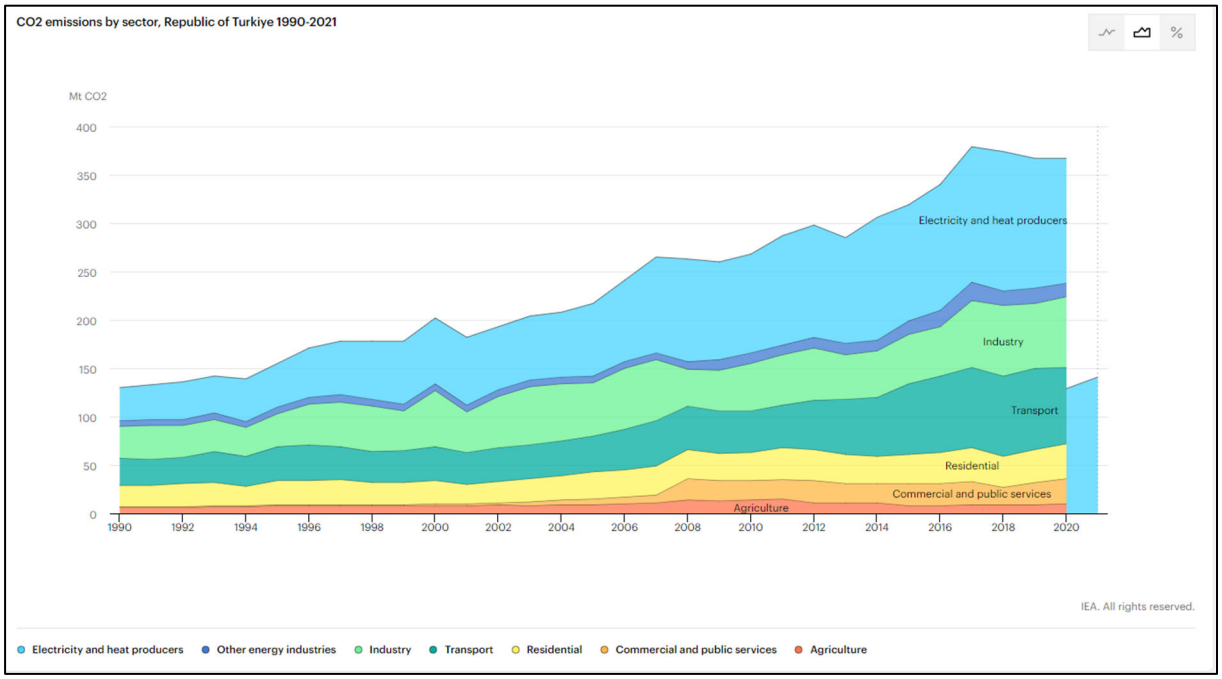
The regions with the highest share of electric train activity are Europe, Japan and Russia, while North and South America still rely heavily on diesel. Passenger rail is significantly more electrified than freight in almost all regions, and regions with higher reliance on urban rail and high-speed rail are those with the largest share of passenger-kilometers served by electricity.

Approximately 7% of global freight transport activity (measured in ton-kilometers) uses rail. Transporting cargo by rail has the potential to provide the least energy- and CO_2-intensive way to move freight of any land-based transport mode, but as with passenger rail, its economic and environmental benefits depend upon the long-term certainty of high throughput volumes on certain routes.

Given that rising demand for rapid delivery of high-value and lighter goods has led to an ongoing shift from rail to road, it will be a challenge for rail to maintain its current share of freight transport.

The graph showing sector-based CO_2 emissions in Türkiye are presented in Figure 26.

Figure 26. Sector-based CO_2 emissions in Türkiye (1990 – 2021)



Source: International Energy Agency, 2023

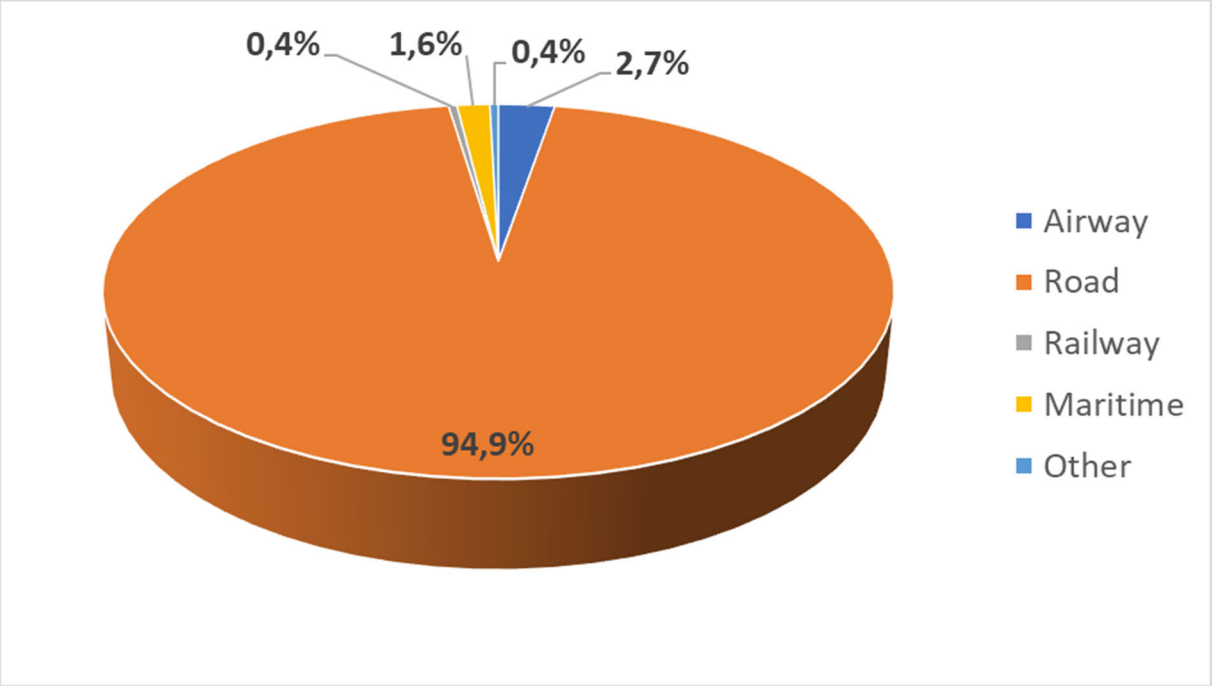
CO_2 emissions from the transport sector in Türkiye, as shown in Table 42 represents a significant portion of CO_2 emissions. The distribution of CO_2 emissions within the transport sector is illustrated in Figure 27. In Türkiye, road transport accounts for the largest share of CO_2 emissions in the sector (95%). Railways, on the other hand, represent the transportation type with the lowest CO_2 emissions, constituting only 0.4% of the sector's emissions as of 2021.

Table 42. GHG emission by transport type (kilotons CO_2 equivalent)

Transport Type	Years								
	1990	1995	2000	2005	2010	2015	2018	2019	2020
Total	26.969	34.113	36.465	42.041	45.392	75.798	84.617	82.428	80.680
Airway	923	2.775	3.099	4.089	2.862	4.205	3.688	3.509	2.164
Road	24.777	29.760	31.850	35.532	39.941	69.309	78.907	76.720	76.601
Railway	721	768	713	757	517	480	435	400	323
Maritime	509	726	623	1.299	1.682	1.147	931	1.217	1.264
Other	39	83	180	364	390	656	657	581	328

Source: International Energy Agency, 2023 and Turkstat, 2022

Figure 27. Distribution of CO_2 Emissions in Transport Sector in Türkiye as of 2021



Source: International Energy Agency, 2023 and Turkstat, 2022

4.3.3 Impact Assessment

4.3.3.1 Land Preparation and Construction Phase

There will be some dust formation that will result from excavation, fill, material storage, unloading and transportation processes to be carried out during the construction works of the project. The possibility of dust formation during the rehabilitation and modernization of the railway line widely depends on the type of field activities such as the movement and speed of the vehicles across the working area width, soil stripping, excavation work, backfilling and rehabilitation. Wind speed and the ability of the winds to transport the particles to sensitive receptors are important factors that determine the frequencies and timescales during which the effects can occur. Dust emissions increase as a result of dry air and high wind speeds and fall to zero if the soil and / or environmental conditions are moist.

During the construction or rehabilitation of sidings (additional tracks), bridges, and station buildings, several sources of air emissions come into play. Diesel-powered construction equipment used for excavation, foundation work, and structural assembly often run on diesel fuel. These engines emit particulate matter (PM), nitrogen oxides (NOx), and volatile organic compounds (VOCs). Additionally, dust and soil disturbance during construction activities release PM and other airborne particles. Concrete production for bridges and station structures involves cement manufacturing, which emits CO_2 during the curing process. Furthermore, the transportation of construction materials to the site using trucks or trains contributes to vehicle emissions.

The construction of snow barriers (structures that prevent snow accumulation on tracks) involves similar emissions as mentioned earlier: diesel machinery, dust, and material transport. Additionally, the renewal of culverts (drainage structures under tracks) may involve excavation and concrete work, leading to emissions.

Constructing retaining walls along tracks can release emissions from machinery and concrete production. Moreover, clearing tunnels for safe passage involves ventilation systems, which may use electricity or diesel generators. Tunnel ventilation can impact air quality.

In various sections (Km: 1364 - Km: 1366; Km: 1390; Km: 1442), mortar curtain was made with 40 cm thick excavation stone and concrete cable duct inside the station, open line excavation was made for copper signal, energy cables and fiber optic cable. It is planned to lay 2x40mm HDPE pipes. Additionally, construction of cable ducts for a total of 13.7 km in cut and cover and drilled tunnels is in question as well. Therefore, excavation is expected at some location, even though it will be lower in amount.

Calculations for dust emissions that may occur during land preparation and construction works, are made in compliance with “Emission Factors to be Used in Dust Emission Mass Flow Calculations” of the Regulation on the Control of Industrial Air Pollution published in the Official Gazette No. 27277 dated 03.07.2009 and EPA emission factors (Cowherd C., Development of Emission Factors for Fugitive Dust Sources, EPA, 1974. This emission factor includes all elements of excavation, fill, loading, unloading and storage activities. Dust emissions that will occur during the transportation and unloading of the material are calculated using the emission factors (see Table 43) given in “Emission Factor Documentation (1998, EPA)”. It shall be noted no storage on the site is expected and the transport of the material is expected to be done on asphalt and paved roads as no dust emission is expected.

Table 43. Emission Factors to be used in Dust Emission Mass Flow Calculations

Operation	Emission Factor	
	Uncontrolled	Controlled
Material Removal	0.025 kg/ton	0.0125 kg/ton
Material Loading	0.01 kg/ton	0.005 kg/ton

The construction works to be carried out within the scope of the project are planned to be completed in about 18 months, working 10 hours a day. The worst-case scenario is taken into consideration in the calculations, and it is assumed that all the studies are done at the same time.

It shall be noted that approximately 143 km new gauge railway line is planned to be constructed including rehabilitation of sidings, bridges etc. Nevertheless, only approximately 27 km of the route will be under excavation where the main activities of earthworks such as cutting will be carried out. Approximately 30 cm excavation will be carried out on the 27km. Thus 27,000 m * 0.3 = 8,100 m^3 excavation material will be generated (9,963 tons[8]). Accordingly, 1845 kg/hour excavation expected. It is assumed to carry out the construction in a controlled manner. Additionally, the construction will be taken place simultaneously at least ten different locations. Thus, the hourly excavation rate is calculated as 185 kg/hr at one location.

It was assumed that the dust emission that will occur during material removal, loading during excavation in the construction phase, will be done simultaneously at ten different locations (the worst-case scenario) and dust emissions were calculated accordingly as 3.2375 kg/hr (see Table 44). Therefore, as stated in the Annex-2 of the Regulation on the Control of Industrial Air Pollution (Amended R.G. 20.12.2014-29211), “Calculation of Air Pollution Contribution” is required by using an internationally accepted distribution model in the facility's impact area if the pollutant mass flow specified in the Table 2.1 of the regulation are exceeded, for new facilities to be established, and Aermod Air Quality Modelling Study has been carried out in this respect. As described before, no material storage on site is expected and material is planned

[8] Density of the excavation waste was assumed as 1.23 according to UK Waste Conversion factors: https://www.sepa.org.uk/media/163323/uk-conversion-factors-for-waste.xlsx

to be transferred on asphalt and paved roads; thus, no additional dust emission is expected with this regard.

Table 44. Emission Factors and Dust Emission Mass Flow Calculations

Operation	Emission Factor		Emission Rate	
	Uncontrolled	Controlled	Uncontrolled	Controlled
Material Removal	0,025 kg/ton	0,0125 kg/ton	NA	2,3125
Material Loading	0,010 kg/ton	0,005 kg/ton	NA	0,925
Material Storage[9]	5,8 kg/ha-day	2,9 kg/ha-day	NA	0 kg/hr
Material Transport[10]	0,7 kg/km-vehicle	0,35 kg/km-vehicle	NA	0 kg/hr
Total				**3.2375 kg/hr**

Moreover, in order to minimize the dust and impacts that may occur on the land during the land preparation and construction phase of the project; measures such as irrigation at emission source, filling and unloading operations without tossing, covering vehicles with tarpaulin during material transportation and keeping the upper part of the material at 10% humidity will be taken.

Excavation and earthmoving during land preparation are expected to generate dust emissions. Particulate matter (PM) released into the air can have implications for air quality, potentially affecting respiratory health.

Increased vehicular traffic associated with the transportation of construction materials and equipment may contribute to elevated levels of pollutants, including nitrogen oxides (NOx) and volatile organic compounds (VOCs), impacting local air quality.

The operation of construction machinery and equipment, such as bulldozers and cranes, can produce emissions. Combustion of fuels may result in the release of pollutants like carbon monoxide (CO) and other air contaminants.

The use of stationary equipment like generators during construction activities can lead to the emission of pollutants. Combustion-related emissions may include CO and other air contaminants.

During the construction phase of the railway renovation project, it is anticipated that there will be minimal impact on air quality in terms of volatile organic compounds (VOC), carbon monoxide (CO), and particulate matter. This expectation stems from several factors, including the fact that the majority of the railway infrastructure already exists, thereby minimizing the need for extensive construction activities. Additionally, any construction work that does occur will likely be segmented, with sections being renovated or upgraded independently of each other. This segmentation reduces the concentration of construction-related emissions in any one area, further mitigating potential air quality impacts. Moreover, the scale of excavation and construction activities is expected to be moderate, ensuring that the release of dust and other particulate matter into the air remains within manageable levels.

Furthermore, careful planning and implementation of construction practices can help minimize emissions and mitigate any potential impacts on air quality. Techniques such as dust suppression measures, efficient equipment operation, and scheduling construction activities during times of lower air pollution levels can all contribute to reducing the project's environmental footprint. Additionally, adherence to relevant environmental regulations and guidelines will ensure that emissions are kept within permissible limits. Overall, while some construction-related activities may temporarily affect air quality in localized areas, the railway renovation project is not expected to have a significant adverse impact on VOC, CO, or

[9] No excavation waste storage will be carried out, thus no emission will occur

[10] Transport will only be carried out on paved and asphalt road; thus, no emission will be expected.

particulate matter levels due to the existing infrastructure, segmented construction approach, and moderate scale of excavation.

Transporting construction materials to the project site can contribute to emissions. Dust and pollutants released during transportation activities may affect air quality in the vicinity of transport routes.

While uncommon, accidental releases of hazardous materials during construction could pose risks to air quality. Emergency preparedness and response plans will be in place to mitigate such incidents.

Construction activities near inhabited areas may temporarily impact indoor air quality in residential and commercial buildings. Measures will be implemented to minimize potential exposure.

Local meteorological conditions, including wind patterns and atmospheric stability, will influence the dispersion and transport of pollutants, affecting the potential extent of air quality impacts during construction.

Significant greenhouse gas emission is not expected due to tools and equipment to be used during land preparation and construction phases, as the number of planned equipment to be used is very low. Therefore, this impact is considered as negligible.

According to the impact assessment studies carried out for air emissions (according to the air quality modelling studies) and GHG impacts no significant impact is foreseen on air quality.

Air Quality Modeling

AERMOD Air Dispersion Model works with 3 input data:

1-Terrain data (topography)

2-Emission data

3-Meteorological data

The hourly data of the meteorological stations of the provinces were used to represent these 3 provinces. For this reason, the modeling study was carried out in 4 stages.

First stage: Between measurement points P1-P5 (Erzincan), an area of 184.3 km x 78.4 km (184,376 m x 78,407 m) and 270 receptor points

Second stage: Between measurement points P6-P7 (Erzurum zone 37 coordinate system)* an area of 25,3 km x 11,1 km (25.337 m x 11.085 m) and 84 receptor points

Third stage: Between measurement points P8-P9 (Erzurum zone 38 coordinate system)*, an area of 30,6 km x 31,7 km (30.597 m x 31.778 m) and 360 receptor points[11]

Stage four: Between measurement points P10-P12 (Kars), an area of 35,4 km x 85,3 km (35.392 m x 85.263 m) and 576 receptor points

The results of the PM_{10} air quality modeling study conducted in four sections are given in Table 45.

[11] Note:* AERMOD model does not work in one piece in different coordinate zone

Table 45. Air Modelling Study Results

PARAMETER	PERIOD	Projected Max Ground Level Concentration (GLC) Values for All Receptors in the Impact Area				2024 and After 2024 Limit Values for LTV and STV specified in Table 2.2 of RCISAP	WBG General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality Table 1.1.1.1 Limit Values
		Stage 1	Stage 2	Stage 3	Stage 4		
PM_{10} (Suspended Particulate Matter in the Air) ($\mu g/m^3$)	**24-Hour**	45,3	48,2	43.2	6,27	**50 $\mu g/m^3$ (Cannot exceed 35 times in a year)**	**50 $\mu g/m^3$**
	Annual	4	8,1	3,39	1	**40 $\mu g/m^3$**	**20 $\mu g/m^3$**

When Table 45 is examined, it is seen that PM_{10} emissions obtained by modeling studies meet the national regulatory and WBG EHS Guidelines limit values at all points.

The cumulative values obtained by cumulatively summing the ground level concentrations obtained as a result of Air Dispersion Modeling with the measurement results are shown in Table 46.

Table 46. Comparison of Cumulative Air Quality Values with Limit Values

No	2024 and After 2024 Limit Values for LTV and STV specified in Table 2.2 of RCISAP & WBG General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality Table 1.1.1.1 Limit Values	24-Hour Period		
		Model Result ($\mu g/m^3$)	Baseline Measurement ($\mu g/m^3$)	Cumulative Value ($\mu g/m^3$)
P-1	50	2	19.37	21,37
P-2	50	20	24.22	44,22
P-3	50	0,03	37.40	37,43
P-4	50	2,56	27.03	29,59
P-5	50	4,28	15.34	19,62
P-6	50	0,042	29.35	29,392
P-7	50	0,41	45.96	46,37
P-8	50	0,057	44.99	45,047
P-9	50	1,16	29.54	30,7
P-10	50	6,28	31.09	37,37
P-11	50	2,86	45.50	48,36
P-12	50	1,75	31.63	33,38

Upon examination of Table 46, it is observed that the cumulative concentrations obtained for PM_{10} meet both the national regulatory and WBG EHS Guidelines limit values.

4.3.3.2 Operation Phase

Ongoing operation of vehicles associated with the project, including maintenance and support vehicles, may contribute to emissions of air pollutants. This includes nitrogen oxides (NOx) and particulate matter (PM), potentially affecting air quality in the operation phase.

Continuous operation of stationary equipment, such as generators and machinery, could result in emissions of pollutants. Measures will be implemented to minimize these emissions and adhere to air quality standards.

Energy sources used for the operation of the project, such as electricity generation and heating systems, may involve fuel combustion. This could lead to emissions of air pollutants, necessitating monitoring and mitigation measures.

Maintenance activities, including vehicle and equipment servicing, may involve the use of chemicals and produce emissions. Mitigation measures will be implemented to reduce potential impacts on air quality.

Ongoing transport of materials to and from the project site during the operation phase may contribute to emissions. This includes both on-site vehicle movements and external transport routes.

Regular vehicular traffic associated with the operation, such as commuting staff and visitors, could contribute to air quality impacts. Measures will be in place to manage and mitigate traffic-related emissions.

At level crossings (where roads intersect with railway tracks) and overpasses, vehicle traffic emits pollutants such as NOx, CO, and PM. As vehicles stop at level crossings or ascend overpasses, brake and tire wear generate PM and other fine particles.

The potential impact of air quality on the local communities during the operation was assessed, and measures will be implemented to address any identified sensitivities or concerns.

The project's operation phase is expected to incorporate advanced and environmentally friendly technologies, significantly reducing emissions compared to traditional practices. With a commitment to green and sustainable practices, the project aims to minimize its environmental footprint, resulting in no significant adverse impacts on air quality during the operational phase. Continuous advancements in technology will contribute to lower emissions, aligning with the project's commitment to environmental stewardship and community well-being.

The implementation of the electrification project for the railway line promises a substantial positive impact on both the environment and public health. By transitioning from diesel fuel usage to electricity, the project will effectively eliminate greenhouse gas emissions associated with train operations. This shift represents a significant step towards reducing carbon footprint and mitigating climate change effects. Moreover, the elimination of diesel emissions will contribute to improving air quality along the railway route, thereby reducing health risks for nearby communities and passengers. Overall, the electrification initiative stands to promote sustainable transportation practices while fostering a cleaner and healthier environment for all.

Furthermore, beyond environmental benefits, the electrification project is poised to enhance the efficiency and reliability of the railway system. With electric-powered trains, operational reliability is expected to improve, leading to fewer disruptions and delays. This increased reliability can positively impact commuters, businesses relying on freight transportation, and the overall economy by ensuring smoother and more predictable travel and cargo movement. Additionally, the electrification initiative may open up opportunities for further innovation and technological advancements in the railway sector, fostering long-term sustainability and competitiveness. In sum, the project's positive impacts extend beyond environmental considerations, encompassing enhanced operational efficiency and economic benefits for both stakeholders and society at large.

Therefore, greenhouse gas emissions and possible impacts on air quality are considered negligible.

4.3.4 Potential Impact Significances and Mitigation Measures

Potential impacts on air quality, mitigation measures and residual impacts are given in Table 47 as a result of the evaluation conducted based on E&S Impact Assessment Methodology (see Appendix-2).

Table 47. Air Quality-Related Impact Significances and Proposed Mitigation Measures

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	Reversibility	Duration	Frequency	Overall Magnitude				
Decrease in Air Quality	Land preparation and construction	Settlements	Local	Short Term Reversible	Short-term	Continuous	Medium	Medium	**Moderate**	In order to minimize the dust and impacts that may occur soil stripping, cut and fill during the land preparation and construction phase of the project following mitigation measures will be taken: ▪ In accordance with the "Exhaust Gas Emission Control and Gasoline and Diesel Quality Regulation" published in the Official Gazette No. 28837 dated 30.11.2013; vehicles with traffic inspections, exhaust gas emission measurements will be used, and vehicles that need maintenance will be taken into maintenance after routine checks and other vehicles will be used until their maintenance is completed. ▪ Procedures to limit the drop height of falling materials will be adopted. ▪ Dust suppression methods will be applied such as watering with water trucks; applying non-toxic anti-dust chemicals etc. at construction sites, service roads, and quarries/material borrow sites and material storage sites. ▪ Water suppression, pressurized distribution or spraying systems will be applied to minimize dust where and when necessary, on paved or unpaved road surfaces. ▪ Loading and unloading of materials will be carried out without throwing and scattering. ▪ Excavated materials will be covered with nylon canvas or with materials with grain size larger than 10 mm during transportation. ▪ Local licensed quarries and material borrow sites will be preferred for the reduction of transportation distance of materials. ▪ Wind shields or barriers around material storage sites will be placed to prevent spreading of dust emissions where necessary. ▪ It will be ensured that maintenance of access roads is carried out regularly and they will be upgraded where necessary (both to construction camp sites, construction sites, quarries/material borrow sites and material storage areas). ▪ Driving of construction vehicles through settlements will be avoided where possible. ▪ Employees will be ensured to work in accordance with the Traffic Law, and special attention will be paid to make loading according to loading standards. ▪ The Project Grievance Mechanism will be implemented. If any comment/grievance/complaint related with dust and air quality is received through the Grievance Mechanism, the complaints will be evaluated and necessary corrective preventive actions will be taken. ▪ Pollution prevention and waste management plan and traffic management plan will be implemented.	**Negligible**
	Operation	Settlements	Local	Irreversible/Long-term reversible	Long-term	Continuous	Medium	Medium	**Moderate**	▪ In the operation phase, following measures will be taken in accordance with RCIAP; o having the locations where stacked materials, the connection area where materials are discharged and conveyors and other carriers covered, o unloading operations without tossing, o covering vehicles with tarpaulin during material transportation, and o keeping the upper part of the material at 10% humidity. ▪ The Project Grievance Mechanism will be implemented. If any comment/grievance/complaint related with dust and air quality is received through the Grievance Mechanism, the complaints will be evaluated and necessary corrective preventive actions will be taken.	**Negligible**
Greenhouse Gas Contribution*	Land preparation and construction	Atmosphere Ecology	Wide	Short Term Reversible	Short-term	Continuous	Medium	Medium	**Moderate**	▪ Construction activities will be carried out in line with good industrial practices. ▪ Alternative fuel and energy resources are not applicable for the construction machinery to be used in the scope of the Project. On the other hand, the Contractor will provide trainings to the operators/drivers that cover practices for; o reducing unnecessary equipment idling time, o avoiding unnecessary operator moves/behaviors that increase fuel consumption (e.g., shifting hydraulic levers unnecessarily, use of excess horsepower), o raising awareness on energy efficiency and best practices. ▪ Fuel efficiency of construction vehicles will be optimized by means of applications such as speed restrictions and avoidance of uphill movements as much as possible. ▪ Contractor will ensure proper maintenance of machinery/equipment including systematic equipment inspection, detection of potential failure and prompt correction to ensure fuel savings. ▪ Energy/fuel consumption of construction machinery, equipment and vehicles will be monitored.	**Negligible**

* With the implementation of the project, electrification of the railway line will take place, eliminating greenhouse gas emissions from diesel fuel usage in the current state. Therefore, the impact of the operation phase is considered negligible.

4.4 Water Resources, Water Quality and Wastewater Management

4.4.1 Project Standards and Methodology

4.4.1.1 Methodology

Data sources used to identify the water resources that are to be managed in the scope of the Project to avoid significant impacts have been determined by using the following data sources:

- TurkStat Database,
- Database of the Turkish State Hydraulic Works (DSI),
- 1/25,000 scale topographical maps of the Project route,
- Long-term Extreme Meteorological Events Reports obtained from Sivas, Erzincan, Erzurum and Kars Meteorological Station, and
- Results of the surface water quality samplings, measurements and analyses conducted as part of the ESIA process.

Once the baseline conditions for the surface water resources are established, potential impacts on these resources have been identified and the significance of impacts have been assessed in line with the methodology defined in Appendix-2, taking the both the receptor sensitivity and the magnitude of the impact into consideration.

4.4.1.2 Project Standards

The national legislation and international standards to be complied with in the Project (see Chapter 2 for details) are listed below:

- Turkish Water Pollution Control Regulation (WPCR)
- Regulation on Water Intended for Human Consumption (RWIHC)
- Regulation on Pits to be Built in Places where Sewer Pipeline Construction is not Possible
- Regulation on the Protection of Groundwater against Pollution and Deterioration
- Surface Water Quality Regulation (SWQR)
- Regulation on the Quality and Treatment of Water Intended for Potable Water Supply
- Communiqué on the Determination of the Protection Areas of Aquifers and Springs Supplying Drinking Water
- Chemical Parameters and Indicator Parameters – Turkish Ministry of Health, 2005
- (Municipality-Based) General Directorate of Water and Sewerage Administration, Regulation on Discharge of Wastewater to the Sewerage Network
- Guidelines for Drinking Water Quality – WHO
- WB ESF – ESS1: Assessment and Management of E&S Risks and Impacts
- WB ESF – ESS3: Resource Efficiency and Pollution Prevention and Management
- WBG General EHS Guidelines – 1. Environment – 1.3 Wastewater & Ambient Water Quality
- WBG EHS Guidelines for Railways
- WBG General EHS Guidelines – 1. Environment – 1.4 Water Conservation
- AIIB ESS1: Environmental and Social Assessment and Management

The values considered for the evaluation of the baseline conditions for potable and non-potable water (water for human consumption) are the limit values specified in RWIHC and in IFC/WHO Drinking Water Guidelines (see Table 48).

Table 48. National and International Limit Values for Water Resources

Parameter	Unit	Limit Values in RWIHC	Limit Values of WHO
Antimony	mg/L	0.005	0.020
Arsenic	mg/L	0.01	0.01
Barium	mg/L	-	0.7
Benzene	mg/L	0.001	0.01
Boron	mg/L	1	2.4
Cadmium	mg/L	0.005	0.003
Chromium	mg/L	0.05	0.05
Copper	mg/L	2	2
Cyanide	mg/L	0.05	-
Fluoride	mg/L	1.5	1.5
Lead	mg/L	0.01	0.01
Mercury	mg/L	0.001	0.006
Nickel	mg/L	0.02	0.07
Nitrate	mg/L	50	50
Nitrite	mg/L	0.5	3
Selenium	mg/L	0.01	0.04
Aluminum	mg/L	0.2	-
Ammonium	mg/L	0.5	-
Chloride	mg/L	250	-
Conductivity	|jS/cm	2500	-
pH	-	6.5<pH<9.5	-
Iron	mg/L	0.2	-
Manganese	mg/L	0.05	-
Sulphate as SO4	mg/L	250	-
Sodium	mg/L	200	-
Uranium	mg/L	-	0.03

The quality of surface water resources is assessed according to the principles of the Surface Water Quality Regulation (SWCR). The purpose of this regulation is to determine and classify the biological, chemical, physico-chemical and hydro morphological qualities of surface waters, coastal and transitional waters, to monitor and maintain the balance of using water in accordance with sustainable development objectives. SWCR evaluates surface waters in three different classes in terms of general chemical and physico-chemical parameters. This classification is performed by comparing the analysis result with the relevant limit value for each parameter analyzed in the sample after sampling. The water quality classes defined in Table-2 in SWCR Annex-5 are given below.

Table 49. Classification of Surface Waters in Terms of General Chemical and Physico-Chemical Parameters According to the Surface Water Quality Regulation

Water Quality	Water Quality Class	Color Code
Very Good	Class I	Blue
Good	Class II	Green

Water Quality	Water Quality Class	Color Code
Moderate	Class III	Yellow

In case the wastewater is discharged to the receiving environment after treatment, the limit values specified in the Turkish Water Pollution Control Regulation (WPCR) and WBG General EHS Guidelines for Wastewater Quality given in Table 50 will be complied.

Table 50. Limit Values for Treated Wastewater Discharge to Receiving Body

Parameter	WPCR Limit Values for Domestic Wastewater (2 hours composite sample)	WBG General EHS Guidelines for Wastewater Quality
BOD (mg/L)	50	30
COD (mg/L)	160	125
Total Suspended Solids (mg/L)	60	50
pH	6-9	6-9
Total Nitrogen (mg/L)	-	10
Total Phosphorus (mg/L)	-	2
Oil and Grease (mg/L)	-	10
Total Coliform Bacteria (Most Probable Number/100mL)	-	400

4.4.2 Baseline Conditions

4.4.2.1 Surface Water Resources

The Divriği-Kars-Georgia border railway line within the scope of the project passes through the Euphrates Sub-Basin of the Euphrates-Tigris basin and Aras Basins, which are among the water basins allocated throughout Türkiye.

The most important surface water that the Divriği Kars railway line cuts in Sivas province is the Çaltı Stream and its tributaries. When the railway line passes to Erzincan province, it follows a course parallel to the Euphrates River and cuts the Euphrates River and its tributaries at many points. The Karasu Stream, which is the most important tributary feeding the Euphrates River, cuts around the Mercan settlement.

Continuing towards the east, the Divriği-Kars railway line intersects the Karasu Stream and its tributaries in Erzurum province and the Hasankale Stream and its tributaries, which feed the Aras River at the pass of the Pasinler plain. Divriği-Kars railway line, heading north-northeast after Erzurum province, enters Kars province and first cuts Süngütaş stream and Büyük Dere stream. Then, it reaches the province of Kars by crossing the Kars stream and its tributaries at several points towards Kars city center.

The BTK railway line, which starts after the city center of Kars, reaches the south of Çıldır lake by cutting the Kars stream and its side branches such as Fehmiharabesi stream, Büyükçayır Stream, Burcalı Stream and Çarcı stream. The BTK railway line, proceeding northwards parallel to the eastern shore of Lake Çıldır, enters the province of Ardahan, where it crosses the Başköy stream and Aksu stream, which are the side branches of the Kara Stream, and reaches the Georgian border.

All surface waters cut along the Divriği-Kars-Georgia border railway line have been crossed and are planned to be crossed with appropriate engineering structures (bridges) designed taking into account the hydrological and meteorological conditions in the region.

Euphrates Sub-Basin

Euphrates Sub-Basin, where the Divriği-Kars-Georgia border railway line is located, is a sub-basin of the Euphrates-Tigris basin. The Euphrates-Tigris basin is a large river system in Western Asia that flows into the Persian Gulf, and its main rivers are the Tigris and the Euphrates, along with their smaller tributaries.

The Divriği-Kars-Georgia border railway line which is located at Euphrates Sub-Basin is surrounded by Asi, Ceyhan, Seyhan, Kızılırmak, Yeşilırmak, Çoruh, Aras, Van Gölü ve Dicle water basins in Türkiye. The Euphrates Sub-basin in question covers the entire province of Tunceli and covers parts of Şanlıurfa, Gaziantep, Mardin, Malatya, Diyarbakır, Şırnak, Adıyaman, Elazığ, Bitlis, Muş, Kahramanmaraş, Kilis, Bingöl, Ağrı, Erzincan, Erzurum, Sivas, Kayseri, Kars, Iğdır, Van, Gümüşhane, Bayburt provinces.

The most important river within the basin is the Euphrates River. The Euphrates River is the most productive river in Türkiye and has the highest water potential. The starting points are the Murat River, which originates from Ağrı Diyadin, and the Karasu River, which originates from Erzurum Dumludağ. After the Euphrates River determines the provincial borders of Erzincan, Tunceli, Elazığ, Malatya, Diyarbakır, Adıyaman and Gaziantep, it enters the territory of Syria and then Iraq. At a point not far from the sea in Iraq, it merges with the Tigris River to form the Shatt al-Arab and flows into the Persian Gulf. The most important tributaries of the river are Murat River, Karasu River, Tohma Stream, Peri, Çaltı and Munzur Stream.

Aras Basin

The Divriği-Kars-Georgia border railway line is passing through at Aras Basin at the easternmost part. Aras Basin covers approximately 3.57% of Türkiye's surface area and has a rainfall area of 28,114 km^2. The Aras Basin, located in the northeast of Türkiye, is surrounded by the Çoruh and Fırat-Tigris basins in the west and the Fırat-Tigris basins in the south. The provinces of Ağrı, Ardahan, Artvin, Erzurum, Iğdır, Kars and Van are located within the borders of the Aras Basin.

The most important river in the basin is the Aras River; it rises from the northern slopes of the Bingöl Mountains within the borders of Erzurum province. The river, which collects all the waters of Tekman Plateau, flows in the north direction within the basin to the east of the Sakaltutan Mountains. After passing the deep and steep Mescitli Gorge, located between the Sakaltutan Mountains and the Topçu Mountain, it descends to the Pasinler Plain. Here it receives the Hasankale (Pasinler) Stream, which collects the waters of the Upper Pasin Basin, and flows in the northeast direction, leaving the provincial borders. It flows through the depressions in the south of the Erzurum-Kars plateau and reaches the Armenian border. After forming a part of the Türkiye-Azerbaijan, Türkiye-Armenia and Azerbaijan-Iran borders, it merges with the Kura River in Azerbaijan.

The length of the Aras River is 1072 km. It is one of the largest rivers of the Caucasus. 548 km of the river is within the borders of Türkiye. In the Aras Basin, there are Iğdır Plain, Kars Plain, Göle Plain, Büyüksütlüce Plain, Hasköy Plain, Çıldır Plain, Ardahan Plateau, Çıldır Lake, Aktaş Lake.

Surface Water and Groundwater Sources Along Railway Line

While Divriği-Kars-Georgia border railway line passes through the provinces of Sivas, Erzincan and Erzurum, it mostly passes through the valleys of the Çaltı, Fırat and Karasu riverbeds, which are the main surface waters in these provinces. While the railway line passes through the valleys in question, it sometimes cuts these surface waters or moves in parallel. In Kars province, the topography is relatively less sloping and flat, and it sometimes cuts these streams as they pass through the Süngütaş and Kars stream valleys. The areas where groundwater resources are located along the railway route and are suitable for exploitation are only in the

regions where the route cuts the alluvial plains that form the plain areas in Erzincan, Erzurum and Kars provinces.

There is no natural lake cut along the railway route, and only the Reservoir area of Karasu-5 HEPP within the borders of Erzincan province is passed.

Surface water and groundwater resources cut along and bypassed along the Divriği-Kars-Georgia border railway line are listed in Table 51.

The hydrological map showing the surface water resources along the Divriği-Kars-Georgia border railway line is given at Appendix-4.5.

Table 51. Surface Water and Groundwater Sources Along Railway Line

Province	Surface Water Resource			Groundwater Resource Area	Explanation
	River /Stream	Dam/Pond	Explanation		
Sivas	Çaltı Stream	-	Railway line passes through Çaltı valley crossing Çaltı Stream.	-	-
Erzincan	Fırat River, Karasu Stream	Karasu - 5 HEPP	Railway line passes through Fırat River and Karasu Stream valleys crossing both Fırat River and Karasu Stream. Railway line crosses Karasu -5 HEPP Reservoir area. Railway line passes through south of Bağıştaş I-II HEPP Reservoir areas and north of Karasu 4-3 HEPP Reservoir area, but do not cross those reservoir areas.	Erzincan Plain Alluviums	The Railway Line passes through the alluviums of the Erzincan plain for about 42 km
Erzurum	Karasu Stream	-	Railway line passes through Karasu valley and crosses Karasu Stream	Erzurum Plain and Pasinler Plain Alluviums	The Railway Line passes through the alluviums of the Erzurum plain for about 45 km and Pasinler plain for about 39 km
Kars	Süngütaş Stream, Kars Stream	Asboğa Lake not crossed but at 435 m east of Railway Line, Çıldır Lake not crossed but at 1.3 km west of Railway Line Kars Dam Reservoir not crossed but at 1.5 km east of Railway Line	Railway line passes through Süngütaş Stream and Kars Stream valleys and crosses them.	Kars -Selim Plain Alluviums	The Railway Line passes through the alluviums of the Kars-Selim plain for about 9.7 km

The main/most important rivers that the Divriği-Kars-Georgia border railway line is crossing are as follows:

Euphrates River

Euphrates is the longest river in Southwest Asia. The starting points are the Murat River, which originates from Ağrı Diyadin, and the Karasu River, which originates from Erzurum Dumludağ. These rivers unite at the Elazığ provincial borders and form the Euphrates River. After determining the provincial borders of Erzincan, Sivas, Tunceli, Elazığ, Malatya, Diyarbakır,

Adıyaman, Gaziantep and Şanlıurfa, Euphrates River enters the territory of Syria and then Iraq. At a point not far from the sea in Iraq, it merges with the Tigris River to form the Shatt al-Arab and flows into the Persian Gulf. The most important tributaries of the river are Murat River, Karasu River, Tohma Stream, Peri Stream, Kahta Stream, Çaltı and Munzur Stream.

Its total length is 2,800 km, and the length of the part within the borders of Türkiye is 1263 km. It has a water catchment basin of 720,000 km². The Euphrates River, which has the largest basin in Türkiye, carries an average of 30 billion m³ of water annually. 80% of this water originates from upstream of the Keban Dam. Since winter precipitation is in the form of snow, the flow rate is 200 m³/sec. It rises rapidly in spring due to rain and snowmelt, reaching 2000 m³/sec. Water begins to decrease starting from July and reaches its lowest level in September-October.

Kars Stream

The source of Kars Stream is the Allahuekber Mountains Range in the southwest of the province. It initially flows mainly in an easterly direction through the district and the district town of the same name, Selim. It then turns north and passes through the Kars provincial center. It then flows in a wide arc to the north, then to the east, and finally to the southeast. It passes through Boğazköy, Harmanlı, Yolboyu, Akçalar, Karaurgan and Geçitköy districts. Finally, the river empties into the Arpaçay Reservoir, from which Achurjan (Arpaçay) flows. The length of Kars Stream is 93 km.

Karasu Stream

Karasu River is the stream that originates from Erzurum Dumlu Mountain, merges with the Murat River near Keban and forms the Euphrates River. Its length until Keban Dam is 460 km.

Passing through the Georgian Strait, Karasu reaches the Erzurum plain. While leaving the Erzurum plain, it catches the Serçeme stream coming from the Ovacık plateau and reaches the Aşkale gorge. The river heading towards Erzincan also receives the Tuzla stream coming from Palandöken Mountain. After passing the Sansa Strait, it crosses the Erzincan plain. Then it enters the Kemah Strait, where it receives Çaltısuyu. After deep and narrow gorges, it merges with the Murat River at the Keban Dam. While Karasu passes through the lands of Erzincan, it receives the Çayırlık stream originating from the Keşiş Mountains and the Tuzla water coming from the southeast. It also receives Kom, Cimin, Mercan, Pahnik, Sürperen waters and Çardaklı stream from the plain. It receives Miran water and Kadıgölü water within the borders of Kemaliye.

Like the Murat River, the Karasu River extends in the east-west direction, parallel to the extension of the mountains. When they head towards the south, they form deep gorges. They unite near Keban and take the name of the Euphrates River.

Çaltı Stream

Originating from the mountains at 2500-2600 m elevation in the south of Sivas, Çaltı Stream is formed by the junction of Güneş Stream, originating from Yılanlı mountains, and Sincan Stream, originating from Tecer, Gürleyük and Karabel regions, in the Cürek gorge near Divriği, where it takes the name Çaltı. The waters of Çaltı Stream flowing in the east direction are poured into Keban Dam Lake. Çaltı Stream, which continues its flow in front of Divriği, follows the Sivas-Erzincan railway. The length of Çaltı Stream is 180 km, and 130 km of it is within the borders of Sivas province.

4.4.2.2 Surface Water Quality

Definition of water pollution was made as anthropogenic or natural caused, direct or indirect introduction of substances, energy, organisms or genetic material that has a probability to cause adverse effects to human health, or harm to living resources or to the environment (ERA,

2019). On the other hand, Turkish Water Pollution Control Regulation identifies water pollution as discharge of material or energy wastes which may cause negative deterioration in biological resources, human health, fishing, water quality and other uses of water directly or indirectly observed as a negative change in the chemical, physical, bacteriological, radioactive and ecological characteristics of the water resource.

Samples were taken from six (6) locations, which were identified in AoI, to determine the current condition of surface water quality. These locations have been selected from the crossing points of railway lines with the water bodies where the main excavation works such as tunnel construction or tunneling works are planned to be carried out. It shall be noted only six points were selected since the majority of the line is an existing infrastructure and no significant historical pollution is expected. Nevertheless, if a crossing subject to a suspicion of pollution is observed during or after construction, additional sampling will be carried out as well.

The samples were taken in accordance with TS EN ISO 5667-6 standards and analyses were carried out by Çınar Laboratories.

The coordinates of the surface water resource sampling points and the analyses results are listed in Table 52 and Table 53, respectively.

Table 52. Surface Water Sampling Locations

Sampling Location	Coordinates (Latitude, Longitude)		Water Body/ Settlement	Sampling Date
W-1	39.434757	38.452874	Bağıştaş Dam	02.11.2023
W-2	40.722597	43.194695	Kars Creek	05.11.2023
W-3	40.803295	43.212762	Fehmiharabesi Creek	05.11.2023
W-4	40.831816	43.259183	Güvercin (Euphrates River)	05.11.2023
W-5	40.859408	43.279222	Kümbet (Euphrates River)	05.11.2023
SW-6	41.061054	43.323331	Çıldır Lake	05.11.2023

The sampling points were shown in Figure 28 and the analyses reports were given in Appendix-5.1.

Figure 28. Surface Water Quality Sampling Locations



Table 53.The Analysis Results of Surface Water Samples

Parameter	Unit	Water Quality*			W-1	W-2	W-3	W-4	W-5	W-6
		Class I (Very Good)	Class II (Good)	Class III (Moderate)						
Color (436 Nm)	m^{-1}	RES 436 nm: ≤ 1.5	RES 436 nm: 3	RES 436 nm: > 4.3	0.10	0.40	0.60	0.20	0.50	0.20
Color (525nm)	m^{-1}	RES 525 nm: ≤ 1.2	RES 525 nm: 2.4	RES 525 nm: > 3.7	< 0.1	0.10	0.20	< 0.1	0.10	< 0.1
Color (620 Nm)	m^{-1}	RES 620 nm: ≤ 0.8	RES 620 nm: 1.7	RES 620 nm: 2.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
pH	-	6-9	6-9	6-9	7.55	8.30	7.92	6.77	7.48	7.57
Conductivity	µS/cm	< 400	1000	> 1000	520.00	456.00	259.00	478.00	167.20	114.50
Oil And Grease**	mg/L	<0.2	0.3	>0.3	< 10	< 10	< 10	< 10	< 10	< 10
Dissolved Oxygen	mg/L	> 8	6	< 6	10.45	10.75	11.60	6.37	9.01	10.17
Chemical Oxygen Demand	mg/L	< 25	50	> 50	< 10	24.20	< 10	40.80	17.60	< 10
Biochemical Oxygen Demand	mg/L	< 4	8	>8	< 3	8.60	< 3	16.20	6.30	< 3
Ammonium Nitrogen	mg/L	< 0.2	1	>1	0.04	0.51	0.17	0.46	0.28	0.02
Nitrate Nitrogen	mg/L	< 3	10	> 10	0.37	1.28	0.61	2.55	0.77	< 0.1
Total Kjeldahl-Nitrogen	mg/L	< 0.5	1.5	> 1.5	0.61	1.79	0.81	1.58	0.86	0.83
Total Nitrogen	mg/L	< 3.5	11.5	> 11.5	< 1	3.07	1.42	4.13	1.63	< 1
Ortho Phosphate Phosphorus	mg/L	< 0.05	0.16	> 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total Phosphorus	mg/L	< 0.08	0.2	> 0.2	0.03	0.38	0.10	0.45	0.21	0.12
Fluoride	µg/L	≤ 1000	1500	> 1500	< 100	< 100	< 100	< 100	< 100	< 100
Manganese	µg/L	≤ 100	500	> 500	5.60	299.00	47.30	91.00	186.00	3.68
Selenium	µg/L	≤ 10	15	> 15	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sulfur	µg/L	≤ 2	5	> 5	< 2	< 2	< 2	< 2	< 2	< 2

** (a) Purpose of use of water as per quality classes:*	*1) Groundwater with high potential of utilizing as drinking water,*
Class I - Water with High Quality (implies that the status of water is "Very good");	*2) Water usable for recreational purposes, including those that require body contact, such as swimming,* *3) Water that can be used for trout production,* *4) Usable water for animal production and farm needs,*
Class II. - Slightly Contaminated Water (implies that the status of water is "Good");	*1) Groundwater with high potential of utilizing as drinking water,* *2) Water usable for recreational purposes,* *3) Water that can be used for fish production other than trout,* *4) Irrigation water provided that it meets the irrigation water quality criteria determined by the legislation,*
Class III. - Contaminated water (implies that the status of water is "Moderate");	*It refers to water and industrial water that can be used for aquaculture after appropriate treatment, excluding facilities that require qualified water such as food and textiles.*
***The analysis of the "Oil and Grease" parameter cannot be determined at a level lower than 10 by the accredited laboratory. Therefore, it could not be classified.*	

According to the analysis results given in table above,

- W-1 is classified as Class II in terms of conductivity and Total Kjeldahl-Nitrogen.
- W-2 is classified as Class III in terms of Biochemical Oxygen Demand, Total Kjeldahl-Nitrogen and Total Phosphorus.
- W-3 is classified as Class II in terms of Total Kjeldahl-Nitrogen and Total Phosphorus.
- W-4 is classified as Class III in terms of Biochemical Oxygen Demand, Total Kjeldahl-Nitrogen and Total Phosphorus.
- W-5 is classified as Class III in terms of Total Phosphorus.
- W-6 is classified as Class II in terms of Total Kjeldahl-Nitrogen and Total Phosphorus.

When the analysis results are evaluated overall, it can be said that the diffuse pollution loads resulting from intensive agricultural and livestock activities in the project area and the wastewater discharged without treatment as a point source negatively affect the water quality of the surface water bodies.

4.4.3 Impact Assessment

4.4.3.1 Land Preparation and Construction Phase

Water Use

In the land preparation and construction phase of the Project, there will be no water use other than drinking and utility purposed water usage by approximately 225 project personnel and moistening water to be used for minimizing uncontrolled dust emissions (5m^3/day). Even though, the number of the employees to be employed within the construction will differ time to time and the amount of workforce to be located is not known, to be able to assess the impact regarding water requirement and wastewater generation it was assumed that a total of approximately 225 staff will be employed for Sivas, Erzincan, Erzurum and Kars Provinces.

Daily needs[12] of the personnel who will work in the land preparation and construction phase of the project will be provided from the construction site to be established and within this scope calculations are made;

- *Sivas: 57 people x (317 L/day-capita)= 18.07 m^3/day*
- *Erzincan: 57 people x (267 L/day-capita)= 15.22 m^3/day*
- *Erzurum: 57 people x (301 L/day-capita)= 17.16 m^3/day*
- *Kars: 57 people x (432 L/day-capita)= 24.62 m^3/day*

Drinking water that will be needed during land preparation and construction period will be purchased from the nearest settlements and utility water will be supplied by tankers.

Wastewater Generation

As described before, it was assumed that 57 staff will be employed in Sivas, 57 staff will be employed at Erzincan, 57 staff will be employed at Erzurum and 57 staff will be employed at Kars. Moreover, a person's daily water use requirement will turn into 100% wastewater. It shall be noted that there will not be any wastewater generation due to water used for dust suppression as surface runoff due to dust suppression activities will be prevented.

Thus, the amounts of wastewater to be generated is estimated to be:

- *Sivas: 18.07* m^3/day
- *Erzincan: 15.22* m^3/day
- *Erzurum: 17.16* m^3/day
- *Kars: 24.62* m^3/day

([12]) (TURKSTAT) 2020 According to Türkiye Municipality Water Statistics for Sivas, Erzincan, Erzurum, and Kars

Wastewater generated due to land preparation and construction activities will be deposited in septic tank that will be impervious, in accordance with “Regulation on Pit Opening Where Sewer System Construction is not Applicable” being published in Official Gazette No.13783 dated 19.03.1971. When the pits are filled, wastewater will be removed by sewage trucks, and disposal will be provided within the scope of the protocol to be made with the municipality that has a licensed wastewater treatment plant (WWTP).

It shall be noted that the relevant wastewater generated and collected will be sent to Sivas WWTP, Erzincan WWTP, Erzurum WWTP and Kars (Sarıkamış) WWTP (according to the city it was generated in). It should be noted that Kars Central WWTP is being constructed and once completed and commenced, this WWTP will also be used to send the collected sewerage. These wastewater treatment plants have environmental permits and have sufficient capacity to treat wastewater generated due to the project and operate in line with environmental legislation.

Impacts on Surface Water Flow

When planning structures for river crossings, understanding the hydrological characteristics of the river is paramount. Rivers exhibit varying flow rates, especially during different seasons. Designing structures that can withstand both low-flow conditions and high-flow events, such as floods, is essential. Proper hydraulic modeling helps determine the required capacity of the crossing. Additionally, considering sediment transport is crucial. Rivers carry sediments downstream, and the design must account for sediment movement to prevent clogging or erosion around the structure.

Ensuring the stability and durability of the structure is fundamental. The foundation of the structure must be stable and resistant to erosion. Geotechnical investigations are essential to assess soil conditions and design appropriate foundations.

Railway river crossings intersect sensitive ecosystems, and their design will minimize ecological impact:

- Aquatic Organisms: Structures should allow for fish and other aquatic organism passage. Fish-friendly designs, such as bottomless arch culverts or single-span bridges, promote ecological connectivity. Properly sized openings and fish ladders facilitate fish migration.
- Habitat Preservation: Avoid disrupting natural habitats along the riverbanks. Properly designed crossings minimize impacts on riparian vegetation and streambeds. Vegetation buffers can help stabilize banks and prevent erosion.

Given changing climate patterns, structures must be resilient to extreme weather events. Elevated designs, flood-resistant materials, and proper drainage systems help mitigate climate-related risks.

In case surface waters are not crossed with properly designed engineering structures and techniques, deformation is possible around them. Other than this impact, the stability of cut & fills along the route may be adversely affected due to uncontrolled flowing surface waters and rising groundwater level. Especially potential flood events in case of excessive precipitation in the region by taking climate change into account should be taken under control for the protection of project route and its environment.

On the other hand, surface waters will not be utilized during the land preparation and construction phase of the project.

Impacts on Groundwater

If hazardous material spills / leaks of fuel, oil, petroleum, cement, etc. are not controlled immediately, it may reach groundwater and cause contamination especially in areas where the groundwater level is high and dominated by alluvial soil. Interaction with groundwater may

occur during the construction of the bridge abutments. Groundwater will not be utilized during the land preparation and construction phase of the project.

4.4.3.2 Operation Phase

Water Use and Wastewater Generation

During the operation phase of the project, the total number of employees to be employed in addition to the existing ones working at the stations will be approximately 35 people. In this context, similar to the construction phase, 8 people were assumed to be employed at Sivas, 9 people were assumed to be employed at Erzincan, 9 people were assumed to be employed at Erzurum, and 9 people were assumed to be employed at Kars. Accordingly, the amounts of water[13] to be used and wastewater to be generated is calculated as:

- *Sivas: 8 people x (317 L/day-capita)= 2.54 m^3/day*
- *Erzincan:* 9 people x (267 L/day-capita)= *2.40 m^3/day*
- *Erzurum:* 9 people x (301 L/day-capita)= *2.71 m^3/day*
- *Kars:* 9 people x (432 L/day-capita)= *3.89 m^3/day*

The wastewater to be generated will be transferred to the nearest licensed municipal WWTP via the existing sewerage network.

There can be wastewater generation due to rail car maintenance and refurbishment as these will be carried out when necessary.

During maintenance, rail cars require thorough cleaning to remove dirt, grease, and other contaminants. High-pressure water jets or automated washing systems are commonly used. These cleaning processes result in wastewater runoff containing detergents, oils, and suspended solids. The wastewater may carry pollutants from brake dust, lubricants, and accumulated grime.

Refurbishment often includes repainting rail cars to enhance aesthetics and protect against corrosion. Surface preparation (such as sandblasting) and application of primers, paints, and coatings generate wastewater. Paint removal (stripping old layers) can release hazardous substances like lead-based paint particles into the wastewater.

Maintenance involves disassembling components, inspecting parts, and replacing worn-out elements. Cleaning and degreasing parts (such as bearings, gears, and brake components) produce wastewater containing solvents, oils, and metal residues.

Rail cars have various fluids (hydraulic oil, coolant, fuel, etc.) that require periodic changes. Draining and disposing of these fluids generate wastewater. Proper handling and disposal are critical to prevent environmental contamination.

Impacts on Surface Water and Groundwater

During operation phase, impacts on river and creek crossings can be in question as dust erosion and emissions can occur due to movement of the trains, waste deposition and chemical and hazardous material storage near creeks.

Firstly, dust deposition during train movement is considered as insignificant as topography of the railway is mainly smooth. Moreover, it will be prohibited to store any type of chemical and hazardous material near 50 meters of any creek or river. Personnel will be trained regarding waste disposal to the rivers and creeks and periodic checks will be maintained to monitor waste disposal to streams.

No surface and groundwater source will be used for potable or drinking water purposes during the operation phase.

(13) (TURKSTAT) 2020 According to Türkiye Municipality Water Statistics for Sivas, Erzincan, Erzurum, and Kars

Accidental leaks or spills during maintenance can introduce contaminants into the environment. These may include fuel, lubricants, or cleaning agents. Implementing spill prevention measures and promptly addressing leaks is crucial.

4.4.4 Potential Impact Significances and Mitigation Measures

Potential Impacts on water resources, mitigation measures and residual impacts are given in Table 54 as a result of the evaluation conducted based on E&S Impact Assessment Methodology (see Appendix-2).

Table 54. Water-Related Impact Significances and Proposed Mitigation Measures

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	Reversibility	Duration	Frequency	Overall Magnitude				
Impacts on Surface Water Quality	Land preparation and construction, Operation	Surface water bodies	Local	Short-term reversible	Short-term	Intermittent	Medium	Low	**Minor**	▪ Wastewater generated due to land preparation and construction activities will be deposited in septic tank that will be impervious, in accordance with "Regulation on Pit Opening Where Sewer System Construction is not Applicable" being published in Official Gazette No.13783 dated 19.03.1971. When the pits are filled, wastewater will be removed by sewage trucks, and disposal will be provided within the scope of the protocol to be made with the municipality that has a licensed wastewater infrastructure system. ▪ The domestic wastewater to be generated during operation phase will be transferred to the nearest licensed municipal WWTP via the existing sewerage network. ▪ No surface water runoff from construction compounds and no untreated wastewater will be discharged to surface waters. ▪ The positioning of stockpiles near to water bodies and in the flood risk areas will be avoided. ▪ Sediment barriers will be provided between earthworks and the watercourse to avoid contamination of waterbodies with sediment. ▪ Works during high flow events and during heavy rainfall will be avoided to reduce the risk of fine sediment release into watercourses, watercourse erosion and increased flood risk. ▪ To collect and reduce the flow of surface runoff originated from construction sites, camp sites and other areas of impermeable surfaces; drainage systems and related strategies will be planned and implemented. ▪ Implementing erosion control measures, such as the use of vegetation, geotextiles, or retaining walls, can prevent soil erosion and sedimentation, which can degrade surface water quality. ▪ Establishing vegetative buffer zones along water bodies adjacent to the railway line can act as a natural barrier, reducing the transport of pollutants into the water during floods. ▪ In order to monitor the water quality of the surface waters within the project study area, periodically at least 2 times a year (rainy and dry periods), considering location of the pollution sources during land preparation and construction phase, water samples will be collected and assessment of the water quality of the samples will be performed. ▪ Pollution prevention and waste management plan and emergency response and preparedness plan will be implemented. ▪ When determining the locations of temporary fuel or oil storage areas, location of water resources will be taken into account. Accidental spill of hazardous materials such as fuel, oil, oil, cement etc. will be taken under control immediately.	**Negligible**
		Biodiversity	Local	Short-term reversible	Short-term	Intermittent	Medium	Medium	**Moderate**		**Negligible**
		Local community	Local	Short-term reversible	Short-term	Intermittent	Medium	Medium	**Moderate**		**Negligible**
Impacts on Surface Water Flow and Flood Risk	Land preparation and construction, Operation	Surface Water Resources, Project elements, Project Personnel, Railway and Highway Users	Wide	Irreversible or Long-term Reversible	Long-term	Intermittent	High	High	**Major**	▪ Surface waters will be crossed with properly designed engineering structures (bridge, culverts, box culverts) and techniques. The positive opinion of DSI will be granted as well ▪ To collect and reduce the flow of surface runoff originated from construction sites, camp sites and other areas of impermeable surfaces; drainage systems and related strategies will be planned and implemented. ▪ By incorporating green infrastructure, such as permeable pavements, green roofs, and vegetated swales, can enhance water absorption and reduce runoff.	**Minor**
Impacts on Groundwater	Land preparation and construction, Operation	Alluvial Groundwater Aquifer	Local	Medium-term reversible	Short-term	Intermittent	Medium	Medium	**Moderate**	▪ When determining the locations of temporary fuel or oil storage areas, location of water resources will be taken into account. Accidental spill of hazardous materials such as fuel oil, oil, cement etc. will be taken under control immediately. ▪ Drip trays and other secondary containment structures will be used for storage of the fuels and potentially hazardous construction materials. ▪ Spill kits will be kept on site to be deployed in the event of a spillage, and site staff will be trained in their use. ▪ Groundwater resources will not be utilized without the permission for the use of groundwater granted by the State Hydraulic Works (DSI). ▪ Emergency preparedness and response plan will be implemented.	**Negligible**
Railcar Maintenance	Operation	Local Community and Sewage System	Local	Short-term reversible	Short-term	Intermittent	Low	Low	**Negligible**	▪ Ultrafiltration will be used to extend the life of washing solutions for aqueous parts or alternatives to water cleaning (e.g. dry cleaning by wire brush or bake oven) will be used; ▪ Discharge of industrial wastes to septic systems, drain fields, dry wells, cesspools, pits, or separate storm drains or sewers will be prevented. ▪ Raise awareness about water conservation, pollution prevention, and responsible land use. Educate staff on the importance of protecting water sources and their role in maintaining water quality	**Negligible**

4.5 Resource and Waste Management

4.5.1 Project Standards and Methodology

In the land preparation and construction phase, aggregate, basalt, granite, gabbro, limestone, etc. construction materials will be required, and borrow sites and quarries will be used to supply construction materials during the construction phase.

In addition, there will be hazardous and non-hazardous waste production that will occur as a result of the daily activities of the personnel who will work during the construction and operation phases. Likewise, waste generation from the passengers using the stations and from the railway maintenance is expected.

As with all infrastructural projects, both construction material requirements and waste generation can be substantial. Therefore, with a well-planned organization, preventive corrective actions and mitigation measures are required for all types of wastes. The methodology to be followed to evaluate the potential impacts associated with waste generation and the standards to be applied for waste management are listed below. Relevant impacts have been identified based on these, and the necessary measures have been determined based on the significance of these impacts.

4.5.1.1 Methodology

Both qualitative and quantitative approaches have been adopted in the ESIA to evaluate the project's material use and waste management.

The assessment, including the establishment of baseline information, is based on the following reports, guidelines and data sources:

- WB ESS 1: *Assessment and Management of Environmental and Social Risks and Impacts*
- WB ESS 3: *Resource Efficiency and Pollution Prevention and Management*
- WBG General EHS Guidelines (2007)
- WBG EHS Guidelines for Railways (April 30, 2007)
- WBG EHS Guidelines for Construction Materials Extraction (April 30, 2007)
- AIIB ESS 1: Environmental and Social Assessment and Management
- Mining resource maps of material borrow sites and quarries published in the internet site of General Directorate of Mineral Research and Exploration (MTA)
- Provincial Environmental Status Reports published by the Provincial Directorates of Environment, Urbanization and Climate Change
- National Waste Management and Action Plan published by the Ministry of Environment, Urbanization and Climate Change, General Directorate of Environmental Management (2016-2023)
- Waste statistics published by TurkStat (2020)

Potential impacts and risks have been identified in consideration with typical impacts/risks associated by railway activities. Significance of impacts has been evaluated based on professional judgment. Related national legislation (e.g., Regulation on Waste Management, Zero Waste Regulation) was also resorted to define the legal liabilities and measures to be taken for the management of wastes in the scope of the Project.

Assumptions and Limitations

The number of personnel, the excavation and filling amounts were estimated based on certain assumptions during the ESIA preparation process due to insufficient data.

4.5.1.2 Project Standards

Regulation on Waste Management is the basis of national legislation relating to the management of waste in Türkiye. In addition to this there are other regulations for specific waste types. These include waste streams from excavations, constructions, building demolitions, waste oils, packaging waste, waste batteries and accumulators, medical waste, waste electrical and electronic equipment, and waste tire. The full list of national waste legislation to be complied within the scope of the project is provided in Chapter 2 of the ESIA Report. Key standards/requirements defined in the national legislation regarding waste management are briefly given in the table below.

Table 55. Key Standards / Terms Defined by National Waste Management Legislation

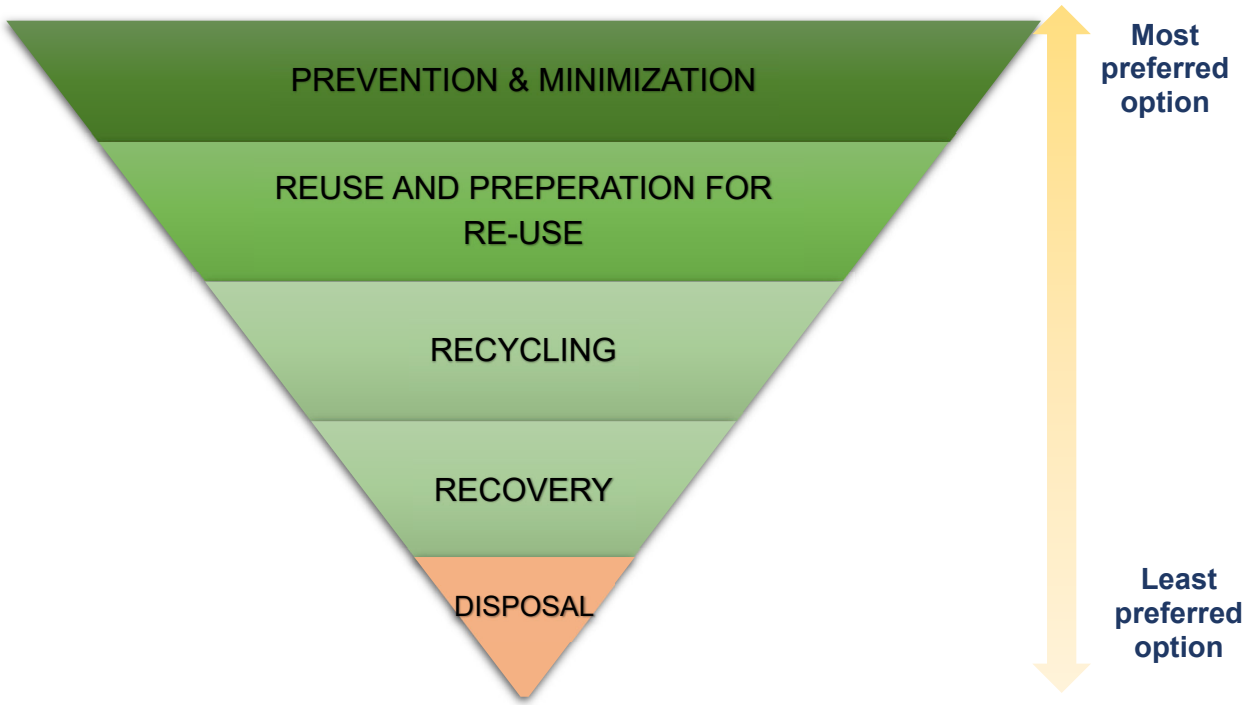
National Legislation	Standards/Terms
Regulation on Waste Management	▪ Waste Management Plan is developed and implemented for reduction at source, reuse and recycling of solid wastes, ▪ "3-Year Industrial Waste Management Plan" is developed, approved (by the authorities) and implemented for the wastes, ▪ Different types of wastes (domestic, recyclable, hazardous, etc.) are stored in separate containers, ▪ Hazardous and non-hazardous wastes are stored in designated temporary storage areas, ▪ Closed containers are used to store hazardous wastes and these containers should be in good condition, durable and closed tightly and placed on water resistant surface such as concrete floor, ▪ Labels put on the waste containers to identify type of the waste, amount of the waste and date of storage, ▪ Records of wastes generated are kept at the project site, ▪ Waste declaration forms (for the waste generated in the previous year) are filled in the online platform of the Ministry of Environment, Urbanization and Climate Change until March of the coming year, ▪ Agreements are made with municipalities or licensed companies for recovery, recycling, and final disposal.
Regulation on Packaging Waste Control	▪ Packaging wastes are temporarily stored in a designated place separate from other wastes and chemicals, ▪ Recyclable waste is delivered to licensed recycling companies.
Regulation on Waste Oil Control	▪ Characteristics of waste oils are analyzed according to the parameters specified in Regulation on Control of Waste Oils and categorization of waste oils are done accordingly.
Regulation on Control of Excavation Soil, Construction and Demolition Waste	▪ Topsoil is stored at a designated storage area separately from the coarse/excavated materials and necessary measures are implemented during the storage period to ensure that it can be reused in rehabilitation or landscaping activities.
Zero Waste Regulation	In order to use resources efficiently in production, consumption and service processes in line with the principles of sustainable development through the effective management of raw materials and natural resources; it is essential to; ▪ Prevent waste generation, ▪ Reduce waste in cases where it is not possible to prevent waste generation, ▪ Evaluate the reuse possibilities of products and materials.

At the international level, the main standard applicable to the Project's impacts on potential materials and wastes is WB ESS 3 - Resource Efficiency and Pollution Prevention standard and it necessitates below issues;

- Development and implementation of technical, financially viable and cost-effective measures to improve the project's efficiency in using energy, water consumption as well as other resources and material inputs, and
- Preventing hazardous and non-hazardous waste production; reduction of waste production in cases where waste generation cannot be prohibited; safe disposal and recycling of waste for human health and the environment and finally, including emissions result from overhaul of wastes and processes also with the proper control sound treatment or disposal of waste for the environment.

Likewise, WBG General EHS Guidelines requires the establishment of a waste management hierarchy that considers the prevention, reduction, reuse, recovery, recycling, disposal of waste and finally waste disposal (see Figure 29).

Figure 29. Waste Management Hierarchy



4.5.2 Baseline Conditions

4.5.2.1 Material Requirements

The successful execution of the railway rehabilitation project necessitates a strategic approach to procure construction materials, ensuring both quality and sustainability. The primary sources for these materials are carefully selected quarries located along the project route. This section outlines the types of construction materials required and the rationale behind the quarry selection.

Aggregates, including crushed stone, gravel, and sand, form a fundamental component in railway construction. These materials are vital for the proper functioning and stability of the railbed. The designated quarries will serve as reliable sources for high-quality aggregates, meeting the specified standards for construction.

Ballast, crucial for distributing the load of the railway track, is another key construction material. The quarries identified for material extraction will provide the necessary ballast material, ensuring optimal track performance, stability, and durability over the project's lifecycle.

The construction of embankments along the railway route requires specific soil types with suitable engineering properties. Designated quarries will supply the required soil, meeting the project's geotechnical specifications to ensure the stability and integrity of the embankment structures.

Available quarries in Sivas, Erzincan, Erzurum and Kars provinces are presented in the maps below. It should be noted that the quarries to be used during the construction will be identified prior to the construction. The maps of existing quarries are presented to state that there are no problem regarding material source in each city.

Figure 30. Quarries in Sivas Province

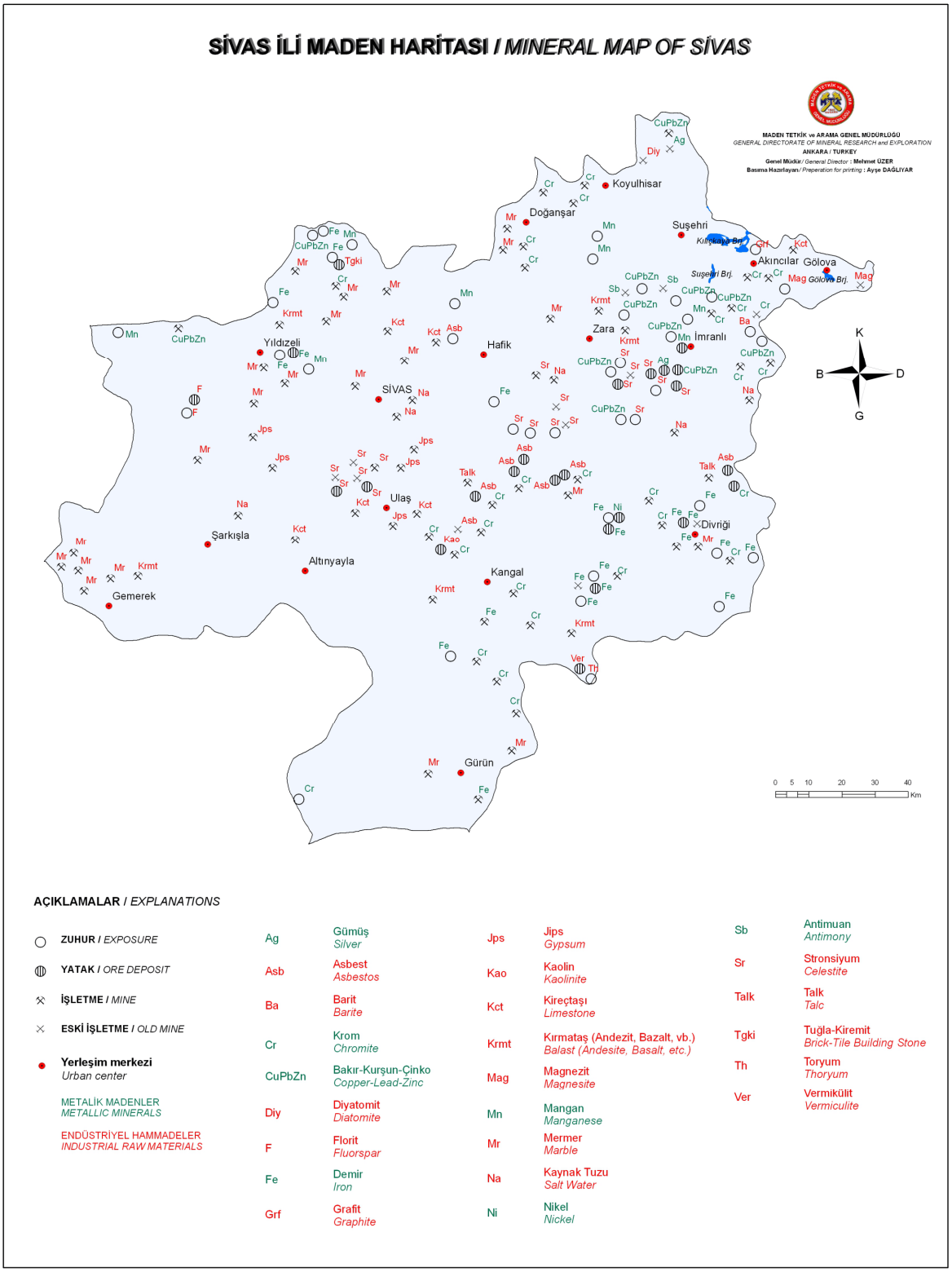


Figure 31. Quarries in Erzincan Province

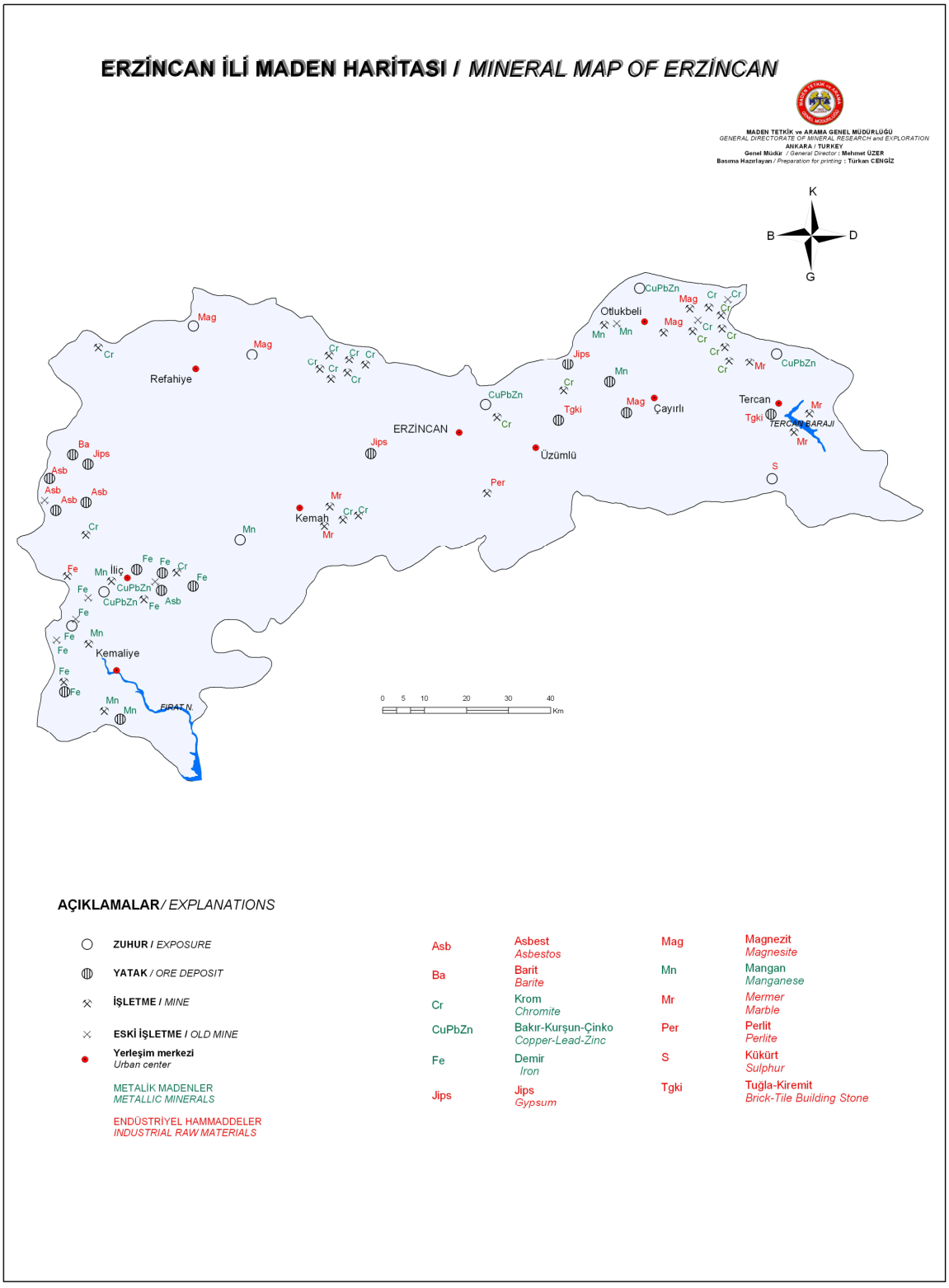


Figure 32. Quarries in Erzurum Province

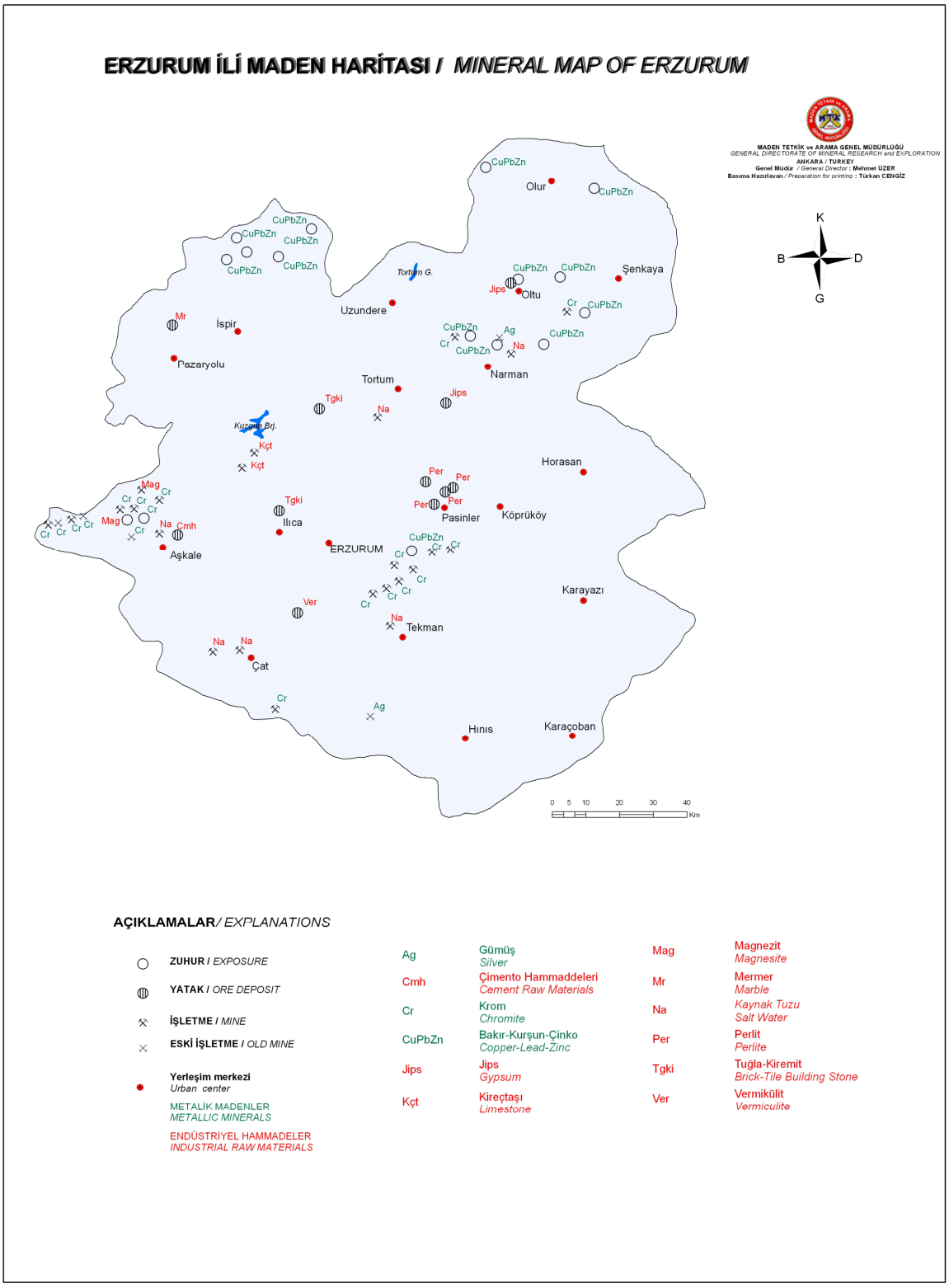
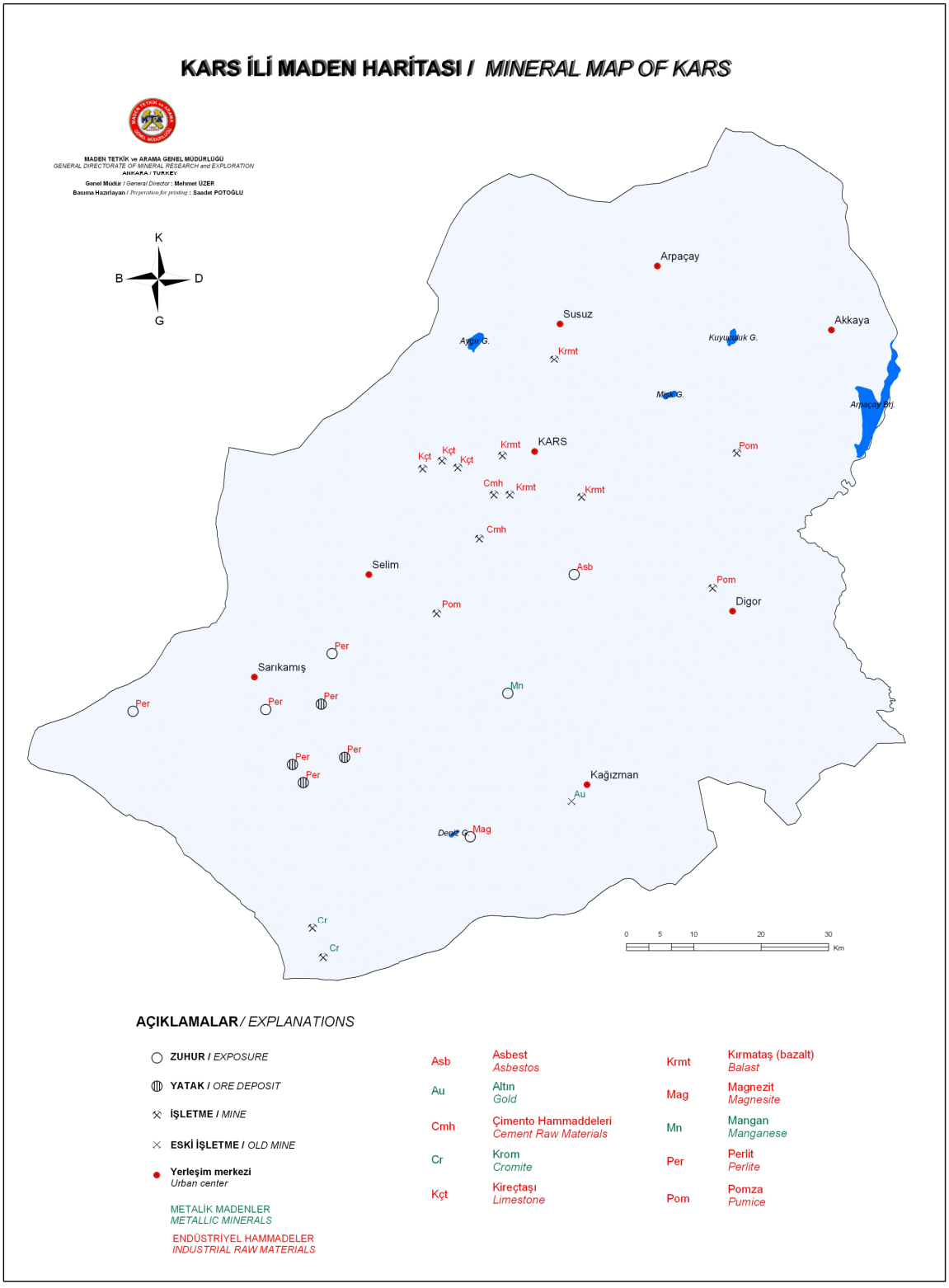


Figure 33. Quarries in Kars Province



Quarries will be selected based on rigorous criteria, including proximity to the construction site to minimize transportation costs and environmental impact, geological suitability, and adherence to E&S sustainability standards. Ensuring that the quarries comply with these criteria is vital for minimizing the environmental footprint and supporting sustainable practices.

Quarry operations are subject to strict environmental regulations to mitigate potential adverse impacts. The quarries to be selected will adhere to these regulations and implementing measures to minimize dust, noise, and other environmental disturbances during material extraction, will contribute to the overall environmentally conscious approach of the project.

Efficient transportation logistics are integral to the construction phase. By sourcing construction materials from quarries along the project route, the need for extensive transportation is reduced, minimizing associated carbon emissions, traffic congestion, and overall environmental impact.

To maintain the construction material's quality and consistency, a robust quality control system is implemented. Regular testing and monitoring procedures are in place to ensure that materials extracted from the designated quarries meet the project's engineering and safety standards.

Sourcing construction materials from designated quarries contributes to the local economy by generating employment opportunities and supporting quarry-related businesses. This approach aligns with the project's commitment to fostering socio-economic benefits within the project's vicinity.

In conclusion, the selection of quarries for sourcing construction materials is a carefully planned and environmentally responsible strategy. It ensures that the project meets its engineering requirements while adhering to sustainability principles and supporting the economic development of the local communities involved in quarry operations.

4.5.2.2 Waste Generation Rates and Waste Management Infrastructure in the Region

Sivas, Erzincan, Erzurum, and Kars provinces' and Türkiye's average daily waste generation values are given below.

Table 56: Waste Statistics of Project Locations (kg/day/person) (2020)

Location	Domestic (Non-Recyclable) *	Recyclable*	Total
Sivas	0.777	0.333	1.11
Erzurum	0.812	0.348	1.16
Erzincan	0.63	0.27	0.9
Kars	0.791	0.339	1.13
Türkiye	0.777	0.333	1.11

** Recyclable and non-recyclable wastes have been calculated based on the Environmental Indicators published by the Ministry of Environment and Urbanization, which states that 30% of generated municipal waste (by weight) consists of packaging waste (Ministry of Environment and Urbanization, 2015).*
Source: Turkstat Municipality Waste Statistics, https://biruni.tuik.gov.tr/medas/?kn=119&locale=tr

In Sivas province, the sanitary landfill is located at the Seyfebeli Haçin Creek location, at the 12th km of the Erzincan Highway. The facility, which became operational as of the end of 2014, started producing electricity as of 2015. Leakage from the storage area is temporarily stored in an impermeable pool and is disposed of by being transported to the wastewater treatment plant with a sewer truck.

There is a sanitary landfill in Erzincan province, operated by Erzincan Municipality. A total of 58,415,480 kg of waste was disposed of in the field in 2020.

In Erzurum Metropolitan Municipality Landfill Facility, 360 tons/day of solid waste generated in Palandöken, Yakutiye and Aziziye Central districts are disposed of through the landfill.

It should be noted these landfills have adequate capacities with relevant environmental permit: and they are operating in line with environmental legislation.

On the other hand, there is no solid waste landfill in Kars province. The assessment on how the generated waste will be disposed of in Kars is explained in detail in Chapter 4.5.3.

4.5.3 Impact Assessment

4.5.3.1 Land Preparation and Construction Phase

The initial phase of the project involves extensive excavation and earthworks, generating inert waste materials like soil, rocks, and debris. The volume of excavated materials depends on geological conditions, with a keen emphasis on potential reuse in construction or landscaping activities, aligning with local regulations. Concurrently, construction and demolition activities will yield diverse waste streams, encompassing concrete, bricks, wood, metals, and packaging waste. A comprehensive waste management plan will guide the proper segregation and recycling of materials, ensuring responsible disposal based on the scale of new construction and existing structure upgrades.

The installation of railway tracks may result in surplus ballast, old track components, and packaging materials, all of which will undergo either reuse or appropriate disposal, with dedicated efforts to recycle packaging waste. Furthermore, the construction of new stations or facility upgrades will contribute to solid waste, including concrete, steel, glass, and packaging waste. A tailored waste management plan, specific to construction and demolition waste, will facilitate recycling and responsible disposal practices. Activities involving vegetation clearing will generate organic waste, comprising branches, leaves, and plant debris. Sustainable practices, such as composting or mulching, will be employed to manage this organic waste effectively.

In addition to construction-related waste, there will be packaging waste from construction materials and equipment, including plastic, cardboard, and metal. Collection points dedicated to recycling or proper disposal will be established to manage packaging waste responsibly. Temporary facilities set up during construction are anticipated to generate waste, primarily household and packaging materials. Rigorous waste management practices, including recycling, will be implemented to minimize contributions to landfills. Certain activities, such as painting, may produce hazardous waste like paint residues and solvents, necessitating stringent management and disposal protocols to prevent environmental contamination. The overarching waste management plan for the project underscores a commitment to sustainability, recycling, and adherence to environmental standards, mitigating the environmental impact associated with solid waste generation.

Solid waste types expected to be generated within the scope of the human activities are; domestic solid wastes, packaging waste of equipment (e.g. wood, cardboard, plastic, etc.), and hazardous waste.

Hazardous waste can be composed of chemicals, (e.g. paint, solvent), packaging materials, cloths contaminated with oils, waste oils, solvents, accumulators, batteries and filters resulting from machine operation and maintenance.

According to the waste lists given in the annexes of the Waste Management Regulation, the types of waste and waste codes that may occur during the land preparation and construction phase of the Project are given in Table 57.

Table 57. General List of Wastes for Land Preparation and Construction Phase

Waste Code	Waste Code Definition
13	**Oil Wastes and Liquid Fuel Wastes (except food oils, 05 and 12)**
13 02	Waste Engine, Transmission and Lubricating Oils
15	**Waste Packaging and Absorbents (not reword), Wiping Cloths, Filter Materials and Protective Clothing**
15 01	Packaging (Including Separately Collected Packaging Wastes of the Municipality)

Waste Code	Waste Code Definition
15 02	Absorbents, Filter Materials, Cleaning Cloths and Protective Clothing
16	**Wastes Not Reword in the List**
16 06	Batteries and Accumulators
17	**Construction and Demolition Waste (Including Excavation Excavated from Contaminated Areas)**
17 01	Concrete, Brick, Tile, Ceramic
17 02	Wood, Glass and Plastic
17 04	Metals (including alloys)
17 05	Soil (Including Excavated Materials from Contaminated Places), Stones and Dredging Muds
17 06	Insulation Materials and Construction Materials Containing Asbestos
17 09	Other Construction and Demolition Waste
20	**Municipal Wastes Including Separately Collected Fractions (Residential and Similar Commercial, Industrial and Institutional Wastes)**
20 01	Separately Collected Fractions (except 15 01)
20 03	Other Municipal Waste

Excavation and Construction Wastes

The amount of excavation expected to occur during the construction phase of the project is approximately 8,100 m^3. Within the scope of the project, the excavation material is intended to be used as filling material as much as possible, to ensure efficient use of resources, minimize the amount of waste to be extracted and reduce associated costs.

In addition to excavation wastes some other materials constitute construction waste such as some temporary structures, garbage materials and other materials such as residual, unusable concrete. Recyclable waste such as cement bags, scrap metals, packaging and wooden crates will be separated from other wastes and temporarily stored on the worksite for final recycling. Contracts will be signed with licensed companies to transport recyclable waste from construction sites.

Non-hazardous Solid Waste

The estimated amount of municipal waste that will occur during the land preparation and construction phase of the project is given in Table 58 according to the number of people working in the field. This amount includes separately collected fractions such as paper, cardboard, glass, metal, plastic and biodegradable waste.

Table 58. Waste to be Generated

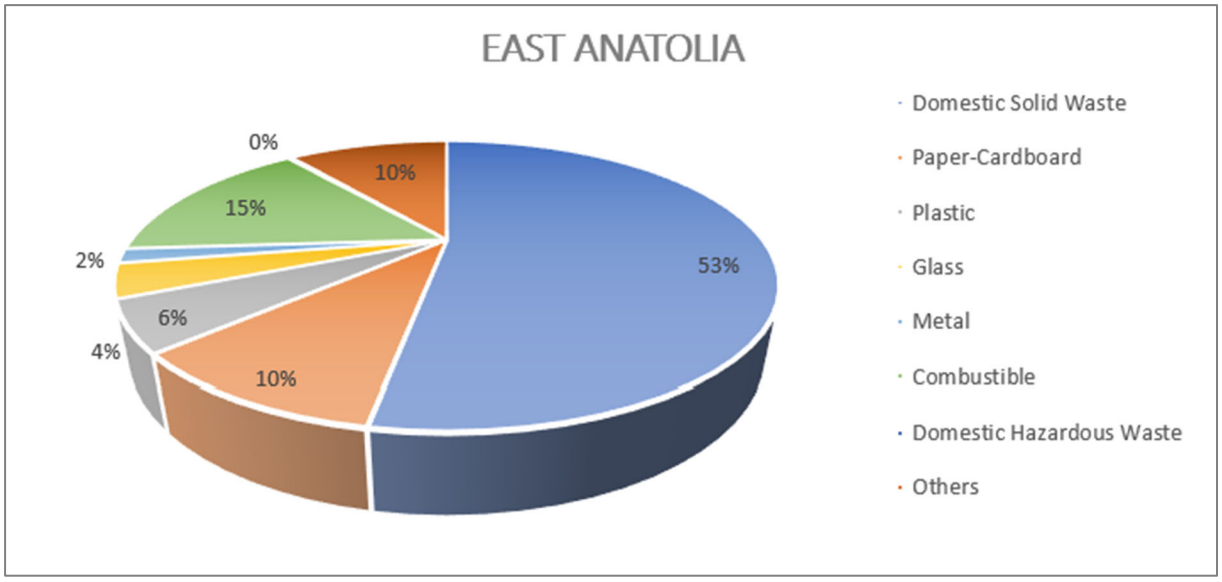
Location	Generated waste (kg-day*capita) (2020)	People to be employed during construction	Amount of waste (kg/day)
Sivas	1.11	57	63.27
Erzurum	1.16	57	66.12
Erzincan	0.9	57	51.30
Kars	1.13	57	64.41

Municipal waste is defined as waste that is classified as non-hazardous and originated from houses or that is similar in content or structurally in the twentieth section of Annex-IV of the Waste Management Regulation. Medical wastes, hazardous wastes, excavated soil, construction-wreckage wastes, and special wastes do not include in these kinds of wastes.

Within the scope of the National Waste Management and Action Plan (2016-2023)[1], the components of municipal waste are categorized by region. 55% of the municipal waste generated according to the municipal waste characterization of the East Anatolian region, where the Project Route is located, is in the bio-waste category. This municipal waste includes

bio-waste, paper-cardboard, plastic, glass, metal, combustible, domestic hazardous waste and other wastes. East Anatolia solid waste characterization is examined below.

Figure 34. Percentage of Municipal Waste Distribution in the East Anatolia Region (GDEM, 2017)



Accordingly, the amount of waste to be generated during the land preparation and construction phase of the project is given below:

Table 59. Municipal Waste Components and Amounts Estimation (Land Preparation and Construction Phase)

Waste Type	Sivas (kg/day)	Erzincan (kg/day)	Erzurum (kg/day)	Kars (kg/day)
Domestic Solid Waste	33.39	34.90	27.08	37.97
Paper-Cardboard	6.42	6.71	5.21	7.30
Plastic	3.50	3.66	2.84	3.99
Glass	2.42	2.53	1.96	2.75
Metal	1.06	1.10	0.86	1.20
Combustible	9.66	10.10	7.83	10.99
Domestic Hazardous Waste	0.19	0.20	0.16	0.21
Others	6.62	6.92	5.37	37.97

For all the provinces, at Sivas, Erzincan, Erzurum and Kars, priority will be given to the local people for the personnel to be employed within the scope of the project. For this reason, a significant part of the personnel to be employed will not add to the domestic waste production of the project, thus resulting in the actual increase of waste caused by the Project will be lower.

In order to reduce the total amount of domestic waste production to be sent to the landfill site, waste management training will be given and separate collection of packaging waste at the logistics center and construction sites will be encouraged. Therefore, the load likely to be added to the existing waste disposal infrastructure capacity by the Project will be negligible. The impact will be temporary and will significantly decrease upon completion of the construction phase.

The solid wastes to be generated within Sivas, Erzincan, and Erzurum will be first temporarily stored in the camp site. Then, it will be transported to the city's sanitary landfill for final disposal. In Kars, the generated wastes will be transported to the most adequate city landfill according

to the opinion to be obtained from Provincial Directorate of Environment, Urbanization and Climate Change.

Hazardous and Special Wastes

During the land preparation and construction phase of the project, various hazardous wastes will also be produced as a result of activities that require the use of fuel, chemicals, paints and solvents. If not properly managed, hazardous waste can result in soil, surface water, and groundwater contamination; it can also create health and safety issues for local communities and project staff.

The hazardous and special wastes mentioned below are expected to be produced as a result of land preparation and construction activities. It should be noted that the excavation works will constitute the largest part of the land preparation and construction phase, and the amount of chemicals and hazardous substances used for construction works is expected to be limited:

- Wastes and materials contaminated with hazardous substances such as lubricants, hydraulic fluids or fuels (personal protective equipment, rugs, clothes, etc.),
- Operation and maintenance of construction equipment and machinery that require the use, storage and transportation of different amounts of fuels, oils and lubricants,
- Solvents and paints to be used in construction activities,
- Vegetable oils, batteries, electrical / electronic equipment, cables, fluorescent lamps, medical supplies consumed by the Project staff,
- Scrap metals metal goods and materials that have been in contact with fuels, hazardous or dangerous substances / chemicals, etc.
- Waste tires and accumulators from construction machinery.
- Maintenance and repairs will be carried out on impermeable grounds. During the repair work to be done in case of any breakdown of machinery and equipment, waste tires, waste batteries and machine equipment parts can be taken place.
- Accumulators expected to occur in case of maintenance and repair operations at the construction site will be given to companies that collect such wastes and provide recycling in accordance with the Waste Management Regulation.
- Waste tires expected to occur after maintenance and repair operations at the construction site will be delivered to the companies or authorized carriers that distribute and sell tires in accordance with the Regulation on Control of End-of-Life Tires.
- Oil change of construction machinery will be carried out every two months, at least once. Oil change for maintenance of the machines will be done at licensed services. Thus, there will be no waste oil production during the land preparation and construction phases of the project.
- In the infirmary, which is planned to be installed at the construction sites during the construction works, only first aid equipment will be available to carry out the first response. At this stage, medical waste generation is not expected, only a small amount of bandage wastes will be generated. These wastes will be collected in private containers in the infirmary and given to the licensed Medical Waste Disposal Facilities. During the construction phase of the project, the provisions of the “Medical Waste Control Regulation” published in the Official Gazette dated 25.01.2017 and numbered 29959 will be complied with.

It is necessary to properly manage hazardous and special wastes to avoid significant impacts on receiving environments and human health.

4.5.3.2 Operation Phase

During the operational phase of the project, routine maintenance activities are anticipated to generate various waste materials across the cities involved, including Erzincan, Sivas, Erzurum, and Kars. These activities are integral to the sustained functionality of the railway

system, ensuring its efficiency and safety. The proactive identification and understanding of these waste streams are crucial for the development and implementation of effective waste management strategies, aligning with environmental sustainability goals and minimizing the potential impact on local ecosystems.

Routine maintenance activities during the operational phase are expected to generate waste materials, including old rail sections, fasteners, and worn-out components. The regular upkeep of railway systems will contribute to the generation of operational waste, encompassing materials such as ballast, track ballast, and used railway ties.

Discarded materials resulting from routine maintenance of the railway infrastructure, including rail sections, fasteners, and associated components, will contribute to operational waste. Waste generated during the operational phase will include materials from standard maintenance activities on the railway, such as ballast and waste from worn-out railway ties.

Non-hazardous Solid Wastes

During the operation phase, solid waste generation that will arise from the personnel working at the stations. In the feasibility studies carried out within the scope of the project, the number of staff to be employed during the operation phase is estimated to be 35 in total. In this case, during the operation phase, the daily amount of waste to be generated is estimated as given in Table 60.

Table 60. Wastes to be Generated during Operation

Location	Generated waste (kg-day*capita)	People to be employed during operation phase	Amount of waste (kg/day)
Sivas	1.11	8	8.88
Erzurum	1.16	9	10.44
Erzincan	0.9	9	8.10
Kars	1.13	9	10.17

When the composition of the waste is evaluated within the scope of the National Waste Management and Action Plan (2016-2023), the components of the waste are indicated in Table 61.

Table 61. Municipal Waste Components and Amounts Estimation (Operation Phase)

Waste Type	Sivas (kg/day)	Erzincan (kg/day)	Erzurum (kg/day)	Kars (kg/day)
Domestic Solid Waste	4.688	5.508	5.508	5.37
Paper-Cardboard	0.896	1.062	1.062	1.032
Plastic	0.496	0.576	0.576	0.564
Glass	0.336	0.396	0.396	0.39
Metal	0.144	0.174	0.174	0.168
Combustible	1.36	1.596	1.596	1.554
Domestic Hazardous Waste	0.032	0.03	0.03	0.03
Others	0.928	1.092	1.092	1.062

A comprehensive waste management programs will be implemented to systematically collect, segregate, and dispose of waste generated during routine maintenance and operational activities.

Wastes from Maintenance and Repair Operations

During the operation phase, the formation of wastes that will result from the maintenance and repair of the trains will occur. Maintenance-repair wastes can be generally described as follows:

Ballast Cleaning: In this activity, which is repeated once every 5 years on average, it is estimated that waste generation (substance without ballast properties) will be released.

Superstructure Renovation/Renewal: Wastes to be caused by concrete sleepers (concrete blocks on which rails sit) resulting from superstructure renewal activities performed every 30 years on average.

Infrastructure Renovation/Renewal: Infrastructure renewal works to be carried out in extraordinary situations during the operation of the railway line, and its frequency cannot be estimated.

Accordingly, wastes listed below will be generated due to maintenance and repair work;

- Metal Waste (rivets, screws, sheet-machine parts, washers, locks, etc.),
- Dust Seals, Electric Cables, Polyethylene and Polypropylene Parts,
- Cabin Glasses and Wagon Wood, Loading Crossbars,
- Waste Engine and Gear Oils,
- Welding and Paint Burrs,
- Oily cloth, gloves, etc.

The maintenance / repair work on the railway route will be carried out at large intervals or in one-off situations. Intensive waste generation is not expected during the operation phase. All waste management will be carried out in accordance with the “Waste Management Regulation” dated 02.04.2015 and numbered 29314.

Hazardous and Special Wastes

Limited quantities of hazardous and special wastes to be generated at this stage will include the following:

- Hazardous wastes related to maintenance (waste oils of maintenance vehicles, paint containers, hydraulic oils, packaging materials, protective personal equipment, filters and other materials contaminated with dangerous substances, etc.),
- Dismantled paint materials,
- Hazardous waste discharged in violation of the law (hazard will be determined by analysis)

4.5.4 Potential Impact Significances and Mitigation Measures

4.5.4.1 Waste Generation

The waste management hierarchy (see Figure 29) is the basis of waste management that will be implemented during the land preparation, construction and operation phases of the project. On this basis, the priority will be to maximize the conservation of resources, to avoid waste generation or to minimize waste production at the source where it is not possible to avoid waste generation.

To minimize waste generation and effectively implement the ESMP and Pollution Prevention and Waste Management Plan (PPWMP) that will be developed within the scope of the project, it is necessary that all personnel receive the necessary training during the construction phase. Any waste generated in areas where waste generation cannot be avoided will be evaluated for reuse, recycling, recovery and proper sorting, depending on the type of waste. Where the reuse option at the site is not applicable (such as reuse of suitable excavation material in filling works), waste will be transported by licensed firms and based on the type of waste, for selecting other processes like reuse, recycling and recovery options. Where only another alternative is left, the last option would be to send the waste to the landfill and finally dispose of it.

In addressing the waste management challenges in Kars, where the absence of a sanitary landfill and wild dumping is observed, comprehensive and site-specific mitigation measures will be implemented. The following measures will be put in place to manage and minimize the impact of waste generated during the project:

- Designated and secure temporary waste storage areas will be established at construction site in Kars to prevent uncontrolled/wild dumping. These areas will be equipped with proper signage and waste segregation facilities to encourage responsible disposal practices among construction workers.
- Regular inspections and monitoring of waste management practices in Kars construction site will be conducted to identify and address any deviations from the prescribed guidelines. Strict penalties for illegal dumping will be implemented to deter such activities and maintain the integrity of the local environment.
- Specialized training on effective waste management practices will be provided to construction personnel in Kars. This includes guidance on waste segregation, handling, and disposal methods to ensure compliance with environmental standards.
- Through the implementation of these mitigation measures, the project aims to address the specific challenges associated with waste management in Kars Construction Site, fostering a cleaner and more sustainable local environment.

4.5.4.2 Material Use

Aggregate material will be needed during the construction phase of the Project. However, types and volumes of materials to be used have not been specified in the feasibility study.

If the Contractor decides to operate a new quarry/borrow site during the construction phase, the E&S assessments should be performed by the Contractor in line with the Management of Change Process described in ESMP. More specifically, the environmental subjects listed below should be assessed;

- Air Emissions,
- Noise and Vibrations,
- Water Use,
- Waste Generation,
- Land Conversion (Reinstatement).

During shoveling, ripping, drilling, blasting, transport, crushing, grinding, screening, and stockpiling) activities dust emissions are expected. To control dust emission:

- Land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles, and blasting should be planned with due consideration to meteorological factors (e.g., precipitation, temperature, wind direction, and speed) and location of sensitive receptors,
- A simple, linear layout for materials-handling operations to reduce the need for multiple transfer points should be designed and installed (e.g., processing plants should be preferably located within the quarry area),
- Dust emissions from drilling activities should be controlled at the source by dust extractors, collectors, and filters, and wet drilling and processing should be adopted, whenever possible,
- Dust emissions from processing equipment (e.g., crushers, grinders, screens) should be adequately controlled through dust collectors, wet processing, or water spraying. Dust control applications should consider the final use of extracted material (e.g., wet-processing stages are preferred when wet materials or high-water contents would not negatively affect their final use),
- Procedures to limit the drop height of falling materials should be adopted,

- Use of mobile and fixed-belt transport and conveyors should be preferred to hauling the material by trucks through internal roads (enclosed rubber-belt conveyors for dusty materials are recommended in conjunction with cleaning devices),
- Internal roads should be adequately compacted and periodically graded and maintained,
- A speed limit for trucks should be considered,
- Water spraying and surface treatment (e.g., hygroscopic media, such as calcium chloride, and soil natural–chemical binding agents) of roadways and exposed stockpiles using a sprinkler system or a" water-mist cannon" should be implemented,
- Exposed surfaces of stockpiled materials should be vegetated.

Moreover, to control, NO_x and CO emissions:

- Alternatives to blasting, such as hydraulic hammers or other mechanical methods,
- If blasting is necessary, planning of the blasting (arrangement, diameter, and depth and direction of blast holes) should be implemented,
- The correct burning of the explosive, typically composed of a mixture of ammonium nitrate and fuel oil, should be ensured by minimizing the presence of excess water and avoiding incorrect or incomplete mixing of explosive ingredients.

Significant levels of noise levels can be expected during the activities such as blasting and extraction. For noise emissions, the following measures have to be considered:

- Reduction of noise from drilling rigs by using downhole drilling or hydraulic drilling,
- Implementation of enclosure and cladding of processing plants,
- Installation of proper sound barriers and (or) noise containments, with enclosures and curtains at or near the source equipment (e.g., crushers, grinders, and screens),
- Use of rubber-lined or soundproof surfaces on processing equipment (e.g., screens, chutes, transfer points, and buckets),
- Use of rubber-belt transport and conveyors,
- Installation of natural barriers at facility boundaries (e.g., vegetation curtains or soil berms),
- Optimization of internal-traffic routing, particularly to minimize vehicle-reversing needs (reducing noise from reversing alarms) and to maximize distances to the closest sensitive receptors,
- The use of electrically driven machines should be considered,
- A speed limit for trucks should be considered,
- Avoidance of flame-jet cutting,
- Construction of berms for visual and noise screening.

Moreover, to control vibration:

- Use of specific blasting plans; correct charging procedures and blasting ratios; delayed, micro delayed, or electronic detonators; and specific in situ blasting tests (the use of downhole initiation with short-delay detonators improves fragmentation and reduces ground vibrations),
- Development of blast design, including a blasting-surfaces survey, to avoid over confined charges and a drill-hole survey to check for deviation and consequent blasting recalculations,
- Implementation of ground vibration and overpressure control with appropriate drilling grids (e.g. grid versus hole length and diameter, orientation of blasting faces) and appropriate charging and stemming process of boreholes, to limit potential issues with fly rock and air blasts,
- Hydraulic hammers or other mechanical methods should be preferred to improve rock fragmentation and minimize fly-rock risks, instead of using secondary blast (plaster blasting),
- Mechanical ripping should be preferably used to avoid or minimize the use of explosives,

- Other sources of vibrations are primary crushers and screening equipment. Adequately designed foundations for these facilities should sufficiently limit vibrations.

Water will be needed during the operation of the quarries and borrow sites. On the other hand, water needs should be limited through recirculation and reuse, implementing closed-circuit systems from sedimentation ponds to the quarrying process. If water use is significant, especially in arid or semi-arid regions, a water-resource availability and impact assessment should be conducted. Moreover, any alteration to water regime via surface water and groundwater should be controlled.

Dewatering of the quarrying pit, diamond-wire cutting, and surface water runoff can generate a wastewater discharge high in suspended solids. To prevent or minimize the suspended sediments in discharge waters the following are recommended:

- Adoption of settlement ponds, sumps, and lagoons designed to allow adequate retention time. Lagoons should be sealed with impervious material, as needed, and adequate maintenance programs of the settlement lagoons should be implemented, including side-slope stability, pipe cleaning/maintenance, and removal of settled materials,
- Recycling of processing / wire cutting waters,
- Construction of a dedicated drainage network,
- Settlement enhancement by using flocculants or mechanical means, particularly where limited space prevents or limits the use of lagoons,
- Installation of sediment traps along water drainages, including fascines, silt fences, and vegetation traps.

Rock waste and removed topsoil–overburden are the main inert wastes produced by quarrying activities. Hazardous wastes may be generated from impurities and trace components included in the exploited (waste) rocks (e.g., asbestos or heavy metals or minerals that could result in acidic runoff). The recommended prevention and control methods to reduce wastes include the following:

- Operational design and planning should include procedures for the reduction of waste production (e.g., blending high-quality rock with poor rock),
- Topsoil, overburden, and low-quality materials should be properly removed, stockpiled near the site, and preserved for rehabilitation,
- Hazardous and non- hazardous waste management plans should be developed and adopted during the design and planning phase. Impacts associated with specific chemical and / or physical properties of extracted materials should be considered during the design phase and impacts from waste rock impurities should be adequately controlled and mitigated by covering waste disposals with noncontaminated soil.

Excavation activities at construction materials extraction sites often involve major topographical and land-cover changes to allow extraction activities, often including clearing of preexisting vegetation. Therefore, proper reinstatement activities should be conducted after operation of the quarry ends. Measures to have an adequate reinstatement activity includes but not limited to:

- Selection of appropriate low-impact extraction (e.g., excavation, quarrying, and dredging) methods that should result in final site contours supportive of habitat restoration principles and final land use,
- Establishment of buffer zones from the edge of extraction areas, considering the characteristics of the natural habitats and the type of extraction activities,
- To reduce the consumption of land area and, consequently, the loss of soil, preference for extraction should be given to thicker deposits (these should be exploited as far as possible and as reasonable),

- Vegetation translocation and relocation techniques should be used as necessary. Vegetation cover, such as native local plants, topsoil, overburden, or spoils feasible for sustaining growth should be removed in separate operations and segregated for later use during site reinstatement, and materials to be used for site reinstatement should be stockpiled and protected from wind and water erosion, as well as from contamination,
- During extraction, ecological niches should be preserved and protected as far as possible,
- Smaller, short-lived extraction sites should be reclaimed immediately, and larger sites with a useful lifespan beyond 3-5 years should be subject to ongoing rehabilitation,
- Management of further site development through routine topographical and land surveys,
- During reinstatement, affected land should be graded and appropriately scarified before soil layers are reapplied, sustaining vegetative regrowth where needed (the combined thickness of topsoil and the growth layer should not be less than that prevailing in the undisturbed areas),
- Affected land should be rehabilitated to acceptable uses consistent with local or regional land use plans. Land that is not restored for a specific community use should be seeded and revegetated with native species,
- Test pits, interim roads (internal and access), buildings, installations, and structures of no beneficial use should be removed, and the land should be appropriately rehabilitated. Hydrological systems should be restored to predevelopment runoff rate.

If the Contractor will have the material obtained from licensed borrow pits and quarries, it will be ensured that the areas and quarries have “EIA Positive” or “EIA Not Required” Decisions. The Contractor will prepare an Aggregate Management Plan and submit to AYGM for approval. The Contractor will identify potential borrow pits and quarries with indication of capacities, while providing measures for site reinstatement within the Aggregate Management Plan and supervise the implementation of the plan. Aggregate Management Plan will include mitigation measures for E&S risks and environmental monitoring needs.

Potential impacts of resource and waste management, mitigation measures and residual impacts are given in Table 62 as a result of the evaluation conducted based on E&S Impact Assessment Methodology (see Appendix-2).

Table 62. Resource and Waste Management-Related Impact Significances and Proposed Mitigation Measures

Definition of Impact	Project Phase	Magnitude of Impact						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact
		Receptor	Extent	Reversibility	Duration	Frequency	Overall Magnitude				
Possible impacts from storage of excavation surplus materials	Land preparation and Construction	Environmental resources (soil, surface water, groundwater), Ecological receptors, Community health and safety	Restricted	Medium-term reversible	Medium-term	Continuous	Medium	Medium	**Moderate**	▪ Use of excavation material as much as possible in filling works, ▪ Storage of excavated material that cannot be used for filling operations in designated storage area(s) where necessary permissions have been obtained and having sufficient capacity. ▪ Proceeding according to the cut and fill program to minimize excavation wastes during excavation operations.	**Negligible**
Hazardous and Non-Hazardous Solid Waste Management	Land preparation and Construction	Environmental resources (soil, surface water, groundwater), Ecological receptors, Community health and safety Project staff health and safety	Restricted	Short-term reversible	Short term	Continuous	Medium	Medium	**Moderate**	▪ To comply with the requirements of applicable waste management regulations for the management of all waste generated as a result of the project activities, ▪ Separation of wastes (hazardous / non-hazardous, recyclable / non-recyclable) and temporary storage in designated storage areas, ▪ Ensuring that waste storage areas meet the standards set by the relevant legislation: - Determining sufficient and appropriate storage areas and ensuring that conditions such as container types, labels and classifications are appropriate in these areas, - Ensuring impermeability on the grounds of storage areas against possible contamination of soil and groundwater, - Sufficient ventilation of the area under conditions where volatile wastes need to be stored, - Establishing a suitable drainage system against leaks, - Restriction of physical access to waste storage areas (through gates, fences, etc.); ensuring that only authorized persons can enter the storage areas, - Placing warning signs and panels with the name and contact number of authorized personnel in storage areas, - In order to be prepared for emergencies such as spillage and fire, keep absorbent materials, fire extinguishing equipment, etc. ready near the area, - Quick identification of any possible spillages / leaks by periodically performing visual checks in hazardous waste areas, ▪ Ensuring that wastes are not spilled out of areas other than those reserved for this purpose and providing all necessary waste management trainings to all personnel and periodic repetition of these trainings, ▪ No waste should be disposed of or burned at the construction site, ▪ Marking waste explosives and using explosive containers as explosive waste. Storage of explosive wastes separately in storage areas reserved for this purpose, where only authorized personnel can work. Delivery of these wastes to licensed companies, ▪ Ensure that Contractor and its subcontractors implement the relevant management plan(s) and comply with Project Standards and the measures specified in this ESIA. ▪ Pollution prevention and waste management plan and will be implemented.	**Negligible**
	Operation	Environmental resources (soil, surface water, groundwater), Ecological receptors, Community health and safety Health and safety of station staff	Wide	Short-term reversible	Long term	Continuous	Medium	Medium	**Moderate**	▪ Visual control of waste and garbage spilled along the railway route and periodic collection of these garbage, separation of these wastes according to their recyclability, storage of separated wastes in separate containers and disposal according to the Waste Management Regulation. ▪ Using lead-free paints for maintenance work. ▪ Collecting the garbage that will occur at the stations from the collection areas to be placed in the station and forwarding them to the related sanitary landfill and/or solid waste storage facility with the licensed collection trucks of the relevant Municipality.	**Negligible**
Additional load on the waste management facilities of the region	Land preparation and Construction Operation	Regional waste management infrastructure	Wide	Irreversible	Long term	Continuous	Low	Low	**Negligible**	▪ In line with the waste management hierarchy and good practices, preferring reuse and recycling practices, ▪ Ensuring that waste disposal agreements are made with municipalities and licensed recycling / disposal firms.	**Negligible**
Waste Management in Kars Province where no sanitary landfill available	Land preparation and Construction	Kars Province	Local	Short-term reversible	Long term	Continuous	Medium	Low	**Minor**	▪ Designated and secure temporary waste storage areas will be established at construction site in Kars to prevent uncontrolled/wild dumping. These areas will be equipped with proper signage and waste segregation facilities to encourage responsible disposal practices among construction workers. ▪ Regular inspections and monitoring of waste management practices in Kars construction site will be conducted to identify and address any deviations from the prescribed guidelines. Strict penalties for illegal dumping will be implemented to deter such activities and maintain the integrity of the local environment. ▪ Specialized training on effective waste management practices will be provided to construction personnel in Kars. This includes guidance on waste segregation, handling, and disposal methods to ensure compliance with environmental standards. ▪ Through the implementation of these mitigation measures, the project aims to address the specific challenges associated with waste management in Kars Construction Site, fostering a cleaner and more sustainable local environment.	**Negligible**

Definition of Impact	Project Phase	Magnitude of Impact						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact
		Receptor	Extent	Reversibility	Duration	Frequency	Overall Magnitude				
Material Use	Land preparation and Construction	Borrow areas and quarries to be selected, Local People	Local	Short-term reversible	Long term	Continuous	Low	Low	**Negligible**	▪ If the Contractor will have material obtained from licensed borrow pits and quarries, it will be ensured that the areas and quarries have “EIA Positive” or “EIA Not Required” Decisions and relevant environmental permit (as appropriate). ▪ The Contractor will identify potential borrow pits and quarries with indication of capacities, while providing measures for site reinstatement within the Aggregate Management Plan (that will include mitigation measures for E&S risks and impacts and monitoring requirements) and supervise the implementation of the plan. ▪ In case of the Contractor plans to use its own quarry, the Contactor will provide its own ES assessment, prepared in line with national requirements and WB ESF, and share it with AYGM and WB. The works in quarry will not commence once the ES assessment and relevant mitigation measures are found to be adequate by AYGM and WB.	**Negligible**

4.6 Cultural Heritage

4.6.1 Project Standards and Methodology

The ESIA cultural heritage assessment studies for the identification, assessment and management of the potential project's impacts on the cultural heritage have been performed by REGIO Cultural Heritage Management Consultancy (REGIO).

During cultural heritage impact assessment studies, a total of six provinces, 22 districts and 188 villages/neighborhoods were considered throughout the project route corridor (see Figure 1) and their names are given in Table 63. The tangible cultural heritage assessment studies were carried out as both desktop reviews and field surveys. However, the main project activities consist of rehabilitation works to be carried out on the existing railway route (old railway route) and the construction activities (splitting, filling, blasting, etc.) that may have created irreversible effects on intangible cultural assets were completed before the cultural heritage impact assessment field studies and there were no records of nor complaints about the irreversible effect on the intangible cultural heritage assets within the Project Impact Areas. Hence, it was deemed sufficient to carry out the intangible cultural heritage assessment studies as only desktop reviews.

The tangible cultural heritage study comprised a desk study of the data available for the study area and field surveys of the railway route conducted by the senior archaeologists. The main objectives of the study are summarized below:

- Identifying the exact location and properties of registered and unregistered cultural heritage sites and assets located within the cultural heritage study area of the ESIA based on desk study and field surveys (Unregistered 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 (ii) other sites including the remains of a historic bridge, a grave/ graveyard, fountain, civilian architecture samples etc.).
- Defining the adverse effects on the tangible and intangible cultural heritage assets which may occur as the result of project related activities (including all Project phases).
- Developing mitigation measures for the management of registered and unregistered cultural heritage within the study area, consistent with the requirements and procedures set by the Law on the Conservation of Cultural and Natural Property (No. 2863) 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 (No. 2863) and identify the management measures to be required by the authorities for those sites (e.g. measures to be taken by the Contractor prior to site entry).
- 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 Türkiye 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.

The scoping of the tangible and intangible cultural heritage studies, including the baseline, impact assessment and management, has been done as summarized in Table 63.

Table 63. Geographical Scope of Tangible and Intangible Cultural Heritage Studies

Section	Provinces	Districts	Villages/Neighborhoods
BTK	Ardahan	Çıldır	Akçakale, Aşağıcambaz, Damlıca,Karakale, Yukarıcambaz
Divriği-Kars	Kars	Arpaçay, Merkez, Sarıkamış, Selim, Susuz	Aydingün, Çanaksu, Doğruyol, Göldali, Gönülalan, Kuzgunlu, Taşbaşi, Yenimahalle, Kakaç, Aydinlikevler, Cumhuriyet, Dikme, Hafizpaşa, Karacaören, Karadağ, Ladikars, Mezra, Örnek, Paşaçayır, Yeni Mahalle, Istasyon, Karaurgan, Kurbançayir, Sırataşlar, Sirbasan, Süngütaş, Tepe, Yağbasan, Yenigazi, Yeniköy, Yukarisarikamiş, Çamyazi, Çatak, Aşağı Kotanli, Benliahmet, Cavlak, Cumhuriyet, Karaçayir, Köprübaşi, Yolgeçmez, Yukari Kotanli, Çarşi, Çaybaşi, Ağziaçik, Cumhuriyet, Çamçavuş, Harmanli, Inkilap, Porsuklu, Yolboyu
	Erzurum	Aşkale, Aziziye, Horasan, Köprüköy, Palandöken, Pasinler, Yakutiye	Altintaş, Dalli, Demirkiran, Karasu, Küçükgeçit, Ortabahçe, Pirnakapan, Saptiran, Sazli, Tazegül, Taşağil, Tecer, Topalçavuş, Çayköy, Alaca, Atlikonak, Demirgeçit, Gezköy, Ilica, Çiğdemli, Azap, Bulgurlu, Camiikebir, Dalbaşi, Esentepe, Hizirilyas, Inönü, Karaçuha, Çiftlik, Şerefiye, Köprüköy, Yapağili, Yukari Söğütlü, Nenehatun, Uzunahmet, Alvar, Bahçelievler, Büyüktüy, Ebsemce, Kethuda, Paşabey, Pusudere, Yukari Danişment, Çakirtaş, Çöğender, Övenler, Üğümü, Şehit Burak Karakoç,Gez, Istasyon, Kavak, Müdürge, Soğukçermik, Çiftlik
	Erzincan	Çayırlı, İliç, Kemah, Kemaliye, Merkez, Tercan, Üzümlü	Doluca, Mirzeoğlu, Çataksu, AbdullahPaşa, Atma, Bağıştaş, Büyükköy, Çaltı, Çöpler, İbrahim Çeçen, Akyünlü, Alpköy, Aşağıgedik, Atma, Beklimçay, Beşikli, Çarşı, Dedek, Eriç, Göğüsbağı, Gökkaya, Kayabaşı, Koçkar, Koruyolu, Küplü, Mermerli, Muratboynu, Oğuz, Olukpınar, Sürek, Uluçınar, Yahşiler, Yastıktepe, Yücebelen, Gümüşçeşme, Beybağı, Beşsaray, Gani Efendi Çiftliği, Istasyon, Karadiğin, Oğlaktepe, Pekmezli, Söğütözü, Ulalar/Cemal Gürsel, Yoğurtlu, Altunkent, Gökçe, Köprübaşi, Mercan, Sucuali, Yeşilyayla, Yollarüstü, Çadirkaya, Altinbaşak, Altinbaşak/ Süleymanli, Avcilar, Bağlar, Demirpinar, Denizdami, Derebük, Karakaya, Pelitli, Pişkidağ, Sansa, Tanyerisarikaya
	Tunceli	Pülümür	Başkalecik, Dağyolu, Doğanpinar
	Sivas	Divriği	Adatepe, Ağilcik, Aşağihamam, Duruköy, Gezey, Güllübağ, Kalealti, Oyuktepe, Çobandurağı

4.6.1.1 Methodology for Baseline Studies

Desk Study

Publications on archaeological and historical cultural heritage related to the field of study and its immediate surroundings have been compiled in order to determine the cultural heritage potential of the project area. Existence of cultural assets has been recorded in the project construction areas and the project impact areas have been researched. Resources used during desk study were as follows:

- Inventory records of Regional Council for the Conservation of Cultural Property in Sivas, Erzurum and Kars,
- Academic publications,
- Historic/ topographic and digital maps, and
- Previous reports on the cultural heritage studies conducted in the area (published by other parties/academia, studies conducted by the cultural heritage team, etc.).

Field Surveys

The field surveys were conducted by the team of qualified experts of REGIO (Senior Archaeologist Halim Özatay, Senior Archaeologist Yunus Ekim). The cultural heritage team visited the proposed route of the Project in order to gather field data on the location and features of the tangible cultural assets.

During the 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.

4.6.1.2 Methodology for Impact Assessment

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 64 as per the Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS 2011).

Table 64. Example Guide for Assessing Value of Heritage Assets (ICOMOS CHIA Guidance – Appendix 3A)

Value Grading	Archaeology	Built heritage or Historic Urban Landscape	Historic Landscape
Very High	Sites of acknowledged international importance inscribed as World Heritage (WH) property.	Sites or structures of acknowledged international importance inscribed as of universal importance as WH property.	Landscapes of acknowledged international importance inscribed as WH property.
	Individual attributes that convey Outstanding Universal Value (OUV) of the WH property.	Individual attributes that convey OUV of the WH property.	Individual attributes that convey OUV of the WH property.
	Assets that can contribute significantly to acknowledged international research objectives.	Other buildings or urban landscapes of recognized international importance.	Historic landscapes of international value, whether designated or not
			Extremely well-preserved historic landscapes with exceptional coherence, time depth, or other critical factors.
High	Nationally designated Archaeological Monuments protected by the State Party's laws.	Nationally designated structures with standing remains.	Nationally designated historic landscape of outstanding interest.
	Undesignated sites of the quality and importance to be designated.	Other buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade.	Undesignated landscapes of outstanding interest.
	Assets that can contribute significantly to acknowledged national research objectives.	Conservation Areas containing very Important buildings.	Undesignated landscapes of high quality and importance, and of demonstrable national value
		Undesignated structures of clear national importance.	Well preserved historic landscapes, exhibiting considerable coherence, time depth or other critical factors.
Medium	Designated or undesignated assets that can contribute significantly to regional research objectives.	Designated buildings. Historic (unlisted) buildings that can be shown to have exceptional qualities or historical associations.	Designated special historic landscapes.
		Conservation Areas containing buildings that contribute significantly to its historic character.	Undesignated historic landscapes that would justify special historic landscape designation.
		Historic townscapes or built-up areas with important historic integrity in their buildings or built settings.	Landscapes of regional value.
			Averagely well- preserved historic landscapes with reasonable coherence, time depth or other critical factors.

Value Grading	Archaeology	Built heritage or Historic Urban Landscape	Historic Landscape
Low	Designated or undesignated assets of local importance.	"Locally Listed" buildings.	Robust undesignated historic landscapes.
	Assets compromised by poor preservation and/or poor survival of contextual associations.	Historic (unlisted) buildings of modest quality in their fabric or historical associations	Historic landscapes with importance to local interest groups
	Assets of limited value, but with potential to contribute to local research objectives.	Historic Townscape or built-up areas of limited historic integrity in their buildings or built settings.	Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations.
Negligible	Assets with little or no surviving archaeological interest.	Buildings or urban landscapes of no architectural or historical merit; buildings of an intrusive character.	Landscapes little or no significant historical interest.
Unknown potential	The importance of the asset has not been ascertained.	Buildings with some hidden (i.e. inaccessible) potential for historic significance.	N/A

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 65 presents a description of the impact magnitude for archaeology and cultural heritage receptors based on ICOMOS (2011).

Table 65. Criteria for Evaluating the Magnitude of Impact (ICOMOS CHIA Appendix 3B)

Impact Grading	Archaeological attributes	Built Heritage or Historic Urban Landscape Attributes	Historic landscape attributes
Major Change	Changes to attributes that convey OUV of 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.		
Moderate Change	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.	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.
	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 Change	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.	

Impact Grading	Archaeological attributes	Built Heritage or Historic Urban Landscape Attributes	Historic landscape attributes
Negligible Change	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.

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 66.

Table 66. Cultural Heritage Impact Significance Assessment Matrix (ICOMOS 2011)

Value of Heritage Asset	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	THE SIGNIFICANCE OF THE IMPACT CHANGE OR THE GENERAL IMPACT (EITHER ADVERSE OR BENEFICIAL)				
	Neutral	Slight	Moderate/ Large	Large	Very Large
For Other Cultural Heritage Assets	**The Significance of The Impact Change (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

In line with the ICOMOS Guidelines, sensitivity of intangible cultural assets and the magnitude of impact of the Project on those (if present) has been assessed with respect to the criteria stated in Table 67.

Table 67. Criteria for the Sensitivity of Intangible Cultural Heritage Receptors and Magnitude of Impact

Sensitivity Level	Criteria	Magnitude Level	Criteria
Very High	Areas associated with ICH 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	Major	Major changes to area that affect the ICH activities or associations or visual links and cultural appreciation.

Sensitivity Level	Criteria	Magnitude Level	Criteria
	importance		
High	Nationally designated areas or activities associatedwith globally important ICH 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 ICH 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	ICH 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 linksand cultural appreciation.
Negligible	Few associations or ICH 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 ICH of the area	No change	No change

The Project will adopt a proactive management of the potential Project impacts, prioritizing 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, ESS 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.

4.6.2 Baseline Conditions

The baseline conditions of the tangible and intangible cultural heritage elements within the study area have been characterized based on the findings of the desk study with field surveys conducted as part of the ESIA. The summary of the findings is listed below:

- Tangible Cultural Heritage
  - Number of nationally recognized cultural heritage sites: 26
  - Number of internationally recognized cultural heritage areas: 6
  - Number of archaeological/cultural heritage sites within Project license and impact areas which were defined by the CHIA team during the ESIA field studies: 58
- Intangible Cultural Heritage
  - Intangible cultural heritage elements which were listed in UNESCO Intangible Cultural Heritage List: 14
  - Intangible cultural heritage elements which were listed in the national inventory: 105 (Ardahan 5, Kars 9, Erzurum 23, Erzincan 12, Tunceli 6, Sivas 50)

4.6.2.1 Archaeological and Historical Background based on Desktop Review

Ardahan, Kars, Erzurum, Erzincan, Tunceli, Sivas, provinces hosting archaeological and cultural richness of Anatolia, are also located on the route of Project. The recent archaeological studies and reports prepared for different construction projects reveal that this project route

was inhabited between Paleolithic Period (app. BC 600000) and Ottoman Period and witnessed development of daily life and culture of mankind in these periods.

Anatolia has been home to many civilizations and a bridge between western and eastern cultures. In Anatolia there are important Early – Middle Miocene (app. 15 million years ago) fossil beds dating back before the signs of early settlements. The most important and the biggest ones of these fossil beds are located in the area surrounding the route of Project. Important fossil localities exist near Sivas, such as Hayranli in Haliminhani district and Duzyayla in Hafik district.

In these fossil localities, in addition to the primate fossils called hominoid, fossils of evolutional and ancestral forms such as Proboscidea, Ruminant, Carnivors, Rhinoceratidae, Equidae and Suidae have been found.

Several stone tools and traces belonging to Epipaleolithic and Paleolithic Period (app. BC 20000-9000) which started 2 million years ago and ended with Neolithic Period, are known from studies conducted in the vicinity of the cities of Kars, Erzurum, Erzincan and Sivas which are located on the path of Project.

During the archaeological studies and surveys carried out along the Borluk Valley near Borluk Village in Kars and in the area called Hamam near Nenehatun in Merkez district, Erzurum, natural rock shelters were discovered where the Paleolithic life can be seen.

A similar situation can be seen in Aceramic Neolithic Period and Neolithic Period (app. BC 10000/9000 – 7500/7000) in which wooden and stone pots had been used and pottery was not known. Production of pottery started in this period. In Neolithic Period, the selection of settlement areas had been made due to proximity to staple resources such as naturally elevated hills along the lake, marsh coasts and riverside terraces. These areas are rich in terms of animals such as birds, fish as well as d several molluscs in addition to the hunting animals. “Mergersen” near Catalyol, Sarkisla district, Sivas is this important Aceramic Neolithic settlement in Anatolia.

This period had been followed by Ceramic Neolithic and Chalcolithic Periods (7500/7000-3000 BC) with different architectural approaches, manufacturing types and pottery production.

Along with these sites, the surroundings of the project route archaeological evidences refering to Chalcolithic Period were determined; Akçakale (Ardahan), Karaz Hoyuk, Pulur Hoyuk, Alaybeyi Hoyuk and Sos Hoyuk (Erzurum), Kaleciktepe, Topcuyenikoy Hoyuk (Sivas-Hafik), Pilir Hoyuk, Kemiktepe Hoyuk, Karapinar Hoyuk, Dogancal Hoyuk (Sivas-İmranlı), Ziyarettepe Hoyuk, Ziyaret (Sivri) Tepe (Sivas-Zara).

Anatolia entered to Early Bronze Age in the beginning of the 4th millennium BC; the end of 3rd millennium BC. The cultural societies that lived in Anatolia in this period developed a technology that enabled them to add tin to copper to achieve a harder alloy called bronze. Aside from bronze, they also produced all kinds of items they needed from copper, gold, silver and natural gold-silver alloy. The transition from Chalcolithic Period to Early Bronze Age was continuous, architectural edifices, stamps, seals and idols in small town and villages continued their development according to local traditions. Similar to Chalcolithic Period, communities of the period which maintained their economy of agriculture and stockbreeding, have seriously improved in trade and mining. Latest archaeological studies carried out in Anatolia and vicinity have presented important data about extensity of trade activities with remote regions. During this period, the competent processing of metals such as gold, silver, copper and bronze had been improved. Rich metal findings which had been left as gifts to the dead in graves and pots for pouring molten metal in settlement areas in Anatolia show the level that had been achieved in this field. The quality and quantity of artifacts prove that people not only sought to produce food but they also reached an important level in art and mining.

Karaz Hoyuk which is in Kahramanlar village, Ilıca province of Erzurum, was a prominent place with its distinctive ceramic works as well as with its architecture and has a name which prevailed from Transcaucasians to Palestine' From Malatya-Elazig region to Northwestern Iran; was believed to be home to Karaz culture with different speculations on its location and roots.

This culture which differentiates regionally and is characterized by various names and named as Karaz Culture, spread from Northeastern Anatolia to Eastern Anatolia and existed over a wide geography that extends all the way to Palestine. Researchers have accepted the location within their political borders as the center of this culture, thus attributing different names such as "Early TransCaucasian Culture", "Yanik Culture", "Kirbeth Kerak Culture" and "Copper Age of Eastern Anatolia". Even though the center of this culture was Northeastern Anatolia, it is accepted that it was spread over the whole Eastern Anatolia. The earliest examples of Karaz Culture, which had existed throughout the 3rd millennium BC, were discovered in archaeological excavations in Karaz, Pulur, Guzellova, and Sos Hoyuk. The results of archaeological studies prove that Northeastern Anatolia had been inhabited as early as the start of Late Chalcolithic Period.

As far as Sivas district of the route is considered, Karapinar Hoyuk in Alçıören village, Hafik district, Gavurtepesi settlement in Zolluk area in Sofular village, Topcuyenikoy in Topcuyeni village boundaries, Seyh Halil Tekke Hoyuk located in Seyh Halil Tekke village located within the boundaries of Yildizeli district, Pulur Hoyuk in Guneykaya village, Mentese Hoyuk in Mentese village, Lafcilar Agili Hoyuk located near Zara district, Ziyaret (Sivri) Tepe Settlement in Ungor village and Yamacin Buyuk Tepe Hoyuk in Ayli village near central district of Sivas can be mentioned as settlements where Bronze Age remains can be seen.

Anatolia, in Middle Bronze Age which dated back approximately years between 1900 – 1500 BC, hosted large cities with fortification walls within cultures of Assyrian Trade Colonies and Early Hittite Kingdom.

In the regions and their surroundings located around the project route, existence of important settlement areas dating back to 2nd millennium BC is known. Tepecik, Bulamac Hoyuk, Sos Hoyuk in Pasinler plain, Karaz Hoyuk and Pulur Hoyuk in Ilica district in Erzurum, Kayalipinar near Yildizeli district in Sivas, Cadir Hoyuk are some of these areas hosting settlements dated back to Middle and Late Bronze Age in Anatolia.

Migration of Sea and North Peoples and Balcanic tribes in the beginning of 12th century caused new formations in Anatolian History. In Iron Age (1200-750/700 BC) Anatolian peninsula came under the rule of several principalities and kingdoms of various communities. Eastern Anatolia had distinctions from Central Anatolia in terms of different geographical features and created a reserved culture isolated from western regions. For this reason, cultural and political alterations in Western and Central Anatolia in the end of 12th century BC, did not affected Eastern Anatolia. In consequence of political disturbance and Sea Peoples Migration in the end of 12th Century BC, it is suggested that Central Anatolia had entered to Dark Age. It is known that Eastern Anatolia was not affected as much as Central Anatolia in the same period. Accordingly, in Anatolia the beginning of Iron Age was related to Sea Peoples Migration and its traces, development of the same period in Eastern Anatolia carried the traces of Transcaucasia and West Persian cultures' influences. Despite the adverse living conditions of the region, population density was very high, especially in the Iron Age and after. The existence of low fields and wide plains suitable for settlements increased this density.

Tilkitepe near Yolgecmez village in Selim district, Kars, Hasan Kale, Buyuk Tug Hoyuk, Tetikom Hoyuk, Sos Hoyuk in Erzurum Pasinler plain, Alacahoyuk in Ilica district, Kayalik Tepe Kalesi, Askale hoyuk within boundaries of Uzunahmet village, Altintepe in Erzincan, Cilhoroz and vicinity in Cayirli district, Erzincan, Cadirkaya Kalesi near Tercan, Cengerli Koyu Hoyuk in Refahiye, Dolmatepe in Yildizeli district in Sivas are the settlements presenting information reflecting Urartian (12th–6th century BC) culture.

Persian Kingdom, after being dominated Eastern Anatolia approximately in 546 BC, ended the Lydian dominance in Central and Western Anatolia and reigned in entire Anatolia until 334 BC. With the defeat of Persians by Macedonian Alexander the Great in 330-30 BC, Hellenistic Period began in Anatolia. Due to the power struggle of 4 major generals after the death of Alexander the Great, the empire divided among these generals and after that the Roman Empire dominated a wide part of Anatolia. Despite of cultural ascendancy of the Roman Empire, it is seen that the local characteristics predominated in Anatolian cultural history. With dimidiation of the Roman Empire in 330 AD, Anatolia took place within the borders of Eastern Roman Empire (Byzantine Empire).

There are many castles of all sizes from the middle age when the political environment of Anatolia changed rapidly. It is possible to see several examples of these castles near project route in Kars, Ardahan and Erzurum steps. Ziyaretkale near Ardahan-Hanak, Hasbey Castle in Kars-Selim, Kaptir Castle in Koprukoy, Erzurum, and Baskoy Castle in Erzincan, Divriği and Kesdoğan Castle in Sivas – Divriği are some examples of these castles.

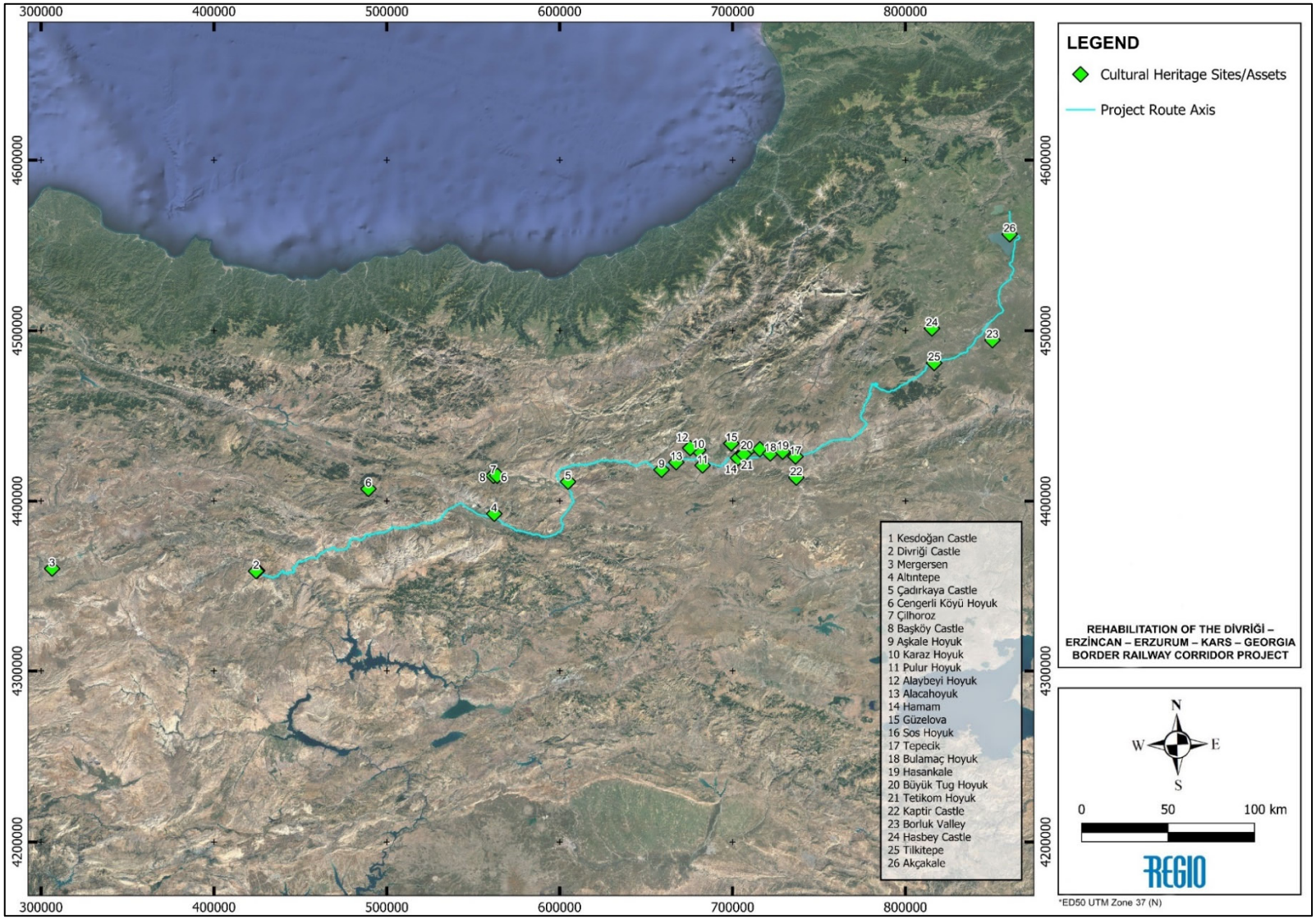
Starting from 1071, Seljuk Turks started coming to the area from East of Anatolia. They brought Islam along with them to Anatolia. After Seljuk Turks, starting from 1299, Ottomans dominated Anatolia. Ottomans who ruled in Anatolia for about 600 years became a large empire after the 16th century. In 1923, after the collapse of Ottoman Empire, modern Turkish Republic was founded by Mustafa Kemal ATATÜRK.

The historical background knowledge as the result of the desktop research is important in terms of demonstrating the potential of tangible cultural assets within the borders of Sivas, Erzurum, Ardahan and Kars provinces, including the Project route. Known settlements having cultural heritage importance vicinity of the Project Area are presented in Figure 35 and Table 68.

Table 68. Cultural Heritage Sites and Assets in Study Area Registered by MoCT

No	Name of the Registered Site or Asset	Province	District	Distance to Project Route (km)	Periods							
					Paleolithic Period	Aceramic Neolithic Period	Chalcolithic Period	Early Bronze Age	Middle Bronze Age	Late Bronze Age	Iron Age	Medieval
1	Kesdoğan Castle	Sivas	Divriği	0,4								
2	Divriği Castle	Sivas	Divriği	0,15								
3	Mergersen	Sivas	Şarkışla	116								
4	Altıntepe	Erzincan	Üzümlü	3								
5	Çadırkaya Castle	Erzincan	Tercan	4								
6	Cengerli Köyü Hoyuk	Erzincan	Refahiye	27								
7	Çilhoroz	Erzincan	Çayırlı	24								
8	Başköy Castle	Erzincan	Çayırlı	25								
9	Aşkale Hoyuk	Erzurum	Aşkale	1								
10	Karaz Hoyuk	Erzurum	Ilıca	5,2								
11	Pulur Hoyuk	Erzurum	Ilıca	2,5								
12	Alaybeyi Hoyuk	Erzurum	Ilıca	6,7								
13	Alacahoyuk	Erzurum	Ilıca	0,43								
14	Hamam	Erzurum	Center	0,07								
15	Güzelova	Erzurum	Center	8,5								
16	Sos Hoyuk	Erzurum	Pasinler	4,38								
17	Tepecik	Erzurum	Pasinler	1,9								
18	Bulamaç Hoyuk	Erzurum	Pasinler	0,55								
19	Hasankale	Erzurum	Pasinler	0,14								
20	Büyük Tug Hoyuk	Erzurum	Pasinler	2,3								
21	Tetikom Hoyuk	Erzurum	Pasinler	0,5								
22	Kaptir Castle	Erzurum	Pasinler	13								
23	Borluk Valley	Kars	Center	6,9								
24	Hasbey Castle	Kars	Selim	21								
25	Tilkitepe	Kars	Selim	0,36								
26	Akçakale	Ardahan	Çıldır	2,8								

Figure 35. Location of Cultural Heritage Sites and Assets in Study Area Registered by MoCT



4.6.2.2 Tangible Cultural Heritage Based on Field Surveys

Tangible cultural heritage related field research was conducted by the team of qualified experts of REGIO between 30 October 2023 and 06 November 2023. Registered / non-registered tangible cultural heritage sites located within the study area have been identified by the REGIO team through ESIA surveys. The sites identified to be located within the study area have been classified based on the criteria presented in Table 69.

Table 69. 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			
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 historical structures such as Railway Station Facilities, bridge, fountain and grave/cemetery etc.		

Provincial distribution of the sites identified within the project route is presented in Table 70.

Table 70. Provincial Distribution of Registered and Non-registered Sites

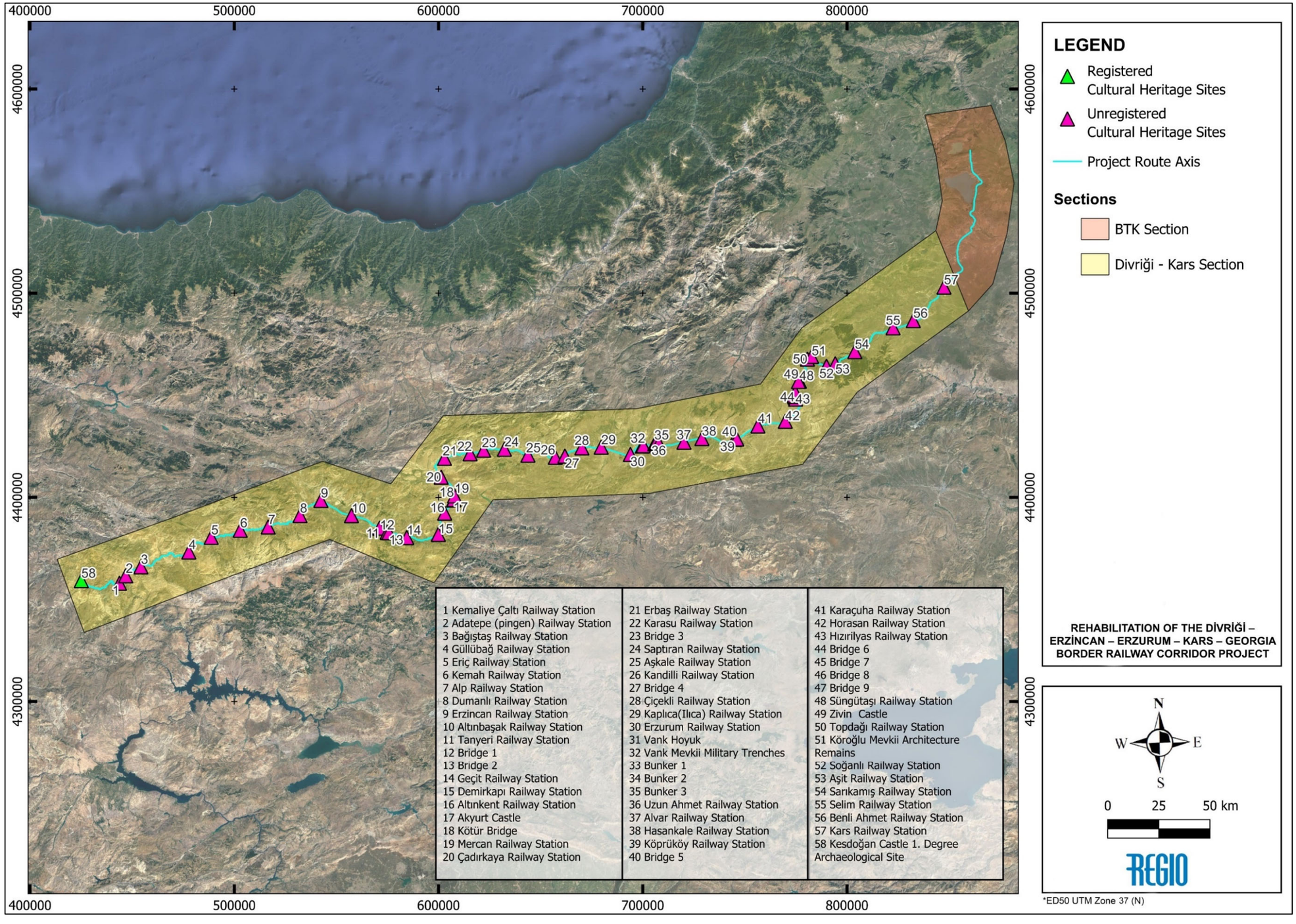
Province	Registered Sites	Non-registered Sites[14]		Total Number of Sites
		Archaeological Site	Other Sites (Railway Station Facilities, Modern/ Old Cemetery, Military Trenches etc.)	
Sivas	1	-	2	3
Erzincan	-	2	16	18
Tunceli	-	-	2	2
Erzurum	-	-	25	25
Kars	-	2	1	3
Ardahan	-	-	-	-
Total	**1**	**4**	**53**	**58**

The list of cultural heritage sites in the project route and it's around (including with registration status, classification, characteristics and location information), is shown in Figure 36 and listed in Appendix-6.

The drawings and photographs pertaining to the registered and non-registered cultural heritage sites are also given in Appendix-7.

[14] All of the cultural assets listed in the Non-Registered Sites list have been identified as a result of field studies. However, all or some of these cultural assets may be registered by the relevant authorities. Due to the time limits of the impact assessment studies, the registration data from the relevant Regional Councils for the Conservation of Cultural Property could not be obtained and the relevant data could not be assessed whether these cultural heritage assets are registered or not.

Figure 36. Locations of the Registered Archaeological Sites and Non-registered Sites within the Study Area



4.6.2.3 Intangible Cultural Heritage Based on Desktop Studies

These ICH elements are traditions or life experiences such as oral traditions, performing arts, social practices, rituals, celebration events, knowledge and practices about nature and the universe, or knowledge and skills related to the production of traditional arts. These ICH elements are inherited from our ancestors, and they should be passed on to our future generations. These ICH elements have been reviewed and assessed during the desktop review studies. As of 2023, there are 25 elements of Türkiye inscribed on the UNESCO Representative List of Intangible Cultural Heritage. Among these elements, there are 14 elements registered in the provinces crossed by the Project as presented in Table 71.

Table 71. Intangible Cultural Heritage Elements in the Provinces Crossed by the Project

No	Intangible Cultural Heritage Element	Year of Admission to UNESCO List	Province with the Element along the Project Route*	Descriptive Information for the Element[15] Summary of the Element
1	Âşıklık (Minstrelsy) Tradition	2009	Ardahan, Kars, Erzurum, Sivas	The Âşıklık (minstrelsy) tradition of Türkiye 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	Nevruz	2016	Ardahan, Kars, Erzurum, Erzincan, Tunceli, Sivas	New Year is often a time when people wish for prosperity and new beginnings. March 21 marks the start of the year in Afghanistan, Azerbaijan, India, Iran (Islamic Republic of), Iraq, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Türkiye, Turkmenistan and Uzbekistan. It is referred to as Nauryz, Navruz, Nawrouz, Nevruz, Nooruz, Novruz, Nowrouz or Nowruz meaning 'new day' when a variety of rituals, ceremonies and other cultural events take place for a period of about two weeks. An important tradition practiced during this time is the gathering around 'the Table', decorated with objects that symbolize purity, brightness, livelihood and wealth, to enjoy a special meal with loved ones. New clothes are worn and visits made to relatives, particularly the elderly and neighbours. Gifts are exchanged, especially for children, featuring objects made by artisans. There are also street performances of music and dance, public rituals involving water and fire, traditional sports and the making of handicrafts. These practices support cultural diversity and tolerance and contribute to building community solidarity and peace. They are transmitted from older to younger generations through observation and participation. Nevruz is known by all the people as a heritage transmitted from generation to generation as the arrival of spring and the first day of the new year according to the old Malik Shah Calendar (Jalali Calendar) and celebrated with enthusiasm by all rural and urban communities, groups, and individuals on every 21 March in Türkiye.
3	Traditional Sohbet Meetings	2010	Ardahan, Erzincan	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.
4	Semah, Alevi-Bektashi ritual	2010	Sivas, Erzincan, Tunceli	Semahs can be described as a set of mystical and aesthetic body movements in rhythmic harmony. They constitute one of the twelve main services found in Djem (Cem) rituals, religious practices performed by adherents of Alevi-Bektashi, a belief system based on admiration for Ali, the fourth caliph after the prophet Muhammed. Semahs are performed by semahçıs (Semah dancers), accompanied by devout musicians playing the saz long-necked lute. Various forms of Semah exist in Alevi-Bektashi communities across Türkiye, each with distinct musical characteristics and rhythmic structures. One consistent characteristic is the performance of the ritual by both men

[15] https://ich.unesco.org/en/state/Türkiye-TR?info=elements-on-the-lists

No	Intangible Cultural Heritage Element	Year of Admission to UNESCO List	Province with the Element along the Project Route*	Descriptive Information for the Element[15] Summary of the Element
				and women, side by side. Semah rituals are founded upon the concept of unity with God as part of a natural cycle: people come from God and return to God. There are two forms of Semah: İçeri Semahs are performed in Djems (Cem) only among adherents as part of the twelve services; Dışarı Semahs are performed independent of services to promote Semah culture to younger generations. Semahs are the most crucial means for the transmission of the Alevi-Bektashi tradition. All practices, traditional motifs and teachings are passed on orally, and distinct genres of art and literature associated with the tradition continue to thrive. In this way, Semahs play a crucial role in fostering and enriching the traditional music culture of Türkiye.
5	Ceremonial Keşkek Tradition	2011	Ardahan, Erzincan, Sivas, Tunceli	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.
6	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	Flatbread Making and Sharing Culture: Lavash, Katyrma, Jupka, Yufka	2016	All provinces	The culture of making and sharing flatbread in Türkiye (also practice in Azerbaijan, Iran, Kazakhstan, and Kyrgyzstan) carries social functions that have enabled it to continue as a widely-practiced 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.
8	Spring Celebration– Hıdrellez	2017	All provinces	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

No	Intangible Cultural Heritage Element	Year of Admission to UNESCO List	Province with the Element along the Project Route*	Descriptive Information for the Element[15] Summary of the Element
				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.
9	Ebru, Turkish Art of Marbling	2014	All provinces	Ebru is the traditional Turkish art of creating colorful patterns by sprinkling and brushing color pigments onto a pan of oily water and then transferring the patterns to paper. Known as marbling, the designs and effects include flowers, foliage, ornamentation, latticework, mosques and moons, and are used for decoration in the traditional art of bookbinding. The practitioner uses natural methods to extract colours from natural pigments, which are then mixed with a few drops of ox-gall, a kind of natural acid, before sprinkling and brushing the colours onto a preparation of condensed liquid, where they float and form swirling patterns. Ebru artists, apprentices and practitioners consider their art to be an integral part of their traditional culture, identity and lifestyle. There is no restriction for practicing the element. People from all ages, gender, social, cultural and economical background are welcomed to practice this prominent art in Türkiye.
10	Heritage of Dede Qorqud/ Korkyt Ata/ Dede Korkut, Epic Culture, Folk Tales, and Music	2018	Ardahan, Kars (Kağızman District), Erzurum	The epic culture, folk tales and music of Dede Qorqud/Korkyt Ata/Dede Korkut are based on twelve heroic legends, stories and tales and thirteen traditional musical compositions shared and transmitted across the generations through oral expressions, performing arts, cultural codes and musical compositions. Dede Qorqud appears in each story as a legendary figure and wise individual, a sage of minstrels whose words, music and expressions of wisdom relate to traditions of birth, marriage and death. In the musical compositions, the main intonations are reproduced using a musical instrument called the Kobyz through the sounds of nature, and imitation soundscapes are characteristic of this medium (such as the imitation of a wolf's howl or a swan's note). The musical compositions are all interconnected by the epic stories that accompany them. The element encompasses social, cultural and moral values such as heroism, dialogue, physical and spiritual wellness and unity as well as respect for nature and contains profound knowledge about the history and culture of Turkic-speaking communities. It is practised and sustained by the community concerned on a wide variety of occasions – from family events to national and international festivals – and is therefore well-rooted in society, serving as a connecting thread between generations.
11	Traditional Turkish Archery	2019	Sivas	Traditional Turkish archery encompasses principles, rituals and social practices, the craftsmanship of traditional equipment, archery disciplines and shooting techniques that have evolved over the centuries. In traditional Turkish archery, there are different types of disciplines practiced on foot and horseback. Bearers and practitioners train individually or collectively to improve their skills, carry out individual shootings and take part in competitions and festive events. The craftsmanship of traditional archery equipment is a key component of the element. The equipment is made with raw materials such as trees grown under certain climatic conditions at high altitudes, organic glues, horns, tendons, silk and leather. Craftspeople must therefore have advanced knowledge of nature, including plants, animals and the climate. Archery equipment is generally decorated with calligraphy, ornaments and marquetry. Craftspeople engaged in the craftsmanship of traditional archery equipment also play an important role in safeguarding the element, with the related skills being transmitted from master to apprentice or through self-learning. In recent years, there has been a remarkable increase in the number of female archers and trainees,

No	Intangible Cultural Heritage Element	Year of Admission to UNESCO List	Province with the Element along the Project Route*	Descriptive Information for the Element[15] Summary of the Element
				as well as a significant increase in the number of non-governmental organizations involved in archery in various regions of Türkiye. Bearers and practitioners ensure the continued viability of the element by adopting it to fit contemporary conditions.
12	Hüsn-i Hat, traditional calligraphy in Islamic art in Türkiye	2021	All provinces	The Hüsn-i hat is the centuries-old practice of writing letters of Arabic origin in a measured and proportional manner while taking into consideration certain aesthetic values. Traditional tools include a specific type of paper glazed with organic substances, a reed pen, pen knives, a special slab for trimming the reed pen, an inkwell, soot ink and a pen case. Many calligraphers, or hattats, make their own tools, and they play an important role in the transmission of the Hüsn-i hat tradition, passing on their knowledge, craft skills and values through apprenticeships. The Hüsn-i hat can be written on paper or leather. It may also be applied on stone, marble, glass and wood, among others. There are many different styles of Hüsn-i hat, and the practice was traditionally used to write the Koran, hadiths (statements of the Prophet Muhammad) and poetry, as well as for State correspondence, such as imperial edicts and warrants, and on religious and public buildings. In Islam, Hüsn-i hat is seen as a means not only of writing ideas, but of depicting them visually. To this day, Hüsn-i hat is still used in sacred and literary works and on mosques, Turkish baths and temples.
13	The telling tradition of Nasreddin Hodja/ MollaNesreddin/ Molla Ependi/Apendi/ Afendi Kozhanasyr/ Nasriddin Afandi anecdotes	2022	All provinces	The Telling Tradition of Nasreddin Anecdotes refers to the social practices and festivals around the telling of anecdotes attributed to Nasreddin, a philosopher and wiseman recognized for his wisdom and humorous analyses and representations of society and life experiences. Although there are slight differences across communities in terms of imagery, character names and stories, the key features are shared as a common heritage in Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Türkiye, Turkmenistan and Uzbekistan. The anecdotes are transmitted through oral tradition and written sources and have inspired local idioms and proverbs. Many have become classics and are also distributed in printed and visual media and in television programmes prepared for children. Characterized by their wisdom, witty repartees, absurdity and element of surprise, the Nasreddin anecdotes often break with accepted norms, with the narrator finding unexpected ways out of complicated situations and always coming out as the winner by the power of word. The anecdotes have an instructive and entertaining function, and communities use them to enrich conversations, reinforce arguments, persuade others or explain a situation. Municipalities, universities and non-governmental organizations play a vital role in the transmission of the anecdotes, organizing various activities and festivals for their commemoration at local, national and international levels.
14	Culture of Çay (tea), a symbol of identity, hospitality and social interaction	2022	Erzurum	Tea culture in Azerbaijan and Türkiye is an important social practice that shows hospitality, builds and maintains social ties, and is used to celebrate important moments in the lives of communities. Although there are several types of tea and brewing techniques, communities in both countries primarily harvest and consume black tea. Communities brew tea by using a wide variety of kettles, produced using traditional craftsmanship. Tea culture is an essential part of daily life for all layers of society, providing a strong sense of cultural identity. The bearers include tea farmers and harvesters, tearoom owners, tea makers, and the artisans who make the associated tools, utensils and sweets. Gümüşhane and Erzurum are the provinces located in Eastern Anatolia Region where communities drink tea in “kıtlama” style.

**According to National Inventories*

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 72.

Table 72. 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
ARDAHAN	Traditional Handicraft and Craftsmanship	Damal Doll with Traditional Türkmen Clothes	Handmade or Plastic Damal Doll Production with Traditional Türkmen Clothes
	Traditional Children's Games and Toys	Playing Traditional Games	Kubbe (Dome)
	Bards Tradition	Aşıklık (Minstrelsy) Tradition	Salman Bey Story
	Traditional Theatrical Arts and Plays	Theatrical Village Play	Camel (Deve) Play
	Turkish Culinary Culture/ Traditional Food and Beverage Making and Social Practices	Traditional Cheese Making	Storage Cheese into A Ceramic Pot
KARS	Traditional Handicraft and Craftsmanship	Felt Making	Traditional Felt Making
	Traditional Music Instrument Making and Performing	Mey Making and Performing	Mey (Balaban) Making
	Traditional Children's Games and Toys	Traditonal Toys and Toy Making	Çiyrik (Local Baby Walker) Making
	Traditions and Practices Based on Beliefs	Rain Prayer Ceremonies	Godu-Godu Ceremony
	Narrative Tradition and Traditional Lyric Arts	Telling Mani Tradition	Telling Mani
	Bards Tradition	Aşıklık (Minstrelsy) Tradition	Minstrelys
	Traditional Cruising Arts and Plays	Theatrical Village Play	Köse (Beardless) Play
			Kazkaz Play
			Farfara Filli
ERZURUM	Traditional Handicraft and Craftsmanship	Oltu Stone Carving	Oltu Stone and Amber Carving
		Traditional Jewellery	Twisted Bracelet Making
		Rosary Making and Crafmanship	Rosary Making Craftsmanship
	Weaving Art and Traditions	Rug Weaving Tradition	Bardız Rug Weaving
	Oya/Embroidery Processing, Sewing and Knitting Traditions	Embroidery And Ornament Art	Kanaviçe (Embroidery Canvas)
	Traditional Children's Games and Toys	Playing Traditional Games	Knucklebones
	Social Practices Related to Cultural Spaces	Coffee House Tradition	Minstrels Meeting
	Marriage Traditions	Çeyiz/Dowry Tradition	Çeyiz Serme (Exhibition of The Dowry)
		Engagement	Hamam Takımı- Şekerbaşı
	Traditions and Practices Based on Beliefs	Ramadan Traditions	Turkish Ramadan Pide
			İftar Hospitality
		Bairam Traditions	Arefelik Traditions
		Read The Whole Koran Tradition	1001 Hatim Tradition
	Bards Tradition	Aşıklık Tradition	Aşıklık
	Traditional Sports	Javelin	Turkish Javelin Game

Provinces	Group Headlines of Elements	Name of the Element	Name of the Element in the National Inventory
	Traditional Healing and Cleaning Practices, Production of Care Products	Thermal Spring Culture	Çermik Tradition
	Turkish Culinary Culture/ Traditional Food and Beverage Making and Social Practices	Molasses, Syrup and Pestil Making and Traditions	Karnavas Mulberry Molasses
		Flatbread Making and Sharing Culture: Yufka and Lavash	Yufka/ Lavash/ Flatbread
		Traditional Cheese Making	Civil Cheese Making
		Collection and Utilisation Traditions of Local Edible Herbs and Spices	Çaşır, Çiriş
		Tea Culture	Kıtlama
		Dolmades/Stuffed Vine-Leaves	Lor (Traditional Cheese) Dolmades
		Kuymak/Mıhlama Culture	Kuymak (A Regional Meal of The Region in Türkiye, Made Primary with Corn, Meal And Cheese)
ERZİNCAN	Traditional Handicraft and Craftsmanship	Coppersmith Tradition	Coppersmith Tradition
		Knife Making	Knife Making
	Traditional Clothing Making and Usage Traditions	Traditional Shoemaking Craftsmanship	Yemenicilik, Traditional Handmade Shoes
	Traditional Meetings and Organizations	Traditional Meetings and Organizations	Sıra Night
			Herfene
	Social Practices Related to Cultural Spaces	Places To Visit Traditions	Sultan Seydi
			Kırklar Shrine
	Prenatal /Postnatal and Childhood Traditions	Diş Hediği Tradition (Celebration for First Tooth of Babies)	Diş Hediği / First Tooth Celebration
	Narrative Tradition and Traditional Lyric Arts	Telling Mani Tradition	Telling Mani
	Bards Tradition	Aşıklık (Minstrelsy) Tradition	Minstrelys
	Turkish Culinary Culture/ Traditional Food and Beverage Making and Social Practices	Aşure (Ashure) Tradition	Aşure (Ashure)
		Ceremonial Keşkek Tradition	Keşkek (Local Dish) Day
TUNCELİ	Afterlife, Brotherhood and Kinship Traditions	Kirve Culture	Kirveli At the Circumcision Wedding
		Musahiplik (Companionship) Tradition	Musahiplik
	Faith, Celebration and Traditions Linked to The Calendar	Heftemal (Hautamal)	Heftemal (Hautamal)
		Gağan	Gağan
	Lamentation Traditions	Mersiye Tradition	Kerbela Mersiyeleri
	Traditional Spectacle Arts and Games	Show Games in Village	Varvara
SİVAS	Traditional Handicraft and Craftsmanship	Woodworking And Wood Carving	Mouthpiece/ Rod
		Knife Making	Knife Making
		Silver Processing	Silversmithing
		Horn And Bone Processing	Bone Comb Making
	The Art of Weaving and Its Traditions	Rug Weaving Tradition	Rug Weaving with Sarkisla
		Carpet Weaving Tradition	Sivas Carpet Weaving

Provinces	Group Headlines of Elements	Name of the Element	Name of the Element in the National Inventory
	Embroidery, Sewing and Knitting Traditions	Knitting	Socks Knitting
	Traditional Children's Games and Toys	Traditions Of Playing Children's Games	Lover's Game
			Steel Rod
			Nochchuk
			Barbara
			Stone Pillar
			Strap Grabber
			Jump Rope
			Bezirgân Head
			Line
			Hide-And-Seek
			Tabbed
			Long Ass
	Social Practices Related to Cultural Spaces	Visiting Traditions	Visiting Köse Süleyman
	Traditions of the Afterlife, Brotherhood of The Way, And Kinship	Kirvelik	Kirvelik
	Farewell And Welcome Traditions	Traditions Of Sending Off and Welcoming Soldiers	Soldier Send-Off
	Pre/Postnatal and Childhood Traditions	The Tradition of Dental Hygiene	Dental Hygiene.
	Marriage Traditions	Dowry Tradition	Dowry Hanging
		Henna Night	Henna Ceremony
	Traditions And Practices Based on Beliefs and Beliefs	Alevi-Bektashi Ritual: Semah	Semah
		Rain Prayer Ceremonies	Prayer For Rain
		Festive Traditions	The Gig of My Breast
	Beliefs, Celebrations and Traditions Linked to The Calendar	Khidirellez	Hıdrellez
		Crocus Pilaf	Crocus Collection Tradition (Hatapıya)
		Nevruz	Nevruz
		Shepherd's Festivals: Ram Slaughter, Wool-Sheep Flotation	Coach Contribution
		Shepherd's Festivals: Ram Slaughter, Wool-Sheep Flotation	Yunnak
	Traditional Festivals and Festivities	Festive Tradition	Şeme Festivals
	Narrative Tradition and Traditional Lyric Arts	The Tradition of Singing Mania	Say Mania
	Bards Tradition	The Tradition of Minstrel	Infatuation
	Traditional Folk Dances	Halay	Aunt Sivas
		Halay	Village Hospitality Aunt
		Halay	Aunt Abdurrahman
		Halay	Pumpkin Aunt
		Halay	Work Aunt
	Traditional Spectacle Arts and Games	Meddahlik	Meddahlik
		Village Cruising Games	Saya Sightseeing
		Village Cruising Games	Sneak
	Traditional Sports	Javelin	Traditional Javelin

Provinces	Group Headlines of Elements	Name of the Element	Name of the Element in the National Inventory
		Traditional Turkish Archery	Mounted Archery
	Turkish Culinary Culture / Traditional Food and Beverage Making and Social Practices	Ashura Tradition	Ashura
		Molasses, Must and Pestil Production and Traditions	Vintage
		Thin Bread Tradition: Phyllo and Lavash	Lavash
		Thin Bread Tradition: Phyllo and Lavash	Pastry

4.6.2.4 Critical Cultural Heritage

Critical cultural heritage is defined as one or both of the following types of cultural heritage:

i. The internationally recognized 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 which would be considered as critical cultural heritage include world heritage sites and nationally protected areas.

Critical cultural heritage should not be removed, significantly altered, or damaged. In exceptional circumstances when impacts on critical cultural heritage are unavoidable, a process of informed consultation and participation of the Affected Communities should be, and which uses a good faith negotiation process that results in a documented outcome. External experts should be retained to assist in the assessment and protection of critical cultural heritage.

4.6.2.4.1 Internationally Recognized Cultural Heritage Sites

World Heritage List[16] and World Heritage Tentative List[17] of UNESCO are considered under the internationally recognized cultural heritage sites.

Türkiye has 21 sites inscribed on the World Heritage List of UNESCO (as of 07 November 2023). Those located in the wider region of the Project are listed in Table 10 and shown in Figure 75. The closest site to the Project is the “Great Mosque and Hospital of Divriği” in Sivas/Divriği which is located at a distance of 1 km to the south of the project 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 “Anatolian Seljuks Madrasah” in Erzurum, which is located at a distance of 1 km to the south of the project route.

None of the internationally recognized cultural heritage sites is overlapping with the study area. Therefore, project activities do not have any impact on the areas listed neither in the World Heritage List or the World Heritage Tentative list. In case alternative areas need to be identified during the construction or operation phase of the project the areas listed in Table 73 and shown in Figure 37 should be avoided.

Table 73. Internationally Recognized Cultural Heritage Areas

No	Site Name	Province	Distance to Project Axis (km)
	World Heritage List of UNESCO		
1	Great Mosque and Hospital of Divriği	Sivas/Divriği	1
2	Archaeological Site of Ani	Kars	38

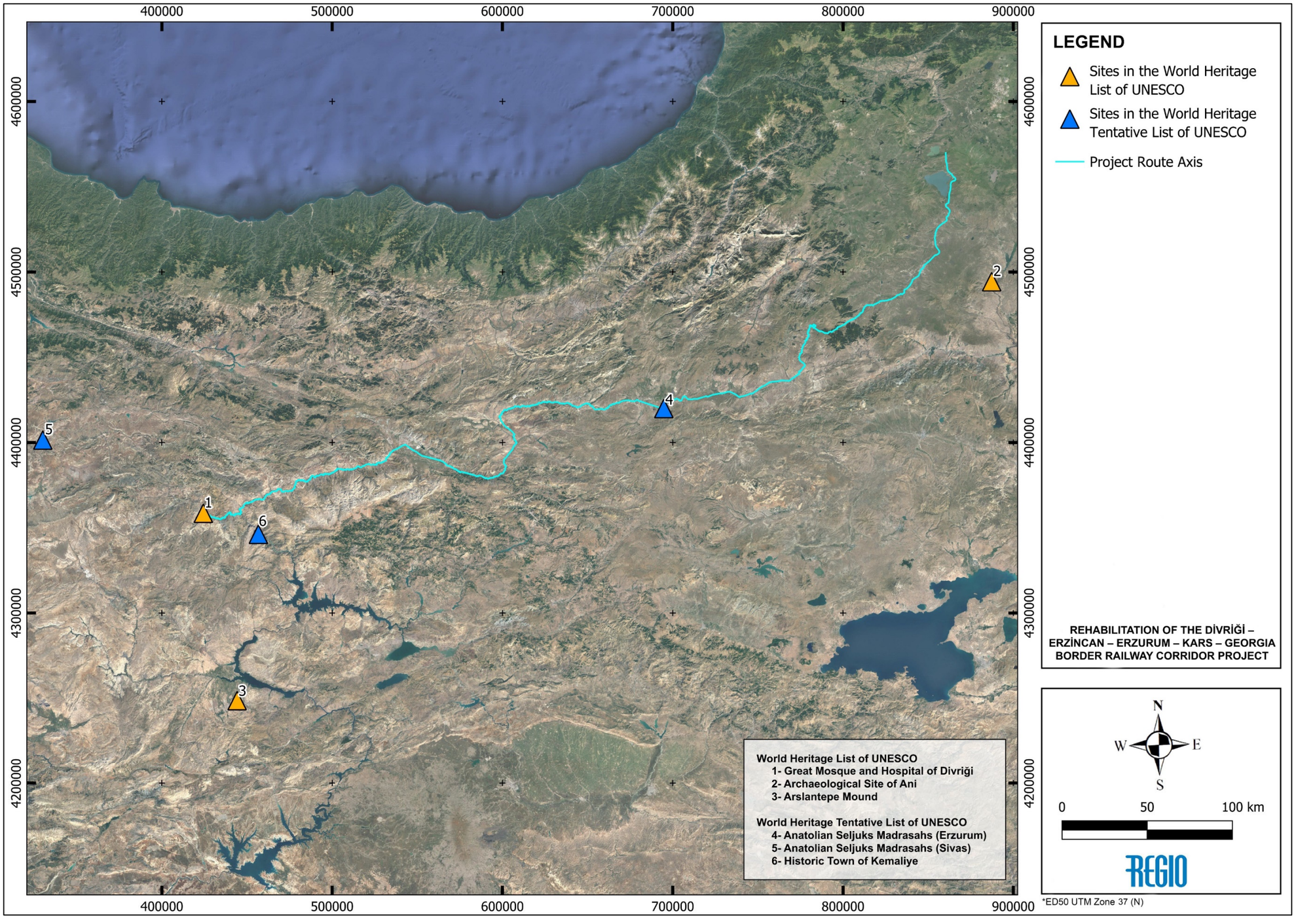
[16] https://whc.unesco.org/en/list/

[17] http://whc.unesco.org/en/tentativelists/

No	Site Name	Province	Distance to Project Axis (km)
World Heritage List of UNESCO			
3	Arslantepe Mound	Malatya	110
World Heritage Tentative List of UNESCO			
4	Anatolian Seljuks Madrasahs	Erzurum	1
5	Anatolian Seljuks Madrasahs	Sivas	100
6	Historic Town of Kemaliye	Erzincan	100

Source: World Heritage List and World Heritage Tentative List of UNESCO

Figure 37. Internationally Recognized Cultural Heritage Sites Around the Project Area



4.6.2.4.2 Legally Protected (Registered) Cultural Heritage

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.

Among the cultural heritage sites identified by the REGIO team within the study area of the Project, the sites listed in Table 74Table 74 are registered, legally protected cultural heritage areas.

Table 74. Legally Protected (Registered) Cultural Heritage Sites and Assets

Section	Site Name	Province	District/Village	Distance to Project Axis (m)
Section 1	Kesdoğan Castle 1. Degree Archaeological Site	Sivas	Divriği/Center	41,61

4.6.2.4.3 Archaeological Potential

Except from the project sections that will be rehabilitated, the physical intervention required sections for the first time (new station buildings, transformer buildings, etc.) 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 ESS criteria as 'replicable cultural heritage', 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.

4.6.3 Impact Assessment, Significance and Mitigation Measures

There are national legislation and international guidelines that have been established in the field of Cultural Assets, in which measures for protection, transport and monitoring are taken and managed.

Tangible Cultural Heritage

The activities to be conducted during the rehabilitation, 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 summarized in Table 75.

Table 75. Sources of 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
Rehabilitation phase	▪ Line infrastructure works, ▪ Line superstructure works ▪ Station arrangements ▪ Electrification, signaling, telecommunication works, etc.	▪ Architectural heritage ▪ Archaeological Sites ▪ Other Archaeological/ Historical Assets
Land preparation phase	▪ Removal of vegetation and/or trees ▪ Installation of fencing ▪ Traffic movements (vehicles and staff)	
Railway construction phase	▪ Topsoil stripping ▪ Excavations and quarry/borrow site operations, etc. ▪ Construction traffic movement ▪ Siting of construction sites ▪ Piling ▪ Landscaping/ earth-mounding ▪ Waste disposal including excess excavated materials	

Phase	Description of Activity	Potential Receptors that may be affected by the Activities
	▪ Structures, installation features (bridges, signage, fencing, etc.) ▪ Installation of lighting scheme ▪ Presence of workforce ▪ Leaks and spills	
Operation phase	▪ N/A	

Sensitivity Levels of the Registered and Non-registered Tangible Cultural Heritage Sites Identified within the Impact Corridor has been provided in Table 76. Apart from these known cultural heritage assets, it is possible to encounter some chance finds during the project activities. The project may also create some potential adverse effects on both known and chance finds. Potential impacts are direct damage or disturbance to cultural heritage resources. This can include:

- Physical damage of sites, including from noise, vibration and dust due to plant, equipment and heavy vehicles, and from spills and leaks,
- Noise and visual intrusion on people's appreciation of cultural heritage,
- Disruption of access to cultural heritage sites,
- Enhanced access to cultural heritage sites allowing increased opportunity to outside parties for collection of artefacts or damage to resources,
- Loss or change of specification or significance of the cultural heritage,
- Disruption or diminution of cultural ecosystem services including customary ways of understanding the wider world and for maintaining social relations and group identity.

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 recognized cultural heritage areas has been provided in Section 4.6.2.4. 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.

Table 76: Sensitivity Levels of the Registered and Non-registered Tangible Cultural Heritage Sites Identified within the Impact Corridor

High	Medium	Low	Negligible
(58) Kesdoğan Castle 1. Degree Archaeological Site	(1) Kemaliye Çaltı Railway Station	(10) Altınbaşak Railway Station	
	(2) Adatepe (pingen) Railway Station	(24) Saptıran Railway Station	
	(3) Bağıştaş Railway Station	(28) Çiçekli Railway Station	
	(4) Güllübağ Railway Station	(37) Alvar Railway Station	
	(5) Eriç Railway Station	(41) Karaçuha Railway Station	
	(6) Kemah Railway Station	(52) Soğanlı Railway Station	
	(7) Alp Railway Station		
	(8) Dumanlı Railway Station		
	(9) Erzincan Railway Station		
	(11) Tanyeri Railway Station		
	(12) Bridge 1		
	(13) Bridge 2		
	(14) Geçit Railway Station		
	(15) Demirkapı Railway Station		
	(16) Altınkent Railway Station		
	(17) Akyurt Castle		

High	Medium	Low	Negligible
	(18) Kötür Bridge		
	(19) Mercan Railway Station		
	(20) Çadırkaya Railway Station		
	(21) Erbaş Railway Station		
	(22) Karasu Railway Station		
	(23) Bridge 3		
	(25) Aşkale Railway Station		
	(26) Kandilli Railway Station		
	(27) Bridge 4		
	(29) Kaplıca (Ilıca) Railway Station		
	(30) Erzurum Railway Station		
	(31) Vank Hoyuk		
	(32) Vank Mevkii Military Trenches		
	(33) Bunker 1		
	(34) Bunker 2		
	(35) Bunker 3		
	(36) Uzun Ahmet Railway Station		
	(38) Hasankale Railway Station		
	(39) Köprüköy Railway Station		
	(40) Bridge 5		
	(42) Horasan Railway Station		
	(43) Hızırilyas Railway Station		
	(44) Bridge 6		
	(45) Bridge 7		
	(46) Bridge 8		
	(47) Bridge 9		
	(48) Süngütaşı Railway Station		
	(49) Zivin Castle		
	(50) Topdağı Railway Station		
	(51) Köroğlu Mevkii Architecture Remains		
	(53) Aşit Railway Station		
	(54) Sarıkamış Railway Station		
	(55) Selim Railway Station		
	(56) Benli Ahmet Railway Station		
	(57) Kars Railway Station		

Management of Potential Impacts and Mitigation Measures

The project may have negative effects on known cultural heritage assets or chance finds. To minimize the adverse effects, a Project-specific Cultural Heritage Management Plan (CHMP) and a chance finds procedure (CFP) have been prepared to guide the Contractor which will also be included in the bidding documents (see Appendix 6 of the ESMP). In line with Article 4 of the Law on Conservation of Cultural and Natural Properties, the main 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 (including chance finds) 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 77 contact details of the authorities are provided in the CHMP - Appendix 6 of ESMP).

Table 77. 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
Sivas Regional Council for the Conservation of Cultural Property	Sivas	Sivas Museum Directorate
Erzurum Regional Council for the Conservation of Cultural Property	Erzincan	Erzincan Museum Directorate
	Tunceli	Tunceli Museum Directorate
	Erzurum	Erzurum Museum Directorate
Kars Regional Council for the Conservation of Cultural Property	Kars	Kars Museum Directorate
	Ardahan	

General management measures applicable to different types of sites are listed in Table 78. 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 78. 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	▪ Avoiding physical intervention ▪ Archaeological monitoring for potential disturbance of the project activities. ▪ Following the decisions of the relevant Regional Council
Archaeological Site	▪ Avoiding physical intervention ▪ 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 for implementation of Regional Council decision.
Other Sites including the remains of a historic bridge, a grave/graveyard, fountain etc.	▪ Avoiding physical intervention ▪ Notify the cultural heritage authorities. ▪ Relocation of moveable cultural heritage asset where applicable ▪ Consideration of Project 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) ▪ Archaeological monitoring for implementation of Regional Council decision.

Intangible Cultural Heritage

Assessment of the impact of the project on intangible cultural heritage has been conducted in the Project route and its vicinity in compliance with international standards and local legislation. The Sivas-Erzurum railway route, which is a part of the project route, was completed and commissioned in 1939. The route between Divriği-Kars has been operated since 1961 for railway transportation. Due to the Bağıştaş dam construction in 2014, the old route was displaced and a new route between Bağıştaş-İliç (Total length is 16 km) was constructed. There is no record or report concerning the adverse effects of the railway project on the intangible cultural heritage elements which are still listed in the UNESCO list and the National Inventory along the project route. The examples of intangible cultural assets identified with the desktop study are not expected to be affected by the Project activities and no adverse effect of already completed infrastructure works was observed or reported.

During the Project activities, active stakeholder engagement should continue and any sensitivity which may the Project cause must be resolved. In addition, the Project staff must

be informed about the intangible cultural heritage assets in the region and their importance for the local communities.

On the other hand, some positive impact on intangible cultural heritage can be observed considering the increase in mobility and trade in the region during the operation phase of the project. Depending on the project's social/community investment strategy, social investment projects can be prepared for promoting rural tourism not only for intangible cultural heritage assets but for physical cultural heritage as well. Financial support to these projects through local communities may contribute to the protection of intangible cultural assets as well as providing source of income for the local people.

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, fibres, or metals). And 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 ESS8 and UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage.

The potential Project impacts, proposed mitigation measures and residual impact significance are summarized in Table 79.

Table 79. Construction Impacts, Proposed Mitigation Measures and Residual Impacts (Cultural Heritage)

No	Receptor	Project Phase	Value of Heritage Asset	Impact Magnitude				Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Mitigation Measures*	Residual Impact **
				Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency			
1	Kemaliye Çaltı Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
2	Adatepe (pingen) Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
3	Bağıştaş Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
4	Güllübağ Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
5	Eriç Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
6	Kemah Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
7	Alp Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
8	Dumanlı Railway Station	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/ Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled;	No “residual impact” is expected on the cultural heritage assets.

No	Receptor	Project Phase	Value of Heritage Asset	Impact Magnitude				Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Mitigation Measures*	Residual Impact **
				Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency			
	(Unknown Registration Status) Outside the Route Axis								* Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	
9	Erzincan Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
10	Altınbaşak Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Low	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
11	Tanyeri Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/ Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
12	Bridge 1 (Unknown Registration Status) Within the Route Axis	All Project Phases	Medium	Minor Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property and complying with the decision taken by the council, * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
13	Bridge 2 (Unknown Registration Status) Within the Route Axis	All Project Phases	Medium	Minor Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property and complying with the decision taken by the council, * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
14	Geçit Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
15	Demirkapı Railway Station	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled;	No “residual impact” is expected on the cultural heritage assets.

No	Receptor	Project Phase	Value of Heritage Asset	Impact Magnitude				Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Mitigation Measures*	Residual Impact **
				Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency			
	(Unknown Registration Status) Outside the Route Axis								* Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	
16	Altınkent Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
17	Akyurt Castle (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
18	Kötür Bridge (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
19	Mercan Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
20	Çadırkaya Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
21	Erbaş Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
22	Karasu Railway Station (Unknown Registration Status)	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property	No “residual impact” is expected on the cultural heritage assets.

No	Receptor	Project Phase	Value of Heritage Asset	Impact Magnitude				Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Mitigation Measures*	Residual Impact **
				Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency			
	Outside the Route Axis								* Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	
23	Bridge 3 (Unknown Registration Status) Within the Route Axis	All Project Phases	Medium	Minor Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property and complying with the decision taken by the council, * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
24	Saptıran Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Low	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
25	Aşkale Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
26	Kandilli Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/ Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
27	Bridge 4 (Unknown Registration Status) Within the Route Axis	All Project Phases	Medium	Minor Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property and complying with the decision taken by the council, * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
28	Çiçekli Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Low	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
29	Kaplıca (Ilıca) Railway Station (Unknown Registration Status)	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property	No “residual impact” is expected on the cultural heritage assets.

No	Receptor	Project Phase	Value of Heritage Asset	Impact Magnitude				Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Mitigation Measures*	Residual Impact **
				Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency			
	Outside the Route Axis								* Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	
30	Erzurum Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
31	Vank Hoyuk (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
32	Vank Mevkii Military Trenches (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
33	Bunker 1 (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
34	Bunker 2 (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
35	Bunker 3 (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
36	Uzun Ahmet Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings.	No “residual impact” is expected on the cultural heritage assets.

No	Receptor	Project Phase	Value of Heritage Asset	Impact Magnitude				Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Mitigation Measures*	Residual Impact **
				Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency			
									* Archaeological monitoring,	
37	Alvar Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Low	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
38	Hasankale Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
39	Köprüköy Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
40	Bridge 5 (Unknown Registration Status) Within the Route Axis	All Project Phases	Medium	Minor Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property and complying with the decision taken by the council, * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
41	Karaçuha Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Low	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
42	Horasan Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
43	Hızırilyas Railway Station (Unknown Registration Status)	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property	No “residual impact” is expected on the cultural heritage assets.

No	Receptor	Project Phase	Value of Heritage Asset	Impact Magnitude				Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Mitigation Measures*	Residual Impact **
				Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency			
	Outside the Route Axis								* Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	
44	Bridge 6 (Unknown Registration Status) Within the Route Axis	All Project Phases	Medium	Minor Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property and complying with the decision taken by the council, * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
45	Bridge 7 (Unknown Registration Status) Within the Route Axis	All Project Phases	Medium	Minor Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property and complying with the decision taken by the council, * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
46	Bridge 8 (Unknown Registration Status) Within the Route Axis	All Project Phases	Medium	Minor Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property and complying with the decision taken by the council, * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
47	Bridge 9 (Unknown Registration Status) Within the Route Axis	All Project Phases	Medium	Minor Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Erzurum Regional Council for the Conservation of Cultural Property and complying with the decision taken by the council, * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
48	Süngütaşı Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Kars Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
49	Zivin Castle (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Kars Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
50	Topdağı Railway Station	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled;	No “residual impact” is expected on the cultural heritage assets.

No	Receptor	Project Phase	Value of Heritage Asset	Impact Magnitude				Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Mitigation Measures*	Residual Impact **
				Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency			
	(Unknown Registration Status) Outside the Route Axis								* Notifying the Kars Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	
51	Köroğlu Mevkii Architecture Remains (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Kars Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
52	Soğanlı Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Low	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Kars Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
53	Aşit Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Kars Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
54	Sarıkamış Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Kars Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
55	Selim Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Kars Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
56	Benli Ahmet Railway Station (Unknown Registration Status) Outside the Route Axis	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/ Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled; * Notifying the Kars Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.
57	Kars Railway Station (Unknown Registration Status)	All Project Phases	Medium	Negligible Change	Irreversible	Short-term	One-off	Neutral/Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled. * Notifying the Kars Regional Council for the Conservation of Cultural Property	No “residual impact” is expected on the cultural heritage assets.

No	Receptor	Project Phase	Value of Heritage Asset	Impact Magnitude				Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Mitigation Measures*	Residual Impact **
				Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency			
	Outside the Route Axis								* Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	
58	Kesdoğan Castle 1. Degree Archaeological Site (Registered Archaeological Site Sivas Regional Council Decision No: NA) Outside the Route Axis	All Project Phases	High	Negligible Change	Irreversible	Short-term	One-off	Slight	Before the project activities, the following procedures regarding cultural assets preservation should be fulfilled. * Notifying the Sivas Regional Council for the Conservation of Cultural Property * Marking the designated places as sensitive areas on the project/construction drawings. * Archaeological monitoring,	No “residual impact” is expected on the cultural heritage assets.

* The present legal procedures must be followed. After the completion of legal procedures, additional measures can be developed, taken and implemented in accordance with the decisions of the relevant responsible authorities of the Republic of Türkiye.

**The Regional Council for the Conservation of Cultural Property Directorates of the Ministry of Culture and Tourism of the Republic of Türkiye are responsible official authorities for determining the mitigation measures to eradicate the project-caused “residual impacts” on the cultural assets. The identified mitigation measures for each cultural heritage asset are released officially by these directorates. Besides, the directorates are responsible for official authority regarding monitoring the implementations in the field of the released mitigation measures. The Project and its subcontractors are responsible for implementing the decisions determined by the Regional Council for the Conservation of Cultural Properties. Therefore, the mitigation measures which were determined by the protection boards for each heritage asset must be taken into consideration and implemented by the project carefully. If this process is followed up by the Project, no “residual impact” is expected on the cultural heritage assets

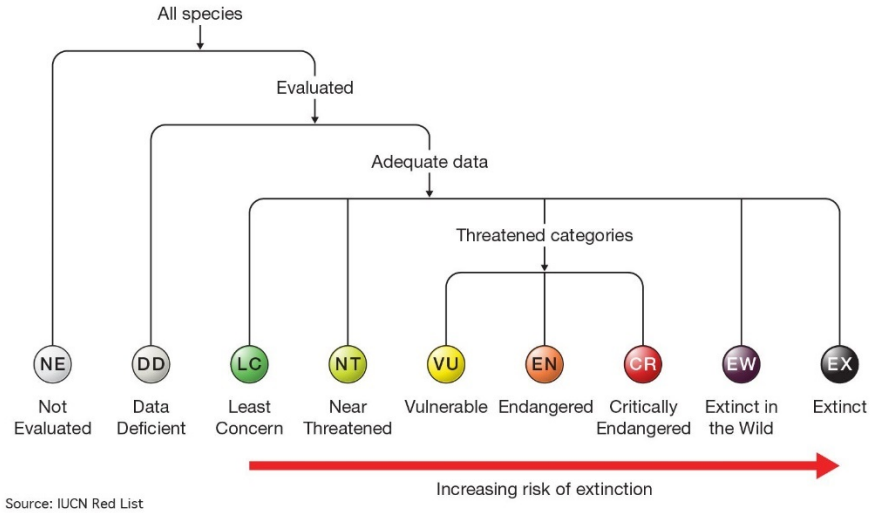
BIOLOGICAL ENVIRONMENT

4.7 Project Standards and Methodology

4.7.1 Project Standards

Within the scope of identifying and monitoring animal groups (invertebrates, amphibians, reptiles, birds and mammals) along the route, it is important to determine their population status and size, as well as their distribution. During field surveys, reproduction and biodiversity criteria have been applied and national and international criteria of nature protection, (IUCN, BERN, CITES, Natura 2000), endemism status and EUNIS codes have been updated.

Habitat types were classified according to EUNIS Habitat Directive habitat types. The following standards have been utilized for the biological diversity assessment of the project:

Convention on the Conservation of European Wildlife and Natural Habitats (BERN Convention)	
National / International	International
Content, Objective and Scope	This Convention, prepared by the EU member states, intends to conserve the natural plant and animal species and their habitats.
Annexes and its Descriptions	Bern Convention consists of 3 appendices. Appendix 1 includes the appropriate and necessary legislative and administrative measures to guarantee the conservation of strictly protected wild flora species. It prohibits the possession or sale of such species.
Enforcement Dates and O.G. Date&No	Published in the Official Gazette no. 18318 on February 20, 1984 and entered into force on September 1, 1984.
International Union for Conservation of Nature (IUCN)	
National / International	International
Content, Objective and Scope	International Union for Conservation of Nature, also known as International Union for Conservation of Nature and Natural Resources or (IUCN), is an international organization founded for the conservation of natural resources.
Annexes and its Descriptions	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. It divides species into nine categories: Not Evaluated, Data Deficient, Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, Extinct in the Wild and Extinct (see Figure 38).  **Figure 38. IUCN Red List Categories**

	Extinct (EX): A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form. **Extinct in the Wild (EW)**: A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form. **Critically Endangered (CR)**: A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild. **Endangered (EN)**: A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild. **Vulnerable (VU)**: A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild. **Near Threatened (NT)**: A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future. **Least Concern (LC)**: A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category. **Data Deficient (DD)**: A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified. **Not Evaluated (NE)**: A taxon is Not Evaluated when it has not yet been evaluated against the criteria.
Enforcement Dates and O.G. Date&No	Türkiye is one of the member countries since January 1, 1993.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1975)	
National / International	International
Content, Objective and Scope	CITES is an international regulation prescribing the issuance of permissions and certificates for the import, export, re-export, introduction from the sea of, briefly international trade in, specimens of wild animal and plant species, alive or dead, as well as the readily recognizable part or derivative thereof between signatory countries, provided that some requirements mentioned in the Convention are met. The main objectives of the Convention are as follows: 1. To monitor and, where required, stop the international trade in endangered or potentially endangered species, 2. To prevent the abuse of ecological balance through international trade, 3. To help signatory countries ensure sustainable use of the biological resources they possess.
Annexes and its Descriptions	Among 29,000 animal and plant species, 5,000 species are protected by CITES from over-exploitation through international trade. All protected species and populations are listed in 3 Appendices. Each species or population listed in the Appendices reflects the necessity to control their trade, which threatens them.

	Appendix I, about 1,200 species, contains species that are threatened with extinction and are or may be affected by trade. Commercial trade in wild-caught specimens of these species is illegal. Appendix II, about 21,000 species, contains species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild. In addition, Appendix II can include species similar in appearance to species already listed in the Appendices. Appendix III, about 170 species, contains species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species. The species are not necessarily threatened with extinction globally. In all member countries, trade in these species is only permitted with an appropriate export permit and a certificate of origin from the state of the member country who has listed the species.
Enforcement Dates and O.G. Date&No	Published in the Official Gazette no. 22672 on June 20, and entered into force on December 22, 1996.
Regulation on the Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora	
National / International	National
Content, Objective and Scope	The purpose of this Regulation is to set out the procedures and principles for controlling the international trade in animal and plant species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) through coordination with relevant organizations and institutions in order to ensure sustainable use of those species.
Annexes and its Descriptions	This Regulation covers the procedures and principles for controlling international trade of specimens defined in the 4th article of the Regulation within the framework of CITES.
Enforcement Dates and O.G. Date&No	Published in the Official Gazette no. 24623 on December 27, 2001.
Regulation on Dismantling, Production and Export of Natural Flower Bulbs	
National / International	National
Content, Objective and Scope	The objective of this Regulation is to regulate the procedures and principles regarding the collection directly from nature, production, harvesting, storage and exportation of the seed, bulb or other parts of the bulbous plants that exist in nature with the aim of protecting them.
Annexes and its Descriptions	This Regulation includes the plant species with bulbs, tubers and rhizomes described as natural flower bulbs whether they are found in nature or not.
Enforcement Dates and O.G. Date&No	Published in Official Gazette No. 28358 dated July 19, 2012.
Law (5042-08.01.2004) and Regulations on the Protection of Plant Breeders' Rights for New Plant Varieties	
National / International	National
Content, Objective and Scope	The objective of this Law is to encourage the improvement of plant varieties, and to protect the rights of the breeders and the new varieties. This Law includes all plant species.
Enforcement Dates and O.G. Date&No	Published in Official Gazette No. 25551 dated August 12, 2004.
Seed Law (5553-31.10.2006)	
National / International	National
Content, Objective and Scope	The objective of this Law is to increase the efficiency and quality in plant production; to provide quality assurance in seed plants; to make arrangements regarding seed plant

	production and trade; and to perform necessary arrangements for restructuring and development of seed planting sector.
Annexes and its Descriptions	This Law includes keeping records of the genetic resources and varieties belonging to the reproduction materials of field crops, vineyards and orchards plants, forest plants and other plant species; and regulations regarding production.
Enforcement Dates and O.G. Date&No	Published in Official Gazette No. 26340 dated November 8, 2006.
Pasture Law (4342-25.02.1998) and Regulation	
National / International	National
Content, Objective and Scope	The objective of this Regulation is to regulate the procedures and principles regarding the implementation of the Act on Amending Certain Provision of the Pasture Law No. 4342, 25/02/1998 and Pasture Law No. 4368, 11/06/1998
Annexes and its Descriptions	This Regulation includes meadows, mountain pastures, winter shelters, and public prairies and grasslands
Enforcement Dates and O.G. Date&No	Published in Official Gazette No. 23272 dated February 28, 1998.
Forestry Law No. 3071 and Implementation Regulations	
National / International	National
Content, Objective and Scope	Principles regarding forest management such as forest planning, operation and protection are determined.
Enforcement Dates and O.G. Date&No	Published in Official Gazette No. 28750 dated August 29, 2013.
Law on Plant Protection and Agricultural Quarantine (6968-15.05.1957)	
National / International	National
Content, Objective and Scope	Includes the procedures and principles in regard to the usage, sales, citation, manufacturing, export, import of the agricultural pest control tools and pesticides; protection of all plants from diseases and pests, and their exportation, importation and transportation within the country.
Enforcement Dates and O.G. Date&No	Came into effect on December 22, 2000.
Central Game Commission (MAK) Decrees	
National / International	National
Content, Objective and Scope	Appendix-I: List of game animals protected by MAK. Appendix-II: List of game animals whose hunting is allowed for certain periods PM: List of wild animals Protected by the Ministry of Forestry and Water Works. This group of animals excluded from the MAK lists and now listed only by the Ministry of Forestry and Water Works.
Enforcement Dates and O.G. Date&No	Law on Hunting No. 4915 The Law on Hunting No. 4915 was published in the Official Gazette of Türkiye on July 14, 2003.
Habitat Directive	
National / International	International

Content, Objective and Scope	The Habitats Directive protects around 1200 European species other than birds which are considered to be endangered, vulnerable, rare and/or endemic. Included in the Directive are mammals, reptiles, fish, crustaceans, insects, molluscs, bivalves and plants. The protection provisions for these species are similar to those in the Birds Directive. They are designed to ensure that the species listed in the Habitats Directive reach a favourable conservation status within the EU. Annex-I:Natural habitat types of community interest whose conservation requires the designation of special areas of conservation Annex-II:Animal and plant species of community interest whose conservation requires the designation of special areas of conservation. Annex-III:Criteria for selecting sites eligible for identification as sites of community importance and designation as special areas of conservation Annex-IV: Animal and plant species of community interest in need of strict protection Annex-V: Animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures
Enforcement Dates and O.G. Date&No	Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora dated May 21, 1992
Directive on the Conservation of Wild Birds	
National / International	International
Content, Objective and Scope	The birds in the scope of EU list are listed as Annex I, Annex II (Part A, Part B); the birds in Annex I are the ones that requires strict protection; while the others are listed in Annex II.
Enforcement Dates and O.G. Date&No	2009/147/EC of the European Parliament and of the Council of 30 November 2009

The World Bank Environmental and Social Standards - ESS6

The main objective of ESS6 on *Biodiversity Conservation and Sustainable Management of Living Natural Resources* is conservation and protection of biodiversity and living natural resources in reaching sustainable development. It is important to maintain ecological functions of habitats and the biodiversity they support. Biodiversity often underpins ecosystem services as well. Therefore, impacts on biodiversity can adversely impact ecosystem services as well. The World Bank addresses requirements related to ecosystem services in ESS1 on *Assessment and Management of Environmental and Social Risks and Impacts*.

The main objectives set out in ESS6 are as the following:

- To protect and conserve biodiversity and habitats.
- To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity.
- To promote the sustainable management of living natural resources.
- To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.

ESS6 requires that the following are described in the assessment of biodiversity-related risks and impacts:

- Ecosystems affected
- Species affected
- Ecosystems services affected
- Protection status
- Site ownership and control
- Baseline threats
- Potential project-related risks and impacts

Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

If natural habitats are identified as part of the assessment, the Borrower will seek to avoid adverse impacts on them in accordance with the mitigation hierarchy. Where natural habitats have the potential to be adversely affected by the project, the Borrower will not implement any project-related activities unless:

(a) There are no technically and financially feasible alternatives; and

(b) Appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy, to achieve no net loss and, where feasible, preferably a net gain of biodiversity over the long term. When residual impacts remain despite best efforts to avoid, minimize and mitigate impacts, and where appropriate and supported by relevant stakeholders, mitigation measures may include biodiversity offsets adhering to the principle of "like-for-like or better."

Critical habitat is defined as areas with high biodiversity importance or value, including:

(a) Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches;

(b) Habitat of significant importance to endemic or restricted-range species;

(c) Habitat supporting globally or nationally significant concentrations of migratory or congregatory species;

(d) Highly threatened or unique ecosystems; and

(e) Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).

In areas of critical habitat, the Borrower will not implement any project activities that have potential adverse impacts unless all of the following conditions are met:

(a) No other viable alternatives within the region exist for development of the project in habitats of lesser biodiversity value;

(b) All due process required under international obligations or national law that is a prerequisite to a country granting approval for project activities in or adjacent to a critical habitat has been complied with;

(c) The potential adverse impacts, or likelihood of such, on the habitat will not lead to measurable net reduction or negative change in those biodiversity values for which the critical habitat was designated;

(d) The project is not anticipated to lead to a net reduction in the population of any Critically Endangered, Endangered, or restricted-range species, over a reasonable time period;

(e) The project will not involve significant conversion or significant degradation of critical habitats. In circumstances where the project involves new or renewed forestry or agricultural plantations, it will not convert or degrade any critical habitat;

(f) The project's mitigation strategy will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated; and

(g) A robust and appropriately designed, long-term biodiversity monitoring and evaluation program aimed at assessing the status of the critical habitat is integrated into the Borrower's management program.

In planning and undertaking E&S assessment related to the biodiversity baseline, the Borrower is required to follow relevant GIIP utilizing desktop review, consultation with experts and field-based approaches, as appropriate.

Where identified, risks and impacts on biodiversity or habitats are required to be managed by the Borrower in accordance with the mitigation hierarchy and GIIP. Given ecological systems are highly complex, it is very hard and at times impossible to make reliable estimations on long-term impact associated with project activities. Therefore, in management of risks where there is high levels of uncertainty, it is important to adopt a precautionary approach and implement adaptive management strategies that can respond to monitoring results. In the precautionary principle, the main emphasis is on avoiding actions with potentially harmful (and particularly with irreversible) consequences until there is sufficient information available to properly assess and weigh the likely costs and benefits. Adaptive management involves adjusting actions and approached based on the results of ongoing monitoring.

The Borrower is required to ensure that competent biodiversity expertise is utilized to conduct the E&S assessment and the verification of the effectiveness and feasibility of mitigation measures. Where significant risks and adverse impacts on biodiversity have been identified, the Borrower will develop and implement a project-specific Biodiversity Management Plan (BMP) to address such risks and impacts.

4.7.2 Methodology for Biodiversity Studies

Biodiversity studies of ESIA within the scope of the Project have been conducted based on previously published scientific work, reports on habitats and species, field surveys conducted in November 2023 and expert judgement. Methodologies applied by field experts targeting different animal and plant groups considered priority habitats of the area, species of high conservation concern and also protected areas.

The fact that field surveys were undertaken in winter, limited on-site data especially in terms of identifying the fauna composition of the area was collected. It is important that additional pre-construction surveys are conducted in Spring and/or Summer, so that data gaps can be closed, and habitat and species-specific mitigation measures and management strategies can reflect the current conditions.

Invertebrate surveys should be performed at At Divriği Hills Important Nature Area, Esence (Keşiş Mountains) Important Nature Area, and Kop Mountains Important Plant Area in vegetation period (April-August) once.

Amphibian and reptile surveys should be performed at Esence (Keşiş Mountains) Important Nature Area and Kop Mountains Important Plant Area in vegetation period (April-August) once.

Bird surveys should be performed at Ekşisu Reedbeds Wetland of National Importance, Erzurum Marshes Wetland of Local Importance, Çıldır Lake Wetland of National Importance, and Esence (Keşiş Mountains) Important Nature Area in migration and breeding periods for 5 days monthly.

Mammal surveys should be performed at Esence (Keşiş Mountains) Important Nature Area in active period of mammals (April-September) once.

These surveys will be performed in pre-construction phase by the Contractor in supervision of AYGM.

As with other E&S topics addressed in the ESIA Report, biodiversity studies were conducted in line with the Turkish legislation, international E&S standards and guidelines, the European Union (EU) legislation, as well as conventions and protocols relevant to the Project.

4.7.3 Biodiversity Study Area

A biological diversity study area describes a designated area where studies and research related to biological diversity are conducted. The term "biodiversity" describes the range of life forms on Earth, encompassing species diversity, genetic diversity within species, and ecosystem diversity. Studying biodiversity is crucial to comprehending, recording, and

protecting the variety of life forms on Earth. This area is determined based on the type and impact of relevant projects.

The Project is passing through six provinces, including Sivas, Erzincan, Tunceli, Erzurum, Kars, and Ardahan Provinces (see Figure 3). To identify impacts of the Project on biodiversity and to conduct critical habitat assessment, in line with the provisions of the World Bank ESS6, not only the Project Area of Influence (AoI), but the larger ESIA study area, which consists of a 250-m corridor extending on each side of the proposed route was considered as the Biodiversity Study Area.

4.7.4 Protected Areas

The World Bank ESS6 identifies two different types of protected areas: Legally Protected Areas and Internationally Recognized Areas of High Biodiversity Value.

ESS6 recognizes legally protected areas that meet the following definition: “A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.” For the purpose the ESS6, this includes areas proposed by governments for such designation. As per WB ESS6, internationally recognized areas of high biodiversity value include World Heritage Natural Sites, Biosphere Reserves, Ramsar Wetlands of International Importance, Key Biodiversity Areas, Important Bird Areas, and Alliance for Zero Extinction Sites, among others.

Where the project occurs within or has the potential to adversely affect an area that is legally protected, designated for protection, or regionally or internationally recognized, the Borrower will ensure that any activities undertaken are consistent with the area’s legal protection status and management objectives and meet the requirements of ESS6, as applicable. In addition, the Borrower will:

(a) Demonstrate that the proposed development in such areas is legally permitted;

(b) Act in a manner consistent with any government recognized management plans for such areas;

(c) Consult and involve protected area sponsors and managers, project-affected parties including Indigenous Peoples, and other interested parties on planning, designing, implementing, monitoring, and evaluating the proposed project, as appropriate; and

(d) Implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area.

In line with this approach, areas that have been designated with a status under the Turkish protected area system, as well as areas designated as, internationally recognized areas of high biodiversity value such as Key Biodiversity Areas (KBAs), Important Bird and Biodiversity Areas (IBAs), and Important Plant Areas (IPAs), were screened for the purpose of this ESIA.

4.7.4.1 Legally Protected Areas

The International Union for Conservation of Nature (IUCN) proposes the following definition for a protected area (IUCN, 2017), which today is widely used around the globe, and recognized as the definition of legally protected areas by ESS6:

> *“A protected area is a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.”*

Legally protected areas play a crucial role in biodiversity conservation efforts and the provision of ecosystem services through their ecological functions. In Türkiye, the Ministry of Agriculture and Forestry is the primary official body responsible for developing and implementing national

biodiversity conservation policies, action plans, designating conservation areas, and overseeing various related tasks carried out by its central and local directorates within the Ministry's organizational structure. In 2006, the IUCN Protected Area Management Categories (as defined by Dudley et al., 2013) were adopted to restructure the Turkish Protected Area System as part of the Biodiversity and Natural Resource Management Project led by the Ministry's General Directorate of Nature Conservation and National Parks (Thomas, 2006). These IUCN Protected Area Management Categories offer a global framework and are recognized by the Convention on Biological Diversity, with the initial goal of establishing a common understanding of protected areas within and between countries. Categorization is done according to the primary management objectives for a protected area, based on the principles listed as the following:

- assignment to a category is a not a commentary on management effectiveness,
- the category systems are international; national names for protected areas may vary, and
- all categories are important; and gradation of human intervention is implied.

Accordingly, legally protected areas in Türkiye, were re-classified under the six (6) protected area management categories defined by the IUCN Guidelines, which identify the main reasons for management as the following:

I Strict protection [Ia) Strict nature reserve and Ib) Wilderness area]

II Ecosystem conservation and protection (i.e., National Park)

III Conservation of natural features (i.e., Natural monument)

IV Conservation through active management (i.e., Habitat/species management area)

V Landscape/seascape conservation and recreation (i.e., Protected landscape/seascape)

VI Sustainable use of natural resources (i.e., Managed resource protected area)

Legally protected areas around the Project route and their IUCN protected area categories are given in Table 80, and maps showing the locations of the protected areas with respect to the Project route are presented in Figure 39, Figure 40, Figure 41, Figure 42, Figure 43, and Figure 44, where the maps were given in province base. Ekşisu Reedbeds Wetland of National Importance, Erzurum Marshes Wetland of Local Importance, and Çıldır Lake Wetland of National Importance are within the Project route. Considering the distances between the railway route and the other legally protected areas in the region, there will be no Project-related impacts on these areas. For the areas in Legally Protected Areas AYGM will further identify and assess potential project-related adverse impacts with pre-construction surveys and apply the mitigation hierarchy so as to prevent or mitigate adverse impacts from the project that could compromise the integrity, conservation objectives, or biodiversity importance of such an area, after additionally surveys and findings (see Section 4.7.2). Therefore, the BMP will be revised and if necessary, a BAP will be prepared.

Table 80. Legally Protected Areas near the Project Route

Province	Protected Area	IUCN Protected Area Category	Distance to the Project Route (km)
Sivas	Oymalık Nature Park	V	107.62
	Karşıyaka Nature Park	V	77.85
	Canköy Nature Park	V	73.71
	Tödürge Lake Wetland of National Importance	IV	59.67
	Ulaş Lakes Wetland of National Importance	IV	80.59
	Çiğ Lake Wetland of Local Importance	IV	107.21
	Kaz Lake Wetland of Local Importance	IV	65.36
Erzincan	Dumanlı Nature Park	V	37.29
	Ekşisu Reedbeds Wetland of National Importance	IV	Within the Area
Tunceli	Munzur Valley National Park	II	15.15

Province	Protected Area	IUCN Protected Area Category	Distance to the Project Route (km)
	Örenönü Nature Park	V	64.19
Erzurum	Kop Mountain Historical National Park	II	3.64
	Nene Hatun Historical National Park	II	0.41
	Çat Wildlife Development Area	IV	31.16
	Verçenik Wildlife Development Area	IV	67.79
	Oltu Wildlife Development Area	IV	28.83
	Tortum Lake Wetland of National Importance	IV	66.26
	Erzurum Marshes Wetland of Local Importance	IV	Within the Area
Kars	Sarıkamış Alahuekber Mountains National Park	II	1.03
	Soğuksu Nature Park	V	4.25
	Kuyucuk Lake Wildlife Development Area	IV	17.69
	Kağızman Wildlife Development Area	IV	39.64
	Kuyucuk Lake Ramsar Area	IV	16.87
	Aygır Lake Wetland of National Importance	IV	12.73
	Çalı Lake Wetland of National Importance	IV	14.82
Ardahan	Cemal Turan Nature Park	V	42.63
	Posof Wildlife Development Area	IV	34.10
	Çıldır Lake Wetland of National Importance	IV	Within the Area
	Aktaş Lake Wetland of National Importance	IV	5.99
	Putka Lake Wetland of National Importance	IV	40.27

Figure 39. Legally Protected Areas (Sivas)

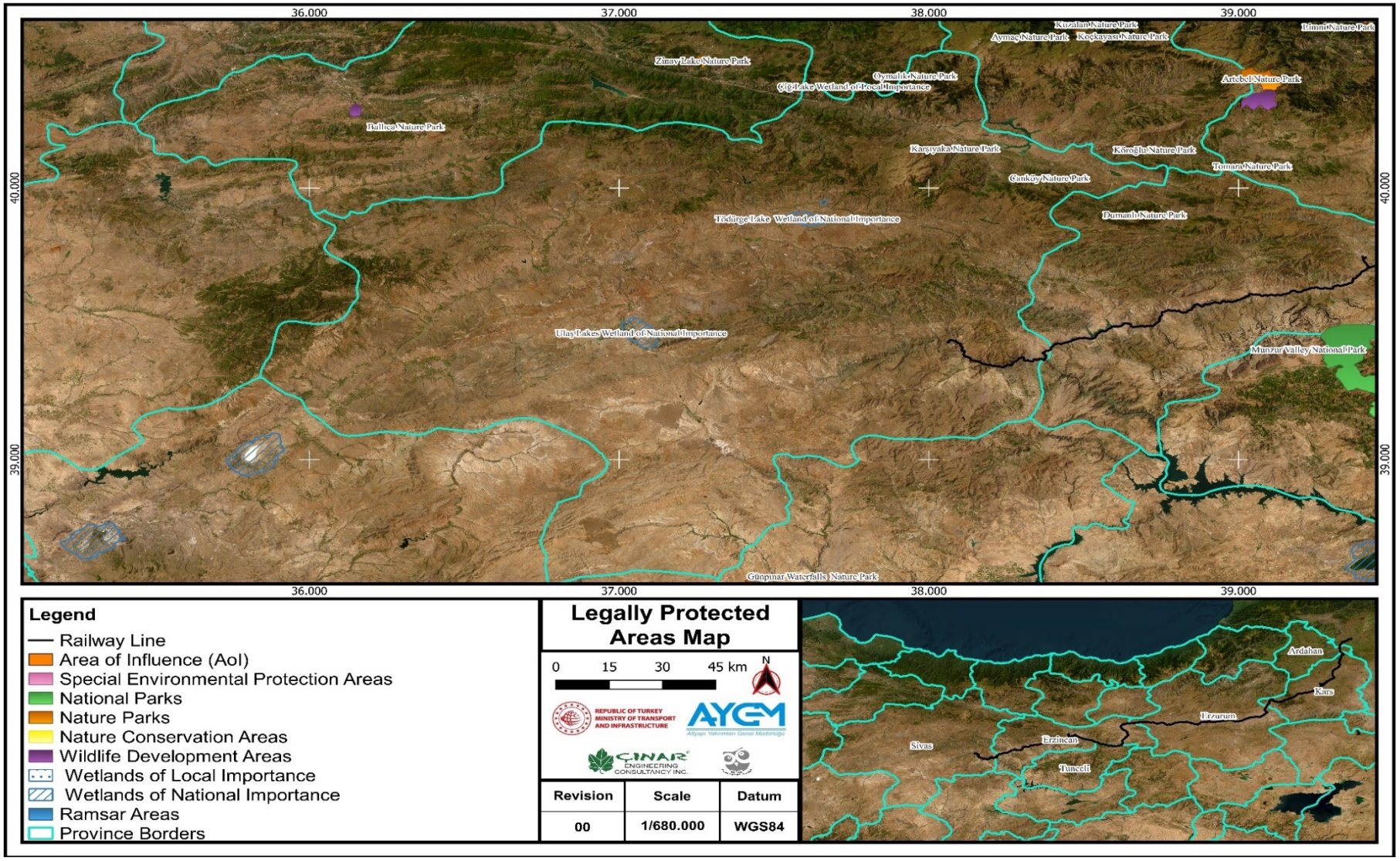


Figure 40. Legally Protected Areas (Erzincan)

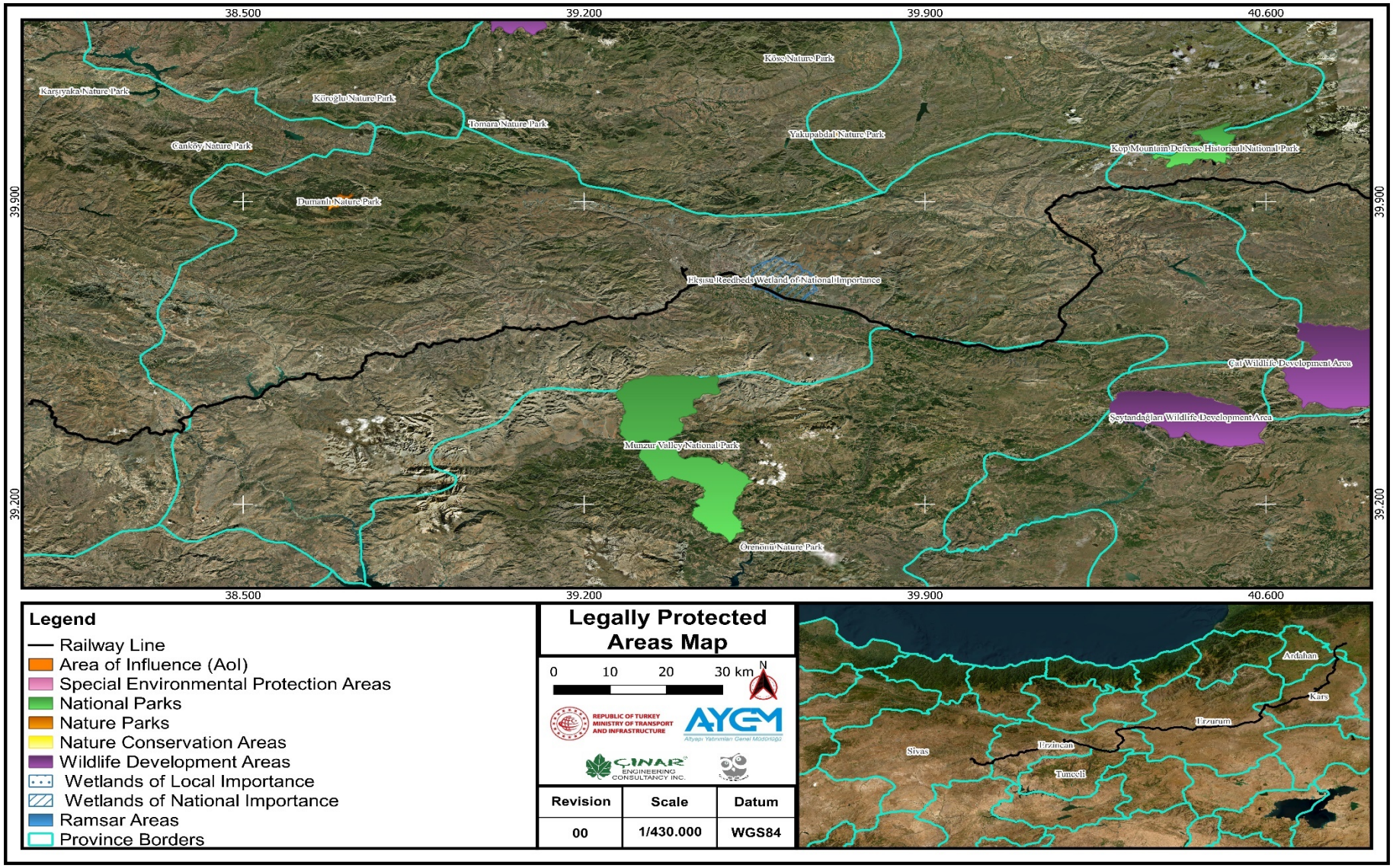


Figure 41. Legally Protected Areas (Tunceli)

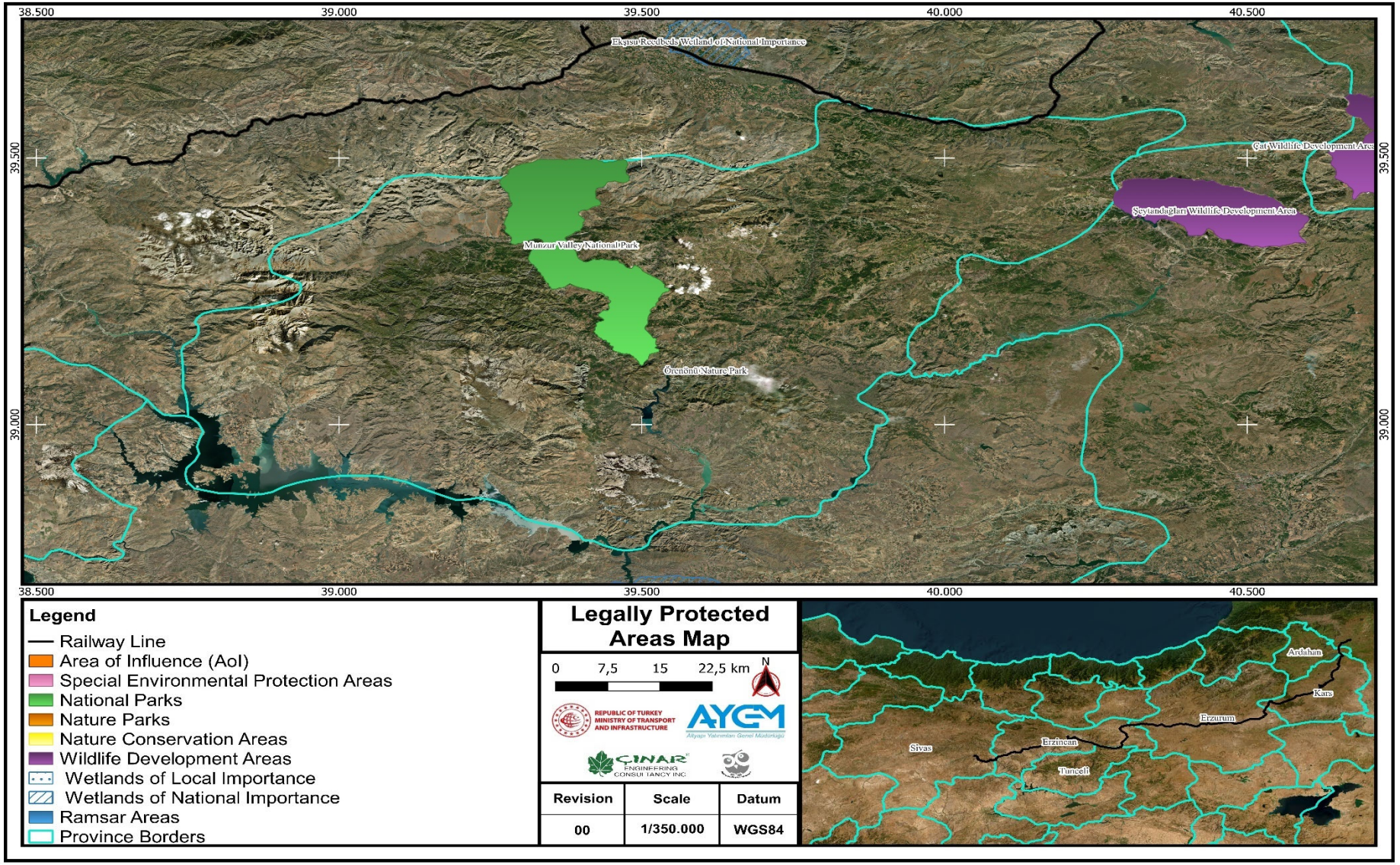


Figure 42. Legally Protected Areas (Erzurum)

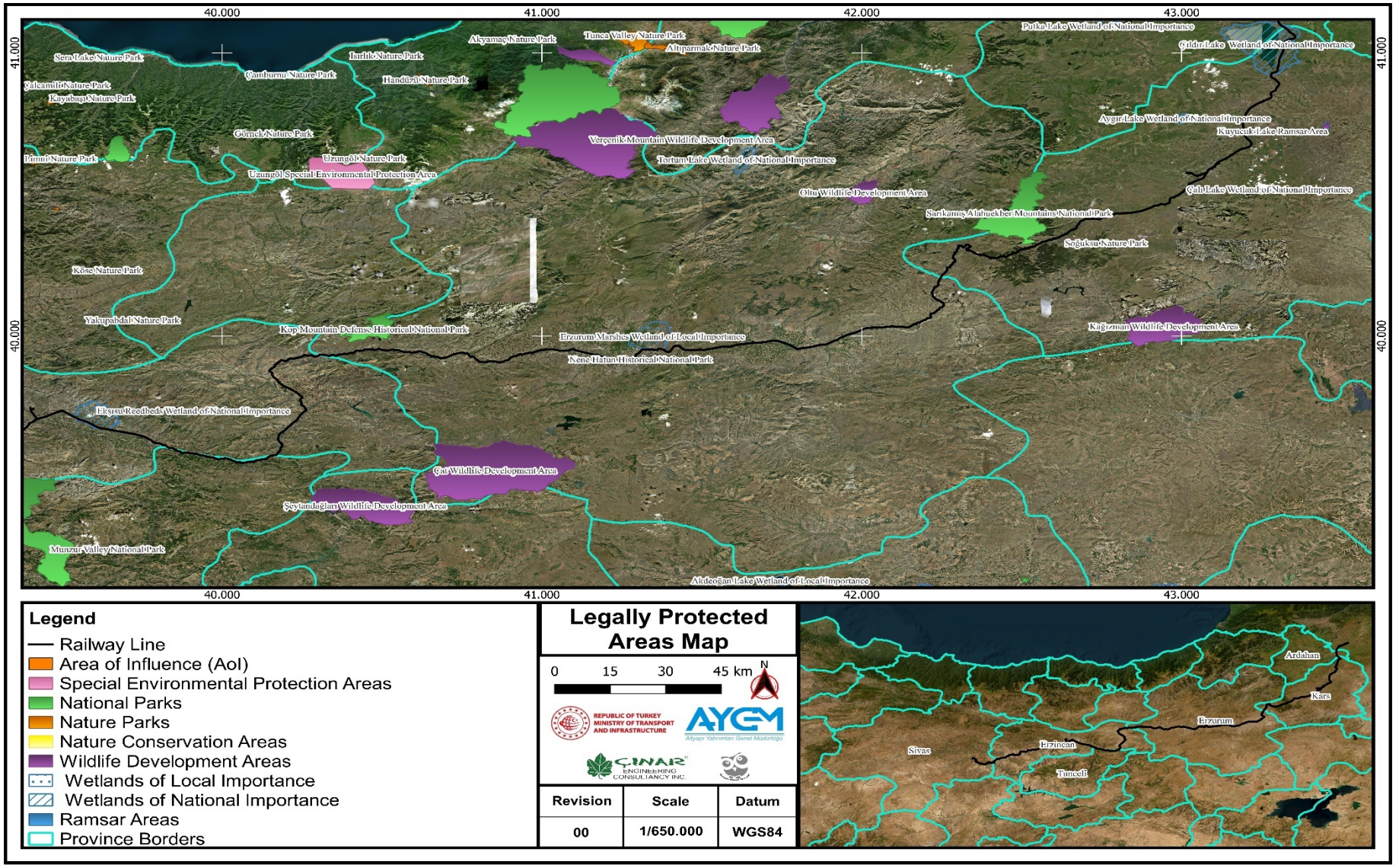


Figure 43. Legally Protected Areas (Kars)

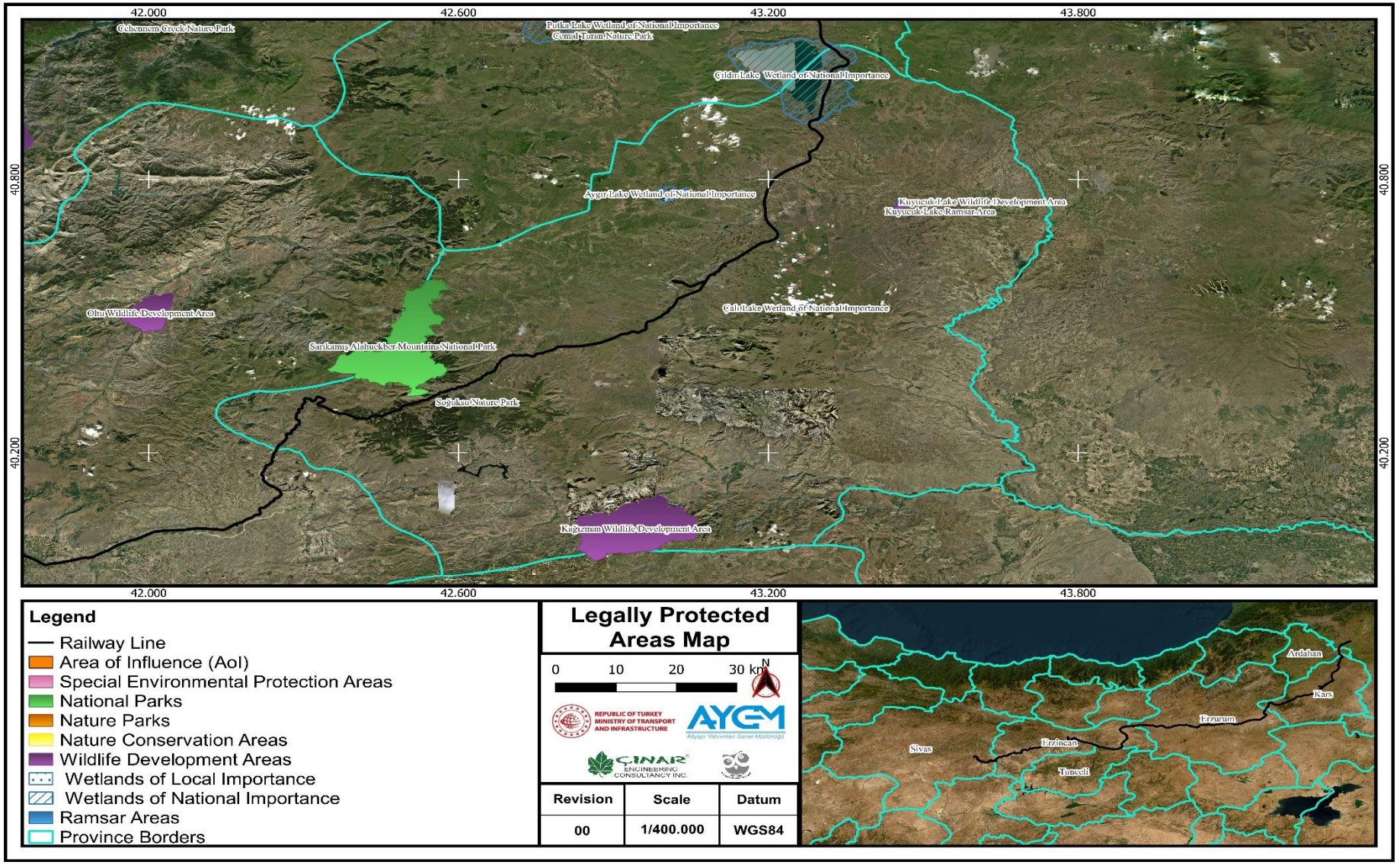
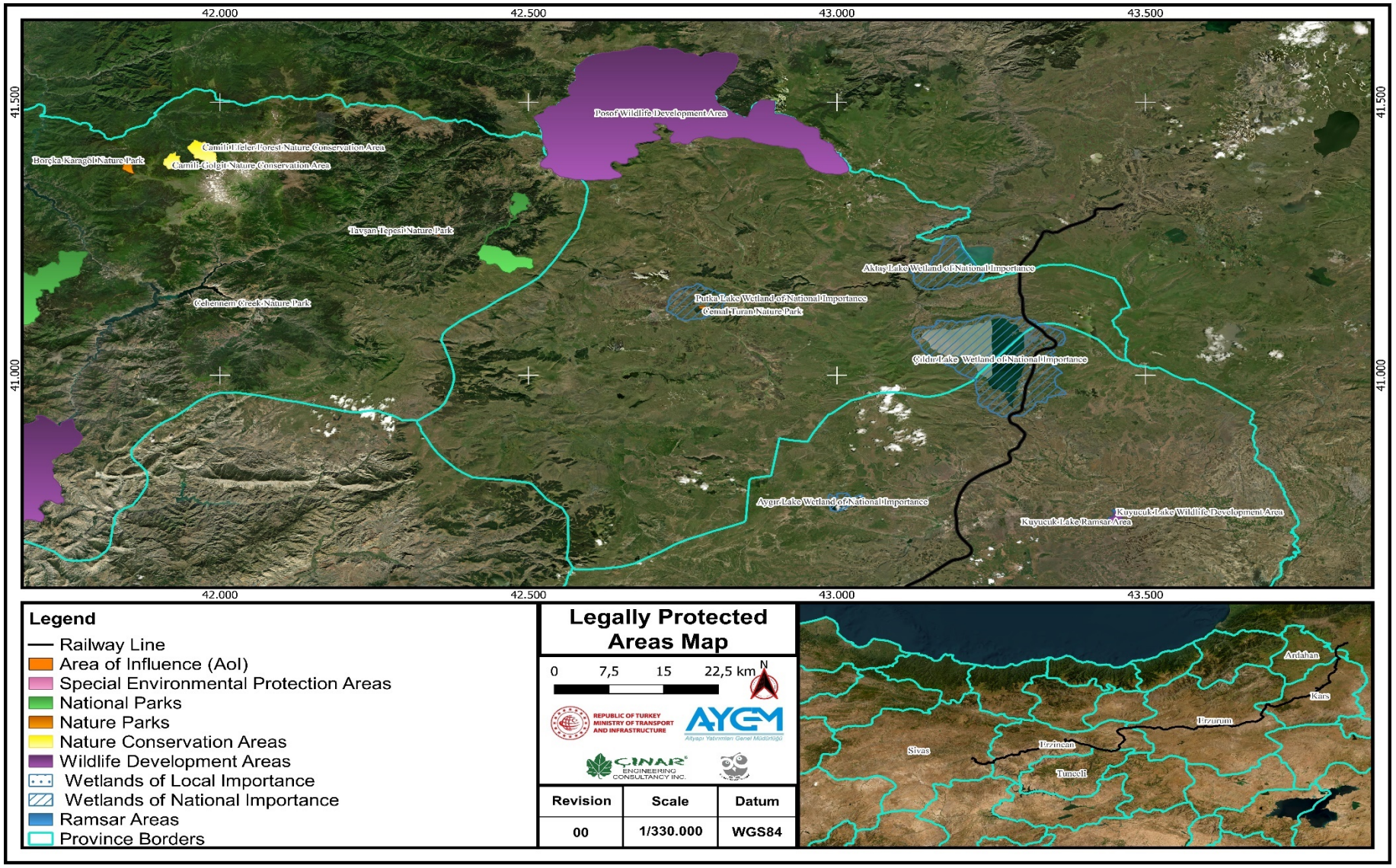


Figure 44. Legally Protected Areas (Ardahan)



Ekşisu Reedbeds Wetland of National Importance is located 11 km east of Erzincan and to the northeast of the Erzincan Plain. The area, designated as wetland of National Importance, was approved by the National Wetlands Commission in 2007. Drying, erosion, overgrazing, reed burning, mining, pollution, and construction represent the general threats and issues in the area. There are 258 plant taxa in the area, with 5 of them being endemic species (*Allium sieheanum* IUCN: **LC**, *Gladiolus halophilus* IUCN: **VU**, *Isatis spectabilis* IUCN: **VU**, *Sonchus erzincanicus* IUCN: **EN**, and *Anthemis wiedemanniana* IUCN: **LC**). Additionally, 7 mammal species, 5 reptile species, 2 amphibian species, and 90 bird species have been identified. The most important bird species in the area is the Common Crane (*Grus grus*, IUCN: **LC**).

Erzurum Marshes Wetland of Local Importance is located in the Yakutiye district of Erzurum province. The region was designated as Wetland of Local Importance on May 18, 2018. Unconscious agricultural and livestock (grazing) activities, domestic and sewage waste, construction, illegal hunting, and drying constitute the general threats and issues in the area. There have been 224 bird species identified in the area. The most important bird species is the Sociable Lapwing (*Vanellus gregarious*, IUCN: **CR**).

Çıldır Lake was registered as Wetland of Nationally Important on April 8, 2015. The main problem threatening the area is human access to the small islands in the lake. There are 73 plant species identified in the area, with 3 of them being endemic (*Centaurea macrocephala* IUCN: **VU**, *Cirsium frickii* IUCN: **VU**, *Marrubium catariifolium* IUCN: **VU**). The area has gained special protection status for ruddy shelduck (*Tadorna ferruginea*, IUCN: **LC**) and the armenian gull (*Larus armenicus*, IUCN: **LC**). In addition, 86 bird species, 9 mammals, 11 reptiles, and 15 fish species have been identified. The velvet scoter (*Melianitta fusca*, IUCN: **LC**) and the white-headed duck (*Oxyura leucocephala*, IUCN: **EN**) are among the most important bird species.

It is important that construction activities in these areas are carried out especially outside the breeding season of birds which is between March and August. Also, construction works should be monitored by an Ornithology Expert during migration period and breeding period for 5 days a month.

4.7.4.2 Internationally Recognized Areas of High Biodiversity Value

As per WB ESS6, internationally recognized areas of high biodiversity value include World Heritage Natural Sites, Biosphere Reserves, Ramsar Wetlands of International Importance, Key Biodiversity Areas, Important Bird Areas, and Alliance for Zero Extinction Sites, among others. In Türkiye, alongside the official efforts led by the Ministry, a diverse range of non-governmental organizations (NGOs), academic institutions, and individual researchers and professionals are actively engaged in collaborative or independent work. Their primary aim is to gain a deeper understanding of Türkiye's natural resources and develop effective conservation strategies to safeguard the survival of habitats and species. Many of these areas and species represent unique ecosystems of global conservation significance. This collective effort reflects a broader commitment to preserving the country's biodiversity and ensuring the long-term sustainability of its natural heritage.

In 2006, Doğa Derneği, in collaboration with the former Ministry of Environment and Forestry, compiled an inventory of Key Biodiversity Areas (KBAs) in Türkiye. This project involved the integration of survey data from across the country with expert opinions, as documented in the work of Eken et al., 2006. Notably, this effort marked the first national-scale application of the KBA approach, which was originally developed by BirdLife International for identifying important bird species in their "Important Bird Areas" studies.

The primary purpose of this KBA inventory was to serve as a valuable resource for identifying and prioritizing areas and species that require focused conservation efforts to minimize the risk of extinction. By identifying and working on these critical areas and species, the inventory aimed to contribute to the overarching goal of "zero extinction," which seeks to prevent the loss of biodiversity and protect species at risk of disappearing.

Internationally recognized areas around the Project route are given in Table 81, and maps showing the locations of the areas with respect to the Project route are presented in Figure 45, Figure 46, Figure 47, Figure 48, Figure 49, and Figure 50, where the maps were given in province base. Divriği Hills Important Nature Area (INA), Munzur Moutains INA, Esence (Keşiş Mountains) INA, Munzur Moutains Important Plant Area (IPA), Kop Mountains IPA, Sarıkamış Forests INA, Çıldır Lake INA, and Çıldır Lake IPA are within the Project route. Considering the distances between the railway route and the other internationally recognized areas of high biodiversity values in the region, there will be no Project-related impacts on these areas. For the areas in internationally recognized areas AYGM will further identify and assess potential project-related adverse impacts and apply the mitigation hierarchy so as to prevent or mitigate adverse impacts from the project that could compromise the integrity, conservation objectives, or biodiversity importance of such an area, after additionally surveys and findings (see Section 4.7.2). Therefore, the BMP will be revised and if necessary, a BAP will be prepared.

Table 81. Internationally Recognized Areas near the Project Route

Province	Internationally Recognized Areas	Distance to the Project Route (km)
Sivas	Divriği Hills INA	Within the Area
	Kösedağ INA	57.70
	Hafik Zara Hills INA	47.93
	Tecer Mountains INA	24.40
	Ulaş Lakes INA	82.66
	Akdağmadeni Forests INA	174,16
	Tohma Valley INA	95.07
	Kelkit Valley INA	86.05
	Giresun Moutains INA	84.41
	Gölova Lakes INA	55.73
	Hafik Zara Gypsum Hills IPA	46.38
	Tecel Mountains IPA	25.16
	Tohma Valley IPA	90.92
	Kelkit Valley IPA	85.68
	Giresun Mountains IPA	93.27
	Tödürge Lake IBA	60.66
Erzincan	Refahiye Forests INA	5.13
	Munzur Moutains INA	Within the Area
	Esence (Keşiş Mountains) INA	Within the Area
	Munzur Moutains IPA	Within the Area
Tunceli	INA 1	81.85
	INA 2	72.01
	INA 3	58.36
	Şeytan Mountains and Perisuyu INA	10.66
Erzurum	Çoruh Valley INA	53.36
	Tortum Basin INA	24.08
	Olur-Otlu Steppes INA	21.06
	Erzurum Marshes INA	0.43
	Kop Mountains INA	0.01
	Eastern Black Sea Mountains INA	33.04
	Palandöken Mountains INA	4.33
	Bingöl Mountains INA	35.68
	Karasu Plain INA	26.60
	Kop Mountains IPA	Within the Area

Province	Internationally Recognized Areas	Distance to the Project Route (km)
	Bingöl Mountains IPA	42.63
	Çoruh Valley IPA	52.49
	Eastern Black Sea Mountains IPA	32.82
	Erzurum Plain IBA	0.89
	Eastern Black Sea Mountains IBA	43.93
Kars	Allahuekber Mountains INA	3.92
	Sarıkamış Forests INA	Within the Area
	Aygır Lake INA	12.79
	Kars Plain INA	7.35
	Kuyucuk Lake INA	17.43
	Aras Valley INA	16.94
	Kuyucuk Lake IBA	17.61
	Çalı Lake IBA	15.88
Ardahan	Posof Forests INA	30.20
	Ardahan Forests INA	29.10
	Yalnıçam Mountains INA	52.59
	Çıldır Lake INA	Within the Area
	Yalnıçam Mountains IPA	45.17
	Çıldır Lake IPA	Within the Area
	Ardahan Forests IBA	41.50
	Aktaş Lake IBA	5.16
	Çıldır Lake IBA	0.14

Figure 45. Internationally Recognized Areas (Sivas)

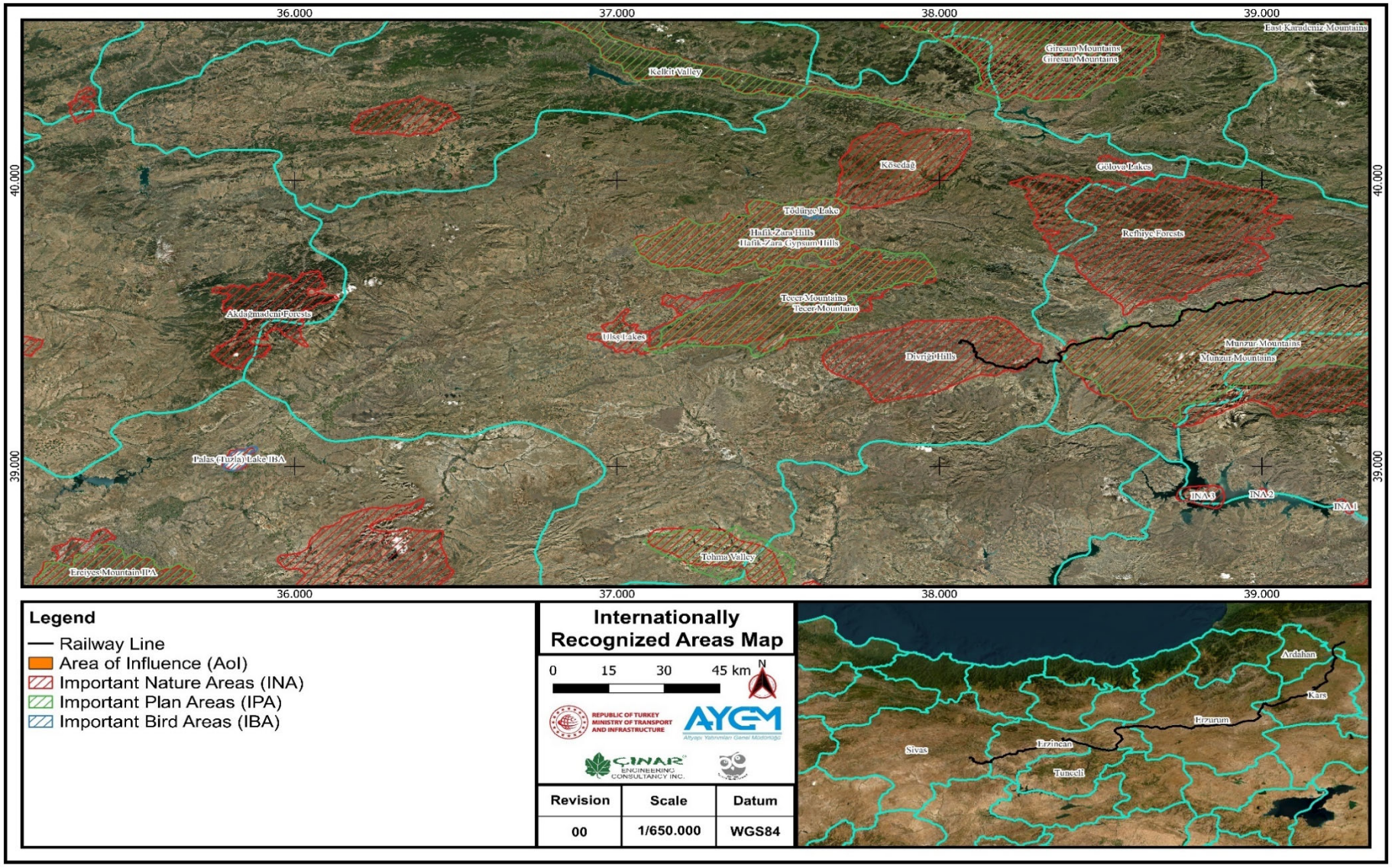


Figure 46. Internationally Recognized Areas (Erzincan)

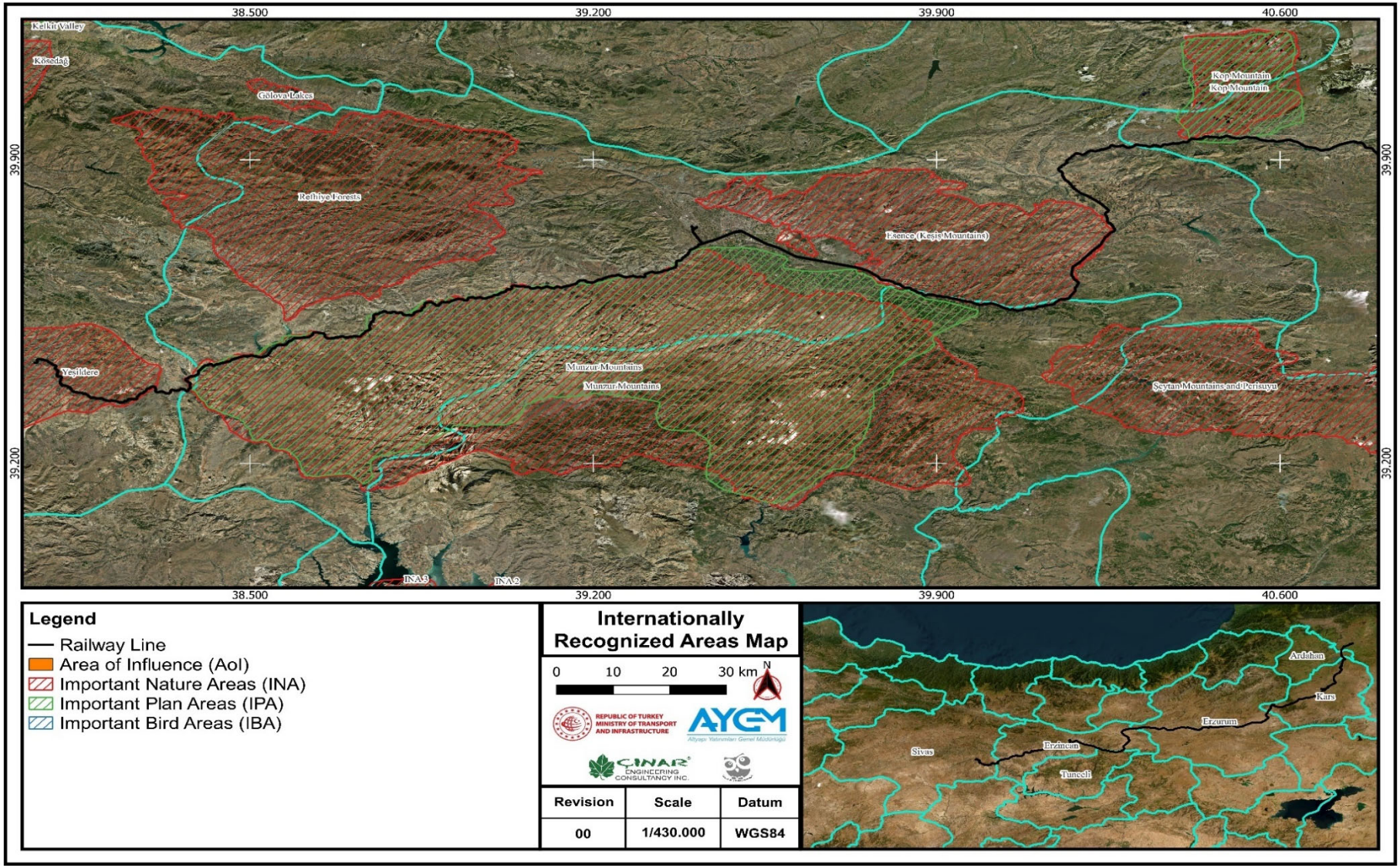


Figure 47. Internationally Recognized Areas (Tunceli)

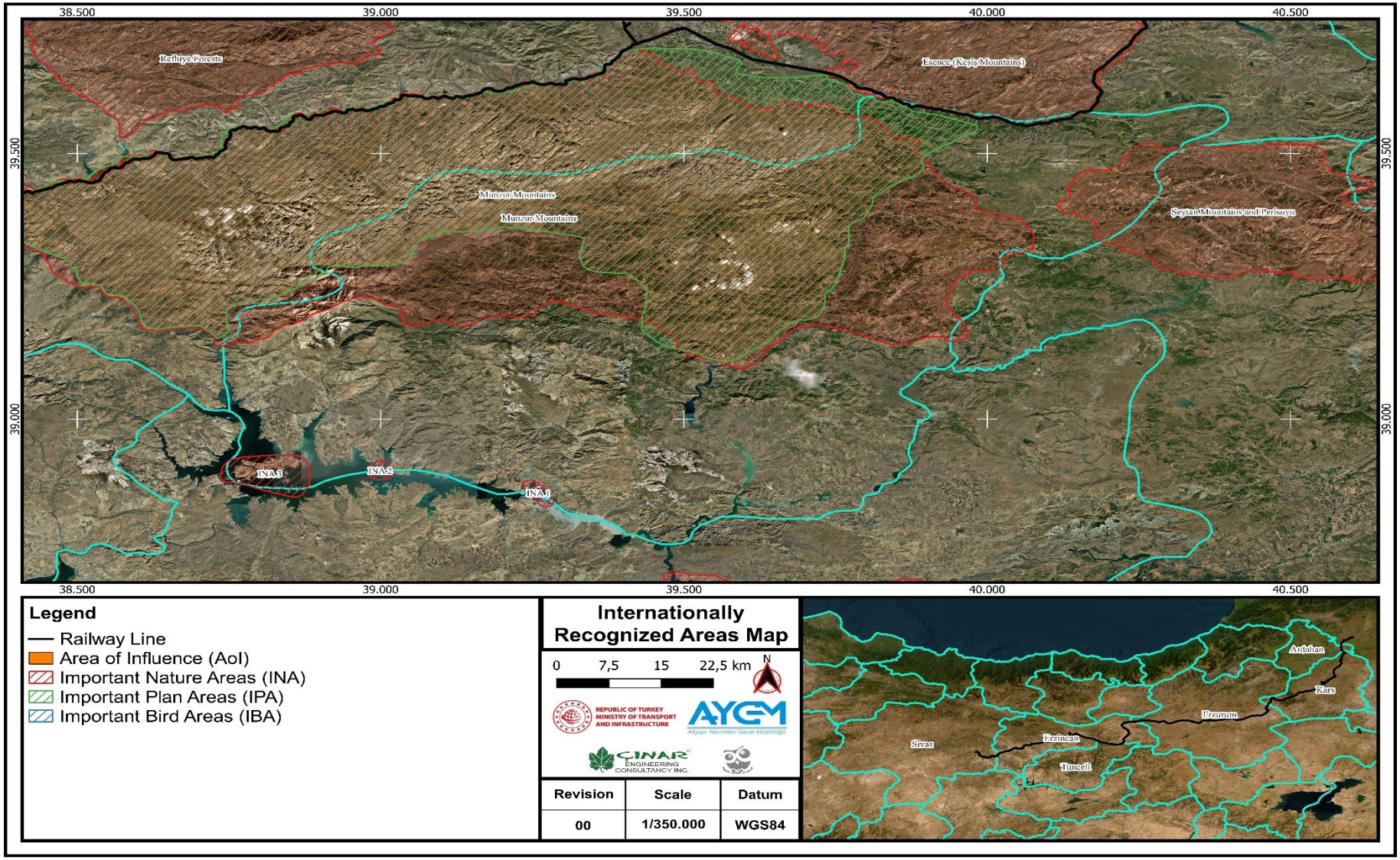


Figure 48. Internationally Recognized Areas (Erzurum)

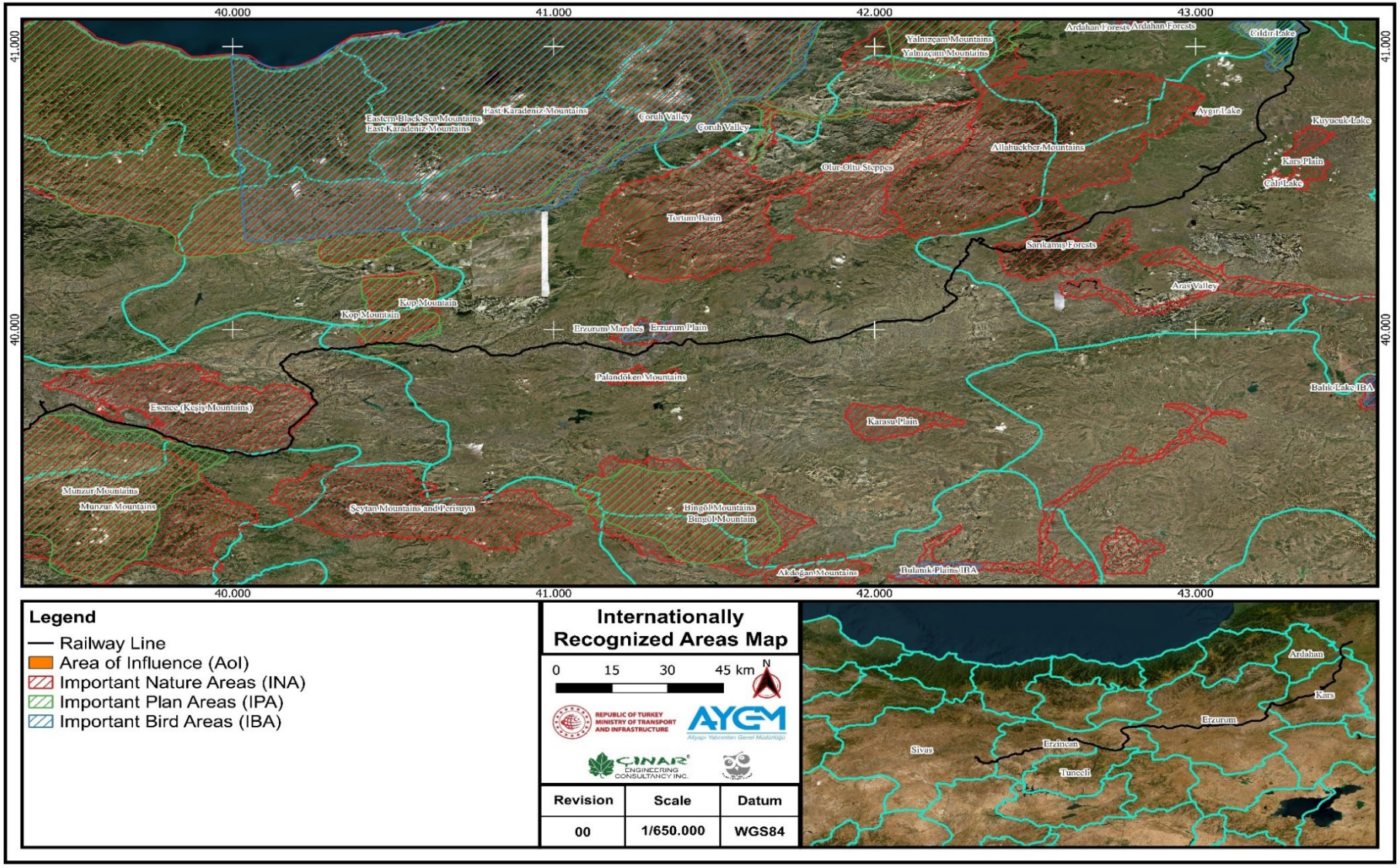


Figure 49. Internationally Recognized Areas (Kars)

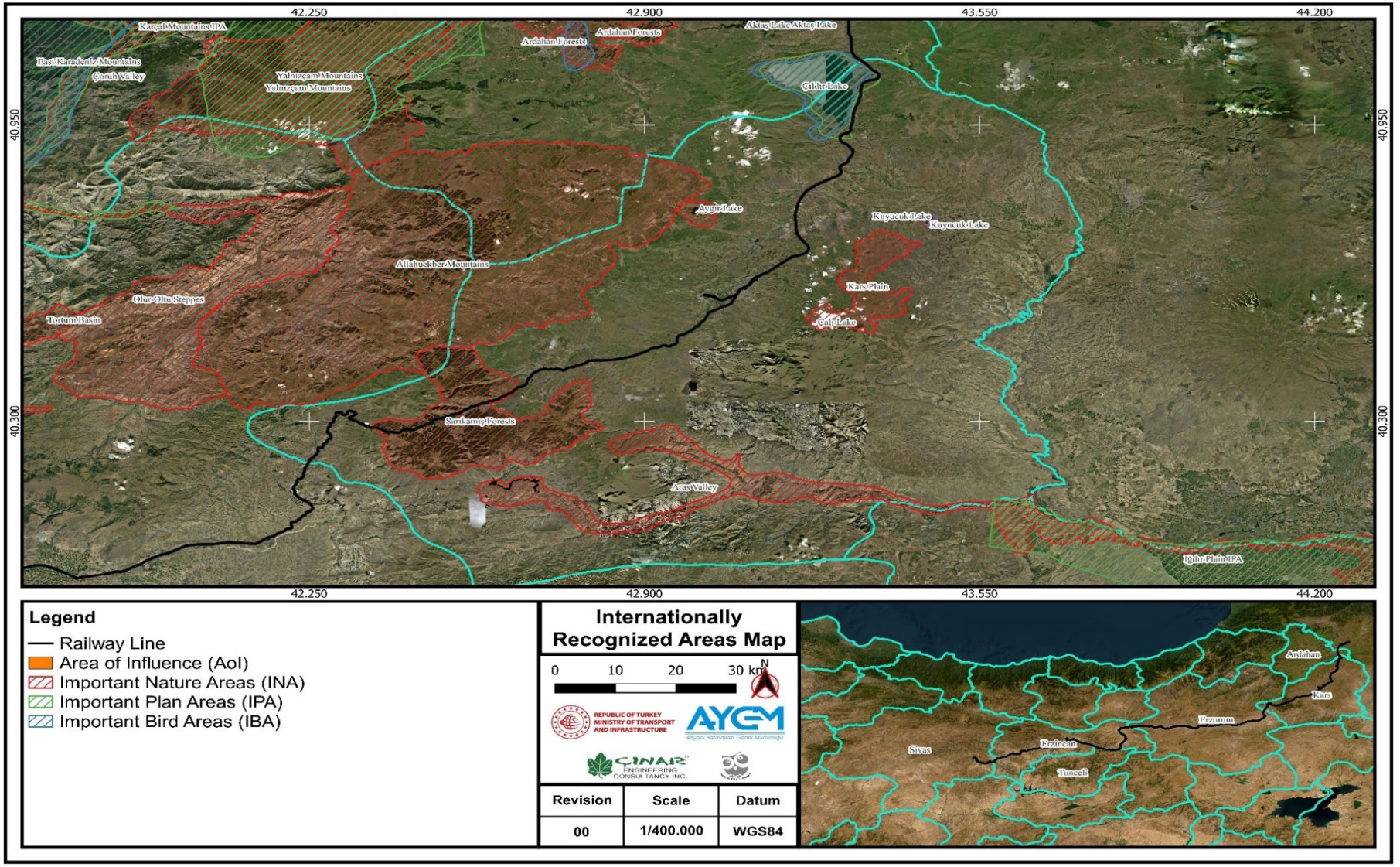
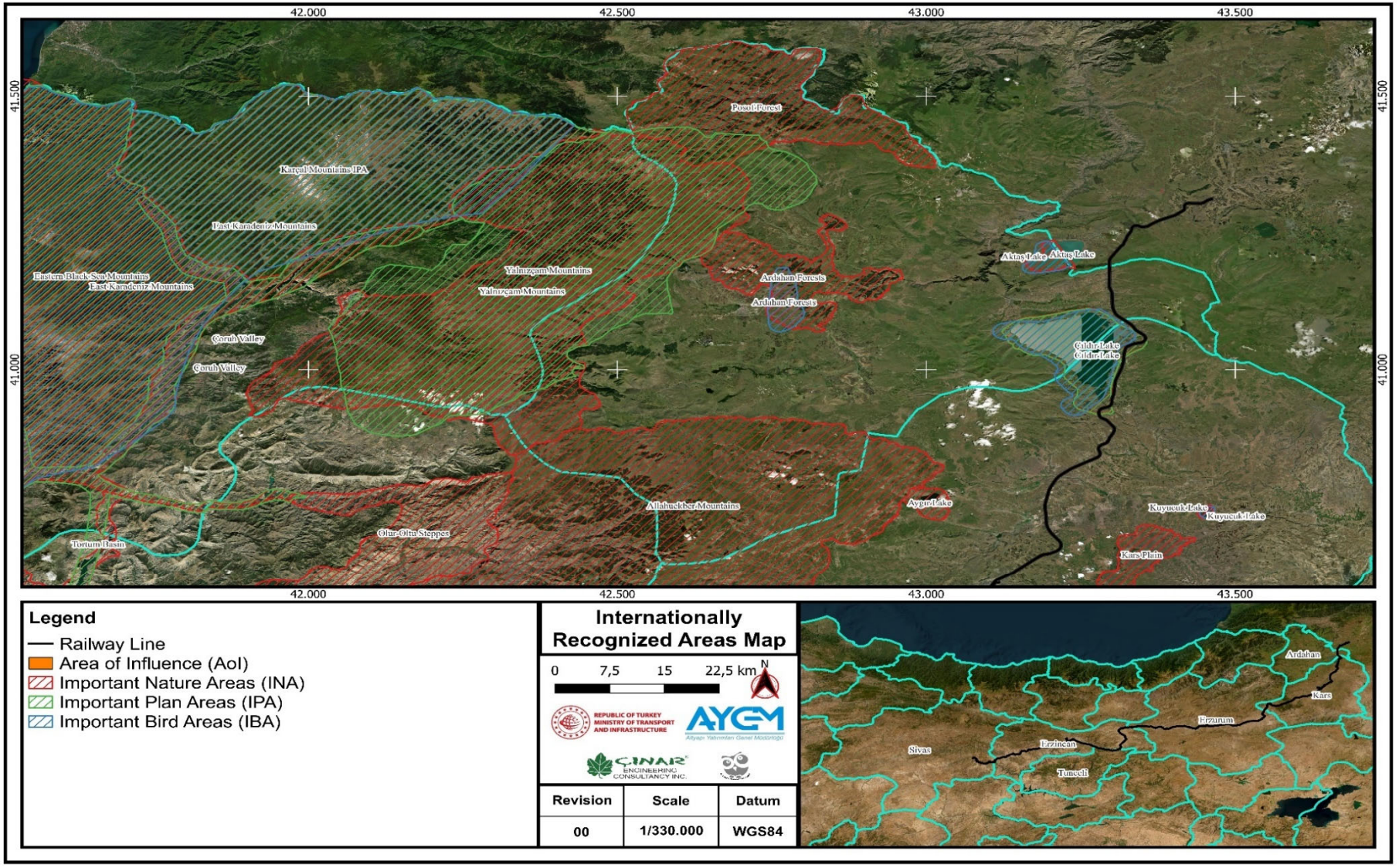


Figure 50. Internationally Recognized Areas (Ardahan)



Divriği Hills Important Nature Area; Divriği Hills include the hills surrounding the Divriği district in the southeastern part of Sivas province and numerous valleys in the region. The hills in the area are fed by the Çaltı Creek, one of the branches of the Euphrates River. This creek meanders through the area, forming bends within the landscape. One of the main branches of the creek, Nih Creek, is located at the southern border of the area, while the other branch, Acı Creek, originates from the Tecer Mountains and is situated at the northwest border. The vegetation in the area is sparse, especially in the eastern part of the hills, which are almost bare. The area consists of mountain steppes and agricultural lands, with agricultural areas concentrated mainly along the riverbanks.

Divriği Hills Important Nature Area is an important habitat for plant species that are globally endangered. In the area, nine plant taxa meet the Important Nature Area criteria (*Astragalus karasarensis* IUCN: **EN**, *Cerasus hippophaeoides* IUCN: **VU**, *Cousinia decolorans* IUCN: **CR**, *Elymus nodosus* subsp. *Gypsicolus* IUCN: **EN**, *Galium baytopianum* IUCN: **EN**, *Hypericum sorgerae* IUCN: **EN**, *Onobrychis albiflora* IUCN: CR, *Salvia hedgeana* IUCN: **CR**, *Veronica macrostachya* subsp. *mardinensis* IUCN: **VU**). The only record of the plant species *Onobrychis albiflora* in the world was made in the Acı Creek in this area. Additionally, the butterfly species *Glaucopsyche alexis* (IUCN: **LC**) also has distribution in the area.

Munzur Moutains Important Nature Area and Important Plant Area; Munzur Mountains Important Nature Area covers the entire mountain range that stretches from the south of Erzincan to the north of Tunceli and ends at the border of Bingöl province. Due to the rugged terrain, transportation is very limited. The connection of Erzincan to the southern provinces is provided by highways that run along the valleys opened by the Karasu River, a branch of the Euphrates River, in the west and the Pülümür Creek in the east.

Munzur Mountains, consisting of limestone and volcanic rocks, includes more than ten peaks exceeding 3000 meters, making it the highest point in the western half of the Eastern Anatolia Region. The elevation rapidly increases from the southwest end of the area towards the east and north, with steep walls that continue up to the peaks, except for the valleys carved by rivers. This vast area, relatively untouched by human impact, contains moraines and glacial lakes at high altitudes. The Munzur Mountains Important Nature Area (INA) encompasses a diverse range of vegetation, including high mountain meadows, scots pine (*Pinus sylvestris* IUCN: **LC**) communities, dense oak (*Quercus* sp.) forests in the northeast and south, and steep cliffs. Due to its rich habitats, the Munzur Mountains are undoubtedly one of the most important natural areas in our country.

The topographic diversity of the area has led to the presence of different habitat types within the Munzur Mountains Important Nature Area. The high-altitude regions, often covered in snow for a large part of the year and receiving abundant precipitation, are home to high mountain (alpine) meadows. The steep cliffs in this area are generally devoid of woody vegetation and support unique rock plant communities. At lower altitudes, there is a forest layer consisting of various oak (*Quercus* sp.) species. In the moist valley bottoms, there are gallery forests that include species such as maple (*Acer* sp.), walnut (*Juglans* sp.), and birch (*Betula* sp.).

Munzur River Valley is one of the best examples of this. The remnants of scots pine (*Pinus sylvestris* IUCN: **LC**) communities near the town of Ovacık are another richness of the area. In the wide-open areas outside the forest, mountain steppe vegetation prevails. These areas are of great importance in terms of rare endemic plant species.

Esence (Keşiş Mountains) Important Nature Area; This region is a mountain range located between the Erzincan Plain and the Otlukbeli Mountains. The north, south, and east of the Esence (Keşiş Mountains) Important Nature Area are surrounded by the Karasu River, one of the most important branches of the Euphrates River. The western part is connected to the Otlukbeli Mountains. The highest point in the area is the Esencetepe, which is located north of the Üzümlü district and reaches an altitude of 3549 meters. The glacial lakes in the valleys surrounding the mountain peaks are visited for day trips in the summer months.

A large part of the Esence (Keşiş Mountains) Important Nature Area is covered with mountain steppes dominated by Astragalus and Artemisia plants, as well as wet meadows. West of Esencetepe, there are glacial lakes known as Yedi Göller (Seven Lakes) at an altitude of over 3000 meters, and on Karakaya Mountain, there is Aygır Gölü, a lake with a depth of up to 10 meters.

The arms of the Karasu River, which surround the mountain on three sides, form deep valleys. The steep cliffs in these valleys are important nesting areas for predatory bird species. On the southwestern slopes of the area, there are communities of juniper and various oak species. The Esence (Keşiş Mountains) Important Nature Area, which is extremely rich in endemic plant species, is also important for butterfly, bird, reptile, and large mammal species. The north of the Üzümlü district is the last habitat for five important plant species that live only in this region.

Kop Mountains Important Plant Area; Kop Mountain is a mountain range on the Erzurum-Bayburt road with its highest peak at 2918 meters. It is surrounded by the branches of the Çoruh River to the north and the Karasu River to the south. The region was once covered with forests, but long-term logging has greatly altered the vegetation of the area. Today, much of the area is covered with steppes.

Kop Mountain is generally covered with mountain steppes. However, there are also remnants of forests in some areas. The vegetation is generally in the form of shrubs. In addition, high mountain meadows extend in the highlands of the region.

In the area, 34 plant taxa are endemic, among these, *Stashys bayburtensis* (IUCN: **CR**) and *Hesperis stellata* (IUCN: **EN**) are found only on Kop Mountain.

The Caucasian salamander (*Mertensiella caucasica* IUCN: **VU**) is a species found on Kop Mountain and is globally endangered. Two separate butterfly species, the Apollo butterfly (*Parnassius apollo* IUCN: **LC**) and the Cinquefoil Skipper (*Pyrgus cirsii* IUCN: **DD**), whose populations are endangered at a global scale, are also found in the area.

Sarıkamış Forests Important Nature Area; Sarıkamış Forests has more floristic richness than its surrounding areas. In the floristic studies within the forest - that has plenty of endemic plants and specific climate conditions, 206 genera, 352 species, 34 sub-species and 8 varieties that belong to 58 families were identified.

According to the studies conducted on 9 stations in the section of TANAP Project route passing through the Sarıkamış Forests, 28 species belonging to 10 orders and 22 families were identified in the terrestrial vertebrate fauna field studies. In the terrestrial invertebrate study, 158 species belonging to 39 families and 5 orders were identified. Among the species identified by the studies in those stations, 2 species (*Nephrotoma nasuta*, *Tipula unicornis*) are widespread endemic species. Furthermore, among the species identified in those stations, there are 7 species that are identified for the first time in Türkiye's fauna.

Flora studies were conducted in the section of TANAP Project route at 7 different locations in 2 different habitats. 136 taxa belonging to 31 families were identified. 11 of those taxa are endemic; 3 of them are regional and 8 are widespread species.

Çıldır Lake Important Nature Area and Important Plant Area; It is the largest and deepest lake in Northeast Anatolia, located within the provinces of Kars and Ardahan. It is a freshwater lake with an area of 120km^2. During the winter months, the depth of the largely frozen lake reaches approximately thirty meters. The lake contains large islets and encompasses Lavaş Lake, a shallow freshwater lake surrounded by reeds, in its southwestern part. Situated between Mount Akbaba and Mount Kısır, the lake is a plateau lake formed as a result of volcanic activities, nourished by snowmelt, rainwater, and underground sources.

The surroundings of the lake are partially marshy, reedy, and surrounded by seasonal subalpine meadows. The bowl-shaped hills surrounding the area exhibit the characteristics of a high plateau steppe. Sparse shrubs and trembling aspen communities are found on the slopes and islets at the lake level.

The plant species called *Cirsium eliasianum* (IUCN: **EN**) is only found around Lake Çıldır in the world. Dalmatian pelican (*Pelecanus crispus* IUCN: **NT**), ruddy shelduck (*Tadorna ferruginea* IUCN: **LC**), common crane (*Grus grus* IUCN: **LC**), and Armenian gull (*Larus armenicus* IUCN: **LC**) are important bird species. The area is a crucial stopover for both spring and autumn bird migration. Especially from mid-September onwards, large numbers of Eurasian buzzard (*Buteo buteo* IUCN: **LC**) and lesser spotted eagle (*Aquila pomarina* IUCN: **LC**) are observed in the northeast and southwest of the area.

The Project crosses KBA's, which were summarized and listed above. The areas should be monitored in proper timeline for invertebrates, amphibians, reptiles, birds and mammals at pre-construction phase (see also Section 4.7.2). At Divriği Hills Important Nature Area the butterfly species *Glaucopsyche alexis* (IUCN: LC) should be monitored in vegetation period (April-August) once. At Esence (Keşiş Mountains) Important Nature Area butterfly, bird, reptile, and large mammal species should be monitored in vegetation period (April-August) once. Monitoring in Kop Mountains Important Plant Area for the Caucasian salamander (*Mertensiella caucasica* IUCN: VU) should be performed spring for once and for the Apollo butterfly (*Parnassius apollo* IUCN: LC) and the Cinquefoil Skipper (*Pyrgus cirsii* IUCN: DD) in vegetation period (April-August) once in pre-construction phase by the contractor in supervision of AYGM.

4.8 Baseline Conditions

The baseline data for the biological environment of the project area and project AoI are gathered from previously published scientific work, literature information on habitats and species, field surveys and expert judgement. The ecological survey was conducted with the following objectives:

- Using various standard techniques, assess the status of major floral and faunal components of all terrestrial habitats present in the Project AoI;
- Data collection and compilation on the status of floral and faunal components and habitats;
- Provide quantitative data on various floral and faunal components.
- Identification and listing of floral and faunal species of conservation significant (CR, EN, VU and threatened and endemic species in accordance with the International Union of Conservation for Nature - IUCN RED List) in the Project AoI; and
- Identification of conservation-sensitive areas (Protect Areas: National Parks, Nature Parks, Nature Reserves, Wildlife Development Area, Special Environmental Protection Area, Wetlands, Biosphere Reserves) in the Project AoI.

Some of the general methodologies for field surveys can be listed as the following:

- In determining sampling/vantage points, locations that represent different habitat types and those that had been identified to be significant to species were considered.
- Some of the flora and fauna species were recorded through direct observations.

Field surveys were conducted in November 2023 to identify and truthing of endemic, rare, and threatened species.

4.8.1 Habitat Classification

The European Nature Information System (EUNIS) puts forward a system for identification and classification of European habitat types. Classification area is quite large including the entire European mainland and seas including islands that are close to the mainland (except for Cyprus, Iceland and Greenland), EU states' archipelagos (Canary Islands, Madeira Islands and Azore Islands) and the European mainland to the west of Ural Mountains that cover Türkiye and the Caucasus. The main objective of the EUNIS habitat classification is to create a European reference set of habitat types including a description of all types and hierarchical classification.

Habitats within the Biodiversity Study Area were evaluated in accordance with the EUNIS classification, which is useful in terms of not only relating the national classifications to international level, but in terms of corresponding EUNIS habitats to habitats listed in Annex I of Habitats Directive for “designation of special areas of conservation” and the European Red List of Habitats (Janssen, 2016) for the critical habitat assessment.

Natural habitat types of the Biodiversity Study Area, characteristic plant species of these habitats, related EUNIS codes, corresponding Habitat Directive Annex I habitats and Natura 2000 codes, as well as the European Red List categories are presented in Table 82. In addition to habitats explained in the table there are also modified and artificial habitats. These habitats can be listed as; I1.1 : Intensive unmixed crops, I1.2 : Mixed crops of market gardens and horticulture, J1.1 : Residential buildings of city and town centres, J1.2 : Residential buildings of villages and urban peripheries, J2.3 : Rural industrial and commercial sites still in active use, J2.7 : Rural construction and demolition sites, J3.2 : Active opencast mineral extraction sites, including quarries, J4.2 : Road networks, J4.3 : Rail networks, and J4.4 : Airport runways and aprons.

EUNIS habitat types of the Biodiversity Study Area are presented in the maps given in Appendix-8. The AoI includes 438138208,9 ha (50.56%) modified habitats and 428411347,4 ha (49,44%) natural habitats. Also, 10713377 ha (1.24%) critical habitats were defined.

Table 82. Habitats of the Biodiversity Study Area

EUNIS Habitat Type	Habitats Directive Annex I	Habitat Characteristics
C1.2 : Permanent mesotrophic lakes, ponds and pools	Annex I	Lakes and pools with waters fairly rich in nutrients (nitrogen and phosphorus) and dissolved bases (pH often 6-7). Communities e.g. of Littorelletea uniflorae and Isoeto-Nanojuncetea. Many unpolluted lowland lakes and ponds are naturally mesotrophic, and support dense beds of macrophytes, which are absent in polluted waters.
C2.2 : Permanent non-tidal, fast, turbulent watercourses	Annex I	Permanent water courses with fast-flowing turbulent water and their associated animal and microscopic algal pelagic and benthic communities. Rivers, streams, brooks, rivulets, rills, torrents, waterfalls, cascades and rapids are included. The bed is typically composed of rocks, stones or gravel with only occasional sandy and silty patches. Features of the riverbed, uncovered by low water or permanently emerging, such as gravel or rock islands and bars are treated as the littoral zone.
D5.3 : Swamps and marshes dominated by Juncus effusus or other large *Juncus spp.*	-	This habitat type is encountered in the Erzincan Plains. Since the habitat is saturated with water, plants with high water requirements thrive in this habitat. The dominant plants of the habitat are *Juncus heldreichianus, Juncus effusus, Phragmites australis*, and *Elymus elonagatus*.
E1.2B : Serpentine steppes	-	It is one of the critical habitats in the project area. It represents the serpentine steppe habitats between Kemah and İliç. Within this habitat, local and regional endemic species such as *Echinophora chrysantha*, *Centaurea aucherana*, *Onosma erzincanica*, *Hesperis breviscapa*, *Tchihatchewia isatidea*, *Physoptychis haussknechtii*, *Silene nerimaniae*, *Beta macrorhiza*, *Hedysarum yilmazunalii*, *Paronychia arabica* subsp. *euphratica*, *Salvia euphratica*, *Stachys inanis*, *Verbascum tuna-ekimii*, and *Allium purpureoviride* are distributed. Therefore, this habitat type is one of the most sensitive and fragile habitats along the route.
E1.2E : Irano-Anatolian steppes	-	It is the most sensitive and critical habitat along the project route. This habitat type is encountered along the İliç-Kemah route and northwest of Aşkale. The characteristic feature of the habitat is the presence of gypsum and marl in varying proportions in the soil. On these soils with a dirty white appearance, numerous endemic species such as *Gypsophila eriocalyx*, *Gypsophila aucheri*, *Ebenus macrophylla*, *Achillea pseodoaleppica*, *Achillea sintenisii*, *Glaucium cappadocicum*, *Verbascum alyssifolium*, *Scorzonera aucherana*, *Tanacetum heterotomum*, *Thymus spathulifolius*, *Thymus cappadocicus*, *Plantago euphratica*, *Gypsophila heteropoda*, *Isatis sivasica*, *Thesium stelleroides* are distributed. Therefore, this habitat is the most sensitive and fragile habitat along the route.
E1.2 : Perennial calcareous grassland and basic steppes	Annex I	It is the most widespread habitat type in the project area. The common plants in this habitat include *Astragalus microcephalus*, *Onobrychis cornuta*, *Elymus hispidus*, *Koeleria cristata*, *Dactylis glomerata*, *Artemisia taurica*, *Artemisia austriaca*, *Berberis crataegina*, and *Euphorbia macroclada*. Endemic species such as *Hedysarum candidissimum*, *Cousinia sintenisii*, *Centaurea derderifolia*, and *Plantago euphratica* are also present in this habitat.
E3.4: Moist or wet eutrophic and mesotrophic grassland	Annex I	Wet eutrophic and mesotrophic grasslands and flood meadows of the boreal and nemoral zones, dominated by grasses Poaceae, rushes *Juncus spp*. or club-rush *Scirpus sylvaticus*.
E4.2 : Moss and lichen dominated mountain summits, ridges and exposed slopes	-	Includes fjell fields in which mosses and lichens are dominant, often with low cover of *Carex bigelowii*. Fjell fields are best developed in boreal and arctic mountains and in subarctic lowlands.

EUNIS Habitat Type	Habitats Directive Annex I	Habitat Characteristics
E4.3 : Acid alpine and subalpine grassland	Annex I	It is represented in the Sarıkamış-Çıldır route in the project area. The habitat, with an altitude ranging between 1800 and 2200 meters, is characterized by dominant species from the Poaceae family. Plants in this habitat are harvested by the local community in July-August to obtain hay. The dominant species in this habitat, which is used for pasture purposes, include *Poa trivialis*, *Dactylis glomerata*, *Festuca sp., Salvia verticillata*, *Cirsium lappaceum*, *Elymus elongatus*, and *Poa pratensis*.
G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix	Annex I	It represents riparian habitats developing along the stream valleys in the project route. The dominant species in this habitat are *Salix alba*, *Populus nigra*, and *Tamarix smyrnensis*. There are no critically distributed species in this habitat.
G1.7 : Thermophilous deciduous woodland	Annex I	This habitat type is predominantly represented in the Erzincan-İliç and Erzincan Aşkale routes in the project area. The dominant oak species in this habitat are *Quercus petraea* subsp. *pinnatiloba*, *Quercus libani*, and *Quercus brantii*. In the understory, endemic species such as *Salvia euphratica* and *Gypsophila aucheri* are also distributed.
G3.4 : *Pinus sylvestris* woodland south of the taiga	Annex I	This habitat type is encountered in the vicinity of Sarıkamış along the project route. The widespread and characteristic species of this habitat are *Pinus sylvestris*. *Populus tremula* is also quite common within this habitat. Forest clearings are covered with subalpine meadows. Endemic species such as *Hieracium karagoellense* are also present in this habitat.
G3.5: Pinus nigra woodland	Annex I	Forests dominated by pines of the *Pinus nigra* group.
G4.8: Mixed non-riverine deciduous and coniferous woodland	-	Mixed non-riverine woodland without a significant Pinus component, comprising elements of *Fagus*, *Betula*, *Populus tremula* or *Sorbus aucuparia* together with *Abies* and *Picea* woodland.
G5.2 : Small broadleaved deciduous anthropogenic woodlands	-	Plantations and small intensively-managed woods of deciduous broadleaved trees less than about 0.5 ha in area.
H3.5 : Almost bare rock pavements, including limestone pavements	Annex I	More or less level surfaces of rock exposed by glacial erosion, by weathering processes, or by aeolian scouring, bare or colonized by mosses, algae or lichens. The hard rock surface may be exposed or partially covered by erosional rock debris, in particular, those produced by frost weathering, heaving, thrusting or cracking. Included are rock surfaces in karst landscapes, rock dome tops, whaleback, roche moutonné, flyggberg and rock basin formations of periglacial areas, golec and felsenmeer formations, level surfaces of dykes and old lava flows. Vascular plant communities may colonize cracks and weathered surfaces.
H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity	-	It represents sparsely vegetated rocky areas along the project route. The characteristic species of this habitat are perennial chamaephytic plants. The common species in this habitat include *Tanacetum armenum*, *Inula aschersoniana*, *Scrophularia libanotica*, *Tanacetum argenteum*, and *Parietaria judaica*. Regional endemic species such as *Campanula munzurensin*, *Phryna ortegioides*, and *Campanula yildirimlii* are also distributed in this habitat.
I1.1 : Intensive unmixed crops	-	This habitat type is quite common along the project route. In this habitat, crops such as wheat, sunflower, sugar beets, cabbage, and beans are cultivated.

EUNIS Habitat Type	Habitats Directive Annex I	Habitat Characteristics
I1.2 : Mixed crops of market gardens and horticulture	-	Intensive cultivation of vegetables, flowers, small fruits, usually in alternating strips of different crops. Includes allotments and small-scale market gardens.
J1.1 : Residential buildings of city and town centres	-	-
J1.2 : Residential buildings of villages and urban peripheries	-	-
J2.3 : Rural industrial and commercial sites still in active use	-	-
J2.7 : Rural construction and demolition sites	-	-
J3.2 : Active opencast mineral extraction sites, including quarries	-	-
J4.3 : Rail networks	-	-
J4.4 : Airport runways and aprons	-	-

Images of the habitats are given below.

Figure 51. G1.7 : Thermophilous deciduous woodland



Figure 52. E1.2 : Perennial calcareous grassland and basic steppes



Figure 53. H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity



Figure 54. G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix



Figure 55. E1.2E : Irano-Anatolian steppes



Figure 56. E1.2B : Serpentine steppes



Figure 57. G3.4 : *Pinus sylvestris* woodland south of the taiga



Figure 58. D5.3 : Swamps and marshes dominated by Juncus effusus or other large *Juncus spp*.



Figure 59. E4.3 : Acid alpine and subalpine grassland



4.8.1.1 Flora

The aim of the survey was to identify the flora and vegetation structure of the route, determine any critical plant species or habitats along the route, and minimize the impact of the activities on these species and habitats. Initially, a sufficient number of sample points representing each habitat were determined using Google Earth. Considering the potential effects on both sides of the road during the activities, a zone of 250 meters to the right and left of the road was included in the study. Accordingly, 33 different sample points representing various habitats were identified along the route. When selecting sample points, priority was given to natural habitats and areas where critical species are distributed. Thus, 2 sample points were designated to represent gypsum steppe habitats, 1 sample point for serpentine steppe habitat, 18 sample points for perennial calcareous steppe habitats, 5 sample points for deciduous mixed oak forests, 1 sample point for riverbank gallery forests, 3 sample points for *Pinus sylvestris* forests, 3 sample points for sparsely vegetated rocky habitats, 1 sample point for marsh habitat, and 4 sample points for acidic alpine and subalpine meadow habitats. The survey locations where the study was conducted, the habitat types of the stations, and their coordinates are given in Table 83.

Table 83. Survey locations along the project route, their coordinates, and habitat types

Survey Location	Coordinates	Habitat types
Loc 1	37 S 421801-4365156	H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity
Loc 2	37 S 467915-4370000	E1.2E : Irano-Anatolian steppes
Loc 3	37 S 492216-4380433	E1.2B : Serpentine steppes
Loc 4	37 S 493146-4381037	E1.2 : Perennial calcareous grassland and basic steppes
Loc 5	37 S 495420-4381360	E1.2 : Perennial calcareous grassland and basic steppes
Loc 6	37 S 505216-4384156	E1.2 : Perennial calcareous grassland and basic steppes
Loc 7	37 S 509127-4384210	E1.2 : Perennial calcareous grassland and basic steppes

Survey Location	Coordinates	Habitat types
Loc 8	37 S 512453-4384331	E1.2 : Perennial calcareous grassland and basic steppes
		G1.7 : Thermophilous deciduous woodland
Loc 9	37 S 521365-4387222	E1.2 : Perennial calcareous grassland and basic steppes
Loc 10	37 S 532694-4386927	E1.2 : Perennial calcareous grassland and basic steppes
Loc 11	37 S 525934-4386912	E1.2 : Perennial calcareous grassland and basic steppes
		G1.7 : Thermophilous deciduous woodland
Loc 12	37 S 527389-4388047	E1.2 : Perennial calcareous grassland and basic steppes
		G1.7 : Thermophilous deciduous woodland
Loc 13	37 S 532701-4391459	E1.2 : Perennial calcareous grassland and basic steppes
Loc 14	37 S 563186-4389324	D5.3 : Swamps and marshes dominated by Juncus effusus or other large Juncus spp.
Loc 15	37 S 572872-4384096	E1.2 : Perennial calcareous grassland and basic steppes
		G1.7 : Thermophilous deciduous woodland
		G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix
Loc 16	37 S 577026-4382383	E1.2 : Perennial calcareous grassland and basic steppes
		G1.7 : Thermophilous deciduous woodland
Loc 17	37 S 578685-4381964	E1.2 : Perennial calcareous grassland and basic steppes
		G1.7 : Thermophilous deciduous woodland
Loc 18	37 S 594024-4379157	E1.2 : Perennial calcareous grassland and basic steppes
		G1.7 : Thermophilous deciduous woodland
Loc 19	37 S 636074-4422532	E1.2E : Irano-Anatolian steppes
Loc 20	37 S 696825-4423895	E1.2 : Perennial calcareous grassland and basic steppes
Loc 21	37 S 699127-4425164	E1.2 : Perennial calcareous grassland and basic steppes
Loc 22	37 S 705790-4426079	E1.2 : Perennial calcareous grassland and basic steppes
Loc 23	37 S 746925-4428637	E1.2 : Perennial calcareous grassland and basic steppes
Loc 24	38 T 260081-4437612	E1.2 : Perennial calcareous grassland and basic steppes
Loc 25	38 T 265684-4454413	E1.2 : Perennial calcareous grassland and basic steppes
Loc 26	38 T 267269-4456633	H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity
Loc 27	38 T 274505-4464154	E4.3 : Acid alpine and subalpine grassland
Loc 28	38 T 279838-4461682	G3.4 : Pinus sylvestris woodland south of the taiga
Loc 29	38 T 286582-4463708	G3.4 : Pinus sylvestris woodland south of the taiga
		E4.3 : Acid alpine and subalpine grassland
Loc 30	38 T 299158-4470410	G3.4 : Pinus sylvestris woodland south of the taiga
		E4.3 : Acid alpine and subalpine grassland
Loc 31	38 T 357445-4537270	E4.3 : Acid alpine and subalpine grassland
Loc 32	38 T 358193-4542803	E4.3 : Acid alpine and subalpine grassland
Loc 33	38 T 360418-4548332	E4.3 : Acid alpine and subalpine grassland

The field surveys along the project route were conducted between November 13th and 16th, 2023. During the fieldwork, habitats at each identified point were thoroughly examined, and field notes were recorded in the field diary. The floristic list provided habitat-based species based on findings and observations obtained during the field trip.

The floristic list is presented in the order of ferns (Pteridophyta), gymnosperms (Gymnospermae), and angiosperms (Angiospermae), respectively. Families within each group are listed in alphabetical order. When listing species, the following details are provided sequentially: Turkish names (if available), plant geography region, endemism status, threat level for endemics, inclusion in the Bern and CITES lists, and abundance within the EUNIS habitat type and area, which are detailed in Table 84.

Table 84. Flora List of the Project Route and Surrounding Areas

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT								RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
PTERIDOPHYTA																									
ASPLENIACEAE	1	*Ceterach officinarum* DC.	Altın otu	Geniş yayılışlı										x								x			
SPERMATOPHYTA																									
GYMNOSPERMAE																									
PINACEAE	2	*Pinus sylvestris* L.	sarıçam	Geniş yayılışlı														x		x					x
CUPRESSACEAE	3	*Juniperus oxycedrus* L. subsp. *oxycedrus*	Katranardıcı	Geniş yayılışlı								x	x									x			
	4	*Juniperus excelsa* Bieb.	Boylu ardıç	Geniş yayılışlı								x	x								x				
EPHEDRACEAE	5	*Ephedra major* Host	Hum	Geniş yayılışlı									x									x			
ANGIOSPERMAE																									
DICOTYLEDONES																									
ACANTHACEAE	6	*Acanthus dioscoridis* L. var. *dioscoridis*		Geniş yayılışlı								x	x									x			
APIACEAE	7	*Astrodaucus orientalis* (L.) Drude		Iran-Turan								x	x									x			
	8	*Artedia squamata* L.	Karabenek	Geniş yayılışlı									x									x			
	9	*Bupleurum gerardii* All.		Geniş yayılışlı									x									x			
	10	***Bupleurum papillosum* DC.**		**Iran-Turan**		**x**	**LC**						**x**									**x**			
	11	***Echinophora chrysantha* Freyn & Sint.**		**Iran-Turan**	**x**		**EN**						**x**				**x**					**x**			
	12	*Echinophora tenuifolia* L. subsp. *sibthorpiana* (Guss.) Tutin		Iran-Turan									x					x		x		x			
	13	*Eryngium campestre* L. var. *campestre* Link	Çakır dikeni	Geniş yayılışlı								x	x										x		
	14	*Eryngium billardieri* Delar	Çakır dikeni	Iran-Turan									x									x			
	15	***Ferulago longistylis* Boiss.**	**Çakşır**	**Iran-Turan**	**x**		**EN**					**x**	**x**									**x**			
	16	***Ferulago pauciradiata* Boiss.**	**Çakşır**	**Iran-Turan**		**x**	**LC**					**x**	**x**			**x**	**x**					**x**			
	17	*Ferula orientalis* L.	Kıngor	Iran-Turan																x			x		
	18	*Grammosciadium pterocarpum* Boiss.		Iran-Turan									x									x			
	19	*Hippomarathrum microcarpum* (M. Bieb.) B. Fedtsch.	Sarunotu	Geniş yayılışlı									x									x			
	20	*Johrenia dichotoma* DC. Subsp. *dichotoma*		Geniş yayılışlı									x									x			
	21	*Malabaila secacul* Banks & Sol.		Geniş yayılışlı								x	x									x			
	22	***Peucedanum palimbioides* Boiss.**		**Iran-Turan**		**x**	**LC**					**x**	**x**									**x**			
	23	*Pimpinella kotschyana* Boiss.		Iran-Turan								x										x			
	24	*Pimpinella tragium* Vill. subsp. *lithophila* (Schischkin) Tutin		Geniş yayılışlı								x										x			
	25	*Prangos meliocarpoides* Boiss. var. *arcis-romanae* (boiss. & Huet & Herrnst. & Heyn	Çakşır	Iran-Turan									x									x			
	26	*Prangos pabularia* Lindl.	Çakşır	Geniş yayılışlı									x									x			
	27	*Ormosciadium aucheri* Boiss.	Ayıeli	Geniş yayılışlı								x	x									x			
	28	*Opopanax hispidus* (Friv.) Gris.		Geniş yayılışlı									x									x			
	29	*Seseli libanotis* Koch	Dağ havucu	Avrupa-Sibirya																x		x			
	30	*Scandix pecten-veneris* L.	Çoban tarağı	Geniş yayılışlı								x										x			
ASCLEPIADACEAE	31	*Vincetoxicum fuscatum* (Hornem.) Reichb. Fil. subsp. *Fuscatum*	Panzehir otu	Geniş yayılışlı									x									x			
ASTERACEAE	32	*Achillea millefolium* L. subsp. *millefolium*	Civan perçemi	Avrupa-Sibirya											x							x			
	33	*Achillea kotschyi* Boiss. subsp. *kotschyi*	Civan perçemi	Geniş yayılışlı									x									x			
	34	***Achillea sintenisii* Hub.-Mor.**	**Kuruçay perçemix**	**Iran-Turan**	**x**		**VU**										**x**					**x**			
	35	***Achillea pseudoaleppica* Hub.-Mor.**	**Civan perçemi**	**Iran-Turan**	**x**		**VU**					**x**	**x**	**x**			**x**					**x**			
	36	*Anthemis hyalina* DC.	Papatya	Geniş yayılışlı									x								x				
	37	*Anthemis tinctoria* L. var. *tinctoria*	Papatya	Geniş yayılışlı								x										x			
	38	*Artemisia taurica* Willd.	Kırım yavşanı	Geniş yayılışlı									x										x		
	39	*Artemisia austriaca* Jacq.	Yavşan otu	Iran-Turan									x									x			

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT								RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	40	*Artemisia spicigera* C. Koch	Bozkır yavşanı	Iran-Turan									x										x		
	41	*Carduus pycnocephalus* L. subsp. *albidus* (Bieb.) Kazmi		Geniş yayılışlı									x									x			
	42	*Carlina vulgaris* L.	Kartam	Geniş yayılışlı									x									x			
	43	*Centaurea aggregata* Fisch. & Mey. ex-DC.	Peygamber çiçeği	Geniş yayılışlı								x										x			
	44	***Centaurea aucherana* DC.**	**Peygamber çiçeği**	**Iran-Turan**	**X**		**EN**					**x**		**x**			**x**					**x**			
	45	***Centaurea derderiifolia* Wagenitz**	**Bağ sarıbaşı**	**Iran-Turan**	**x**		**VU**						**x**									**x**			
	46	*Centaurea carduiformis* DC. subsp. *carduiformis* var. carduiformis	Peygamber çiçeği	Iran-Turan									x									x			
	47	*Centaurea glastifolia* L.	Kotankıran	Iran-Turan																x			x		
	48	***Centaurea huber-morathii* Wagenitz**	**Ayaklı tülübaş**	**Iran-Turan**	**x**		**VU**									**x**							**x**		
	49	*Centaurea solstitialis* L. subsp. *solstitialis*	Peygamber çiçeği	Geniş yayılışlı									x					x		x		x			
	50	*Centaurea urvillei* DC. subsp. *armata* Wagenitz	Peygamber çiçeği	Geniş yayılışlı								x	x									x			
	51	*Cetntaurea virgata* Lam.	Peygamber çiçeği	Geniş yayılışlı									x									x			
	52	*Chrysophthalmum montanum* (DC.) Boiss.		Iran-Turan										x								x			
	53	*Chardinia orientalis* (L.) O. Kuntze		Iran-Turan									x									x			
	54	*Chondrilla juncea* L. var. *juncea*		Geniş yayılışlı									x									x			
	55	*Cichorium intybus* L.	Hindiba	Geniş yayılışlı									x									x			
	56	*Cirsium macrobotrys* (C. Koch) Boiss.	Öküzkangalı	Geniş yayılışlı																x		x			
	57	*Cirsium lappaceum* (Bieb.) Fischer subsp. *lappaceum*	Deve dikeni	Geniş yayılışlı									x									x			
	58	*Cirsium vulgare* (Savi) Ten.	Deve dikeni	Geniş yayılışlı											x			x		x		x			
	59	*Cnicus benedictus* L. var. *benedictus*		Geniş yayılışlı									x					x		x		x			
	60	***Cousinia sintenisii* Freyn**		**Iran-Turan**	**x**		**VU**					**x**	**x**	**x**						**x**					
	61	***Cousinia bicolor* Freyn & Sint.**	**Alacakızan**	**Iran-Turan**		**x**	**LC**						**x**									**x**			
	62	*Crepis foetida* L. subsp. *rhoeadifolia* (Bieb.) Celak		Geniş yayılışlı									x									x			
	63	*Crepis sancta* (L.) Babcock		Geniş yayılışlı									x									x			
	64	*Crupina crupinastrum* (Moris) Vis.		Geniş yayılışlı								x										x			
	65	*Echinops pungens* Trautv. var. *pungens*	Kirpi başı	Iran-Turan								x										x			
	66	*Gundelia tournefortii* L. var. *tournefortii*	Kenger	Iran-Turan								x	x										x		
	67	***Helichrysum arenarium* (L.) Moench subsp. *aucheri* (Boiss.) Davis & Kupicha**	**Ölmez çiçek**	**Iran-Turan**		**x**	**LC**					**x**	**x**									**x**			
	68	*Helichrysum armenium* DC. subsp. *armenium*	Ölmez çiçek	Iran-Turan									x	x								x			
	69	*Hieracium pannosum* Boiss.		Akdeniz								x										x			
	70	***Hieracium karagoellense* (Zahn) Sell & West**	**Göl şahinotu**	**Avrupa-Sibirya**		**x**	**LC**											**x**				**x**			
	71	*Inula aucherana* DC.		Iran-Turan											x							x			
	72	*Inula oculus-christi* L.	İsa gözü	Geniş yayılışlı								x										x			
	73	*Inula aschersoniana* Janka		Geniş yayılışlı											x							x			
	74	***Jurinea cataonica* Boiss. & Hausskn.**		**Iran-Turan**		**x**	**LC**					**x**									**x**				
	75	***Jurinea brevicaulis* Boiss.**	**Çatalgöbek**	**Iran-Turan**		**x**	**NT**					**x**	**x**									**x**			
	76	*Lapsana communis* L. subsp. i*ntermedia* (Bieb.) Hayek		Geniş yayılışlı								x	x									x			
	77	*Logfia arvensis* (L.) Holub.		Geniş yayılışlı									x									x			
	78	*Onopordum candidum* Nab.	Kalafat dikeni	Iran-Turan								X	x									X			
	79	*Picnomon acarna* (L.) Cass.		Mediterranean									x		x							x			
	80	*Picris strigosa* Bieb		Iran-Turan									x									x			
	81	*Pilosella x auriculoides* (A. F. Lang) Sell & West		Geniş yayılışlı									x									x			
	82	*Scariola orientalis* (Boiss.) Sojak		Iran-Turan								x										x			
	83	*Scorzonera cana* (C.A.Meyer) Hoffm. Var. j*acquiniana* (W.Koch) Chamberlain	İskorçin	Geniş yayılışlı								x										x			

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT									RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	84	***Scorzonera tomentosa* L.**	**İskorçin**	**Iran-Turan**		**X**	**LC**						**x**	**x**								**x**			
	85	***Scorzonera aucherana* DC.**	**Boz tekesakalı**	**Iran-Turan**	**x**		**VU**									**x**						**x**			
	86	*Scorzonera latifolia* (Fisch. & Mey.) DC.	İskorçin	Iran-Turan										x								x			
	87	*Senecio vernalis* Waldst.&Kit.	Kanarya otu	Geniş yayılışlı									x									x			
	88	*Serratula cerinthifolia* (Sm.) Boiss.		Geniş yayılışlı								x									x				
	89	*Serratula radiata* (Waldst. & Kit.) Bieb. Subsp. *biebersteiniana* Iljin ex Grossh.		Iran-Turan								x									x				
	90	*Siebera pungens* (Lam.) J. Gay										x	x									x			
	91	*Sonchus arvensis* L. Subsp. *uliginosus* (Bieb.) Beg.	Bol sökwlek	Geniş yayılışlı															x			x			
	92	*Steptorhamphus tuberosus* (Jacq.) Grossh.		Geniş yayılışlı									x									x			
	93	*Tanacetum argenteum* (Lam.) Willd. subsp. *canum* (C.Koch) Grierson var. *canum*	Solucan otu	Geniş yayılışlı										x								x			
	94	***Tanacetum cadmeum* (Boiss.) Heywood subsp. *orientale* Grierson**	**Hoş dağçiçeği**	**Iran-Turan**		**x**	**LC**						**x**	**x**								**x**			
	95	*Tanacetum armenum* (DC.) Schultz Bip.	kayapapatyası	Geniş yayılışlı										x								x			
	96	***Tanacetum heterotomum* (Bornm.) Grierson**	**Soluk pireotu**	**Iran-Turan**	**x**		**VU**									**x**						**x**			
	97	*Taraxacum crepidiforme* DC. subsp. *crepidiforme*	Hindiba	Geniş yayılışlı									x									x			
	98	*Tragopogon coloratus* C.A.Meyer	Teke sakalı	Iran-Turan								x										x			
	99	*Tripleurospermum oreades* (Boiss.) Rech. Fil. var. *oreades*		Geniş yayılışlı									x									x			
	100	*Tussilago farfara* L.	Öksürük otu	Geniş yayılışlı											x			x		x		x			
	101	*Xanthium strumarium* L. subsp. *strumarium*	Pıtrak	Geniş yayılışlı														x		x		x			
	102	*Xerathemum annuum* L.		Geniş yayılışlı									x									x			
	103	*Xeranthemum longipapposum* Fisch. & Mey.		Iran-Turan									x									x			
BERBERIDACEAE	104	*Berberis crataegina* DC.	hanım tuzluğu	Geniş yayılışlı								x	x									x			
BORAGINACEAE	**105**	***Alkanna megacarpa* DC.**	**Havaciva**	**Iran-Turan**		**x**	**LC**					**x**	**x**									**x**			
	106	*Anchusa azurea* Miller var. *azurea*	sığır dili	Geniş yayılışlı									x									x			
	107	*Asperugo procumbens* L.		Avrupa-Sibirya											x							x			
	108	*Bugllossoides arvensis* (L.) Johnston		Geniş yayılışlı									x									x			
	109	*Cynoglossum montanum* L.		Avrupa-Sibirya									x						x		x	x			
	110	*Echium italicum L.*	engerek otu	Akdeniz								x			x							x			
	111	*Heliotropium dolosum* De Not	Bambul otu	Geniş yayılışlı									x								x				
	112	*Heliotropium greuteri* H.Riedl	bambul otu	Akdeniz									x									x			
	113	*Onosma alba-roseum* Fisch. & Mey. subsp. *alba-roseum* var. *alba-roseum*	Emzik otu	Iran-Turan										x								x			
	114	***Onosma erzincanica* Binzet & Eren**	**Erzincan emzikotu**	**Iran-Turan**	**x**		**CR**						**x**			**x**						**x**			
	115	***Paracaryum cristatum* (Schreber) Boiss. subsp. *cristatum***		**Iran-Turan**		**x**	**LC**						**x**									**x**			
	116	*Paracaryum strictum* (C. Koch) Boiss.		Iran-Turan									x									x			
	117	*Rochelia cardiosepala* Bunge		Geniş yayılışlı									x								x				
BRASSICACEAE	118	*Aethionema arabicum* (L.) Andrz. ex-DC.	taş çanta	Iran-Turan								x										x			
	119	*Aethionema grandiflorum* Boiss. & Hohen		Iran-Turan								x										x			
	120	*Aethionema armenum* Boiss.	Taşçantası	Iran-Turan								x	x				x					x			
	121	*Aethionema diastrophis* Bunge		Geniş yayılışlı									x									x			
	122	*Alyssum minus* (L.) Rothm. var. *minus*	Kuduz otu	Geniş yayılışlı								x										x			
	123	***Alyssum pateri* Nyar. Subsp. *pateri***		**Iran-Turan**		**x**	**LC**						**x**								**x**				
	124	*Arabis caucasica* Willd. subsp. *caucasica*	Kaz teresi	Geniş yayılışlı										x								x			
	125	*Arabis nova* Vill.	Kaz teresi	Geniş yayılışlı								x										x			
	126	*Capsella bursa- pastoris* (L.) Medik.	Çoban çantası	Geniş yayılışlı								x										x			
	127	*Cardaria draba* (L.) Desv. subsp. *draba*		Geniş yayılışlı									x		x							x			

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT								RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	128	*Clypeola jonthlaspi* L.		Geniş yayılışlı										x								x			
	129	*Coluteocarpus vesicaria* (L.) Holmboe subsp. *vesicaria*		Iran-Turan									x								x				
	130	*Diplotaxis tenuifolia* (L.) DC.		Geniş yayılışlı									x								x				
	131	*Erophila verna* (L.) Chevall. subsp. *verna*	Çırçır otu	Geniş yayılışlı								x										x			
	132	***Eryssimum thrysoideum* Boiss. subsp. *thrysoideum***		**Iran-Turan**		**x**	**LC**					**x**										**x**			
	133	*Erysimum crassipes* Fisch. & Mey.		Geniş yayılışlı									x									x			
	134	*Fibigia suffruticosa* (Vent.) Sweet		Iran-Turan								X									X				
	135	***Hesperis breviscapa* Boiss.**	**Yayla akşamyıldızı**	**Iran-Turan**	**x**		**EN**										**x**								
	136	***Isatis sivasica* P.H. Davis**	**Sivas çiviti**	**Iran-Turan**	**x**		**VU**									**x**						**X**			
	137	*Lepidium vesicarium* L.	Çakçakotu	Iran-Turan									x									x			
	138	*Matthiola longipetala* (Vent.) DC. Subsp. *bicornis* (Sibth. & Smith.) P.W. Ball		Geniş yayılışlı								x										x			
	139	***Physoptychis haussknechtii* Bornm.**		**Iran-Turan**	**x**		**EN**										**x**					**x**			
	140	***Tchihatchewia isatidea* Boiss.**	**Allı gelin**	**Iran-Turan**	**X**		**VU**										**x**				**x**				
	141	*Sterigmostemum incanum* Bieb.	Bozsüsün	Iran-Turan												x						x			
	142	*Thlaspi perfoliatum* L.	akça çiçeği									x										x			
CAMPANULACEAE	143	*Asyneuma amplexicaule* (Willd.) Hand.-Mazz. var. *amplexicaule*		Geniş yayılışlı								x										x			
	144	***Campanula yildirimlii* Kit Tan & Sorger**	**Çançiçeği**	**Iran-Turan**	**x**		**EN**							**x**								**x**			
	145	***Campanula munzurensis* P. H. Davis**	**Munzurçanı**	**Iran-Turan**	**x**		**VU**							**x**								**x**			
	146	*Campanula crispa* Lam.	Burum çanı	Iran-Turan										x								x			
	147	*Leguosia pentagonia* (L.) Thellung	Kadın aynası	Geniş yayılışlı								x	x									x			
CAPPARACEAE	148	*Cleome ornithopodioides L.*	Taşsaçakgülü	Geniş yayılışlı											x							x			
CAPRIFOLIACEAE	149	*Lonicera nummularifolia* Jaub. & Spach subsp. *nummularifolia*	Hanım eli	Geniş yayılışlı								x	x									x			
CARYOPHYLLACEAE	150	*Acanthophyllum verticillatum* (Willd.) Hand.-Mazz.		Iran-Turan								x	x									x			
	151	***Arenaria acerosa* Boiss.**		**Geniş yayılışlı**		**x**	**LC**						**x**									**x**			
	152	*Arenaria gypsophiloides* L. Mant. Var. *gypsophiloides*	Çövenkumotu	Iran-Turan																x					
	153	***Arenaria acutisepala* Hausskn. ex Williams**		**Iran-Turan**		**x**	**LC**						**x**									**x**			
	154	*Dianthus orientalis* Adams	Karanfil	Geniş yayılışlı									x	x								x			
	155	*Dianthus crinitus* Sm. var. *crossopetalus* Boiss.	Karanfil	Geniş yayılışlı									x									x			
	156	***Dianthus zederbaueri* Vierh.**	**Karanfil**	**Iran-Turan**		**x**	**LC**						**x**									**x**			
	157	***Gypsophila eriocalyx* Boiss.**	**Bozkır çöveni**	**Iran-Turan**		**x**	**LC**									**x**							**x**		
	158	***Gypsophila heteropoda* Freyn & Sint. Subsp. *minutiflora* Bark.**	**Cüce karşani**	**Iran-Turan**	**x**		**VU**									**x**						**x**			
	159	***Gypsophila aucheri* Boiss.**	**Çöven**	**Iran-Turan**	**x**		**VU**					**x**	**x**			**x**	**x**					**x**			
	160	***Gypsophila sphaerocephala* Fenzl. Ex Tchihat. Var. *cappadocica* Boiss.**	**Çöven**	**Iran-Turan**		**x**	**LC**						**x**			**x**						**x**			
	161	*Minuartia hamata* (Hausskn.) Mattf.		Geniş yayılışlı									x									x			
	162	*Petrorhagia alpina* (Habl.) Ball & Heywood subsp. *alpina*		Geniş yayılışlı								x										x			
	163	***Phryna ortegioides* (Fisch. & Mey.) Pax & Hoffm.**		**Iran-Turan**		**x**	**NT**							**x**								**x**			
	164	*Saponaria viscosa* C.A. Meyer		Iran-Turan								x										x			
	165	*Silene ampullata* Boiss.		Iran-Turan								x									x				
	166	*Silene chaetodonta* Boiss.		Iran-Turan								x										x			
	167	***Silene nerimaniae* G.E. Genç, A. Kandemir & İ. Genç**	**Sultan nakılı**	**Iran-Turan**	**x**		**VU**										**x**					**x**			
	168	*Silene saxatilis* Sims	Simotu	Geniş yayılışlı										x								x			
	169	*Silene supina* Bieb. subsp. *pruinosa* (Boiss.) Chowdh.		Geniş yayılışlı								x	x									x			
	170	*Silene stenobotrys* Boiss. & Hausskn.	Maraş nakılı	Iran-Turan									x	x								x			

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT								RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	171	*Silene marschallii* C.A. Meyer		Iran-Turan								x									x			
	172	*Silene vulgaris (Moench) Garcke*		Geniş yayılışlı								x	x									x			
	173	*Velezia rigida* L.		Akdeniz								x										x			
CHENOPODİACEAE	174	*Chenopodium botıys* L.	Kuzu kulağı	Geniş yayılışlı											x			x		x		x			
	175	***Beta macrorhiza* Stev.**	**Kızıl pancar**	**Iran-Turan**			**VU**										**x**					**x**			
	176	*Krascheninnikovia ceratoides* (L.) Güldenst.	Fırçasirken	Geniş yayılışlı									x										x		
	177	*Kochia prostrata* (L.) Schrad.	Yatık ateştopu	Geniş yayılışlı									x										x		
	178	*Salsola canascens* (Moq.) Boiss.	Boz soda	Iran-Turan									x									x			
	179	*Noaea mucronata* (Forssk.) Aschers & Schweinf. Subsp. *tournefortii* (Spach) Aellen		Geniş yayılışlı								x	x									x			
CISTACEAE	180	*Fumana aciphylla* Boiss.		Iran-Turan								x										x			
	181	*Fumana procumbens* (Dun.) Gren. & Godr.		Geniş yayılışlı									x									x			
	182	*Helianthemum ledifolium* (L.) Miller var. *ledifolium*		Geniş yayılışlı									x									x			
CONVOLVULACEAE	183	*Convolvulus arvensis* L.	Gündüz sefası	Geniş yayılışlı								x										x			
	184	*Convolvulus holosericeus* Bieb. Subsp. *holosericeus*	Gündüz sefası	Geniş yayılışlı									x									x			
	185	***Convolvulus pseudoscammonia* C. Koch**		**Iran-Turan**		**x**	**LC**						**x**									**x**			
	186	*Convolvulus lineatus* L.	Gündüz sefası	Geniş yayılışlı								x	x									x			
CRASSULACEAE	187	*Sedum album* L.	Dam koruğu	Geniş yayılışlı										x								x			
	188	*Sedum pallidum* Bieb. var. *Pallidum*	Dam koruğu	Geniş yayılışlı										x								x			
	189	*Sedum sempervivoides* Bieb.	Dam koruğu	Geniş yayılışlı									x									x			
CUSCUTACEAE	190	*Cuscuta monogyna* Vahl subsp. *monogyna*	Cin saçı	Geniş yayılışlı								x										x			
DIPSACACEAE	191	*Scabiosa argentea* L.	Uyuz otu	Geniş yayılışlı								x										x			
	192	*Scabiosa rotata* Bieb.	Uyuz otu	Iran-Turan									x									x			
	193	*Cephalaria projera* Fisch. & Lall.	Ganteper	Iran-Turan									x									x			
	194	***Pterocephalus pinardii* Boiss.**		**Akdeniz**		**x**	**LC**						**x**									**x**			
EUPHORBIACEAE	195	*Euphorbia macroclada* Boiss.	Sütleğen	Iran-Turan								x	x									x			
	196	*Euphorbia denticulata* Lam.	Sütleğen	Iran-Turan									x									x			
	197	*Euphorbia orientalis* L.	Eşek sütleğeni	Iran-Turan																x		x			
FABACEAE	198	*Anthyllis vulneraria* L. subsp. *boissieri* (Sag.) Bornm.		Geniş yayılışlı								x	x									x			
	199	*Astragalus amblolepis* Fischer	Küt geven	Iran-Turan								x										x			
	200	*Astragalus aduncus* Willd.	Geven	Iran-Turan								x	x									x			
	201	*Astragalus anthylloides* Lam.	Geven	Iran-Turan								x										x			
	202	*Astragalus densifolius* Lam. subsp. *densifolius*	Geven	Iran-Turan								X										X			
	203	*Astragalus nanus* DC.	Geven	Geniş yayılışlı									x									x			
	204	*Astragalus microcephalus* Willd.	Anadolu kitresi	Iran-Turan									x											x	
	205	***Astragalus pennatulus* Hub.-Mor. & Chamb.**	**Geven**	**Iran-Turan**		**x**	**NT**					**x**	**x**										**x**		
	206	*Astragalus pycnocephalus* Fischer var. *pycnocephalus*	Geven	Iran-Turan								x	x									x			
	207	*Astragalus gummifer* Lab.	Geven	Iran-Turan								x	x		x							x			
	208	*Astragalus tigridis* Boiss.	Geven	Iran-Turan								x										x			
	209	*Colutea cilicica* Boiss. & Bal.	Patlangaç	Geniş yayılışlı								x								x					
	210	*Coronilla orientalis* Miller var. *orientalis*		Geniş yayılışlı									x									x			
	211	*Coronilla scorpioides* (L.) Koch	Taç otu	Geniş yayılışlı								x										x			
	212	*Coronilla varia* L. subsp. *varia*	Taç otu	Geniş yayılışlı								x										x			
	213	*Dorycnium pentaphyllum* Scop. Subsp. *anatolicum* (Boiss.) Gams	Ana gernevük	Geniş yayılışlı								x										x			
	214	***Ebenus macrophylla* Jaub. & Spach**	**Ulugeven**	**Iran-Turan**	**x**		**VU**									**x**						**x**			

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT								RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	215	***Ebenus laguroides* Boiss. var. *laguroides***		**Iran-Turan**		**x**	**LC**					**x**	**x**									**x**			
	216	*Genista albida* Willd.	Akborcak	Geniş yayılışlı								x	x									x			
	217	***Hedysarum candidissimum* Freyn**	**Hoş batalağı**	**Iran-Turan**		**x**	**NT**						**x**									**x**			
	218	***Hedysarum yilmazunalii* Kandemir, F. Yildiz, & H.İ. Türkoğlu**	**Erzincan batalağı**	**Iran-Turan**	**x**		**CR**										**x**					**x**			
	219	*Hedysarum varium* Willd.		Iran-Turan									x												
	220	*Medicago lupulina* L.	Yonca	Geniş yayılışlı								x										x			
	221	*Medicago minima* (L.) Bart. var. *minima*	Yonca	Geniş yayılışlı								x										x			
	222	*Medicago radiata* L.	Yonca	Iran-Turan									x									x			
	223	*Melilotus officinalis* (L.) Desr.	Taş yoncası	Geniş yayılışlı								x										x			
	224	*Onobrychis cornuta* (L.) Desv.	Kuşkaçıran	Iran-Turan									x										x		
	225	***Onobrychis cappadocica Boiss.***		**Iran-Turan**		**X**	**LC**					**X**										**x**			
	226	***Onobrychis fallax* Freyn & Sint.**	**Korunga**	**Iran-Turan**		**x**	**LC**					**x**										**x**			
	227	*Pisum sativum* L. subsp. *sativum* var. s*ativum*	Bezelye	Geniş yayılışlı								x										x			
	228	*Robinia pseudo- acacia* L.	Yalancı akasya	Geniş yayılışlı								x										x			
	229	*Trifolium arvense* L.var. *arvense*	Üçgül	Geniş yayılışlı								x	x									x			
	230	*Trifolium campestre* Schreb.	Üçgül	Geniş yayılışlı								x			x							x			
	231	*Trifolium repens* L. var. *repens*	Üçgül	Geniş yayılışlı									x					x		x		x			
	232	*Trigonella astroites* Fisch. & Mey.		Iran-Turan									x									x			
	233	*Trifolium trichocephalum* Bieb.	Üçgül	Geniş yayılışlı									x									x			
	234	*Trigonella brachycarpa* (Fisch.) Moris		Iran-Turan								x										x			
	235	*Trigonella lunata* Boiss.		Iran-Turan								x										x			
	236	*Trigonella monantha* C.A.Meyer subsp. *monantha*	Buy, boy	Iran-Turan								x										x			
	237	*Trigonella spruneriana* Boiss. var. *spruneriana*		Iran-Turan									x									x			
	238	*Vicia cracca* L. subsp. *stenophylla* Vel.	Fiğ	Geniş yayılışlı									x									x			
	239	*Vicia sativa* L. subsp. *nigra* var. *nigra*	Fiğ	Geniş yayılışlı								x			x							x			
FAGACEAE	240	*Quercus brantii* Lindley	Palamut meşesi	Iran-Turan								x												x	
	241	*Quercus libani* Olivier	Lübnan meşesi	Iran-Turan								x												x	
	242	***Quercus petraea* (Mattuschka) Liebl. subsp. *pinnatiloba* (C. Koch) Menitsky**	**Sapsız meşe**	**Geniş yayılışlı**		**X**	**LC**					**x**													**x**
	243	*Quercus pubescens* Willd.	Tüylü meşe	Geniş yayılışlı								X										X			
GERANIACEAE	244	*Erodium cicutarium* (L.) Herit. subsp. *cicutarium*	Turna gagası	Geniş yayılışlı								x										x			
	245	*Geranium tuberosum* L. subsp. *tuberosum*	Turna gagası	Geniş yayılışlı									x									x			
	246	*Pelargonium endlicherianum* Fenzl	Solucan otu	Geniş yayılışlı										x								x			
GLOBULARIACEAE	247	*Globularia trichosantha* Fisch. & Mey.	Globularya	Iran-Turan								x	x		x							x			
HYPERICACEAE	248	*Hypericum hyssopifolium* Chaix subsp. e*longatum* (Ledeb.) Woron var. *microcalycinum* (Boiss. & Heldr.) Boiss.	Kantaron, koyun kıran, kayış kıran	Iran-Turan								x			x							x			
	249	*Hypericum scabrum* L.	Kantaron	Iran-Turan								x	x		x							x			
	250	***Hypericum uniglandulosum* Hausskn. Ex Bornm.**	**kantaron**	**Iran-Turan**		**x**	**NT**					**x**				**x**						**x**			
ILLECEBRACEAE	251	*Herniaria glabra* L.	Kırık otu	Geniş yayılışlı								x										x			
	252	***Paronychia arabica* (L.) DC. Subsp. *euphratica* Chaudhri**		**Iran-Turan**	**x**		**VU**					**x**			**x**							**x**			
JUGLANDACEAE	253	*Juglans regia* L.	Ceviz	Kültür														x		x		x			
LAMIACEAE	254	*Acinos rotundifolius Pers.*		Kültür								x										x			
	255	*Ajuga chamaepitys* (L.) Schreber subsp. c*hia* (Schreb.) Arcangeli var. *chia*	Mayasıl otu	Geniş yayılışlı								x										x			
	256	*Lamium amplexicaule* L.	Ballıbaba	Avrupa-Sibirya								x										x			

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT								RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	257	*Lamium garganicum* L. subsp. *reniforme* (Montbret & Aucher ex Bentham) R. Mill	Ballıbaba	Geniş yayılışlı										x								x			
	258	*Marrubium globosum* Montbret & Aucher ex Bentham subsp. *globosum*	Bozcaboğum	Geniş yayılışlı								X	x									X			
	259	*Mentha longifolia* (L.) Hudson subsp. *typhoides* (Briq.) Harley var. *typhoides*	Nane	Geniş yayılışlı											x							x			
	260	*Nepeta italica* L.		Geniş yayılışlı								x									x				
	261	***Origanum haussknechtii* Boiss.**	**kekik**	**Iran-Turan**	**X**		**VU**							**x**								**x**			
	262	***Phlomis oppositiflora* Boiss. & Hausskn.**		**Iran-Turan**		**X**	**LC**						**x**									**x**			
	263	*Phlomis pungens* Willd. Var. *pungens*		Geniş yayılışlı									x								x				
	264	***Phlomis linearis Boiss. & Balansa***	***Yayla otu***	***Iran-Turan***		***x***	***LC***						***x***									***x***			
	265	*Salvia bracteata* Banks & Sol.	Adaçayı	Iran-Turan									x									x			
	266	***Salvia divaricata* Montbret & Aucher ex Bentham**	**Saplı şalba**	**Iran-Turan**		**x**	**LC**					**x**	**x**									**x**			
	267	***Salvia euphratica* Montbret & Aucher var. *leiocalycina* (Rech. fil.) Hedge**	**Adaçayı**	**Iran-Turan**	**x**		**VU**						**x**			**x**	**x**					**x**			
	268	*Salvia multicaulis* Vahl.	Kürtreyhanı	Iran-Turan									x									x			
	269	*Salvia verticillata L. susp. verticillata*	Dadırak	Avrupa-Sibirya																x		x			
	270	***Salvia rosifolia* Sm.**	**Gülmeryemiye**	**Iran-Turan**		**x**	**LC**									**x**						**x**			
	271	*Salvia sclarea* L.	Adaçayı	Geniş yayılışlı								x										x			
	272	*Salvia candidissima* Vahl. subsp. *candidissima*	Adaçayı	Iran-Turan								x			x							x			
	273	*Salvia palaestina* Bentham	Adaçayı	Iran-Turan								x										x			
	274	*Salvia virgata* Jacq.	Adaçayı	Iran-Turan								x	x									x			
	275	*Salvia viridis* L.	Adaçayı	Akdeniz								x										x			
	276	*Satureja hortensis* L.	Sater	Geniş yayılışlı								x	x									x			
	277	***Scutellaria oreientalis* L. subsp. *bicolor* (Hochst.) Edmodson**	**Kaside**	**Iran-Turan**		**X**	**LC**					**x**										**x**			
	278	*Sideritis montana* L. subsp. *remota* (d'Urv.) P. W. Ball ex Heywood		Akdeniz									x									x			
	279	*Stachys annua* L. subsp. *annua* var. *annua*		Geniş yayılışlı								x										x			
	280	***Stachys inanis* Hausskn. & Bornm.**		**Iran-Turan**	**x**		**VU**						**x**				**x**					**x**			
	281	*Teucrium chamaedrys* L. subsp. *sinuatum* (Celak) Rech. fil.	Yer meşesi	Iran-Turan								x			x							x			
	282	*Teucrium multicaule* Montbret & Aucher ex Bentham	Haptutan	Iran-Turan	x							x					x					x			
	283	*Teucrium orientale* L. var. *orientale*	Yer meşesi	Iran-Turan								x										x			
	284	*Teucrium polium* L.	Kısa mahmut	Geniş yayılışlı								x		x		x	x					x			
	285	***Thymus cappadocicus* Boiss. *var. cappadocicus***	**Taş kekiği**	**Iran-Turan**	**x**		**VU**					**x**	**x**	**x**								**x**			
	286	***Thymus spathulifolius* Hausskn. & Velen**	**Kaşık kekiği**	**Iran-Turan**	**x**		**EN**									**x**						**x**			
	287	*Ziziphora capitata* L.		Iran-Turan								x										x			
	288	*Ziziphora clinopodioides* Lam.	Kekik	Geniş yayılışlı									x									x			
LINACEAE	289	*Linum mucronatum* Bertol. subsp. *mucronatum*	Keten	Iran-Turan								x										x			
	290	*Linum tenuifolium* L.	Narinketen	Geniş yayılışlı									x									x			
MALVACEAE	291	*Alcea digitata (Boiss.) Alef.*	Hatmi	Iran-Turan									x									X			
	292	*Alcea calvertii* (Boiss.) Boiss.	Hıraçiçeği	Iran-Turan								x	x									x			
	293	*Malva sylvestris* L.	Ebegümeci	Geniş yayılışlı								x										x			
	294	*Malva neglecta* Wallr.	Hatmi	Geniş yayılışlı								x										x			
MORACEAE	295	*Ficus carica* L. subsp. *carica*	İncir	Geniş yayılışlı										x								x			
MORINACEAE	296	*Morina persica* L. var. *persica*		Iran-Turan									x									x			
OLEACEAE	297	*Fraxinus angustifolia* Vahl. subsp. *angustifolia*	Diş budak	Geniş yayılışlı								x										x			
	298	*Jasminum fruticans* L.	Yasemin	Akdeniz								x		x								x			
PAPAVERACEAE	299	*Corydalis rutifolia* (Sibth. & Sm.) DC. subsp. *erdelii* (Zucc.) Cullen & Davis		Geniş yayılışlı								x										x			

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT								RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	300	***Glaucium cappadocicum* Boiss.**	**Boynuzlugelincik**	**Iran-Turan**	**x**		**VU**					**x**	**x**			**x**					**x**			
	301	*Papaver rhoeas* L.	Gelincik	Geniş yayılışlı											x						x			
	302	***Papaver triniifolium* Boiss.**	**Gelincik**	**Iran-Turan**		**x**	**LC**										**x**				**x**			
	303	*Papaver glaucum* Boiss. & Hausskn.	Gelincik	Iran-Turan									x								x			
PLANTAGINACEAE	304	*Plantago lanceolata* L.	Sinir otu	Geniş yayılışlı								x									x			
	305	***Plantago euphratica* Decne. Ex Barneoud**	**Sinir otu**	**Iran-Turan**	**x**		**VU**						**x**			**x**					**x**			
PLUMBAGINACEAE	306	*Acantholimon acerosum* (Willd.) Boiss. var. *acerosum*	Pişik geveni	Iran-Turan								x	x								x			
	307	*Acantholimon ulicinum* (Willd. ex Schultes) Boiss. Subsp. *lycaonicum* (Boiss. & Heldr.) Bokhari & Edmondson	Pişik geveni	Iran-Turan								x									x			
	308	***Acantholimon caesareum* Boiss. & Bal.**	**Pişik geveni**	**Iran-Turan**		**x**	**LC**						**x**				**x**				**x**			
	309	***Limoniopsis owerinii* (Boiss.) Lincz.**	**Eğin kuduzotu**	**Iran-Turan**			**VU**							**x**							**x**			
	310	*Plumbago europaea* L.	Karakına	Avrupa-Sibirya								x	x								x			
POLYGALACEAE	311	*Polygala anatolica* Boiss. & Heldr.	Keten	Geniş yayılışlı								x									x			
POLYGONACEAE	312	*Polygonum setosum* Jacq.	Ebemekmeği	Iran-Turan									x	x							x			
	313	*Rumex scutatus* L.	Labada	Geniş yayılışlı									x								x			
PRIMULACEAE	314	*Anagallis arvensis* L. var. *Caerulea* (L.) Gouan.	fare kulağı	Geniş yayılışlı								x									x			
	315	*Androsace maxima* L.		Geniş yayılışlı									x								x			
RANUNCULACEAE	316	*Adonis aestivalis* L. subsp. *parviflora* (Fisch. ex DC.) Busch	Kanavcı otu	Geniş yayılışlı								x									x			
	317	*Ceratocephalus falcatus* (L.) Pers.		Geniş yayılışlı								x									x			
	318	*Clemtais orientalis* (Gay.) Schröd.	Ak asma	Geniş yayılışlı														x		x	x			
	319	*Consolida orientalis* (Gay) Schıöd	Hazeran	Geniş yayılışlı								x									x			
	320	*Delphinium kurdicum Boiss. & Hohen*		Iran-Turan								x								X				
	321	*Ranunculus arvensis* L.	Düğün çiçeği	Geniş yayılışlı								x									x			
	322	*Ranıunculus kochii* Ledeb.		Iran-Turan																	x			
RESEDACEAE	323	*Reseda lutea* L. var. *lutea*	Muhabbet çiçeği	Geniş yayılışlı								x									x			
	324	***Reseda armena* Boiss. var. *scabridula* Abdallah & De Wit**	**Hasgerdanlık**	**Iran-Turan**	**x**		**VU**						**x**								**x**			
RHAMNACEAE	325	*Paliurus spina-christi* Miller	Kara çalı	Geniş yayılışlı								x			x							x		
	326	*Rhamnus pallasii* Fisch. & Mey.	Cehri	Geniş yayılışlı								x	x	x							x			
ROSACEAE	327	*Cotoneaster nummularia* Fisch.& Mey.	Dağ muşmulası	Geniş yayılışlı									x	x							x			
	328	*Cerasus mahaleb* (L.) Miller var. *mahaleb*	Mahleb	Geniş yayılışlı									x	x							x			
	329	*Cerasus microcarpa* (C.A.Meyer) Boiss. Subsp. *microcarpa*	Yabani kiraz	Iran-Turan								x	x								x			
	330	*Cerasus angustifolia* (Spach) Browicz var. *angustifolia*	Kızıl kiraz	Iran-Turan								x		x							x			
	331	*Crataegus orientalis* Pallas ex Bieb. var. *orientalis*	Alıç	Geniş yayılışlı								x									x			
	332	*Crataegus monogyna* Jacq. subsp. *monogyna*	alıç	Geniş yayılışlı								x									x			
	333	*Geum urbanum* L.		Avrupa-Sibirya								x									x			
	334	*Potentilla recta* L.	Beşparmak otu	Geniş yayılışlı								x									x			
	335	*Prunus divaricata* Ledeb. subsp. *divaricata*	Çakal eriği	Geniş yayılışlı								x									x			
	336	*Pyrus elaeagnifolia* Pallas subsp. *elaeagnifolia*	Ahlat	Geniş yayılışlı								x									x			
	337	*Rosa pulverulenta* M. Bieb.	bodur gül	Geniş yayılışlı								x		x							x			
	338	*Rosa canına* L.	Gül	Geniş yayılışlı								x	x								x			
	339	*Rosa pimpinellifolia* L.	Karakuşburnu	Avrupa-Sibirya																x	x			
	340	*Rubus sanctus* Schreber	Böğürtlen	Geniş yayılışlı								x			x						x			
	341	*Sanguisorba minor* Scop. subsp. *minor*	Küçük çayır düğmesi	Geniş yayılışlı								x	x								x			

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT									RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	342	*Spiraea crenata* L.	Keçisakalı	Geniş yayılışlı								x		x							x			
RUBIACEAE	343	*Asperula arvensis* L.	Asperula	Akdeniz								x									x			
	344	*Asperula involucrata* Wahlenb.		Geniş yayılışlı								x									x			
	345	***Asperula stricta* Boiss. subsp. *latibracteata* (Boiss.) Ehrend**		**Iran-Turan**		**x**	**LC**						**x**								**x**			
	346	*Callipeltis cucullaria* (L.) Steven		Iran-Turan								x	x								x			
	347	*Crucianella exasperata* Fisch.& Mey.		Iran-Turan								x	x								x			
	348	*Cruciata taurica* (Pallas ex Willd.) Ehrend.		Iran-Turan									x								x			
	349	*Galium tenuissimum* Bieb. Subsp. *trichophorum* (Kar. & Kir) Ehrend.		Iran-Turan								x									x			
	350	*Galium verum* L. subsp. *verum*	Yoğurt otu	Avrupa-Sibirya								x									x			
SALICACEAE	351	*Salix alba* L.	Ak söğüt	Avrupa-Sibirya														x		x	x				
	352	*Populus tremula* L. Subsp. *tremula*	Titrek kavak	Geniş yayılışlı														x						x	
	353	*Populus nigra* L. Subsp. *nigra*	Karakavak	Avrupa-Sibirya											x								x		
SANTALACEAE	**354**	***Thesium stelleroides* Jaub. & Spach**	**Ana güvelek**	**Iran-turan**	**x**		**VU**									**x**						**x**			
SCROPHULARIACEAE	355	*Anarrhinum orientale* Bentham		Iran-Turan								x	x								x			
	356	***Linaria corifolia* Desf.**	**Nevruz**	**Iran-Turan**		**X**	**LC**					**x**									**x**			
	357	*Odontites aucheri* Boiss.		Ira-turan									x								x			
	358	*Scrophularia libanotica* Boiss. subsp. *armena* R. Mill	Kaya çekemi	Iran-Turan		x	NT							x							x			
	359	*Scrophularia xanthoglossa* Boiss. var. *decipiens* (Boiss. & Kotschy) Boiss.		Iran-Turan											x						x			
	360	*Verbascum cherianthifolium* Boiss. var. *cherianthifolium*	Sığır kuyruğu	Geniş yayılışlı								x									x			
	361	*Verbascum mucronatum* Lam.	Sığır kuyruğu	Akdeniz										x							x			
	362	***Verbascum alyssifolium* Boiss.**	**Kuduzkuyruk**	**Iran-turan**	**x**		**CR**									**x**					**x**			
	363	***Verbascum tunae-ekimii* F. Karavelioğulları, A. Duran& E.Hamzaoğlu**	**Sığır kuyruğu**	**Iran-Turan**	**X**		**CR**					**x**				**x**	**x**				**x**			
	364	*Veronica orientalis* Miller subsp. *orientalis*	Yavşan otu	Geniş yayılışlı								x	x								x			
SOLANACEAE	365	*Solanum nigrum* L. subsp. *nigrum*	Köpek memesi	Geniş yayılışlı								x									x			
TAMARICACEAE	366	*Tamarix smyrnensis* Bunge	Ilgın	Geniş yayılışlı											x							x		
THYMELAEACEAE	367	*Daphne oleoides* Schreber	Gövçek	Geniş yayılışlı								x	x								x			
	368	*Thymelaea passerina* (L.) Cosson & Germ.		Geniş yayılışlı								x	x								x			
ULMACEAE	369	*Celtis glabrata* Steven ex Bieb.	Çitlenbik	Geniş yayılışlı										x							x			
	370	*Celtis tournefortii* Lam.	Dardağan	Geniş yayılışlı								x		x								x		
URTICACEAE	371	*Urtica dioica L*	Isırgan	Avrupa-Sibirya								x	x								x			
	372	*Parietaria judaica* L.	Duvarfesleğeni	Geniş yayılışlı										x							x			
VALERIANACEAE	373	*Valerianella muricata* (Stev.) Baxt.	Kuzu gevreği	Geniş yayılışlı									x								x			
	374	*Valerianella vesicaria* (L.) Moench		Geniş yayılışlı								x		x							x			
VERBENACEAE	375	*Verbena officinalis* L.	Mine çiçeği	Geniş yayılışlı								x									x			
MONOCOTYLEDONAE																									
CYPERACEAE	376	*Schoenus nigricans* L.		Geniş yayılışlı											x						x			
IRIDACEAE	**377**	***Iris galatica* Siehe**	**Navruz**	**Geniş yayılışlı**		**X**	**LC**					**X**								**X**					
	378	*Crocus biflorus* Mill. Subsp. *tauri* (Maw) B. Mathew	Çiğdem	Iran-Turan									x								x			
	379	***Gladiolus hamzaoglui* H. Duman, Sağıroğlu& Tekşen**	**İliç kargasoğanı**	**Iran-Turan**	**x**		**VU**						**x**		**x**						**x**			
JUNCACEAE	380	*Juncus inflexus* L.	Kofa	Geniş yayılışlı											x						x			
	381	*Juncus effusus* L.	Cilaotu	Geniş yayılışlı															x				x	
	382	*Juncus heldreichianus* Marsson ex Parl. Subsp. *orientalis* Snog.	Kısadombay	Geniş yayılışlı															x			x		
LILIACEAE	383	*Allium kharputense* Freyn & Sint.	Yabanisoğan	Iran-Turan								x									x			

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT									RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	384	*Allium callidictyon* C.A. Meyer ex Kunth	Yabani soğan	Iran-Turan										x								x			
	385	***Allium dictyoprasum* C.A.Meyer ex Kunth**	**Top soğan**	**Iran-Turan**									**x**				**x**					**x**			
	386	***Allium purpureoviride* M. Koyuncu & İ. Genç**	**Yabani soğan**	**Iran-Turan**	**x**		**VU**										**x**					**x**			
	387	*Allium roduntum* L.	Yabanisoğan	Geniş yayılışlı								x		x								x			
	388	***Asphodeline tenuior* (Fischer) Ledeb. var. *puberulenta* E. Tuzlaci**		**Geniş yayılışlı**	**X**		**VU**					**x**					**x**					**x**			
	389	***Bellevalia gracilis* Feinbrun**		**Iran-Turan**		**x**	**LC**						**x**									**x**			
	390	*Colchicum triphyllum* G.Kunze	Acı çiğdem	Akdeniz									x									x			
	391	*Eremurus spectabilis* Bieb.	Çiriş	Iran-Turan																x		x			
	392	***Fritillaria crassifolia* Boiss. & Huet subsp. *crassifolia***	**boynubüküк**	**Iran-Turan**		**x**	**LC**						**x**								**x**				
	393	*Gagea villosa* (Bieb.) Duby var. v*illosa*	Altın yıldız	Akdeniz								x										x			
	394	*Gagea bulbifera* (Pallas) Schultes & Schultes fil.	Altın yıldız	Avrupa-Sibirya									x									x			
	395	*Gagea glacialis* C. Koch	Altın yıldız	Iran-Turan									x									x			
	396	***Hyacinthella acutiloba* K. Persson & Wendelbo**	**Sümbül**	**Iran-Turan**	**x**		**VU**					**x**	**x**									**x**			
	397	*Muscari neglectum* Guss.	Misk, arap sümbülü	Geniş yayılışlı								x	x									x			
	398	*Ornithogalum oligophyllum* E.D. Carke		Geniş yayılışlı								x										x			
	399	*Ornithogalum sphaerocarpum* Kerner	Tükürük otu	Geniş yayılışlı								x	x									x			
	400	***Scilla leepii* Speta**		**Iran-Turan**		**x**	**NT**					**x**	**x**									**x**			
	401	*Tulipa armena* Boiss. var. *armena*	Lale	Geniş yayılışlı								X										X			
ORCHIDACEAE	402	*Epipactis veratrifolia* Boiss. & Hohen.	Orkide	Iran-Turan										x								x			
	403	*Dactylorhiza iberica* (Bieb. ex Willd.) Soo	Orkide	Akdeniz										x								x			
POACEAE	404	*Aegilops triuncialis* L. subsp. *triuncialis*		Geniş yayılışlı								x			x							x			
	405	*Agropyron cristatum* (L.) Gaertner subsp. *pectinatum* (Bieb.) Tzvelev var. *pectinatum*	Otlak ayrığı	Geniş yayılışlı								x											x		
	406	*Bothriochloa ischaemum* (L.) Keng.		Geniş yayılışlı								x										x			
	407	*Dactylis glomerata* L. subsp. *glomerata*	Domuz ayrığı	Avrupa-Sibirya								x								x		x			
	408	*Briza media* L.		Geniş yayılışlı								x										x			
	409	*Briza humilis Bieb.*		Geniş yayılışlı								x	x									x			
	410	*Bromus japonicus* Thunb.		Geniş yayılışlı								x										x			
	411	*Bromus sterilis* L.	Brom	Avrupa-Sibirya								x										x			
	412	*Bromus tomentellus* Boiss.		Iran-Turan									x										x		
	413	*Cynodon dactylon* (L.) Pers.	Köpekdişi	Geniş yayılışlı															x	x		x			
	414	*Elymus hispidus* (Opiz.) Melderis subsp. *hispidus*		Geniş yayılışlı								x	x	x						x		x			
	415	*Elymus elongatus* (Host) Runemark Subsp. *turcicus* (McGuire) Melderis	Puslu putaotu	Geniş yayılışlı																x			x		
	416	*Festuca valesiaca* Schleicher ex Gaudin	Meşe yumağı	Geniş yayılışlı								x	x										x		
	417	*Gaudiniopsis macra* (Bieb.) Eig subsp. *macra*		Iran-Turan								x	x									x			
	418	*Koeleria cristata* (L.) Pers.		Geniş yayılışlı								x	x									x			
	419	*Melica penicillaris* Boiss. & Bal.		Iran-Turan									x									x			
	420	*Pennisetum orientale* L. C. M. Richard		Iran-Turan								x	x									x			
	421	*Phleum exaratum* Hochst. Ex Griseb. subsp. e*xaratum*		Akdeniz								x	x									x			
	422	*Phragmites australis* (Cav.) Trin. ex Steud.	Kamış	Avrupa-Sibirya											x				x				x		
	423	*Piptatherum holciforme* (Bieb.) Roemer & Schultes var.*holciforme*		Geniş yayılışlı								x								x		x			
	424	*Stipa holosericea* Trin.	Dirgen kılaç	Iran-Turan									x									x			
	425	*Taeniatherum caput-medusae* (L.) Nevskisubsp. *crinitum* (Schreber) melderis		Iran-Turan									x									x			
	426	*Poa bulbosa* L.	Yumrulu salkım	Geniş yayılışlı								x	x									x			
	427	*Poa trivialis* L.	Kabasalkımotu	Geniş yayılışlı																x			x		

FAMILY	NO	SPECIES	TURKISH NAME	FITOGEOGRAPHIC REGION	ENDEMISM		RDB	BERN	CITES			HABITAT								RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	1	2	3	4	5
	428	*Poa pratensis* L.	Çim	Geniş yayılışlı															x	x		x			

ENDEMISM	**HABITAT TYPES**
R: Regional Endemic	1: G1.7 : Thermophilous deciduous woodland
W: Widespread Endemic	2: E1.2 : Perennial calcareous grassland and basic steppes
	3: H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity
RDB. Threat Category	4: G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix
According to the IUCN (Ekim et al., 2000)	5. E1.2E : Irano-Anatolian steppes
EX: Extinct	6. Serpantin step **(E1.B)**
EW: Extinxt in the Wild	7. G3.4 : *Pinus sylvestris* woodland south of the taiga
CR : Critically Endangered	8. D5.3 : Swamps and marshes dominated by *Juncus effusus* or other large *Juncus spp.*
EN: Endangered	9. E4.3 : Acid alpine and subalpine grassland
VU: Vulnerable	
NT: Tnear Threatened	**RELATIVE ABUNDANCES**
LC: Least Concern	1: Extremely rare
DD: Data Deficient	2: Rare
	3: Moderate density
	4: Abundant
	5: Very abundant
	BERN (BERN CONVENTION)
	Anx1 (Annex1): Strictly Protected Flora Species

The areas along the route, where the project will be implemented, exhibit a vegetation structure shaped by Mediterranean and Continental climates. A significant portion of the route consists of dry and irrigated agricultural areas. The natural habitat covers approximately 30% of the total area along the route. Within the areas where natural vegetation thrives, there are habitats such as perennial calcareous steppe, gypsum steppe, serpentine steppe, needle-leaved forests, deciduous forests, marshes, riparian zones, and sparsely vegetated rocky habitats. The entire project route falls within the Iran-Turan plant geography region. Therefore, numerous endemic species are also present in the natural habitats representing the Iran-Turan geography region.

According to the surveys there are a total of 428 species and taxa at or below the level of family, belonging to 62 families (see Table 84). Among these identified species, 81 are endemic. Of the endemic taxa, 38 are regional (including *Echinophora chrysantha, Ferulago longistylis, Achillea sintenisii, Achillea pseudoaleppica, Centaurea aucherana, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii, Scorzonera aucherana, Tanacetum heterotomum, Onosma erzincanica, Hesperis breviscapa, Isatis sivasica, Physoptychis haussknechtii, Tchihatchewia isatidea, Campanula yildirimlii, Campanula munzurensis, Gypsophila heteropoda subsp. minutiflora, Gypsophila aucheri, Silene nerimaniae, Ebenus macrophylla, Hedysarum yilmazunalii, Paronychia arabica ssubsp. euphratica, Origanum haussknechtii, Salvia euphratica ssp. leiocalycina, Stachys inanis, Thymus cappadocicus var. cappadocicus, Tymus spathulifolius, Glaucium cappadocicus, Plantago euphratica, Reseda armena var. scabridula, Thesium stelleroides, Verbascum alyssifolium, Verbascum tuna-ekimii, Gladiolus hamzaoglui, Allium purpureoviride, Hyacinthella acutiloba, and Asphodeline tenuior var. puberulenta*), while 43 (including *Bupleurum papillosum, Ferulago pauciradiata, Peucedanum palimbioides, Cousinia bicolor, Helichrysum arenarium subsp. aucheri, Hieracium karagoellense, Jurinea cataonica, Jurinea brevicaulis, Scorzonera tomentosa, Tanacetum cadmeum subsp. orientale, Alkana megacarpa, Paracaryum cristatum subsp. cristatum, Alyssum pateri subsp. pateri, Erysimum thrysoideum subsp. thrysoideum, Arenaria acerosa, Arenaria acutisepala, Dianthus zederbaueri, Gypsophila eriocalyx, Gypsophila sphaerocephala var. cappadocica, Phryna ortegioides, Convolvulus pseudoscammonia, Pterocephalus pinardii, Astragalus pennatulus, Ebenus laguroides var. laguroides, Hedysarum candidissimum, Onobrychis fallax, Onobrychis cappadocica, Quercus petraea subsp. pinnatiloba, Hypericum uniglandulosum, Phlomis oppositiflora, Phlomis linearis, Salvia divaricata, Salvia rosifolia, Scutellaria orientalis subsp. bicolor, Papaver triniifolium, Acantholimon caesareum, Asperula stricta subsp. latibracteata, Linaria corifolia, Scrophularia libanotica subsp. armena, Iris galatica, Fritillaria crassifolia subsp. crassifolia, Bellevalia gracilis, and Scilla leepii*) are relatively widely distributed. Additionally, along the route, the species *Limoniopsis owerinii* and *Beta macrorhiza*, although not endemic, were identified as rare.

Of these identified species, 81 are endemic. Among the endemics, 38 are regionally restricted, including *Echinophora chrysantha, Ferulago longistylis, Centaurea aucherana, Hesperis breviscapa, Physoptychis haussknechtii, Campanula yildirimlii*, and *Tymus spathulifolius*. These species are limited to specific areas in Erzincan and Sivas, making their IUCN Red List categories "Endangered, EN."

Additionally, species like *Onosma erzincanica, Hedysarum yilmazunalii, Verbascum alyssifolium*, and *Verbascum tuna-ekimii* are found only in Erzincan, specifically in the Ilıç and Kemah districts. Given their restricted distribution and limited populations, these species are categorized as "Critically Endangered, CR."

Furthermore, species such as *Achillea sintenisii, Achillea pseudoaleppica, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii,* and others, while not endemic, have limited distributions primarily in Erzincan and Sivas. Considering the areas and population status where these species occur, their IUCN Red List categories are classified as "Vulnerable, VU."

The *species Limoniopsis owerinii* and *Beta macrorhiza*, while not endemic, have rare distributions and are found only in Erzincan, warranting their national IUCN Red List category as "Vulnerable, VU."

Species with relatively wide distributions in the project area, such as *Phryna ortegioides, Astragalus pennatulus, Hedysarum candidissimum, Hypericum uniglandulosum, Scrophularia libanotica subsp. armena*, and *Scilla leepii*, are found in Erzincan, Sivas, Kayseri, Erzurum, and Elazığ. Consequently, their IUCN Red List categories are "Near Threatened, NT."

Species with broad distributions across the country, such as *Bupleurum papillosum, Ferulago pauciradiata, Peucedanum palimbioides*, and others, are categorized as "Least Concern, LC" due to their relatively wide distributions.

Images of locally and regionally endemic species, as well as non-endemic but rare species identified in the project area, are given below. The list of local, regional endemic and rare species is given in Table 85.

Figure 60. *Campanula munzurensis* (IUCN: VU)



Figure 61. *Plantago euphratica* (IUCN: VU)



Figure 62. *Centaurea derderifolia* (IUCN: VU)



Figure 63. *Echinophora chrysantha* (IUCN: EN)



Figure 64. *Tchihatchewia isatidea* (basal leaf) (IUCN: VU)



Figure 65. *Silene nerimaniae* (IUCN: VU)



Figure 66. *Physoptychis haussknechtii* (IUCN: EN)



Figure 67. *Verbascum alyssifolium* (IUCN: CR)



Figure 68. *Verbascum alyssifolium* (IUCN: CR)



Figure 69. *Ebenus macrophylla* (IUCN: VU)



Figure 70. *Centaurea huber-morathii* (IUCN: VU)



Figure 71. *Glaucium cappadocicum* (IUCN: VU)



Figure 72. *Salvia euphratica* subsp. *Leiocalycina* (IUCN: VU)



Figure 73. *Onosma erzincanica* (IUCN: CR)



Figure 74. *Allium purpureoviride* (IUCN: VU)



Figure 75. *Beta macrorhiza* (IUCN: VU)



Figure 76. *Paronychia arabica* subsp. *Euphratica* (IUCN: VU)



Figure 77. *Campanula yildirimlii* (IUCN: EN)



Figure 78. *Hesperis breviscapa* (IUCN: EN)



Figure 79. *Thymus cappadocicus* var. *cappadocicus* (IUCN: VU)



Figure 80. *Achillea pseudoaleppica* (IUCN: VU)



Figure 81. *Asphodeline tenuior* var. *puberulenta* (IUCN: VU)



Figure 82. *Centaurea aucherana* (IUCN: EN)



Figure 83. *Cousinia sintenisii* (IUCN: VU)



Figure 84. *Hyacinthella acutiloba* (IUCN: VU)



Figure 85. *Limoniopsis owerinii* (IUCN: VU)



Figure 86. *Origanum haussknechtii* (IUCN: VU)



Figure 87. *Reseda armena* var. *scabridula* (IUCN: VU)



Figure 88. *Verbascum tunae-ekimii* (IUCN: CR)



Figure 89. *Gladiolus hamzaoglui* (IUCN: VU)



Figure 90. *Hedysarum yilmazunalii* (IUCN: CR)



Table 85. High Conservation Concern Flora Species of the Biodiversity Study Area

Species	Turkish Name	RDB	Coordinates	Survey Location
Onosma erzincanica	Erzincan emzikotu	CR	37S 527389-4388047	Loc 12
			37S 492216-4380433	Loc 3
Hedysarum yilmazunalii	Erzincan batalağı	CR	37S 492216-4380433	Loc 3
Verbascum alyssifolium	Kuduzkuyruk	CR	37S 467915-4371980	Loc 2
Verbascum tuna-ekimii	Ekim sığırkuyruğu	CR	37S 525934-4386912	Loc 11
			37S 532694-4386927	Loc 10
			37S 495420-4381360	Loc 5
Echinophora chrysantha	Yıldız çördüğü	EN	37S 525934-4386912	Loc 11
			37S 492216-4380433	Loc 3
Ferulago longistylis	Dişi kişniş	EN	37S 572872-4384096	Loc 15
			37S 578685-4381964	Loc 17
Centaurea aucheirana	Çeşit tülübaş	EN	37S 492216-4380433	Loc 3
Hesperis breviscapa	Yayla akşamyıldızı	EN	37S 492216-4380433	Loc 3
Physoptychis haussknechtii	Gezertere	EN	37S 492216-4380433	Loc 3
Campanula yildirimlii	Yiğit çıngırağı	EN	37S 456608-4366613	Loc 26
Tymus spathulifolius	Kaşık kekiği	EN	37S 467915-4371980	Loc 2
Achillea sintenisii	Kuruçay perçemi	VU	37S 421801-4365156	Loc 1
			37S 467915-4371980	Loc 2
Achillea pseudoaleppica	Harput perçemi	VU	37S 467915-4371980	Loc 2
			37S 493146-4381037	Loc 4
Centaurea derderifolia	Bağ sarıbaşı	VU	37S 493146-4381037	Loc 4
Centaurea huber-morathii	Ayaklı tülübaş	VU	37S 636074-4422532	Loc 19
Cousinia sintenisii	Bayırkızanı	VU	37S 467915-4371980	Loc 2
			37S 493146-4381037	Loc 4
			37S 532701-4391459	Loc 13
Scorzonera aucherana	Buz tekesakalı	VU	37S 467915-4371980	Loc 2
Tanacetum heterotomum	Soluk pireotu	VU	37S 467915-4371980	Loc 2
			37S 636074-4422532	Loc 19
Isatis sivasica	Sivas çivitotu	VU	37S 467915-4371980	Loc 2
Tchihatchewia isatidea	Allıgelin	VU	37S 492216-4380433	Loc 3
Campanula munzurensis	Munzurçanı	VU	37S 512453-4384331	Loc 8
Gypsophila heteropoda subsp. minutiflora	Cüce karşani	VU	37S 467915-4371980	Loc 2
Gypsophila aucheri	Çöven	VU	37S 467915-4371980	Loc 2
			37S 492216-4380433	Loc 3
			37S 493146-4381037	Loc 4
			37 S 521365-4387222	Loc 9
			37 S 532694-4386927	Loc 10
			37 S 525934-4386912	Loc 11
			37 S 577026-4382383	Loc 16
			37 S 578685-4381964	Loc 17
Silene nerimaniae	Sultan nakılı	VU	37S 492216-4380433	Loc 3
Ebenus macrophylla	Ulugeven	VU	37S 467915-4371980	Loc 2
Paronychia arabica subsp. euphratica	Fırat etyaranı	VU	37S 492216-4380433	Loc 3
Origanum haussknechtii	Dağ mercanı	VU	37S 492216-4380433	Loc 3
Salvia euphratica ssp. leiocalycina	Fırat şalbası	VU	37S 493146-4381037	Loc 4

Species	Turkish Name	RDB	Coordinates	Survey Location
			37 S 495420-4381360	Loc 5
			37 S 505216-4384156	Loc 6
			37 S 509127-4384210	Loc 7
			37 S 512453-4384331	Loc 8
			37S 532701-4391459	Loc 13
Stachys inanis	Bağış çayı	VU	37S 492216-4380433	Loc 3
Thymus cappadocicus var. cappadocicus	Taşkekiği	VU	37S 467915-4371980	Loc 2
Glaucium cappadocicus	Boynuzlu gelincik	VU	37S 467915-4371980	Loc 2
Plantago euphratica	Toklubaşı	VU	37S 467915-4371980	Loc 2
			37S 493146-4381037	Loc 4
			37 S 495420-4381360	Loc 5
Reseda armena var. scabridula	Hasgerdanlık	VU	37S 492216-4380433	Loc 3
Thesium stelleroides	Anagüvelek	VU	37S 467915-4371980	Loc 2
Gladiolus hamzaoglui	İliç kargasoğanı	VU	37S 492216-4380433	Loc 3
Allium purpureoviride	Renkli soğan	VU	37S 492216-4380433	Loc 3
Hyacinthella acutiloba	Sivrisümbül	VU	37S 492216-4380433	Loc 3
Asphodeline tenuior var. puberulenta	Tesbihcik	VU	37S 492216-4380433	Loc 3
Limoniopsis owerinii	Eğin kuduzotu	VU	37S 456608-4366613	Loc 26
Beta macrorhiza	Kızıl pancar	VU	37S 492216-4380433	Loc 3

As a result of field surveys conducted on the route, a total of 81 endemic plant species have been identified in the project area, with 38 being regional endemics (such as *Echinophora chrysantha, Ferulago longistylis, Achillea sintenisii, Achillea pseudoaleppica, Centaurea aucherana, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii, Scorzonera aucherana, Tanacetum heterotomum, Onosma erzincanica, Hesperis breviscapa, Isatis sivasica, Physoptychis haussknechtii, Tchihatchewia isatidea, Campanula yildirimlii, Campanula munzurensis, Gypsophila heteropoda* subsp. *minutiflora, Gypsophila aucheri, Silene nerimaniae, Ebenus macrophylla, Hedysarum yilmazunalii, Paronychia arabica* ssubsp. *euphratica, Origanum haussknechtii, Salvia euphratica* ssp. *leiocalycina, Stachys inanis, Thymus cappadocicus* var. *cappadocicus, Tymus spathulifolius, Glaucium cappadocicus, Plantago euphratica, Reseda armena* var. *scabridula, Thesium stelleroides, Verbascum alyssifolium, Verbascum tuna-ekimii, Gladiolus hamzaoglui, Allium purpureoviride, Hyacinthella acutiloba*, and *Asphodeline tenuior* var. *puberulenta*), and 43 having a broader distribution. The endemism rate is approximately 19%. Considering that around 70% of the route is agricultural or modified land, the high endemism rate can be attributed to the critical habitats present along the route.

In the project area, the IUCN categories for the local endemic species *Onosma erzincanica, Hedysarum yilmazunalii, Verbascum alyssifolium,* and *Verbascum tuna-ekimii* are classified as 'Critically Endangered, CR.' For the regional endemic species, *Echinophora chrysantha, Ferulago longistylis, Centaurea aucherana, Hesperis breviscapa, Physoptychis haussknechtii, Campanula yildirimlii,* and *Tymus spathulifolius*, they are categorized as 'Endangered, EN.' Additionally, regional endemic species such as *Achillea sintenisii, Achillea pseudoaleppica, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii, Scorzonera aucherana, Tanacetum heterotomum, Isatis sivasica, Tchihatchewia isatidea, Campanula munzurensis, Gypsophila heteropoda* subsp. *minutiflora, Gypsophila aucheri, Silene nerimaniae, Ebenus macrophylla, Paronychia arabica* ssubsp. *euphratica, Origanum haussknechtii, Salvia euphratica* ssp. *leiocalycina, Stachys inanis, Thymus cappadocicus* var. *cappadocicus, Glaucium cappadocicus, Plantago euphratica, Reseda armena* var. *scabridula, Thesium stelleroides, Gladiolus hamzaoglui, Allium purpureoviride, Hyacinthella acutiloba*, and *Asphodeline tenuior* var. *puberulenta* are categorized as 'Vulnerable, VU.' The species

Limoniopsis owerinii and *Beta macrorhiza*, which are not endemic but have a rare distribution, are also classified as 'Vulnerable, VU' at the national level. The population status of local and regionally distributed endemic or rare species in the project area is provided in Table 86.

Table 86. The populations of local and regional endemic and rare species, the percentage of their total populations to the total population in Türkiye, and threats/suggestions

Species	RDB	Pop. at the Area	Pop. Türkiye ratio	Criterion	Threats/Recommendations
Onosma erzincanica	CR	20	%0.2-0.3	Criterion 1	Due to habitat loss, a decline in population is anticipated. Therefore, in July, seeds of populations along the route should be collected and planted in suitable habitats.
Hedysarum yilmazunalii	CR	100	‰0.2-0.3	Criterion 1	Due to habitat loss, a decline in the population is expected. Therefore, in August, seeds of populations along the route should be collected and planted in suitable habitats.
Verbascum alyssifolium	CR	20	‰0.2-0.3	Criterion 1	Due to habitat loss, a decline in the population is expected. Therefore, in August, seeds of populations along the route should be collected and planted in suitable habitats.
Verbascum tuna-ekimii	CR	50	%0.2-0.3	Criterion 1	Due to habitat loss, a decline in the population is expected. Therefore, in August, seeds of populations along the route should be collected and planted in suitable habitats.
Echinophora chrysantha	EN	20	‰0.2-0.3	Criterion 1	Due to habitat loss, a decline in the population is expected. Therefore, in September-October, seeds of populations along the route should be collected and planted in suitable habitats.
Ferulago longistylis	EN	100	‰0.2-0.3	Criterion 1	Due to habitat loss, a decline in the population is expected. Therefore, in August-September, seeds of populations along the route should be collected and planted in suitable habitats.
Centaurea aucheirana	EN	300	‰0.2-0.3	Criterion 1	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, seeds of populations along the route should be collected and planted in suitable habitats.
Hesperis breviscapa	EN	20	%0.1-0.2	Criterion 1	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, seeds of populations along the route should be collected and planted in suitable habitats.
Physoptychis haussknechtii	EN	20	%0.2-0.3	Criterion 1	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, seeds of populations along the route should be collected and planted in suitable habitats.
Campanula yildirimlii	EN	20	%0.2-0.3	Criterion 1	Due to habitat loss, a decline in the population is expected. Therefore, in August-September, seeds of populations along the route should be collected and planted in suitable habitats.
Tymus spathulifolius	EN	200	‰0.2-0.3	Criterion 1	Due to habitat loss, a decline in the population is anticipated. Therefore, the seeds of populations along the route should be collected and planted in suitable habitats in July-August.
Achillea sintenisii	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.
Achillea pseudoaleppica	VU	300	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Centaurea derderifolia	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.
Centaurea huber-morathii	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Cousinia sintenisii	VU	300	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.

Species	RDB	Pop. at the Area	Pop. Türkiye ratio	Criterion	Threats/Recommendations
Scorzonera aucherana	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Tanacetum heterotomum	VU	100	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.
Isatis sivasica	VU	20	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is anticipated. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.
Tchihatchewia isatidea	VU	100	‰0.2-0.3	Criterion 2	Due to habitat loss, a decrease in the population is expected. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.
Campanula munzurensis	VU	5	%1-2	-	Due to habitat loss, a decrease in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Gypsophila heteropoda subsp. *minutiflora*	VU	300	‰0.2-0.3	Criterion 2	Due to habitat loss, a decrease in the population is expected. Therefore, the seeds of populations along the route should be collected in June-July and planted in suitable habitats.
Gypsophila aucheri	VU	500	‰0.2-0.3	Criterion 2	Due to habitat loss, a decrease in the population is anticipated. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Silene nerimaniae	VU	20	%1-2	-	Due to habitat loss, a decrease in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Ebenus macrophylla	VU	50	%0.2-0.3	Criterion 2	Due to habitat loss, a decrease in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Paronychia arabica subsp. *euphratica*	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decrease in the population is anticipated. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Origanum haussknechtii	VU	100	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, it is advisable to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Salvia euphratica ssp. *leiocalycina*	VU	500	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Stachys inanis	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Thymus cappadocicus var. *cappadocicus*	VU	300	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Glaucium cappadocicus	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is anticipated. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Plantago euphratica	VU	20	%0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is anticipated. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Reseda armena var. *scabridula*	VU	10	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the seeds of populations along the route in July-August and plant them in suitable habitats.

Species	RDB	Pop. at the Area	Pop. Türkiye ratio	Criterion	Threats/Recommendations
Thesium stelleroides	VU	20	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Gladiolus hamzaoglui	VU	100	%0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the bulbs of populations along the route in July-August and plant them in suitable habitats.
Allium purpureoviride	VU	20	%0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the bulbs of populations along the route in June-July and plant them in suitable habitats.
Hyacinthella acutiloba	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the bulbs of populations along the route in May-June and plant them in suitable habitats.
Asphodeline tenuior var. *puberulenta*	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the rhizomes of populations along the route in May-June and plant them in suitable habitats.
Limoniopsis owerinii	VU	50	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the seeds of populations along the route in September-October and plant them in suitable habitats.
Beta macrorhiza	VU	20	‰0.2-0.3	Criterion 2	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the seeds of populations along the route in July-August and plant them in suitable habitats.

The following recommendations are proposed to minimize the impact on critically distributed species (IUCN Threat Categories CR, EN, VU, NT) and ensure the continuity of populations of endemic species along the ETMIC route.

a) Gypsum Habitats between İliç and Kemah:

The gypsum habitats along the route between İliç and Kemah represent the most sensitive and critical habitat of the project. This habitat hosts 16 locally or regionally distributed endemic species, making it a critical area for biodiversity. The soil in this habitat has a distinctive dirty-white appearance and supports numerous endemic species such as *Gypsophila aucheri, Ebenus macrophylla, Achillea pseudoaleppica, Achillea sintenisii, Glaucium cappadocicum, Verbascum alyssifolium, Scorzonera aucherana, Tanacetum heterotomum, Thymus spathulifolius, Thymus cappadocicus, Plantago euphratica, Gypsophila heteropoda, Isatis sivasica*, and *Thesium stelleroides*.

Given the high sensitivity and fragility of this habitat, it is considered the most vulnerable along the route. The proposed activities may lead to habitat loss in some areas, resulting in population decline for critical species. To minimize the impact of these activities and conservation of biodiversity, the following measures are recommended:

1. Seed Collection and Preservation:
   - Collect seeds of critical species during the appropriate period and deposit them in the Türkiye Seed Gene Bank to ensure their preservation.
2. Proper Soil Management:
   - Implement proper soil management practices in the gypsum habitats, considering their sensitivity and fragility.
   - Prevent the invasion of invasive species into the areas where gypsum soils are stored.
3. Monitoring with Biologist Supervision:
   - Conduct monitoring of populations belonging to critical species directly affected by the activity.
   - Ensure the monitoring is carried out under the supervision of a biologist to safeguard the populations.

These measures aim to mitigate the direct impact on critical species and their habitats, especially in the gypsum habitats between İliç and Kemah, and contribute to the conservation of biodiversity along the route.

b) Serpentine Habitats between İliç and Kemah:

The serpentine habitats between İliç and Kemah represent one of the critical habitats within the project area. This habitat is home to local and regional endemic species such as *Echinophora chrysantha, Centaurea aucherana, Onosma erzincanica, Hesperis breviscapa, Tchihatchewia isatidea, Physoptychis haussknechtii, Silene nerimaniae, Beta macrorhiza, Hedysarum yilmazunalii, Paronychia arabica* subsp*. euphratica, Salvia euphratica, Stachys inanis, Verbascum tuna-ekimii, Allium purpureoviride*.

Considering the presence of these local and regional endemic species, this habitat type is one of the most sensitive and fragile along the route. The proposed activities may lead to habitat loss in certain areas, resulting in population decline for critical species. To minimize the impact of these activities and conservation of biodiversity, the following measures are recommended:

1. Seed Collection and Preservation:
   - Collect seeds of critical species during the appropriate period and deposit them in the Türkiye Seed Gene Bank to ensure their preservation.
2. Proper Soil Management:
   - Implement proper soil management practices in the serpentine steppes, considering their sensitivity and fragility.

- Prevent the invasion of invasive species into the areas where gypsum soils are stored.

3. Monitoring with Biologist Supervision:
   - Conduct monitoring of populations belonging to critical species directly affected by the activity.
   - Ensure the monitoring is carried out under the supervision of a biologist to safeguard the populations.

These measures aim to mitigate the direct impact on critical species and their habitats, especially in the serpentine habitats between İliç and Kemah, and contribute to the conservation of biodiversity along the route.

c) Gypsum Habitats in the Northwest of Aşkale:

The gypsum habitats in the northwest of Aşkale are considered critical habitats within the project corridor. This habitat hosts regionally endemic species such as *Centaurea Huber-morathii, Tanacetum heterotomum, Thymus spathulifolius*, all of which are critically distributed. Therefore, this habitat stands out as one of the most sensitive and fragile habitats along the route. The proposed activities may lead to habitat loss in certain areas, resulting in population decline for critical species. To minimize the impact of these activities and conservation of biodiversity, the following measures are recommended:

1. Seed Collection and Preservation:
   - Collect seeds of critical species during the appropriate period and deposit them in the Türkiye Seed Gene Bank to ensure their preservation.
2. Proper Soil Management:
   - Implement proper soil management practices in the gypsum habitats, considering their sensitivity and fragility.
   - Prevent the invasion of invasive species into the areas where gypsum soils are stored.
3. Monitoring with Biologist Supervision:
   - Conduct monitoring of populations belonging to critical species directly affected by the activity.
   - Ensure the monitoring is carried out under the supervision of a biologist to safeguard the populations.

These measures aim to mitigate the direct impact on critical species and their habitats, especially in the gypsum habitats in the northwest of Aşkale, contributing to the overall conservation efforts along the route.

d) Seed Collection Efforts:

Prior to and/or during the construction phase, it is crucial to conduct seed collection activities for the 38 regionally endemic (*Echinophora chrysantha, Ferulago longistylis, Achillea sintenisii, Achillea pseudoaleppica, Centaurea aucherana, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii, Scorzonera aucherana, Tanacetum heterotomum, Onosma erzincanica, Hesperis breviscapa, Isatis sivasica, Physoptychis haussknechtii, Tchihatchewia isatidea, Campanula yildirimlii, Campanula munzurensis, Gypsophila heteropoda* subsp*. minutiflora, Gypsophila aucheri, Silene nerimaniae, Ebenus macrophylla, Hedysarum yilmazunalii, Paronychia arabica* ssubsp*. euphratica, Origanum haussknechtii, Salvia euphratica* ssp*. leiocalycina, Stachys inanis, Thymus cappadocicus* var*. cappadocicus, Tymus spathulifolius, Glaucium cappadocicus, Plantago euphratica, Reseda armena* var*. scabridula, Thesium stelleroides, Verbascum alyssifolium, Verbascum tuna-ekimii, Gladiolus hamzaoglui, Allium purpureoviride, Hyacinthella acutiloba,* and *Asphodeline tenuior* var*. puberulenta)* and 2 rare non-endemic *(Limoniopsis owerinii, Beta macrorhiza*) plant species found within the project area. The seeds should be collected and delivered to the Ankara Seed Gene Bank. The collection periods for seeds of local and regional endemic species are provided in Table 87.

Table 87. Seed Collection Periods for Local and Regional Endemic Plants

Species	Suitable Month(s) for Seed/Tuber Collection	Suitable Month(s) for Seed/Tuber Planting
Onosma erzincanica (seed)	July	October-November
Hedysarum yilmazunalii (seed)	July-August	October-November
Verbascum alyssifolium (seed)	August-September	October-November
Verbascum tuna-ekimii (seed)	August	October-November
Echinophora chrysantha (seed)	August-September	October-November
Ferulago longistylis (seed)	August-September	October-November
Centaurea aucheriana (seed)	July-August	October-November
Hesperis breviscapa (seed)	July-August	October-November
Physoptychis haussknechtii (seed)	July-August	October-November
Campanula yildirimlii (seed)	August-September	October-November
Tymus spathulifolius (seed)	August-September	October-November
Achillea sintenisii (seed)	July-August	October-November
Achillea pseudoaleppica (seed)	July-August	October-November
Centaurea derderifolia (seed)	July-August	October-November
Centaurea huber-morathii (seed)	July-August	October-November
Cousinia sintenisii (seed)	August-September	October-November
Scorzonera aucherana (seed)	August-September	October-November
Tanacetum heterotomum (seed)	August-September	October-November
Isatis sivasica (seed)	June-July	October-November
Tchihatchewia isatidea (seed)	June-July	October-November
Campanula munzurensis (seed)	July-August	October-November
Gypsophila heteropoda subsp. *minutiflora* (seed)	June-July	October-November
Gypsophila aucheri (seed)	July-August	October-November
Silene nerimaniae (seed)	July-August	October-November
Ebenus macrophylla (seed)	June-July	October-November
Paronychia arabica subsp. *euphratica* (seed)	July-August	October-November
Origanum haussknechtii (seed)	July-August	October-November
Salvia euphratica ssp. *leiocalycina* (seed)	June-July	October-November
Stachys inanis (seed)	July-August	October-November
Thymus cappadocicus var. *cappadocicus* (seed)	July-August	October-November
Glaucium cappadocicus (seed)	July-August	October-November
Plantago euphratica (seed)	July-August	October-November
Reseda armena var. *scabridula* (seed)	June-July	October-November
Thesium stelleroides (seed)	July-August	October-November
Gladiolus hamzaoglui (bulb)	July-August	October-November
Allium purpureoviride (bulb)	July-August	October-November
Hyacinthella acutiloba (bulb)	May-June	October-November
Asphodeline tenuior var. *puberulenta* (rhizome)	June-July	October-November
Limoniopsis owerinii (seed)	July-August	October-November
Beta macrorhiza (seed)	July-August	October-November

e) Monitoring Activities to be Conducted During Construction and After Completion of Activities:

To ensure the survival of critical endemic plant species (local and regional endemics) along the route and to assess the extent of their impact from the activity, monitoring should be conducted at least twice a year during the construction period and for two years after completion of the construction. This will involve checking whether these plant species continue to thrive and assessing the degree of impact, taking urgent measures if necessary.

4.8.1.2 Fauna

Fauna surveys were also conducted in November 2023. Sampling point that covers the entire Biodiversity Study Area, and vantage points in a larger area to represent different habitats were selected considering the seasonal constraints for observation.

A large list of fauna was prepared through an extensive literature review prior to field surveys, and a target list of species considering habitat characteristics and the known threats species are facing. Since the data obtained through direct observation was limited due to seasonal limitations, species with high conservation risk (CR, EN, VU, NT) were listed using literature data in the evaluations within the scope of ESIA. Widespread and species not under threat were not evaluated. It is possible to extend the list following additional pre-construction surveys during appropriate seasons.

The list of high conservation concern fauna species identified at the Biodiversity Study Area through previous records and habitat suitability is provided in Table 88 for mammals, Table 89 for birds, Table 90 for reptiles, Table 91 for fish species, and Table 92 for invertebrates. No species at risk were observed due to the species being in hibernation and seasonal restrictions.

Table 88. High Conservation Concern Mammal Species of the Biodiversity Study Area

Classification Of Species				Conservation Status			
Order	**Family**	**Species**	**Common Name**	**BERN**	**IUCN**	**CITES**	**HAB. DIR.**
RODENTIA	Cricetidae	*Mesocricetus brandti*	Turkish Hamster	-	NT	-	-
RODENTIA	Sciuridae	*Spermophilus xanthoprymnus*	Near East Suslik	-	NT	-	-
CARNIVORA	Ursidae	*Ursus arctos*	Brown Bear	Ann 2	VU	Ann 1	Ann 2

Table 89. High Conservation Concern Bird Species of the Biodiversity Study Area

Classification Of Species		Conservation Status			
Family	**Species**	**BERN**	**IUCN**	**CITES**	**RDBT**
COLUMBIDAE	*Streptopelia turtur*	Ann 3	LC	-	A.3.1
MOTACILLIDAE	*Anthus pratensis*	Ann 2	LC	-	A.3
HAEMATOPODIDAE	*Haematopus ostralegus*	Ann 3	LC	-	A.3
CHARADRIIDAE	*Vanellus vanellus*	Ann 3	LC	-	A.5
ACCIPITRIDAE	*Clanga clanga*	Ann 3	VU	Ann 2	B.1.2
ACCIPITRIDAE	*Gypaetus barbatus*	Ann 3	LC	Ann 2	A.1.2
ACCIPITRIDAE	*Neophron percnopterus*	Ann 3	EN	Ann 2	A.3
ANATIDAE	*Aythya ferina*	Ann 3	VU	-	A.5
ANATIDAE	*Oxyura leucocephala*	Ann 2	EN	Ann 2	A.2

Table 90. High Conservation Concern Reptile Species of the Biodiversity Study Area

Classification Of Species			Conservation Status		
Family	**Species**	**Common Name**	**BERN**	**IUCN**	**CITES**
Viperidae	*Vipera eriwanensis*	Alburzi Viper	Ann 2	VU	-
Testudinidae	*Testudo graeca*	Moorish Tortoise	Ann 2	VU	Ann 2

Table 91. High Conservation Concern Fish Species of the Biodiversity Study Area

Family	Species	Common Name	BERN	IUCN	CITES	Endemism
CYPRINIDAE	*Alburnus escherischi*	Steindachner	-	NE	-	E
CYPRINIDAE	*Capoeta tinca*	Anatolian Khramulya	-	NE	-	E
CYPRINIDAE	*Gobio obtusirostris*	N/A	-	LC	-	E

Table 92. High Conservation Concern Invertebrate Species of the Biodiversity Study Area

Classification Of Species		Conservation Status			Endemism
Family	Species	BERN	IUCN	RBBT	
Chrysomelidae	*Cryptocephalus paphlagonius* Sassi et Kismali, 2000	-	-	-	R
Glaphyridae	*Eulasia chrysopyga* (Faldermann, 1835)	-	-	-	-
Meloidae	*Zonitis nigriventris* Motschulsky, 1873	-	-	-	R
Asilidae	*Dysmachus safranboluticus* Hasbenli & Geller-Grimm, 1999	-	-	-	R
Tipulidae	*Tipula guentheri* Oosterbroek, 1994	-	-	-	R
Lycaenidae	*Phengaris nausithous* (Bergstrasser, 1779)	-	NT	EN	-
Lycaenidae	*Phengaris nausithous* (Bergstrasser, 1779)	-	NT	EN	-
Lycaenidae	*Polyommatus merhaba* de Prins et al., 1991	-	-	EN	R

4.8.1.3 Invasive Alien Species

The Convention on Biological Diversity (CBD) defines invasive alien species (IAS) as “species whose introduction and/pr spread outside their natural past or present distribution threatens biological diversity. IAS occurs in all taxonomic group of organisms; including animals, plants, fungi and microorganisms, and can affect all types of ecosystems. Invasion by alien species is reported to have caused significant degradation with negative impacts on biological diversity and people’s livelihoods according to IUCN, which requires that all projects that may provide a key pathway for invasive species are screened for their potential to accidentally introduce invasive alien species. In line with provisions of ESS6, projects that potentially cause introduction of alien species are subject to a risk assessment. Once established, eradication of IAS requires more effort and resource allocation, prevention is the first step in management.

The Global Invasive Species Programme (GISP) is an international partnership working to address the global threat of IAS, with the main objective of conserving biodiversity and sustain livelihoods by minimizing the spread and impact of invasive alien species with the implementation of Article 8(h) of the CBD. Furthermore, managed by the IUCN’s Species Survival Commission, there is an Invasive Species Database (GISD), which currently works on establishing a Global Register of Introduced and Invasive Species (GRIIS) to develop country-wise validated, verified and annotated inventories of introduced and invasive species.

Türkiye has a wide marine IAS dataset, while studies on terrestrial ones have been rather limited. With funding from the Global Environment Fund (GEF), a GEF VI project addressing invasive species threats at key marine biodiversity areas is being implemented by the General Directorate of Nature Conservation and National Parks (GEF, 2020). The project started in 2018, was planned to be completed in four years. The objective of the project is to ensure resilience of marine and coastal ecosystems through strengthened capacities and investment in prevention, detection, control and management of IAS. In line with the most recent European Union legislation (1143/2014) on IAS, which requires a mandatory response by all member states to the threats that invasive species pose to biodiversity and ecosystem services, a similar project will be undertaken also for inland water and terrestrial ecosystems.

Studies that have already been conducted reveal an estimated 1.5% of plant species in Türkiye being exotics (Arslan et al. 2015), although a comprehensive list of alien plants is still lacking. Türkiye is a member of EPPO, an intergovernmental organization responsible for cooperation in plant health within the Euro-Mediterranean region, which aims to protect plants by developing international strategies against the introduction and spread of pests and by promoting safe and effective pest control methods through A1 and A2 lists of pests recommended for regulation. Arslan et. al. (2015) also report that species that have been recorded in the EPPO list of invasive alien plants that are present in Türkiye are; *Acroptilon repens, Ailanthus altissima, Ambrosia artemisiifolia* (= *A. elatior*), *Carpobrotus edulis, Cortaderia selloana, Cyperus esculentus, Paspalum distichum* (= *P. paspalodes*), *Oxalis pes-*

caprae and *Sicyos angulatus*, while *Azolla filiculoides* and *Rhododendron ponticum* are listed in the EPPO Observation List of Invasive alien plants and *Miscanthus sinensis*, listed in the EPPO Alert List, are also recorded in the Turkish flora (Arslan et al., 2015).

Project biodiversity studies led by field experts did not yield any data on presence of IAS. However, given the datasets in Türkiye are still limited, and considering general risks associated with railways in terms of introduction and spread of IAS, necessary measures will be taken as per ESS6. International guidelines and best practices will be followed to avoid intentional or accidental introduction of alien or non-native species, and if introduced necessary strategies and procedures will be developed to eradicate IAS.

4.8.2 Critical Habitat Assessment

4.8.2.1 Critical Habitat Concept

Critical habitat is defined as areas with high biodiversity importance or value, including:

(a) Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches;

(b) Habitat of significant importance to endemic or restricted-range species;

(c) Habitat supporting globally or nationally significant concentrations of migratory or congregatory species;

(d) Highly threatened or unique ecosystems; and

(e) Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d). Modified habitats, in the most general sense, are those that have been subject to some form of alteration, often resulting in agricultural land. Despite the fact that some modified habitats might lose all of their natural characteristics, it is still required to minimize further impacts. Natural habitats are composed of plant and/or animal species that are mostly of native origin, where human activity has not been significant enough to modify ecological functions and species composition within. In areas of natural habitat mitigation measures are required to be designed to achieve no net loss of biodiversity.

Critical habitats are those that are of high biodiversity importance or value. Both natural and modified habitats may contain high biodiversity values qualifying as critical habitat. While habitat types are defined by the degree of human-induced modification, this is not necessarily an indicator of the biodiversity value of a habitat as per WB ESS6.

Critical habitat criteria as put forward by WB ESS6 that forms the basis of critical habitat assessment are as follows:

Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species

Criterion 2: Endemic or restricted-range species

Criterion 3: Migratory or congregatory species

Criterion 4: Highly threatened and/or unique ecosystems

Criterion 5: Key evolutionary processes

In areas of critical habitat, ESS6 requires the Borrower not to implement any project activities that have potential adverse impacts unless all of the following conditions are met:

(a) No other viable alternatives within the region exist for development of the project in habitats of lesser biodiversity value;

(b) All due process required under international obligations or national law that is a prerequisite to a country granting approval for project activities in or adjacent to a critical habitat has been complied with;

(c) The potential adverse impacts, or likelihood of such, on the habitat will not lead to measurable net reduction or negative change in those biodiversity values for which the critical habitat was designated;

(d) The project is not anticipated to lead to a net reduction in the population of any Critically Endangered, Endangered, or restricted-range species, over a reasonable time period;

(e) The project will not involve significant conversion or significant degradation of critical habitats. In circumstances where the project involves new or renewed forestry or agricultural plantations, it will not convert or degrade any critical habitat;

(f) The project's mitigation strategy will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated; and

(g) A robust and appropriately designed, long-term biodiversity monitoring and evaluation program aimed at assessing the status of the critical habitat is integrated into the Borrower's management program.

It should also be noted that Critical Habitat Assessment is independent of a project's potential impacts on biodiversity value within its AoI or an extended area. The outcome of the Critical Habitat Assessment does not indicate a particular impact associated with project activities or requirement for a mitigation measure. Rather it provides a thorough analysis of the existing biodiversity value in a given area and informs the applicability of WB ESS6 requirements. For the project-related impacts a mitigation hierarchy is to be applied and measures are required to be defined for different phases of a project.

4.8.2.2 Critical Habitat Methodology

To identify the statuses of species that have been identified based on literature data and assessed through expert judgement, besides the IUCN Red List of Threatened Species utilized to determine endangered and critically endangered species, other criteria were also used in critical habitat assessment, wherever applicable. In determining "highly threatened and unique ecosystems", IUCN Red List categories for ecosystems were used as the main reference.

Since international, even European biodiversity assessments do not always cover Turkish habitats and species, experts' judgment was often consulted to interpret data. Since international, even European biodiversity assessment do not always cover Turkish habitats and species, experts' judgment was often consulted to draw conclusions on the current statuses of biodiversity components. Local expert judgment was also referred to due to the fact that there are no officially established or widely accepted national evaluations on threat and conservation statuses of habitats and species in Türkiye.

Criterion 1: Critical (CR) and/or Endangered (EN) Species

Species threatened with global extinction and listed as Critically Endangered (CR) and Endangered (EN) on the IIUCN Red List are considered as part of Criterion 1. Critically Endangered species face an extremely high risk of extinction, while Endangered species face a very high risk of extinction in the wild.

Quantitative data on potential critical habitat triggering species' populations were assessed based on the Guidance Note (GN) 6 (2019) thresholds, which not only consider global conservation priorities but also nationally or regionally significant concentrations of species. Accordingly;

(a) areas that support globally-important concentrations of an IUCN Red-listed EN or CR species (≥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 species, the loss of which would result in the change of the IUCN Red List status to EN and meet these thresholds;

(c) as appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species, trigger designation of critical habitat.

In determining CR and EN species at the Biodiversity Study Area, the IUCN Red List of Threatened Species, European Red Lists, and the only IUCN correspondence in Türkiye; the Red Data Book of Turkish Plants have been utilized as the main references. Regional statuses of species, supported by expert judgment on species' current population trends in Türkiye, have also been assessed.

Criterion 2: Endemic and/or Restricted-Range Species

The updated version of the GN 6 (2019) defines the term endemic as restricted-range, which refers to a limited extend of occurrence (EOO) as such:

- For terrestrial vertebrates and plants, a restricted-range species is defined as those species which have an EOO less than 50,000 km^2.
- Form marine systems, restricted-range species are provisionally being considered those with an EOO of less than 100,000 km^2.
- For coastal, riverine and other aquatic species in habitats that do not exceed 200 km width at any point, restricted-range is defined as having a global range less than or equal to 500 km linear geographic span.

An area can be designated as critical habitat, if it holds ≥10 percent of the global population size and ≥10 reproductive units of an endemic and/or restricted-range species. Terrestrial species identified at the Biodiversity Study Area were assessed with respect to their EOOs and population sizes, based on the IUCN Red List, IUCN European assessments, and expert judgment.

Criterion 3: Migratory or 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 those, whose individuals gather in large groups on a cycle or otherwise regular and/or predictable basis according to PS6. The thresholds are as 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.

The significant groups of migratory and congregatory species that are potential critical habitat triggers in the area are birds. The timing of site surveys was not suitable for identification of migratory species and define their habitat use and preferences. Assessments for Criterion 3 can be made following detailed pre-construction migration surveys. These surveys include migration and breeding period surveys. Monitoring in these periods (March-October) should be performed 5 days long monthly by an Ornithologist Expert (see also Section 4.7.2).

Criterion 4: Highly Threatened or Unique Ecosystems

To identify highly threatened or unique ecosystems, WBG requires the Borrower to use the IUCN Red List of Ecosystems (RLE) where formal assessments have been performed, and if not to use assessments using systematic methods at the national/regional level, carried out by government bodies, recognized institutions and/or other relevant qualified organizations. The thresholds are:

(a) areas representing ≥5 percent 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.

European Red List assessments for terrestrial habitats were used in the assessments, where legally protected and internationally recognized areas were also considered. Divriği Hills Important Nature Area (INA), Munzur Moutains INA, Esence (Keşiş Mountains) INA, Munzur Moutains Important Plant Area (IPA), Kop Mountains IPA, Sarıkamış Forests INA, Çıldır Lake INA, and Çıldır Lake IPA are within the Project route and are considered as threatened ecosystems. However, due to the Project is the modernization of the existing railway, impacts on these areas will be limited.

Criterion 5: Key Evolutionary Processes

Evolutionary processes are defined as structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation and combinations of these variables can influence evolutionary processes that give rise to regional configurations of species and ecological properties. The significance of structural attributes in a landscape that may influence evolutionary processes are required to be determined on a case-by-case basis, and determination of habitat that triggers this criterion will rely on scientific knowledge.

Examples to spatial features associated with evolutionary processes can be listed as; landscapes with high spatial heterogeneity, ecotones, edaphic interfaces, connectivity between habitats, and sites of demonstrated importance to climate change adaptation either for species or ecosystems.

The Biodiversity Study Area is not associated with key evolutionary processes. Neither it hosts flora and/or fauna species that have distinct evolutionary histories with populations that show proven phylogenetic divergence from other species' other known populations.

4.8.2.3 Critical Habitat Triggering Biodiversity Features

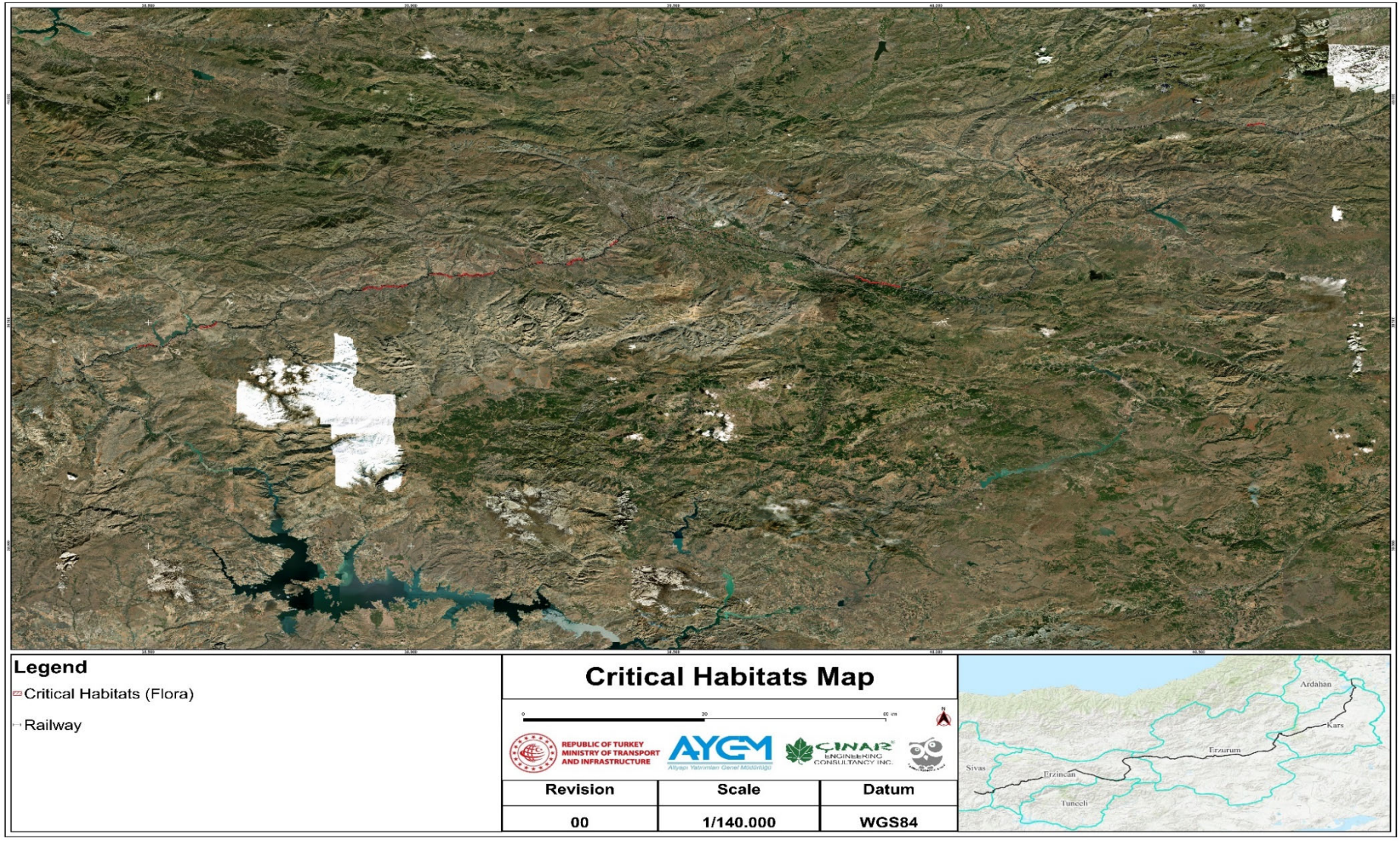
Even though the railway route passes in protected areas, the route itself is modified habitat and the railway line is in operation for more than 60 years. The railway rehabilitation and modernization activities will be conducted within the railway corridor and for facilities where additional area will be required such as new sidings or extension of sidings will not be within these protected areas. If no project activities are conducted in these areas other than the existing railway corridor, it is expected that there will not be an impact on these critical habitats and critical habitat triggering species.

The potential critical habitat triggering flora species are given in Table 86. The criterions considered are also given in table. Most of the species are regional endemic species and others are distribution restricted species. Therefore, all flora species are triggering critical habitat. The distribution of these species includes only the known areas. Also, the habitats, which were determined (see Table 83and Table 82) were evaluated according to the Criterion 4. Due to the Critical Habitat Triggering species E1.2 : Perennial calcareous grassland and basic steppes, E1.2B : Serpentine steppes, E1.2E : Irano-Anatolian steppes, E1.B : Serpantin step, G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix, G1.7 : Thermophilous deciduous woodland, and H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity habitat types meets the Criterion 4. The critical habitats are represented in Figure 91. Almost all species were distributed only in Türkiye. *Salvia euphratica* ssp. *leiocalycina* has population also in New Zealand. *Limoniopsis owerinii* has population also in Russia. *Beta macrorhiza* has population also in Greece, Bulgaria, Geogia, and Russia. Therefore, the global populations of the triggering species were evaluated according to the global population sizes and precautions given in the BMP should be implemented. Due to the distribution sensitivity of these species, Criterion 1 and Criterion 2 were triggered.

In determined critical habitats no project activities will be carried out and construction will be performed on the route. Outside the route near the critical habitats no actions will be performed.

BMP has been prepared to define the necessary mitigation measures to avoid indirect impacts on the identified critical habitat and triggering species. Due to the Project is a modernization project, critical habitats are defined outside the railway route. For the conservation of the regional endemic and distribution restricted species, no activities will be performed in critical habitats. Due to seasonal limitations no critical habitat could be determined for fauna species. Further identification and assessment will be performed after pre-construction phase surveys, which are specified in Section 4.7.2. According to the findings, if needed, further mitigation measurements will be implemented, and the BMP will be revised/updated. Due to the Project is a modernization project, it is expected that the impacts of the Project will be limited. Potential triggering fauna species (see Table 88, Table 89, Table 90 Table 91, and Table 92) will be monitored between May and September once a month. After clarification of presence of these species critical habitat assessment will be updated.

Figure 91. Critical Habitat for Flora Species



4.8.3 Ecosystem Services Review

The Millennium Ecosystem Assessment (MA) was initiated with the support of the UN in 2001 to assess how changes in ecosystems impact human well-being and what actions are needed to be enhanced to ensure sustainable use of ecosystems and their contribution to human life. The MA involved knowledge and expertise of over a thousand experts worldwide to publish its synthesis reports linking biodiversity to ecosystem services, as well as to human well-being and development needs. These reports, reflecting consensus view of a large body of social and natural scientists, provide a widely accepted definition and categorization of ecosystem services (MA, 2005).

ESS6 also recognize the importance of maintaining benefits that people, including businesses, derive from ecosystems. ESS1 defines ecosystem services as “the benefits that people drive from ecosystems”. Project development must therefore be balanced and the potential for utilizing the multiple economic, social and cultural values of biodiversity and living natural resources should be assessed in an optimized manner.

Ecosystem services are organized into four types: (a) provisioning services, which are the products people obtain from ecosystems and which may include food, freshwater, timbers, fibers, medicinal plants; (b) regulating services, which are the benefits people obtain from the regulation of ecosystem processes and which may include surface water purification, carbon storage and sequestration, climate regulation, protection from natural hazards; (c) cultural services, which are the nonmaterial benefits people obtain from ecosystems and which may include natural areas that are sacred sites and areas of importance for recreations and aesthetic enjoyment; and (d) supporting services, which are the natural processes that maintain the other services and which may include soil formation, nutrient cycling, and primary production.

In line with the provisions of the ESS1, interaction of the Project with ecosystem services and benefits derived from ecosystem services are assessed in this section of the ESIA biodiversity studies. In addition to biodiversity studies, socio-economic findings of the ESIA which are detailed in Socio-Economic Environment Section, have also been used.

Guidelines developed by the WRI provide a useful tool to incorporate evaluation of ecosystem services into the Project ESIA studies. The first step in the Ecosystem Services Review (ESR) is identifying ecosystem services based on the following criteria:

- Impact: Direct impact on a particular ecosystem service caused by project activities that also impacts the community
- Dependence: Project’s dependence on the ecosystem service for its operations
- Relevance to Affected Community: Ways in which livelihood, health, safety or culture of a community will be impacted
- Management Control: The project’s control over the ecosystem service in question

Potential ecosystem services identified for this project are defined below:

a) Provisioning services (goods provided):

• Agricultural lands and orchards provide essential services for both nourishment and livelihoods.

• Plants in wetlands, steppe, and grassland habitats serve as feeding areas for large and small livestock, as well as breeding grounds for birds, reptiles, and mammals.

• Serpentine and gypsum steppe habitats, besides serving as a gene pool, are crucial for livestock.

• Flowing and stagnant water sources supply water to wildlife and are used for irrigation in agricultural areas. Additionally, these water sources regulate the regional water regime.

b) Regulating services (ecological functions):

• Through plant cover and trees, oxygen essential for human survival is produced by utilizing carbon dioxide.

• Plant cover contributes to controlling erosion and preventing water inundations.

• Plant cover helps water infiltrate into the subsoil, reducing surface runoff and minimizing sediment transport to lakes and seas.

c) Cultural services (non-material benefits to humans):

• Natural habitats play a crucial role in sustaining the habitat of critical species.

These ecosystem services play a vital role in supporting human well-being and sustaining biodiversity and the Project will not have an impact on these ecosystem services.

4.9 Impact Assessment

Habitat loss and fragmentation due to linear structures like railways and highways have been identified as the most significant impacts on biodiversity through studies conducted globally. Although railway emissions and land use required by the infrastructure is lower than that of other means of transport, it is required that railways are evaluated based on their own properties and their site-specific impacts on biodiversity are assessed thoroughly.

In this section of the ESIA Report, potential impacts of the Project on biodiversity, the framework for the mitigation hierarchy implemented in line with ESS6 to reach “no net loss-net gain”, and lastly sensitivity criteria developed for biodiversity receptors that are subject to the site-specific impact assessment. Potential impacts of the Project that are addressed in impact assessment can be listed under the following three main headings:

1. **Habitat Loss and Fragmentation – Barrier Effect:** Loss of feeding, breeding, nesting areas, differentiation in animal behavior, changes in population genetics, formation of ecological traps and passages for invasive alien species
2. **Animal Mortality:** Collision, electrocution, wire strikes and rail entrapment
3. **Environmental Impacts:** Noise and vibration, air emissions, soil pollution, water pollution, soil erosion and changes in the hydraulic structure

4.9.1 Land Preparation and Construction Phase

The most significant impact of the Project on biodiversity during its land preparation and construction phase will be habitat loss and fragmentation, and the barrier effect the two impacts bring about. Populations of flora species will be directly impacted, while fauna species’ habitat use capabilities will be reduced.

When distribution of a particular population is divided by a railway, part of the habitat is lost, and the rest might be destructed. The small isolated patches that are formed as a result of fragmentation may not have sufficient capacity to maintain viable populations. Activities to be realized during the land preparation and construction phase may present physical barriers limiting animals’ movement between areas where they feed and have access to water, and their breeding sites.

Given that biodiversity field for the ESIA was undertaken in winter, on-site data do not provide adequate information to provide an understanding on the fauna composition of the area. Mitigation measures proposed at this stage are targeted at flora species, which were identified during field surveys and targeted fauna species according to literature records. Prior to the onset of land preparation and construction phase, additional field surveys will be conducted during appropriate seasons for fauna species and habitats (Spring-Summer) to further detail potential impacts and also develop site and species-specific measures. These pre-construction surveys are specified in Section 4.7.2. For this purpose, invertebrates, reptiles, birds, and

mammal species will be further identified before construction phase and necessary mitigations will be implemented.

WBG Environmental, Health, and Safety Guidelines for Railways (2007), proposes the following measures to be implemented to minimize impacts of new railway construction on biodiversity:

- Avoid fragmentation or destruction of critical habitats;
- When rail crossings of watercourses are unavoidable, maintain water flow and fish access by utilizing appropriate methods;
- Minimize the clearing of riparian vegetation during construction;
- Avoid construction activities during the breeding season and other sensitive seasons or times of day, especially where critically endangered or endangered species are concerned; and
- Avoid the introduction of invasive species during reinstatement activities, preferably through the use of native plant species.

Potential environmental impacts associated with the land preparation and construction phase of the Project, might also disturb flora and fauna species, based on the magnitude of impacts and sensitivity of the biodiversity receptors. Mitigation measures to be taken to minimize impacts on air, soil and water quality and regarding control of noise and vibration are provided in the related chapters of this ESIA Report. Principles and implementation strategies with respect to control and management of environmental impacts that have been developed in line with the national legislation, and international standards and guidelines are provided both for land preparation and construction, and operation phases of the Project as part of the ESMP.

Given that the project is a rehabilitation and modernization effort, it is essential to recognize that while critical impacts may be minimized, they cannot be entirely ruled out. The project will traverse protected areas, internationally recognized areas of high biodiversity value, and critical and natural habitats that are home to flora and fauna species of high conservation concern. According to the Environmental and Social Standard 6 (ESS6), these areas and species require stringent conservation efforts.

To ensure a comprehensive understanding of the project's environmental implications, a clear and systematic impact assessment is required. Therefore, Section 4.7.2 defines the pre-construction surveys for fauna species, which has to be performed to further identify triggering species and critical habitats. Critical habitats, which were defined after flora surveys, are not located within the railway route and therefore will not be affected due to the Project. However, for the conservation of these species (see Table 85) seeds will be collected and seeds will be delivered to the Türkiye Gene Bank. These surveys will be performed with a Botanist Specialist.

The identification of nesting areas and consideration of breeding seasons are crucial steps in preventing direct mortality and conserving future generations of species. These efforts should be explicitly linked to the specific species of concern, with a detailed analysis of how the project might impact them. Potential impacts should be evaluated for their significance, and mitigation measures must be well-defined and targeted to address these impacts effectively after pre-construction surveys.

Pre-construction surveys play a critical role in identifying the species that could be impacted by habitat fragmentation. Therefore, the BMP should be updated after these surveys, which should yield more than just a list of species; they should also assess the significance of the fragmentation impacts and inform the development of species-specific strategies within the Biodiversity Management Plan (BMP).

The project must engage stakeholders robustly to identify passages that will also serve human and cattle needs while providing safe passage for wildlife. This is conducted within the framework of the Stakeholder Engagement Plan (SEP).

4.9.2 Operation Phase

Although the most significant impacts of railways are noted as habitat loss and fragmentation, the newly formed sets around the routes passing through different habitats form important green corridors. Vegetation management constitutes an integral part of railway operation and maintenance. It is important not only in terms of fire control, visibility, falling trees and leaves, but also for maintaining biodiversity. Railway corridors can provide opportunities for flora and fauna species that are already under the pressure of urbanization, through newly formed habitats and interactions between these corridors and adjacent habitats (Borda-de-Agua et al., 2017).

Since the project is a rehabilitation project a direct habitat fragmentation will not occur.

Regular maintenance of vegetation along rights-of-way may involve the use mechanical and manual methods, as well as herbicides. Vegetation maintenance beyond that which is necessary for safety, may remove unnecessary amounts of vegetation, resulting in loss of successional species and an increased risk of invasive species (WBG, 2007).

WBG (2007) recommends the following measures to be taken to prevent and control impacts from right-of-way vegetation maintenance:

- Within the scope of an integrated vegetation management,
  - the track areas should be kept completely clear of vegetation, and
  - from the edge of the track area to the boundary of the right-of-way, vegetation should be structured with smaller plants near the line and larger trees further away from the line to provide habitats for a wide variety of plants and animals,
- Native species should be planted, and invasive plant species removed,
- Railways should be designed and maintained to discourage plant growth in the track area (e.g. providing lateral barriers to plant migration and ensuring rapid drainage of the track area),
- Biological, mechanical, and thermal vegetation control measures should be used where practical, and use of chemical herbicides on the bank beyond the transition area should be avoided (approx. 5 meters from the track),
- Maintenance clearing in riparian areas should be avoided or minimized.

In line with the WBG EHSG for Railways, herbicides for the Project will be used following the manual on pesticides prepared by the World Health Organization (WHO) and the UN Food and Agriculture Organization (FAO). Accordingly, necessary trainings should be provided to the Project personnel both on use of herbicides, and also on biodiversity features in the area.

The barrier effect of the railways that start off during the land preparation and construction phase, continues through the operation and maintenance phases. Although limited when compared to impacts of highways, animal mortality due to collision, electrocution, wire strikes and rail embankment are the most obvious impacts of operation-phase impacts (Dorsey et al., 2015). Collision is a significant risk factor for mammals and birds, while smaller animals have been reported to die due to embankment (Budzic and Budzic, 2014).

For those animals that approach the railways to use the newly formed habitats, it is possible to lower the mortality risk by taking measures to limit their passages. Fencing, sound signals/barriers, chemical repellents, lights and reflectors, and physical barriers such as trees and noise barriers, can be effective in lowering mortality rates. These measures, however, also carry the risk of increasing the barrier effect. To prevent such measures to enhance the barrier effect, physical barriers and fences should not be placed randomly along the right-of-way. Instead, appropriate locations where collision risk is higher should be determined prior to construction. When fencing is used, it is also crucial to provide escapes.

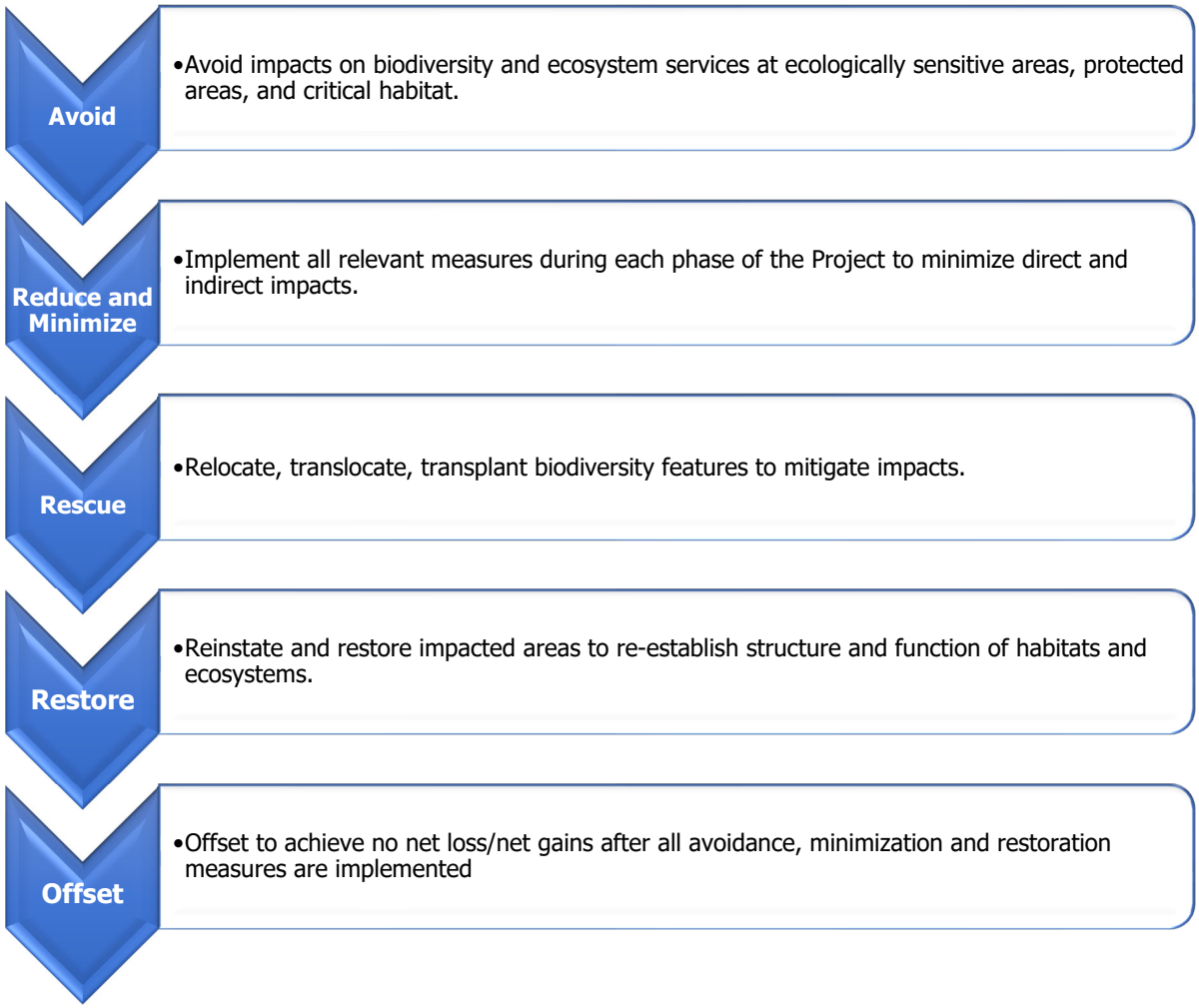
Structures such as bridges and culverts, originally designed for other purposes, can be repurposed or newly designed to serve as wildlife passages within the Project. The identification of significant locations for these passages, as well as the adequacy of planned structures, should be determined based on the habitat use of fauna, which will be assessed prior to construction. Also, the passages will be clarified after pre-construction fauna surveys. Therefore, specific recommendations to the detailed design will be provided based on the results of these surveys. When considering the need and location for new wildlife passages, it is important to also take into account socio-economic impacts. Additionally, passages that facilitate both human and cattle movement and provide access to grazing lands should be identified through consultations conducted as part of the Stakeholder Engagement Plan (SEP) and should be addressed using an integrated approach.

4.9.3 Mitigation Hierarchy

In line with the provisions of ESS6, biodiversity impact assessment has been conducted following the mitigation hierarchy. The main objective of biodiversity studies undertaken within the scope of the Project is to develop and implement mitigation measures and actions in order to achieve no net loss in natural habitats and species of high conservation concern, and net gains in critical habitat.

The theoretical framework for the mitigation hierarchy that has been implemented in biodiversity studies is presented in Figure 92. To reach habitat and species conservation targets in line with the ESS6 requirements, the mitigation hierarchy approach has been adopted. Following the implementation of the mitigation hierarchy, and after appropriate avoidance, minimization and restoration measures are taken, biodiversity offsets may be considered to compensate for significant residual impacts targeting measurable conservation outcomes as net gains in critical habitats within the scope of the Project's ESMP. Since potential impacts on critical habitats will be limited due to the project being a rehabilitation project, identified mitigation measurements will be implemented.

Figure 92. The Mitigation Hierarchy



4.9.4 Receptor Sensitivity

As a result of the baseline and critical habitat studies conducted within the scope of ESIA, different sensitivity criteria have been developed for habitats and species. The sensitivity of a biodiversity receptor has been determined based on its intrinsic value and susceptibility attributing to its uniqueness, extent, conservation status, endemism, abundance and resilience. Sensitivity criteria used for the Project biodiversity impact assessment are given in Table 93.

Table 93. Sensitivity Criteria for Biodiversity Receptors

Sensitivity	Biodiversity Receptors		
	Habitats	Flora	Fauna
High	Critical and natural habitats that are listed as CR, EN, VU according to the RLE that require longer periods of time to recover (more than 10 years)	Local endemic species and/or those that are listed as CR, EN, VU, NT according to the Red Data Book of Turkish Plants or local endemic species that have not been evaluated according to the Red List criteria yet	Endemic species and/or species of high conservation concern (CR, EN, VU, NT)
Medium	Priority habitats listed under Annex I of the Habitats Directive that are of regional significance that can recover in medium-term (5-10 years)	Regional endemic species and/or those that are listed as CR, EN, VU, NT according to the Red Data Book of Turkish Plants	Habitats Directive Annex II/IV species and/or species that are of regional or local significance whose

Sensitivity	Biodiversity Receptors		
	Habitats	Flora	Fauna
			populations may be in decline
Low	Natural habitats that recover in shorter periods of time (1-5 years)	Widespread endemic species and/or those that are listed as LC according to the Red Data Book	Widespread species with relatively higher populations and larger range
Negligible	Modified and artificial habitats	Non-endemic widespread flora species	Vagrant species / accidental records

Receptors that are subject to the impact assessment and their associated sensitivity levels determined applying the above criteria are provided in Table 94. Flora and fauna species that are of high conservation concern have been identified as those that are listed as CR, EN, VU and NT according to the Red List, and those that require specific measures to be conserved. Due to the Project is a rehabilitation project, sensitivity of critical species and habitats will be low. However, to ensure the population status and biodiversity conservation, mitigation measures have been identified.

4.10 Potential Impact Significances and Mitigation Measures

In the assessment of Project-related potential impacts on biodiversity receptors addressed in the ESIA Report, the mitigation hierarchy presented in Figure 92 has been implemented in line with the ESS6. Definition of impacts, factors defined by the impact assessment methodology, related mitigation measures and significance of residual impacts are presented in Table 94. Mitigation measures defined in the ESIA will be further developed based on data to be obtained from additional field work especially for fauna groups and implemented within the scope of the BMP following the “no net loss-net gain” principle.

Table 94. Impacts on Biodiversity Receptors, Mitigation Measures and Significance of Residual Impacts

Impact Description	Project Phase	Receptor	Impact Magnitude					Receptor Sensitivity	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Reversibility	Duration	Frequency	Overall Magnitude				
Habitat loss / fragmentation	Land preparation and construction	Natural habitats and Critical Habitats	Restricted	Irreversible	Long-term	One-off	Medium	Medium	**Moderate**	▪ The Project personnel will be informed on the sensitivity of critical and natural habitats and species, conservation priorities, and also nesting areas that will be identified through pre-construction surveys. Any direct impact on plant and animal species will be prevented. ▪ Trainings will be organized for the Project personnel to inform them about the biodiversity and sensitivity of endemic species. ▪ Limiting the construction activities to designated work areas and minimizing vegetation clearance by limiting to only required areas. ▪ Prior to construction works commenced, critical habitats will be marked along the railway corridor. ▪ Project-related impacts on air, soil and water in natural habitats will be avoided. ▪ No Project related activities will be carried out in the Critical habitats. ▪ Endemic species seeds will be collected in vegetation period (May-September) (see Table 85), and seeds will be delivered to the Türkiye Gene Bank. These surveys will be performed with a Botanist Specialist by the contractor under the control of AYGM... ▪ Soil management will be implemented. ▪ Construction will be monitored via a Botanist between May-September once monthly in Critical Habitats.	**Minor**
		Flora species of high conservation concern	Restricted	Irreversible	Long-term	One-off	Medium	Medium	**Moderate**		**Minor**
		Fauna species of high conservation concern	Restricted	Irreversible	Long-term	One-off	Medium	Medium	**Moderate**	▪ Pre-construction surveys for invertebrates, amphibians, reptiles, birds and mammals will be conducted as specified in Section 4.7.2 and BMP will be updated. ▪ In setting up a schedule for land preparation activities, breeding seasons of animals will be considered to prevent direct mortality and also conserve the next generation of their populations in the area. ▪ Project-related impacts on air, soil and water in natural habitats will be avoided. ▪ In line with the characteristics of the target species, it will be decided in consultation with experts whether passages planned within the scope of the Project would be sufficient for wildlife. ▪ Where necessary, in order to ensure no net loss in populations of fauna species new structures will also be considered in areas that are identified to be significant for animal passages. Passages that will also enable human and cattle passage and provide access to grazelands will be identified through consultations within the scope of the Stakeholder Engagement Plan (SEP). ▪ To minimize animal mortality, locations along the route where animal passage will be prevented and methods that will be used to prevent passage of target species (fencing, sound signals, chemical repellents, lights and reflectors, etc.) will also be identified. ▪ Hunting of fauna species will be prohibited. In case of illegal hunting activities, authorities will be notified.	**Minor**
Use of machinery and equipment	Land preparation and construction	Natural habitats Flora and fauna species of high conservation concern	Restricted	Reversible	Short-term	Intermittent	Low	Medium	**Minor**	▪ Trainings will be organized for the Project personnel to inform them about the on-site speed limits and also importance of animal passages. ▪ Machinery and equipment that arrive in work areas will be checked for presence of invasive alien species. ▪ All machinery and equipment will be subject to regular maintenance and will not be used out of purpose. ▪ Use of machinery and equipment will be limited to designated work areas. Impacts related to noise and vibration will be controlled in line with the Project standards.	**Minor**
Indirect impacts (dust, air	Land preparation	Natural habitats	Restricted	Reversible	Short-term	Intermittent	Low	Medium	**Minor**	▪ To control dust emissions, vegetation clearance will only be undertaken in pre-determined activity areas, and habitats will be rehabilitated upon completion of	**Negligible**

Impact Description	Project Phase	Receptor	Impact Magnitude					Receptor Sensitivity	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Reversibility	Duration	Frequency	Overall Magnitude				
emissions, noise, waste, and impacts on water and soil quality)	and construction	Flora and fauna species of high conservation concern								construction activities. All related dust suppression measures will be taken to ensure prevention of indirect impacts on biodiversity features. ▪ On-site speed limits will be enforced to avoid direct mortality of animals. ▪ There will be no direct discharge into water resources. ▪ Project-related wastes will be collected at designated waste storage areas, and periodically removed from work areas. ▪ Solid wastes and wastewater that will result from land preparation and construction activities of the Project will be managed through implementation of the related management plans (Pollution Prevention and Waste Management Plan, etc.). ▪ .	
Invasive alien species	Land preparation and construction	Natural habitats Flora and fauna species of high conservation concern	Local	Reversible	Medium-term	Intermittent	Low	Medium	**Minor**	▪ Natural vegetation will be conserved to the best possible extent during land preparation and native species will be used in restoration after completion of the construction phase. ▪ Vehicles and equipment entering the site will be checked for invasive alien species. If identified, necessary measures will be taken in line with the Project standards to eradicate the species. ▪ Instead of using herbicides, which would destroy the natural vegetation and enable introduction of invasive alien species, different vegetation management methods will be considered as appropriate spatially and temporally. ▪ During the land preparation and construction phase biodiversity monitoring studies, potential for presence of invasive alien species in the area will also be monitored	**Negligible**
Habitat loss / fragmentation	Operation	Natural habitats	Restricted	Irreversible	Long-term	One-off	Medium	Medium	**Moderate**	▪ Natural habitat will be restored upon completion of construction activities, enabling species to re-inhabit these areas. ▪ Statuses of habitats and associated species populations will be monitored during operation period. Where necessary, habitat and species-specific measures will be developed and implemented with an adaptable management approach. ▪ To establish coherence between newly formed and natural habitats, conserve fauna species, prevent introduction of invasive alien species, and ensure secure transportation, integrated vegetation management strategies will be developed and implemented.	**Minor**
Habitat loss / displacement	Operation	Flora and fauna species of high conservation concern	Restricted	Irreversible	Long-term	One-off	Medium	Medium	**Moderate**	▪ Animal mortality will be kept under control through implementation of methods to prevent animal passage and strategies related to use of existing passages / construction of new ones, based on habitat use of target species. ▪ In order to prevent animals being attracted to vegetation along the route, to limit the time animals spend near the railway, and increase their visibility and also vision, appropriate vegetation schemes will be implemented within the scope of the integrated vegetation management.	**Minor**
Invasive alien species	Operation	Natural habitats Flora and fauna species of high conservation concern	Local	Reversible	Medium-term	Intermittent	Low	Medium	**Minor**	▪ To avoid development of alien species along the railway route, natural plants will be used in restoration, and regular maintenance will continue throughout the operation phase. ▪ To take necessary measures against the risk of invasive alien species being transferred by the trains, there will be periodical controls and if identified, necessary measures will be taken in line with the Project standards to avoid spread of invasive alien species. ▪ During the operation phase biodiversity monitoring studies, potential for presence of invasive alien species in the area will also be monitored.	**Negligible**

SOCIO-ECONOMIC ENVIRONMENT

4.11 Project Standards and Methodology

4.11.1 Project Standards

The primary data sources utilized in socio-economic impact assessment studies include statistics obtained through desktop analysis, information from official local institutions' websites, stakeholder interviews conducted during fieldwork, and photographs taken in the vicinity of stations and nearby settlements. The sources used to assess socio-economic impacts within the scope of the project may include:

- World Bank's ESF and Borrower's Guidance Notes
- World Bank Group's General Environmental, Health, and Safety (EHS) Guidelines
- World Bank Group's Environmental, Health, and Safety Guidelines for Railways

4.11.2 Methodology

The adapted methodology for Social Impact Assessment (SIA) of the project is grouped under the following headings:

- Defining assessment boundaries, identifying key social issues, and determining scope and scale to lay the foundation for the entire SIA process.
- Establish a social baseline by gathering comprehensive information about existing social conditions in the affected area, encompassing demographic, economic, cultural, and community data.
- Identifying and involving relevant stakeholders, including local communities, NGOs, and other groups affected or interested in the project, with a focus on ensuring diverse perspectives are considered.
- Identifying and evaluating potential positive and negative social impacts on individuals, communities, and institutions, with an assessment of changes in employment, income, education, health, and social cohesion.
- Developing strategies to mitigate adverse social impacts and enhance positive ones, which may entail adjusting project design, implementing community development programs, or creating compensation mechanisms.
- Establishing a plan to monitor social impacts during and after project implementation, ensuring proposed measures are effective and allowing for adjustments as needed.

4.11.2.1 Identification of Social Impact Area

When determining the social impact area of the project, two units were taken into consideration. The first is the stations, and the second is the railway. A 0-500 m corridor was used to determine the social impact area around the stations. For assessing the social impact area around the railway, a 0-5 km corridor was considered. According to the information provided in Table 9, the main activities of the project will be conducted around the stations and their surroundings. Therefore, the primary social impact areas of the project are the 0-500 m corridors considering stations as the central points. The secondary social impact area of the project is the 0-5 km corridors, considering the railway lines between stations as the central points. The direct impacts of the project will be observed within the 0-500 m corridor, while the indirect impacts will be observed within the 0-5 km corridor. As a summary;

- 1st Social Impact Area, 0-500 m buffer, Primary Social Impact Area, Direct impacts of the Project: Center of the social impact area is the Stations. Station employees are at the very core of this impact area. Additionally, this social impact area also includes the settlements around the stations, which are located within the 500 m corridor.

- 2nd Social Impact Area, 0-5 km buffer, Secondary Social Impact Area, Indirect impacts of the Project. Center of the social impact area is the railway line. This social impact area includes the settlements around the railway line, which are located within the 0 - 5 km corridor.

4.11.2.2 Identification of Stakeholders

Stakeholders are identified in four steps according to the social impact areas. These steps are as follows. Details of these identification are given in project-specific SEP document.

The distribution of these stakeholders according to social impact areas and their descriptions are provided below:

- 1st Social Impact Area
  - Step 1: Directly affected PAPs
    - 1) Employee of the Stations, and personnel of the trains, and passengers
    - 2) Local people living in the settlements around the station and passengers
    - 3) Local administrators (mukhtars) of the settlements which are located around the stations
    - 4) Youth, students, ethnic groups
    - 5) Farmer, fishermen, beekeepers
    - 6) DVIGs; Information has also been collected regarding non-Turkish-speaking individuals, elderly individuals, elderly women who are heads of households living alone, illiterates, and disabled individuals, all of whom are considered vulnerable according to ESS10
- 2nd Social Impact Area
  - Step 2: Indirectly affected PAPs
    - 1) Local people living in the settlements around the railway line
    - 2) Local administrators (mukhtars) of the settlements which are located around the railway line
    - 3) DVIGs
  - Step 3: Local and regional governmental institutions as OIPs
    - 1) Local institutions
    - 2) Regional institutions
    - 3) Local businesses
    - 4) Labor unions
    - 5) Local NGOs/CSOs
    - 6) Media (printed and electronic)
    - 7) Other developmental agencies

4.11.2.2.1 Step 1: Directly affected PAPs

4.11.2.2.1.1 Employee of the Stations

All stations accessible within the project scope have been visited, and interviews have been conducted at all stations excluding unmanned facilities. Additionally, those unmanned facilities that are accessible have also been included in the study. Details about the research are provided with Appendix-9 and Table 102.

The key informants given as "railway employees" mostly consist of station chiefs, movement officers, and train composition workers. All station chiefs and train composition workers are male, but some of the interviewed movement officers are female. The remaining participants are managers who are unit and branch responsible in the main stations, Erzincan, Erzurum, and Kars.

The field notes, mostly presented through direct quotation methods, have been provided under the "Finding and Observation" subtitle for the regions of Ardahan, Kars, Erzurum, Erzincan Tunceli, and Sivas. They have been presented in tables along with photographs on a station-by-station basis. The data extracted from the relevant sections of these tables have been utilized for social impact assessment and mitigation measures.

The data collected during the fieldwork primarily consists of notes taken by a social specialist during in-depth interviews and photographs taken in the field. These data have been reported in accordance with E&S standards.

Among the visited facilities, 11 have both male and female employees. In 6 out of the 11 conducted interviews, women also participated. In facilities where there are female employees but interviews with them could not be conducted (Topdağı, Süngütaşı, and Çaltı), the female employees are on a shift change day. In Erzincan and Erzurum Stations, where there are female employees, no women participated in the interviews.

The Selim station (Kars Province, Selim District) has staff, an interview with an employee could not be conducted because the staff member was not present at the time the fieldwork was carried out.
Although there are no abandoned stations, there are units located between stations with no station building or personnel. The first of these is Benliahmet (11th row of Table 101) , and the other is Geçit station (40th row of Table 101).
In the preliminary interviews, it was found that some units had stations but no station buildings or personnel. Stations Soğanlı (17th row of Table 101), Erbaş (35th row of Table 101), and Güllübağ (48th row of Table 101), could not be visited due to difficulties in road access.

Additional* Studies *for 1st Phase of Social Survey

- **Areas visited despite not being within the project scope (Six Units):**

Some strategic areas that are not within the project scope, such as the Aşit station, have also been included in the social research. The first of these is the Kars Logistics Center (**5th row** of Table 102), which was visited on 17.10.2023. The Aşit station (**15th row** of Table 102) was visited on 17.10.2023, and general information about the tunnel structures in the area was collected, too.

During stakeholder meetings in 3 areas, visits were made based on recommendations by key informants, who were responsible on Kars Main Station. They emphasized the potential implementation risk related to intersection between the railway line and highway. These locations are listed as the following: (1) BTK Junction, 2) Kars Main Station - BTK Junction and 3) Kars Central - Highways Overpass). The BTK junction, where the Kars station intersects with the BTK line, and the sections where the train line intersects with the main road in Kars were also observed on-site on 30.10.2023 to understand the train movements in the area. For these locations, similar to the Aşit tunnel, field visits were conducted together with the officials working at the Kars station. The information provided in Table 124 was obtained through these officials. **Rows 7, 8, and 9** of Table 102 summarize these unit visits.

Another station visited despite being out of scope is Çatak (**13th row** on Table 102) This unit was visited to provide information about the general conditions of the units not covered within the scope. However, as seen in Table 128, almost no relationship could be identified between the station and the nearby area. Some of the names of the station do not reflect the real condition. For instance, the station used to be in use as a station in the past. However, currently, there is no building related to railway line such as train station, train stop, or any type of maintenance structure. In addition, the identified area has no intersect to the settlement.

Although the Aşit (**15th row** on Table 102) station is out of the project scope, the Aşit tunnel was visited on 17.10.2023, and general information about the tunnel structures in the area was collected.

Thus, the number of units planned for interviews was increased from **29** to **35**.

- **Areas visited despite not being within the methodology scope (3 units):**

As previously mentioned, stations with personnel were included in the coverage, and this number was determined to be 29, as stated above. However, despite the lack of possibility of conducting interviews, some stations were still visited. Under these conditions, the number of units visited is **3**. Rows 10 (Dikme), 22 (Karaçuha), and 38 (Altınkent) of Table 102 belong to these unit visits.

Thus, the number of units planned for interviews has increased from **35** to **38**. The list of stations covered by the field study, details of which are provided in Appendix-9 is given in Table 102.

4.11.2.2.1.2Local people living in the settlements around the station

An online questionnaire was used for the household survey. During the fieldwork, data that could be tracked online were directly analyzed by the system, and outputs were obtained through graphs and tables. A total of 384 household questionnaires were successfully implemented, but one of them was canceled due to data quality issues, resulting in 383 household surveys being analyzed.

For detailed information about the applied surveys please refer to Table 95 under section 4.11.2.3 Research Methods.

According to the analysis results of online household survey questionnaire, 256 male and 127 female respondents were interviewed as household representatives. Of these, 358 are between the ages of 15 and 64 (working age group), while 25 are aged 65 and older (elderly).

At the beginning of the study, the list provided in Table 9 was taken into consideration. This list contains 49 units. Eight of these units (Divriği, Karasu, Palandöken, Topdağı, Sayding, Aşit, Çatak, and Hudut) were not included in the study because they were not within the scope of the project. Thus, the study aimed to focus on 41 units. Accordingly, settlements in and around the Erzincan İliç district, where a mining accident occurred recently, have not been included in the household survey. The units excluded from the household survey list are, according to kilometer information, Çaltı (804+599 km), Bağıştaş (821+802 km), and İliç (832+434 km).

For the remaining 38 units, referred to as "stations" from here on, a research universe consisting of a total of 48 settlements, including the settlement(s) where the unit is located and located within the 500 m buffer, has been created. The sampling method within the research universe are detailed under the heading 4.11.2.4 Sampling in the study.

To summarize results of the sampling, settlements have been selected which have distance to the relevant station between 0 to 500 m. While some stations are surrounded by a single settlement, other stations intersect with multiple settlements. Therefore, 48 settlements have been included in the study for 38 stations. The detailed numbers for settlements within the 0-500 m corridor adjacent to the stations are as follows: Altınbaşak station is adjacent to 6 settlements. Mercan station is connected to 2 settlements, while Çadırkaya station is linked with 3 settlements. Aşkale station is neighboring 2 settlements, and Canbaz station also shares borders with 2 settlements.

There is a different situation for Erzurum Main station which is located in Yakutiye district (in other words central district). The station intersects with 12 different settlements. Among them, Ömer Nasuhi Bilmen neighborhood is the most populous area of the Yakutiye district. Therefore, during the sampling studies, this settlement around the station was taken as a reference. However, since Erzurum is the only metropolitan city in the region, the studies were not only conducted in Ömer Nasuhi Bilmen neighborhood but also in densely populated areas in the city center and around the train station.

Total population of the settlements, which are listed in Table 97, is 72,413 with 21,619 households. The sampling has been calculated as 384. 383 of them were successfully completed. Please refer to 4.11.2.4 Sampling to examine the used sampling methodology.

4.11.2.2.1.3Mukhtars of the settlements which are located around the stations

Similar to the household survey, a distinct online questionnaire was designed for interviews with mukhtars, and the system analyzed the data instantly using graphs and tables. Mukhtar survey questionnaire was used jointly for both the mukhtars of settlements around the stations and the mukhtars of settlements around the railway line.

All contacted mukhtars were male. Age information was not requested from the mukhtars as it was not relevant for the analysis.

One of the 48 mukhtars around the stations could not be reached, and four refused to participate for various reasons (see 4.11.2.5 Limitations). The list of the 43 successful interviews is provided below Table 98.

Site visit photographs and schedule belong to 2nd phase of social research are given via Appendix-11.

In addition to specific to a station (Uzunahmet), interviews were conducted with the mukhtar and villagers in the settlement during the 1st phase of the social survey.

All the local representatives of these 48 settlements have been included to the 2nd phase of the social research. In other words, there is no sampling methodology for the mukhtar interviews. A full census was planned for mukhtars of the settlements located in 0-500 m buffer.

It was also planned to conduct face-to-face interviews with each mukhtar of these 48 settlements, which are detailed under the previous subheading, and also listed in Table 97. However, 5 of the interviews could not be realized for several reasons (see 4.11.2.5 Limitations). Details of these mukhtar interviews are given in Table 98.

4.11.2.2.2 Step 2: Indirectly affected PAPs

It was planned to conduct face-to-face interviews with the headmen (or mukhtar) of the 48 settlements included in the household survey during the fieldwork. Additionally, a total of 185 settlements located along the railway route but not directly around the stations were identified. These settlements were assessed based on their proximity to the railway line, and a total of 144 settlements within a 5 km buffer were identified.

Thus, a total of 192 local administrator interviews were designed, including 48 face-to-face interviews and 144 phone interviews.

As a summary, for settlements along the railway line, a mukhtar survey involving local administrators' participation and conducted via phone interviews was designed.

28 mukhtars refused to participate for various reasons, and access could not be established with 19 mukhtar for different reasons (see 4.11.2.5 Limitations). Therefore, out of the planned 144 interviews, 97 were successfully completed. The list of completed mukhtars interviews is provided below 99.

4.11.2.2.3 Step 3: Other Interested Parties

The project route encompasses a total of six (6) provinces, and 22 districts. During the planning of stakeholder consultations, institutions and organizations operating in areas such as local government (municipality, metropolitan municipality, district governorship), development, trade, education, health, agriculture, animal husbandry, and forestry, local businesses, local NGOs/ CSOs, media, development agencies etc. located primarily in provincial and district centers, have been considered among the groups that may be interested in the project.

Local and regional institutions may be interested in the project. In this project these are located in the centers of districts and provinces.

All of the following institutions in provincial and district centers have participated in stakeholder consultations (see Table 100).

Site visit photographs and schedule belong to 2nd phase of social research are given via Appendix-11.

Besides, focus group discussion have been conducted with students, young people, women, and communities representing various ethnic and cultural backgrounds, farmers, and fishermen.

The list of focus group meetings held is provided below (see Table 101)

Site visit photographs and schedule belong to 2nd phase of social research are given via Appendix-11.

4.11.2.2.4 Vulnerable Groups

In accordance with ESS10, this project defines vulnerable groups based on characteristics that might limit their access to project-related information, participation in consultations, and access to announcements. Consequently, non-Turkish-speaking individuals, the elderly, elderly women who are heads of households living alone, illiterates, and people with disabilities are identified as vulnerable groups for this project. Most data on these Disadvantaged and Vulnerable Individuals and Groups have been gathered during Step 1 and Step 2 of the studies.

- **Non-Turkish speaker people:** 28% of all households. In light of the results, it is observed that languages other than Turkish are spoken in 63 settlements (45%), with some settlements having more than one language spoken other than Turkish. The languages reflected in the records, based on intensity, include Kurdish, Zazaki, Azerbaijani, Laz, and Arabic. In terms of language diversity, the most heterogeneous region is Erzincan (please refer to 4.12.9).
- **Elderly people:** Within the scope of household survey, the distribution of the population by age groups is as follows: 318 individuals are in the 0-14 age group (children), 1,176 individuals are in the 15-64 age group (working age), and 128 individuals are **aged 65 and above (elderly)**. The overall ratio of elderly individuals is 8% (please refer to 4.12.1).
- **Disabled people:** In the household survey, out of a total of 1,622 individuals, 43 disabled individuals are mentioned. In the mukhtar interviews, the number of disabled individuals is approximately 978. In settlements around the station, the percentage of households with disabled individuals is 72%, while around the railway, this percentage goes up to 80% (please refer to 4.12.4).

Site visit photographs and schedule belong to 2nd phase of social research are given via Appendix-11 Schedule of the Social Research.

4.11.2.3 Research Methods

Two separate social research studies were conducted to assess the project's social impact. During the first phase of social research only the stations were visited. The information obtained from these station visits was used to design the second phase of the social research.

Prior to the first phase, a one-day preliminary field visit was conducted on 17.10.2023. In the first phase, social research was carried out exclusively for station employees, starting on date 30.10.2023 and concluding on date 03.11.2024. In the second phase, social research was conducted for all stakeholders. Please refer to Table 95 for the dates of the second phase of social research.

Table 95. Phase of Social Research

Phase of Social Research	Scope	Date
Preliminary site visit	To visit Kars Logistic Centre, Kars Main Station, Sarıkamış Station, Aşit Tunnel, Güvercin Station and Canbaz Station	07.10.2023
First Phase	In depth interviews with employee of the stations	30.10.2023-03.11.2023
Second Phase	Household Survey within the primary social impact area. This study also aimed to collect information on DVIGs.	20.03.2024-28.03.2024
	Semi structured Stakeholder (OIPs) Interviews within the centers of districts and provinces	20.03.2024-28.03.2024
	Focus Group Discussions have been conducted with individuals or groups expected to be more significantly affected than others by the anticipated adverse impacts of the project.	20.03.2024-28.03.2024
	Face to face mukhtar survey within the primary social impact area. DVIGs also included to the scope of the survey.	20.03.2024-28.03.2024
	Remote mukhtar survey within the secondary social impact area. DVIGs also included to the scope of the survey.	15.03.2024-27.04.2024

In this study, both quantitative and qualitative research methods were used within scope of the social research. Quantitative research methods were used only in the second phase of the study, while qualitative research methods were employed in both phases. Implemented research techniques are given the following subheading.

The applied techniques identified in accordance with the research method are listed in below:

- Qualitative Research Methods
  - ***In-Depth Interviews*** were utilized in face-to-face interviews conducted with station employees during the first phase of the study.
  - ***Focus Group Discussions*** have been conducted with individuals or groups expected to be more significantly affected than others by the anticipated adverse impacts of the project.
  - ***Semi structured Interviews*** were primarily used in face-to-face interactions with OIPs of the Project.
- Quantitative Research Methods
  - ***Household questionnaires*** were conducted face-to-face as part of the Household Survey.
  - ***Mukhtar questionnaires*** were conducted as part of both face-to-face Mukhtar interviews and remote Mukhtar interviews.

Household survey and mukhtar survey overlapped in scope. While the household survey focused on individuals, the mukhtar survey assessed the overall condition of the settlement. Both survey forms aimed to gather information about DVIGs. As an additional note; questions related to land and housing in the household questionnaire were asked for the 500-meter corridor, too. Even for settlements within 0-5 km, questions regarding land and housing were asked for the 500-meter corridor, regardless of whether the center of the settlement was within a maximum of 5 km distance.

During fieldwork, a household survey, mukhtar survey, stakeholder survey, and focus group meetings were conducted by a team of 6 sociologists. Operating as two separate teams, one part of the field team conducted stakeholder meetings and focus group discussions in city and district centers, while the other team simultaneously conducted the mukhtar interviews and household survey. Additionally, two sociologists, separate from the team, conducted the mukhtar interviews via phone calls both before and after the fieldwork, concurrently with the fieldwork. The names and roles of the sociologists in the team are as follows (see Table 96).

Table 96. Social Team Composition

	Staff	Responsibility	Title	Gender	Phase of Social Research
1	Özge Çelik	Social Research Team Leader	Social Specialist	Female	All phases
2	Sıla Tonbul	Field Survey Team Leader	Social Specialist	Female	Second Phase
3	Figen Can	Household Survey Team Leader	Sociologist	Female	Second Phase
4	Taylan Özgür Öz	Stakeholder Interviewer	Sociologist	Male	Second Phase
5	Öznur Baysal	Conductor of Focus Group Discussion	Sociologist	Female	Second Phase
6	Melek Efe	Interviewer	Sociologist	Female	Second Phase
7	Havva Hande Günoğlu	Interviewer	Sociology undergraduate student on thesis period	Female	Second Phase
8	Didem Aslı Dönmez	Conductor of remote mukhtar survey	Sociologist	Female	Second Phase

4.11.2.4 Sampling

The sampling technique was used for calculating the sample size for a proportion in a finite population. The components and explanations of the formula are given in following:

n = required sample size

N = total number of households. In here 21,619 households across 48 settlements

Z = z-score corresponding to the desired confidence level (e.g., 1.96 for a 95% confidence level)

p = estimated proportion of households with a particular characteristic (use 0.5 for maximum variability if the exact proportion is unknown)

e = desired margin of error (expressed as a proportion)

$$n = \frac{N.Z^2.p(p-1)}{(N-1)e^2 + Z^2.p(p-1)}$$

The average household size and total number of households are provided at the district level, but it is not possible to access this data at the village and neighborhood level. Therefore, the average household size for each settlement has been estimated by extrapolating from district-level data.

The total population of the 48 settlements within 0-500 meters of the 38 stations is 72,413. Using the average household size in the district, the total number of households is estimated to be 21,619. When this value (N=21,619) is applied in the formula, the sample size is calculated to be approximately between 384 and 386. To address the issue of areas with low population counts having a sample size of 0, adjustments were made by reallocating samples from high-population areas to low-population areas without changing the overall sample size.

The details of the procedures described in this paragraph can be reviewed through Table 97.

Table 97. Settlements around the stations and sampling size

	Province	District	Settlement	Station	Population (2024)	Average Household Size of the District (2024)	Number of Households	% of total number of households	Distribution within sampling	Number of completed household questionnaire
1	Sivas	Divriği	Gezey	Dazlak	18	3.14	6	0	**2**	**0**
2	Sivas	Divriği	Güllübağ	Güllübağ	771	3.14	246	1	**4**	**5**
3	Erzincan	Kemah	Eriç	Eriç	40	2.16	19	0	**2**	**2**
4	Erzincan	Kemah	Çarşı	Kemah	1,106	2.16	512	2	**9**	**11**
5	Erzincan	Kemah	Alpköy	Alp	67	2.16	31	0	**2**	**1**
6	Erzincan	Kemah	Akyünlü	Dumanlı	39	2.16	18	0	**2**	**0**
7	Erzincan	Central	Çarşı	Erzincan	2,512	2.92	860	4	**15**	**16**
8	Erzincan	Üzümlü	Büyük Kadağan	Altınbaşak	134	3	45	0	**2**	**2**
9	Erzincan	Üzümlü	Fırat	Altınbaşak	225	3	75	0	**2**	**2**
10	Erzincan	Üzümlü	İstasyon	Altınbaşak	276	3	92	0	**2**	**2**
11	Erzincan	Üzümlü	Küçük Kadağan	Altınbaşak	242	3	81	0	**2**	**2**
12	Erzincan	Üzümlü	Pınarbaşı	Altınbaşak	514	3	171	1	**2**	**2**
13	Erzincan	Üzümlü	Süleymanlı	Altınbaşak	425	3	142	1	**2**	**2**
14	Erzincan	Üzümlü	Avcılar	Tanyeri	142	3	47	0	**2**	**2**
15	Tunceli	Pülümür	Yarbaşı	Geçit	48	2.33	21	0	**2**	**0**
16	Erzincan	Üzümlü	Bağlar	Demirkapı	84	3	28	0	**2**	**1**
17	Erzincan	Tercan	Kargın	Altınkent	2,131	3.06	696	3	**4**	**3**
18	Erzincan	Tercan	Akşemsettin	Mercan	651	3.06	213	1	**3**	**4**
19	Erzincan	Tercan	Atatürk	Mercan	2,443	3.06	798	4	**5**	**5**
20	Erzincan	Tercan	Camiikebir	Çadırkaya	692	3.06	226	1	**3**	**3**
21	Erzincan	Tercan	Gözeler	Çadırkaya	424	3.06	139	1	**3**	**0**
22	Erzincan	Tercan	Yeni	Çadırkaya	541	3.06	177	1	**3**	**0**
23	Erzincan	Çayırlı	Çataksu	Erbaş	165	2.99	55	0	**2**	**1**
24	Erzurum	Aşkale	Saptıran	Saptıran	148	3.36	44	0	**2**	**3**
25	Erzurum	Aşkale	Üç Mart	Aşkale	483	3.36	144	1	**3**	**3**

	Province	District	Settlement	Station	Population (2024)	Average Household Size of the District (2024)	Number of Households	% of total number of households	Distribution within sampling	Number of completed household questionnaire
26	Erzurum	Aşkale	İstasyon	Aşkale	2,027	3.36	603	3	**10**	**11**
27	Erzurum	Aşkale	Kandilli	Kandilli	894	3.36	266	1	**4**	**4**
28	Erzurum	Aziziye	Çiğdemli	Çiçekli	475	3.51	135	1	**3**	**0**
29	Erzurum	Aziziye	Ilıca	Kaplıca(Ilıca)	8,002	3.51	2,280	11	**43**	**49**
30	Erzurum	Yakutiye	Ömer Nasuhi Bilmen	Erzurum	29,254	3.44	8,504	40	**134**	**132**
31	Erzurum	Palandöken	Uzunahmet	Uzunahmet	165	3.7	45	0	**2**	**0**
32	Erzurum	Pasinler	Çöğender	Alvar	559	3.8	147	1	**3**	**3**
33	Erzurum	Pasinler	Kethuda	Hasankale	866	3.8	228	1	**4**	**3**
34	Erzurum	Köprüköy	Şehitler	Köprüköy	1,033	4.01	258	1	**5**	**5**
35	Erzurum	Horasan	Karaçuha	Karaçuha	59	3.88	15	0	**2**	**2**
36	Erzurum	Horasan	Esentepe	Horasan	841	3.88	217	1	**4**	**5**
37	Erzurum	Horasan	Hızırilyas	Hızır İlyas	314	3.88	81	0	**2**	**2**
38	Kars	Sarıkamış	Süngütaş	Süngütaşı	126	3.79	33	0	**2**	**2**
39	Kars	Sarıkamış	Sırbasan	Soğanlı	150	3.79	40	0	**2**	**2**
40	Kars	Sarıkamış	İstasyon	Sarıkamış	1,161	3.79	306	1	**5**	**5**
41	Kars	Selim	Köprübaşı	Selim	574	3.91	147	1	**3**	**3**
42	Kars	Selim	Benliahmet	Benliahmet	645	3.91	165	1	**3**	**4**
43	Kars	Central	Cumhuriyet	Kars	7,335	3.37	2,177	10	**25**	**27**
44	Kars	Central	Hafızpaşa	Kars	2,581	3.37	766	4	**10**	**10**
45	Kars	Arpaçay	Güvercin	Güvercin	306	3.26	94	0	**9**	**10**
46	Kars	Arpaçay	Taşbaşı	Taşbaşı	188	3.26	58	0	**9**	**12**
47	Ardahan	Çıldır	Yukarıcambaz	Canbaz	329	3.14	105	0	**9**	**9**
48	Ardahan	Çıldır	Aşağıcambaz	Canbaz	208	3.14	66	0	**9**	**11**
			Total		**72,413**		**21,619**	**100**	**≅384**	**383**

Table 98. Mukhtar Survey around the stations and result of the interview

	Province	District	Settlement	Station	Result of the Interview
1	Sivas	Divriği	Gezey	Dazlak	Completed
2	Sivas	Divriği	Güllübağ	Güllübağ	Completed
3	Erzincan	Kemah	Eriç	Eriç	Completed
4	Erzincan	Kemah	Çarşı	Kemah	Completed
5	Erzincan	Kemah	Alpköy	Alp	Completed
6	Erzincan	Kemah	Akyünlü	Dumanlı	Completed
7	Erzincan	Central	Çarşı	Erzincan	Refused
8	Erzincan	Üzümlü	Büyük Kadağan	Altınbaşak	Completed
9	Erzincan	Üzümlü	Fırat	Altınbaşak	Completed
10	Erzincan	Üzümlü	İstasyon	Altınbaşak	Completed
11	Erzincan	Üzümlü	Küçük Kadağan	Altınbaşak	Completed
12	Erzincan	Üzümlü	Pınarbaşı	Altınbaşak	Completed
13	Erzincan	Üzümlü	Süleymanlı	Altınbaşak	Completed
14	Erzincan	Üzümlü	Avcılar	Tanyeri	Completed
15	Tunceli	Pülümür	Yarbaşı	Geçit	Completed
16	Erzincan	Üzümlü	Bağlar	Demirkapı	Refused
17	Erzincan	Tercan	Kargın	Altınkent	Completed
18	Erzincan	Tercan	Akşemsettin	Mercan	Completed
19	Erzincan	Tercan	Atatürk	Mercan	Completed
20	Erzincan	Tercan	Camiikebir	Çadırkaya	Completed
21	Erzincan	Tercan	Gözeler	Çadırkaya	Completed
22	Erzincan	Tercan	Yeni	Çadırkaya	Completed
23	Erzincan	Çayırlı	Çataksu	Erbaş	Completed
24	Erzurum	Aşkale	Saptıran	Saptıran	Completed
25	Erzurum	Aşkale	Üç Mart	Aşkale	Completed
26	Erzurum	Aşkale	İstasyon	Aşkale	Completed
27	Erzurum	Aşkale	Kandilli	Kandilli	Completed
28	Erzurum	Aziziye	Çiğdemli	Çiçekli	Completed

	Province	District	Settlement	Station	Result of the Interview
29	Erzurum	Aziziye	Ilıca	Kaplıca(Ilıca)	Completed
30	Erzurum	Yakutiye	Ömer Nasuhi Bilmen	Erzurum	Completed
31	Erzurum	Palandöken	Uzunahmet	Uzunahmet	Refused
32	Erzurum	Pasinler	Çöğender	Alvar	Refused
33	Erzurum	Pasinler	Kethuda	Hasankale	Completed
34	Erzurum	Köprüköy	Şehitler	Köprüköy	Could not be accessed
35	Erzurum	Horasan	Karaçuha	Karaçuha	Completed
36	Erzurum	Horasan	Esentepe	Horasan	Completed
37	Erzurum	Horasan	Hızırilyas	Hızır İlyas	Completed
38	Kars	Sarıkamış	Süngütaş	Süngütaşı	Completed
39	Kars	Sarıkamış	Sırbasan	Soğanlı	Completed
40	Kars	Sarıkamış	İstasyon	Sarıkamış	Completed
41	Kars	Selim	Köprübaşı	Selim	Completed
42	Kars	Selim	Benliahmet	Benliahmet	Completed
43	Kars	Central	Cumhuriyet	Kars	Completed
44	Kars	Central	Hafızpaşa	Kars	Completed
45	Kars	Arpaçay	Güvercin	Güvercin	Completed
46	Kars	Arpaçay	Taşbaşı	Taşbaşı	Completed
47	Ardahan	Çıldır	Yukarıcambaz	Canbaz	Completed
48	Ardahan	Çıldır	Aşağıcambaz	Canbaz	Completed

Table 99. Mukhtar Survey around the railway line and result of the interview

#	Province	District	Settlement	Result of the Interview
1	Erzincan	Çayırlı	Doluca	Completed
2	Erzincan	İliç	Atma	Completed
3	Erzincan	İliç	Bağıştaş	Completed
4	Erzincan	İliç	Büyükköy	Completed
5	Erzincan	İliç	Çaltı	Completed
6	Erzincan	İliç	Çöpler	Refused
7	Erzincan	İliç	İbrahim Çeçen	Completed
8	Erzincan	İliç	Ortatepe	Completed
9	Erzincan	İliç	Abdullahpaşa	Completed
10	Erzincan	Kemah	Aşağı Gedik	Completed
11	Erzincan	Kemah	Atma	Completed
12	Erzincan	Kemah	Beklimçay	Completed
13	Erzincan	Kemah	Beşikli	Completed
14	Erzincan	Kemah	Dedek	Completed
15	Erzincan	Kemah	Göğüsbağı	Completed
16	Erzincan	Kemah	Kayabaşı	Completed
17	Erzincan	Kemah	Gökkaya	Refused
18	Erzincan	Kemah	Koçkar	Completed
19	Erzincan	Kemah	Koruyolu	Completed
20	Erzincan	Kemah	Mermerli	Refused
21	Erzincan	Kemah	Muratboynu	Completed
22	Erzincan	Kemah	Oğuz	Completed
23	Erzincan	Kemah	Olukpınar	Completed
24	Erzincan	Kemah	Yastıktepe	Completed
25	Erzincan	Central	Beşsaray	Completed
26	Erzincan	Central	Gani Efendi Çiftliği	Completed
27	Erzincan	Central	Oğlaktepe	Completed
28	Erzincan	Central	Pekmezli	Completed
29	Erzincan	Central	Cemal Gürsel	Completed
30	Erzincan	Central	Ulalar	Completed
31	Erzincan	Kemah	Küplü	Completed

#	Province	District	Settlement	Result of the Interview
32	Erzincan	Kemah	Sürek	Completed
33	Erzincan	Central	Barış	Completed
34	Erzincan	Central	Karadiğin	Completed
35	Erzincan	Central	Söğütözü	Completed
36	Erzincan	Kemah	Uluçinar	Refused
37	Erzincan	Kemah	Yahşılar	Completed
38	Erzincan	Central	Sancak	Completed
39	Erzincan	Central	Şehit Cengiz Topel	Refused
40	Erzincan	Central	Bayrak	Refused
41	Erzurum	Aşkale	Altıntaş	Completed
42	Erzurum	Aşkale	Dallı	Completed
43	Erzurum	Aşkale	Demirkıran	Refused
44	Erzurum	Aşkale	Karasu	Completed
45	Erzurum	Aşkale	Pırnakapan	Completed
46	Erzurum	Aşkale	Şafak	Completed
47	Erzurum	Aşkale	Sazlı	Refused
48	Erzurum	Aşkale	Taşağıl	Completed
49	Erzurum	Aşkale	Tecer	Refused
50	Erzurum	Aşkale	Topalçavuş	Completed
51	Erzurum	Aşkale	Küçükgeçit	Completed
52	Erzurum	Aşkale	Çayköy	Completed
53	Erzurum	Aşkale	Kıbrıs	Could not be accessed
54	Erzurum	Köprüköy	Yapağılı	Could not be accessed
55	Erzurum	Köprüköy	Yukarı Söğütlü	Refused
56	Erzurum	Palandöken	Nene Hatun	Completed
57	Erzurum	Yakutiye	Çiftlik	Completed
58	Erzurum	Yakutiye	İstasyon	Completed
59	Erzurum	Yakutiye	Müdürge(Çayırtepe)	Completed
60	Erzurum	Yakutiye	Soğukçermik(Soğucak)	Completed
61	Kars	Arpaçay	Çanaksu	Completed
62	Kars	Arpaçay	Aydıngün	Completed
63	Kars	Arpaçay	Doğruyol	Refused

#	Province	District	Settlement	Result of the Interview
64	Kars	Arpaçay	Göldalı	Refused
65	Kars	Arpaçay	Gönülalan	Completed
66	Kars	Arpaçay	Kakaç	Completed
67	Kars	Arpaçay	Kümbet	Completed
68	Kars	Arpaçay	Kuzgunlu	Completed
69	Kars	Arpaçay	Yenimahalle	Completed
70	Kars	Central	Aydınlıkevler	Completed
71	Kars	Central	Dikme	Could not be accessed
72	Kars	Central	Halitpaşa	Completed
73	Kars	Central	Karacaören	Could not be accessed
74	Kars	Central	Karadağ	Completed
75	Kars	Central	Ladikars(Kümbetli)	Could not be accessed
76	Kars	Central	Mezra	Could not be accessed
77	Kars	Central	Örnek	Completed
78	Kars	Central	Yeni Mahalle	Completed
79	Kars	Central	Paşaçayır	Completed
80	Kars	Sarıkamış	Çatak	Completed
81	Kars	Sarıkamış	Karaurgan	Refused
82	Kars	Sarıkamış	Sırataşlar	Completed
83	Kars	Sarıkamış	Yağbasan	Could not be accessed
84	Kars	Sarıkamış	Yenigazi	Completed
85	Kars	Selim	Çaybaşı	Could not be accessed
86	Kars	Selim	Çarşı	Completed
87	Kars	Selim	Cavlak	Completed
88	Kars	Selim	Cumhuriyet	Completed
89	Kars	Selim	Karaçayır	Completed
90	Kars	Selim	Aşağıkotanlı	Completed
91	Kars	Sarıkamış	Yeniköy	Refused
92	Kars	Selim	Yolgeçmez	Completed
93	Kars	Sarıkamış	Kurbançayır	Refused
94	Kars	Selim	Yukarıkotanlı	Completed
95	Kars	Sarıkamış	Tepe	Refused

#	Province	District	Settlement	Result of the Interview
96	Kars	Susuz	Çamçavuş	Completed
97	Kars	Susuz	Cumhuriyet	Completed
98	Kars	Susuz	Harmanlı	Refused
99	Kars	Susuz	Porsuklu	Completed
100	Kars	Susuz	Yolboyu	Completed
101	Erzincan	Tercan	Gökçe	Completed
102	Erzincan	Tercan	Köprübaşı	Completed
103	Erzincan	Tercan	Yeşilyayla	Completed
104	Erzincan	Üzümlü	Demirpınar	Completed
105	Erzincan	Üzümlü	Derebük	Completed
106	Erzincan	Üzümlü	Karakaya Koyu	Completed
107	Erzincan	Tercan	Sucuali	Refused
108	Erzincan	Tercan	Yollarüstü	Refused
109	Erzincan	Üzümlü	Pelitli	Refused
110	Erzincan	Üzümlü	Pişkidağ	Refused
111	Ardahan	Çıldır	Akçakale	Refused
112	Erzincan	Üzümlü	Denizdamı	Completed
113	Erzurum	Aziziye	Alaca	Completed
114	Erzurum	Aziziye	Atlıkonak	Completed
115	Erzurum	Horasan	Camii Kebir	Completed
116	Erzurum	Aziziye	Demirgeçit	Completed
117	Erzurum	Horasan	Dalbaşı	Completed
118	Erzurum	Pasinler	Alvar	Completed
119	Erzurum	Pasinler	Çakırtaş	Completed
120	Erzurum	Pasinler	Bahçelievler	Completed
121	Erzurum	Pasinler	Büyüktüy	Completed
122	Erzurum	Pasinler	Pusudere	Completed
123	Erzurum	Pasinler	Şehit Burak Karakoç	Refused
124	Erzurum	Pasinler	Yukarıdanişment	Completed
125	Erzurum	Pasinler	Paşabey	Completed
126	Sivas	Divriği	Kalealtı	Refused
127	Tunceli	Pülümür	Başkalecik	Refused

#	Province	District	Settlement	Result of the Interview
128	Erzurum	Horasan	Şerefiye	Completed
129	Erzurum	Pasinler	Ebsemce	Completed
130	Ardahan	Çıldır	Damlıca	Could not be accessed
131	Ardahan	Çıldır	Karakale	Could not be accessed
132	Erzurum	Horasan	Azap	Could not be accessed
133	Erzurum	Pasinler	Övenler	Could not be accessed
134	Sivas	Divriği	Aşağıhamam	Could not be accessed
135	Sivas	Divriği	Çobandurağı	Could not be accessed
136	Erzurum	Horasan	Çiftlik	Could not be accessed
137	Erzurum	Horasan	Bulgurlu	Could not be accessed
138	Erzurum	Pasinler	Üğümü	Could not be accessed
139	Tunceli	Pülümür	Dağyolu	Refused
140	Sivas	Divriği	Adatepe	Could not be accessed
141	Sivas	Divriği	Oyuktepe	Could not be accessed
142	Tunceli	Pülümür	Doğanpınar	Completed
143	Erzurum	Pasinler	Reşadiye	Refused
144	Erzurum	Horasan	İnönü	Refused

Table 100. Interviewed Stakeholders

	Province	District	Institution
1	Sivas	Divriği	Divriği Cemevi Cultural Center
2	Sivas	Divriği	Divriği Train Station Signaling and Electrification Chiefdom
3	Sivas	Divriği	Sivas Cumhuriyet University Divriği Nuri Demirağ Vocational School
4	Sivas	Divriği	Divriği Station
5	Sivas	Divriği	Divriği Municipality
6	Sivas	Divriği	Divriği Chamber of Agriculture
7	Sivas	Divriği	Divriği District Governorship
8	Sivas	Divriği	Divriği Village Services Union
9	Erzincan	Kemah	Kemah Municipality
10	Erzincan	Kemah	Kemah Social Assistance Association
11	Erzincan	Kemah	Kemah District Governorship
12	Erzincan	Kemah	Kemah Alevi Cultural Association Zeynal Karakoç Cem and Cultural Center
13	Erzincan	Kemah	Kemah District State Hospital
14	Erzincan	Central	Erzincan Governorship Social Solidarity and Aid Foundation
15	Erzincan	Central	Erzincan Municipality
16	Erzincan	Üzümlü	Üzümlü District Governorship
17	Erzincan	Üzümlü	Üzümlü Municipality
18	Erzincan	Üzümlü	Üzümlü Social Solidarity and Aid Foundation
19	Erzincan	Üzümlü	Üzümlü District National Education Directorate
20	Tunceli	Pülümür	Pülümür Municipality
21	Tunceli	Pülümür	Pülümür Beekeeping Cooperative
22	Erzincan	Tercan	Tercan District Agriculture Directorate
23	Erzincan	Tercan	Tercan District Governorship
24	Erzincan	Çayırlı	Çayırlı District Governorship Social Solidarity and Aid Foundation
25	Erzincan	Çayırlı	Çayırlı District Special Provincial Administration Directorate
26	Erzincan	Çayırlı	Çayırlı Sugar Beet Growers' Cooperative
27	Erzincan	Çayırlı	Çayırlı Municipality
28	Erzurum	Aşkale	Aşkale District National Education Directorate
29	Erzurum	Aşkale	Aşkale District Directorate of Planning and Urbanization
30	Erzurum	Aziziye	Aziziye District Governorship
31	Erzurum	Aziziye	Aziziye District Directorate of Agriculture and Forestry

	Province	District	Institution
32	Erzurum	Aziziye	Aziziye District National Education Directorate
33	Erzurum	Yakutiye	Northeast Anatolia Development Agency (KUDAKA)
34	Erzurum	Yakutiye	Erzurum Metropolitan Municipality
35	Erzurum	Yakutiye	Yakutiye District National Education Directorate
36	Erzurum	Yakutiye	Erzurum Eastern Anatolia Project (DAP) Regional Development Administration Presidency
37	Erzurum	Palandöken	Palandöken District Governorship
38	Erzurum	Pasinler	Pasinler District National Education Directorate
39	Erzurum	Pasinler	Pasinler District Governorship
40	Erzurum	Pasinler	Pasinler District Health Directorate
41	Erzurum	Köprüköy	Köprüköy District Directorate of Agriculture and Forestry
42	Erzurum	Köprüköy	Köprüköy District Governorship
43	Erzurum	Horasan	Horasan Municipality
44	Erzurum	Horasan	Horasan District National Education Directorate
45	Kars	Selim	Selim Social Solidarity and Aid Foundation
46	Kars	Selim	Selim District National Education Directorate
47	Kars	Selim	Selim Municipality
48	Kars	Selim	Selim Public Education Center
49	Kars	Sarıkamış	Sarıkamış Chamber of Agriculture
50	Kars	Sarıkamış	Sarıkamış District Directorate of Agriculture and Forestry
51	Kars	Sarıkamış	Sarıkamış District Governorship
52	Kars	Sarıkamış	Sarıkamış District Health Directorate
53	Kars	Sarıkamış	Sarıkamış Public Education Center
54	Kars	Central	Serhat Development Agency (SERKA)
55	Kars	Central	Kars Municipality
56	Kars	Arpaçay	Arpaçay Sugar Beet Cooperative
57	Kars	Arpaçay	Arpaçay Municipality
58	Kars	Arpaçay	Arpaçay Chamber of Agriculture Presidency
59	Ardahan	Çıldır	Çıldır Municipality
60	Ardahan	Çıldır	Çıldır Village Services Union
61	Ardahan	Çıldır	Çıldır Social Solidarity and Aid Association

Table 101. Completed Focus Group Meetings

#	Province	District	Focus Group Discussion
1	Sivas	Divriği	Divriği Alevi Focus Group
2	Sivas	Divriği	Divriği Women Entrepreneurs Focus Group, Hüma Hatun Street (Project Street)
3	Erzincan	Kemah	Kemah Student Focus Group
4	Erzincan	Tercan	Tercan Youth Focus Group
5	Erzincan	Üzümlü	Üzümlü Ahıska Turks Women Focus Group
6	Erzurum	Aşkale	Aşkale Women Focus Group
7	Erzurum	Pasinler	Pasinler Healthcare Workers Focus Group
8	Erzurum	Horasan	Horasan Women Focus Group
9	Kars	Selim	Selim Women Focus Group
10	Kars	Arpaçay	Arpaçay Beekeeper-Livestock Farmer-Farmer Focus Group
11	Ardahan	Çıldır	Çıldır Fishermen Focus Group

4.11.2.5 Limitations

First Phase of the Social Research (October-November 2023)

The elevated and mountainous terrain characteristics of the regions through which the route passes have brought about challenges in terms of accessibility. Therefore, work was not conducted in station areas where access via road is impossible.

The fact that the study was conducted in October and November meant that it was affected by the early onset of darkness. Consequently, activities such as taking photographs and visiting the fields were impossible after sunset and were deferred to the following day, leading to the closure of the field program during those hours.

Stakeholder meetings planned to take place at Erzurum Station, one of the main stops of the project, were disrupted due to interruptions in the duties and responsibilities of informative personnel.

Second Phase of the Social Research (March 2024)

The limitations have been explained under the following headings;

Heavy Winter Conditions: Between March 19 and 28, 2024 the weather conditions continued to be rainy in Sivas and Erzincan regions, and cold with snowfall in Erzurum, Kars, and Ardahan regions. The ice and snowfall made both road access difficult and extended travel times.

Difficult Road Conditions: The secondary roads connecting the rural settlements have soil, stabilized, and low-quality asphalt pavement characteristics. This situation, combined with the weather conditions, completely restricted access to some settlements. Due to this access problem, Divriği Gezey village in Sivas and Yarbaşı village in Pülümür, Tunceli could not be visited.

Insufficient Internet and Phone Coverage Network: In household and mukhtar (village head) surveys, face-to-face interviews conducted via online connection were supplemented with printed questionnaires in areas where internet connection was unavailable. This situation has caused some missing data.

Wrong phone number: During desk-based research, efforts were made to collect mukhtars' phone numbers from the internet. However, access to many mukhtars could not be achieved due to incorrect registered phone numbers, some correct phone numbers belonging to the previous term's mukhtar, or completely incorrect phone numbers. This situation resulted in the inability to conduct many mukhtar interviews planned to be conducted by phone.

Local Administrator Election Period: The local elections in Türkiye were held on March 31, 2024. Therefore, the period between March 19th and March 28th, when the research was conducted, coincided with the period of most intense election campaigns. This situation has led to many mukhtars, mayors, and relevant institutions being hesitant to participate in the interviews.

Ramadan Period: In the year 2024, the month of Ramadan started on March 11th and ended on April 9th. Hence, the period between March 19th and March 28th fell within the Ramadan period. The fatigue and sleep deprivation brought about by fasting have reduced the participation of household representatives who were planned to be interviewed in the research. In the Erzurum region, it is a local cultural practice for many households to stay awake from iftar until suhoor (pre-dawn meal) and sleep during the day. This has made it difficult to reach individuals for interviews before iftar. To overcome this issue, the study planned to be conducted in the Ömer Nasuhi Bilmen neighborhood resulted in the preference for crowded public areas such as coffeehouses and reading rooms in the city center after iftar. Therefore, the sample represented the city center rather than the neighborhood.

Table 102. Information about First Phase of Social Survey (October-November 2023)

#	Name of the facility	Km	Scope of the Project	Date	Current condition	Province	Scope of the survey	Key informant	Interviewees	Description of employee
1	*Hudut*	*1444+479*	*Out of the scope*	*Not visited*	*No information*	*Ardahan*	*Not visited*	*Not visited*	*Not visited*	*No employee*
2	Canbaz	1432+349	Within the scope	31.10.2023	Station	Ardahan	Visited	Railway Employee	Males	*There is no permanent employee. Responsible staff is assigned by the Kars 47th Branch of TCDD's Department of Railway Maintenance.*
3	Taşbaşı	1416+349	Within the scope	31.10.2023	Station	Kars	Visited	Railway Employee	Males	*There is no permanent employee. Responsible staff is assigned by the Kars 47th Branch of TCDD's Department of Railway Maintenance.*
4	Güvercin	1397+149	Within the scope	31.10.2023	Station	Kars	Visited	Railway Employee	Males	*There is no permanent employee. Responsible staff is assigned by the Kars 47th Branch of TCDD's Department of Railway Maintenance.*
5	*Kars Logistic Centre*	*No information*	*Additional study*	*17.10.2023*	*Logistic center*	*Kars*	*Visited*	*Railway Employee*	*Males*	*No information*
6	**Kars**	**1365+204**	Within the scope	**31.10.2023**	**Kars Main Station**	**Kars**	**Visited**	**Railway Employee**	**Males and Females**	**Both male and female** *No information*
7	*Kars*	*No information*	*Additional study*	*30.10.2023*	*BTK Junction*	*Kars*	*Visited*	*Railway Employee*	*Males*	*No employee*
8	*Kars*	*No information*	*Additional study*	*30.10.2023*	*Kars Main Station - BTK Junction*	*Kars*	*Visited*	*Railway Employee*	*Males*	*No employee*
9	*Kars*	*No information*	*Additional study*	*30.10.2023*	*Kars Central - Highways Overpass*	*Kars*	*Visited*	*Railway Employee*	*Males*	*No employee*
10	Dikme	1352+150	Within the scope	31.10.2023	Abandoned Stop / Station	Kars	Visited	No key informant	No key informant	No employee
11	Benli Ahmet	1340+550	Within the scope	31.10.2023	Station	Kars	Visited	No key informant	No key informant	No employee
12	Selim	1329+945	Within the scope	31.10.2023	Station	Kars	Visited	Consultation could not be realized	Consultation could not be realized	Consultation could not be realized
13	*Çatak*	*1319+875*	*Out of the scope*	*31.10.2023*	*Abandoned Stop / Station*	*Kars*	*Visited*	*No key informant*	*No key informant*	*No employee*
14	Sarıkamış	1305+615	Within the scope	31.10.2023	Station	Kars	Visited	Railway Employee	Males and a female	Both male and female 7 staffs
15	*Aşit*	*1293+750*	*Out of the scope*	*17.10.2023*	*Abandoned Stop / Station*	*Kars*	*Visited*	*Railway Employee*	*Males*	*Only male*
16	Soğanlı	1288+850	Within the scope	Not visited	Station	Kars	Not visited	No key informant	No key informant	No employee
17	Topdağı	1273+531	Within the scope	31.10.2023	Station	Kars	Visited	Railway Employee	Males	Both male and female 5 staffs
18	Süngütaşı	1260+280	Within the scope	31.10.2023	Station	Kars	Visited	Railway Employee	Males	Both male and female 6 staffs
19	Hızır İlyas	1248+408	Within the scope	Not visited	Abandoned Stop / Station	Erzurum	Not visited	No key informant	No key informant	No employee
20	Horasan	1233+879	Within the scope	01.11.2023	Station	Erzurum	Visited	Railway Employee	Males	Only male 4 staffs
21	Karaçuha	1219+943	Within the scope	01.11.2023	Abandoned Stop / Station	Erzurum	Visited	No key informant	No key informant	No employee
22	Köprüköy	1206+485	Within the scope	01.11.2023	Station	Erzurum	Visited	Railway Employee	Males	Only male 4 staffs
23	Hasankale	1189+298	Within the scope	01.11.2023	Station	Erzurum	Visited	Railway Employee	Males	Only male 5 staffs
24	Alvar	1180+762	Within the scope	Not visited	Abandoned Stop / Station	Erzurum	Not visited	No key informant	No key informant	No employee
25	Uzun Ahmet	1167+219	Within the scope	01.11.2023	Station	Erzurum	Visited	Railway Employee	Males	Only male 4 staffs
26	**Erzurum**	**1148+672**	Within the scope	**01.11.2023**	**Main station**	**Erzurum**	**Visited**	**Railway Employee**	**Males**	**Both male and female** *No information*
27	*Palandöken*	*No information*	*Out of the scope*	*Not visited*	*Logistic center*	*Erzurum*	*Not visited*	*Not visited*	*Not visited*	*No information*
28	Kaplıca(Ilıca)	1133+496	Within the scope	01.11.2023	Station	Erzurum	Visited	Railway Employee	Males and a female	Both male and female 6 staffs
29	Çiçekli	1124+500	Within the scope	Not visited	Abandoned Stop / Station	Erzurum	Not visited	No key informant	No key informant	No employee
30	Kandilli	1108+989	Within the scope	01.11.2023	Station	Erzurum	Visited	Railway Employee	Males	Only male 6 staffs
31	Aşkale	1093+221	Within the scope	02.11.2023	Station	Erzurum	Visited	Railway Employee	Males and a female	Both male and female
32	Saptıran	1080+463	Within the scope	Not visited	Abandoned Stop / Station	Erzurum	Not visited	No key informant	No key informant	No employee
33	*Karasu*	*1061+852*	*Out of the scope*	*Not visited*	*Station*	*Erzurum*	*Not visited*	*No key informant*	*No key informant*	*No employee*
34	Erbaş	1047+637	Within the scope	Not visited	Station	Erzincan	Not visited	No key informant	No key informant	No employee
35	Çadırkaya	1033+998	Within the scope	02.11.2023	Station	Erzincan	Visited	Railway Employee	Males	Only male

#	Name of the facility	Km	Scope of the Project	Date	Current condition	Province	Scope of the survey	Key informant	Interviewees	Description of employee
										6 staffs
36	Mercan	1021+812	Within the scope	02.11.2023	Station	Erzincan	Visited	Railway Employee	Males	Only male 8 staffs
37	Altınkent	1011+460	Within the scope	Not visited	Abandoned Stop / Station	Erzincan	Visited	No key informant	No key informant	No employee
38	Demirkapı	998+831	Within the scope	02.11.2023	Station	Erzincan	Visited	Railway Employee	Males	Only male 7 staffs
39	Geçit	981+650	Within the scope	02.11.2023	Station	Tunceli	Visited	No key informant	No key informant	No employee
40	Tanyeri	966+648	Within the scope	02.11.2023	Station	Erzincan	Visited	Railway Employee	Males	Only male 10 staffs
41	Altınbaşak	951+338	Within the scope	Not visited	Abandoned Stop / Station	Erzincan	Not visited	No key informant	No key informant	No employee
42	**Erzincan**	**933+784**	Within the scope	**02.11.2023**	**Main station**	**Erzincan**	**Visited**	**Railway Employee**	**Males**	**Both male and female**
43	Dumanlı	921+002	Within the scope	Not visited	Abandoned Stop / Station	Erzincan	Not visited	No key informant	No key informant	No employee
44	Alp	901+798	Within the scope	03.11.2023	Station	Erzincan	Visited	Railway Employee	Males	Only male 7 staffs
45	Kemah	885+765	Within the scope	03.11.2023	Station	Erzincan	Visited	Railway Employee	Males and a female	Both male and female 9 staffs
46	Eriç	868+650	Within the scope	03.11.2023	Station	Erzincan	Visited	Railway Employee	Males	Only male 6 staffs
47	Güllübağ	851+457	Within the scope	Not visited	Station	Sivas	Not visited	No key informant	No key informant	No employee
48	İliç	832+434	Within the scope	03.11.2023	Station	Erzincan	Visited	Railway Employee	Males	Only male 10 staffs
49	Bağıştaş	821+802	Within the scope	03.11.2023	Station	Erzincan	Visited	Railway Employee	Males and a female	Both male and female 6 staffs
50	Çaltı	804+599	Within the scope	03.11.2023	Station	Erzincan	Visited	Railway Employee	Males	Both male and female 10 staffs
51	Dazlak	793+500	Within the scope	Not visited	Abandoned Stop / Station	Sivas	Not visited	No key informant	No key informant	No employee
52	*Divriği*	*777+708*	*Out of the scope*	*Not visited*	*Station*	*Sivas*	*Not visited*	*Not visited*	*Not visited*	*No information*

4.11.2.6 Impact Assessment

The standards and subheadings that provide the basis for the evaluated data are as follows;

ESS1 Assessment and Management of Environmental and Social Risks and Impacts

- Economic displacement for individuals and businesses due to land acquisition.
- Potential effects on culturally and environmentally protected areas.
- Effects on disadvantaged and vulnerable groups.
- Risks to community health and safety during construction.
- Risks related to labor influx, with a specific focus on women and girls in communities.
- Discrimination concerns access to project benefits for certain groups.
- Impacts on the health, safety, and well-being of workers.
- Risks to sites with cultural heritage importance.
- Ecosystem services

ESS2 Labor and Working Conditions

- All categories of workers, encompassing full-time employees, part-time workers, interns, and apprentices.
- The legislation is comprehensive and applicable across various sectors and industries.
- Non-discrimination
- Freedom of association
- Minimum employment age and wage
- Child and forced labor
- Occupational health and safety
- Dispute resolution
- Increased labor influx in a community, leading to risks such as gender-based violence (GBV) and harassment.

ESS4 Community Health and Safety

- Identification, evaluation, and management risks and impacts to the health and safety of the affected communities
- Assessment of traffic and road safety risks and propose measures to manage these risks
- Engagement with the community on safety matters and ensure they are informed about the risks and measures in place
- Engagement with affected communities and other stakeholders throughout the project lifecycle
- Informative actions for affected communities about risks and proposed measures

ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

- To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives.
- To avoid forced eviction.
- To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement cost; and (b) assisting displaced persons in their efforts to improve, or at least restore their livelihoods and living standards in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.
- To improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure.
- To conceive and execute resettlement activities as sustainable development programs, providing sufficient investment resources to enable displaced persons to benefit directly from the project, as the nature of the project may warrant

ESS10 Stakeholder Engagement and Information Disclosure

- Identification and analysis of stakeholders
- Parties affected by the project
- Other interested parties
- Individuals or groups facing disadvantages/vulnerabilities
- Timing of the stakeholder engagement program
- Strategy for information disclosure and consultation
- To incorporate the views of disadvantaged/vulnerable groups
- Grievance redress mechanism
- Monitoring and reporting

4.12 Baseline Conditions

The existing railway, which will be rehabilitated as part of the project, passes through a total of six provinces which are respectively Sivas, Tunceli, Erzincan, Erzurum, Kars, and Ardahan.

4.12.1 Population

According to the results of the household survey, the total population of the interviewed settlements around the stations is 1,622. Of this population, 804 are female and 818 are male. The average household size is 4.2.

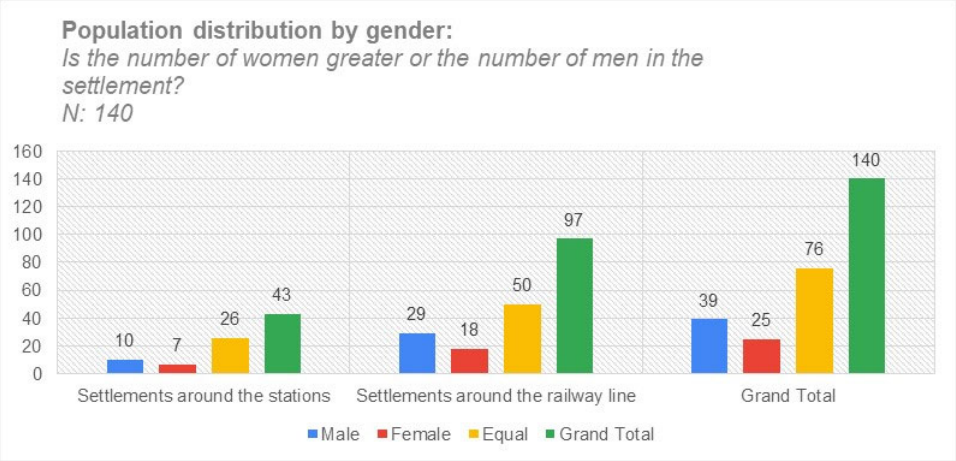
In the mukhtar survey, the total number of households in the settlements was reported as approximately 29,805. Of this population, approximately 16,512 households reside in settlements around the railway line, while the remaining approximately 13,293 households are around the stations. The reason for the uncertainty of the result is that the number of households in a settlement is given in ranges, and also, a mukhtar may not have precise information on these matters.

Therefore, it can be said that dense population areas are concentrated around the station areas. As a result, population movements such as migration from rural areas to urban areas, are more likely to be observed in settlements around the stations rather than in settlements around the railway line.

According to the gender distribution of the population in the settlements around of the railway line, there are 25 settlements where the number of females is higher, 39 settlements where the number of males is higher, and 76 settlements where the number of females and males are equal.

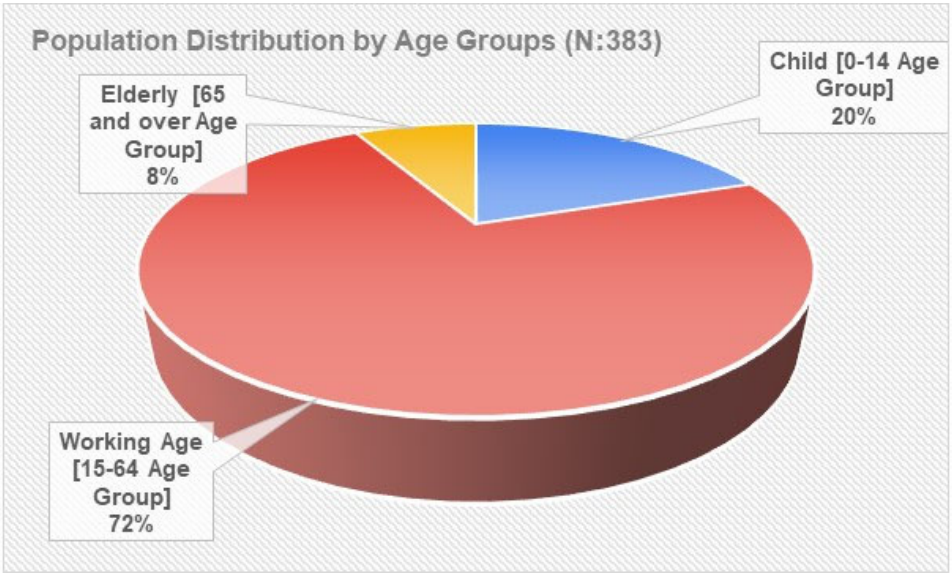
Both in the household survey and in the mukhtar survey, the numbers of females and males are generally equal (see Figure 93).

Figure 93: Gender distribution, as adapted from the mukhtar survey



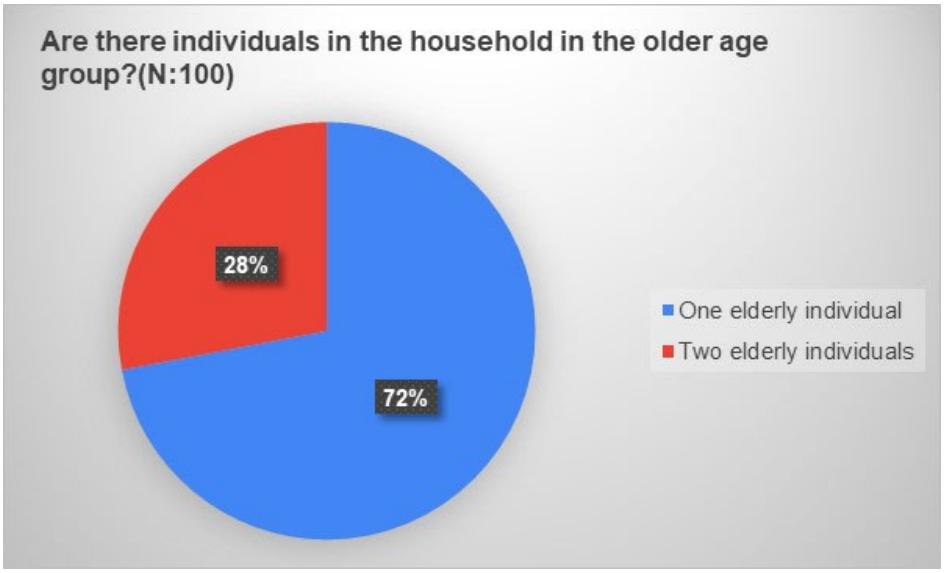
Within the scope of household survey, the distribution of the population by age groups is as follows: 318 individuals are in the 0-14 age group (children), 1,176 individuals are in the 15-64 age group (working age), and 128 individuals are aged 65 and above (elderly) (see Figure 94).

Figure 94: Age distribution, as adapted from the household survey



In parallel, 100 out of 383 surveys answered "yes" to the question "Are there individuals in the household in the older age group?" In 72 of these households, there is 1 elderly person, and in 28 households, there are 2 elderly individuals. The overall ratio of elderly individuals is 8% (see Figure 95).

Figure 95: Elderly individuals, as adapted from the household survey



In the mukhtar survey, it was observed that settlements are mostly populated by middle-aged, young-middle-aged, and young populations (see Table 103).

Table 103: Age distribution, as adapted from the mukhtar survey

Age Groups	Settlements around the stations	%	Settlements around the railway line	%	Number of interviews	%
Young	9	**21**	32	**33**	41	**29**
Middle age	4	**9**	25	**26**	29	**21**
Not another age group	5	**12**	7	**7**	12	**9**
Middle age	24	**56**	54	**56**	78	**56**
Elderly	4	**9**	13	**13**	17	**12**
Not another age group	20	**47**	41	**42**	61	**44**
Elderly	**10**	**23**	**11**	**11**	**21**	**15**
Not another age group	10	**23**	11	**11**	21	**15**
Number of interviews	**43**	**100**	**97**	**100**	**140**	**100**

When both the household and mukhtar surveys are considered together, the majority of the population is in the middle and upper-middle age groups, with a large percentage of them being of working age.

4.12.1.1 Youth and Elderly

Although there is no significant difference in the distribution of the population by age group, the young age group is more concentrated in settlements along the railway line rather than around the station. This situation is consistent with the emphasis on issues such as "limited areas for young people to socialize" and "lack of social and cultural activity areas" that emerge when discussing the region's problems (see Figure 96 and Table 104).

Figure 96: Opinions on the groups benefiting from the project, as adapted from the household survey

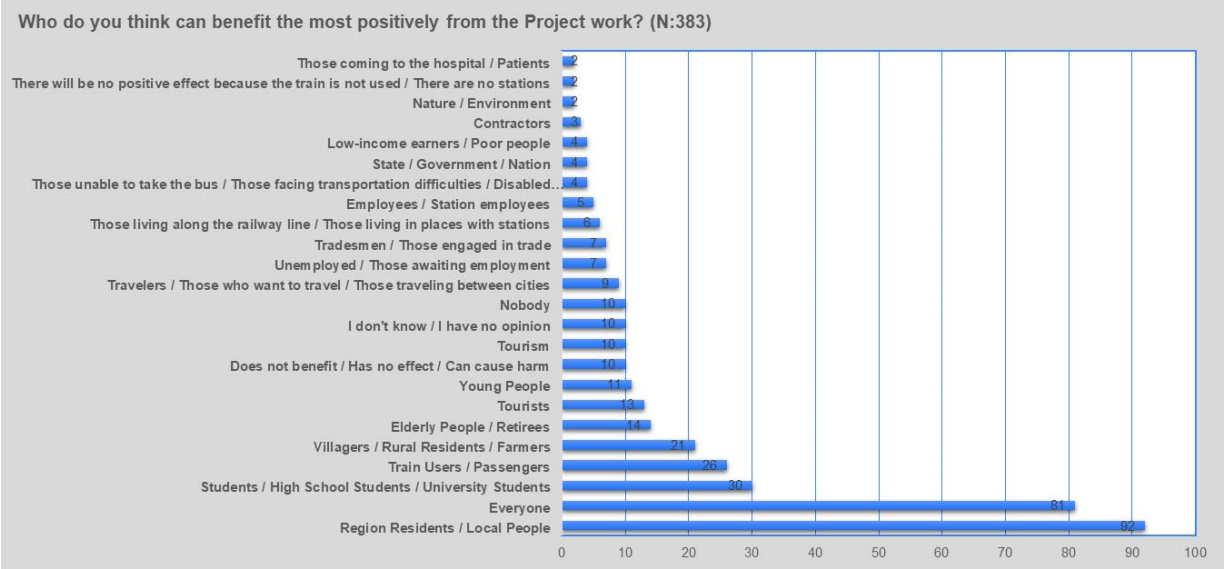


Table 104: Who can benefit the most positively from the project activities? as adapted from the household survey

Answer	%
Region People / Local People / Native People	24
Everyone	21
Students / High School Students / University Students	8
Train users / Passengers	7
Villagers / Rural Dwellers / Farmers	5
Elderly / Retirees	4
Tourists	3
Youths	3
I do not know / I have no opinion	3
Does not provide benefit / Has no effect / Can cause harm	3
Nobody	3
Tourism	3
Travelers / Those who want to travel / Inter-city travelers	2
Merchants / Those engaged in trade	2
Unemployed / Those awaiting employment	2
Residents along the railway line / Residents in places with stations	2
Workers / Station workers	1
Low-income individuals / Those with low income / The poor	1
State / Government / Nation	1
Those unable to take the bus / Those experiencing transportation problems / Disabled individuals	1
Contractors	1
Nature / Environment	1
Those coming to the hospital / Patients	1
It will not have a positive effect because the train is not used / Because there is no station.	1
Number of interviews	**383**

The stakeholder views compiled regarding the effects of the project on the migration, students, and youth are as follows. The notes during the interview have been directly transcribed using the quotation method.

- Erzincan, Üzümlü, Üzümlü Social Solidarity and Aid Foundation: "Improving train transportation can be an important factor for students traveling out of the province, those going to the hospital, and individuals receiving social assistance who need to pay for transportation."
- Erzurum, Horasan, Horasan Municipality: "Passing through the city is very risky; accidents occur at level crossings. There are three level crossings in Horasan, and accidents occur from time to time. Passing very close to schools is also an additional risk for students."
- Kars, Arpaçay, Arpaçay Chamber of Agriculture Presidency: "Lake Çıldır is a treasure for us, but the railway line does not continue to here. If there was a station in Çıldır, it would have a very positive contribution in terms of tourism. Additionally, university students going to Kars pay 120 TL round trip by bus, but there is a train passing through Akyaka, and the round trip is 20 TL."

For the question "How many people are there who are elderly and live alone / are female household heads?" within scope of mukhtar survey, since valid numerical data could not be obtained, the answers for this disadvantaged group were analyzed as "Yes", "No", and "No idea". According to this, there are female household heads living alone in 115 out of 140 settlements.

Although the elderly was not emphasized as much among the disadvantaged groups in stakeholder meetings, some stakeholder meetings did address the issues of the elderly in the region.

- Erzincan, Kemah, Alevi Cultural Association Kemah Zeynal Karakoç Cem and Cultural Center: "The train is frequently used, but since ticket sales started only online, especially for the elderly, it has become difficult to use the train."
- Kars, Selim, Selim Public Education Center: "Increasing the speed and comfort of the train would free people from being dependent on the highway. Especially as one gets older, it becomes difficult to travel by bus without taking breaks. The train is more comfortable in this regard, but the train journey also takes a long time. Additionally, if the stops become active, its usage will increase even more. It is difficult to take breaks on the bus, but on the train, we can get up and walk around, use the restroom whenever we want."

One of the most expressed regional issues is transportation. In city centers, transportation issues are more related to traffic congestion and overcrowding of public transport vehicles, while in district centers, neighborhoods, or villages, transportation problems refer to the insufficient number of transportation vehicles, infrequent service, and roads physically unsuitable for a safe journey.

The views on young people and students in focus group meetings can be summarized as follows:

Location: Tercan Teachers' Lodge Cafeteria - Tercan/Erzincan Participant Information: 2 female, 1 male - student/youth

What are the most important problems in the region for students/youth?

Attendance 3: Transportation.

Attendance 1: Transportation. For example, I do not have a direct bus from here to Trabzon. I have to go to Erzurum or Erzincan and transfer from there.

Attendance 1: There are no social areas at all. There are a few places. We have one café, for example. There are no activities.

Location: Pasinler District Health Directorate - Pasinler/Erzurum Participant Information: 2 female, 1 male

What are the most important problems in the region for young healthcare workers?

Attendance 2: It's a very small place. There's nothing here. If we need anything, even the smallest thing, we have to go to the center. We try to do our grocery shopping from the center.
Attendance 3: There are no social areas. Not even a café to go to.

Attendance 1: Transportation is also a problem. It's especially harder in winter.

The views on elderly people from the focus group meetings can be summarized as follows:

Location: Erzincan Binali Yıldırım Kemah Vocational School – Kemah\Erzincan, Participant Information: 4 Male Students

How do you think the planned railway rehabilitation works will affect your region? Positively, negatively, why?

Attendance 1: Elderly people are constantly waiting in the cold. There is also no ticket counter here now. Tickets have to be bought online. The elderly cannot buy tickets online.

Attendance 3: When you buy a ticket on the train, they charge you twice as much.

Location: Selim Public Education Center Clothing Workshop - Kars, Selim

Participants: 6 Women

What are the most important problems for women in the region?

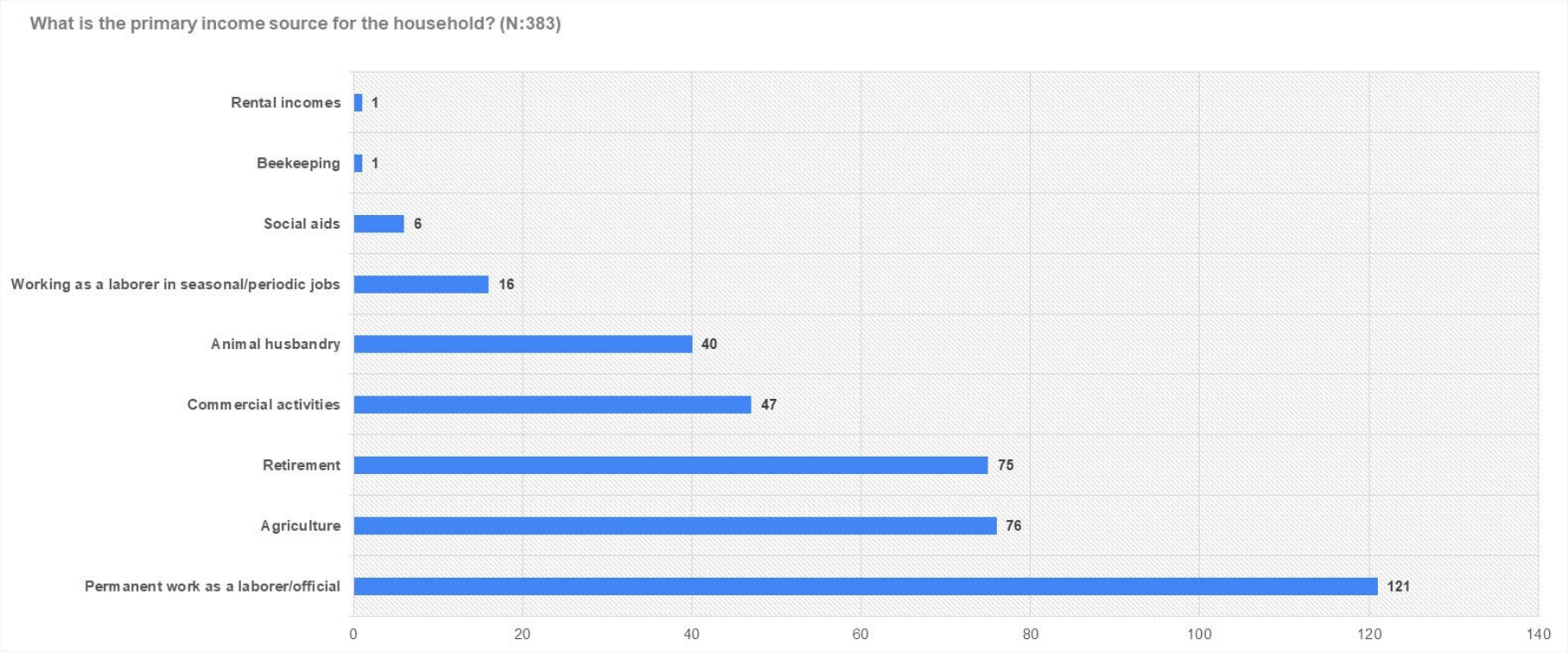
Attendance 2: I am a literacy teacher here. I have a student who is 65 years old. Women are very interested in courses. They just do not have enough opportunities.

4.12.2 Economic Activities

When the household survey asked about the sources of income, the most common primary source of income for households was income from regular jobs. This is followed by agricultural activities, retirement income, commercial activities, and livestock. Among the 205 households with a secondary source of income (see Table 105)Out of 383 households, 178 do not have a secondary source of income (see Table 106 and Figure 97). In 13 households, a tertiary source of income is found, which are as follows: Employment as a worker/official (6 households), retirement (5 households), commercial activities (1 household) and employment as a laborer in seasonal/periodic jobs (1 household).

Table 105: General distribution of income sources, as adapted from the household survey

Primary income source	Secondary income source
Employment as a worker/official	Commercial activities
Agriculture	Livestock
Retirement	Employment as a worker/official



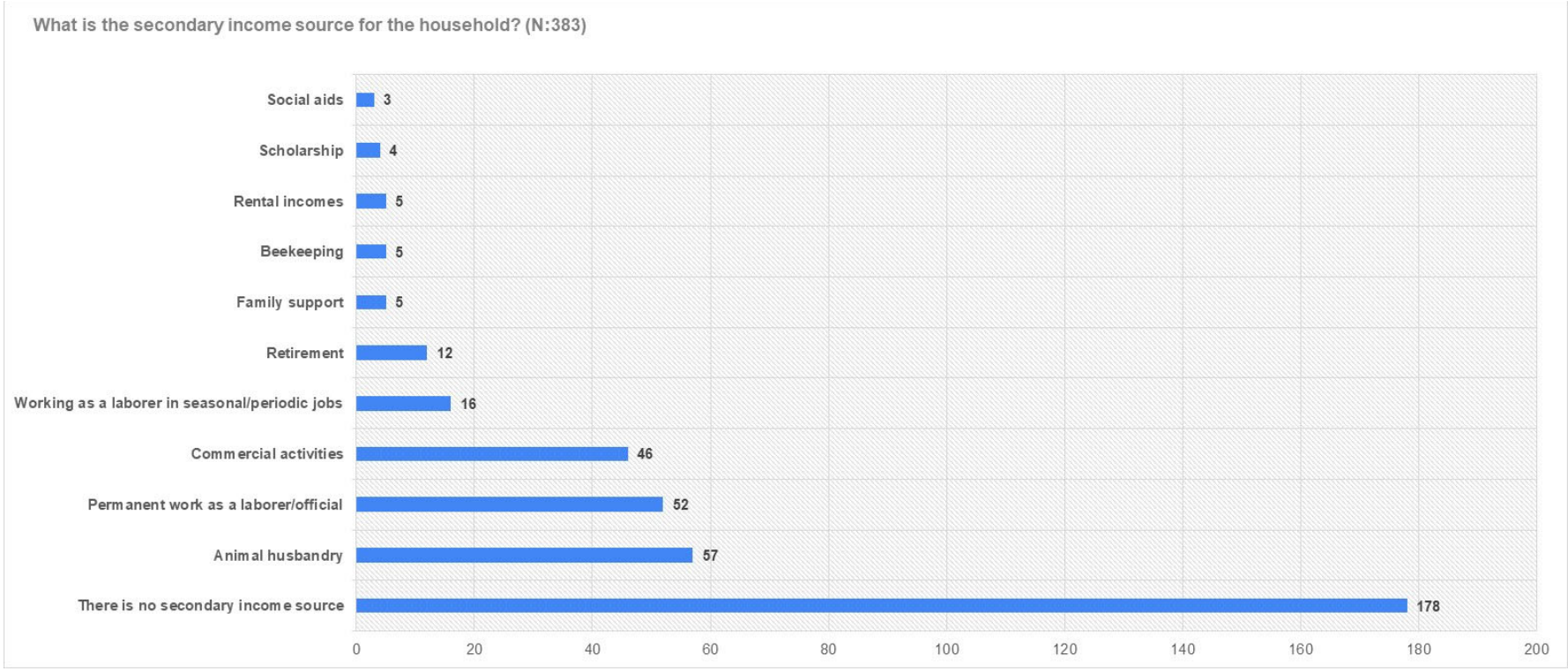


Figure 97: Primary and secondary income sources, as adapted from Household survey

Table 106: Primary and secondary income sources, as adapted from Household survey

	What is the secondary income source for the household?											
What is the primary source of income for the household?	**There is no secondary income source**	**Animal husbandry**	**Permanent work as a laborer/official**	**Commercial activities**	**Working as a laborer in seasonal/periodic jobs**	**Retirement**	**Family support**	**Beekeeping**	**Rental incomes**	**Scholarship**	**Social aids**	**Number of interviews**
Permanent work as a laborer/official	76	0	16	21	2	0	2	0	3	0	1	**121**
Agriculture	3	57	4	1	3	8	0	0	0	0	0	**76**
Retirement	33	0	19	12	3	1	1	4	0	1	1	**75**
Commercial activities	43	0	0	0	0	0	1	0	2	0	1	**47**
Animal husbandry	14	0	7	8	8	3	0	0	0	0	0	**40**
Working as a laborer in seasonal/periodic jobs	5	0	6	4	0	0	0	1	0	0	0	**16**
Social aids	3	0	0	0	0	0	0	0	0	3	0	**6**
Beekeeping	0	0	0	0	0	0	1	0	0	0	0	**1**
Rental incomes	1	0	0	0	0	0	0	0	0	0	0	**1**
Number of interviews	**178**	**57**	**52**	**46**	**16**	**12**	**5**	**5**	**5**	**4**	**3**	**383**

The results of the mukhtar survey indicate that the most important primary source of income in the settlements around the railway line is agriculture and animal husbandry. In the settlements around the station, agriculture, followed by retirement, are the top two primary sources of income. Among the 135 households with a secondary source of income (see Table 107). Secondary sources of income are predominantly agriculture for both groups, with retirement and working as a laborer/employee in permanent jobs coming in second. In 15 households, a tertiary source of income is found, which are as follows: Retirement (7 households), Beekeeping (3 households), employment as a worker/official (2 households), employment as a laborer in seasonal/periodic jobs (2 household), and livestock (1 household).

When all the data is considered together, the region's prominent sources of income are working as a laborer/employee in permanent jobs, retirement, and animal husbandry.

When the results of the household survey are examined, approximately 13% of the total population (199 individuals) are experiencing unemployment. Besides, the question " The number of people aged 15-64 who are looking for a job but cannot find one?" was answered as "yes" at a rate of 35%.

According to the definition of unemployment (People aged 15-64 who are looking for a job but cannot find one.), this represents individuals between the ages of 15-64 who are actively seeking work but unable to find it. Men and women between the ages of 15-64 make up 73% of the total population. The unemployment rate among men is higher than that among women. Specifically, while the unemployment rate among men between the ages of 15-64 is around 17%, the unemployment rate among women in the same age group is around 8%. This situation may be related to women not seeing themselves within the definition of unemployment, or more accurately, not actively seeking work.

Table 107: General distribution of income sources, as adapted from the mukhtar survey

Primary income source	Secondary income source
Agriculture	Livestock
Livestock	Employment as a worker/official
Retirement	Beekeeping



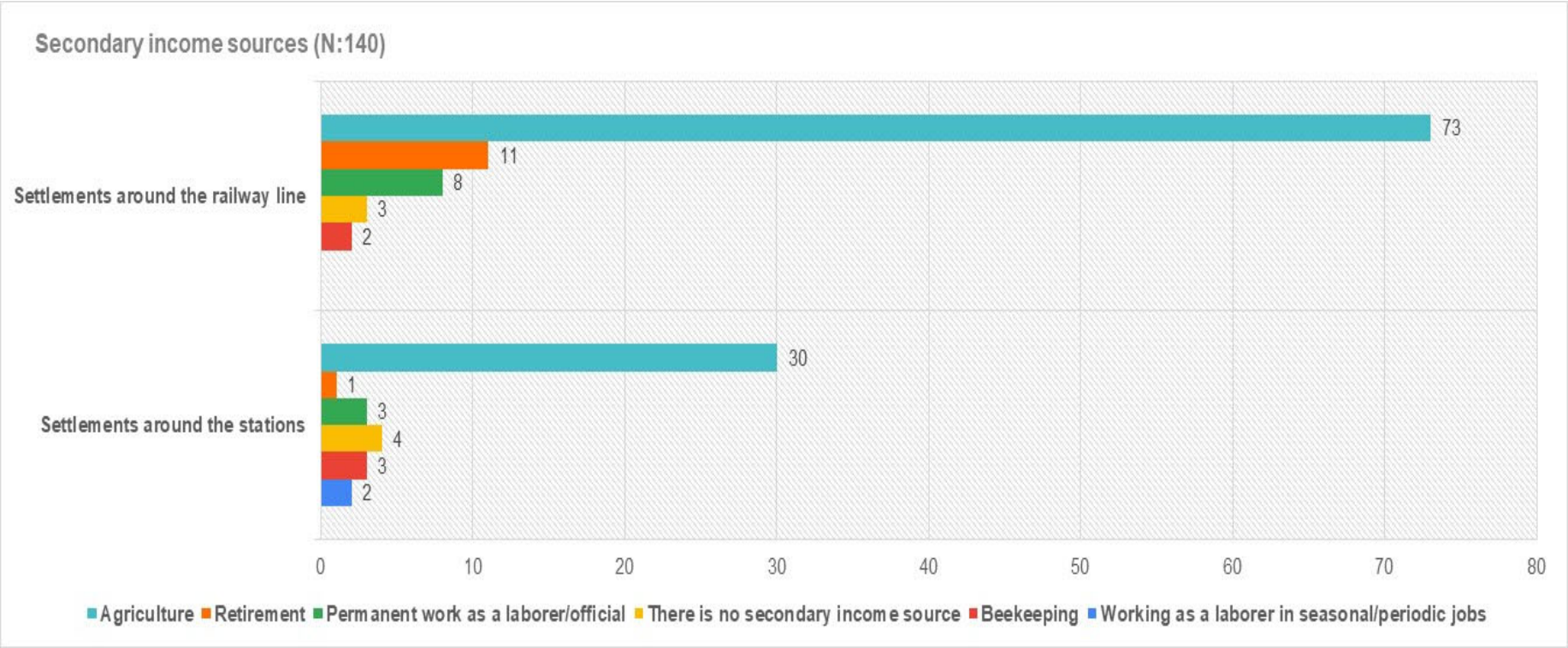


Figure 98: Primary and secondary income sources, as adapted from Mukhtar survey

Table 108: Primary and secondary income sources, as adapted from Mukhtar survey

	What is the secondary income source for the household?						
What is the primary source of income for the household?	**Beekeeping**	**Retirement**	**Animal husbandry**	**Working as a laborer in seasonal/periodic jobs**	**Permanent work as a laborer/official**	**There is no secondary income source**	**Number of interviews**
Agriculture	0	4	103	2	1	0	**110**
Animal husbandry	2	8	0	0	6	2	**18**

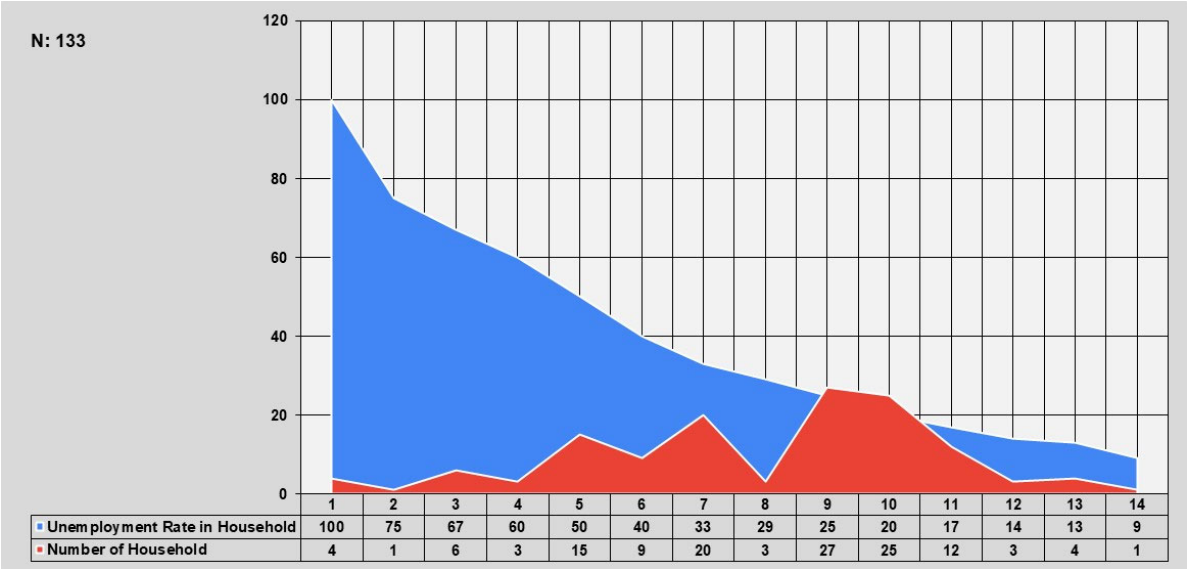
	What is the secondary income source for the household?						
What is the primary source of income for the household?	**Beekeeping**	**Retirement**	**Animal husbandry**	**Working as a laborer in seasonal/periodic jobs**	**Permanent work as a laborer/official**	**There is no secondary income source**	**Number of interviews**
Retirement	4	0	0	0	3	1	**8**
Permanent work as a laborer/official	1	0	0	0	0	2	**3**
Working as a laborer in seasonal/periodic jobs	0	0	0	0	1	0	**1**
Number of interviews	**7**	**12**	**103**	**2**	**11**	**5**	**140**

In 250 out of 383 households, no individuals were found who were looking for a job but could not find one. In 10 out of these 250 households, there are already no individuals in the 15-64 age range.

In the remaining 133 households, both men and women fitting this description were found. The total population in these 133 households is 659 people, and the number of individuals fitting the definition of unemployment is 199 (with an unemployment rate of approximately 30%).

When looking at the household level, it is observed that 5 households have an unemployment (number of people aged 15-64 who are looking for a job but cannot find one) rate between 75-100%, 24 households have a rate between 50-74%, 59 households have a rate between 25-49%, and 45 households have a rate between 9-24%. Therefore, the overall unemployment rate at the household level may be misleading (see Figure 99).

Figure 99: Unemployment rates based on Households, as adapted from Household survey



	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Unemployment Rate in Household	100	75	67	60	50	40	33	29	25	20	17	14	13	9
Number of Household	4	1	6	3	15	9	20	3	27	25	12	3	4	1

The mukhtar data does not provide a valid result regarding household unemployment. Inconsistent answers were obtained from mukhtars who could not accurately express the number of households, to the question "How many people in the settlement are experiencing unemployment (of working age and actively seeking work)?" Therefore, a clear unemployment rate could not be obtained for either the settlements around the stations or those around the railway line. Therefore, when roughly interpreted as either unemployment exists or does not exist, the following approximate result emerges.

4.12.2.1 Persons/Groups Experiencing Economic Hardship

4.12.2.1.1 Unemployment

In the household survey, in response to the question "Who can benefit the most positively from the project activities?" "Unemployed / Those seeking employment" has a score of 9%. Similarly, "Workers / Station employees" also has a low score among those who can benefit from the project activities (7%). This indicates that there is no clear view regarding whether the project will create employment or improve the work environment (see Figure 90 and Table 104).

While the responses to the question "What are the most important issues in your settlement?" vary widely in household data, economic difficulties, unemployment, employment, and insufficient job opportunities for women stand out. Particularly when unemployment is reported as the primary issue, employment is positioned as the secondary issue. Similarly, alongside investment deficiency, unemployment has been reported as the primary issue in many responses.

The main emphasis here is that while the lack of investment, limited job opportunities, and unemployment stand out as issues in the region, the projects along the railway line are not perceived as a solution to these problems.

The summary of other responses, presented in relation to the issue of unemployment, has been adapted from household data using Table 109.

In the mukhtar survey, among the 36 different responses provided regarding the most important issues in the region, unemployment ranks sixth. Unemployment has been expressed as a more significant issue in settlements around the stations. Unlike households, mukhtars have either brushed off regional issues as "no problems" or highlighted "infrastructure" problems.

In addition, there is almost no emphasis on unemployment among the people who will benefit the most from the project's benefits and those who will be most affected by its negative impacts.

Figure 100: Most important problems, as adapted from Mukhtar survey

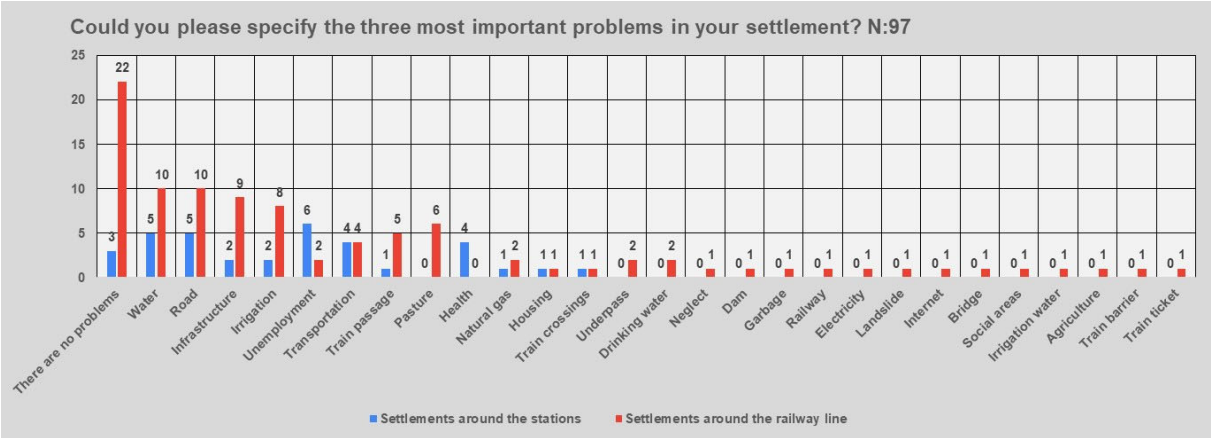


Table 109: Most important issues based on economic problems, as adapted from the household survey

	Unemployment	Lack of investment	Economy	Employment	Underdevelopment of the region	Insufficient job opportunities for women	Number of answers related to economic problems
There are no other problems	23	5	5	5	2	0	**40**
Infrastructure	12	1	0	0	0	0	**13**
Employment	11	0	0	0	0	0	**11**
Lack of investment	8	0	0	0	0	0	**8**
Lack of social areas	7	0	0	0	0	0	**7**
Road	4	0	0	0	0	1	**5**
Transportation	3	1	0	0	0	0	**4**
Agriculture	2	1	0	0	0	0	**3**
Health	2	0	0	0	0	0	**2**
Economy	2	0	0	0	0	0	**2**
Animal husbandry	2	0	0	0	0	0	**2**
Railway	2	0	0	0	0	0	**2**
Local government	1	0	1	0	0	0	**2**
Climate characteristics	1	0	0	0	0	0	**1**
Housing	1	0	0	0	0	0	**1**
Social structure	1	0	0	0	0	0	**1**
Migration	1	0	0	0	0	0	**1**
Conservatism	1	0	0	0	0	0	**1**
Production	1	0	0	0	0	0	**1**
Grazing	1	0	0	0	0	0	**1**
Social justice	1	0	0	0	0	0	**1**
Unemployment	0	1	1	0	0	0	**2**
Underdevelopment of the region	0	0	1	0	0	0	**1**
Number of answers related to economic problems	**87**	**9**	**8**	**5**	**2**	**1**	**112**

The stakeholder views compiled regarding the effects of the project on the migration, students, and youth are as follows. The notes during the interview have been directly transcribed using the quotation method.

- Erzurum, Yakutiye, Erzurum DAP Regional Development Administration Presidency: " It would benefit tourism, reduce external migration, and increase investment opportunities."
- Kars, Sarıkamış, Sarıkamış Chamber of Agriculture: " From an economic perspective, it would be positive as it would create employment. Additionally, if train services are frequent, longer breaks can be taken, which would contribute to tourism. Cafés could also be opened in railway buildings."
- Ardahan, Çıldır, Çıldır Municipality: "Our only expectation is to extend the Eastern Express here. It comes to Yukarıcambaz and unloads cargo every 15-20 days. It does not connect to any commercial activity here; it does not contribute. When there is no source of income, the young population migrates. Even having a station here would create employment."
- Ardahan, Çıldır, Çıldır Social Solidarity and Aid Association: "It has no benefit for the citizens, it does not provide employment. The BTK railway line also does not provide any benefit. If a logistics center is established, employment will be provided, and the migration of the young population will decrease, even prevented. People come with tours but stay in Kars, the hotels here remain empty. We need a station here, otherwise it will continue like this."
- Ardahan, Çıldır, Çıldır Village Services Union: "I do not think it will have a big impact. If there was a train and it operated daily, it would have positive effects, but I do not think that will happen either. If it passes through Çıldır, it will contribute to tourism, trade, and animal husbandry. There is a lot of migration outwards, and the young population is quite low. If there is employment, migration will decrease."

The views on employment, unemployment and female unemployment in focus group meetings can be summarized as follows:

Location: Selim Public Education Center Clothing Workshop - Kars, Selim

Participants: 6 Women

How are women affected by these works and their results?

Attendance 3: If our station opens, it will create job opportunities for women as well.

Attendance 6: The building next to the station could be used as a hotel. When the station is operational, the hotel will also thrive. This would also provide opportunities for women. Women in our district are entrepreneurial. If given the opportunity, women here are open to working.

Attendance 5: We are not passive actually. Our husbands also allow it. We also want to work.

What are the most important problems for women in the region?

Attendance 6: As Selim women, we are not passive at all. They think we are because we are in the East. We just do not have the opportunity.

Attendance 4: Men do not exert pressure. We also want to work but there are no job opportunities here, but they can be created if our station opens.

Attendance 3: Everything is not just about the house. We are improving ourselves.

Attendance 6: I feel very uncomfortable at home. I feel better when I go out, produce, and see my friends at the course.

Location: Sivas Divriği Women Entrepreneurs Focus Group, Hüma Hatun Street (Project Street)

Participants: 4 Women

What impact do you think the planned railway rehabilitation works will have? Positive or negative? Why?

Attendance 3: Tourism train directly affects us because Hüma Hatun Street is also included in the schedules. They first come to the Grand Mosque, then the mansions, then Hüma Hatun and Cam Teras. This way, of course, it has a direct relationship with us and has a significant contribution to us. We definitely support it in a positive direction. We have a problem. The disadvantage for us is that the train from Ankara does not stop in Divriği. Because the train from Ankara does not stop, those who go to Kars and come back are already finished, meaning their budgets are finished, they do not even want to travel. We have a request for it to stop on the way. We would be very happy if you could convey this because then it would contribute significantly to us. For example, if it passes here at 8, let it pass at 10. They can have their breakfast here and so on. Divriği is a bit neglected. Divriği is also the pearl of Sivas. We should revitalize Kemaliye. For example, Erzurum should also revive, Divriği should also revive. We all benefit from this.

Attendance 2: I agree with my friend. Our situation (*twelve female entrepreneurs*) is like that.

4.12.2.1.2 Social Aid Recipients

In the mukhtar survey, an attempt was made to reach economically disadvantaged groups by asking mukhtars, "How many people in the settlement rely on social assistance?" Although these social aids include items such as disability pensions and elderly pensions, those benefiting from the state's social assistance must be economically disadvantaged. Although the responses from the mukhtars do not express consistent numbers, it can be said that the number of people relying on social assistance in the settlements is approximately around 3,500. In only 20 out of 140 settlements, there are no households benefiting from social assistance (see Table 110).

Table 110: Distribution of Social Aid Users, as adapted from the mukhtar survey

Number of Social Aid Users	Settlements around the stations	Settlements around the railway line	Number of interviews
1	0	4	**4**
2	1	5	**6**
3	1	5	**6**
4	0	7	**7**
5	1	7	**8**
5-10	1	0	**1**
6	1	4	**5**
6-7	1	0	**1**
7	2	3	**5**
8	0	1	**1**
10	0	4	**4**
12	0	1	**1**
13	0	3	**3**
14	1	0	**1**
15	4	3	**7**
15-20	2	0	**2**
20	4	1	**5**
23	0	1	**1**
20-25	1	0	**1**

Number of Social Aid Users	Settlements around the stations	Settlements around the railway line	Number of interviews
27	0	1	**1**
28	0	1	**1**
30	1	2	**3**
35	0	1	**1**
40	0	8	**8**
50	1	4	**5**
50-60	2	0	**2**
56	0	1	**1**
60	1	3	**4**
65	0	1	**1**
75	1	1	**2**
80	0	1	**1**
85	1	0	**1**
100	1	2	**3**
105	0	1	**1**
130	0	1	**1**
100-150	1	0	**1**
170	0	1	**1**
200	1	2	**3**
200-250	1	0	**1**
350	1	0	**1**
400	0	2	**2**
500	2	0	**2**
600	0	1	**1**
No idea	3	0	**3**
Not available	6	14	**20**
Number of interviews	**43**	**97**	**140**

The opinion of the relevant institution providing data about the relationship between the Project and social assistance users are as follows:

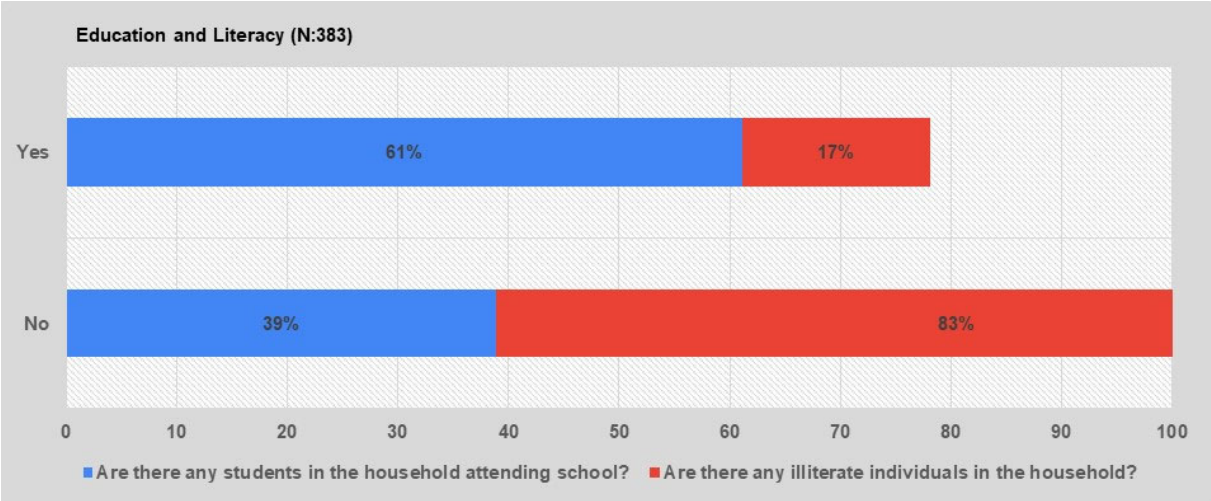
- Erzincan, Üzümlü, Üzümlü Social Assistance and Solidarity Foundation: " Improving train transportation can be an important factor for students traveling outside the city, patients going to the hospital, and individuals receiving social assistance who require transportation and may not afford private vehicles."

4.12.3 Education

According to the household survey, out of the total number of households, 234 households include students attending school. This corresponds to nearly 61% of the households. On the contrary, the number of households including illiterate individuals is 65, which corresponds to a rate of 17%. However, the efforts to be made for illiterate individuals, especially in the stakeholder engagement processes, may be overlooked at a significant level (see Figure 101).

In summary, concerning the project's relationship with education, young people and students are highlighted once again (see 4.12.1.1 Youth and Elderly and Figure 96).

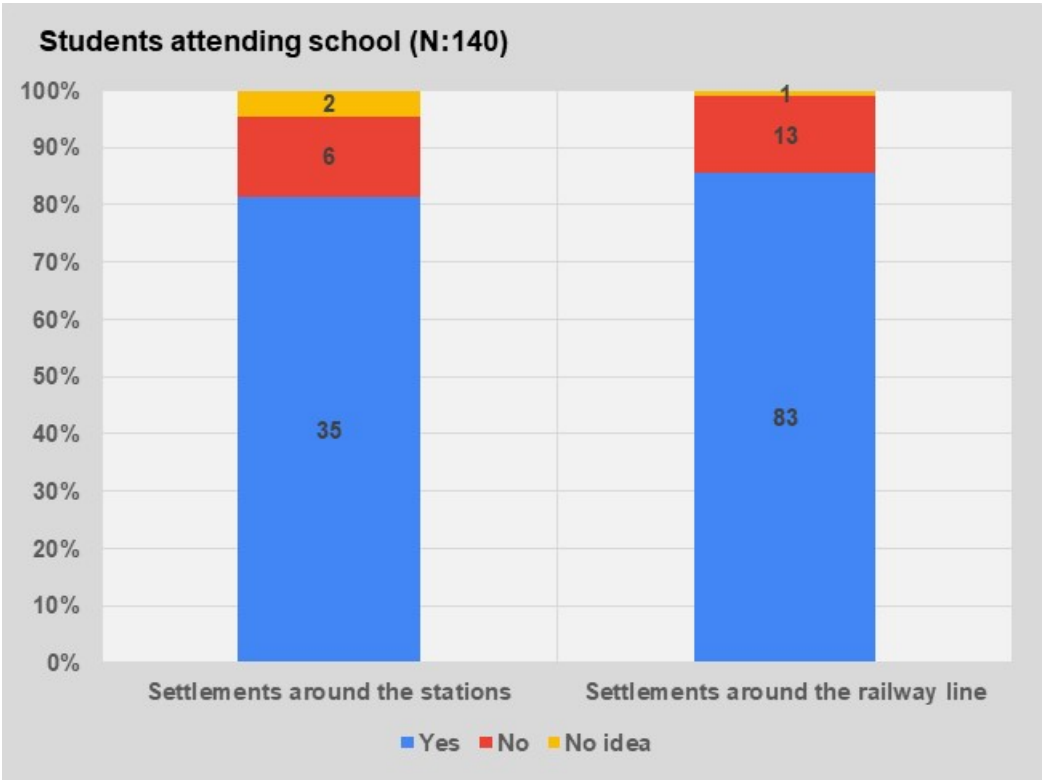
Figure 101: Education and Literacy, as adapted from the household survey



When evaluated based on the mukhtar survey, the responses to the question "Approximately how many students (under 18 years old) are attending school in the settlement?" also contain numerical inconsistencies or large intervals in the numbers provided as answers. To address this gap, the responses were analyzed as "Yes," "No," and "No idea." When compared, the number of students attending school is higher in the settlements around the railway line than those around the station (see Figure 102).

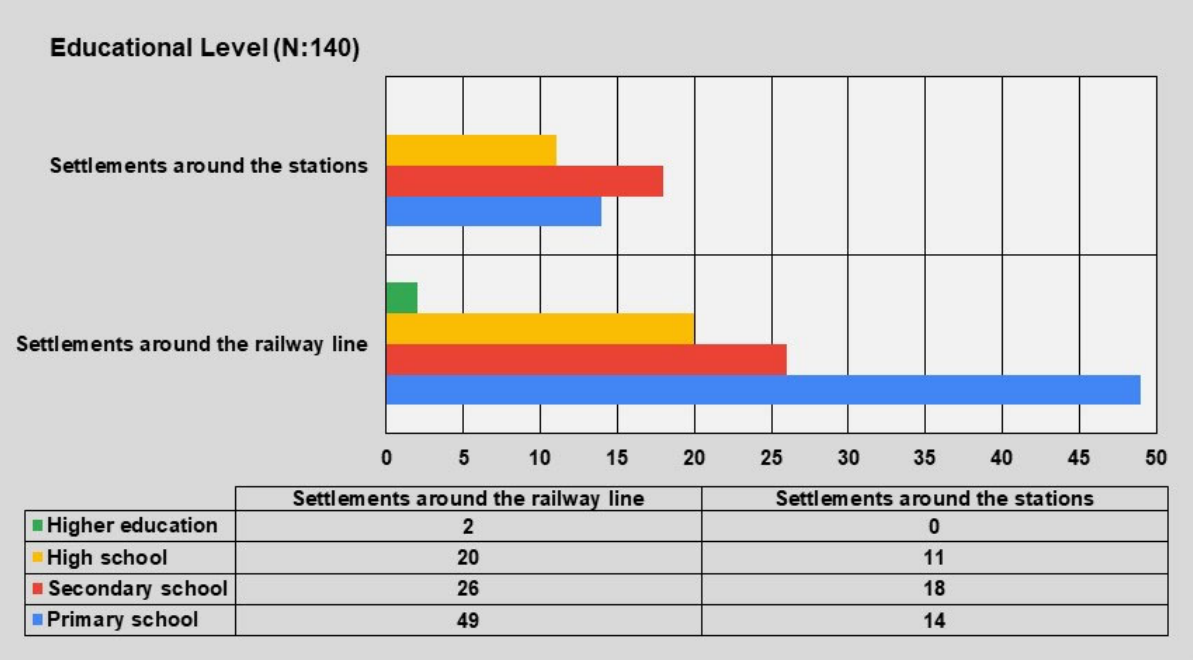
Given the problems related to pedestrian and school crossings along the railway line, students attending school are among the at-risk groups in terms of public health and safety. In this sense, areas around the railway line, especially those lacking protected crossings and barriers, become more important for safety.

Figure 102: Students, as adapted from the Mukhtar survey



When the education levels at the settlement level are examined, it is observed that the general education level is mostly at the level of middle school, primary school, and high school. The number of people with higher education levels is low (see Figure 103).

Figure 103: Educational Level, as adapted from the Mukhtar survey



	Settlements around the railway line	Settlements around the stations
Higher education	2	0
High school	20	11
Secondary school	26	18
Primary school	49	14

4.12.3.1 Students

The majority of the emphasis on this issue is covered under 4.12.1.1 Youth and Elderly. Additionally, in settlements around the railway where the number of students attending school is high, students should definitely be considered as sensitive groups in terms of public health and safety.

The stakeholder views regarding this issue are as follows:

- Erzurum, Yakutiye, Yakutiye District National Education Directorate: "There are schools within a 150-meter distance. The line passes through the heart of the city, and accidents occur at level crossings. Solutions such as underpasses and overpasses should be implemented. It poses a danger as it is very close to schools. Although we enroll students based on their residence, there are still students coming from different areas who have to cross the train route to get to school."
- Erzurum, Pasinler, Pasinler District National Education Directorate: "It will surely benefit the education sector as well; the safest transportation method is by railway, and it is also economical. It can increase the number of students coming to schools here. Our schools in the town center are quite good; if transportation issues and economic reasons are resolved, people in surrounding villages may not have reservations about sending their children to school".
- Erzurum, Aşkale, Aşkale District National Education Directorate: "Passing through the city center is dangerous; students use this road constantly, and accidents have occurred before. Despite measures being taken, accidents continue to happen."
  Erzurum, Horasan, Horasan District National Education Directorate: "The route to school for children is quite risky. We, as an institution, have established a residence-based system, but sometimes students show a different address and enroll in schools, so there are situations where they intersect with the train line on their way to school. There is no overpass, which is a deficiency. If an underpass or overpass is built, the risk will decrease. There is a barrier system, but it is far from the road that students

use. Accidents also occur at the entrance and exit of Horasan; a barrier system is essential there as well.

The views on young people and students in focus group meetings can be summarized as follows:

Location: Erzincan Binali Yıldırım Kemah Vocational School – Kemah\Erzincan, Participant Information: 4 Male Students

How do you think the planned railway rehabilitation works will affect your region? Positive, negative, why?

Attendance 2: It would create a very positive impact.

Attendance 3: When there is a delay, some people miss the train, others have to leave early.

Attendance 4: The express train is constantly delayed.

Attendance 2: We also need to take the train because there is no other means of transportation here. We use it regularly here.

What are the most important problems in the region for young people?

Attendance 1: The biggest problem is transportation. There's already a train in the morning. If we cannot wake up in the morning, we miss the train. Then we have to go the next day. Our work is disrupted. You wait until the next day. There are shuttles until five, but the roads are bad, so it upsets your stomach. You feel uncomfortable. It's a big problem from that perspective. Even if the train goes every three hours, it would be very good.

Attendance 4: The school is far from the center.

Attendance 1: It's not just a problem to walk there. Nothing is open after 20:30. The dormitory is open until 23:00 -00:00. When we go there, we are disappointed. We cannot find anything we're looking for. The pharmacy, for example, is the biggest problem. There is no hospital at all. When something happens, they send us to the center by ambulance. It's a problem on the way back. We have to take a taxi and pay for it. There is no shuttle, no train, nothing... Transportation is a big problem. Everything is difficult for students.

Location: Tercan Teachers' Lodge Cafeteria - Tercan/Erzincan Participant Information: 2 female, 1 male - student/youth

How do students be affected by these works and their results?

Attendance 2: Let me say for people like us, university students with limited time, when we go somewhere, we need to return quickly. So, it would be good because the earlier we get home, the better for us. It would be good in terms of time for anywhere we need to go.

What are the most important problems in the region for students/youth?

Attendance 3: We use taxis to get from the dormitory to the center. As a student, it's a bit difficult to afford this.

Attendance 1: There are no social areas at all. There are a few places. We have one café, for example. There are no activities.

4.12.4 Health

In the household survey, out of a total of 1,622 individuals, 43 disabled individuals are mentioned. These 43 individuals are distributed across 39 households, indicating that some households have more than one disabled individual.

In the mukhtar interviews, the number of disabled individuals is approximately 978. The approximation is due to some mukhtars providing intermittent results and some indicating that they have no information. Information has been provided that there are no disabled individuals

in almost 31 settlements. In summary, there are disabled individuals in 109 out of 140 settlements. In settlements around the station, the percentage of households with disabled individuals is 72%, while around the railway, this percentage goes up to 80% (see Table 111).

Table 111: Distribution of disabled people, as adapted from Mukhtar survey

Answer	Settlements around the stations	%	Settlements around the railway line	%
No idea	1	**2**	0	**0**
Yes	11	**26**	19	**20**
No	31	**72**	78	**80**
Number of interviews	**43**	**100**	**97**	**100**

When asked about having chronic illnesses among household members, 178 households responded affirmatively. This indicates that the prevalence of chronic illnesses among household members is nearly half of the households surveyed.

In the mukhtar survey, diabetes ranks first among the most important chronic diseases in settlements, while hypertension is the second most common chronic disease. It was reported that there are no cases of chronic diseases in 78 out of 140 settlements (56%) (see Table 112).

Table 112: Primary and Secondary Chronic Diseases, as adapted from Mukhtar survey

	Secondary Chronic Disease								
Primary Chronic Disease	**No chronic disease**	**Diabetes**	**Hypertension**	**Heart**	**Cancer**	**Asthma**	**Cholesterol**	**Rheumatism**	**Number of interviews**
No chronic disease	56	0	0	0	0	0	0	0	**56**
Diabetes	6	0	15	1	2	0	1	0	**25**
Cancer	7	8	4	3	0	1	0	0	**23**
Hypertension	6	13	0	2	0	0	0	0	**21**
Heart	2	4	2	0	4	0	0	1	**13**
Asthma	0	0	0	1	0	0	0	0	**1**
Chronic Obstructive Pulmonary Disease (COPD)	1	0	0	0	0	0	0	0	**1**
Number of interviews	**78**	**25**	**21**	**7**	**6**	**1**	**1**	**1**	**140**

The presence of chronic diseases indicates a routine need for health services in settlements. Therefore, since it is known that the train is used as a means of transportation to access health facilities, project activities have the potential to indirectly affect individuals with chronic diseases.

When investigating the most significant issues in the settlement, the health topic was addressed from various perspectives. These include inadequate health facilities and services, the distance of the hospital from the settlement, and the lack of specialist doctors in hospitals.

Some of the mentioned issues are related to the project activities. Especially elderly and sick individuals who have to travel to health institutions in other regions prefer trains due to their economic and comfortable nature. Therefore, disadvantaged groups receiving health services, especially the elderly, should be considered as train users.

Based on this, it is likely that the elderly and retirees are mentioned among the groups likely to benefit from the positive effects of the project activities (see Figure 96).

4.12.4.1 Persons/Groups Experiencing Medical Hardship

The stakeholder views regarding this issue are as follows:

- Sivas, Divriği, Sivas Cumhuriyet University Divriği Nuri Demirağ Vocational School: " The physical infrastructure of the district is not suitable for new developments, especially in terms of housing, health, and education. Therefore, there are deficiencies in addressing transportation issues and providing new employment opportunities due to inadequate conditions in our district.
- Erzincan, Kemah, Kemah District State Hospital: " In cases of urgent referrals, taxis are prioritized because they are considered faster, but trains are also preferred by the local population."
- Erzincan, Üzümlü, Üzümlü Social Assistance and Solidarity Foundation: " Improving train transportation can be an important factor for students traveling outside the city, patients going to the hospital, and individuals receiving social assistance who require transportation and may not afford private vehicles."
- Erzurum, Pasinler, Pasinler District Health Directorate: "Having a healthy alternative to the Erzurum-Pasinler highway for staff and patients is a positive contribution in terms of facilitating service access and transportation."
- Kars, Sarıkamış, Sarıkamış District Health Directorate: " Erzurum is a center for us in terms of health, and patients are usually referred there. However, the bus leaves for Erzurum at 7:30 in the morning while the train is at 9:30, so the bus is preferred. Transportation to Erzurum is very important in terms of health; there is no private hospital in Kars. Especially cancer patients prefer the bus because they go early."
- Kars, Sarıkamış, Sarıkamış Public Education Center: " People living here go to the hospital in Erzurum and prefer the bus because the services are frequent. But the bus is very costly. As you know, it's not just a one-time trip; you go back and forth until you recover, and if you have a companion, the cost increases even more. If train services become more frequent, health expenses would be more affordable. Actually, the Eastern Express had started to become popular, but when the pandemic hit, everything stopped. Reviving it would have many positive effects."

During the meeting with the Sarıkamış District Health Directorate, it was also noted that the Social Solidarity and Assistance Foundation tracks how often cancer patients go to the hospital.

The train line is also used for short distances to go to the hospital, but people often miss their appointment times due to delays when they go by train. As a result, appointments are often canceled, those who need to give samples remain hungry, and often tests cannot be performed for this reason. People have to get a new appointment, having gone to the center in vain.

One reason for the preference of the railway is also the poor condition of roads in geographically rugged areas. It has been noted that individuals traveling on rough roads by road experience physiological discomfort (nausea, individuals with hernia problems feeling pain and discomfort due to the shaking, etc.) regardless of whether they are sick or not.

The views on health conditions in focus group meetings can be summarized as follows:

Location: Divriği Cemevi and Cultural Center - Divriği\Sivas Participant Information: 4 Alevi Men

According to you, what impact will the planned railway rehabilitation works have on your region? Positive, negative, why?

Attendance 3: The biggest problem for the citizens regarding the train is its long duration. The train departing here at 19:30 arrives in Ankara the next day around 13:00.

Attendance 2: It's not a problem that it arrives at 13:00. Once you know the schedule, you can plan accordingly. But the issue is if you arrive at your destination at 15:00 - 16:00 instead of 13:00. It does not arrive on time, that's the biggest problem.

Attendance 4: Someone is new, going to Ankara for work. Maybe they plan to return in the evening around 08:30 - 09:00, saying, "I'll be in Ankara, finish my work, and come back," but

they get off at 13:00. If it was scheduled for 13:00, maybe they would not board it and look for other alternatives. That's the biggest problem.

Attendance 3: I went from Divriği to Sivas for a doctor's appointment. He said 09:00, but I arrived around 10:50. The doctor was not there anymore. I went to Sivas for nothing. When you need to give a sample, you'll have to fast. I thought I'd take a minibus, but they increased the fare, it's expensive. The train costs half as much.

Location: Erzincan Binali Yıldırım Kemah Vocational School – Kemah\Erzincan, Participant Information: 4 Male Students

What are the most important problems in the region from the perspective of young people?

Attendance 4: The school is far from the center.

Attendance 1: It's not just the distance, but also the fact that nothing is open after 8:30 PM. The dormitory is open until midnight. When we go out, we end up wasting our time because we cannot find what we need. The biggest problem is the pharmacy. There is no hospital. When something happens, they send us to the center by ambulance. It's a problem when we return. We have to take a taxi and pay for it. There are no shuttles, no trains, nothing... Transportation is a big problem. Everything is difficult for students.

Location: Pasinler District Health Directorate - Pasinler, Erzurum

Participant Information: 2 Women, 1 Man

According to you, what impact would the planned railway rehabilitation work have on your region? Positive, negative, why?

Attendance 2: I think it would be good for everyone who uses it.

Attendance 1: I do not use it because it's slow, but I would consider it if it were faster.

Attendance 3: If it becomes faster, of course, it will be used. The Eastern Express should be made more suitable for the use of the local people rather than for tourism purposes. They advertise it for tourism, but I think serving the local people is more important, especially since the prices are high. Poor people still cannot afford it. Also, because it's so slow, nobody in our family uses it. Personally, I would use it if it were faster. I wish they would connect the high-speed train to here.

How would young healthcare workers be affected by these activities and their results?

Attendance 3: If you build it, we will use it. It would be good for us too.

Attendance 2: I would use it too. There's no traffic hassle, and the journey would be more enjoyable than by road.

What are the most important problems in the region from the perspective of young healthcare workers?

Attendance 2: It's a very small place. There's nothing here. If we need even the smallest thing, we have to go to the center. We even try to do our grocery shopping from the center.

Attendance 3: There are no social areas. There is not even a cafe we can go to.

Attendance 1: Transportation is also a problem, especially in winter.

Location: Arpaçay\Kars Participant Information: 4 males - beekeepers/farmers/ranchers

As beekeepers/farmers/ranchers, how do you think you will be affected by these works and their results?

Attendance 3: The train also benefits agriculture and animal husbandry. There's also the issue of the hospital. There is a huge hospital in Kars, but it's empty. Even for the smallest problem, they send us to Erzurum. Sometimes the train is good for us when going to Erzurum, but sometimes there are no seats available, and sometimes the timings do not match.

4.12.5 Agriculture, Husbandry and Beekeeping

According to the household survey results, approximately 22% (84/383) of households engaged in agricultural activities along the railway line continue this activity. In the same study, approximately 20% (76/383) of households reported engaging in grazing activities along the railway line

In the mukhtar survey, both in settlements around the station and in settlements around the railway, agriculture is stated as the primary source of livelihood. The secondary source of income for households whose primary source of livelihood is agriculture is largely animal husbandry. The majority of agricultural activities are carried out to meet the feed needs of animal husbandry. Therefore, in households where agriculture is the primary source of income, regular income streams such as retirement and similar salaried jobs are included as secondary sources of income instead of agriculture (see Table 113 and Figure 104).

The answer to question "Is agriculture and animal husbandry practiced in the settlement?" is 131 out of 140 (131/140). This number is 37 (37/43) in settlements around the station and 94 (94/97) in settlements around the railway.

As seen, the rate of engaging in agriculture and animal husbandry in settlements around the station is quite high, approximately 86%. This rate is higher in settlements around the railway, at approximately 97%.

This situation is related to the fact that settlements around the station are located in areas where agricultural areas, such as provincial and district centers, have decreased.

Settlements around the railway, on the other hand, are mainly located in rural areas and in regions where agricultural areas are more concentrated.

Although a precise number cannot be given for the number of households engaged in agriculture and animal husbandry, it is mentioned that there are approximately 12,000 households (see Table 113).

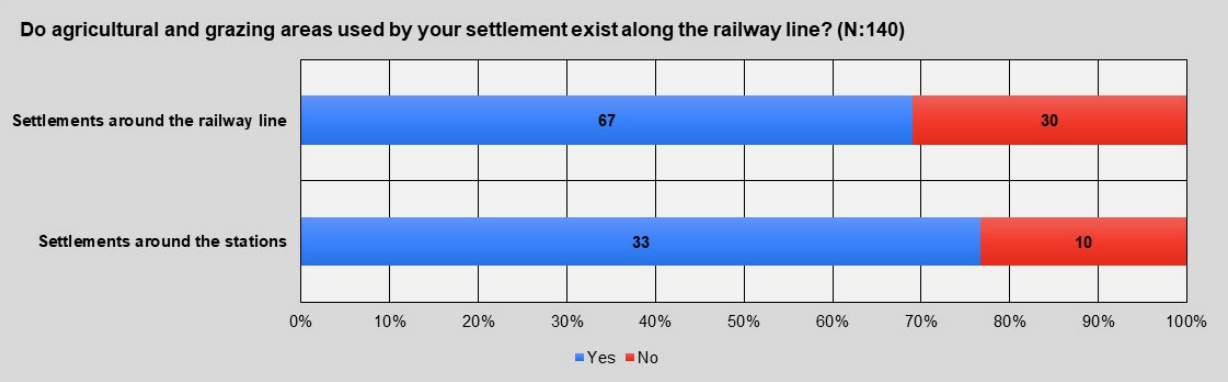
Table 113: Number of Households engaged in agriculture and husbandry, as adapted from the mukhtar survey

Number of households engaged in agriculture and husbandry	Settlements around the stations	Settlements around the railway line	Number of households
Everyone	3	0	**3**
1	1	1	**2**
2	0	2	**2**
3	0	4	**4**
4	0	3	**3**
5	2	2	**4**
5-10	1	0	**1**
6	0	1	**1**
7-8	1	0	**1**
8	0	4	**4**
10	0	4	**4**
13	0	1	**1**
14	0	1	**1**
15	0	5	**5**
18	0	1	**1**
20	1	6	**7**
22	0	1	**1**
25	1	2	**3**
30	3	7	**10**

Number of households engaged in agriculture and husbandry	Settlements around the stations	Settlements around the railway line	Number of households
30-40	2	0	**2**
35	0	4	**4**
40	0	6	**6**
45	1	0	**1**
50	1	1	**2**
55	0	1	**1**
60	1	2	**3**
70	1	7	**8**
75	0	3	**3**
80	0	1	**1**
85	1	0	**1**
90	0	2	**2**
100	3	5	**8**
110	0	2	**2**
120	1	2	**3**
130	1	2	**3**
130-140	1	0	**1**
150	3	2	**5**
200	1	3	**4**
250	2	1	**3**
270	0	1	**1**
300	0	1	**1**
300-350	1	0	**1**
350	1	1	**2**
400	1	1	**2**
400-500	1	0	**1**
1,000	1	1	**2**
Number of households	**37**	**94**	**131**

According to the findings provided with Figure 104 both settlements around the station and settlements around the railway have high rates (around 70%) of agricultural and grazing areas used along the railway line. The rate of "Yes" responses in settlements around the station is around 77%, while in other settlements, this rate is around 69%. Although the exact location of these lands is not known, it can be said that they are approximately within the 500-meter corridor around the railway line.

Figure 104: Areas related to agriculture and grazing, as adapted from the mukhtar survey



It has been mentioned that in 4 settlements, although there are lands around the railway line, they are not used as a source of livelihood. 2 mukhtars expressed that they are not informed

about the issue, while one mukhtar stated that "everyone" in the village uses these lands (see Table 114).

Table 114: User of the agricultural and grazing areas

Number of users	Settlements around the stations	Settlements around the railway line	Number of households
Everyone	0	1	**1**
No idea	0	2	**2**
No use / No livelihood	2	2	**4**
4	1	1	**2**
5	1	2	**3**
5-6	1	0	**1**
5-10	0	1	**1**
7	0	1	**1**
8	0	2	**2**
10	0	5	**5**
12	0	1	**1**
13	0	1	**1**
14	0	1	**1**
15	0	3	**3**
15-20	1	0	**1**
18	0	1	**1**
20	2	7	**9**
20-25	1	0	**1**
25	1	1	**2**
25-30	1	0	**1**
20-30	1	0	**1**
30	1	3	**4**
30-40	1	0	**1**
35	1	4	**5**
40	0	4	**4**
40-50	1	0	**1**
45	1	0	**1**
50	4	2	**6**
60	0	4	**4**
70	1	3	**4**
75	0	1	**1**
80	0	5	**5**
85	1	0	**1**
100	3	4	**7**
107	0	1	**1**
140	1	0	**1**
150	1	1	**2**
180	1	0	**1**
200	1	0	**1**
300	0	2	**2**
400	0	1	**1**
500	2	0	**2**
1,000-1,500	1	0	**1**
Number of households	**33**	**67**	**100**

The majority of agricultural products are used as fodder crops in animal husbandry (see Figure 105). It can be said that agricultural production is also relevant for livestock products.

Figure 105: Most Produced Primary, secondary, and tertiary agricultural products, as adapted from the mukhtar survey

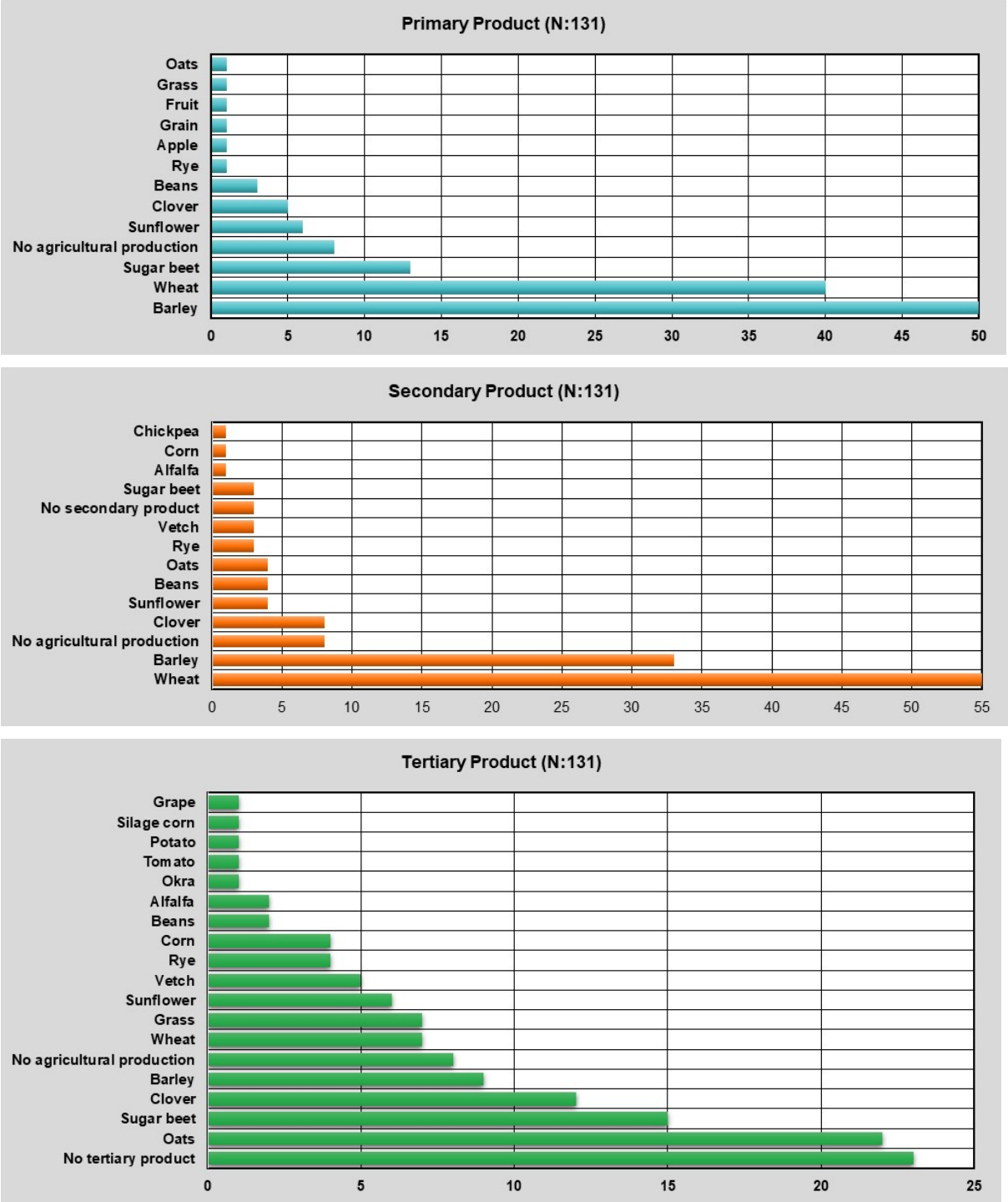
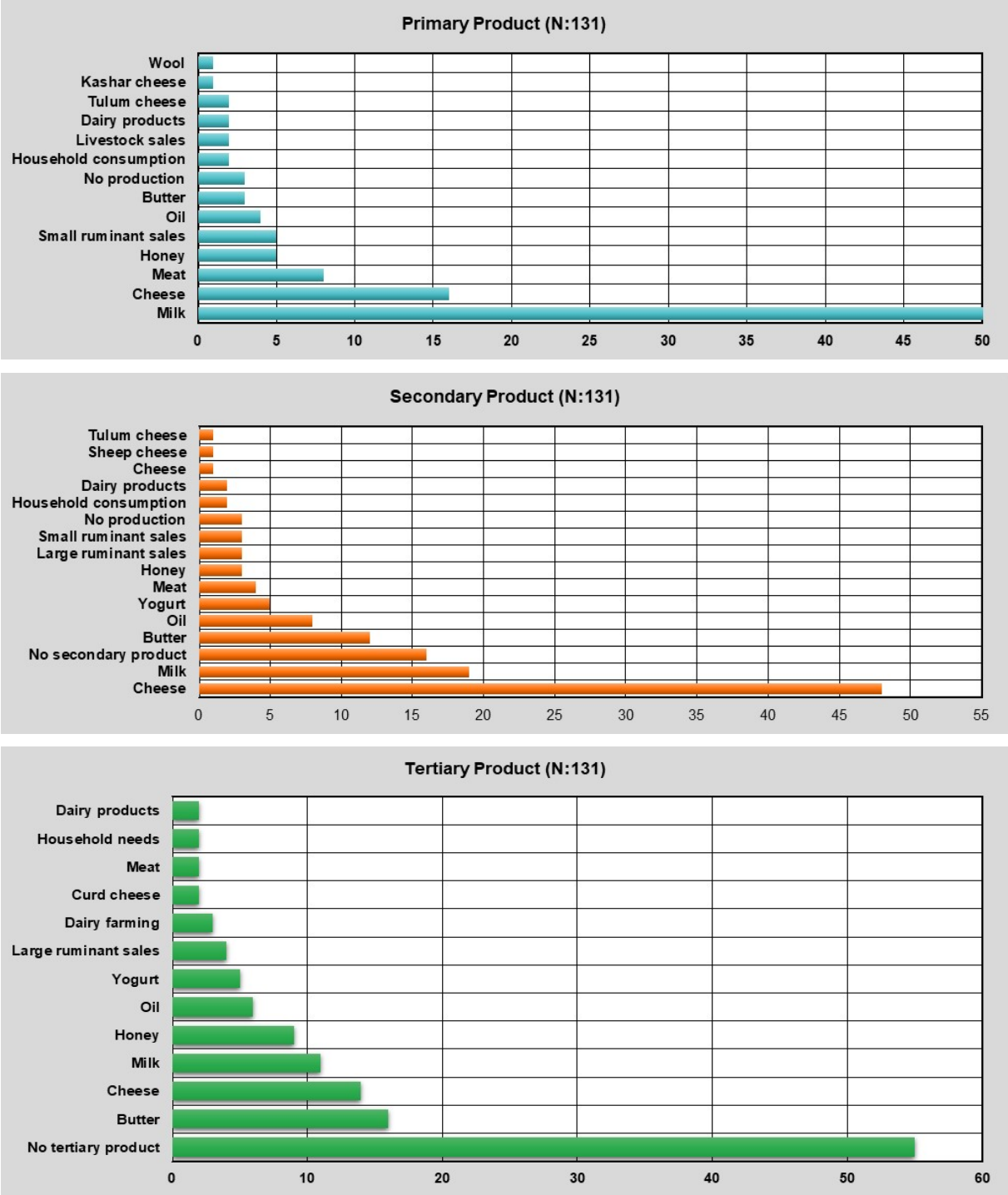


Figure 106: Most Produced Primary, secondary, and tertiary animal products, as adapted from the mukhtar survey

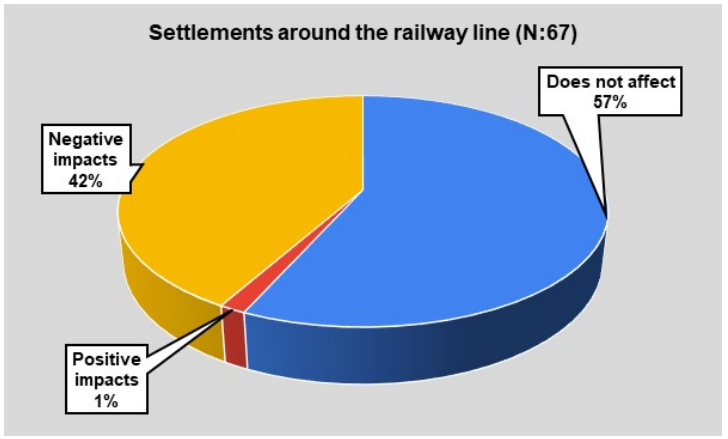


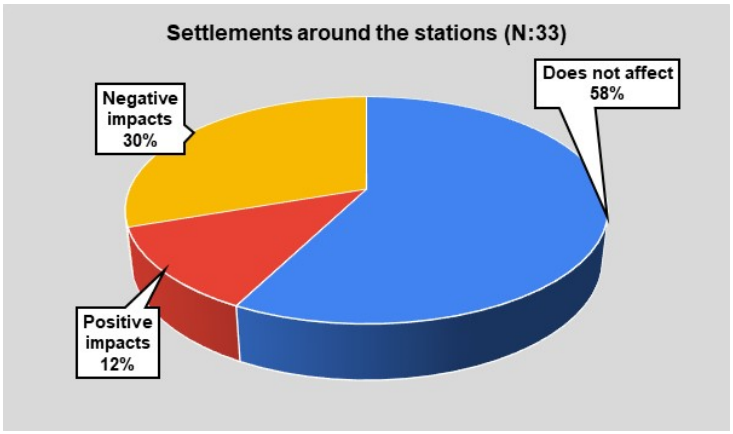
Beekeeping is reported as a livelihood for only 10 settlements, and it is classified among the secondary or tertiary sources of income. In the household survey, similarly, only one household reported beekeeping as the primary source of income, while 5 households mentioned beekeeping as a secondary source of income. Honey is among the most produced products in animal production, ranking among the primary, secondary, and tertiary products. Cheese such as Kashar, Çeçil, and Tulum, along with honey, hold both economic and cultural significance in the local production network (see Figure 106).

4.12.5.1 Expected Impacts of Project on Agriculture and Husbandry

When questioning how landowners / land user, if they conduct agricultural and grazing activities, will be affected by the project in terms of livelihood, the highest response rate belongs to the idea that project activities will not affect the livelihoods in these areas (see Figure 107).

Figure 107: Evaluation of impact on agricultural and husbandry livelihood, as adapted from the mukhtar survey





When asked how the project activities would affect their agricultural activities, only 7 households expressed a positive opinion. A majority (45/84) indicated that the project's activities would not affect their agricultural activities at all. While 30 households expressed negative views, 9 households did not express an opinion (see Figure 108).

When asked how the project activities would affect their grazing activities, unlike the opinions regarding agriculture, no positive responses were received from any household. The proportion of household representatives stating that the project's activities would not affect their livestock activities is around 63% (48/76). One household did not express an opinion (Figure 109).

Similar views are reflected in the results obtained from the question "According to you, who can be most affected and harmed by the project activities?" In line with the concerns of household representatives, the responses include those involved in animal husbandry/shepherds, those involved in agriculture/animal husbandry, those with land along the railway line, and those involved in agriculture/with agricultural land. When considering agriculture and animal husbandry responses together, the proportion increases significantly (see Table 119).

Figure 108: Evaluation of project impact on agricultural activities, as adapted from the household survey

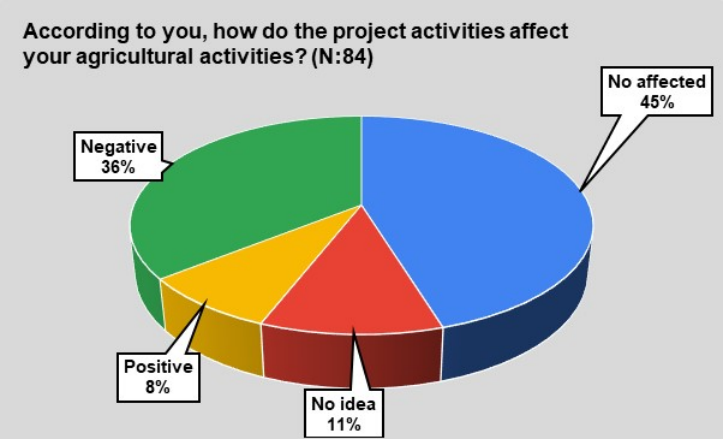
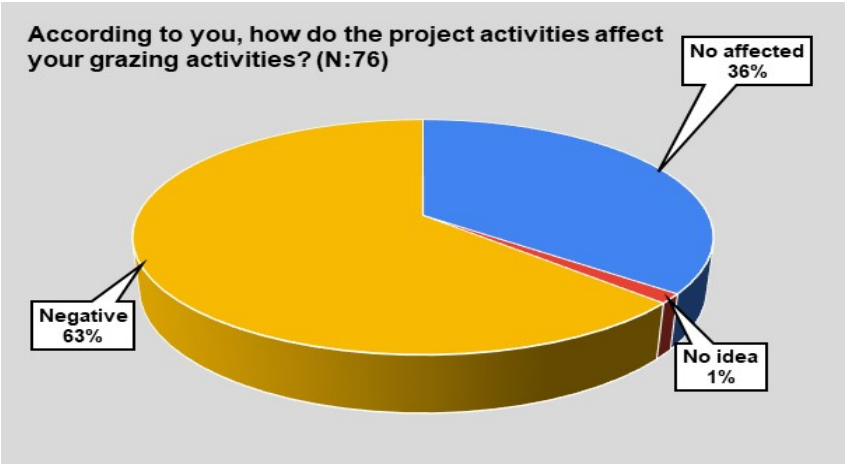


Figure 109: Evaluation of project impact on grazing activities, as adapted from the household survey



The relationship between agricultural areas, including grazing areas, and project activities is reflected in the opinions about the project. In this regard, the responses to the question "In your opinion, who can be most affected and harmed by the project activities?" emphasize agriculture and animal husbandry.

Unlike the opinions mentioned in Table 115, Table 116, and Table 117 the statement "There is no one who will be positively or negatively affected because of the existing railway line" can be considered as an elaboration of the views "It does not affect" or "It has neither benefit nor harm."

After questions evaluating agriculture and animal husbandry as a livelihood, the presence of agricultural and grazing areas has also been investigated in settlements as part of the mukhtar survey. It is important to note that the opinions conveyed through Table 115, Table 116, and Table 117 also include the assessment of agricultural and grazing areas.

The details of the relevant opinions can be listed as given in Table 115, Table 116, and Table 117.

Table 115: Concerns related to agricultural activities and agricultural areas

Settlements	Opinions
Railway line	Those who have cultivated fields.
Railway line	People with land will be affected if there is expansion, but if there is no expansion, no one will be affected.
Railway line	If it happens, villagers and agricultural workers will suffer losses. It would be worse with barbed wire. Protected crossings should be made, passage roads should be made.
Railway line	People who engage in agricultural activities may be adversely affected.

Settlements	Opinions
Railway line	There are fields near the railway line. There is damage in these fields. These landowners are affected.
Railway line	Landowners near the railway line are greatly affected.
Railway line	Those who have fields nearby.
Station	Landowners
Station	There are agricultural lands belonging to our village near the railway line. However, there is no protective measure around the railway line. Therefore, we face a very high risk of accidents. In fact, one person from our village died as a result of a train accident. Therefore, those who use those agricultural lands may suffer harm.
Station	There are agricultural lands next to the railway line, they should be careful.

Table 116: Concerns related to husbandry and grazing areas

Settlements	Opinions
Railway line	Previously, there was a renovation work on the rails. At that time, many of our animals died.
Railway line	There are many people involved in livestock farming, controlled crossings are necessary, animals are harmed.
Railway line	If the pasture areas are entered, those engaged in livestock farming will be adversely affected.
Railway line	Those who use pasture areas will suffer harm.
Railway line	Everyone who uses pasture areas is affected.
Railway line	People who use pasture areas are affected.
Railway line	People who use pasture areas are adversely affected.
Railway line	People who use pasture areas suffer harm.
Railway line	Those who use pasture areas.
Railway line	The use of pastures is decreasing.
Railway line	People who use pastures may be affected.
Railway line	It is harmful to those who use pastures.
Railway line	Since our pasture is crossed, those who use the pasture areas are greatly affected. My animals died many times.
Railway line	We have our pasture lands near the railway line. Those who use these lands may be adversely affected.
Railway line	There are pasture lands near the railway line. These lands need to be protected. We have requested this before. People who use the pasture are adversely affected.
Railway line	Owners of pasture lands near the railway line are adversely affected.
Station	Animals are harmed, and there should be a controlled level crossing.
Station	Animals are affected and die. There are pastures there, our children play there. It's always a loss.

Table 117: Concerns related to both agriculture and husbandry

Settlements	Opinions
Railway line	If there is expansion into pasture and agricultural lands, those who use these areas will be adversely affected.
Railway line	Those who use pasture and agricultural lands will be affected.

The opinions and suggestions regarding the relationship between the project and agricultural and livestock activities, as mentioned in the responses to the question "What are the three most important problems in your settlement?" in the mukhtar survey, are presented in Table 118.

Table 118: Railway-related agriculture and husbandry problems in settlements

Settlements	Problems
Railway line	When they renovate the railway, it would be sufficient for us if they do not damage our lands.
Railway line	The grazing land is on the railway.

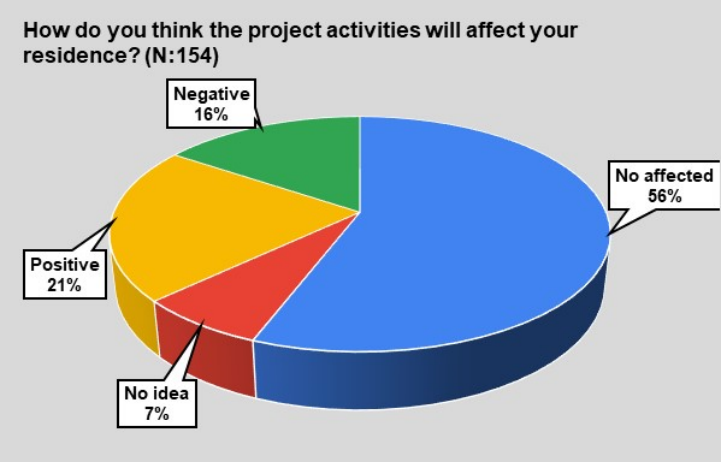
Settlements	Problems
Railway line	The transit route of the pastures was uncontrolled. This area was closed by the TCDD. A passage was made by placing a pipe over the water channel, but this area is quite narrow. We demand the expansion of this area.
Railway line	It was stated that an underpass would be made for our animals to pass to the pasture near the existing railway line, but a bridge was built instead. This bridge fills with water. Therefore, an underpass should be made.
Railway line	The existing railway line divides our pasture and agricultural lands right in the middle. Therefore, our land uses have been restricted. Also, our animals frequently die.
Railway line	When the railway was being built, no passage was left for our animals to the pastures, so we are struggling. Also, we requested a connection to the highway during the construction of the railway line. They built a bridge, but people cannot get out from there.
Railway line	We requested a passage for our animals near the railway line, but no passage was given. There is only one passage, which we find insufficient.
Railway line	The railway divided the pasture in two. Since there is no protection measure around the railway line, our animals cross over the rails. Several of our animals died by getting under the train. It was stated that a passage would be given to us, but it was not given. We have suffered a lot. Therefore, we demand a solution.
Railway line	Due to the train, there is a lot of damage to our animals while grazing in the pastures. We pass our animals over the rails to get to the pastures.
Railway line	Our roads are very bad. Our animals die on the railway line due to the grazing lands.
Station	The railway and the cattle road are problematic. There are issues with the passage of animals.

Considering the connection between agriculture and animal husbandry, the production of these agricultural products becomes important in relation to the concerns and problems related to animal husbandry and settlement (see Table 115, Table 116, Table 117, and Table 118, respectively).

4.12.6 Housing

In household interviews, approximately 40% of participants (154/383) answered "yes" to the question "Is there a residence where the household resides along the railway line?" From 154 household representatives were expected to evaluate the effects of the project with the question "How do you think the Project activities will affect your residence?" 86 people responded that it would not affect them, while 11 people could not express an opinion. Of the remaining, 33 mentioned the positive effects of the project, while 24 expect negative effects (see Figure 110).

Figure 110: Opinions on housing, as adapted from the household survey



Besides, among the people who may be harmed by the project, responses were also received as "Those living around the railway line / Those with houses" (2%) (see Table 119).

In the mukhtar interviews, the question "Are there houses along the railway line in your settlement?" was used to understand the impact of the project on houses and their residents. Among 140 settlements, 63 representatives answered yes to the question (45%). These representatives were then asked the following question, "Approximately how many households live in these houses?" Although the answers contained inconsistent numbers, the approximate number of households residing in these houses can be considered as 3,800. Some mukhtars have mentioned that there are houses but no households living in them.

4.12.7 Technical Infrastructure

The most important issues reported in the mukhtar survey findings include water (irrigation water and drinking water), roads (village roads and access roads), transportation, housing, natural gas, waste management, electricity, internet, and other general technical infrastructure issues.

Mukhtars have either dismissed regional issues as "non-existent" or emphasized "infrastructure" issues.

Among these issues, notable concerns include dissatisfaction with existing railway lines, deficiencies in railway level crossings, poor condition of barriers around railway lines, restrictions on access to grazing and agricultural areas by railway lines, and a significant emphasis on the risk posed by trains for animal crossings (see Figure 100).

In the household survey, technical infrastructure problems related to general technical infrastructure, roads, housing, and railway were reported among the technical infrastructure problems in areas where unemployment-centered regional issues intersect (see Table 109).

In some places, tickets are not issued at the station. Train tickets must be purchased online. As a result, those without internet access or who do not know how to use it, especially the elderly, are forced to buy tickets on the train because they cannot purchase tickets online. In this case, they end up paying twice the fare.

There are opinion to relevant issue:

- "The train is frequently used, but especially for the elderly, using the train has become difficult since tickets are only sold online now." - Alevi Culture Association Kemah Zeynal Karakoç Cem and Cultural Center
- "Elderly people are constantly waiting in the cold. There is no ticket counter here now. Tickets must be purchased online. The elderly cannot buy tickets online." - Erzincan Binali Yıldırım Kemah Vocational School – Kemah\Erzincan)

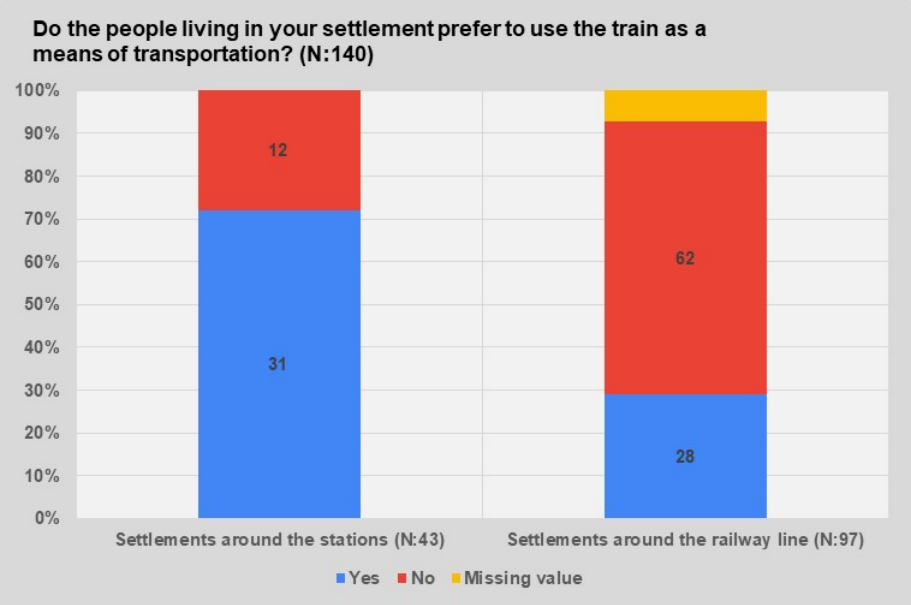
4.12.8 Transportation

The preference for using the train as a means of transportation is common in settlements. This preference is even higher in settlements around the station, with a rate of 72% (see Figure 111).

When examining whether households use the train as a transportation method, the question "Is the train line in your region preferred as a means of transportation in your household?" was asked, and 47% answered yes (181/383).

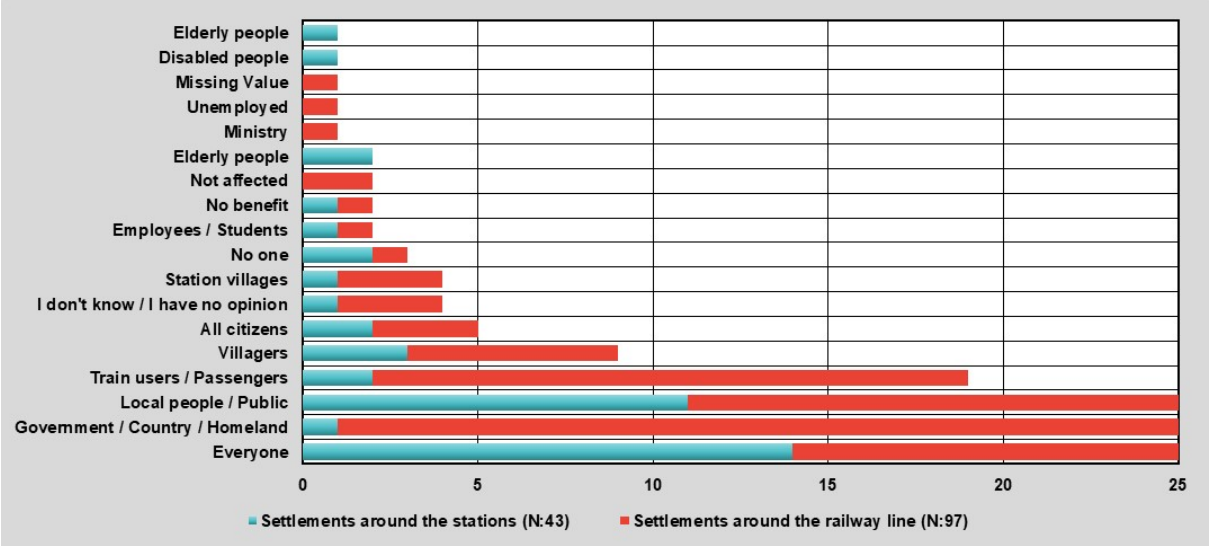
The usage rate decreases as the settlement moves away from the station. Therefore, the use of trains is lower in settlements that are far from the station or do not have a station in the settlement. Among the problems reported about the region, handicaps such as the absence of a station in the settlement, the train not stopping at the existing station building, inconvenient train schedules, and the sale of train tickets online are frequently mentioned. These issues have been frequently raised, especially in stakeholder meetings and focus group discussions.

Figure 111: Trains as mean of transportation, as adapted from the mukhtar survey



When considering the benefits of the project activities, emphasis has been placed on train users and passengers who will be positively affected. In a sense, as a transportation development project, train users are considered as a group that will benefit directly as transportation users (see Figure 112).

Figure 112: According to you, who can benefit the most from the Project activities? as adapted from the mukhtar survey



Among the groups at the household level who will benefit positively from the project, moderate emphasis has been placed on groups such as train users, passengers, tourists, and individuals interested in traveling (see Figure 90 and Table 104).

In the household survey, there is no mention of a group that would generally be harmed by the project. However, quite interestingly, responses have indicated that those who would be negatively affected by the project include individuals and groups involved in road transportation, companies, drivers, minibuses, and fuel companies. When looking at the views grouped under the heading "Road Transporters / Road Travel Companies / Fuel Companies / Drivers," the responses are as follows: bus companies, road travel companies, road transporters, minibus drivers, bus drivers, service car drivers, minibus drivers, travel companies, drivers, taxi drivers, transportation companies, long-distance drivers, air

transportation sector, fuel sellers, and fuel companies. Among these responses, "bus companies" are mentioned the most.

When individuals who expect no harm and believe that no one will be harmed are excluded from the responses, the highest proportion is for those who fall into this group. Based on this, the positive outcomes of improvements in railway transportation could pose a problem for road and even air transportation. The shift of passenger capacity from road transportation to railway transportation could affect individuals and groups dependent on the road transportation sector, including fuel stations (see Table 119).

Table 119: Who can be most affected and harmed by the project activities? as adapted from the household survey

Answer	%
Nobody	47
There will be no harm	22
Road transporters / Road Travel Companies / Fuel Companies / Drivers	8
I do not know / I have no opinion	5
Those involved in animal husbandry / Shepherds / Animals	4
Villagers	3
Those living around the railway line / Those with houses	2
Those involved in agriculture / Those involved in animal husbandry	2
Those with land along the railway line	1
Region People / Local People / Native People	1
Trains are not suitable for everyone / Not everyone can use trains	1
Train projects are not being realized / Projects are delayed	1
Elderly	1
Low-income individuals / Those with low income / The poor	1
Those involved in agriculture / Those with agricultural land	1
Project workers / Station workers	1
Everyone	0
Nature / Environment	0
Those experiencing traffic problems due to trains	0
Number of interviews	**383**

The issues mentioned, especially, are related to transportation, such as the absence of underpasses, lack of transportation routes connecting neighborhoods to districts, transportation problems to the center, roads damaged due to dams, poor village roads, and problems with transportation such as lack of internet access, poor roads, and lack of paved roads leading to mud accumulation in villages. Additionally, issues regarding the railway include dissatisfaction with the existing railway lines, deficiencies in level crossings, poor condition of barriers around railway lines, restrictions on railway lines' access to grazing areas and agricultural areas, and trains posing a risk for animal crossings, which is one of the most emphasized issues (see Figure 100).

As a summary, main problems based on railway transportation can be listed as follows:

- The train arriving significantly late from the west, causing people to go to the train station on time and wait for 2-3 hours.
- Tickets being found too costly.
- Elderly individuals unable to adapt to these conditions due to ticket purchase processes being via technological means.
- Damage to individuals engaged in livestock farming in the area due to the train tracks not being properly sealed (resulting in trains hitting animals).

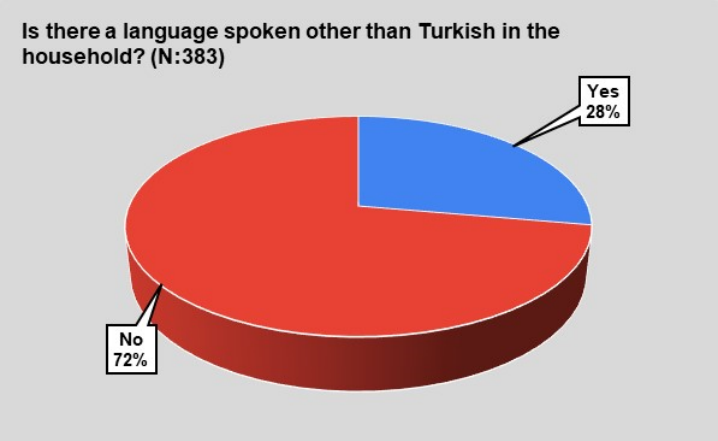
- Villagers and locals taking longer to reach their destinations (a crossing or bridge is needed for passage).
- Absence of level crossings.
- Rendering some stations non-functional at certain points.

4.12.9 Ethnic origin, Language, and Belief

Information about languages spoken other than Turkish has been collected in household and mukhtar surveys. The main objective here is to provide a current status assessment to effectively include communities speaking languages other than Turkish, and any minorities if present, in stakeholder engagement processes for informative purposes.

In this context, in the household survey, household representatives were asked the question "Is there a language spoken other than Turkish in the household?" and a response of "yes" was received at a rate of 28%.

Figure 107: Languages other than Turkish, as adapted from the household survey



A similar question was posed during the mukhtar survey as follows: "Are there languages other than Turkish used in your settlement? Could you specify?" The distribution of responses according to settlements is provided in Figure 113. In light of the results, it is observed that languages other than Turkish are spoken in 63 settlements (45%), with some settlements having more than one language spoken other than Turkish. The languages reflected in the records, based on intensity, include Kurdish, Zazaki, Azerbaijani, Laz, and Arabic. In terms of language diversity, the most heterogeneous region is Erzincan.

Please refer to SEP (separate document) which contain more detailed information about languages to be used for communication with different stakeholders along the railway line and in settlements around stations.

In parallel with the language situation, the question "Are there people other than Turks living in your settlement? Could you specify?" was also conveyed to the mukhtars. The results are distributed according to settlements in Figure 114. Accordingly, in 42 settlements (%29), Kurds, Alevis, Laz people, Syrians, Afghans, Terekeme people, Azerbaijanis, Zazas, and Russians were mentioned apart from Turks. The highest number is among Kurds, and the most ethnically diverse region is Erzincan Province, too.

The mukhtar survey, which involved interviews with 140 mukhtars in settlements, was completed with the question "Is there a place of worship other than a mosque in your settlement?" Responding to this question, 27 mukhtars gave an affirmative answer. The places of worship outside of mosques are mostly cemevis, followed by churches. Although some churches are in ruins and closed for use, they still provide insight into the ethnic and religious structure of the region. Despite the similarity of settlements in terms of diversity, Erzincan stands out again due to the number of cemevis (see Figure 115).

Figure 113: Distribution of Languages other than Turkish, as adapted from the mukhtar survey

Province	Disrtrict	Settlement	Kurdish	Kurdish, Azerbaijani	Kurdish, Laz	Kurdish, Zazaki	Kurdish, Zazaki, Arabic	Zazaki	Zazaki, Kurdish	Grand Total
Sivas			2							2
	Divriği		2							2
		Gezey	1							1
		Güllübağ	1							1
Tunceli									2	2
	Pülümür								2	2
		Doğanpınar							1	1
		Yarbaşı							1	1
Erzincan			13			7	1	9		30
	Çayırlı							1		1
		Doluca						1		1
	İliç		4							4
		Abdullahpaşa	1							1
		Büyükköy	1							1
		Çaltı	1							1
		İbrahim Çeçen	1							1
	Kemah		3			3		1		7
		Aşağı Gedik	1							1
		Beklimçay	1							1
		Beşikli				1				1
		Çarşı	1							1
		Koruyolu				1				1
		Küplü						1		1
		Oğuz				1				1
	Central		1			4				5
		Barış				1				1
		Cemal Gürsel				1				1
		Gani Efendi Çiftliği	1							1
		Karadiğin				1				1
		Ulalar				1				1
	Tercan		3				1	2		6
		Camiikebir	1							1
		Gözeler	1							1
		İstasyon					1	1		2
		Köprübaşı						1		1
		Yenimahalle	1							1
	Üzümlü		2					5		7
		Avcılar						1		1
		Büyük Kadağan	1							1
		Derebük						1		1
		Fırat	1							1
		Küçük Kadağan						1		1
		Pınarbaşı						1		1
		Süleymanlı						1		1
Erzurum			11		1					12
	Aşkale		2							2
		Kandilli	1							1
		Pırnakapan	1							1
	Horasan		3							3
		Camii Kebir	1							1
		Hızırilyas	1							1
		Şerefiye	1							1
	Palandöken		1							1
		Nene Hatun	1							1
	Pasinler		4		1					5
		Bahçelievler			1					1
		Büyüktüy	1							1
		Çakırtaş	1							1
		Kethuda	1							1
		Paşabey	1							1
	Yakutiye		1							1
		City center, inculding Ömer Nasuhi Bilmen	1							1
Kars			15	2						17
	Arpaçay		2							2
		Güvercin	1							1
		Yenimahalle	1							1
	Central		1	2						3
		Cumhuriyet		1						1
		Hafızpaşa		1						1
		Karadağ	1							1
	Sarıkamış		4							4
		Çatak	1							1
		İstasyon	1							1
		Sırbasan	1							1
		Yenigazi	1							1
	Selim		7							7
		Çarşı	1							1
		Cavlak	1							1
		Cumhuriyet	1							1
		Karaçayır	1							1
		Köprübaşı	1							1
		Yolgeçmez	1							1
		Yukarıkotanlı	1							1
	Susuz		1							1
		Cumhuriyet	1							1
		Grand Total	41	2	1	7	1	9	2	63

Figure 114: Distribution of Ethnic Origins other than Turkish, as adapted from the mukhtar survey

Province	Disrtrict	Settlement	Alevi, Kurdish	Kurdih	Kurdish, Afghan, Syrian	Kurdish, Alevi	Kurdish, Laz	Kurdish, Terekeme, Alevi, Azerbaijani	Kurdish, Zaza	Russians	Turkish, Azerbaijani, Kurdish	Zaza	Grand Total
Erzincan			1	10	1				4			1	17
	İliç			4									4
		Abdullahpaşa		1									1
		Büyükköy		1									1
		Çaltı		1									1
		İbrahim Çeçen		1									1
	Kemah		1	5								1	7
		Aşağı Gedik		1									1
		Beklimçay		1									1
		Beşikli		1									1
		Kayabaşı	1										1
		Koruyolu		1									1
		Küplü										1	1
		Oğuz		1									1
	Central								4				4
		Barış							1				1
		Cemal Gürsel							1				1
		Karadiğin							1				1
		Ulalar							1				1
	Tercan				1								1
		İstasyon			1								1
	Üzümlü			1									1
		Karakaya Koyu		1									1
Erzurum				7		1	1						9
	Aşkale			1									1
		Pırnakapan		1									1
	Horasan			1									1
		Şerefiye		1									1
	Palandöken			1									1
		Nene Hatun		1									1
	Pasinler			3		1	1						5
		Bahçelievler					1						1
		Büyüktüy		1									1
		Çakırtaş		1									1
		Kethuda				1							1
		Paşabey		1									1
	Yakutiye			1									1
		City center, inculding Ömer Nasuhi Bilmen		1									1
Kars				13				1		1	1		16
	Arpaçay			1									1
		Yenimahalle		1									1
	Central			1				1			1		3
		Cumhuriyet									1		1
		Hafızpaşa						1					1
		Karadağ		1									1
	Sarıkamış			4									4
		Çatak		1									1
		İstasyon		1									1
		Sırbasan		1									1
		Yenigazi		1									1
	Selim			6						1			7
		Benliahmet								1			1
		Çarşı		1									1
		Cavlak		1									1
		Cumhuriyet		1									1
		Karaçayır		1									1
		Yolgeçmez		1									1
		Yukarıkotanlı		1									1
	Susuz			1									1
		Cumhuriyet		1									1
		Grand Total	1	30	1	1	1	1	4	1	1	1	42

Figure 115: Distribution of religious areas other than mosque, as adapted from the mukhtar survey

Province	Disrtrict	Settlement	Cemevi	Cemevi, Church, Chapel	Church	Church ruins	Grand Total
Sivas			1				1
	Divriği		1				1
		Güllübağ	1				1
Tunceli			1				1
	Pülümür		1				1
		Doğanpınar	1				1
Erzincan			21	1			22
	Çayırlı		1				1
		Doluca	1				1
	İliç		2				2
		Atma	1				1
		Bağıştaş	1				1
	Kemah		6	1			7
		Beşikli	1				1
		Çarşı	1				1
		Kayabaşı		1			1
		Olukpınar	1				1
		Sürek	1				1
		Yahşılar	1				1
		Yastıktepe	1				1
	Central		5				5
		Beşsaray	1				1
		Cemal Gürsel	1				1
		Gani Efendi Çiftliğ	1				1
		Sancak	1				1
		Ulalar	1				1
	Tercan		1				1
		İstasyon	1				1
	Üzümlü		6				6
		Avcılar	1				1
		Büyük Kadağan	1				1
		Fırat	1				1
		Karakaya Koyu	1				1
		Pınarbaşı	1				1
		Süleymanlı	1				1
Erzurum			1				1
	Aşkale		1				1
		Dallı	1				1
Kars					1	1	2
	Arpaçay					1	1
		Aydıngün				1	1
	Central				1		1
		Cumhuriyet			1		1
Grand Total			24	1	1	1	27

4.13 Findings and Observations

4.13.1 Ardahan Province

4.13.1.1 Settlements

The Canbaz station (see Table 120), located in the Çıldır district of Ardahan is surrounded by the settlements of Aşağıcambaz and Yukarıcambaz.

Canbaz station, being adjacent to a forested and mountainous region, may exhibit examples of wildlife in its vicinity. Wildlife examples in the nearby area may include components of the

ecosystem associated with Çıldır Lake, Aktaş Lake and other connected water bodies. Kuyucuk Bird Paradise also located within the boundaries of Arpaçay district. There is a bird observation tower located on Çıldır Lake.

Fishing, which can be practiced in all four seasons, constitutes a significant economic source for the local community. Fishing in Çıldır Lake is a crucial human activity, and during the winter when the lake freezes, thick ice layers are broken to catch fish. The most important fish species caught in the lake are carp. However, in seasons with low precipitation, the lake level rapidly decreases, causing the reed beds essential for the reproduction of species like carp to narrow. Additionally, many fishermen, by not adhering to regulations and engaging in uncontrolled fishing, adversely impact fish stocks.

The Ardahan Blossom Honey registered under geographical indications also signifies beekeeping activities in the region[18][19].

According to Address Based Population Registration System (ABPRS) presented by Turkish Statistical Institute (TurkStat), Ardahan accommodates 28,669 households in 2024, with the average household size is 3.07.

In Çıldır, the average household size is 3.14, with a total number of households being 2,683. The population of Yukarıcambaz is 329, while Aşağıcambaz has a population of 208.

General results of household survey for these settlements are listed in below:

- A total of 20 household surveys were completed in these settlements on March 27, 2024.
- In the discussions, apart from 5 female household representatives, mostly men have participated.
- The preferred method for informing about the project is mostly through the mukhtar.
- Despite being a settlement near the station, the usage of trains among the residents is low, with only 3 out of 20 households using trains.
- Only 4 households are knowledgeable about the project. The rest are partially informed or not informed at all.
- There is an emphasis on students and young people who will benefit from the project. Concern about the negative impacts of the project is low.
- The total population in the represented households is 90 individuals, with a high number of individuals in the 15-64 age group.
- The number of men and women in the households is close (41 women, 49 men).
- The primary source of livelihood in the households is agriculture, followed by livestock farming.
- The prominent issues in the region are unemployment, transportation, and problems related to livestock farming, in that order.
- Among the 90 individuals, there are 28 unemployed individuals and 3 individuals with disabilities.
- There are students attending school in 5 households.
- There are elderly individuals in the advanced age group in 9 households.
- Languages other than Turkish are spoken in 3 households.

Meetings were arranged with the mukhtars of Yukarıcambaz, Aşağıcambaz, Akçakale, Damlıca, and Karakale settlements. Meetings were successfully conducted with the mukhtars of Yukarıcambaz and Aşağıcambaz. However, the meeting with the mukhtar of Akçakale was declined, as he was the former mukhtar and opted not to participate in the discussion. Contact with the mukhtars of Damlıca and Karakale has not been possible due to the unavailability of official telephone numbers.

[18] https://ardahan.tarimorman.gov.tr/Menu/68/Cografi-Isaretler

[19] https://ci.turkpatent.gov.tr/cografi-isaretler/detay/38103

4.13.1.2 Stations

The necessary data for the respective station has been obtained from the interviews carried out with the staff responsible of the Kars 47th Branch of TCDD's, Department of Railway Maintenance.

Included in the investigation are the Canbaz station in Çıldır District within the confines of Ardahan province.

The data derived from face-to-face interviews carried out at field stations and the field notes in Ardahan province are delineated in Table 120.

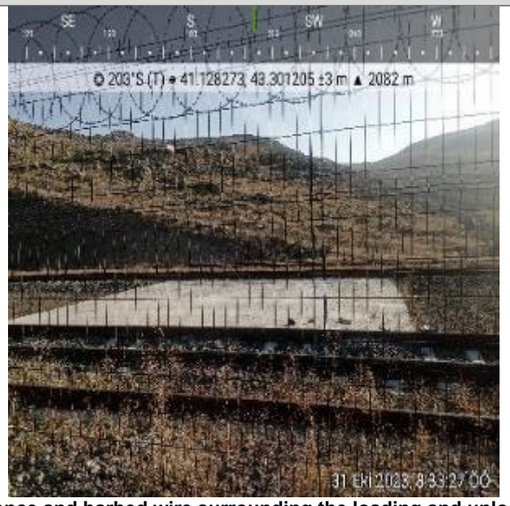
Table 120. Canbaz Station

<table>
<tr><th>Name of Station</th><th>Location</th><th>Scope of the Project</th><th colspan="3">Baseline Condition</th></tr>
<tr><td>Canbaz</td><td>Province: Ardahan
District: Çıldır
Nearby Settlement: Aşağı Cambaz
km: 1432+349</td><td>The existing mainline will be duplicated, and the configuration will be adjusted to accommodate a 1,050 m train on two additional sidetracks. Four additional level crossings will be established between the existing and new tracks.</td><td colspan="3">If any siding work is to be carried out, there will be a need for station building and personnel to work here. The existence of a project related to the establishment of a station building for this station is mentioned.
At this station, loading and unloading operations were being carried out. There was an area dedicated to storing the equipment of trains arriving from Georgia. These operations are now conducted at the Kars Logistics Center. During loading and unloading, there is an enclosed area with wire fences around it to protect materials and equipment. However, since there is currently no activity here, this protection area is not being fully utilized. Additionally, there is a container on the station premises where employees of the Pasifik Eurasia company stay. As Pasifik Eurasia is currently not actively operating at the Canbaz station, there is no one at the campsite. However, since this area is not entirely unused, accommodation will commence here once activities begin. Due to maintenance and road construction activities on the Georgian side, there has been no train passage from Georgia to the Turkish side since April 2023. Since that date, the Canbaz station has been almost idle. However, the previously used equipment, the protection area, and the campsite consisting of a single container are ready for use.</td></tr>
<tr><td>ESSs</td><td colspan="2">Findings</td><td colspan="3">Photographs</td></tr>
<tr><td>ESS1</td><td colspan="2">At the present state, there is no structure at the station that could E&S risks. The region where the station is located has been included in the Ardahan-Kars-Artvin Development Project (AKAKP) due to its water resources and agricultural-livestock potential.</td><td rowspan="4">

Camp Area of Pasifik Eurasia Company</td><td colspan="2" rowspan="4">

The Area Used for Loading and Unloading</td></tr>
<tr><td>ESS2</td><td colspan="2">There is no dedicated station building allocated for this station. Therefore, there are no personnel permanently stationed here. The personnel responsible for the operations at this station work at the Kars 47th Branch of TCDD's, Department of Railway Maintenance, located in the central district of Kars Province the campsite for Pasifik Eurasia[20] company employees are ready for use. However, during a site visit, it was not possible to establish communication with any personnel, and therefore, the exact number of employees working in this area for the company is unknown.
Due to the absence of any facilities at Canbaz Station, household waste, sewage, and emissions related to heating are not observed at the current state. In the narrow area where loading and unloading operations take place, there may be components such as chemical waste used in the maintenance and repair of vehicles, paint, tires, metal parts, which could contribute to pollution. However, access to this area is restricted, and during the field visit, it was not possible to determine precisely what is within the fenced area.</td></tr>
<tr><td>ESS4</td><td colspan="2">Canbaz Station and the surrounding tunnels do not have protective barriers. There is no structure to prevent pedestrian and animal traffic on the tracks and switch areas. Only the semi-enclosed area used for loading and unloading is surrounded by both fences and barbed wires for protection.</td></tr>
<tr><td>ESS5</td><td colspan="2">In accordance with the opinion of the respondent that the station and the surrounding land are under the authority of the TCDD, and there is sufficient space for the planned activities in the region. Therefore, there is no need for land acquisition on private or public land during the course of the project.</td></tr>
<tr><td>ESS10</td><td colspan="2">One of the most crucial stakeholders at this station is the Pasifik Eurasia company and its working personnel in the region.
The list of private and government institutions in Çıldır that could be project stakeholders is provided below[21]:
▪ Çıldır District Governorship[22]
▪ Çıldır Municipality[23]
▪ Ardahan University Çıldır Vocational High School[24]
▪ Çıldır District Directorate of National Education[25]
▪ Çıldır District Directorate of Agriculture and Forestry[26]
• Çıldır Healthcare Institutions[27]</td></tr>
</table>

[20] https://pasifikeurasia.com.tr/hakkimizda.php
[21] http://www.cildir.gov.tr/protokol
[22] http://www.cildir.gov.tr/
[23] https://www.cildir.bel.tr/
[24] https://cildir.ardahan.edu.tr/
[25] https://cildir.meb.gov.tr/
[26] https://ardahan.tarimorman.gov.tr/Menu/75/Cildir-Ilce-Tarim-Ve-Orman-Mudurlugu
[27] http://www.ardahan.gov.tr/saglik2016

Name of Station	Location	Scope of the Project	Baseline Condition	
	• Aras Electricity Distribution Inc. (Aras EDAŞ[28]) Representative • Çıldır District Special Administration[29] • Limited Liability Çıldır Fisheries Cooperative[30] • Federation of Çıldır Associations[31] • Çıldır Irrigation Union[32] • General Directorate of Highways, Kars 18th Regional Directorate, 183rd Ardahan Branch, Çıldır Maintenance Center [33] All the mentioned stakeholders have been added to Appendix-10.		 **One of the Access Roads Used as a Service Road**	 **The wire fence and barbed wire surrounding the loading and unloading area**

28 https://www.arasedas.com/

29 http://www.ardahanozelidare.gov.tr/ilce-ozel-idareleri

30 https://www.tarimorman.gov.tr/BSGM/Belgeler/Icerikler/Su%20%C3%9Cr%C3%BCnleri%20Altyap%C4%B1lar%C4%B1/%C4%B0ST%C4%B0HSAL%20HAKKI%20K%C4%B0RALANAN%20G%C3%96L-BARAJ%20G%C3%96L%C3%9C%20SU%20%C3%9CR%C3%9CNLER%C4%B0%20AVLAK%20SAHALARI.pdf

31 https://www.cildirfed.org.tr/

32 https://cildirimsulamabirligi.gov.tr/Home3

33 https://www.kgm.gov.tr/Sayfalar/KGM/SiteTr/Bolgeler/18Bolge/Subeler/SbArdahan.aspx

4.13.2 Kars Province

4.13.2.1 Settlements

In the Kars province, there are 8 stations included Taşbaşı Station (Arpaçay district), Güvercin Station (Arpaçay district), Kars Main Station (Central district), Dikme Abandoned Station, Benliahmet Station (Selim district), Selim Station (Selim district center), Çatak Abandoned Station, Sarıkamış Station (Sarıkamış district center), Topdağı Station, and Süngütaşı Station (Sarıkamış district).

As observed, there are a total of 8 stations within 4 districts. Accordingly, there are 2 stations (Arpaçay and Taşbaşı) in the Arpaçay district, 1 station (Kars Main Station) in the Kars central district, 3 stations (Süngütaş, Soğanlı, and Sarıkamış) in the Sarıkamış district, and 2 stations (Selim and Benliahmet) in the Selim district. The Çatak and Topdağı stations have been excluded from the second phase of research as they are not involved in the project activities. Since the Dikme station intersects with the Kars station, its influence extends to the central district of Kars and its neighborhoods.

In the region, the Kars River and the Fehmi Harabe Stream are key geographical components that play a significant role in road and railway crossings.

The irrigation channels constructed over these two water bodies by the DSİ involve nearby villages and the DSİ as stakeholders in the project. This inclusion is due to the extensive large-scale and small-scale livestock farming activities carried out in the region.

In the agricultural regions encompassing the villages of Harmanlı, Güvercin, Yalınçayır, Arpaçay, Gönülalan, Gölaldı, and Çanaksu along the pathway, seasonal practices such as harvesting cabbage, sunflower, and sugar beet have been noted. Additionally, on the same route, pastures and beehive structures utilized in apiculture have been identified. Consequently, entities associated with sugar beet, including cooperatives, Kars Sugar Factory, and the Kars Beekeepers Association, may also be considered project stakeholders. Given that livestock farming is primarily focused on cattle farming, cooperatives and unions associated with milk and cheese production are also considered project stakeholders.

The "Analysis of Enterprises Producing Kashar Cheese in Kars and Ardahan," produced by Serhat Development Agency (SERKA), in December 2022, provides up-to-date data on the current situation in the region34. According to this report, in the year 2021, the number of Milk and Dairy Product Enterprises in Kars was 6235.

Kars province, which is located at the Northeast Region of Türkiye, has hosted most of ethnic groups historically.

Due to the severe winter conditions in the region, wild animals can be observed near the train tracks, extending up to the railway. Especially during the evening hours in the winter, bear, wolf, and wild boar crossings have been observed.

Taşbaşı station, located adjacent to a forested and mountainous region, is likely to highlight various wildlife species in its vicinity. The nearby area may feature examples of the ecosystem associated with Çıldır Lake and other interconnected water bodies, contributing to the rich biodiversity of the region. The project, which can be evaluated within the scope of ecosystem services and is conducted by the Kars Region Natural Product Growers Association (KADÜ), has been included the village of Aydıngün among the project villages36.

34 https://www.serka.gov.tr/assets/upload/dosyalar/kars-ve-ardahanda-peynir-ureten-isletmelerin-analizi.pdf
35 https://kars.tarimorman.gov.tr/
36 http://www.karsdogal.org/proje-koumlyler304.html

Wildlife crossing is a critical issue for Süngütaşı station. Beehives used for beekeeping have been observed in the vicinity of the station. While not a characteristic activity, this situation may indicate nearby beekeeping activities.

Similarly, Kars Honey, which holds a geographical indication, is also related to the intensive beekeeping activities in the region37.

The "Kaz Eti" (Goose Meat) registered on 03.10.2023 as a geographically protected product upon the request of the Kars Chamber of Commerce and Industry indicates goose farming, which holds a significant place in livestock and tourism activities in the Kars region38.

Due to the geographical location of the Güvercin station and the surrounding natural resources, Güvercin Station shares parallel and similar characteristics with Canbaz and Taşbaşı Stations.

According to ABPRS presented by TurkStat 2024 data, Kars accommodates 72,246 households with a 3.58 average household size. The other population data are given in Table 121.

Table 121. Population information of Kars region

Province	District	Station	Settlement	Population	Number of Household	Average Household Size
Kars	-	-	-	278,335	72,246	3.58
Kars	Arpaçay	-	-	14,670	4,418	3.26
Kars	Arpaçay	Güvercin	Güvercin	306	-	-
Kars	Arpaçay	Taşbaşı	Taşbaşı	188	-	-
Kars	Central	Kars	-	122,524	32,589	3.37
Kars	Central	Kars	Cumhuriyet	7,335	-	-
Kars	Central	Kars	Hafızpaşa	2,581	-	-
Kars	Sarıkamış	Sarıkamış	-	37,348	9,512	3.79
Kars	Sarıkamış	Süngütaş	Süngütaş	126	-	-
Kars	Sarıkamış	Soğanlı	Sırbasan	150	-	-
Kars	Sarıkamış	Sarıkamış	İstasyon	1,161	-	-
Kars	Selim	Selim	-	21,178	5,380	3.91
Kars	Selim	Selim	Selim	574	-	-
Kars	Selim	Benliahmet	Benliahmet	645	-	-

General results of household survey for these settlements are listed in below:

- A total of 75 household surveys were completed in these settlements between 25 and 28, March 2024.
- During the survey, apart from 26 female household representatives, mostly men have participated.
- The preferred method for informing about the project is mostly through the mukhtar, meetings, and the Ministry.
- The usage of trains among the residents is at a medium level.
- Only 12 households are knowledgeable about the project. The rest are partially informed or not informed at all.
- There is an emphasis on Region Population / Local People / Local Residents who will benefit from the project. There is a specific emphasize on tourism. Concerns about the negative impacts of the project are related to Livestock Breeders / Shepherds / Animals.
- The total population in the represented households is 366 individuals, with a high number of individuals in the 15-64 age group.

37 https://ci.turkpatent.gov.tr/cografi-isaretler/detay/38240

38 https://ci.turkpatent.gov.tr/cografi-isaretler/detay/3402

- The number of men and women in the households is close (177 women, 189 men).
- The primary source of livelihood in the households is agriculture, followed by livestock farming and retirement.
- The prominent issues in the region are unemployment, technical infrastructure problems such as road condition, and animal passageways.
- Among the 366 individuals, there are 65 unemployed individuals and 6 individuals with disabilities.
- There are students attending school in 51 households.
- There are elderly individuals in the advanced age group in 27 households.
- Languages other than Turkish are spoken in 30 households.

There are meetings were scheduled with 49 mukhtars of the settlements. However, 13 meeting with the mukhtar could not be realized due to decline and access problems. The reason for not being able to reach the mukhtars is largely due to incorrect phone numbers and other numbers found on the internet. Reason of the refused interviews can be listed as follows:

- Expressing that he would not be affected by the conducted works.
- Stating that he did not want to share information about his village.
- Stating that the grazing lands already passed through the middle.
- The meeting was declined without specifying a reason.

4.13.2.2 Stations

The railway extends from the western border of Kars province to the northeastern border near Ardahan.Included in the investigation are Taşbaşı Station (see Table 122), Güvercin Station (see Table 123), Kars Main Station, BTK Line and Kars Logistic Centre (see Table 124), Dikme Abandoned Station (see Table 125), Benliahmet Station (see Table 126), Selim Station (see Table 127), Çatak Abandoned Station (see Table 128), Sarıkamış Station (see Table 129), Topdağı Station (see Table 130) and Süngütaşı Station (see Table 131) within the confines of Kars.

The Soğanlı Station in the Kars Sarıkamış region has been excluded from the scope of the study due to accessibility challenges and the absence of stakeholders at the station.

The data derived from face-to-face interviews carried out at field stations and the field notes in Kars province are delineated in between Table 122 and Table 131

Detailed information on field survey schedule of 1st phase of social research is given in Appendix-9. In addition, all the stakeholders including the PAPs are given with Appendix-10. While data regarding unmanned and closed facilities is sourced from discussions conducted with the responsible staffs of the Kars 47th Branch of TCDD's Department of Railway Maintenance, information about stations where station employees are present has been obtained through discussions with the personnel here. The remaining findings have been obtained through visits to the relevant station and the surrounding settlement.

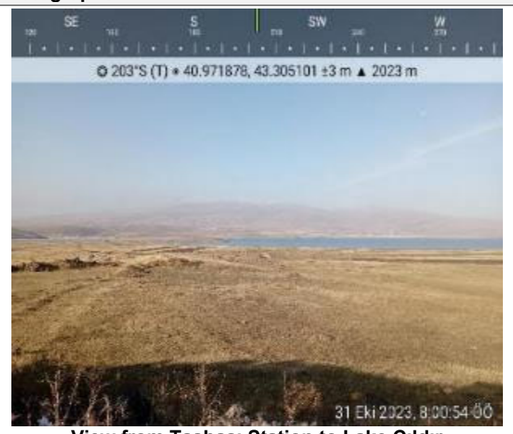
In this context, on October 31, 2023, Taşbaşı Station and Güvercin Station were visited together with the responsible staff of the Kars 47th Branch of TCDD's Department of Railway Maintenance. The visit to Kars Main Station was also conducted on the same date with the same team. Information regarding the BTK line and Kars Logistics Center was obtained during a field visit on October 17, 2023, and October 30, 2023. Similar data regarding the abandoned station, Aşid Tunnel, was obtained during fieldwork on October 17, 2023.

Interviews were not possible at Dikme Abandoned Station, Benliahmet Station and Çatak Station due to their unmanned characteristic. Nevertheless, these stations and their surroundings were visited and documented through photography. At Selim Station, interviews could not be conducted due to inaccessible personnel; however, the station and its

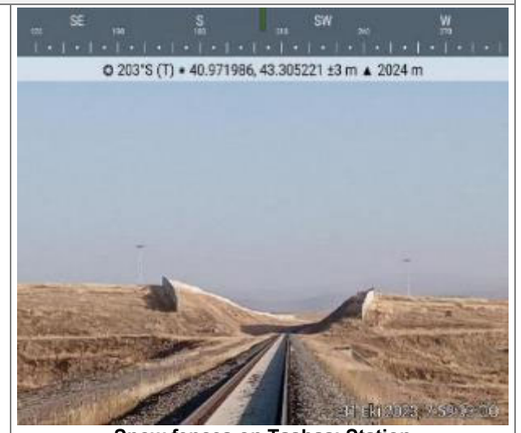
surroundings were visited and photographed. Face-to-face interviews were carried out with authorized personnel at Sarıkamış Station and Süngütaşı Station.

Table 122. Taşbaşı Station

Station	Location	Scope of the Project	Baseline Condition
Taşbaşı	**Province: Kars** **District: Arpaçay** **Nearby Settlement: Taşbaşı** **km: 1416+349**	The existing mainline will be doubled, and one additional sidetrack will be arranged to accommodate a 1,050 m train. Four additional level crossings will be established between the existing and new tracks.	In accordance with the opinion of the respondent that the area does not have an expropriation issue. There is no structure owned by the TCDD. Personnel responsible for the station have been assigned, but their duty station is at the Kars 47th Branch of the TCDD's Department of Railway Maintenance. A station used for freight transport. It is not used for passenger transportation.
ESSs	**Findings**		**Photographs**
ESS1	There is no identified risk and impact for the current situation of the station. The region where the station is located has been included in the AKAKP due to its water resources and agricultural-livestock potential.		
ESS2	Due to the absence of any structure owned by the TCDD, there are no personnel permanently stationed here. Since there is no structure, accommodation is also not provided. Personnel access this station primarily via Placer Mobile Excavator – Maintenance Repair Road Vehicle traveling on the rails rather than by road. There is no activity that could create a source of pollution since there are no structures or facilities		
ESS4	There is no protective structure around the tracks to prevent crossings. Therefore, the rails on the station line are open and in a risky condition for both pedestrian and animal traffic. The activity in the vicinity does not pose a risk of water, soil, or air pollution for the residential areas. Materials such as concrete sleepers and bearers used during the maintenance and repair of the railway are stored in the open. Similarly, old materials undergoing repairs are also kept outdoors.		
ESS5	In accordance with the opinion of the respondent that the station and the adjacent land fall under the authority of the TCDD, with ample space available for the proposed activities in the area. Consequently, there is no requirement for land acquisition either from private or public domains throughout the project.		
ESS10	The areas surrounding the station encompass villages in Çıldır district, affiliated with Ardahan Province, and villages in Arpaçay district, affiliated with Kars Province. Additionally, cooperatives[39] engaged in agriculture and livestock activities, as well as tourism facilities (Arpaçay Kütük Ev[40]) in the vicinity, are also stakeholders affected by the project. Kuyucuk Lake and Çıldır Lake serve as camping grounds for tourists, contributing to tourism along the lake shores. In this context, campers from outside the region could also be impacted by project activities. Local administrators (or mukhtars) of the relevant villages /neighborhoods, along with public institutions and non-governmental organizations (if any) in Arpaçay and Çıldır districts, are stakeholders with potential interest in the project. Passenger trains do not make stops at this station. Consequently, the probability of individuals from outside the region engaging with the train is minimal. The list of private and government institutions in Arpaçay district that could be project stakeholders is provided below[41]: • Arpaçay District Governorship[42] • Arpaçay Municipality[43] • Arpaçay District Directorate of National Education[44] • Arpaçay District Directorate of Agriculture and Forestry[45] • Arpaçay District Health Group Presidency[46] • TEDAŞ Operation Directorate • Arpaçay Chamber of Agriculture[47] • Arpaçay Rural Service Delivery Union[48] • Arpaçay State Hospital[49] • Arpaçay District Special Administration[50] • Arpaçay Irrigation Cooperative[51] • Kars Arpaçay Associations Federation[52]		



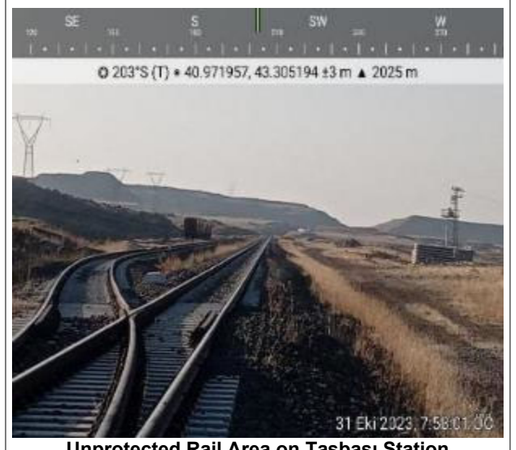
View from Taşbaşı Station to Lake Çıldır



Snow fences on Taşbaşı Station



Access Road to Grazing Areas around Taşbaşı Station



Unprotected Rail Area on Taşbaşı Station

39 Arpaçay Irrigation Cooperative, https://bolge24.dsi.gov.tr/Sayfa/Detay/959#
40 http://arpacay.gov.tr/arpacay-kutukev
41 http://www.arpacay.gov.tr/ilce-protokolu
42 http://www.arpacay.gov.tr/
43 http://www.arpacay.gov.tr/arpacay-belediyesi
44 https://arpacay.meb.gov.tr/
45 http://www.arpacay.gov.tr/ilce-tarim-ve-orman-mudurlugu
46 http://www.arpacay.gov.tr/saglik-grup-baskanligi
47 http://arpacay.ziraatodasi.org.tr/iletisim
48 http://www.arpacay.gov.tr/koylere-hizmet-goturme-birligi
49 https://arpacaydh.saglik.gov.tr/
50 http://arpacay.gov.tr/ilce-ozel-idare-mudurlugu
51 https://bolge24.dsi.gov.tr/Haber/Detay/9275
52 https://www.facebook.com/KarsAtaFed/

Station	Location	Scope of the Project	Baseline Condition	
	All the mentioned stakeholders have been added to Appendix-10.			

Table 123. Güvercin Station

Station	Location	Scope of the Project	Baseline Condition
Güvercin	**Province: Kars District: Arpaçay Nearby Settlement: Güvercin km: 1397+149**	The existing main line will be doubled, and 1 additional sidetrack will be arranged to accommodate a 1,050 m train. Four additional level crossings will be established between the existing and new tracks.	There are no structures owned by the TCDD in the area. While personnel responsible for the station have been assigned, their duty station is at the Kars 47th Branch of the TCDD's Department of Railway Maintenance. The station is primarily utilized for freight transport and is not operational for passenger transportation. The station was visited for the first time as part of the site inspection activity on October 17, 2023. The second visit took place on October 31, 2023, during stakeholder meetings. Employees of the Kars 47th Branch of the TCDD's Department of Railway Maintenance accompanied both visits.
ESSs	**Findings**		**Photographs**
ESS1	The current situation of the station does not exhibit any identified risks or impacts. The region containing the station has been encompassed within the scope of AKAKP, attributed to its water resources and potential in agriculture and livestock.		 **Station's View towards Güvercin village**
ESS2	Lack of any structure owned by the TCDD results in the absence of permanently stationed personnel. With no infrastructure available, accommodation facilities are also not provided. Personnel primarily access this station through Placer Mobile Excavator – Maintenance Repair Road Vehicle, utilizing rail transportation rather than road access. No structures or facilities are present, eliminating any activities that could potentially generate a source of pollution.		
ESS4	There is no protective structure in place around the tracks to hinder crossings. As a result, the rails on the station line are exposed and pose a potential risk for both pedestrian and animal traffic. The activities in the surrounding area do not present a risk of water, soil, or air pollution for the residential zones. Materials like concrete sleepers and bearers, used in railway maintenance and repair, are stored openly. Likewise, materials undergoing repairs are also kept outdoors.		
ESS5	In accordance with the opinion of the respondent that both the station and the adjacent land are under the authority of the TCDD, providing sufficient space for the planned activities in the area. Consequently, there is no need for land acquisition from either private or public domains throughout the project.		
ESS10	Güvercin Station is the closest station to the settlement compared to the Canbaz and Taşbaşı stations. Therefore, due to the railway and surrounding construction activities, interaction is expected to be higher compared to the other two stations. High interaction also increases the risks associated with the railway in terms of community health and safety. Passenger trains do not stop at this station. Therefore, the likelihood of the population coming from outside the region interacting with the train is low. All the mentioned stakeholders have been added to Appendix-10.		 **Agricultural Fields Around the Station**



One of the Access Roads Used as a Service Road

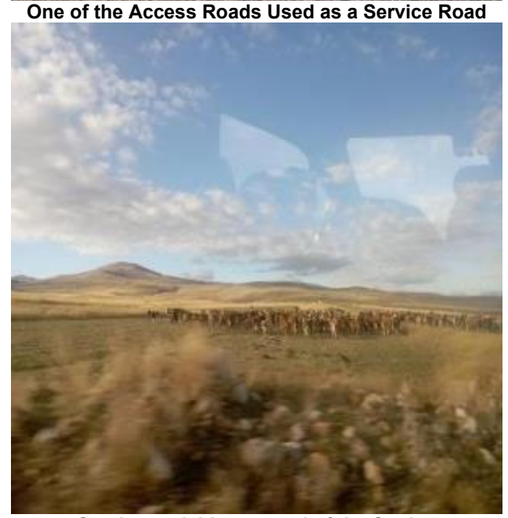
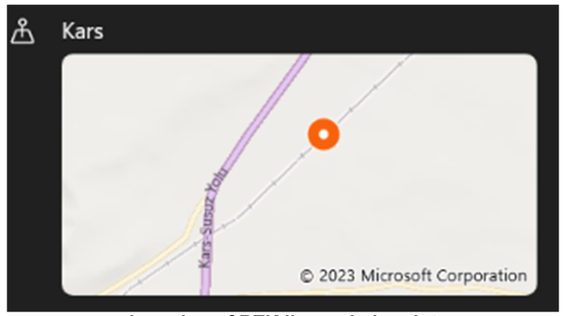
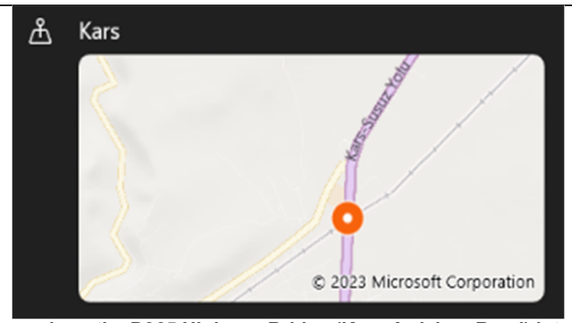
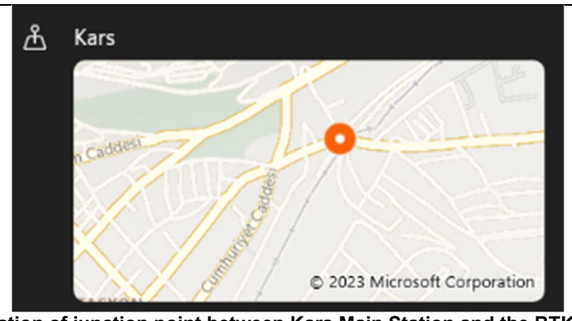

Grazing activities around of the Station

Table 124. Kars / BTK Line and Kars Logistic Centre

<table>
<tr><th>Station</th><th>Location</th><th>Scope of the Project</th><th colspan="2">Baseline Condition</th></tr>
<tr><td rowspan="4">Kars</td><td rowspan="4">Province: Kars
District: Central
Nearby Settlement: İstasyon Neighborhood
km: 1365+204</td><td rowspan="4">The existing station will be arranged to have a double main line, as an extension of the BTK double track. The ongoing double main line, with reduced kilometers, will be continued, and one of them will be extended to create the Kars Logistics connection.</td><td colspan="2">The first major station in the east-west direction of the line is Kars Station. The Kars Station is actively used for both freight and passenger transportation. Ticket sales are available at this station. The station is located in the city center of Kars. The mainline train arriving at the station is the Eastern Express, along with the regional train on the Kars-Akyaka line and the Touristic Eastern Express. The majority of regional train services in Türkiye are provided with DMU (Diesel Multiple Unit) sets[53]. These regional trains are named as "raybüs" that means "railcar". One of the noteworthy features of Kars Station is its connection to BTK railway line and the Kars Logistics Center. These features pose challenges for conducting operations within the urban areas along the line. One of these challenges is the potential conflicts with existing road infrastructure. Another difficulty is the necessity for land acquisition associated with the work on the line in the city center. The Kars Logistics Center (KLC) was visited during the site inspection on October 17, 2023. During a meeting with TCDD officials on the same day, information about the bogie exchange station and the overall status of the KLC was provided by the authorities. During this meeting, it was also conveyed that many of the tunnel structures from Sarıkamış to Divriği were physically problematic. It was specifically mentioned that the Aşid Tunnel, located at an altitude of 2,070-2,100 meters, is one of the most challenging areas.

Some statistics about railway operations on Kars region are given in the following [54&55]:
• The Kars city center is traversed by a total of 283 mainline tracks
• In Kars, the train-kilometers for Freight (13,248) and Service Train (11,677) are recorded by line sections
• Between 2018 and 2022, the Kars Logistics Center transported a total of 71,000 tons of freight
• In 2021, 60,058 passengers departed from Kars, while 59,991 passengers arrived in the city</td></tr>
<tr><td>

Location of BTK line switch point</td><td>

The area where the D965 Highway Bridge (Kars-Ardahan Road) intersects with the railway.</td></tr>
<tr><td>

Location of junction point between Kars Main Station and the BTK line switch point</td><td>
Kars Logistic Centre</td></tr>
<tr><td>ESSs</td><td colspan="2">Findings</td><td colspan="2">Photographs</td></tr>
<tr><td>ESS1</td><td colspan="2">According to the results of the meeting with the authorized personnel, the planned activities for Kars Station may intersect with the highways at two points within the city. One of these points is the Mihrali Bey overpass, and the other is the overpass on the Ardahan - Kars Road. The highways on both the right and left sides of the road leading to the Kars Logistics Center may be affected. In these areas, there may be issues related to expropriation. In accordance with the opinion of the respondent that to reduce the impact and minimize land acquisition, it would be</td><td></td><td></td></tr>
</table>

[53] https://tr.railTürkiye.org/seyahat/bolgesel-tren-secenekleri/

[54] https://static.tcdd.gov.tr/webfiles/userfiles/files/istrapor/20182022.pdf

[55] https://adminapi.tcddtasimacilik.gov.tr/files/pdfs/TCDD-Tasimacilik-2021-istatistikleri.pdf

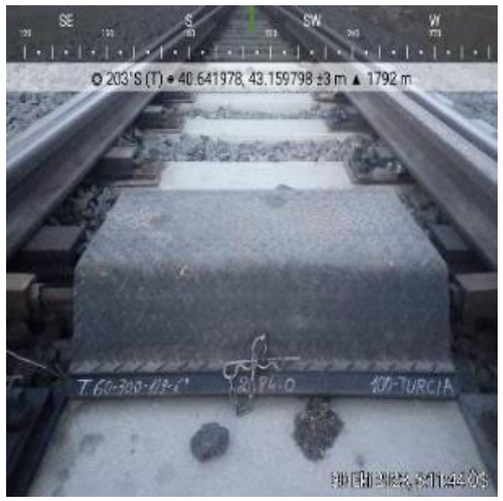
Station	Location	Scope of the Project	Baseline Condition
	appropriate to use "double-deck turnouts" in railway construction. This way, it will be possible to install 4 tracks on a single turnout. In the same meeting, the necessity of arranging level crossings on the roads between Kars and the Kars Logistics Center was emphasized. These adjustments can be addressed by constructing both overpasses and underpasses. One of the most significant challenges at the stations in the region is the difficulty posed by winter conditions. During the field visit on October 17, 2023, particular attention was given to the hindrance caused by icicles formed due to water leakage inside the Aşid Tunnel. It was mentioned that these icicles impede work. Freezing of switches during winter conditions was also noted as a factor complicating operations. On the identical route, tunnel structures are noticed at kilometer points 12+035, 13+784, 17+220, 18+680, 20+850, 21+263, 22+010, and 26+418, respectively, from their initial positions. Typically, tunnels encounter challenging conditions at the road access points. Illumination is absent within the tunnels in the specified area. The railway overpass bridges connecting the tunnels exhibit substantial wear and tear.		
ESS2	One of the most significant challenges for railway personnel is the difficulty of working in winter conditions. The freezing of switches creates disruptions in train operations. Personnel involved in the construction and maintenance of tunnels and stations face difficulties due to the severe winter conditions caused by geographical factors. In challenging terrains such as the Aşid Tunnel, where access to the railway via road is not possible, access is only achievable through vehicles like Placer Mobile Excavator – Maintenance Repair Road Vehicle on the railway. In the workforce in Kars, there are two newly appointed female traffic officers.		
ESS4	In the meeting with the authorized personnel, information was conveyed indicating that existing level crossings might be insufficient for upcoming projects. Particularly, to reduce the risk of accidents related to trains on railway tracks in the city center, the construction of both underpasses and overpasses can be employed as preventive measures.		
ESS5	There is no finding and observation.		
ESS10	For Kars Station, the most important stakeholders are 1) Highways 18th Regional Directorate, 2) General Directorate of State Hydraulic Works (DSİ) 24th Regional Directorate, and 3) Kars Municipality. These stakeholders are frequently contacted during current railway maintenance and repair operations. The authorized units at Kars Station are in contact with city authorities, highways, and the municipality due to urban roadways, as well as with DSİ regarding irrigation canals and culverts in rural areas during their work.		



BTK line switch point 1



BTK line switch point 2



Technical details given on rail line



Responsible staff on BTK line switch point

Station	Location	Scope of the Project	Baseline Condition	
	Due to its location, the closest stakeholder to the KLC is Pasifik Eurasia, which operates here. Another stakeholder in close proximity to the KLC is the Kars Organized Industrial Zone (OIZ). The Mezraa settlement, located at the intersection of the BTK and the Armenia routes on the Kars-Susuz Road, is an important stakeholder. Nowadays, five ethnic community which we can call them as “Azeri,” “Türkmen,” “Kurdish,” “Terekeme” and “Yerli,” live in city[56]. The ETMIC project, as an intergovernmental initiative, directly involves the Government of Georgia as it is a neighboring country. In this context, Kars Station, the largest station before the border, is a project stakeholder in collaboration with Georgian Railways. The Kartsakhi-Aktaş Border Gate, located in Kenarbel Village in the Çıldır district of Ardahan province, is a project stakeholder as it serves as a project intersection for transportation activities between the two countries. SERKA, which operates activities in the TRA2 development region comprising Ağrı, Ardahan Iğdır, and Kars, provinces, is among the stakeholders of the project. BTC Pipeline and the Trans-Anatolian Natural Gas Pipeline (TANAP) Project represent crucial strategic investments in the region and are counted among the stakeholders of the project. The potential stakeholders within Kars Central District are listed below. • Kars Governorship[57] • Kars Municipality[58] • Kars Kafkas University[59] • Kars Provincial Directorate of Environment, Urbanization, and Climate Change[60] • TEDAŞ ARAS Regional Directorate[61] • Kars Cultural Heritage Protection Regional Board Director[62] • Kars Provincial Directorate of National Education[63] • Kars Provincial Health Directorate[64] All the mentioned stakeholders have been added to Appendix-10.	 **The level crossing at the junction points between Kars Main Station and the BTK line switch point 1**  **The intersection of the highway overpass and the railway on the Kars-Ardahan Road-1**	 **The level crossing at the junction points between Kars Main Station and the BTK line switch point 2**  **The intersection of the highway overpass and the railway on the Kars-Ardahan Road-2**

56 https://www.sosyalarastirmalar.com/articles/an-approach-to-migration-phenomenon-in-terms-of-ethnic-identity-the-case-ofkars.pdf
57 http://www.kars.gov.tr/
58 https://www.kars.bel.tr/
59 https://www.kafkas.edu.tr/
60 https://kars.csb.gov.tr/
61 http://kars.gov.tr/aras-elektrik-dagitim-anonim-sirketi
62 https://kvmgm.ktb.gov.tr/TR-50642/kars-kultur-varliklarini-koruma-bolge-kurulu-mudurlugu.html
63 https://kars.meb.gov.tr/
64 https://karsism.saglik.gov.tr/

Table 125. Dikme Abandoned Station

Station	Dikme Abandoned Station
Location	**Province: Kars** **District: Central** **Nearby Settlement: Dikme** **km: 1352+150**
Scope of the Project	The construction of additional sidings will be organized to accommodate trains of 700 m at the station, with the main line designed to include two additional sidings
Baseline Condition	At this station, there is no station building, and there is no staff assigned to the station. There is no passenger movement for the Eastern Express at this stop. The nearest settlement, which gives the station its name, is the Dikme settlement, belonging to the central district of Kars Province. The settlement includes a primary school, secondary school (Dikme Hacı Yasemen Yılmazel Primary School and Secondary School), and a health center (Kars Central Community Health Center (CHC) Dikme Health House) as essential facilities. Within the village, there is the Hacı Ayşe Cultural Center, serving as a gathering and civil society space. Large-scale livestock farming activities have been observed in the region. Grazing areas intersect with railway structures such as bridges, culverts, and underpasses. All the mentioned stakeholders have been added to Appendix-10.



Dikme Hacı Yasemen Yılmazel Primary School



Dikme Hacı Ayşe Cultural Centre



Water bodies and grazing activities nearby railway



Train track overpass

Table 126. Benliahmet Station

Station	Benliahmet Station
Location	**Province: Kars** **District: Selim** **Nearby Settlement: Benliahmet** **km: 1340+550**
Scope of the Project	The existing station will be arranged to accommodate 750 m trains with a main line + 1 sidetrack configuration. The 2nd and 3rd sidetracks will be canceled.
Baseline Condition	At this station, there is no station building, and there is no staff assigned to the station. There is no passenger movement for the Eastern Express at this stop. The nearest settlement, which gives the station its name, is the Benliahmet settlement, belonging to Selim district of Kars Province. The settlement includes a primary school, secondary school (Benliahmet Şehit Öğretmen Taşkın Senger Primary School and Benliahmet Şehit Öğretmen Taşkın Senger Secondary School), and a health center (Kars Selim CHC Benliahmet Health House) as essential facilities. Within the village, there is the Benliahmet Equestrian Sports Club, serving as a civil society space. Large-scale livestock farming activities have been observed in the region. Grazing areas intersect with railway structures such as bridges, culverts, and underpasses. All the mentioned stakeholders have been added to Appendix-10.

Station	Benliahmet Station		
			
Benliahmet Health House	Mukhtarship building and Equestrian Sports Club	Benliahmet Şehit Öğretmen Taşkın Senger Primary School	Benliahmet Şehit Öğretmen Taşkın Senger Secondar School

Table 127. Selim Station

Station	Selim Station
Location	**Province: Kars** **District: Selim** **Nearby Settlement: Selim** **km: 1329+945**
Scope of the Project	The existing station will be arranged to accommodate 750 m trains with a main line + 2 sidetracks configuration. The 3rd sidetrack will be canceled.
Baseline Condition	At Selim Station, there is a new station building, including the old station building, administrative building for railway personnel, a protection area for loading and unloading operations. The meeting could not take place during the field visit because the assigned personnel were not present at the location. The second station after Kars Station on the east-west route of the Eastern Express is Selim. Selim District stakeholders are listed below: ▪ Selim District Governorship[65] ▪ Selim Municipality[66] ▪ Selim District Directorate of National Education[67] ▪ Selim District Directorate of Agriculture and Forestry[68] ▪ Selim District CHC[69] ▪ Selim Chamber of Agriculture[70] ▪ Selim District Special Administration[71] ▪ Settlements named as Aşağı Kotanlı, Benliahmet, Çarşı, Cavlak, Çaybaşı, Cumhuriyet, Karaçayır, Köprübaşı, Yolgeçmez, and Yukarı Kotanlı All the mentioned stakeholders have been added to Appendix-10.



One of the idle structures around the station



Canopy



Stationmaster and Operations Officer administrative building along with passenger waiting lounge



A view of freight trains

65 http://www.selim.gov.tr/
66 https://www.selim.bel.tr/
67 https://selim.meb.gov.tr/
68 https://kars.tarimorman.gov.tr/Menu/13/Ilce-Mudurlukleri
69 kars.tarimorman.gov.tr/Menu/13/Ilce-Mudurlukleri
70 http://selim.ziraatodasi.org.tr/
71 http://www.karsozelidare.gov.tr/selim-ilce-zel-idaresi

Table 128. Çatak Abandoned Station

Station	Çatak Abandoned Station
Location	**Province: Kars** **District: Selim** **Nearby Settlement: Çatak** **km: 1319+875**
Scope of the Project	No work will be done.
Baseline Condition	No work is planned at the station located in Çatak village, which is affiliated with Sarıkamış District of Kars Province. At this station, there are no stops for freight or passenger trains.



General view of Çatak



Mukhtarship building



Çatak village mosque



Çatak village condolence house

Table 129. Sarıkamış Station

<table>
<tr><th>Station</th><th>Location</th><th>Scope of the Project</th><th colspan="3">Baseline Condition</th></tr>
<tr><td>Sarıkamış Station</td><td>Province: Kars
District: Sarıkamış
Nearby Settlement: Kazım Karabekir
km: 1305+615</td><td>The existing station will be arranged with a mainline and 5 sidetracks to accommodate 750 m trains. The blind track and connections will be canceled.</td><td colspan="3">Passenger boarding and alighting processes for regional trains, the Eastern Express, and the Touristic Eastern Express are carried out at the station. Additionally, freight trains operate at the station. The Touristic Eastern Express operates seasonally and runs between November and April. The currently inactive line connects to the Agricultural Products Office (TMO). The other inactive line is the access road to the snow hangar where equipment and materials used in snow combat activities are located. At Sarıkamış station, there are building structures for accommodation; however, they cannot be made suitable for accommodation through renovation and repair.</td></tr>
<tr><td>ESSs</td><td colspan="2">Findings</td><td colspan="3">Photographs</td></tr>
<tr><td>ESS1</td><td colspan="2">In the meeting with the station manager and the movement officer on October 31, 2023, it was conveyed that there might be disruptions in train traffic due to road construction and repair processes throughout the project duration.

One of the issues at the station is related to security. Theft problems are encountered in old lodgment structures and similar areas that fall within the blind spots of security cameras. One of the contributing deficiencies to this situation is the inadequate lighting in the areas around the station.

The region experiences intense icing at switches and switch ends due to severe winter conditions. This situation is significant enough to disrupt train traffic. Additionally, problems during switch changes due to freezing create a risk of accidents.

The personnel interviewed believe that this issue can be resolved by installing heating systems on the switches. For example, in regions where winter conditions are more typical, such as Izmir, some switches are equipped with heating systems, and positive results have been observed.</td><td rowspan="4">

The nearby sensitive receiver is the school building.



Uncontrolled pedestrian crossing - 1</td><td rowspan="4">

Abandoned structures subject to theft.



Uncontrolled pedestrian crossing - 2</td></tr>
<tr><td>ESS4</td><td colspan="2">The absence of a pedestrian crossing within the city and the distant locations of level crossings poses issues for both vehicular and pedestrian traffic. Although the impact may not be significant due to the low vehicular traffic in the district, the organized underpass for vehicle crossings is insufficient. In the closest vicinity to the station, there is a primary school. Students from this primary school have been observed making uncontrolled crossings over the train tracks to access the school. Similar problems occur due to animal crossings for grazing. The absence of sufficient material to prevent crossings around the station is one of the reasons for the mentioned issues.</td></tr>
<tr><td>ESS5</td><td colspan="2">In accordance with the opinion of the respondent there will be no issue with expropriation in the vicinity of the station.</td></tr>
<tr><td>ESS10</td><td colspan="2">One of the main requests from stakeholders in the station area is the construction of a pedestrian overpass. The railway dividing the town center into two creates issues for pedestrian crossings.

There is a complaint box and a complaint form available at the station.

The most sensitive stakeholder in the vicinity of the station is Halitpaşa Primary School[72] and its students. According to the data for the 2023 academic year, the school has 5 classrooms, 8 teachers, and 99 students.

During the meeting, it was mentioned that the most intensive communication was established with the Sarıkamış District Governorate, Sarıkamış Municipality, and Sarıkamış District Police Department.

The people living in İstasyon neighborhood, due to their daily routine, are stakeholders affected by the project as PAP. Additionally, local administrators of the district and</td></tr>
</table>

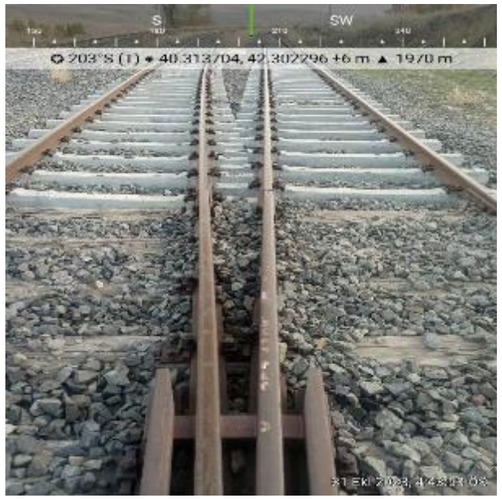
[72] https://karshalitpasailkokulu.meb.k12.tr/

Station	Location	Scope of the Project	Baseline Condition	
	public institutions and non-governmental organizations in Sarıkamış are among the stakeholders who may have an interest in the project, as "Other Interested Parties". The following is a list of private and public institutions in Sarıkamış district that may serve as stakeholders in the project. • Sarıkamış District Governorship[73] • Sarıkamış Municipality[74] • Sarıkamış District Police Department[75] • Sarıkamış District Gendarmerie Command[76] • Sarıkamış Deep Snow and Severe Cold Weather Combat Training Center Command • Sarıkamış District Special Administration[77] • Sarıkamış District Directorate of Health[78] • Sarıkamış District Directorate of National Education[79] • Sarıkamış Forest Management Directorate[80] • Kafkas University Sarıkamış Vocational School[81] • Kafkas University Sarıkamış School of Physical Education and Sports[82] All the mentioned stakeholders have been added to Appendix-10. Sensitive groups related to this component include individuals with disabilities, the elderly, and children who are at a higher risk in pedestrian traffic at railway crossings. Additionally, station personnel are at a disadvantage due to the inadequate lighting and security camera coverage, exposing them to risks such as theft and attacks.		

73 http://www.sarikamis.gov.tr/
74 https://www.sarikamis.bel.tr/
75 http://www.sarikamis.gov.tr/protokol-listesi
76 https://kars.jandarma.gov.tr/iletisim-ilce-jandarma
77 http://www.karsozelidare.gov.tr/sarikamis-ilce-zel-idare1
78 https://karsism.saglik.gov.tr/TR-143261/sarikamis-ilce-saglik-mudurlugu.html
79 https://sarikamis.meb.gov.tr/
80 https://www.ogm.gov.tr/erzurumobm/kurulusumuz/sarikamis-orman-isletme-mudurlugu
81 https://www.kafkas.edu.tr/smyo
82 https://kafkas.edu.tr/sabesyo/tr/sayfa5657

Table 130. Topdağı Station

<table>
<tr><th>Station</th><th>Location</th><th>Scope of the Project</th><th colspan="3">Baseline Condition</th></tr>
<tr><td>Topdağı Station</td><td>Province: Kars
District: Sarıkamış
Nearby Settlement: Yeniköy
km: 1273+531</td><td>The station is not suitable for extension. All lines will be preserved.</td><td colspan="3">The nearest settlement is Yeniköy. The Eastern Express is a passenger station, and freight trains also operate at the station. There are lodgings for staff, but they are insufficient in number. It is centrally located in the surrounding villages. It can be highlighted that the challenges at the station, including issues with train meetings and overtaking due to insufficient useful length. Poor road conditions connecting to the station hinder both staff and passenger access. The inadequate lighting in the vicinity, especially during late-night train services, has been identified as a significant problem. The recommendation is to introduce a signal system, which is currently lacking, to address these issues in the project implementation.</td></tr>
<tr><td>ESSs</td><td colspan="2">Findings</td><td colspan="3">Photographs</td></tr>
<tr><td>ESS1</td><td colspan="2">Insufficient useful length in the vicinity of the station creates difficulties in train meetings and overtaking. The poor conditions of the roads connecting to the station make it difficult for both the station staff and the passengers to access the station. In addition to the deficiencies in access roads, inadequate lighting in the vicinity particularly poses a problem for access during late-night train services. It is recommended to introduce a signal system that currently does not exist in the implementation of the project.</td><td rowspan="4" colspan="3">

Communication information and informative documents displaying train schedules.


Old type switches/components in need of maintenance and repair.

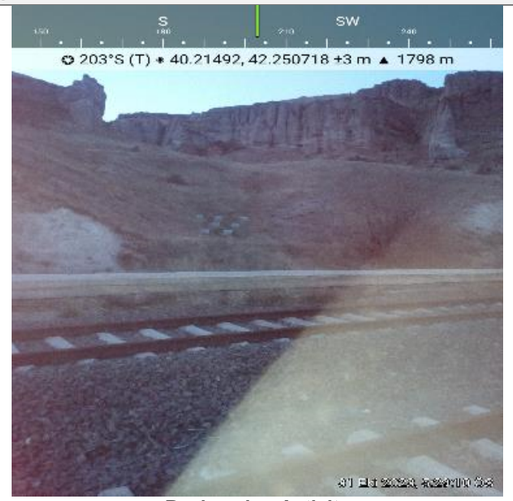

Yeniköy Health House


Livestock activity in Yeniköy</td></tr>
<tr><td>ESS2</td><td colspan="2">The total number of employees at the station is 5, with one being the station master, two being movement officers, and the rest being train formation officers. According to the information obtained on October 31, 2023, there is also a female movement officer at the station who works at Topdağı station on certain days of the week. However, during the meeting on October 31, 2023, it was stated that the female employee was not present at the station.
One of the main challenges the station faces is the working conditions during the winter season. The personnel responsible for controlling the switches face difficulties in accessing the switch points. Due to the difficulties encountered in changing the switches in winter conditions, the directions are made through the nearby station Horasan instead of Topdağı station.</td></tr>
<tr><td>ESS4</td><td colspan="2">Passengers coming from nearby settlements have to use their own flashlights. The access conditions of this station, which is a common point for all nearby villages, are a significant problem that affects all passengers in the vicinity due to poor road and lighting conditions.</td></tr>
<tr><td>ESS5</td><td colspan="2">There is no finding and observation.</td></tr>
<tr><td>ESS10</td><td colspan="2">The nearest settlement to the station is Yeniköy. All the villages in the region up to Sarıkamış Station use this station for transportation. The specified route includes the villages of Kurbançayır, and Sırbasan. Due to the intense winter conditions in the region, railway usage is preferred over the road during the winter season. Therefore, the busiest periods of the station coincide with the winter months. Another factor influencing the number of passengers is the exam period for students.
The individuals with disabilities and the elderly are among the sensitive and disadvantaged groups due to deficiencies in access roads. Additionally, women who are heads of households and travel to the station by crossing a dark path may also be hesitant.
In the settlement of Yeniköy, there is a health center (Kars Sarıkamış CHC Yeniköy Health House) and a primary school (Yeniköy Orhan Yavuz Primary School[83]). The village relies on livestock farming. Among the project stakeholders, households engaged in livestock farming in the village may also be included.
All the mentioned stakeholders have been added to Appendix-10.</td></tr>
</table>

83 https://yenikoyorhanyavuzilkokulu.meb.k12.tr/

Table 131. Süngütaşı Station

Station	Location	Scope of the Project	Baseline Condition
Süngütaşı Station	**Province: Kars District: Sarıkamış Nearby Settlement: Süngütaşı km: 1260+280**	The existing station will be arranged to accommodate 750 m trains with a main line + 1 sidetrack configuration, and 1 sidetrack and the blind track will be canceled.	The station was closed until one month ago due to renovation works. One of the existing three tracks is currently closed due to renovation. This station does not have loading and unloading operations. Only passenger and freight trains operate at this station. The freight trains in operation travel back and forth on the Erzurum-Kars route. The passenger trains include the Eastern Express and the Touristic Eastern Express, which operate between November and April. The Karaurgan facility, which is not within the scope of the project, is the nearest facility to this station. Karaurgan facility is not a station but only a halt. The total population of the settlement is 127.
ESSs	**Findings**		**Photographs**
ESS1	No issues in operation have been reported, and there is no negative feedback about the project.		
ESS2	The station is staffed with a total of 6 personnel. One of these employees is a female movement officer. As of the meeting on October 31, 2023, she is not present at the station due to her off-duty day. There is accommodation available for employees.		
ESS4	The attendance of two close-by stations is a source of satisfaction for passengers. The station and its surroundings are not used for grazing activities. The effective factor in this situation is the distance of the water source, Süngütaşı Creek, from the station. In short, individuals engaged in livestock farming in the region cannot use this area for grazing.		
ESS5	In accordance with the opinion of the respondent the area around the station does not include private land or village land. Therefore, no expropriation issue is expected during the works		
ESS10	Local residents who are located in the two nearest settlements are Süngütaşı and Karaurgan are main stakeholders. After the renovation works at the station, the satisfaction level of the passengers in the region has increased. The presence of a waiting room and lavatories, in particular, is a significant development.		



Beekeeping Activity



Inadequate platform features

4.13.3 Erzurum Province

4.13.3.1 Settlements

In Erzurum province, there are 11 stations. These stations are Alvar, Aşkale, Erzurum, Hasankale, Hızırilyas, Horasan, Kandilli, Kaplıca (Ilıca), Karaçuha, Köprüköy, and Saptıran, in alphabetical order.

There are 3 stations in Aşkale district (Aşkale, Kandilli and Saptıran), 1 station in Aziziye district (Kaplıca (Ilıca)), 3 stations in Horasan district (Hızırilyas, Horasan, and Karaçuha), 1 station in Köprüköy district (Köprüköy), 2 stations in Pasinler district (Alvar and Hasankale), and 1 station in Erzurum central district as Yakutiye.

According to ABPRS presented by TurkStat 2024 data, Erzurum accommodates 197,862 households with a 3.48 average household size. The settlements around the stations are given with the demographic information via Table 132.

Table 132. Population information of Erzurum region

Province	District	Station	Settlement	Population	Number of Household	Average Household Size
Erzurum	-	-	-	749,993	197,862	3.48
Erzurum	Aşkale	Aşkale	-	21,410	6,302	3.36
Erzurum	Aşkale	Aşkale	Üç Mart	483	-	-
Erzurum	Aşkale	Aşkale	İstasyon	2,027	-	-
Erzurum	Aşkale	Kandilli	Kandilli	894	-	-
Erzurum	Aşkale	Saptıran	Saptıran	148	-	-
Erzurum	Aziziye	-	-	68,251	17,637	3.51
Erzurum	Aziziye	Kaplıca (Ilıca)	Ilıca	8,002	-	-
Erzurum	Horasan	-	-	36,359	9,261	3.88
Erzurum	Horasan	Horasan	Esentepe	841	-	-
Erzurum	Horasan	Hızırilyas	Hızırilyas	314	-	-
Erzurum	Horasan	Karaçuha	Karaçuha	59	-	-
Erzurum	Köprüköy	-	-	14,184	3,497	4.01
Erzurum	Köprüköy	Köprüköy	Şehitler	1,033	-	-
Erzurum	Pasinler	-	-	26,833		
Erzurum	Pasinler	Alvar	Çöğender	559	-	-
Erzurum	Pasinler	Hasankale	Kethuda	866	-	-
Erzurum	Yakutiye	-	-	186,066		
Erzurum	Yakutiye	Ömer Nasuhi Bilmen		29,254	49,261	3.44

General results of household survey for the abovementioned settlements are listed in below:

- Between March 22nd and 25th, 2024, a total of 222 household surveys were conducted in these communities.
- During the surveys, mostly men participated, with 75 female household representatives also taking part.
- The primary channels for project awareness are the Ministry, municipalities, and phone communications.
- Train usage among residents is notably high.
- Only 18 households possess full knowledge of the project, while others are partially informed or not at all.

- The project's focus is on students, train users, passengers, and residents near the railway line, with special attention to hospital visitors/patients. Concerns about negative impacts involve road transporters, travel companies, fuel firms, and drivers.
- The total population in surveyed households is 931, with 697 individuals aged 15-64.
- The gender distribution is nearly equal, with 465 women and 466 men.
- The main sources of income are permanent employment, retirement, and agriculture.
- Key regional issues include unemployment, weather conditions, and transportation.
- Out of 931 individuals, 85 are unemployed and 21 have disabilities.
- 148 households have school-going students.
- 41 households include elderly members.
- In 53 households, languages other than Turkish are spoken.

There are meetings were scheduled with 56 mukhtars of the settlements. However, 16 meeting with the mukhtar could not be realized due to decline and access problems. The mukhtars of the three settlements around the stations named Alvar, Köprüköy and Uzunahmet are also included in this count. The inability to contact the mukhtars is mainly attributed to inaccurate phone numbers and other contact information. Reason of the refused interviews can be listed as follows:

- Participation was declined by refusing to engage.
- The meeting was declined without a reason being specified.
- The conversation was ended.
- It was stated that they were not the mukhtar.
- It was stated that they were unavailable
- The expression of not wishing to express their opinions on the matter was stated.
- Their unwillingness to comment on the project was expressed.

4.13.3.2 Stations

The existing railway line delineates a route from the western border to the eastern border of Erzurum province, passing through the city center. One of the remaining 9 stations in the Erzurum region is Erzurum Main Station, and the other is an abandoned station (Karaçuha). As of November 1, 2023, face-to-face meetings were held with station employees at all stations except Karaçuha Abandoned Station. Contrary to expectations, the meeting at the Erzurum Main Station provided very general information. In Karaçuha Abandoned Station, only a field visit was conducted, and photographs were taken.

Hızırilyas, Alvar, Çiçekli, Saptıran, and Karasu stations, although located in the Erzurum region, have been excluded from the field program that includes stakeholder meetings due to accessibility challenges and the likelihood of reaching stakeholders.

The station located in Palandöken, including the logistics center area, has been excluded from the field study since no work will be conducted within the project scope in that region.

To examine the Horasan Station (see Table 133), Karaçuha Abandoned Station (see Table 134), Köprüköy Station (see Table 135), Hasankale Station (see Table 136), Uzunahmet Station (see Table 137), Erzurum Main Station (see Table 138), Kaplıca (Ilıca) Station (see Table 139), Kandilli Station (see Table 140) and Aşkale Station (see Table 141), sequentially for information obtained from face-to-face meetings and field visits. Additionally, a meeting was held with the mukhtar of the Uzunahmet settlement, and relevant notes have been utilized in Table 137).

Detailed information on field survey schedule of 1st phase of social research is given in Appendix-9. In addition, all the stakeholders including the PAPs are given with Appendix-10.

Field observations mainly act as a guide for the socioeconomic framework, while the information are detailed between Table 133 and Table 141.

Table 133. Horasan Station

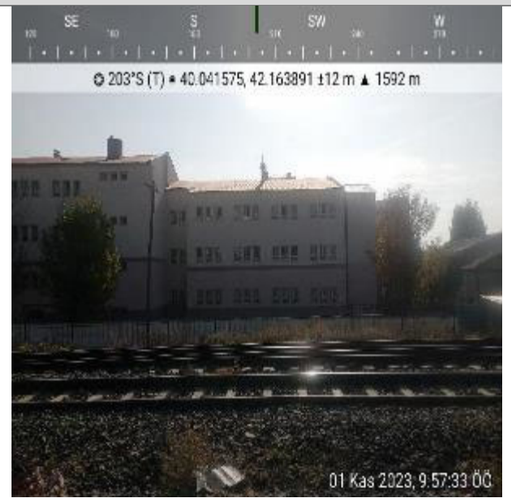
Station	Location	Scope of the Project	Baseline Condition
Horasan Station	**Province: Erzurum** **District: Horasan** **Nearby Settlement: Esentepe / Mümtaz Turan / Yeni / İnönü** **km: 1233+879**	The existing station will be arranged to accommodate 750 m trains with a main line + 4 sidetracks, and 1 blind track will be canceled.	Two passenger trains arrive at the station every day. The train schedules are around 10 AM and 6 PM. A freight train also arrives every two days. Thus, a total of 6 trains makes stops at the station, including both passenger and freight trains.

ESSs	Findings	Photographs	
ESS1	There has been no negative feedback regarding the current state of the station. There is no anticipated adverse impact for the planned project.		
ESS2	The number of personnel working at the station is 4. All of these employees are male, with 2 being train formation workers, 1 station manager, and the other track maintenance and repair officer. The station provides accommodation facilities.		
ESS4	The requests for underpasses and overpasses have been expressed on the railway tracks. Especially in the inner part of Horasan, there is a need for an overpass for pedestrian crossing. During the meeting on November 1, 2023, it was emphasized that the need for a level crossing at points 1235+700-800 to 1233+900 and 1234+00 km is of vital importance. The mentioned points have been identified as the busiest crossing points due to the high concentration of students in those areas. According to the findings from the meeting, these points are not barrier-free level crossings. In terms of train traffic safety, enclosure walls need to be arranged to prevent pedestrian and animal crossings. Walls have become ineffective at many points due to damaged barriers.		
ESS5	In accordance with the opinion of the respondent no issues related to expropriation are expected on the track. However, on the other side of the road, there are residential areas and fields. In the event of extension works towards residential areas and fields, there is a possibility of encountering private properties		
ESS10	The requests from the stakeholders in the region include the arrival of a high-speed train to the area. The number of passengers on train journeys varies, with recorded counts ranging from a minimum of 5 to a maximum of 30 passengers. Between the 1250+60 km point and the station, there are issues with the telephone networks in the area. The station is equipped with a suggestion and complaint box as well as an information board. A ramp-accessible toilet has been provided for individuals with disabilities. The following is a list of private and public institutions in Horasan district that may serve as stakeholders in the project. • Horasan District Governorship[84] • Horasan Municipality[85] • Horasan District Police Department[86] • Horasan District Gendarmerie Command[87] • Atatürk University Horasan Vocational School[88] • Horasan District Directorate of National Education[89] • Horasan District Health Directorate[90] • Horasan State Hospital[91]		

Controlled level crossing

Uncontrolled level crossing

84 http://www.horasan.gov.tr/
85 https://www.horasan.bel.tr/
86 http://www.horasan.gov.tr/ilce-protokol-listesi
87 https://erzurum.jandarma.gov.tr/iletisim-ilce-jandarma
88 https://birimler.atauni.edu.tr/horasan-meslek-yuksekokulu/
89 https://horasan.meb.gov.tr/
90 https://horasansm.saglik.gov.tr/
91 https://horasandh.saglik.gov.tr/

Station	Location	Scope of the Project	Baseline Condition	
	• Palen Doğal Gaz[92] • General Directorate of Highways, Erzurum 122nd Branch, Horasan Maintenance Centre[93] • Erzurum Provincial Administration Horasan Maintenance Centre All the mentioned stakeholders have been added to Appendix-10.		 **Sensitive recipient school building**	 **Accessible toilet**
			 **Suggestion and complaint box**	 **Information board**

92 https://www.palen.com.tr/

93 https://www.kgm.gov.tr/Sayfalar/KGM/SiteTr/Bolgeler/12Bolge/Subeler/SbErzurum.aspx

Table 134. Karaçuha Abandoned Station

Station	Karaçuha Abandoned Station
Location	**Province: Erzurum** **District: Horasan** **Nearby Settlement: Karaçuha** **km: 1219+943**
Scope of the Project	Additional sidetrack construction will be carried out, and the station will be arranged with the main track + 1 sidetrack to accommodate 1,050 m trains.
Baseline Condition	At this station, there is no station building, and there is no staff assigned to the station. There is no passenger movement for the Eastern Express at this stop. The nearest settlement, which gives the station its name, is the Karaçuha settlement, belonging to Horasan district of Erzurum Province. There is no school in the settlement. Students here are transported to the Horasan Boarding Regional Middle School[94] and Kemaleddin Horasani[95] Elementary School in Horasan through a transportation system. The distance from the settlement to the mentioned schools is 18 km[96] All the mentioned stakeholders have been added to Appendix-10.



Level Crossing on Erzurum-Ağrı Highway



Village interior view 1



Village interior view 2



Village interior view 3

94 https://horasanybo.meb.k12.tr/tema/okulumuz_hakkinda.html
95 https://khorasani.meb.k12.tr/
96 https://horasan.meb.gov.tr/meb_iys_dosyalar/2020_03/09090607_TAYIMA_TEMEL_EYYTYM_2020-2021.xlsx

Table 135. Köprüköy Station

Station	Location	Scope of the Project	Baseline Condition
Köprüköy Station	**Province: Erzurum** **District: Köprüköy** **Nearby Settlement: Şehitler** **km: 1206+485**	Additional siding construction will be carried out, and the station will be arranged to accommodate 1,050 m trains with one main track + 1 sidetrack.	Recently, railway repair and maintenance work known as "poz çalışması[97]" has been implemented at this station. Inspections of station conditions are also carried out during visits called "turne[98]" conducted by authorized managers. The station where the train arrives twice a day receives and disembarks passengers, with the number of passengers varying but averaging around 5 people.

ESSs	Findings	Photographs
ESS1	No E&S risks related to the project have been identified.	 **Uncontrolled pedestrian crossing on the railway 1**  **Information document**
ESS2	There are a total of 4 employees working at the station. One is the station master, two are train formation workers, and the other is a movement officer. All employees are male, and there is no female employee assigned to the station, even though reassignment. Lodging facilities for station personnel are provided at the station.	
ESS4	The railway virtually divides the district into two parts. In the area north of the railway, there are schools and government offices, while the southern part consists of residential areas. Therefore, students heading to the school area are required to cross over the railway. Due to the walls surrounding the railway, the pedestrian crossings are located at a distance. However, students and other pedestrians are creating openings in the fence walls surrounding the railway to cross. Recently, an accident occurred involving a pedestrian crossing approximately 500 meters from the switch point. The walls constructed by the railway to prevent crossing are broken during the night, creating passage areas. The construction of an overpass in an intermediate area could prevent such unauthorized crossings. Households engaged in animal husbandry in the region can also use level crossings for animal crossings.	 **Uncontrolled pedestrian crossing on the railway 2**  **Accessible toilet for people with disabilities**
ESS5	In accordance with the opinion of the respondent here will be no issues related to expropriation in the vicinity of the station.	
ESS10	The stakeholders in the region have requested the construction of an overpass. In the region, the Eastern Express is used for short-distance travel, and ticket pricing is based on boarding and alighting fees. However, a decrease in the number of passengers has been reported during the recent period due to the fare increases in boarding and alighting fees. Köprüköy District Governorship is the closest government institution to the station. Köprüköy High School and Köprüköy State Hospital[99] are also among the other stakeholders. The following is a list of private and public institutions in Köprüköy district that may serve as stakeholders in the project: • Köprüköy District Governorship[100] • Köprüköy Municipality[101] • Köprüköy District Police Department[102] • Köprüköy District Gendarmerie Command[103] • Köprüköy District Directorate of National Education[104] • Köprüköy District Health Directorate[105] • Köprüköy District Integrated Hospital[106]	

97 https://dergipark.org.tr/tr/download/article-file/1318467
98 https://static.tcdd.gov.tr/webfiles/userfiles/files/mevzuat/genelemir/bakim/105.doc
99 District Integrated Hospital
100 http://www.koprukoy.gov.tr/
101 https://koprukoy.bel.tr/
102 http://www.koprukoy.gov.tr/birimlerimiz-emniyet-mudurlugu
103 http://www.koprukoy.gov.tr/jandarma-komutanligi
104 https://koprukoy.meb.gov.tr/
105 http://www.koprukoy.gov.tr/birimlerimiz-ilce-saglik-mudurlugu
106 https://koprukoyentegre.saglik.gov.tr/

Station	Location	Scope of the Project	Baseline Condition	
	All the mentioned stakeholders have been added to Appendix-10.			

Table 136. Hasankale Station

Station	Location	Scope of the Project	Baseline Condition	
Hasankale Station	**Province: Erzurum** **District: Pasinler** **Nearby Settlement: Kaplıcalar** **km: 1189+298**	The existing station will be arranged to accommodate 750 m trains, with a main line + 2 additional side lines, and the blind tracks will be canceled.	The Eastern Express arrives at the station twice a day. Additionally, freight trains also operate at the station. There is an active spur line between the station and Pasinler TMO. The daily number of passengers varies between 5 and 7 people.	
ESSs	**Findings**		**Photographs**	
ESS1	There are deficiencies throughout the line. Especially the platform lengths are insufficient. Passengers face difficulties getting on and off. Security cameras covering 9 points are in place, and there are no security issues.		 **Passengers awaiting the Eastern Express**	 **Employees assisting passengers traveling with heavy loads**
ESS2	The total number of employees at the station is 5. One of these employees is the station manager, and the others are movement officers and train formation workers. There are no female employees at the station. There is accommodation available at the station, but currently, it has no users.			
ESS4	In the neighborhoods of Kethüda and Reşadiye, there are level crossings. There can be issues with level crossings. There are both manual and automatic barriers at the crossings, and malfunctions can occur. When a malfunction is reported, intervention is carried out. Passengers face difficulties getting on and off. There is a fencing wall around the railway, but there may be pedestrians who do not want to go around this wall.			
ESS5	In accordance with the opinion of the respondents that there is no expropriation issue in the station and its surroundings.			
ESS10	The station is used by the rural population in the region. The passenger capacity is so low on some days that there are almost no passengers. Therefore, interaction with the local residents is infrequent. Due to the insufficient platform, passengers face difficulty in boarding and disembarking from trains with heavy items such as sacks and baskets. For this station, one of the important stakeholders is the Pasinler TMO. Among the passengers using the station, the elderly and disabled individuals are considered disadvantaged stakeholders of the project due to difficulties they may encounter in boarding and disembarking caused by the insufficient platform. The mentioned entities are stakeholders related to the Project. These entities represent various sectors such as local government, education, healthcare, law enforcement, agriculture, and more in the Pasinler district. • Pasinler District Governorship[107] • Pasinler Municipality[108] • Atatürk University Pasinler Vocational School • Pasinler District Police Department[109] • Pasinler District Gendarmerie Command • Pasinler District National Education Directorate[110] • Pasinler District CHC[111] • İbrahim Hakkı State Hospital[112] • Pasinler District Agriculture and Forestry Directorate[113] • Pasinler Chamber of Agriculture[114] All the mentioned stakeholders have been added to Appendix-10.			

107 http://www.pasinler.gov.tr/
108 https://www.pasinler.bel.tr/
109 https://birimler.atauni.edu.tr/pasinler-meslek-yuksekokulu/
110 https://pasinler.meb.gov.tr/
111 https://erzurumism.saglik.gov.tr/TR,43808/pasinler-toplum-sagligi-merkezi.html
112 https://pasinlerdh.saglik.gov.tr/
113 https://erzurum.tarimorman.gov.tr/Menu/3/Ilce-Mudurluklerimiz
114 https://ziraatodasi.gen.tr/ziraat-odasi-rehber/pasinler-ziraat-odasi-baskanligi/

Station	Location	Scope of the Project	Baseline Condition	
			 Out of service lodgment	 Information board

Table 137. Uzunahmet Station

Station	Location	Scope of the Project	Baseline Condition
Uzunahmet Station	**Province: Erzurum** **District: Palandöken** **Nearby Settlement: Uzunahmet** **km: 1167+219**	The existing station will be arranged to accommodate 750 m trains, with a mainline configuration and 3 additional sidetracks; the blind track will be eliminated.	This station is responsible for snow fighting operations. The snow fighting operations here are conducted in collaboration with road maintenance teams. The station is closed to passenger traffic. The primary function of the station is to regulate train traffic and support snow clearance activities. There is an asphalt plant affiliated with the Highways Authority in the neighboring area of the station. While the connecting line was previously linked to this facility, the mentioned line is currently inactive. The nearest settlement is Uzunahmet. In the village, there is a primary school[115] and a kindergarten. Both schools have one teacher each. In the primary school section, grades 1, 2, 3, and 4 receive lessons together in a single classroom. The number of students in the primary school is 13. The kindergarten has one class with a student population. According to the mukhtar's statement, the existence of the station does not affect agricultural and livestock activities. It has also been mentioned that there are no privately owned village lands around the station regarding land acquisition.
ESSs	**Findings**		**Photographs**
ESS1	One of the fundamental challenges of the station is harsh winter conditions. Renewal efforts have been carried out during maintenance and repair works.		
ESS2	At the station, there are a total of 4 employees, including the station master, train formation worker, and movement officer. There is no female employee working temporarily or otherwise. Although there is accommodation provided for the employees, nobody is currently using it. One of the major challenges for the personnel working here is access to the station. Most of the employees commute from Erzurum Central district. The primary reason for this is the absence of essential services such as schools and hospitals in the closest settlement, Uzunahmet.		
ESS4	It is noted that there are underpasses for animal crossings, but these points are not preferred by villagers as they extend the distance. Therefore, incidents involving animals crossing the tracks may occur in the sections outside the stations, known as "hatt-ı harici," between the two stations. In crossings over agricultural fields, agricultural machinery utilizes level crossings.		
ESS5	In accordance with the opinion of the respondent there will be no expropriation issue in the station and its surroundings.		

[115] https://uzunahmet.meb.k12.tr/

Station	Location	Scope of the Project	Baseline Condition
ESS10	Despite Uzunahmet settlement being quite close to the station, communication with the settlement is low. Communication continues with the mukhtar. Occasionally, communication is established with individuals requesting permission for grazing from the settlement. While these requests are not denied by the station, problems arise when there is a high volume of animal crossings. Some villagers prefer to use structures like underpasses and culverts for their animals to shelter during the winter season. The most frequently communicated stakeholder is Palandöken Municipality. Another stakeholder is the neighboring facility, the asphalt plant of the Highways Authority. The presence of a large garden belonging to the station leads some families to prefer the station garden for picnics and leisure activities on weekends. This situation creates a problem, such as people leaving their trash after having a picnic. The grazing area around the station is also used by households engaged in animal husbandry in settlements such as Uzunahmet, Büyüktuy, and Pusudere. A structure owned by an individual is used as both a residential and barn area in a location remarkably close to the station. The household in this area is an important stakeholder of both the station and the project. The gendarmerie unit in Palandöken is typically contacted for public order issues, while communication with the gendarmerie in Hasankale is established for matters related to rail safety. The other interested groups can be listed in below: • Palandöken Municipality[116] • Palandöken District Gendarmerie Command[117] • Palandöken District Police Department[118] • Palandöken District National Education Directorate[119] • Palandöken District Agriculture and Forestry Directorate[120] All the mentioned stakeholders have been added to Appendix-10.	 **A private property that includes both a barn and a residence**  **Access roads around the railway**  **Grazing areas and field around the station**  **Asphalt facility owned by the highways and inactive connection line.**

Table 138. Erzurum Main Station

Station	Location	Scope of the Project	Baseline Condition
Erzurum Main station	**Province: Erzurum** **District: Yakutiye** **Nearby Settlement: Ömer Nasuhi Bilmen / Şükrüpaşa** **km: 1148+672**	The station layout will be modified to make the two tracks on the left side, in the direction of increasing mainline kilometers, suitable for 750 m trains.	Due to the responsibilities and duties of authorized personnel, the meeting was conducted briefly, and the recorded meeting notes have been summarized. In the discussions held on November 1, 2023, it was reported that there would be no expropriation issues in the Erzurum Station area. • Certain level crossings within the city need to be converted into underpasses. There are restrictions on the clearance in tunnel structures. None of the planned new electrical-communication structures comply with the existing height of the tunnels. • Due to the ongoing works, Kandilli Station may become inadequate, while Ilıca Station is suitable for the works. Crossings and tunnel structures need to be revised in many places. Additionally, it is essential for both internal and external units to collaborate. In accordance with the opinion of the respondent the coordination is particularly crucial in expropriation-related activities. For instance, coordinated efforts with the DSİ are mandatory in the area between Aşkale and Çadırkaya. The riverbeds over the Karasu River are problematic regions.

116 One of the central districts of Erzurum Province
117 https://erzurum.jandarma.gov.tr/iletisim
118 http://www.palandoken.gov.tr/ilce-emniyet-mudurlugu
119 https://palandoken.meb.gov.tr/
120 https://erzurum.tarimorman.gov.tr/Menu/3/Ilce-Mudurluklerimiz

Station	Location	Scope of the Project	Baseline Condition
			• The main stakeholders the organization collaborates with are Erzurum Metropolitan Municipality, Highways, DSİ, Palen Gaz, and Aras Elektrik. All the mentioned stakeholders have been added to Appendix-10.

Table 139. Kaplıca (Ilıca) Station

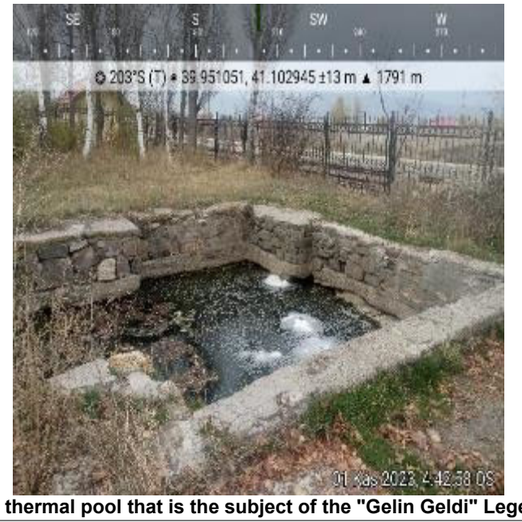
Station	Location	Scope of the Project	Baseline Condition
Kaplıca Station	**Province: Erzurum** **District: Aziziye** **Nearby Settlement: Ilıca** **km: 1133+496**	The existing station will be arranged to accommodate 750 m trains, with a main line + 3 sidetracks configuration, and blind tracks will be canceled.	It is a station with different activity definitions. These activities include a passenger station, a freight station, a ballast loading station, a military fuel loading station, and a NATO road. The ballast requirement for the region between Erzurum and Kars is provided by this station. Two passenger trains arrive at the station daily. The average number of passengers getting on and off is around 5. Passenger traffic is more intense on Sundays.
ESSs	**Findings**		**Photographs**
ESS1	The useful length of the station is in the range of 550-580 meters due to the level crossing.		
ESS2	There are a total of 6 train formation workers, 1 movement officer, and 1 station chief working at the station. The personnel serving as the movement officer is a woman. The station has a lodging building, but it is not in use.		
ESS4	The train tracks are used for both pedestrian and animal crossings. To prevent this, the construction of a pedestrian overpass or a fencing wall is necessary. Similarly, the presence of primary school, middle school, and high school students leads to the use of the train tracks as a crossing area. The schools in the region include Ilıca Borsa İstanbul Yavuz Selim Social Sciences High School[122], Ilica Multiprogram Anatolian High School[123], Ilıca Toprakkale Ziyaettin Özatalay Middle School[124], Ilıca Toprakkale Ziyaettin Özatalay Primary School[125], and Ilıca Kindergarten[126]. The region also has a health center (Erzurum Ilıca Family Health Center (FHC)[127]) but it is located at a distance from the station Therefore, there is a low connection between the traffic of the health center and the station. All the mentioned stakeholders have been added to Appendix-10 The level crossing, viewed from the station, is in a blind spot. Audible warnings and barriers should be applied to these level crossings where control is done from the station. Additional measures such as overpasses can be implemented. In parallel, adjustments should be made to ensure that people cannot pass through the bars around the train in order to enhance safety.		
ESS5	There is no finding and observation.		
ESS10	The pool located in the station garden is known by the local people as the "Bride Arrived Pool" It is believed to be enchanting and bring good luck. Therefore, many people come to the station to see this pool and make wishes. The bubbling appearance of the water in the thermal pool, due to its sulfuric composition, is considered by visitors as a sign that legendary events are taking place inside the pool[128].Despite being fenced, many people enter inside and swim in the pool. There have not been any complaints or requests from the people living around this station. However, the train personnel are disturbed by the general attitudes and behaviors of the local people in the region. These issues can be listed as follows: • using the railway crossing for pedestrian crossing despite warnings and precautions, • insistence on animal crossings, • theft of switches and equipment, • theft of sheets from station structures, • unauthorized entry into the thermal pool in the station garden despite warnings, • use of station surroundings for substance and alcohol consumption, and • pollution of station toilets and garden with items like diapers. In accordance with the opinion of the respondents, the settlements of Alaca, Atlikonak, Demirgeçit, and Çiğdemli affiliated with Aziziye, as well as the households engaged in agriculture and animal husbandry, are among the stakeholders of the project who may be affected by project activities. All the mentioned stakeholders have been added to Appendix-10.		



Components related to the NATO[121] line



Basalt Pile



The thermal pool that is the subject of the "Gelin Geldi" Legend



Freight Trains

121 Organisation du traité de l'Atlantique nord / North Atlantic Treaty Organization
122 https://yavuzselimsosyalbilimlerlisesi.meb.k12.tr/
123 https://aziziyeilicacpal.meb.k12.tr/
124 https://toprakkalem.meb.k12.tr/
125 https://toprakkalemm.meb.k12.tr/
126 https://anaokuluilica.meb.k12.tr/
127 http://www.erzurumilicaasm.com/
128 https://kulturportali.gov.tr/turkiye/erzurum/kulturatlasi/gelin-geldi-golu---gelin-geldi-efsanesi. The information provided is quoted from the sources "Bilge Seyidoğlu; Erzurum Efsaneleri: Dergah Yay. Erzurum Kitaplığı 1997–2018," "Bilge Seyidoğlu; Erzurum Efsaneleri: (Dergah Yay. Erzurum Kitaplığı 2018 Erzurum Büyükşehir Belediyesi Yayını)," and "İ.Hakkı Konyalı: Abideleri ve Kitabeleri ile Erzurum Tarihi."

Table 140. Kandilli Station

<table>
<tr><th>Station</th><th>Location</th><th>Scope of the Project</th><th colspan="2">Baseline Condition</th></tr>
<tr><td>Kandilli Station</td><td>Province: Erzurum
District: Aşkale
Nearby Settlement: Kandilli
km: 1108+989</td><td>The existing station will be arranged to accommodate 750 m trains with a main line + 2 side lines, and the blind track will be canceled.</td><td colspan="2">The movement of passenger trains, freight trains, and track inspection vehicles (plaser vehicles) takes place at the station.
The total population of Kandilli is 926 people. In Kandilli, there is one primary school[129], one middle school[130], and 1 high school[131]. The total number of students in these three schools is 143.
There are two healthcare institutions in Aşkale district named as Aşkale District State Hospital[132] and Aşkale FHC[133] and in the district, and in Kandilli, there is also a FHC named as Aşkale Kandilli FHC.
All the mentioned stakeholders have been added to Appendix-10.</td></tr>
<tr><td>ESSs</td><td colspan="2">Findings</td><td colspan="2">Photographs</td></tr>
<tr><td>ESS1</td><td colspan="2">No issues have been reported.</td><td rowspan="5">

Freight Trains-1

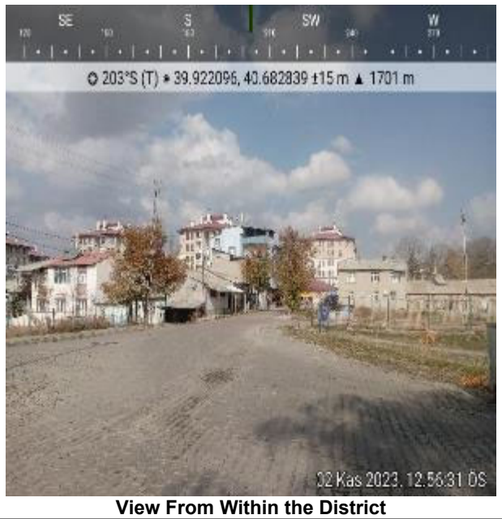

Waiting room</td><td rowspan="5">

Freight Trains-2


Passenger platform</td></tr>
<tr><td>ESS2</td><td colspan="2">A total of 6 personnel work at the station. Among these personnel, 2 are movement officers, and the other 4 are train formation staff. There are no female employees at the station. There is accommodation available for the staff in the form of a lodge, but it is not currently in use.
The roads used for arrivals and departures at the switch heads are not suitable for this station. This situation creates a problem for railway personnel during external train encounters.</td></tr>
<tr><td>ESS4</td><td colspan="2">The employees, expressing significant issues with animal crossings, do not believe that these movements can be prevented. The only proposed solution is the construction of an overpass for crossings towards Ilıca.</td></tr>
<tr><td>ESS5</td><td colspan="2">There is no finding and observation.</td></tr>
<tr><td>ESS10</td><td colspan="2">Due to the low population in the region, the number of passengers is low, and the rate of interaction with the local population is also low. The dialogue with the local people occurs during animal crossings. The railway personnel are inclined to allow animal crossings outside the moments of train encounters, but this policy is occasionally violated.</td></tr>
</table>

129 https://kandilliguvencilkokulu.meb.k12.tr/
130 https://kandilliguvencortaokulu.meb.k12.tr/
131 https://askalekandillilisesi.meb.k12.tr/
132 https://askaledh.saglik.gov.tr/
133 https://www.askaleasm.com/

Table 141. Aşkale Station

Station	Location	Scope of the Project	Baseline Condition
Aşkale Station	**Province: Erzurum** **District: Aşkale** **Nearby Settlement: Cahit Aybar** **km: 1093+221**	The main line will be extended to accommodate 700 m trains with the addition of 2 sidetracks. The 3rd sidetrack, connection to branch lines, and the blind track will be preserved.	The station has passenger trains, freight trains, traffic safety, and loading-unloading capabilities. The station has 2 connections in the direction of Karasu and 1 connection in the direction of Kandilli. The connection road in the Kandilli direction is connected to the ABS Plaster Factory. One of the connection roads in the Karasu direction is connected to the Aşkale Cement Factory, and the other is connected to TurkMag. Commercial loading and unloading operations for TurkMag activities are carried out outside the switch.
ESSs	**Findings**		**Photographs**
ESS1	No issues have been reported.		
ESS2	A total of 10 personnel is working at the station. Among these, 6 are formation workers, 1 is a train formation officer, 2 are movement officers, and the last one is the station chief. One of the movement officers at the station is a woman. The station has a residence consisting of 7 apartments, and all of them are in use. Issues related to electrical facilities and communication rarely occur. System malfunctions, on the other hand, may occur every two months.		
ESS4	The pathway leading to the passenger platform is inadequate, causing challenges for elderly and disabled individuals due to the presence of three railway tracks between the platform and the station. Instances of individuals being at risk of falling have been reported. There are enclosure walls around the railway tracks, but pedestrian crossings can still occur. This is causing issues. There are three schools in the area. Students, especially young children, can pass through the perimeter walls and access the railway tracks. Animal crossings can be observed in areas outside of the switch points. The passage of agricultural machinery is rare, as they tend to use areas outside the track more frequently. Due to the station not being enclosed, security issues are arising. Incidents of theft may be directed towards metal pieces used in road maintenance. A security camera system is also present at the station. The overpasses are located within the station premises. One of the two overpasses is in the direction of Kandilli, and the other is in the direction of Karasu.		 **Aşkale Cement Factory**  **Overpass**
ESS5	There is no finding and observation.		
ESS10	Two trains arrive at the station on a daily basis. The average number of passengers boarding and disembarking varies between 5 and 10 individuals. This number may change during holiday periods. Passageway for the passenger platform is not suitable. Elderly and disabled individuals are having difficulty because there are three railway tracks between the platform and the station. Passengers boarding and alighting are expressing considerable complaints about this matter. Those who are disabled, elderly, or carrying heavy loads are facing difficulties. ABS Plaster Factory[134], Aşkale Cement Factory[135], and TurkMag[136] are the project stakeholders. The most actively engaged stakeholders are the Aşkale District Governorship and the Aşkale Police Department. All the mentioned stakeholders have been added to Appendix-10		 **Informational Sign**  **View From Within the District**

134 https://www.absalci.com.tr/
135 https://www.askalecimento.com.tr/
136 https://www.turkmag.com.tr/

4.13.4 Erzincan Province

4.13.4.1 Settlements

In Erzincan province, there are 11 stations. These stations are Alp, Altınbaşak, Altınkent, Çadırkaya, Demirkapı, Erbaş, Eriç, Erzincan, Kemah, Mercan, and Tanyeri, in alphabetical order.

The railway commences from the western side of Erzincan province, traversing through the city center and extending towards the furthest western point.

There are 1 station in Çayırlı district (Erbaş), 3 station in Kemah district (Alp, Eriç, and Kemah), 1 station in Erzincan central district (Erzincan), 3 station in Tercan district (Altınkent, Çadırkaya, and Mercan), 3 stations in Üzümlü district (Altınbaşak, Demirkapı, and Tanyeri).

One common issue shared by Mercan, Erbaş, and Karasu stations is the descent of wild animals onto the railway tracks. Nearby of Alp Station, there are occurrences of wild animal crossings, too. Besides, the issue of wild animals is also present at Kemah station. Encounters with wolves, jackals, and wild boars have been reported. For Çaltı Station, due to the iron mine137, snakes, spiders, and other insects can be encountered in the station building. Additionally, wild boar herds, wolves, and bear movements have been observed in the mountainous area across from the station. The villages in the region are actively engaged in beekeeping.

Due to the accident that occurred at the Çöpler Gold Mine on February 13, 2024, the settlements around İliç and Bağıştaş stations were excluded from the scope of household and mukhtar surveys conducted face-to-face. Therefore, despite being located around the train station, the settlements of Atma, Bağıştaş, Büyükköy, Çaltı, İbrahim Çeçen, Ortatepe, and Abdullahpaşa were included only in the mukhtar survey conducted by phone. One of the mukhtars in this region expressed that he was negatively affected by other projects (Bağıştaş-I Dam and Hydroelectric Power Plant (HEPP) Project[138], Çöpler Gold Mine[139]) in the vicinity of the village, indicating that he had no expectations within the scope of this project and did not wish to respond.

According to ABPRS presented by TurkStat 2024 data, Erzincan accommodates 75,398 households with a 2.86 average household size. The settlements around the stations are given with the demographic information via Table 142.

Table 142. Population information of Erzincan region

Province	District	Station	Settlement	Population	Number of Household	Average Household Size
Erzincan	-	Erzincan	-	243,399	75,398	2.86
Erzincan	Central	Erzincan	-	165,860	51,025	2.92
Erzincan	Central	Erzincan	Çarşı	2512	-	-
Erzincan	Çayırlı	-	-	8,415	2,719	2.99
Erzincan	Çayırlı	Erbaş	Çataksu	165	-	-
Erzincan	Kemah	Kemah	-	7,517	3,189	2.16
Erzincan	Kemah	Kemah	Çarşı	1106	-	-
Erzincan	Kemah	Eriç	Eriç	40	-	-
Erzincan	Kemah	Alp	Alpköy	67	-	-
Erzincan	Tercan	-	-	16,573	5,322	3.06
Erzincan	Tercan	Altınkent	Kargın	2131	-	-

137 https://eticaret.mta.gov.tr/index.php?route=product/product&product_id=7388

138 https://www.icholding.com.tr/EN/enerji/ProjeDetay/29

139 https://www.anagold.com.tr/projects/copler_operations.html

Province	District	Station	Settlement	Population	Number of Household	Average Household Size
Erzincan	Tercan	Mercan	Akşemsettin	651	-	-
Erzincan	Tercan	Mercan	Atatürk	2443	-	-
Erzincan	Tercan	Çadırkaya	Camiikebir	692	-	-
Erzincan	Üzümlü	-	-	14,517	4,746	3
Erzincan	Üzümlü	Altınbaşak	İstasyon	276	-	-
Erzincan	Üzümlü	Altınbaşak	Fırat	225	-	-
Erzincan	Üzümlü	Altınbaşak	Pınarbaşı	514	-	-
Erzincan	Üzümlü	Altınbaşak	Süleymanlı	425	-	-
Erzincan	Üzümlü	Altınbaşak	Büyük Kadağan	134	-	-
Erzincan	Üzümlü	Altınbaşak	Küçük Kadağan	242	-	-
Erzincan	Üzümlü	Demirkapı	Bağlar	84	-	-
Erzincan	Üzümlü	Tanyeri	Avcılar			

General results of household survey for the abovementioned settlements are listed in below:

- Between March 20th and 22nd, 2024, a total of 61 household surveys were carried out within these communities.
- The surveys mainly involved male participants, with 18 female household representatives also participating.
- The primary channels for raising awareness about the project were the mukhtar, meetings, and phone communications.
- The utilization of trains among residents was moderate.
- Only 4 households had a complete understanding of the project, while others were either partially informed or completely unaware.
- The project was expected to be beneficial for local residents, villagers, and the elderly. Concerns regarding negative impacts include individuals involved in animal husbandry, road transportation, travel agencies, fuel companies, and drivers.
- The total population in the surveyed households is 219, with 143 individuals aged 15-64.
- The female population is higher than male population among total surveyed households (114/105).
- Gender distribution is nearly equal, with 465 women and 466 men among total population of surveyed households.
- The main sources of income are agriculture, retirement, and animal husbandry.
- Key regional issues include unemployment and transportation.
- Out of 219 individuals surveyed, 122 were unemployed and 10 had disabilities.
- 29 households have school-going children.
- 22 households include elderly members.
- Languages other than Turkish are spoken in 20 households. The main sources of agriculture, retirement, and husbandry.
- Key regional issues include unemployment, and transportation.
- Out of 219 individuals, 122 are unemployed and 10 have disabilities.
- 29 households have school-going students.
- 22 households include elderly members.
- In 20 households, languages other than Turkish are spoken.

There are meetings were scheduled with 71 mukhtars of the settlements. However, 12 meeting with the mukhtar could not be realized due to decline. Reason of the refused interviews can be listed as follows:

- Reluctance to provide information
- Suspicions of being frauds

- Unavailability
- Expressing a lack of opinion on the matter
- Negative impact of other projects such as mining and dam
- Due to the existing train line, it was expressed that no opinions could be provided

4.13.4.2 Stations

Field studies for the 12 stations in the Erzincan region have been successfully completed. One of these stations is Erzincan Station, and the other is Altınkent Station, which is abandoned. General information about the project and its effects was gathered at Erzincan Station, while only field visits and photography were conducted at Altınkent Station. Çadırakaya, Mercan, Altınkent, Demirkapı, Tanyeri, and Erzincan Main Station were visited on November 2, 2023, while field studies for Alp, Kemah, Eriç, İliç, Bağıştaş, and Çaltı stations were carried out on November 3, 2023.

The Erbaş and Dumanlı stations in the Erzincan region have not been included in the field research due to accessibility issues and the absence of stakeholders for interviews at the stations. Similarly, Altınbaşak Station, where transportation is not challenging but lacks station personnel for stakeholder meetings, has also been excluded from the scope of the study.

Detailed information on field survey schedule of 1st phase of social research is given in Appendix-9. In addition, all the stakeholders including the PAPs are given with Appendix-10.

To examine the Çadırkaya Station (see Table 143), Mercan Station (see Table 144), Altınkent Station (see Table 145), Demirkapı Station (see Table 146), Tanyeri Station (see Table 147), Erzincan Main Station (see Table 148), Alp Station (see Table 149), Kemah Station (see Table 150), Eriç Station (see Table 151), İliç Station (see Table 152), Bağıştaş Station (see Table 153), and Çaltı Station (see Table 154), sequentially for information obtained from face-to-face meetings and field visits.

As a note, Çaltı station is situated in the Çaltı settlement, which falls under the authority of Kemaliye district in Erzincan. Simultaneously, it is in the Adatepe village area of the Divriği district in Sivas province. Despite being administratively linked to Erzincan province, this station is geographically closer to Sivas province and is positioned on the border between the two provinces.

Field observations mainly act as a guide for the socioeconomic framework, while the information are detailed between Table 143 and Table 154).

Table 143. Çadırkaya Station

Station	Location	Scope of the Project	Baseline Condition
Çadırkaya Station	**Province: Erzincan** **District: Tercan** **Nearby Settlement: Çadırkaya / Gözeler locality** **km: 1033+998**	The existing station will be reconfigured to accommodate 750 m of trains, with a main line and two side lines. The single sideline will be canceled.	The Eastern Express and Touristic Express serve as passenger trains, while there is also a freight train at the station. During the busiest period, the station hosts a total of 11 train services, with 2 each for the Eastern Express and the Touristic Eastern Express, and 7 for freight trains. This year, the Touristic Eastern Express service is scheduled to operate between December 11, 2023, and March 11, 2024, this year. Please note that the service starts, and end dates may vary each year.
ESSs	**Findings**		**Photographs**
ESS1	The internet is problematic. This situation is prevalent throughout the Çadırkaya settlement. There are significant deficiencies in the communication infrastructure, including radio, telephone, and internet services.		
ESS2	At the station, there are 6 train formation workers, 1 operations officer, and a station chief. There is accommodation available for personnel, provided in a single-unit dwelling and currently occupied. The existing housing is in inadequate condition. There is another building belonging to the road department.		
ESS4	Issues can occur with barriers at level crossings during train intersections. The barriers may close and open spontaneously. A camera system is necessary to monitor areas outside the station. There can be animal crossings in empty switch points. While the issue has been addressed in areas where walls have been constructed, problems persist in locations without walls. Students are using both the highway and the railway. Therefore, it is important to construct an overpass.		
ESS5	There is no finding and observation.		
ESS10	The number of people at the station increases during the summer months. Pedestrian crossing points are not suitable for individuals with disabilities. Residents' most frequently complained issue is their inability to reach the station by phone. This situation is consistently related to frequent line disruptions. The most frequently contacted stakeholders are the Highways Tercan 16th Regional Directorate, 164th Branch. Çadırkaya Municipality is passive in the proceedings. They are in contact with the village guard due to the possibility of theft incidents. The closest settlements to the station are Gözeler neighborhood of the Çadırkaya town, and Çayırlı, settlements. There are four active schools within the Çadırkaya municipality boundaries. These schools operate at the primary (Çadırkaya Şehit Jandarma Binbaşı Ümit Çelik Primary School[140]), middle (Çadırkaya Şehit Jandarma Binbaşı Ümit Çelik Middle School[141] and Çadırkaya Imam Hatip Middle School[142]), and high school levels (Çadırkaya Multidisciplinary High School[143]). Tercan is home to a vocational school affiliated with Erzincan Binali Yıldırım University[144]. Çadırkaya FHC[145] is the healthcare center of the municipality. Other health service units in the Tercan District include Tercan State Hospital[146], Emergency Health Services Station, and Tercan FHC[147]. All the mentioned stakeholders have been added to Appendix-10		



Freight trains



General condition of the ways



Station building

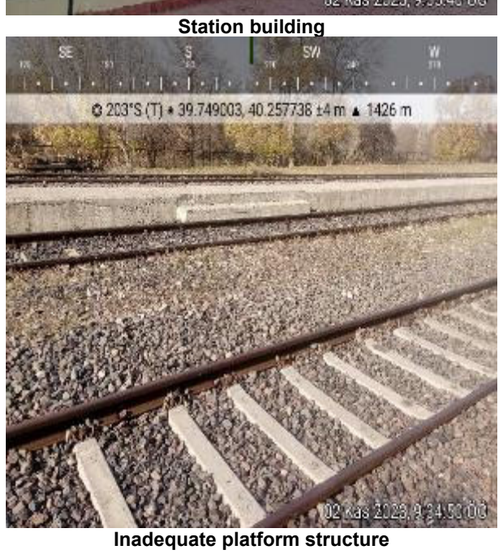


Waiting room

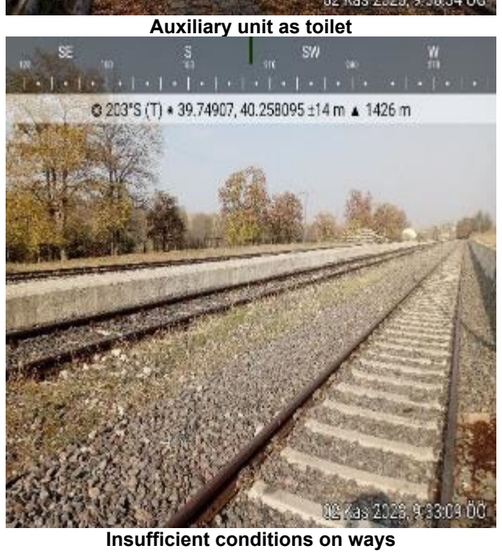
[140] https://cadirkayailkokulu.meb.k12.tr/
[141] https://cadirkayaortaokulu.meb.k12.tr/
[142] https://cadirkayaiho.meb.k12.tr/
[143] https://cadirkayacpl.meb.k12.tr/
[144] https://tercanmyo.ebyu.edu.tr/
[145] https://erzincanism.saglik.gov.tr/TR-58724/cadirkaya-asm.html
[146] https://tercandh.saglik.gov.tr/
[147] https://erzincanism.saglik.gov.tr/TR-58725/tercan-asm.html

Table 144. Mercan Station

<table>
<tr><th>Station</th><th>Location</th><th>Scope of the Project</th><th colspan="2">Baseline Condition</th></tr>
<tr><td>Mercan Station</td><td>Province: Erzincan
District: Tercan
Nearby Settlement: Mercan
km: 1021+812</td><td>The existing station will be reorganized to accommodate trains up to 750 m in length, with a main line and three sidetracks. The blind track will be discontinued.</td><td colspan="2">Loading and unloading operations, live animal transportation, coal transportation, and agricultural material transportation are conducted at the station. The coal arriving at the station are materials distributed by the government for heating assistance[148] to households in need as part of social aid initiatives. The coal aid, sent to the Çadırkaya, Otlukbeli, Tercan, and Bayburt regions, is brought to this station, unloaded here, and then loaded onto trucks for transfer to the mentioned settlements. However, with the closure of the factory, this line has become disused. The mentioned agricultural material primarily consists of fertilizer. One of the currently inactive railway lines used to connect to a facility that was formerly a flour mill.</td></tr>
<tr><td>ESSs</td><td colspan="2">Findings</td><td colspan="2">Photographs</td></tr>
<tr><td>ESS1</td><td colspan="2">Issues with telephone lines and communication are common problems shared with nearby stations in the vicinity. The use of a stove for heating is also prevalent in other nearby stations. For instance, Erbaş station experiences frequent power outages. Karasu station has very weak signal strength in its telephone lines. Tanyeri station also shares similar deficiencies. Therefore, there is a crucial need for significant improvements in the communication system, especially in radios.</td><td rowspan="4">

Station building


Inadequate platform structure</td><td rowspan="4">

Auxiliary unit as toilet


Insufficient conditions on ways</td></tr>
<tr><td>ESS2</td><td colspan="2">A total of 8 individuals works at the station, comprising 1 station manager, 1 operations officer, and a staff of 6 train composition workers. There are no female employees in this personnel roster. There is accommodation available for the personnel, with 4 apartments currently in use in the station's housing facilities.

There is a challenge in finding rental housing within the settlement boundaries of Mercan. If the existing housing is insufficient or in an unusable condition, there could be challenges related to accommodation. Additionally, there are demands from students seeking rental homes in Mercan.

There is no rotation system applied to the employees at the stations in the region. Unlike other stations where personnel are transferred to different stations after a certain period, this system is not implemented in the stations in this region. As a result, issues such as transportation, communication, heating, and accommodation create pressure on the current staff at the station. The situation is particularly challenging for employees at stations like Erbaş and Karasu, who face difficulties in transportation and communication.

The station uses a stove as a heating system, and wood and coal are burned as fuel. This situation is considered risky for the health of the personnel staying at the station, especially if chimney cleaning is neglected, the risk will increase.</td></tr>
<tr><td>ESS4</td><td colspan="2">There are two level crossings around the station. Currently, there are no barriers at the level crossings because they are frequently broken. It is necessary to implement full preventive systems at these crossings.

The station lacks a security component in the form of a camera system.</td></tr>
<tr><td>ESS5</td><td colspan="2">In accordance with the opinion of the respondent during the project studies, there may be challenges related to expropriation at this station. There are private lands on both sides of the railway tracks. The expropriation process is smoother on the Erzincan side. However, on the Çadırkaya side, there are barns that need to be addressed in the expropriation efforts.</td></tr>
<tr><td>ESS10</td><td colspan="2">The highest demand from travelers in the region is for the extension of the railcar line to Mercan. railcar, known as regional trains, operates on short-distance local routes. While there is a regional train running between Erzincan and Divriği, there is currently none between Erzurum and Erzincan. Because of the harsh winter conditions in the region, individuals deem the presence of lines such as railcar essential when road transportation becomes challenging. Another reason for the preference for railcar is its economic advantage from the passenger's perspective.

There are grazing activities around the station. Households engaged in livestock farming in the settlement contact the station to inquire about the arrival of trains, ensuring the passage of their</td></tr>
</table>

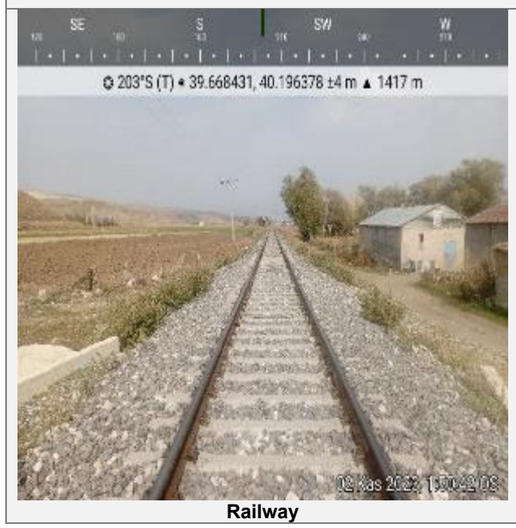
[148] https://www.aile.gov.tr/sygm/programlarimiz/sosyal-yardim-programlarimiz/

Station	Location	Scope of the Project	Baseline Condition	
	animals. In this context, it can be said that there is an ongoing dialogue between the local community and station personnel. There are two active schools within the Mercan municipality boundaries. These schools operate at the primary (Mercan Primary School[149]), and high school levels (Mercan Multidisciplinary High School[150]). Tercan is home to a vocational school affiliated with Erzincan Binali Yıldırım University[151]. Mercan FHC[152] is the healthcare center of the municipality. Other health service units in the Tercan District include Tercan State Hospital[153], Emergency Health Services Station, and Tercan FHC[154]. All the mentioned stakeholders have been added to Appendix-10.			

149 https://mercanilkokulu.meb.k12.tr/
150 https://mercanlisesi.meb.k12.tr/
151 https://tercanmyo.ebyu.edu.tr/
152 https://erzincanism.saglik.gov.tr/TR-58717/mercan-asm.html
153 https://tercandh.saglik.gov.tr/
154 https://erzincanism.saglik.gov.tr/TR-58725/tercan-asm.html

Table 145. Altınkent Abandoned Station

Station	Altınkent Abandoned Station
Location	**Province: Erzincan** **District: Tercan** **Nearby Settlement: Kargın town municipality** **km: 1011+460**
Scope of the Project	Additional sidetrack construction will be arranged to accommodate trains up to 1,050 m in length, with a main line and one side track.
Baseline Condition	At this station, there is no station building, and there is no staff assigned to the station. There is no passenger movement for the Eastern Express at this stop. The current settlement of the municipality was originally the Kargın Village. On February 27, 1971, Kargın attained municipality status and became a town[155].The name of the town was changed to "Altunkent" on January 26, 1973, [156]. Later, in 2009, based on the request of the public, the municipal council decided to change the name back to "Kargın."[157]. Railway and highway have divided agricultural lands, serving as boundaries between cultivated and uncultivated areas. In the plains, plants such as shepherd's purse, wild mallow, common fumitory, St. John's wort, chamomile, and clover are noticeable in meadows and pastures. As one goes towards the eastern highlands, herbs like thistle, nettle, wild chickpea, dock, shepherd's needle, and yarrow become prominent in the landscape[158]. The nearest district center is Tercan. There are two active schools within the Kargın Municipality. These schools operate at the primary (Altunkent Ömer Gültekin Primary School[159], and secondary school levels (Altunkent Ömer Gültekin Secondary School[160]). Erzincan Provincial Health Directorate Emergency Medical Services Chief Physician's Office operates at Emergency Health Services Station (ASHİ) No. 2 located in Kargın[161] All the mentioned stakeholders have been added to Appendix-10.



Railway



Culvert



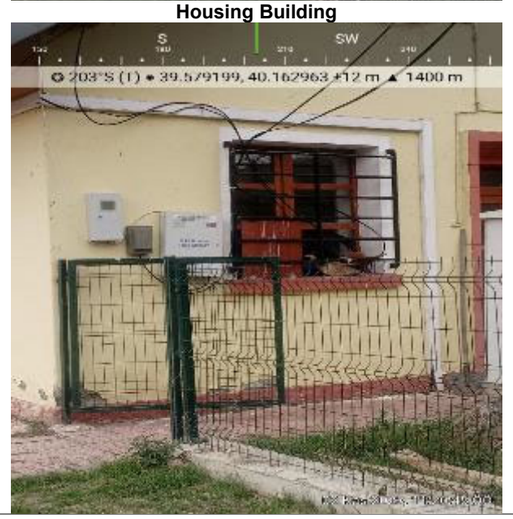
İstasyon neighborhoods



Agricultural areas

155 https://www.resmigazete.gov.tr/arsiv/13783.pdf
156 https://www.resmigazete.gov.tr/arsiv/14443.pdf
157 https://tr.wikipedia.org/wiki/Karg%C4%B1n,_Tercan
158 https://acikbilim.yok.gov.tr/bitstream/handle/20.500.12812/702688/yokAcikBilim_10266142.pdf?sequence=-1
159 https://omergultekin.meb.k12.tr/
160 https://omergultekinortaokulu.meb.k12.tr/
161 https://erzincaniasb.saglik.gov.tr/TR-261701/tercan-2-nolu-ashi-kargin.html

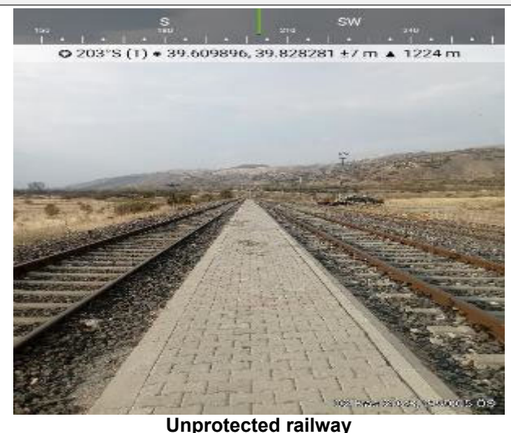
Table 146. Demirkapı Station

Station	Location	Scope of the Project	Baseline Condition
Demirkapı Station	**Province: Erzincan District: Üzümlü Nearby Settlement: (Sansa) Bağlar km: 998+831**	The existing station will be reconfigured to accommodate trains up to 1,050 m in length, with a main line and 2 sidetracks.	The station provides passenger train services; however, one of the two passing trains does not make a stop at the station. For instance, the train traveling from Kars to Ankara does not stop at this station, while the train from Ankara to Kars makes a stop at the station. This situation varies depending on train traffic. For example, last year, trains coming from both directions used to stop at the station. One of the nearby settlements is Bağlar Village. The current name of the station is Sansa, which was previously known by a different name. The regional train does not make a stop at the station. All freight trains operating on the Kars-Divriği line utilize this station. Although the station is considered inactive due to its low population capacity, its existence is necessary for the operation of train traffic. The closest settlements is Bağlar village, The nearest district center is Üzümlü. The nearest healthcare institution in the region is Üzümlü State Hospital[162] and Üzümlü FHC. All the mentioned stakeholders have been added to Appendix-10.
ESSs	**Findings**		**Photographs**
ESS1	The planned project was stated to be suitable for the station.		
ESS2	The total number of employees at the station is 7. One of them is the station manager, and the others are train composition workers. There are no female employees at the station. There is a housing facility at the station; however, it is not in use due to the need for maintenance and repairs. There are a total of 4 housing units, but only one person resides in these accommodations. While not certain, it has been conveyed that there is a decision for the demolition of the housing units. One of the significant issues for the station's employees is related to transportation. Due to inadequate accommodation facilities, commuting is carried out from Erzincan and Erzurum. Frequent power outages occur, but there is no equipment such as a generator available. There are no issues with the internet. The water reservoir is currently in a disused state; however, it has been decided to renovate it during the survey works, and improvements are planned.		
ESS4	There are no protective measures on the railway track. There is no wire fence or enclosure wall, leading to security-related issues. For example, there are no security cameras in place. There are no barriers at the level crossings.		
ESS5	In accordance with the opinion of the respondent that there may be issues related to expropriation. Some of the works may affect the village as they pass through village land.		**Housing Building**
ESS6	There is no observation.		
ESS8	Due to the registered cultural status of the station building, necessary renovations are not allowed on external doors and similar areas.		
ESS10	One of the demands from the local community in the region is for all trains to stop at the station. Although the village has a small population, there is ongoing livestock farming activity. Surprisingly, the railway is not utilized for animal crossings. In a recent development, a household that owns animals has decreased the number of livestock. Due to the low population, pedestrian crossings are not frequent. The village lacks social facilities such as schools and markets. A minibus providing market services comes to the village once a week. For power outages, communication is established with Aras Elektrik company in Üzümlü district and Mercan town. All the mentioned stakeholders have been added to Appendix-10		**Toilet Facility** 

[162] https://erzincanism.saglik.gov.tr/TR-59256/uzumlu-ilce-devlet-hastanesi.html

Station	Location	Scope of the Project	Baseline Condition	
			Internet Infrastructure	General Appearance of the Station Area

Table 147. Tanyeri Station

Station	Location	Scope of the Project	Baseline Condition
Tanyeri Station	**Province: Erzincan District: Üzümlü Nearby Settlement: Avcılar km: 966+648**	The existing station will be arranged to accommodate trains up to 1,050 m in length, with a main line and 1 sidetrack. The second secondary track will be canceled.	The intended length of the track will be less than the practical length of the station. It is the first station before Erzincan. It is the affiliated station of Erzincan station. At the station, the stopping of the trains of the Eastern Express traveling from Kars to Ankara have been discontinued. Only the trains from Ankara to Kars make a stop at this station. Traffic Management from the Center (TMİ) is still the communication method used in the stations in the region[163]. There is no public building such as a school or health center near the station. The nearest district center is Üzümlü. The nearest healthcare institution in the region is Üzümlü State Hospital[164] and Üzümlü FHC. All the mentioned stakeholders have been added to Appendix-10
ESSs	**Findings**		**Photographs**
ESS1	The planned track length will be shorter than the useful length of the station. Therefore, the reduction in useful length due to the current traffic load is evaluated as a negative impact. The ongoing connections with Erzincan station due to the train traffic at the station may result in disruptions at Erzincan station as a consequence of the shortened track. The technical aspect of the work may have some difficulties. Specifically, due to the location of the bridge on the Demirkapı side, the bridge remains within the switch handle and cannot be included in the turnout. Therefore, only a one-way operation can be carried out on the Erzincan side.		 **Informative documents**
ESS2	A total of 10 personnel is on duty at the station. These personnel consist of 1 station chief, 2 movement officers, and 7 train organization workers. Although there is accommodation at the station, it is currently not in use. In such a way, it may reach a point where operations cannot be carried out simultaneously for two trains.		
ESS4	Recently, a subway has been constructed for animal crossings 1 to 1.5 km from the station. This underpass is shared by the Demirpınar and Avcılar settlements. Since the population in the vicinity is low, there is no issue regarding pedestrian crossings.		 **Communication tools**
ESS5	There is no finding and observation.		 **Unprotected railway**
ESS10	The region has been a target of terrorist attacks in the past years. Therefore, it is still considered a terrorism-prone area. Due to the impact of this situation, the closest stakeholder is the Tanyeri Gendarmerie Station Command. In addition to this stakeholder, Üzümlü District Governorship, Avcılar Neighborhood Mukhtarship, and Erzincan Station Directorate are also stakeholders with whom intensive communication is maintained. One of the closest stations to the station, in the direction of Erzincan, is Altınbaşak Station, which was closed approximately 30 years ago. The other station, Geçit (in the direction of Erzurum), has also been closed for about 30 years. All the mentioned stakeholders have been added to Appendix-10.		 **Culvert to access main road**

163 https://static.tcdd.gov.tr/webfiles/userfiles/files/sebekebildirimi/2021/333.pdf

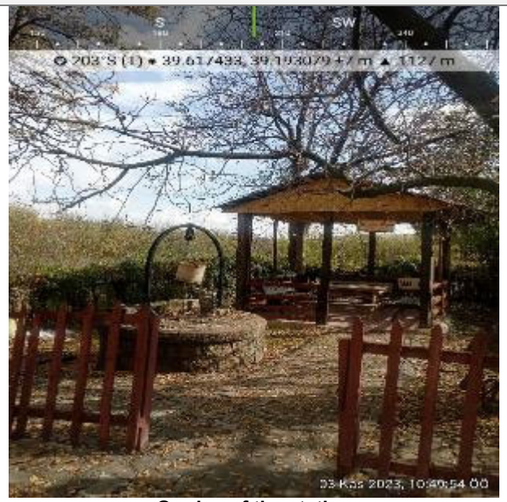
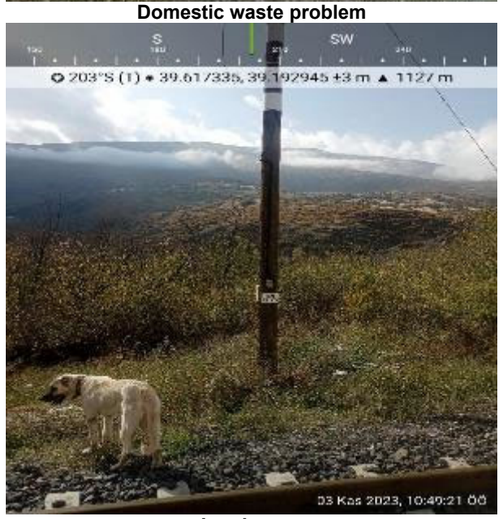
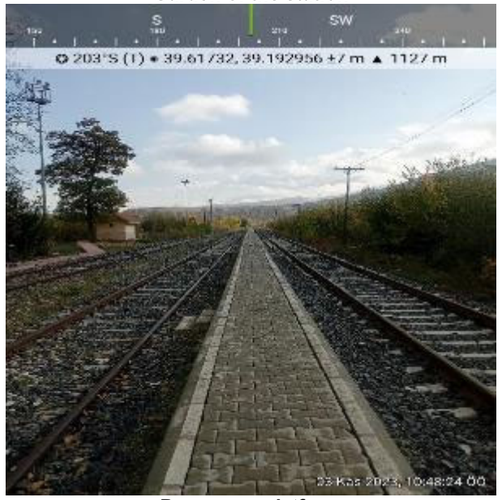
164 https://erzincanism.saglik.gov.tr/TR-59256/uzumlu-ilce-devlet-hastanesi.html

Table 148. Erzincan Main Station

Station	Location	Scope of the Project	Baseline Condition
Erzincan Main Station	**Province: Erzincan District: Central Nearby Settlement: Çarşı km: 933+784**	The main line and the adjacent single line will be extended to accommodate trains of 750 meters. All other lines will be preserved.	There is no difficulty in the implementation of the project at the station. There is no level crossing in the areas near the station. One of the level crossings is located 4-5 km away in the direction of Divriği towards Erzincan OIZ. The other one is on the airport road in the direction of Erzincan. Erzincan Station's most communicative stakeholders include Aras Elektrik Company, Cultural Heritage Protection Directorate, Enerya Company, the Highways Authority, Governorate and Erzincan Municipality. In addition, the institution maintains close contact with its Road Maintenance Directorate internally. Additionally, institutions such as the DSİ are also included in the list of stakeholders. All structures along the line from Erzincan to Divriği and from Erzincan to Erzurum are registered, except for the İliç station. Eriç, Güllübağ, and Dazlak stations are located in the most challenging access areas. Dumanlı station is actually a military point. Alp and Kemah stations are in an area with easy access. Bağıştaş remains an inactive point. The most important station between Erzincan and Divriği is Çaltı, where loading, unloading, and mining transportation are carried out. The operational area of Erzincan station is between Çadırkaya and Bağıştaş. From Çaltı onwards, the operational area of Divriği station begins. All the mentioned stakeholders have been added to Appendix-10

Table 149. Alp Station

Station	Location	Scope of the Project	Baseline Condition
Alp Station	**Province: Erzincan** **District: Kemah** **Nearby Settlement: Alp locality** **km: 901+798**	The existing station will be arranged to accommodate 750 m trains, with a main line and 2 sidetracks.	Passenger and freight trains arrive at the station, but loading and unloading are not performed. Additionally, railbus trains also stop at the station. The station is not a stop for the Eastern Express. There are no ticket sales at the station. There are 4 times a day, 2 departures and 2 returns. The nearest district center is Kemah. The nearest healthcare institution in the region is Kemah District State Hospital[165] All the mentioned stakeholders have been added to Appendix-10

ESSs	Findings	Photographs
ESS1	The station is close to a curve, and if it extends, this curved area may pose a problem.	 **Domestic waste problem**
ESS2	There are a total of 7 employees at the station, including 1 station chief, 1 movement officer, and the remaining employees are train formation workers. There is housing available, and 4 out of 5 apartments are currently in use. Frequent power outages and internet issues are being experienced. The Traffic Management Center (TMİ) system is also prone to malfunctions. The station does not have security cameras. There are occasional issues with the radios. There is no heating system. A stove is used for heating. The station falls under the municipality services of Kemah. The request for garbage containers has been fulfilled, but there is an ongoing issue with domestic waste disposal. Accumulated garbage is not being collected by the municipality. Requests, including the provincial special administration, have not been met.	 **Garden of the station**
ESS4	Train tracks allow both pedestrian and animal crossings. There is no level crossing between the two block sections.	
ESS5	There is no finding and observation.	
ESS10	The gendarmerie command in Alp village and the settlement of Maksutuşağı have frequent communication. All the mentioned stakeholders have been added to Appendix-10. The number of passengers is low. with a weekly passenger capacity of 4 or 5 people. The most common request from passengers is related to access to the station. The station is in close proximity to the Tunceli-Ovacık region. Although there has not been a terrorist attack in the immediate vicinity of the station, concerns exist in the region due to terrorist incidents in the nearby areas. For instance, there was an explosion at Dumanlı Station in the 1990s, and similar incidents occurred in 2017.	 **Landscape**  **Passenger platform**

[165] https://erzincanism.saglik.gov.tr/TR-59186/kemah-ilce-devlet-hastanesi.html

Table 150. Kemah Station

<table>
<tr><th>Station</th><th>Location</th><th>Scope of the Project</th><th colspan="2">Baseline Condition</th></tr>
<tr><td>Kemah Station</td><td>Province: Erzincan
District: Kemah
Nearby Settlement: Çarşı
km: 885+765</td><td>The existing track next to the main line will be extended to accommodate 750 m trains. The other track will be preserved.</td><td colspan="2">The station serves the Eastern Express, the seasonal tourist Eastern Express, the regional train (railbus) operating on the Divriği-Erzincan route, and freight trains. There is ticket sales and a ticket clerk at this station. The Road Maintenance Directorate is also present at the station. The station also has a commercial ramp.
The station is located in the Çarşı neighborhood in the district center of Kemah.
The nearest healthcare institution in the region is Kemah District State Hospital[166].
The schools in the district are Kemah Sultan Melik Multi-Program Anatolian High School[167], Necatibey Middle School[168], Kemah İmam Hatip Middle School[169], Aziz and Mehmet Torun Primary School, Kerer Primary School[170], and Hacı Kamer Torun Kindergarten
Additionally, Erzincan Binali Yıldırım University Kemah Vocational School is also located in the district[171].
All the mentioned stakeholders have been added to Appendix-10</td></tr>
<tr><td>ESSs</td><td colspan="2">Findings</td><td colspan="2">Photographs</td></tr>
<tr><td>ESS1</td><td colspan="2">There is no observation.</td><td rowspan="4">
Electronically Controlled Level Crossing with Barriers in Beklimçay

One of the rare ticket booths on the railway route</td><td rowspan="4">
Uncontrolled pedestrian crossing around the station

Toilet not suitable for people with disabilities.</td></tr>
<tr><td>ESS2</td><td colspan="2">There are a total of 9 employees at the station. It is a station where ticket transactions are made, excluding stations with ticket office clerks. Among the employees, one is the station chief, one is the ticket office clerk, one is the movement officer, and the rest are train formation workers. The employee serving as the movement officer is a woman. There is a fully occupied household in 1 residence building for the employees.
Even though the station building is old, maintenance and repair work has been carried out on the interior structure.
In this station, there is no issue with electricity interruptions. There are no problems with the radio communication system and internet access. However, there may be occasional issues with the TMİ. Natural gas is used for heating, and the natural gas system comes through İliç.
Materials that have become unused after maintenance and repair work are stored in a makeshift manner along the railway track. The presence of the Track Maintenance Directorate around the station area may contribute to the accumulation of such unused materials.</td></tr>
<tr><td>ESS4</td><td colspan="2">Animal crossings and the passage of agricultural machinery are common on the train tracks. An electronically controlled level crossing with barriers is present on the Eriç-Divriği route (Beklimçay settlement). However, the train station is located at the entrance of the entire settlement. In this sense, although there is a perimeter wall, it is insufficient. There are no schools or student areas nearby.</td></tr>
<tr><td>ESS5</td><td colspan="2">In accordance with the opinion of the respondent the area suitable for expansion in the planned works for the station is towards Divriği-Eriç. However, in the direction of Erzincan, there may be private lands encountered.</td></tr>
<tr><td>ESS10</td><td colspan="2">The institutions with intensive communication are the police department, district governorship, and municipality.
The issues that station employees particularly emphasize are: 1) the need for staff housing, 2) inadequacy of health facilities in the region, 3) transportation/access problems for personnel, and 4) the shortage of rental housing in the surrounding settlements.
The key issues for the people in the surrounding settlements include:
1) Lack of a disabled ramp
2) Accessibility challenges for the elderly
3) Absence of a disabled toilet
4) Frequent train delays
The station is located in a settlement referred to as a terrorist zone, and due to concerns about terrorist attacks, station personnel deliberately do not answer questions from the local residents about "finding out train schedules" and "learning which train is coming."
There are no security cameras at the station; however, the station is under the surveillance of the military from the dominant hill.</td></tr>
</table>

166 https://erzincanism.saglik.gov.tr/TR-59186/kemah-ilce-devlet-hastanesi.html

167 https://kemahsultanmelikcpal.meb.k12.tr/

168 https://kemahnecatibey.meb.k12.tr/

169 https://kemahimamhatip.meb.k12.tr/

170 https://kemahkerer.meb.k12.tr/

171 https://kemahmyo.ebyu.edu.tr/

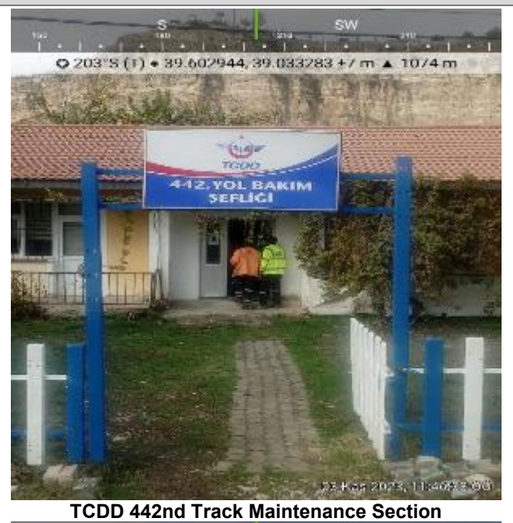
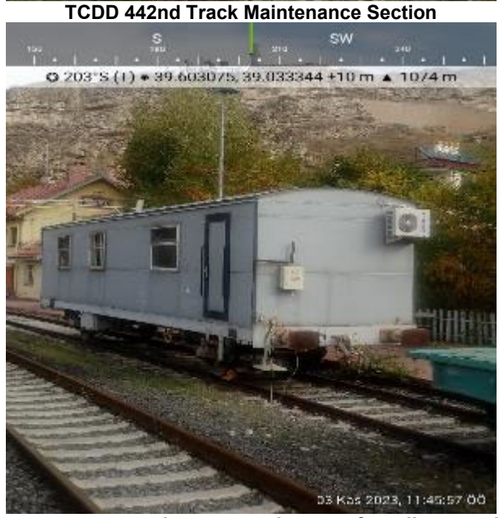
Station	Location	Scope of the Project	Baseline Condition	
	All the mentioned stakeholders have been added to Appendix-10		 TCDD 442nd Track Maintenance Section	 Unused materials
			 Wagon structure serving as a resting area for railway workers.	 One of the housing structures.

Table 151. Eriç Station

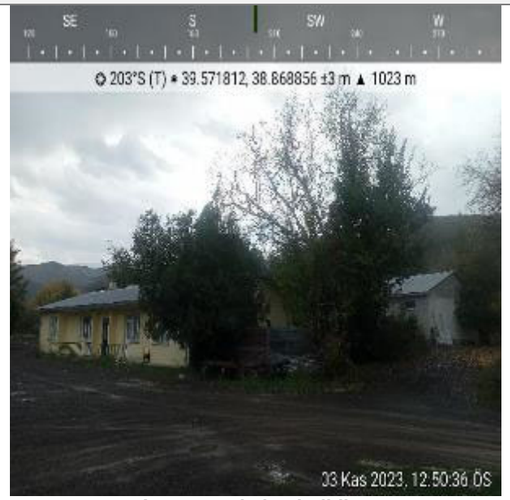
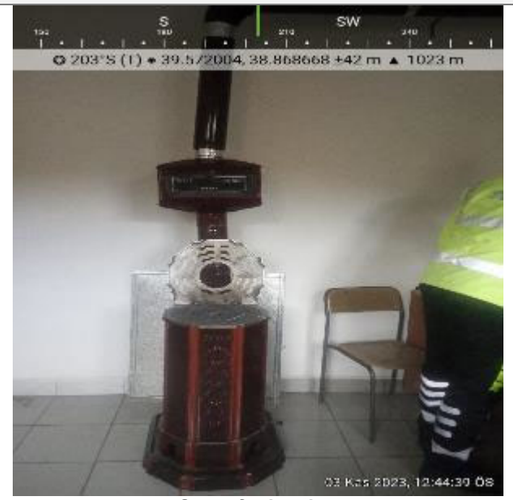
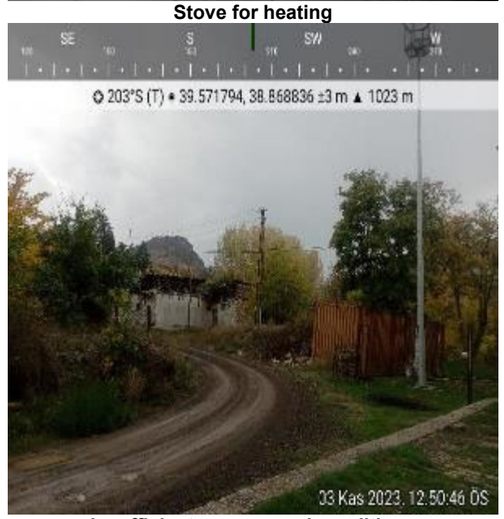
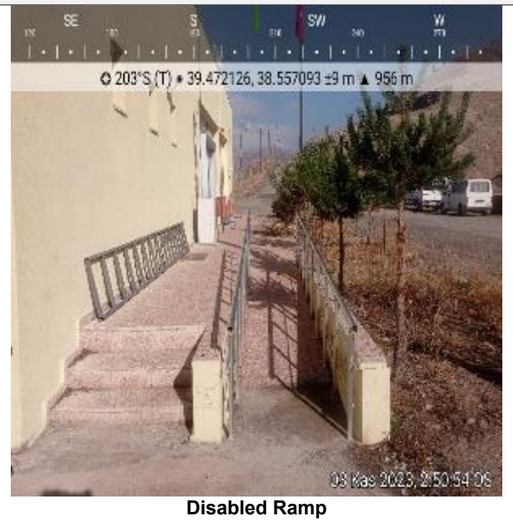
Station	Location	Scope of the Project	Baseline Condition
Eriç Station	**Province: Erzincan** **District: Kemah** **Nearby Settlement: Boğaziçi** **km: 868+650**	The existing station will be arranged with a main line + 2 side lines to accommodate 750 m trains.	One of the stations with the longest useful length in the region is Eriç and the other is İliç station. This station serves both passenger and freight trains. Train meetings take place at this station due to the availability of adequate length. Both the Eastern Express and a regional train known as "railcar" stop at this station. There is a commercial ramp at the station; however, loading and unloading operations are not carried out there. This station is a contiguous station to both Kemah Station and İliç Station. This station, which was once utilized for loading wheat, has been inactive in this regard for a decade. The station is located in Eriç village in the district center of Kemah. The station is located in the Çarşı neighborhood in the district center of Kemah. There are no educational or health institutions in the settlement. The nearest educational and health facilities are located in the Kemah district.
ESSs	**Findings**		**Photographs**
ESS1	There is no observation.		 **Accommodation building**
ESS2	The station has a staff of 6 train formation workers, 2 movement officers, and 1 station manager. There is accommodation available for the employees, and it is currently used by 4 households. The significant issue for station personnel is related to access to the station. The nearest settlements are far from the station, and personnel rely on the railbus for transportation. However, there can be a mismatch between train schedules and working hours, leading to either arriving at the station too early or being unable to leave the station at all, especially if the train schedules do not align with their working hours. Some employees use their own vehicles for transportation. The main technical issues facing the station are power outages and water interruptions. Heating is provided by a stove. There are no issues with the telephone and radio communication systems. The station has internet access.		 **Stove for heating**
ESS4	The station surroundings do not have a perimeter wall. There are no barriers and controlled crossing components in level crossings. Due to the region being a terrorism zone, there are concerns about security. Apart from that, no security or theft issues have been reported. However, there is no security camera at the station.		
ESS5	In accordance with the opinion of the respondent that the land around the station is mostly private property, with gardens in the direction of İliç, and houses in the direction of Kemah.		 **Informative documents**
ESS10	The most intensively communicated settlements are Koçkar, Eriç, and Oğuz, . Despite low population density, the most frequently mentioned issue by the local people is the delays in trains. Even though the Eastern Express does not have many passengers, the railbus is actively used. During the summer, the daily number of passengers varies between 25 and 30. In the winter, this number drops to the range of 5 to 10. Continuous contact with the Eriç Gendarmerie Command is maintained. The surrounding settlements have a low population, and agricultural activities are rarely carried out by 1 or 2 households. While this station was previously actively used for wheat loading operations, this activity has been stopped for about 10 years. All the mentioned stakeholders have been added to Appendix-10		 **Insufficient access road conditions**

Table 152. İliç Station

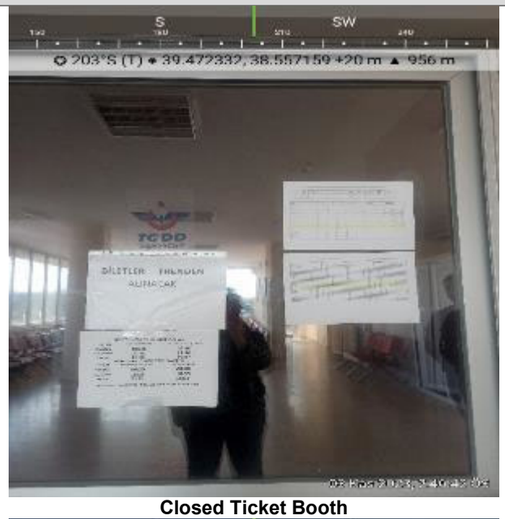
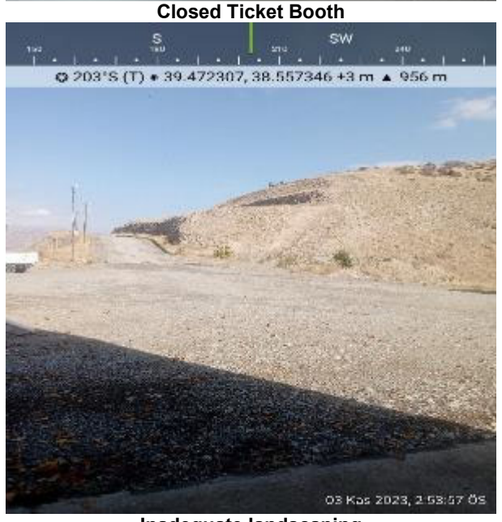
<table>
<tr><th>Station</th><th>Location</th><th>Scope of the Project</th><th>Baseline Condition</th></tr>
<tr><td>İliç Station</td><td>Province: Erzincan
District: İliç
Nearby Settlement: İbrahim Çeçen / İstasyon
km: 832+434</td><td>The existing station will be arranged to accommodate 750 m trains with a main line and 2 sidetracks.</td><td>One of the stations with the longest useful length in the region is İliç, and the other is Eriç station.
The station is served by the Eastern Express, regional trains, and the tourist Eastern Express as passenger trains. The İliç station is a significant stop for the Touristic Eastern Express because the arriving trains have the longest waiting time at this station. Passengers departing from here explore Kemah and its surroundings by road before returning to the İliç station to continue the tour by train. The presence of the Touristic Eastern Express, which started on December 11th and will end before Ramadan, has a substantial impact on the entire operation of the station.
On the other hand, this station is also the busiest for the regional train. The number of passengers boarding and alighting via the railbus is over 100.
There is no loading or unloading at the station. There is no commercial ramp, and there is no connection line.
The station is located in İliç district.
The educational institutions in Iliç and surrounding villages include in Iliç center; Iliç Seyda Fırat Multi-Program High School[172], Anagold Mining Middle School[173], Iliç İbrahim Çeçen Imam Hatip Middle School[174], Mehmet Şemsettin Günaltay Primary School[175], 23 Nisan Primary School[176], and Iliç Kindergarten[177], as well as the village schools Çöpler Primary School[178], Sabırlı Primary School[179], and Elmacık Primary School[180].
The health institutions in the district include Iliç District Health Group Presidency[181], Iliç State Hospital[182], and Iliç FHC[183].
All the mentioned stakeholders have been added to Appendix-10.</td></tr>
<tr><td>ESSs</td><td colspan="2">Findings</td><td>Photographs</td></tr>
<tr><td>ESS1</td><td colspan="2">The current useful length of the station is 930 m. Due to project works shortening the track, there may be issues with train meetings.</td><td rowspan="2">

Disabled Ramp</td><td rowspan="2">

Wheelchair</td></tr>
<tr><td>ESS2</td><td colspan="2">The station has traffic officers and train formation workers. The staff consists of a total of 10 individuals, including 7 train formation workers and 3 movement officers. Due to temporary assignments, this number decreases to 8, with 6 train formation workers and 2 movement officers.
There is accommodation available for the staff; however, all 6 apartments are currently occupied. No accommodation options have been provided for the remaining personnel. Due to the energy production facility and mining installations in Iliç, there is a serious housing shortage in the area. Many employees commute from Erzincan due to this, which becomes a significant expense item for the staff. Some employees use the railbus, but there is a mismatch between train schedules and working hours.
Despite the station's overall activity, there is no ticket clerk since ticket sales are not conducted at the station. There are no female employees at the station.
The most significant problems expressed by the station staff can be listed as follows:
1) Frequent power outages
2) Weak signal and inadequate internet access in telephone lines
3) Absence of a ticket clerk
4) Lack of a camera system for security
5) Inadequate station environmental planning and muddy access roads in rainy weather</td></tr>
</table>

172 https://seydafiratlisesi.meb.k12.tr/
173 https://anagoldortaokulu.meb.k12.tr/
174 https://imamhatiportaokulu.meb.k12.tr/
175 https://767654.meb.k12.tr/
176 https://ilic23nisanilkokulu.meb.k12.tr/
177 https://ilicanaokulu.meb.k12.tr/
178 https://copler.meb.k12.tr/
179 https://sabirli.meb.k12.tr/
180 https://ilicelmacikilkokulu.meb.k12.tr/
181 http://www.ilic.gov.tr/ilce-saglik-grup-baskanligi
182 https://erzincanism.saglik.gov.tr/TR-59247/ilic-ilce-devlet-hastanesi.html
183 https://erzincanism.saglik.gov.tr/TR-58708/ilic-asm.html

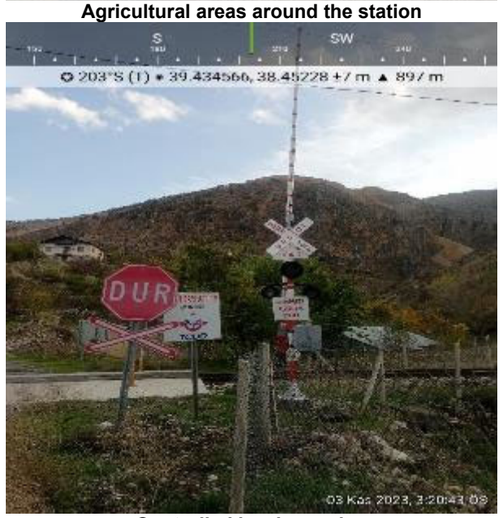
<table>
<tr><th>Station</th><th>Location</th><th>Scope of the Project</th><th colspan="2">Baseline Condition</th></tr>
<tr><td></td><td colspan="2">6) Irregular collection of domestic waste
7) Inadequacy of the sewer system
8) Difficulty in maintaining the cleanliness of toilets, prayer rooms, sinks, etc. during peak passenger periods
9) Insufficient housing facilities relative to the number of personnel
10) The windows and doors of the cabins where train formation workers wait for the operations at the switch points are broken.
11) The lack of shopping facilities such as a market or grocery store nearby to meet daily needs.
12) Frequent power cuts, poor signal and insufficient internet connectivity in telephone lines, irregular collection of domestic waste and Inadequate sewer system are the main problems</td><td rowspan="3">
Announcement Board

Residential Building</td><td rowspan="3">
Closed Ticket Booth

Inadequate landscaping</td></tr>
<tr><td>ESS4</td><td>There is no level crossing. Pedestrian and animal crossings are rare. There is no concern related to terrorism.</td></tr>
<tr><td>ESS5</td><td>There is no findings and observation.</td></tr>
<tr><td>ESS10</td><td>During the construction of the dam in the region, the old station building was submerged.
Even though the station is terribly busy, the fact that ticket transactions are not conducted here creates conflicts between passengers and employees. For example, personnel involved in train meetings cannot answer phone calls from people seeking information when they are not in the station building. As a result, numerous complaints have been lodged on the CİMER (Presidential Communication Center) platform.
The passengers come from the center of Iliç.
Around the station, there is a gold mining area "Çöpler Gold Mine"[184], a dam, and a power generation facility "Bağıştaş-I Dam and HEPP Project"[185][186]. These are important stakeholders for the station. Therefore, Anagold Madencilik and IC Holding are corporate stakeholders in the project.
All the mentioned stakeholders have been added to Appendix-10</td></tr>
</table>

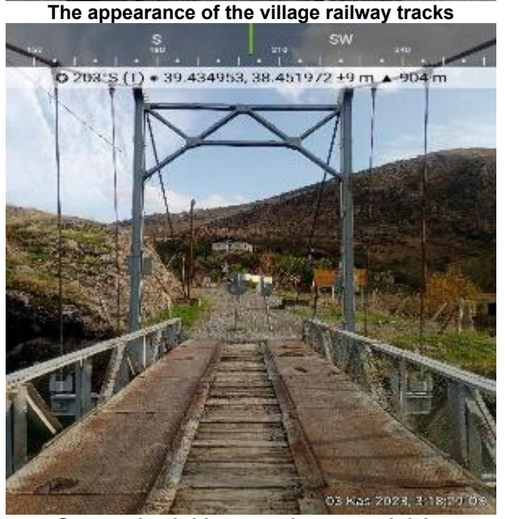
184 https://www.anagold.com.tr/tr/anasayfa/
185 https://www.enerjiatlasi.com/hidroelektrik/bagistas-baraji.html
186 https://www.icholding.com.tr/TR/insaat/ProjeDetay/32

Table 153. Bağıştaş Station

<table>
<tr><th>Station</th><th>Location</th><th>Scope of the Project</th><th colspan="2">Baseline Condition</th></tr>
<tr><td>Bağıştaş Station</td><td colspan="2">Province: Erzincan
District: İliç
Nearby Settlement: Bağıştaş / Kayacık
km: 821+802</td><td colspan="2">The station serves as a passenger station for the Eastern Express and regional trains (railbuses). There is no ticket booth at the station. The nearest settlement is the village of Bağıştaş. There are no schools or health facilities in the settlement.</td></tr>
<tr><td>ESSs</td><td colspan="2">Findings</td><td colspan="2">Photographs</td></tr>
<tr><td>ESS1</td><td colspan="2">There is no observation.</td><td rowspan="4">

Agricultural areas around the station


Controlled level crossing</td><td rowspan="4">

The appearance of the village railway tracks


Suspension bridge over the reservoir lake</td></tr>
<tr><td>ESS2</td><td colspan="2">There are 5 train formation workers and 1 movement officer working at the station. The movement officer is a female employee. Personnel transportation is provided by a railbus. There are no housing facilities available.
The key issues at the station include frequent power outages, weak signal in telephone lines, difficulties in accessing the station, and water shortages during the summer months.
Power outages are a significant problem. Heating is provided using a stove, and wood or coal is used as fuel for the stove. The risk of poisoning for station personnel exists due to heating with the stove. There have been instances of blockage and subsequent smoking in the station building's chimney due to pigeons nesting in it.</td></tr>
<tr><td>ESS4</td><td colspan="2">In the Bağıştaş and Kayalar locations, there is a level crossing with controlled barriers. The station surroundings do not have security cameras. There are no pedestrian crossings in the region due to the low population, but there are frequent animal crossings. In parallel, the use of agricultural machinery on the railway is high. There are wire fences within the station, but there is no enclosure wall.</td></tr>
<tr><td>ESS5</td><td colspan="2">In accordance with the opinion of the respondent that there is no expected issue of expropriation.</td></tr>
<tr><td>ESS10</td><td colspan="2">Passengers complain about the dwindling number of trips, resulting in exceptionally long waiting times. There is a platform for passengers, but it is not sufficient.
Some villagers call to inquire about train schedules for animal crossings or tractor passages.
Due to frequent power outages, communication with the electricity distribution company (TEDAŞ) is intense. Another important stakeholder is the İliç gendarmerie command.
All the mentioned stakeholders have been added to Appendix-10
The station surroundings do not include sensitive facilities such as schools and health facilities. The population in the region is low and consists of elderly individuals.
The frequent power outages and weak phone signals bring communication issues along. In this regard, there is a deficiency in terms of communication at the station.</td></tr>
</table>

Table 154. Çaltı Station

Station	Location	Scope of the Project	Baseline Condition
Çaltı Station	**Province: Erzincan** **District: Kemaliye** **Nearby Settlement: Çaltı / Adatepe (Divriği)** **km: 804+599**	The current station will be arranged to accommodate 750 m trains, with a main line and 3 side lines. The blind track will be canceled.	This station coordinates the transportation of minerals between Divriği and Çaltı. The source includes iron, ore dust, and occasionally chrome. The materials extracted from the nearby mine are transported by rail to Divriği and then to Karabük. Loading operations are carried out at the station. The predominant products include iron ore, iron powder, and pellets. The locomotive engines of freight trains coming from Divriği are faulty. The station has two ramps, one used by the Etüt company in the Bağıştaş direction and the other used by Hestaş in the Divriği direction. Each ramp has a length of over 400 meters and a capacity for 30 freight wagons. The station also provides services for passenger trains. It serves as a stop for both the railbus and the Eastern Express. The station is located in the Çaltı settlement, which is affiliated with Kemaliye district in Erzincan, and at the same time, in the Adatepe village region of Divriği district in Sivas province. Although administratively part of Erzincan province, this station lies closer geographically to Sivas province and is situated on the border between the two provinces. The nearest settlement is Gümüşçeşme, which is affiliated with the Kemaliye district.The other settlement is Çaltı village, affiliated with İliç. Both settlements lack educational and health institutions.
ESSs	**Findings**		**Photographs**
ESS1	The presence of the mining area in the region increases the risks of the project.		 **Freight truck operating in the mining area.**
ESS2	A total of 10 personnel is working at the station. These personnel include one station chief, one movement officer, seven train formation workers, and one logistics service personnel. The personnel serving as the movement officer is a woman. Due to the shift change on November 3, 2023, the day of the interview, she is not at the station, and a meeting with her could not be arranged. The logistics service personnel are not directly stationed at the station but work in the TCDD's Kemaliye Çaltı Logistics Section, which is allocated for loading and unloading operations in the region's mines. One notable problem for station personnel is the lack of shopping and dining options in the vicinity. Basic necessities such as bread and drinking water are brought by the daily railbus drivers and delivered to the station personnel. In this sense, there is a deprivation in terms of amenities. During lunch and dinner, the personnel occasionally cook their own meals, and sometimes they use the dining facilities of nearby mining companies. The station frequently experiences internet and power outages, leading to significant communication issues. A generator is used to address power outages. Heating is provided using a stove, supplemented by air conditioning. Recent problems related to water shortages have been resolved. There is also an issue regarding drinking water. It is unknown whether an analysis has been conducted on the water drawn from the well.		 **A view from the mining area.**
ESS4	Pedestrian traffic at level crossings is low, and animal crossings are exceedingly rare. The most frequent use is by trucks belonging to mine workers. Unauthorized crossings by these vehicles can sometimes be observed at level crossings.		
ESS5	In accordance with the opinion of the respondent the direction towards Bağıştaş would be more suitable due to the level crossing in the Divriği direction.		
ESS10	One of the significant problems at the station is the disruptions to TMİ telephone lines and radios. These faults almost lead to a disruption in communication throughout the day, affecting the operation of trains. The most important stakeholder for the station is the TCDD's Kemaliye Çaltı Logistics Section. The station is located next to an iron mine[187], and there are three private companies operating in this area. The private companies operating here are Bilfer[188], Etüt[189], and HESTAŞ[190]. All		

187 https://eticaret.mta.gov.tr/index.php?route=product/product&product_id=7388
188 https://bilfer.com/
189 https://etutmadencilik.com/ana-sayfa
190 https://www.hestas.com.tr/

Station	Location	Scope of the Project	Baseline Condition	
	subcontractors and subcontractors' employees operating in the station area of these three companies are stakeholders in the project. All the mentioned stakeholders have been added to Appendix-10 The number of passengers at the station varies depending on the number of workers coming to work in the mine. Mine workers mostly come from the nearby Çaltı village, Gümüşçeşme hamlet. There does not seem to be a problem between the employees of the mining company and the station staff. The requests from mining companies are primarily related to wagon allocation. There can be delays of 2 to 3 hours on train journeys, especially on the Eastern Express. Passengers often express complaints about these delays.		 **A DMU train (regional train or railbus).**	 **Warning sign for snakes and pests.**

4.13.5 Tunceli Province

4.13.5.1 Settlements

In Tunceli province, there is 1 station within Pülümür district. Geçit station is located in Yarbaşı village. The household survey could not be realized because there were no permanent residents in village. There are three settlements nearby of train line. Name of these are Başkalecik, Dağyolu, and Doğanpınar. One of the mukhtar did not attend the meeting because the train line was far from the village, while the other one did not participate, claiming to be the former mukhtar. Population data has been given by Table 155.

Table 155. Population information of Tunceli region

Province	District	Station	Settlement	Population	Number of Household	Average Household Size
Tunceli	-	-	-	89,317	29,606	2.63
Tunceli	Pülümür	-	-	4,010	1,642	2.33
Tunceli	Pülümür	Geçit	Yarbaşı	48	-	-

According to the results of the meeting with the mukhtar of Yarbaşı, no negative impact is expected on the village due to the project. There are no agricultural fields or grazing areas around the train line in this settlement. Agriculture and animal husbandry are the primary sources of livelihood in the region. Additionally, beekeeping has been identified as a source of income. Apart from the mosque, the cem evi serves as a place of worship. Besides Turks, Kurds and Zazas inhabit the area, speaking Zazaki and Kurdish in addition to Turkish.

4.13.5.2 Stations

Tunceli serves as the point of entry for the railway project into Türkiye's Eastern Anatolia Region. The railway traverses three villages under the authority of the Pülümür District, situated to the north of Tunceli. Among the areas affected by the project, Tunceli experiences the least impact (Detailed information on field survey schedule of 1st phase of social research is given in Appendix-9. In addition, all the stakeholders including the PAPs are given with Appendix-10.

Included in the investigation are the Geçit station in Pülümür District within the confines of Tunceli province.

Table 156. Geçit Station

Station	Geçit Abandoned Station
Location	**Province: Tunceli** **District: Pülümür** **Nearby Settlement: Yarbaşı** **km: 981+650**
Scope of the Project	The existing station will be reconfigured to accommodate trains up to 700 m in length, with a main line and 1 sidetrack. The second secondary track will be canceled.
Baseline Condition	There is no more information about the station. The station is located in the region between Erzincan and Tunceli provinces. Although the nearest settlement appears to be Yarbaşı, a complete assessment cannot be made due to the almost impossible road access to the station. The dense mountainous and elevated terrain of the region has made it impossible to evaluate the station. The total population of the three relevant settlements is 278, and the most populous settlement is Doğanpınar with 152 people. The total population of Pülümür district is 3,498 people.

4.13.6 Sivas Province

4.13.6.1 Settlements

In Sivas province, there is 2 stations within Divriği district, which are Güllübağ and Dazlak stations. Around of these stations there are seven settlements named as Güllübağ, Gezey, Kalealtı, Aşağıhamam, Çobandurağı, Adatepe and Oyuktepe. Household survey has been conducted only in Güllübağ settlement. Gezey village has not been visited due to the poor road conditions. Population data has been given by Table 157.

Table 157. Population information of Sivas region

Province	District	Station	Settlement	Population	Number of Household	Average Household Size
Sivas	-	-	-	650,401	193,486	3.13
Sivas	Divriği	-	-	16,893	6,421	2.58
Sivas	Divriği	Dazlak	Gezey	18	-	-
Sivas	Divriği	Güllübağ	Güllübağ	771	-	-

General results of household survey for these settlements are listed in below:

- A total of 5 household surveys were completed in Güllübağ on 20.03.2024.
- During the survey, apart from 2 male household representatives, mostly female have participated.
- The preferred method for informing about the project is mostly through the mukhtar.
- Residents are using the train frequently.
- Nobody has knowledge about the project.
- There is an emphasis on students who will benefit from the project. There is no specific emphasis for disadvantaged groups because of the project.
- The total population in the represented households is 16 individuals, with a high number of individuals in the 15-64 age group (12 individuals).
- The number of men and women in the households is close (7 women, 9 men).
- The primary source of livelihood in the households is retirement, trade, and salary.
- The prominent issues in the region are health, unemployment, and transportation.
- There are unemployed individuals among both female and male.
- There are 2 disabled individuals.
- There are no students attend to school among households.
- One household consist elderly individuals.
- Languages other than Turkish are spoken in one household.

Mukhtar survey has been carried out both in Gezey and Güllübağ. The mukhtars of other settlements which are located around the train line. One of the mukhtars around the railway line refused the meeting, citing personal matters. The others could not be reached due to incorrect phone numbers.

4.13.6.2 Stations

There is no station in Divriği district center, which is included in the scope of the Project. Güllübağ, and Dazlak stations are located in the most challenging access areas. Dazlak is also an abandoned station.

There are no findings and observations related to Dazlak Abandoned Station and Divriği Station. The station is situated in the Çaltı locality, belonging to the Kemaliye district in Erzincan, and concurrently, in the Adatepe village area of the Divriği district in Sivas province.

While it is administratively within the boundaries of Erzincan province, geographically, this station is closer to Sivas province and is positioned on the border between the two provinces.

4.14 Vulnerable Groups

In line with the principles of railway development, the categorization of vulnerable populations, as outlined by the ESF of World Bank, is crucial for addressing relative disadvantages within the context of the project.

In accordance with ESS10, this project defines vulnerable groups based on characteristics that might limit their access to project-related information, participation in consultations, and access to announcements. Consequently, non-Turkish-speaking individuals, the elderly, elderly women who are heads of households living alone, illiterates, and people with disabilities are identified as vulnerable groups for this project. These groups are;

- Non-Turkish speaker people
- Illiterates
- Elderly people
- Disabled people
- Elderly women who are heads of households living alone

Addressing the concerns and potential adverse effects on these groups is crucial for ensuring the project's ethical and social responsibility, as well as minimizing the negative impact on vulnerable stakeholders.

Vulnerable groups associated with this aspect include individuals with disabilities, and the who face heightened risks in pedestrian traffic at railway crossings. Moreover, non-Turkish speaker individual cannot access information related to E&S risks of the Project. Therefore, the regions where the non-Turkish speaker individuals are intense, informative documents should be covering local languages. In addition, informative meetings should be conducted by using translator. Addressing the safety concerns of these vulnerable groups is crucial for ensuring a secure, informative actions and inclusive environment at railway crossings and stations.

The sensitive issues relevant to the Project are described in Table 158.

Table 158. Sensitive issues for both internal and external stakeholders

ESSs	Issues caused to vulnerability	Finding and observations	Receptors	DVIGs
ESS1 ESS2 ESS10	**Access problems**	• Difficult access to stations by road • Exclusive access to stations only by train • Mismatch between working hours at stations accessible only by train and train schedules • Poor/inadequate or non-existent access roads to stations • Distance from the city and district center	• Railway employees • Local Residents • Passengers	• Elderly (including female-headed households) • Handicapped people
ESS1 ESS2 ESS10	**Accommodation problems**	• Absence of housing in the station area • Inability to repair existing housing due to its age and historical significance • Rental housing issues in the region where the station is located • Fewer housing units than the number of personnel • Absence of shopping facilities at the station and its surroundings • Absence of schools and hospitals in the settlement where the station is located • Insufficiency of schools and hospitals in the settlement where the station is located	• Railway employees	• No DVIG
ESS1 ESS2 ESS10	**Working conditions**	• Weak mobile phone coverage areas • Frequent power outages • Incidents of water interruptions • Use of wood and coal in stoves for heating • Inability to perform switch works in regions experiencing severe winter conditions • The station being outside municipal services and domestic waste not being collected	• Railway employees	• Not available

ESSs	Issues caused to vulnerability	Finding and observations	Receptors	DVIGs
		• Insufficiency of switch point cabins • Lack of a sewage system • Absence or inadequacy of drinking water • Wildlife crossings		
ESS1 ESS2 ESS4 ESS10	**Obstacles for passenger**	• Limited number of train services • High fares for short-distance trains • Delayed arrivals of trains • Absence of ticket sales at stations • Absence of personnel such as ticket clerks except at major stations	• Local Residents • Passengers	• Elderly (including female-headed households) • Handicapped people
ESS1 ESS2 ESS4 ESS10	**Handicaps for disabled and elderly people**	• Short or nonexistent passenger platforms at stations • Absence of platforms for people with disabilities • Lack of accessible restrooms for people with disabilities • Insufficient lighting around stations • Absence of heating in waiting rooms • Exclusive reliance on online ticket purchases	• Local Residents • Passengers	• Elderly (including solely household head females) • Handicapped people
ESS1 ESS2 ESS4 ESS5 ESS10	**Community health, safety, and security problems**	• Absence of controlled crossing equipment at level crossings • Inadequate perimeter walls • Absence of overpasses and underpasses in student areas • Presence of pedestrian crossings in areas where train stations are situated amidst residential areas and school zones • Designated areas for pedestrian crossings being far from residential and school zones • Intense passage of livestock in rural areas • Crossings in agricultural fields using the railway • Structures such as culverts being used as animal shelters	• Railway employees • Local Residents • Passengers	• Elderly (including solely household head females) • Handicapped people • Non-Turkish speaker individuals • Illiterates

ESSs	Issues caused to vulnerability	Finding and observations	Receptors	DVIGs
		• Attacks on train personnel accommodation cars • Incidents of theft in stations without security cameras • Abandoned structures/surplus materials • The materials used during maintenance and repair works being attractive for theft • Terrorism issues		

4.15 Social Impact Assessment

4.15.1 Land Preparation and Construction Phase

A SIA during the construction phase of a project involves evaluating and understanding the potential social effects and implications that may arise as a result of the construction activities. This assessment is a critical component of responsible and sustainable project management.

The project route encompasses a total of 6 provinces, 1 metropolitan municipality, 22 districts, and 185 village/neighborhood settlements. Considering the length of the project line, the expected effects during the construction period will primarily affect groups along the line, especially in close proximity to residential areas.

4.15.1.1 Working conditions

The existing conditions faced by railway employees can be adapted to the specific context of land preparation and construction activities for siding:

- The absence of housing in the vicinity of the construction site for siding poses a significant challenge for personnel. Repairing existing housing structures may be hindered by their age and historical significance, necessitating alternative solutions for accommodating construction workers.
- Similar to the challenges faced by railway employees, the construction team may encounter difficulties in securing rental housing in the region where the siding construction is taking place, further complicating the living arrangements for the personnel.
- The shortage of housing units compared to the number of personnel remains a concern, mirroring the challenges faced by railway employees. This could affect the overall well-being and efficiency of the construction workforce.
- The absence of shopping facilities, schools, and hospitals in the settlement near the construction site may impact the daily lives of the construction team. Insufficiencies in these basic amenities need to be addressed for the overall welfare of the personnel.
- Weak mobile phone coverage, frequent power outages, and incidents of water interruptions could hamper communication and construction activities. Robust infrastructure planning and backup systems are essential to mitigate these challenges.
- In regions experiencing severe winter conditions, the reliance on wood and coal in stoves for heating, coupled with the inability to perform switch works, requires strategic planning to ensure the safety and well-being of the construction team.
- Similar to railway stations, if the construction site is located outside municipal services, issues such as the lack of domestic waste collection need to be addressed to maintain a clean and functional work environment.
- Challenges such as the insufficiency of switch point cabins, lack of a sewage system, and inadequacy of drinking water require targeted infrastructure development to support construction activities.
- Wildlife crossings in the construction area necessitate environmental awareness and planning to minimize disruptions to local ecosystems.
- The severe conditions in working conditions will be felt more especially in Erzurum, Erzincan, and Sivas regions, especially in stations and regions that are more faced with access problems, weather conditions and communication problems.
- The fact that all of the tunnel structures between Sarıkamış and Divriği are technically inadequate and incomplete will further affect the problems in terms of employees and freight transportation.

4.15.1.2 Passenger and local residents

Passengers traveling along the railway route from Sivas to Ardahan may experience various impacts due to land preparation and construction activities associated with the development of siding. Service disruptions are a notable concern as construction endeavors can result in temporary alterations or interruptions in train services. This unpredictability may significantly affect the travel plans and schedules of passengers who rely on the railway for their daily commute or occasional travel. In addition to service disruptions, passengers may face inconvenience arising from delays, changes in platforms, or altered train schedules. Such adjustments necessitate passengers adapt to new arrangements, potentially leading to extended journey times and a reevaluation of their travel plans. The comfort and predictability of their regular commuting routine may be compromised during the construction phase.

Communication challenges further compound the potential impact on passengers. Inadequate communication regarding construction-related changes has the potential to sow confusion among passengers, making it difficult for them to navigate the evolving circumstances. Clear, transparent, and timely communication is therefore paramount to minimizing disruptions and assisting passengers in planning their journeys effectively. A comprehensive communication strategy that includes regular updates, informative announcements, and accessible channels for passenger inquiries is essential to ensure a smooth and well-informed travel experience during the construction activities from Sivas to Ardahan.

The disruptions resulting from land preparation and construction activities are anticipated to have an impact on the Orient Express tourist flights. These tours, conducted from December to March, encompass visits to cultural and historical sites in the region. This annual tourist activity, spanning approximately three months, contributes significantly to the region's economy. The withdrawal of this tourist activity and the associated sources of income will affect tourism agencies, providers of hotel and accommodation services, and local tourist enterprises. The Kars and Ardahan regions, in particular, are expected to experience a more pronounced impact from this disruption.

4.15.1.3 Residences and other structures

In accordance with the findings of household survey some of the households expect adverse impacts on their housing, as well as adverse impacts on structures, lands, crops, and other assets within the AoI. These impacts may increase, particularly if land acquisition becomes necessary. However, the exact impact can only be assessed once the specific corridor is determined, and then an assessment of specific impacts will need to be prepared.

4.15.1.4 Vulnerable groups

Ensuring accessibility, safety, and comfort for vulnerable groups during land preparation and construction activities is essential. This includes clear communication about changes

Land preparation and construction activities for siding, particularly when considering vulnerable groups, can have specific impacts that need careful consideration:

- Construction may exacerbate the challenges faced by individuals with mobility issues, the elderly, as short or nonexistent platforms can hinder accessibility. Mitigation measures, such as temporary platforms or alternative boarding arrangements, should be considered during construction.
- The lack of dedicated platforms for people with disabilities can significantly impact their ability to board trains safely. Construction activities should prioritize the creation of accessible platforms, ensuring that these individuals have equal opportunities for rail travel.

- The absence of accessible restrooms can pose significant difficulties for individuals with disabilities. Construction projects should include the provision of temporary or alternative accessible restroom facilities to accommodate the needs of vulnerable groups during the construction phase.
- Insufficient lighting can create safety concerns, particularly for vulnerable groups. Construction activities should include measures to maintain or enhance lighting around stations to ensure the safety and security of passengers, especially during early mornings or late evenings.
- Lack of heating in waiting rooms can be particularly challenging, especially for elderlies who may be more susceptible to temperature extremes. Construction planning should consider providing alternative waiting areas or temporary heating solutions to address this issue.
- Elderlies, such as those with limited digital access or technological literacy, may face challenges with exclusive online ticket purchases. During construction, alternative methods for ticket purchase and assistance should be made available to ensure that these individuals can access and use rail services without barriers.
- Provision of information and signage in other languages than Turkish would be necessary as part of addressing issues of vulnerable groups.

4.15.2 Operation Phase

There is expected impacts for the operating period.

- Employees will be made aware of any possible OHS risks and will be trained to deal with them properly.
- During operation, risks such as train derailments, collisions, and equipment failures can result in severe injuries or fatalities among both passengers and railway workers.
- With the elimination of the existing infrastructure deficiencies, the railways are preferred by the workforce as an employment area.
- Further strengthening of the feature of being the reason for the preference of the railway route at points such as Kars and Erzurum, where intense winter conditions are currently experienced.
- Revival of trade relations that were interrupted by factories and soil crop offices that remained on blind lines due to modernization works on the railway
- Increasing the capacities of units that are commercially strategically important such as the mining facility near Sivas, the OIZ in Erzincan, the Palandöken Logistics Center in Erzurum, and the Kars Logistics Center.
- In order to ensure compliance with the changes that will take place on the train lines, the technical training of the existing personnel will enable the workforce to become better equipped.
- The expected increase in demand for regional trains, especially due to improvements in railway routes and stations, will ensure that environmentally sensitive components such as resource efficiency and climate change are supported by moving transportation from road to rail.
- Tourism activity, which is provided by the touristic orient express and has a significant demand capacity, will be supported due to improvements in the railway route.

4.15.3 Potential Impact Significances and Mitigation Measures

Addressing the identified challenges in accordance with the World Bank's ESF involves incorporating appropriate mitigation measures into the project planning and execution. Implementing these mitigation measures requires ongoing collaboration with local stakeholders, adherence to ESSs, and a commitment to sustainable development practices. Regular monitoring and feedback mechanisms should be established to assess the effectiveness of the measures and make adjustments as needed.

4.15.3.1 Working Conditions

Housing: Collaborate with local authorities and communities to identify suitable locations for temporary housing. Prioritize the preservation of historical structures and consider alternative solutions such as modular housing or repurposing existing facilities.

Rental Housing: Work with local housing authorities and private entities to secure rental housing options for construction personnel. Consider long-term leases or partnerships with local landlords to ensure stable housing arrangements.

Shortage of Housing Units: Implement a comprehensive housing plan that addresses the shortage, considering both temporary and permanent solutions. Collaborate with local governments to incentivize the construction of affordable housing for project personnel.

Lack of Basic Amenities: Invest in the development of essential facilities such as shopping centers, schools, and hospitals in the vicinity of the construction site. Partner with local governments and businesses to ensure sustainable access to these amenities.

Municipal Services Outside Construction Site: Collaborate with local municipalities to address waste collection issues. Develop waste management plans and establish partnerships for the regular collection and disposal of domestic waste.

Infrastructure Development for Switch Points: Invest in targeted infrastructure development to address specific challenges such as switch point cabins, sewage systems, and drinking water facilities. Collaborate with relevant authorities for effective implementation.

Wildlife Crossings: Conduct thorough environmental impact assessments to identify wildlife crossings. Implement mitigation measures such as underpasses or overpasses to minimize disruptions to local ecosystems.

4.15.3.2 Passenger and local residents

Travel Schedule: Develop a comprehensive schedule for construction activities to minimize service disruptions. Plan construction activities during off-peak travel times when feasible. Provide alternative transportation options or temporary arrangements to ensure continuity in passenger services.

Communication: Implement a robust communication strategy that prioritizes clear, transparent, and timely information dissemination. Establish a dedicated communication team responsible for updating passengers on construction-related changes. Utilize multiple channels such as announcements, signage, and digital platforms to ensure information accessibility.

Adaptation: Prioritize passenger comfort by minimizing disruptions during peak travel hours. Provide amenities and facilities to enhance the passenger experience during construction. Offer assistance programs or incentives for passengers facing extended journey times.

Announcements: Schedule regular updates and informative announcements to keep passengers informed about changes in platforms, schedules, and potential delays. Use both audio and visual communication methods to cater to diverse passenger needs.

Accessible Channels: Establish accessible channels for passenger inquiries and feedback. This could include a dedicated helpline, online customer service platforms, and information booths at key stations. Ensure that staff are trained to assist passengers with diverse needs.

Tourism: Collaborate with tourism agencies, local authorities, and affected businesses to develop alternative strategies during the disruption of Orient Express tourist flights. Explore the possibility of adjusting the timing or rerouting of tourist activities to minimize economic losses in the Kars and Ardahan regions.

Stakeholder Engagement: Engage with local communities, passengers, and businesses through regular forums and consultation sessions. Gather feedback on the impacts and effectiveness of mitigation measures and adjust strategies accordingly.

Monitoring: Establish a monitoring and evaluation framework to assess the effectiveness of mitigation measures. Regularly review and update strategies based on feedback, changing circumstances, and evolving construction timelines.

4.15.3.3 Vulnerable groups

Temporary Platforms: Install temporary platforms or alternative boarding arrangements to ensure accessibility for individuals with mobility issues, the elderly, or families with strollers during construction.

Communication: Clearly communicate changes in boarding arrangements and provide signage that guides passengers to accessible areas. Ensure that information is available in multiple formats, including visual and audible cues. It would be appropriate and necessary to include languages other than Turkish in methods at locations where people who predominantly speak languages other than Turkish live or travel.

Accessibility: Prioritize the creation of accessible platforms for people with disabilities during construction activities. Ensure that boarding areas have ramps or lifts and meet accessibility standards outlined in relevant regulations.

Temporary Facilities: Include the provision of temporary or alternative accessible restroom facilities in construction plans. Ensure that these facilities are well-maintained, clearly marked, and meet the needs of individuals with disabilities.

Lighting Upgrades: Implement measures to maintain or enhance lighting around stations, especially in areas where vulnerable groups may face safety concerns. Upgrade lighting infrastructure to improve visibility during early mornings or late evenings.

Waiting Areas: Identify alternative waiting areas that provide heating solutions for vulnerable groups. Consider temporary heating options in waiting rooms to address temperature-related challenges, ensuring the comfort of passengers.

Ticket Purchase: Offer alternative methods for ticket purchase and assistance, especially for individuals with limited digital access or technological literacy. Provide in-person ticketing options, manned counters, or self-service kiosks with clear instructions.

Communication: Ensure that all communication regarding changes, alternatives, or assistance methods is accessible to individuals with diverse needs including for non-Turkish speaker. Utilize multiple communication channels, including announcements, signage, and accessible digital platforms.

Training: Train staff to be sensitive to the needs of vulnerable groups. Provide guidance on assisting individuals with disabilities and elderly passengers during construction, emphasizing empathy and inclusivity.

Stakeholder Engagement: Establish mechanisms for receiving feedback from vulnerable groups during construction. Actively engage with advocacy organizations, community representatives, and individuals to understand specific needs and address concerns.

Grievance Redress Mechanism: Ensure that construction activities comply with accessibility standards and regulations, including those outlined by relevant authorities. Regularly assess and audit the project to confirm ongoing adherence to these standards.

NGOs: Collaborate with disability advocacy groups and organizations representing vulnerable populations. Seek their input in the planning and implementation of measures to address accessibility challenges during construction.

Table 159. Socioeconomic-Related Impact Significances and Proposed Mitigation Measures

Potential 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	Reversibility	Duration	Frequency	Impact Magnitude				
Working conditions	Land preparation and construction	Railway employees Local Residents Passengers Contractor personnel working on the project	Restricted	Short-term reversible	Short-term	Continuous	High	High	**Major**	- Collaborate with local authorities and communities to identify suitable locations for temporary housing, prioritizing the preservation of historical structures. - Work with local housing authorities and private entities to secure rental housing options for construction personnel, including long-term leases or partnerships with local landlords. - Partner with local governments and businesses to ensure sustainable access to basic amenities. - Collaborate with local utility providers to minimize interruptions and enhance communication reliability. - Plan for adequate heating solutions in regions with severe winter conditions, exploring alternatives to wood and coal stoves. - Collaborate with local municipalities to address waste collection issues and establish waste management plans. - Tailor solutions to the unique challenges of each region, considering access problems, weather conditions, and communication issues. - Prioritize the assessment and improvement of tunnel structures to ensure safety and functionality for employees and freight transportation. - The contractor is required to prepare their own Labor Management Plan (LM Plan) according to the Project's LMP. -This document should include a CoC. CoC, legal obligations concerning GBVH and SEA/SH incidents should be included. Workers will be trained on CoC at the orientation. This training will be applied on camp sites to avoid harassment issues and cultural conflict with local people. -Relevant documents should be binding for direct workers, and contracted workers, -Borrower will identify potential risks of child labor, forced labor and serious safety issues which may arise in relation to primary suppliers. May require the primary supplier to take appropriate steps to remedy A Workers' Grievance Mechanism (WGM) must be established ensuring it is open to anonymous reporting for GBVH, SEA/SH.	**Moderate**
Residences	Land preparation and construction	Owner pf residents	Restricted	Short-term reversible	Short-term	Continuous	Medium	Medium	**Moderate**	- Avoid damage to houses and other structures. - Keep consultation processes active for impacts such as noise and vibration. - Consider vulnerable individuals within households. - A grievance mechanism including handling of the SEA/SH grievances will be established and maintained	**Minor**
Passenger and local residents	Land preparation and construction	Local Residents Passengers	Local	Short-term reversible	Short-term	Continuous	High	High	**Moderate**	- Develop a comprehensive schedule for construction activities to minimize service disruptions, considering off-peak travel times whenever possible. - Provide alternative transportation options or temporary arrangements to ensure continuity in passenger services during construction. - Implement a robust communication strategy that prioritizes clear, transparent, and timely information dissemination to keep passengers informed about construction-related changes. - Establish a dedicated communication team responsible for updating passengers on construction-related updates and changes. - Utilize multiple communication channels such as announcements, signage, and digital platforms to ensure information accessibility for all passengers. - Prioritize passenger comfort by minimizing disruptions during peak travel hours and providing amenities and facilities to enhance the passenger experience during construction. - Schedule regular updates and informative announcements to keep passengers informed about changes in platforms, schedules, and potential delays. - Establish accessible channels for passenger inquiries and feedback, such as a dedicated helpline, online customer service platforms, and information booths at key stations. - Collaborate with tourism agencies, local authorities, and affected businesses to develop alternative strategies during the disruption, considering adjusting the timing or rerouting of tourist activities to minimize economic losses in the affected regions.	**Minor**

Potential 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	Reversibility	Duration	Frequency	Impact Magnitude				
										- Engage with local communities, passengers, and businesses through regular forums and consultation sessions to gather feedback on the impacts and effectiveness of mitigation measures. - Establish a monitoring and evaluation framework to assess the effectiveness of mitigation measures and regularly review and update strategies based on feedback, changing circumstances, and evolving construction timelines.	

4.16 Labor and Working Conditions

The details regarding the number of staff, their qualifications, and the specific camp locations have not been finalized. These aspects have been approximated based on the evaluation of past project experiences and outlined in the Labor Management Procedures (LMP) of the Project. The contractor will prepare their own Labor Management Plans (LM Plans) based on the Labor Management Procedures of this Project.

4.16.1 Methodology and Project Standards

The project will adhere to both national legislation and international standards, including:

- Turkish Labor Law and relevant regulations,
- Turkish Law on Occupational Health and Safety and related regulations,
- World Bank ESS2: Labor and Working Conditions,
- International Labor Organization (ILO) conventions ratified by Türkiye.

The project will uphold key international labor standards, including:

  - Right to Organize and Collective Bargaining Convention,
  - Abolition of Forced Labor Convention,
  - Conventions on Minimum Age and Child Labor,
  - Conventions on Discrimination and Equal Remuneration.

There is alignment between Turkish Law and ESS2 requirements, given Türkiye's commitment to ILO Conventions. The requirements covered in this section are inclusive of all Project workers, irrespective of their specific roles in the project, ensuring their full rights in accordance with adopted laws and standards. The various worker categories under ESS2 encompass:

- Direct workers: individuals directly employed by the financier or project owner for project-related tasks.
- Contracted workers: individuals engaged by a third party to perform work or provide services integral to the project's core functions.
- Primary supply workers: individuals employed or engaged by a primary supplier.

ESS2 is applicable to all project workers, including those working direct workers, and contracted workers.

The contractor is required to prepare their own LM Plan according to the Project's LMP.

4.16.2 Child Labor & Forced Labor

As per Turkish law, commitments to ILO conventions, and in alignment with ESS2, the minimum working age for employees on this project will be 18 years old. Employment of Child Labor is strictly prohibited.

To ensure compliance, all personnel files and identity information of employees will be maintained according to the Project's LMP and Contractor's LM Plan. Contracts with workers and subcontractors will explicitly state the prohibition of child labor.

The Project LMP will oversee the implementation of these measures, ensuring strict adherence to regulations.

Additionally, a workers' grievance mechanism will be established to address any concerns or comments regarding the Project promptly. This mechanism will provide avenues for solutions and corrective actions as needed, emphasizing the importance of a safe and ethical working environment.

Article 18 of the Constitution of the Republic of Türkiye, prohibits forced labor: “No one shall be forced to work. Forced labor is prohibited. Work required of an individual while serving a sentence or under detention provided that the form and conditions of such labor are prescribed by law; services required from citizens during a state of emergency; and physical or intellectual work necessitated by the needs of the country as a civic obligation shall not be considered as forced labor.” Prison labor, work during a state of emergency, and work required by the country as a civic obligation do not constitute forced labor.

Article 80 and Article 117 of the Penal Code penalizes human trafficking and violation of the freedom to work and labor, respectively.

Türkiye has ratified the ILO Convention No. 29 on Forced Labor and ILO Convention No. 105 on the Abolition of Forced Labor.

Therefore, forced labor under Project is strictly prohibited.

4.16.3 Discrimination

The MoTI aims to implement policies fostering increased participation in the workforce and employment, particularly for groups requiring special attention, such as women and the disabled. Recent improvements for public employees in Türkiye contribute to preventing discrimination, including the establishment of a Public Personnel Advisory Board for consultation on general personnel issues. Other measures involve enhancing the compulsory employment rate of disabled individuals in public institutions, prohibiting night duty for pregnant personnel, extending free maternity leave, and allowing male personnel to avail themselves of this right. Additionally, the introduction of paid companionship permits for civil servants caring for relatives in need of treatment exemplifies this positive trajectory (State Personnel Presidency).

4.16.4 Right of Association

- Expanding the association and joining union members rights of civil servants, removing the year requirement to become a union founder, and pave the way for candidate civil servants to become union founders,
- Forgiveness of disciplinary offenses of civil servants and other public officials,
- Replacing the collective bargaining system without binding with collective bargaining system (State Personnel Presidency).

4.16.5 Labor Influx

To eliminate the risks that may arise from interaction between project workers and local communities, the contractor will prepare a Labor Influx Management Plan and a Workers’ Camp Management Plan prior to commencement of works and submit to ETMIC sub-unit of PIU for approval based on the Good International Industry Practice. The works will not commence until these plans are cleared by ETMIC sub-unit of PIU. These plans will involve sensitization and awareness campaigns among the project workers and the local community, including but not limited to Code of Conduct (CoC) and grievance mechanism.

4.17 Occupational Health and Safety

4.17.1 Project Standards

The national legislation and international standards that will be considered for the impacts/risks related with OHS issues during the project activities and will be complied are as follows:

- Regulation on Occupational Health and Safety Risk Assessment
- Regulation on Occupational Health and Safety Services
- Regulation on Duties, Authority, Responsibilities and Trainings of Occupational Health and Safety Specialists
- Regulation on Procedures and Principles of Occupational Health and Safety Training of Employees
- Regulation on the Occupational Health and Safety Committees
- Regulation on the Health and Safety Measures to be taken in Workplace Buildings and Additions
- Regulation on Protection of Buildings from Fire
- Regulation on the Emergency Cases in Workplaces
- First Aid Regulation
- Regulation on Protection of Workers from Dangers of Explosive Environments
- Communique on Hazard Classes List related to Occupational Health and Safety
- Regulation Concerning the Protection of Workers from Risks Associated with Noise
- Regulation Concerning the Protection of Workers from Risks Associated with Vibration
- Regulation on Health and Safety Conditions in the Use of Work Equipment
- Regulation on Occupational Health and Safety on Construction Works
- 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 Dust Management
- Regulation on Safety Information Forms Regarding Hazardous Materials and Mixtures
- Regulation on Personal Protection Equipment
- Regulation on Usage of Personal Protective Equipment in Workplaces
- Regulation on Vocational Training of the Employees Working in Dangerous and Highly Dangerous Workplaces
- Regulation on the Provisions of Occupational Health and Safety Training of Employees
- Regulation on Transportation of Explosives via Highways
- WBG General EHS Guidelines for Construction and Decommissioning
- WBG General EHS Guidelines for Railways

4.17.2 Impact Assessment

4.17.2.1 Land Preparation and Construction Phase

During the construction phase the following activities will be carried out:

- Renewal of infrastructure and superstructure of the railway line, passenger platforms, culverts
- Installation of signaling and telecommunication systems
- Construction and extension of sidings
- Electrification of railway line
- Establishment of electric power installation systems (substations, neutral zones, and 154kV power transmission lines)
- Construction of level crossings, bridges, retaining walls, snow barriers, station buildings
- Reconstruction of overpasses

These activities will include mainly excavation, earthmoving, working at heights and working with electricity.

The risks associated with these activities during the construction phase of the project are:

- Risk of soil collapse or landslides in excavation areas, which can lead to workers being trapped or injured under debris.
- Potential for workers to collide with or be crushed by heavy machinery such as excavators, bulldozers, and loaders, or for machinery to overturn.
- Contact with existing electrical lines or underground cables during land preparation may result in electric shock. Prior to excavation and other land preparation activities, it is essential to identify and mark the locations of underground electrical cables and other infrastructure.
- Improper installation or protection of temporary electrical lines on the construction site can lead to electric shock. To mitigate this risk, temporary electrical lines should be properly insulated and safeguarded to prevent accidental damage. Moreover, workers involved in land preparation must be educated about potential electrical hazards, trained in the safe use of electrical equipment, and equipped with appropriate PPE.
- Risk of electric shock, fire, or explosion if underground electrical cables, gas pipelines, or other infrastructure services are damaged during excavation.
- Slips, trips, and falls are common risks, especially in uneven or unstable areas, and can lead to potential injuries.
- Heat stress, dehydration, or fatigue from long working hours or extreme weather conditions pose medical risks. Additionally, precautions should be taken against the risk of bites from animals such as scorpions, snakes, and insects present in the area.
- Inadequate working conditions, such as insufficient lighting on the construction site, working in confined spaces, bullying, ergonomic issues, and lack of hygiene, can increase the risk of accidents or health problems, creating hazardous working conditions.
- Inhalation of dust from soil, sand, and other materials during excavation operations, potentially causing respiratory illnesses.
- Exposure to high levels of noise and vibration from excavation machinery operations, leading to hearing loss and other health issues.
- Musculoskeletal problems resulting from manual handling and lifting of heavy loads.
- Risk of falling from heights during the assembly of bridges, viaducts, and other tall structural elements.
- Exposure to chemicals during the use of concrete, solvents, fuels, and other substances, posing risks of chemical exposure.
- Fire and explosion risks during the storage and use of flammable and explosive materials.
- Traffic accidents due to vehicles entering and exiting the construction site.

4.17.2.2 Operation Phase

The risks that may be encountered during the operation phase, including maintenance and repair work on railways are:

- Inadequate occupational health and safety management in railway operation areas, increasing the risk of accidents and health issues for workers.
- Deficiencies in the safe use of railway operation vehicles and machinery, leading to accidents and inefficient machine utilization.
- Lack of safety in the use of machinery and equipment used in railway maintenance and repair, potentially causing accidents.
- Physical hazards such as slipping, tripping, and falling, particularly concerning tracks and work equipment, posing risks to teams.

- Insufficient safety measures at platforms and stations, threatening the safety of passengers and staff.
- Risk of exposure for teams during the use or storage of chemicals (e.g., lubricants, cleaning agents).
- Irregular maintenance or malfunctions in electrical lines and signaling systems, negatively impacting operational continuity and safety.
- Risk of electrical burns and shocks from electrical lines during maintenance and repair.
- Lack of regular or adequate maintenance of tracks and railway infrastructure, leading to safety issues and operational disruptions.
- Unregulated traffic and inadequate safety measures during railway work, potentially causing accidents.

4.17.3 Potential Impact Significances and Mitigation Measures

Regarding the management of OHS related risks, an Occupational Health and Safety Management Plan (OHSMP) was developed as part of the ESMP. In line with this plan, site specific OHS risk assessments will be carried out and site-specific OHS Management Plans will be developed and implemented. The mitigation measures stated in this plan are summarized below:

During the land preparation construction phase, to prevent any type of incident, significant occupational health and safety measures have to be taken, such as;

The risk of accidents or incidents due to incomplete document preparation, lack of audits, inadequate training delivery, and failure to implement management plans:

- Risk assessment study within the scope of every activity to be conducted for the project will be conducted before commencing the works.
- Employees will be made aware of any possible OHS risks and will be trained to deal with them properly.
- Contractor must ensure immediate response to and timely reporting, analysis and communication of all incidents to AYGM.
- All incidents shall be recorded in the approved incident reporting system and be analyzed to a level commensurate with the actual consequence or potential risk rating, whichever is higher.
- Contractor is committed to return workers to meaningful and productive employment at the earliest possible time.
- Contractor employees will undergo a medical assessment to ensure they are medically fit to perform their role before commencing the works and these controls will be repeated annually.
- Contractor must ensure that health assessments are carried out in respect of all personnel who engage in specific tasks with the potential for occupational exposure.
- Where personnel are required to work alone, the activities and conditions shall be risk assessed and a safe system of work developed.
- Contractor must ensure that all personnel and visitors wear or use personal protective equipment provided if it is necessary to protect them from harm.
- Contractor must ensure that sufficient safety signs are posted in workplaces and travel ways to prevent incidents, identify hazards.
- Contractor must ensure that all personnel undertaking activities where there is a risk of a person falling from one level to another do so in a controlled manner to reduce the risk of personal injury.
- Task specific hazard identification will be done for each activity.
- Access to the project area will be restricted by the Contractor and necessary precautions will be taken such as fencing the area and placing relevant signs etc.
- Site inductions will be carried out by the contractor.

- Inspections of the project site should be carried out weekly. Contractor will undertake weekly inspections of the whole work site.
- Contractor is obliged to provide adequate personal protective equipment free of charge to workers.

Risk of Soil Collapse or Landslides in Excavation Areas:

- Engineering solutions should be applied for regular support and reinforcement of excavation walls.
- Geotechnical assessments should be conducted prior to excavation, with continuous monitoring of ground conditions.
- Workers should be trained on signs of potential collapses and evacuation procedures.

Hazards from Use of Heavy Machinery (Excavators, Bulldozers, Loaders):

- Regular maintenance and inspections should be conducted for safe and efficient machine operation.
- Comprehensive training programs should be organized and certification provided for machine operators.
- Designation and marking of pedestrian and vehicle traffic areas can help prevent collisions and accidents.

Risk of Electric Shock, Fire, or Explosion Due to Damage to Underground Infrastructure Services:

- Relevant authorities should be contacted for detection and marking of underground services before excavation. Prior to excavation and other land preparation activities, it is essential to identify and mark the locations of underground electrical cables and other infrastructure.
- Improper installation or protection of temporary electrical lines on the construction site can lead to electric shock. To mitigate this risk, temporary electrical lines should be properly insulated and safeguarded to prevent accidental damage. Moreover, workers involved in land preparation must be educated about potential electrical hazards, trained in the safe use of electrical equipment, and equipped with appropriate PPE.
- Workers should receive training on safe excavation techniques and use of hand tools in case of accidental damage.
- Reporting of underground infrastructure damage and development of emergency response plans are necessary.

Risk of Respiratory Diseases Due to Dust During Excavation Operations:

- Dust control measures such as watering systems or dust suppressants should be employed.
- Workers should be provided with appropriate respiratory protective equipment (masks, filters) and encouraged to use them.
- Air quality should be regularly monitored and dust levels maintained within permissible limits.

Exposure to High Noise and Vibration Levels from Earthmoving

- Noise isolation and vibration reduction measures should be implemented on machines.
- Workers should receive training on the use of hearing protective equipment and undergo regular health checks.
- Worker rotation or scheduling adjustments may be necessary to avoid prolonged exposure to high noise and vibration levels.

Musculoskeletal Problems Due to Manual Handling of Heavy Loads:

- Mechanical lifting equipment (cranes, hoists) should be used to prevent manual handling where possible.
- Training should be provided to workers on proper lifting techniques and ergonomic practices.
- Task rotation or scheduling adjustments should be considered to reduce repetitive heavy lifting tasks.

Risk of Falling from Heights During Assembly of Bridges, Viaducts, and Other High Structures:

- Safety guardrails, safety nets, and personal fall protection systems should be used in assembly areas.
- Regular inspection of fall protection equipment and connection points should be conducted.
- Detailed training on fall prevention and rescue procedures should be provided to workers.

Risk of Chemical Exposure During Use of Concrete, Solvents, Fuels, and Other Chemicals:

- Procedures should be established for safe storage, use, and disposal of chemicals.
- Workers should receive training on safe working methods with chemicals and provided with personal protective equipment.
- Encouragement of the use of less hazardous chemicals whenever possible should be promoted.

Fire and Explosion Risk During Storage and Use of Flammable and Explosive Materials:

- Designated areas and appropriate containers should be used for the safe storage of flammable and explosive materials.
- Fire prevention and extinguishing equipment (fire extinguishers, alarm systems) should be installed and regularly checked.
- Regular inspection of storage areas should ensure compliance with safety standards.

Traffic Accidents Due to Vehicles Entering and Exiting the Construction Site:

- Clearly defined traffic routes and pedestrian crossing areas should be established on the construction site.
- Traffic management plans and speed limits should be implemented and regularly reviewed.
- Vehicle operators should receive training on construction site-specific traffic rules and hazards.

During the operation phase, to prevent any type of incident, significant occupational health and safety measures have to be taken, such as;

Risk of Exposure to Chemicals During Use or Storage (e.g., lubricants, cleaning chemicals):

- Establishing procedures for safe storage and use of chemicals.
- Providing training to teams on handling chemicals safely and using personal protective equipment.

Irregular Maintenance or Failures of Electrical Lines and Signaling Systems Affect Operational Continuity and Safety:

- Regular maintenance of electrical lines and ensuring compliance with safety standards.
- Continuous monitoring of signaling systems and timely replacement when necessary.
- Establishing alternative plans for power outages during maintenance and operations.

Risk of Electrical Shock and Electric Current During Maintenance Due to Electrical Lines:

- Use of appropriate insulation and protection equipment during work on electrical lines.

- Providing training on electrical safety and adherence to safety procedures.

Lack of Regular Maintenance of Rails and Railway Infrastructure Leads to Safety Issues and Operation Interruptions:

- Regular inspection and maintenance of rails.
- Stabilization of railway infrastructure and regular inspection of retaining walls.
- Regular inspection and cleaning of rainwater drainage systems during operation.

Unregulated Traffic Management and Insufficient Safety Measures During Work on Railway Lines Lead to Accidents:

- Establishment of safety corridors in work areas and development of traffic management plans.
- Provision of appropriate markings and barriers at railway crossings and intersections.
- Regulation of working hours and monitoring of noise levels.

Inadequate Occupational Health and Safety Management in Railway Operation Sites:

- A site specific OHS risk assessment will be carried out and an OHS Management Plan will be developed and implemented.
- Establishing occupational health and safety policies and implementing them at operation sites.
- Providing regular training to employees on occupational safety and risk management.
- Developing emergency plans and ensuring all employees are familiar with them.

Deficiencies in Safe Use of Railway Operation Vehicles and Machinery:

- Conducting regular maintenance and safety checks of machinery.
- Providing training and certification for operators on the safe use of equipment.
- Installing safety equipment (e.g., reverse cameras, warning systems) on machines and ensuring proper labeling.
- Major railway failures that can lead accidents such as broken wheel or axle and broken rail or track buckle will be controlled via control train and OHS personnel of TCDD monthly.
- Suitability of the signalization system will be controlled in a daily manner.

Deficiencies in Safe Use of Maintenance and Repair Equipment Used in Railway Maintenance:

- Regular maintenance and safety checks of equipment.
- Providing training to personnel on the safe operation of equipment and raising awareness.

Physical Hazards such as Slips, Trips, and Falls, Especially Related to Rails and Work Equipment, Pose Risks for Teams:

- Regular cleaning and organizing of work areas.
- Ensuring employees work on non-slip surfaces.
- Use of personal protective equipment against falls and providing safety training.

Inadequate Safety Measures at Platforms and Stations Threaten Passenger and Staff Safety:

- Installation of safety barriers and guardrails at platform edges.
- Implementation and regular testing of emergency warning systems.
- Providing passengers with safety information and awareness.
- No personnel will be working without having necessary trainings.
- Level crossings will be controlled daily.
- Operation will be stopped immediately if any factor that may lead accidents is reported.

Issues requiring occupational health and safety measures and training are:

For construction;

- Exposure to Chemicals: Risks from handling and storage of chemicals such as solvents, adhesives, and fuels.
- Welding Hazards: Risks from aluminum termite welding fume emissions, burns, and radiation exposure.
- Excavation Work, Earthwork Hazards: Risks of collapses and landslides during excavation and earthworks.
- Vibration of Heavy Construction Equipment: Risks associated with prolonged exposure to vibration from equipment like jackhammers and excavators.
- Dust and Noise: Risks of respiratory issues from dust inhalation and hearing loss from excessive noise levels.
- Traffic Accidents: Risks of accidents involving construction vehicles and machinery.
- Lifting Heavy Materials: Risks of musculoskeletal injuries from lifting and carrying heavy construction materials.
- Construction Iron Accidents: Risks of cuts, punctures, and other injuries from handling rebar and other construction iron.
- Ergonomic Hazards During Construction: Risks of musculoskeletal disorders from poor posture and repetitive tasks.
- Environmental Hazards: Risks from exposure to environmental factors like insects, wasps, and extreme weather conditions.
- Power Cuts and Arc Failure Burns: Risks of burns and other injuries from power outages or arc failures during electrical work.
- Electrical Work: Risks of electric shock or electrocution during electrical installations and repairs.
- Burns: Risks of thermal burns from hot surfaces, equipment, and materials.

For operation;

- Exposure to chemicals: Risks associated with the handling and storage of lubricants, cleaning chemicals, and other hazardous substances.
- Electrical hazards: Risk of electrical shock or burns due to faulty wiring or during maintenance of electrical systems.
- Physical hazards (slips, trips, falls): Risks of injury from slipping, tripping, or falling, especially around rails and maintenance equipment.
- Traffic accidents: Risks associated with vehicular movement in and around the railway site.
- Heavy lifting: Risks of musculoskeletal injuries from lifting and carrying heavy materials or equipment.
- Machinery operation hazards: Risks of accidents during the operation of maintenance machinery.
- Vibration hazards: Risks associated with the use of heavy maintenance equipment that generates significant vibration.
- Noise hazards: Risks of hearing damage from prolonged exposure to high noise levels generated by operating machinery.
- Dust hazards: Risks of respiratory problems from dust generated during maintenance activities.
- Welding hazards: Risks associated with welding activities, such as exposure to fumes, burns, and radiation.
- Ergonomic hazards: Risks of musculoskeletal disorders from repetitive tasks or poor ergonomic practices during maintenance work.
- Environmental hazards: Risks from exposure to environmental factors like insects, wasps, or extreme weather conditions.
- Power cuts and arc failure burns: Risks of burns due to unexpected power outages or arc failures during electrical maintenance work.

- Fire hazards: Risks of fire due to the presence of flammable materials or improper handling of combustible substances.

4.18 Community Health and Safety

4.18.1 Project Standards and Methodology

The project adheres to the World Bank's ESF, particularly ESS4 on Community Health and Safety. This standard emphasizes the importance of safeguarding the health and safety of the community affected by the project's activities. It includes measures to mitigate potential health risks, ensure safety during construction, and address community concerns related to health and safety issues.

The Project's potential impacts on the community health and safety have been assessed in consideration of the settlements located near the project route.

Main data sources and guidance used to compile the baseline information, conduct impact assessment and develop related mitigation measures are listed below:

- WB ESS 4 Community Health and Safety
- WBG General EHS Guidelines (April 30, 2007)
- WBG EHS Guidelines for Railways (April 30, 2007)
- Turkish Statistical Institute (TurkStat) website and related statistics (www.tuik.gov.tr)
- General Directorate of Highways (KGM) website and related statistics and maps(www.kgm.gov.tr)
- General Directorate of Security Affairs Department of Traffic Services (trafik.gov.tr)

Assessment of potential community health and safety risks and impacts of the Project has been done in consideration of the existing local conditions, measures that will be inherently taken in accordance with the requirement of the national legislation, and benefit from the expert knowledge and experience of typical sectoral risks associated with the construction. International standards and guidelines have also been taken into consideration to develop additional measures for the management of community health and safety aspects. The assessment has been based on professional expert judgment that relies on a qualitative approach.

In accordance with the ESS4, the following general aspects have been covered in the scope of the assessment:

- Infrastructure and Equipment Design and Safety
- Traffic and Road Safety
- Community Exposure to Health Problems
- Hazardous Materials Management and Safety
- Emergency Preparedness and Response
- Risk of GBV, SH/SEA
- Security Personnel

In the assessment of impact significance, magnitude factors have been determined based on expert judgement. For the assessments related to community health and safety, the receptor sensitivity level has always been assumed as high when the safety of local communities is of concern. Sensitivity level has been assumed as moderate for other types impacts such as infrastructure, local healthcare capacity, etc.

4.18.2 Impact Assessment

4.18.2.1 Land Preparation and Construction Phase

Identified stakeholders has been described as PAPs, OIPs and vulnerable groups in line with expected impacts of the Project. These groups include households engaged in agricultural, livestock, beekeeping, and similar activities in these residential areas. The initial groups affected by the project also comprise users of access roads in the project areas and their immediate surroundings, as well as members of irrigation unions who are common users of irrigation channels and water beds. The following items should be considered under the CHS issues in line with risk on traffic and pedestrian safety due to construction traffic:

- Pedestrian
- Access routes
- Signs, signals, and marking
- Passages of construction traffic
- Drivers and operators
- Speed limits
- Vehicle maintenance
- Material borrow sites and quarries
- Explosives
- Forced and child labor

In addition, items relevant emergency preparedness should be investigated under both CHS and OHS issues;

- Measurement /systems adopted to local communities
- Use of communication and information tools
- Tracking under GM and WGM

When the Contractor under the supervision of AYGM hires workers for security, it will assess risks to people and property both on and off-site. It will follow proportionality, GIIP, and laws for hiring, conduct rules, training, equipping, and monitoring in accordance with ESS4.

Community exposure health problems should be considered especially on common areas of the project workforce.

4.18.2.2 Operation Phase

The potential impacts for the operating period are as follows:

- Operational activities may cause disruptions in railway operational safety.
- Transport of dangerous goods during operation can increase risks.
- Safety vulnerabilities may arise at level crossings.
- Emergency preparedness and response plans may be inadequate.
- Risks on pedestrian safety.
- The service becomes attractive due to the increasing quality in railway transportation.
- Modernization, electrification and signaling works planned to be carried out along the route will provide improvements in issues such as driving safety and road safety.
- Enhancing the safety features and overall quality of trains will encourage women, the elderly, individuals with disabilities, and students to choose railways as their preferred mode of transportation.

4.18.3 Potential Impact Significances and Mitigation Measures

Infrastructure Challenges: Develop robust infrastructure, including backup systems for power, and improve mobile phone coverage. Work with local utility providers to minimize interruptions and enhance communication reliability.

Winter Conditions and Heating: Plan for adequate heating solutions in regions with severe winter conditions. Explore alternatives to wood and coal stoves and ensure the availability of resources for switch works during adverse weather.

Regional Challenges: Tailor solutions to the unique challenges of each region, taking into account access problems, weather conditions, and communication issues. Collaborate closely with local communities and authorities to address region-specific concerns.

Tunnel Structures: Prioritize the assessment and improvement of tunnel structures. Invest in necessary upgrades and repairs to ensure the safety and functionality of tunnels, thereby addressing issues related to employees and freight transportation.

Controlled Crossing Equipment: Install and maintain controlled crossing equipment at level crossings, including warning signals, barriers, and automatic gates. Regularly inspect and test this equipment to ensure its proper functioning.

Perimeter Walls: Erect sturdy perimeter walls around construction sites to prevent unauthorized access. Utilize materials that discourage climbing or breaching. Clearly mark designated entry and exit points for authorized personnel.

Overpasses and Underpasses: Identify student-populated areas and areas prone to pedestrian-vehicle interactions. Plan and construct overpasses or underpasses to enhance safety for pedestrians. Ensure proper lighting and signage for these structures.

Designated Crossing Areas: Determine high-traffic pedestrian zones around train stations in residential and school areas. Establish designated crossing areas with clear signage and, if necessary, install safety features such as pedestrian signals or crosswalks.

Livestock Management: Develop and implement safety measures for railway crossings in rural stretches, considering the frequent passage of livestock. This may include warning signs, barriers, and outreach programs to educate local communities about safe crossing practices.

Security of Construction Activities: Ensure that abandoned structures along the railway line are properly secured to prevent unauthorized access and potential safety hazards. Implement measures such as fencing or sealing entrances.

Protection of Materials: Develop and enforce stringent security protocols to safeguard construction materials from theft. This may involve secure storage areas, surveillance systems, and regular inventory checks.

Training and Awareness: Provide comprehensive safety training for construction personnel, emphasizing the specific challenges associated with railway construction. Foster a culture of safety awareness among all stakeholders.

Compliance Monitoring: Regularly monitor and enforce compliance with safety requirements throughout the construction process. Conduct regular safety audits and inspections to identify and address potential hazards.

Integrated Safety and Security Planning: Integrate safety and security considerations into the overall project planning and execution. Collaborate with relevant authorities, law enforcement, and community stakeholders to address both safety and security aspects comprehensively.

Monitoring: Establish a routine maintenance schedule to inspect and maintain safety features, such as crossing equipment, perimeter walls, and overpasses/underpasses. Promptly address any issues to ensure continued effectiveness.

Training: Engage with local communities to communicate safety measures and raise awareness about the importance of adhering to safety guidelines. Encourage reporting of safety concerns and feedback. Workforce can foster social integration between workers from diverse backgrounds and the local community. This interaction can promote cultural exchange and understanding.

Labor Camps: Although their location is not known at the moment labor camps will be established during the implementation of the Project. To create safer environment for the nearby communities, workers will be trained on CoC, and a project grievance mechanism to address complaints and sensitive grievances including SEA/SH will be established. Nearby communities will be informed about this GM through public participation meetings. Women specific meetings will be also organized.

During the pre-construction phase, it is very important for AYGM to sign a protocol with TCDD officials and include them in the design process and/or to organize monthly technical meetings with the operating teams of the existing line to exchange ideas about current issues and possible problems that may arise.

Table 160. Community Health and Safety-Related Impact Significances and Proposed Mitigation Measures

Potential 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	Reversibility	Duration	Frequency	Impact Magnitude				
Vulnerable groups	Land preparation and construction	Local Residents Passengers	Local	Short-term reversible	Short-term	Continuous	High	High	**Major**	▪ Install temporary platforms or alternative boarding arrangements to ensure accessibility for individuals with mobility issues, the elderly, or families with strollers during construction. ▪ Clearly communicate changes in boarding arrangements and provide signage that guides passengers to accessible areas. Ensure that information is available in multiple formats, including visual and audible cues. ▪ Prioritize the creation of accessible platforms for people with disabilities during construction activities. Ensure that boarding areas have ramps or lifts and meet accessibility standards outlined in relevant regulations. ▪ Include the provision of temporary or alternative accessible restroom facilities in construction plans. Ensure that these facilities are well-maintained, clearly marked, and meet the needs of individuals with disabilities. ▪ Implement measures to maintain or enhance lighting around stations, especially in areas where vulnerable groups may face safety concerns. Upgrade lighting infrastructure to improve visibility during early mornings or late evenings. ▪ Identify alternative waiting areas that provide heating solutions for vulnerable groups. Consider temporary heating options in waiting rooms to address temperature-related challenges, ensuring the comfort of passengers. ▪ Offer alternative methods for ticket purchase and assistance, especially for individuals with limited digital access or technological literacy. Provide in-person ticketing options, manned counters, or self-service kiosks with clear instructions. ▪ Ensure that all communication regarding changes, alternatives, or assistance methods is accessible to individuals with diverse needs including for non-Turkish speaker. Utilize multiple communication channels, including announcements, signage, and accessible digital platforms. ▪ Train staff to be sensitive to the needs of vulnerable groups. Provide guidance on assisting individuals with disabilities and elderly passengers during construction, emphasizing empathy and inclusivity. ▪ Establish grievance mechanism for public to receive feedback from vulnerable groups during construction. Actively engage with advocacy organizations, community representatives, and individuals to understand specific needs and address concerns. ▪ Ensure that construction activities comply with accessibility standards and regulations, including those outlined by relevant authorities. Regularly assess and audit the project to confirm ongoing adherence to these standards. ▪ Collaborate with disability advocacy groups and organizations representing vulnerable populations. Seek their input in the planning and implementation of measures to address accessibility challenges during construction.	**Moderate**
Risk on traffic and pedestrian safety due to construction traffic	Land preparation and construction	Railway employees Local Residents Passengers Contractor' personnel	Local	Short-term reversible	Short-term	Continuous	High	High	**Major**	▪ Investigate all construction areas and construction access routes for potential community interaction (with a particular attention to schools, children parks, etc.) with Project construction phase traffic. Based on results, develop and implement site specific measures (i.e., improve signage, visibility) and driver/operator trainings prior to initiation of any construction work. ▪ Implement access restriction at construction areas and access routes, by specifying restricted zones, (i.e. dangerous routes), fencing, barriers, etc.	**Minor**

Potential 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	Reversibility	Duration	Frequency	Impact Magnitude				
										▪ Install signs, signals, markings and other appropriate traffic regulation devices, including reflective and flashing signage for nighttime traffic safety, at all required sites. ▪ Avoid passage of construction traffic through the settlements, whenever alternative roads are present. ▪ Where passage through existing settlements is unavoidable, take all necessary measures (i.e. speed limits, traffic signs, driver trainings) to prevent safety risks on local communities, 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 meetings and leaflets, notices, signs, etc. ▪ Allow only drivers/operators with valid licenses specific to each construction phase vehicle to drive/operate vehicles. ▪ Provide driving skills improvement trainings in consideration of the requirements of specific vehicles, machinery, etc. ▪ Implement speed limits at all construction sites. ▪ Conduct periodic medical checks for drivers/operators. ▪ Conduct periodic vehicle maintenance. ▪ Initiate construction only after relevant permits are obtained and all required measures such as signage, barriers, fencing, lighting, etc. are taken. ▪ Prioritize selection of material borrow sites and quarries in the areas that does not interact with public. ▪ Use only licensed firms for explosives delivery to ensure safety along the existing roads to be used for transport of explosives. ▪ Provide information and awareness raising activities with stakeholders, communities including women, children and also disabled. ▪ Enforce strict speed limits within the construction zone and monitor vehicle speeds regularly. ▪ Establish safe and well-marked pedestrian walkways separated from vehicular traffic. ▪ The contractor is required to prepare their own Labor Management Plan (LM Plan) according to the Project's LMP and provide written contract to workers, comprising job description, working hours, wages, rights and duties. This document will include a CoC which has provisions on. SEA/SH incidents. ▪ Relevant documents should be binding for direct workers, and contracted workers, . ▪ AYGM and /or Contractor will identify potential risks of child labor, forced labor and serious safety issues which may arise in relation to primary suppliers. May require the primary supplier to take appropriate steps to remedy. ▪ A Workers' Grievance Mechanism (WGM) must be established ensuring it is open to anonymous reporting for GBVH, SEA/SH.	
Emergency Preparedness and Response	Land preparation and construction	Railway employees Local Residents Passengers Contractor' personnel	Local	Short-term reversible	Short-term	One-off	Medium	High	**Major**	▪ Develop and implement a project-specific Emergency Preparedness and Response Plan for the construction phase covering the risks on local communities. ▪ Develop measures/systems for collaboration with the local communities and other external parties including local governmental agencies, media, etc. where necessary. ▪ Notify local communities 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.	**Minor**

Potential 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	Reversibility	Duration	Frequency	Impact Magnitude				
										▪ Where necessary, communicate the details of the nature of the emergency, protection options, etc. through trained community liaison officer(s). ▪ AYGM will cooperate with related authorities both for prevention of emergencies and during emergency situations, where necessary. ▪ Communicate to the media through qualified, trained persons and/or by using appropriate tools (i.e., press releases), where necessary.	
Security personnel	Land preparation and construction	Railway employees Local Residents Passengers Contractor' personnel	Local	Short-term reversible	Short-term	Intermittent	Low	Medium	**Minor**	▪ Conduct legal inquiries during the hiring process of security personnel (or the company the security service is procured from) to check competency and existence of any former abuse incidents. ▪ Provide trainings on code of conduct, gender sensitivities and local cultural sensitivities to security personnel or ensure that the company the security service is procured from provides its personnel with similar trainings. The trainings will ensure force is used only for preventive and defensive purposes and in proportion to the threat. ▪ Provide necessary identification, communications devices, and any other equipment required for the job to the security personnel to ensure maximum efficiency. The security personnel will not be allowed to carry firearms. ▪ Investigate any grievance from local communities regarding inappropriate conduct of security forces immediately. ▪ Ensure appropriate conduct of security personnel through document and incident report reviews, as well as review of grievances received. ▪ When the Borrower hires workers for security, it will assess risks to people and property both on and off-site. It will follow proportionality, GIIP, and laws for hiring, conduct rules, training, equipping, and monitoring. Force won't be allowed unless for necessary defense, in proportion to the threat. ▪ Ensure all measures are included in contractual agreements. ▪ Ensure security personnel are adequately trained and certified to handle security responsibilities effectively.	**Negligible**
Community exposure to health problems	Land preparation and construction	Railway employees Local Residents Passengers Contractor' personnel	Wide	Short-term reversible	Short-term	Intermittent	Medium	Medium	**Moderate**	▪ In order to avoid the spread of diseases among the workforce of the project, air conditioning and ventilation will be provided in accordance with the current climate conditions, minimum space requirement, etc. ensuring compliance with the processes and standards related to the housing of workers involving issues. ▪ Training of all staff on health and general hygiene and cleaning. ▪ Conduct periodic medical checks of staff, provide vaccination and / or develop other mitigation measures developed, when required. ▪ Carrying out health awareness raising activities involving local communities. ▪ Provide education programs for local residents on how to minimize exposure to construction-related health hazards and promote healthy living practices	**Negligible**
Pedestrian safety	Operation	Users of the railways and connection roads	Local	Short-term reversible	Long-term	Continuous	High	Medium	**Major**	▪ Putting clear and clear warning signs at the entry points (e.g., stations and level crossings), ▪ Installation of fences or other barriers at the ends of the station and other areas and preventing unauthorized access to the rails, ▪ Providing trainings about not entering the area without permission, especially for local youth, ▪ Ensuring that the specified route is safe, clearly determined and easy to use, ▪ Establishment of closed-circuit security cameras and monitoring systems (CCTV) to monitor railway stations, and an emergency announcement system to prevent violations in other areas where intruders are frequent.	**Minor**

Potential 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	Reversibility	Duration	Frequency	Impact Magnitude				
										▪ Establish safe and well-marked pedestrian walkways separated from vehicular traffic	
Emergency Preparedness and Response	Operation	Local communities Users of the railways	Local	Short-term reversible	Long-term	Intermittent	Medium	High	**Major**	▪ Develop and implement a project-specific Emergency Preparedness and Response Plan for the operation phase of the railway, ▪ Regular controls of the route safety, ▪ Cooperation with related authorities (for emergency prevention and during emergencies), ▪ Emergency response begins as soon a rail emergency is identified or reported. When it is notified of a rail emergency, they will immediately make notifications per TCDD protocols.	**Minor**
General railway operational safety	Operation	Local communities Users of the railways	Local	Short-term reversible	Long-term	Continuous	High	Medium	**Major**	▪ Implement railway operational safety procedures, such as a positive train control (PTC) system, aimed at reducing the likelihood of train collisions. ▪ Unless the full PTC system is considered practical, where manual trusses are located, reporting is made when the train passes from the mainline to the side road in the absence of signaling, and that this information is returned to all employees and train officers on the train. ▪ Regular inspection and maintenance of railway lines and facilities to operate in accordance with national and international railway line safety and standards. ▪ Implement a general safety management program equivalent to internationally recognized railway safety programs.	**Minor**
Level crossing safety	Operation	Local communities Users of the railways	Local	Short-term reversible	Long-term	Continuous	High	Medium	**Major**	▪ Using bridges or tunnels instead of level crossings (removing gates can also improve train performance because most gates have low speed limits to minimize the risks of road traffic.) ▪ Regular inspection / maintenance to ensure automatic doors installation and smooth operation in all level crossings.	Moderate

5 CUMULATIVE IMPACT ASSESSMENT

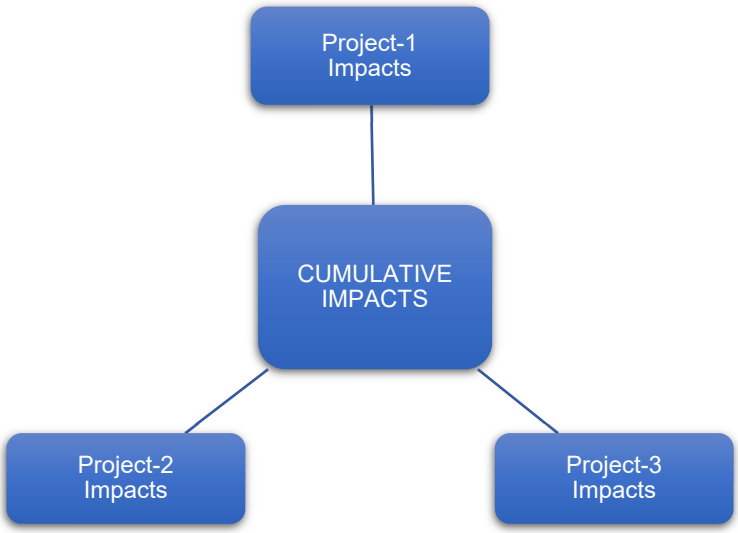
5.1 Methodology and Project Standards

The Cumulative Impact Assessment (CIA) was conducted for the Project followed the methodologies specified by relevant international guidelines. Being one of the most recent and comprehensive documents, the Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (IFC, August 2013) is the primary document for the methodology to be applied in this chapter, while the following additional key documents will also be resorted:

- Cumulative Impacts Assessment and Management Guidance published by International Association for Impact Assessment (IAIA) (Canter L., and William R., 2009; http://www.iaia.org/);
- European Commission's (EC) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (May, 1999);
- Cumulative Impacts Assessment Practitioners Guide prepared by the Cumulative Impacts 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);
- World Banks Sample Guidelines on Cumulative Environmental Impact Assessment for Hydropower Projects in Türkiye published under the Energy Sector Management Assistance Program (ESMAP, 2012).

IFC defines cumulative impacts as "those that result from the successive, incremental, and/or combined impacts of an action, project, or activity (collectively referred as "developments") when added to other existing, planned, and/or reasonably anticipated future ones. Multiple and successive E&S 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 (IFC, August 2013) (Figure 116).

Figure 116. Illustration of Cumulative Impacts



The need for 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 Valued Environmental and Social Components (VESCs), which are defined as the E&S attributes that are considered to be important in assessing risks.

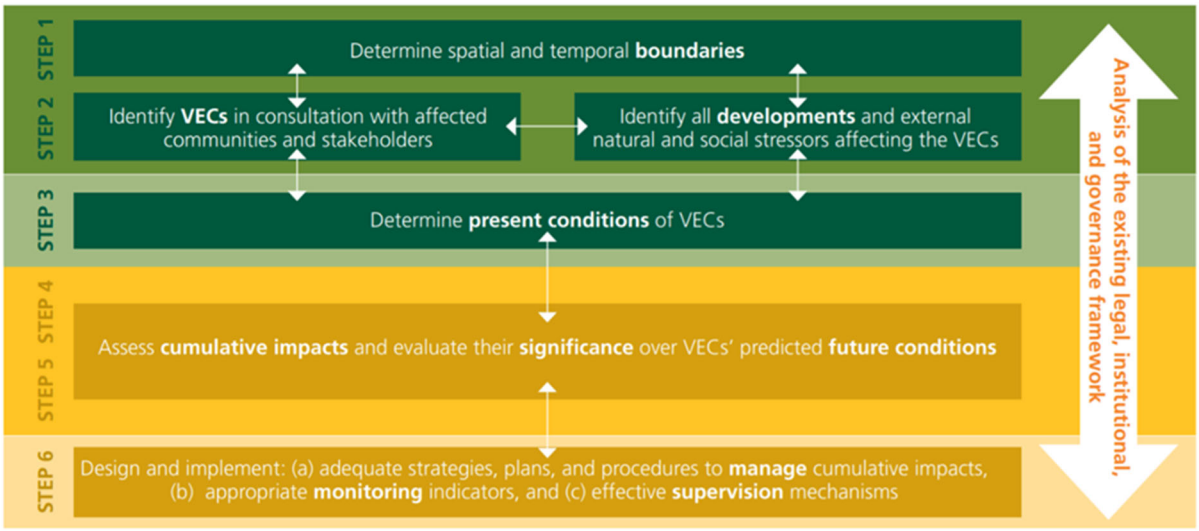
The CIA process to be implemented in case of such circumstances is defined by IFC (August 2013) as:

(i) analyzing the potential impacts and risks of proposed developments in the context of the potential impacts of other human activities and natural E&S drivers on the chosen VESCs over time; and

(ii) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible. In light of the evolving global practice, IFC proposes a six-step approach for conducting Project-initiated CIA studies (IFC, August 2013).

This approach, which will be adopted in the CIA study to be conducted as a part of the Project ESIA studies, is illustrated below.

Figure 117. Six-Step CIA Approach



Source: IFC, August 2013

Steps to be followed in scope of the CIA study for the Project are listed below:

- Step 1: Scoping Phase I – VESCs, Spatial and Temporal Boundaries
- Step 2: Scoping Phase II – Other Activities and Environmental Drivers
- Step 3: Establish Information on Baseline Status of VESCs
- Step 4: Assess Cumulative Impacts on VESCs
- Step 5: Assess Significance of Predicted Cumulative Impacts
- Step 6: Management of Cumulative Impacts

5.2 Cumulative Impact Assessment

5.2.1 Step 1: Scoping Phase I-VESCs, Spatial and Temporal Boundaries

In the first step of the CIA study, initially VESCs will be identified in consideration of the E&S assessments done in the previous chapters of this ESIA Report. Afterwards, time frame (spatial boundaries) for the analysis will be determined and geographical scope (spatial boundaries) of the assessment will be established as the CIA Study Area. Details of the Step 1 assessments are provided in the following sections.

5.2.1.1 Valued Environmental and Social Components (VESCs)

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 in this report referred to as VESCs and may include the following:

- Physical features
- Social conditions, or
- Cultural aspects

This approach entails the CIA studies to be looked at “from the VESCs point of view”, instead of a Project centered perspective as this is the case in the ESIA studies and allows assessment of combined (i.e., cumulative) impacts of various projects/activities on each VESC.

In line with the good CIA perspectives as explained above, the CIA study for the Project will focus on the impacts on the selected VESCs that are to be affected by the Project activities. In other words, any VESC that would be affected by other projects/activities, but not the Project, will not be assessed in the scope of the CIA.

In consideration of the findings of the baseline and impact assessment studies conducted for the Project, valued environmental and social components to be considered in the CIA have been selected as presented in table below.

Table 161. Valued Environmental and Social Components (VESCs)*

E&S Subject	VESCs	Specified VESCs
Biodiversity and Natural Resources	Critical Habitats	E1.2 : Perennial calcareous grassland and basic steppes, E1.2B : Serpentine steppes, E1.2E : Irano-Anatolian steppes, E1.B : Serpantin step, G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix, G1.7 : Thermophilous deciduous woodland, and H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity
	Natural Habitats	H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity E1.2E : Irano-Anatolian steppes E1.2B : Serpentine steppes E1.2 : Perennial calcareous grassland and basic steppes G1.7 : Thermophilous deciduous woodland D5.3 : Swamps and marshes dominated by Juncus effusus or other large Juncus spp. G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix E4.3 : Acid alpine and subalpine grassland G3.4 : Pinus sylvestris woodland south of the taiga
	Legally Protected Areas	Ekşisu Reedbeds Wetland of National Importance Erzurum Marshes Wetland of Local Importance Çıldır Lake Wetland of National Importance
	Internationally Recognized Areas	Divriği Hills Important Nature Area Munzur Moutains Important Nature Area and Important Plant Area Esence (Keşiş Mountains) Important Nature Area Kop Mountains Important Plant Area Sarıkamış Forests Important Nature Area Çıldır Lake Important Nature Area and Important Plant Area
	Flora and Fauna Species with High Conservation Priority	Flora species: *Onosma erzincanica* *Hedysarum yilmazunalii*

E&S Subject	VESCs	Specified VESCs
		Verbascum alyssifolium *Verbascum tuna-ekimii* *Echinophora chrysantha* *Ferulago longistylis* *Centaurea aucheirana* *Hesperis breviscapa* *Physoptychis haussknechtii* *Campanula yildirimlii* *Tymus spathulifolius* *Achillea sintenisii* *Achillea pseudoaleppica* *Centaurea derderifolia* *Centaurea huber-morathii* *Cousinia sintenisii* *Scorzonera aucherana* *Tanacetum heterotomum* *Isatis sivasica* *Tchihatchewia isatidea* *Campanula munzurensis* *Gypsophila heteropoda subsp. minutiflora* *Gypsophila aucheri* *Silene nerimaniae* *Ebenus macrophylla* *Paronychia arabica subsp. euphratica* *Origanum haussknechtii* *Salvia euphratica ssp. leiocalycina* *Stachys inanis* *Thymus cappadocicus var. cappadocicus* *Glaucium cappadocicus* *Plantago euphratica* *Reseda armena var. scabridula* *Thesium stelleroides* *Gladiolus hamzaoglui* *Allium purpureoviride* *Hyacinthella acutiloba* *Asphodeline tenuior var. puberulenta* *Limoniopsis owerinii* *Beta macrorhiza* :Mammals *Mesocricetus brandti* *Spermophilus xanthoprymnus* *Ursus arctos* Birds *Streptopelia turtur* *Anthus pratensis* *Haematopus ostralegus* *Vanellus vanellus* *Clanga clanga* *Gypaetus barbatus* *Neophron percnopterus* *Aythya ferina* *Oxyura leucocephala* Reptiles *Vipera eriwanensis* *Testudo graeca* Fish Species *Alburnus escherischi* *Capoeta tinca* *Gobio obtusirostris* Invertebrates *Cryptocephalus paphlagonius* Sassi et Kismali, 2000 *Eulasia chrysopyga* (Faldermann, 1835) *Zonitis nigriventris* Motschulsky, 1873

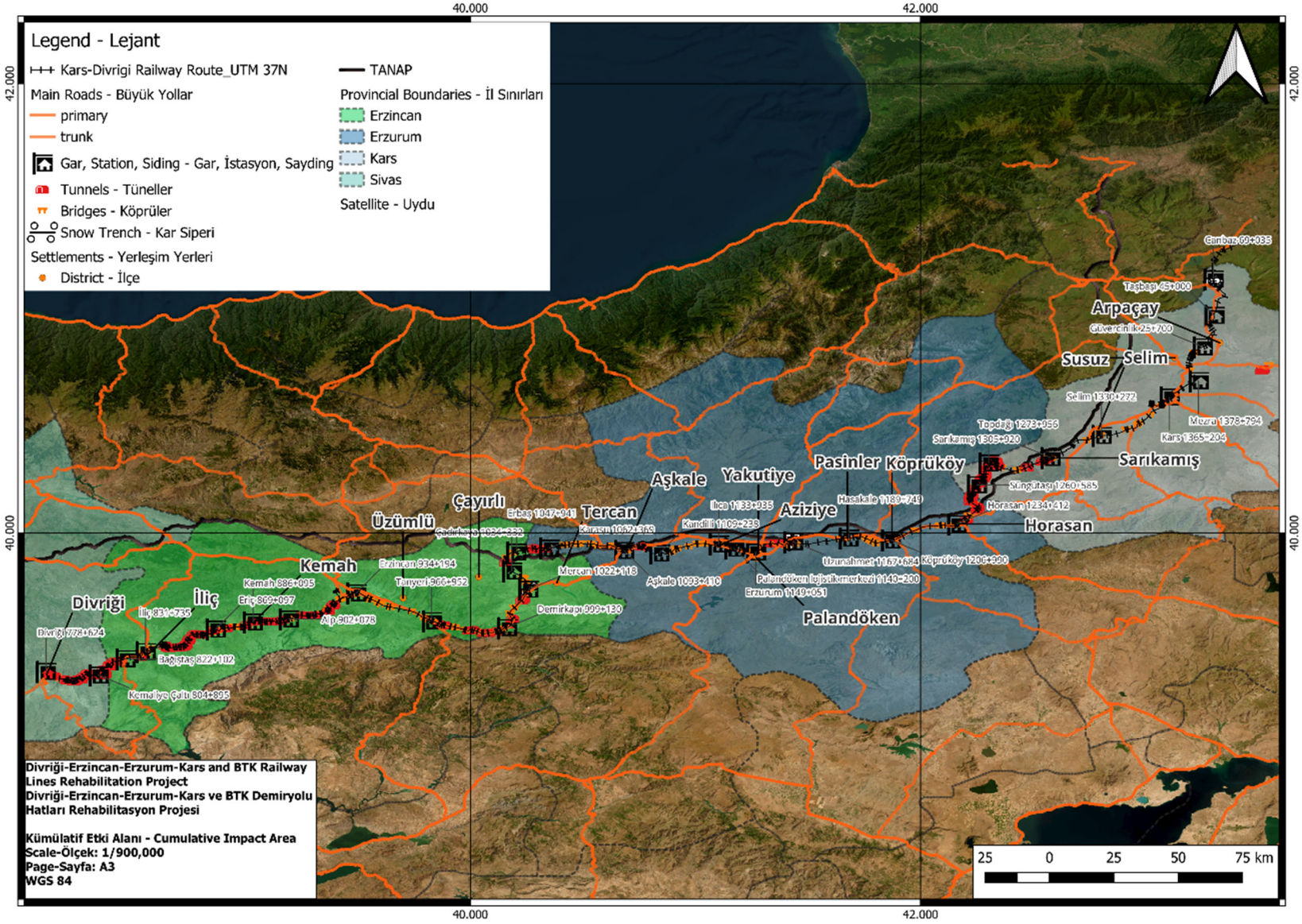
E&S Subject	VESCs	Specified VESCs
		Dysmachus safranboluticus Hasbenli & Geller-Grimm, 1999 *Tipula guentheri* Oosterbroek, 1994 *Phengaris nausithous* (Bergstrasser, 1779) *Polyommatus merhaba* de Prins et al., 1991
Land Use	Agricultural Areas	Arable lands
Air emissions and Noise	Air quality and noise levels in settlements along the Project Route	Kemaliye Çaltı, Bağıştaş, Dumanlı, Altınbaşak, Altınkent, Alaca, Aziziye, Karahoca, Hızırilyas, Dikme, Kars Logistics Center, Canbaz Station
Cultural Heritage	Registered Archaeological Sites	Kesdoğan Castle 1. Degree Archaeological Site
Socio-Economic Environment	Quality of Life	Access to healthcare, education, commercial facilities
		Air pollutants and noise
	Traffic	Traffic load
	Cumulative impact of past projects	Especially, İliç district of Erzincan Province can be sensitive due to the gold mining accident at Çöpler, the Dam and HEPP at Bağıştaş.

5.2.1.2 Spatial and Temporal Boundaries

Cumulative impacts can occur (a) when there is “spatial crowding” as a result of overlapping impacts from various actions on the same VESC in a limited area, (e.g., increased noise levels in a community from industrial developments, existing roads, and a new highway or a railway; or landscape fragmentation caused by the installation of several transmission lines in the same area) or (b) when there is “temporal crowding” as impacts on a VESC from different actions occur in a shorter period of time than the VESC needs to recover. (IFC, August 2013).

For the determination of spatial boundaries of the CIA study, an iterative process has been applied. In this context, the relevant and readily available data were evaluated and a larger region covering important industrial infrastructure projects was examined. As a result of the examination, the cumulative impacts from motorways passing through and near the route, and the quarries to be used, and TANAP route were assessed (see Figure 118).

Figure 118. Cumulative Impact Assessment Study Area



5.2.2 Step 2: Scoping Phase II- Environmental Drivers

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 VESCs. For example, the fire regime in forested areas is a major driver that shapes social, ecological and economic systems (IFC, August 2013).

Most of the land acquisition works on the project route has been completed. Long-term and cumulative effects, especially from land acquisition, reveal transformative effects on livelihoods;

- Decrease of agricultural lands and increasing household consumption costs
- Increasing feed costs due to barrier/loss of access to available pasture lands, decreasing income from livestock production and transformation of livelihood

Another factor which may possibly trigger potential cumulative impacts is the future urban development potential. Increasing potential of passenger transport with railways and increasing capacity of the tourism and commerce at Sivas, Erzincan, Erzurum, Kars to further land developments around the project area. Increased accesses to lands trigger the potential for developments. These may include but not limited to residential, industrial, cultural and tourism developments and thus, land use patterns in areas accessed by the motorway are prone to further changes over time.

Based on the existing knowledge of the ecology and/or natural dynamics of the selected VESCs, no other major environmental driver that may contribute to cumulative impacts has been identified for this CIA study.

5.2.3 Step 3: Establish Information on Baseline Status of VESCs

Information on the baseline status of the VESCs 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 VESCs are presented in the related chapters of this ESIA Report.

5.2.4 Step 4: Assess Cumulative Impacts on VESCs

Assessment of potential cumulative impacts of the Project together with other projects/activities/developments identified in the CIA Study Area on the selected VESCs has been based on a qualitative approach. The cumulative impact potential on the VESCs has been evaluated considering the projects affecting the VESC along with the Project (the Project under Assessment).

In this regard, the cumulative impact potential on each VESC has been classified as negligible, low, medium or high depending on the criteria described in Table 162.

Table 162. Criteria for Magnitude of Cumulative Impact Potential

Magnitude of Cumulative Impact Potential	Criteria
Negligible	The VESC is affected only by the ETMIC Project
Low	The VESC is affected by the ETMIC Project and 1 other project
Medium	The VESC is affected by the ETMIC Project and 2 other projects
High	The VESC is affected by the ETMIC Project and 3 or more projects

Potential impacts of the Project on social and economic environment are discussed in detail above and adverse and beneficial cumulative impacts of VESCs are evaluated in the table below.

Table 163. Cumulative Impacts on VESCs*

E&S Factor	VECs	Specified VESCs	*ETMIC*	*Existing Motorways*	*Quarries*	*TANAP*
Biodiversity and Natural Resources*	Critical Habitat	E1.2 : Perennial calcareous grassland and basic steppes, E1.2B : Serpentine steppes, E1.2E : Irano-Anatolian steppes, E1.B : Serpantin step, G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix, G1.7 : Thermophilous deciduous woodland, and H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity	**Low**	**High**	**High**	**High**
	Natural Habitats	H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity E1.2E : Irano-Anatolian steppes E1.2B : Serpentine steppes E1.2 : Perennial calcareous grassland and basic steppes G1.7 : Thermophilous deciduous woodland D5.3 : Swamps and marshes dominated by Juncus effusus or other large Juncus spp. G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix E4.3 : Acid alpine and subalpine grassland G3.4 : Pinus sylvestris woodland south of the taiga	**Low**	**High**	**High**	**High**
	Legally Protected Areas	Ekşisu Reedbeds Wetland of National Importance Erzurum Marshes Wetland of Local Importance Çıldır Lake Wetland of National Importance	**Low**	**High**	**High**	**High**
	Internationally Recognized Areas	Divriği Hills Important Nature Area Munzur Moutains Important Nature Area and Important Plant Area Esence (Keşiş Mountains) Important Nature Area Kop Mountains Important Plant Area Sarıkamış Forests Important Nature Area Çıldır Lake Important Nature Area and Important Plant Area	**Low**	**High**	**High**	**High**
	Flora and Fauna Species with High Conservation Priority	Flora species: *Onosma erzincanica* *Hedysarum yilmazunalii*	**Low**	**High**	**High**	**High**

E&S Factor	VECs	Specified VESCs	ETMIC	Existing Motorways	Quarries	TANAP
		Verbascum alyssifolium *Verbascum tuna-ekimii* *Echinophora chrysantha* *Ferulago longistylis* *Centaurea aucheirana* *Hesperis breviscapa* *Physoptychis haussknechtii* *Campanula yildirimlii* *Tymus spathulifolius* *Achillea sintenisii* *Achillea pseudoaleppica* *Centaurea derderifolia* *Centaurea huber-morathii* *Cousinia sintenisii* *Scorzonera aucherana* *Tanacetum heterotomum* *Isatis sivasica* *Tchihatchewia isatidea* *Campanula munzurensis* *Gypsophila heteropoda subsp. minutiflora* *Gypsophila aucheri* *Silene nerimaniae* *Ebenus macrophylla* *Paronychia arabica subsp. euphratica* *Origanum haussknechtii* *Salvia euphratica ssp. leiocalycina* *Stachys inanis* *Thymus cappadocicus var. cappadocicus* *Glaucium cappadocicus* *Plantago euphratica* *Reseda armena var. scabridula* *Thesium stelleroides* *Gladiolus hamzaoglui* *Allium purpureoviride* *Hyacinthella acutiloba* *Asphodeline tenuior var. puberulenta* *Limoniopsis owerinii* *Beta macrorhiza* :Mammals *Mesocricetus brandti*				

E&S Factor	VECs	Specified VESCs	*ETMIC*	*Existing Motorways*	*Quarries*	*TANAP*
		Spermophilus xanthoprymnus *Ursus arctos* Birds *Streptopelia turtur* *Anthus pratensisiHaematopus ostralegusiVanellus vanellusiClanga clangaiGypaetus barbatus* *Neophron percnopterus* *Aythya ferina* *Oxyura leucocephala* Reptiles *Vipera eriwanensis* *Testudo graeca* Fish Species *Alburnus escherischi* *Capoeta tinca* *Gobio obtusirostris* Invertebrates *Cryptocephalus paphlagonius* Sassi et Kismali, 2000 *Eulasia chrysopyga* (Faldermann, 1835) *Zonitis nigriventris* Motschulsky, 1873 *Dysmachus safranboluticus* Hasbenli & Geller-Grimm, 1999 *Tipula guentheri* Oosterbroek, 1994 *Phengaris nausithous* (Bergstrasser, 1779) *Polyommatus merhaba* de Prins et al., 1991				
Protected Areas	Legally Protected and Internationally Recognized Areas of High Biodiversity Value	Legally Protected Areas: Ekşisu Reedbeds Wetland of National Importance, Erzurum Marshes Wetland of Local Importance, and Çıldır Lake Wetland of National Importance. Internationally Recognized Areas: Divriği Hills Important Nature Area (INA), Munzur Moutains INA, Esence (Keşiş Mountains) INA, Munzur Moutains Important Plant Area (IPA), Kop Mountains IPA, Sarıkamış Forests INA, Çıldır Lake INA, and Çıldır Lake IPA	**Low**	**Low**	**Medium**	**High**
Land Use	Agricultural Areas	Arable lands	**Low**	**High**	**Medium**	**Negligible**
Air emissions and noise	Air quality and noise levels in settlements along the Project Route	Settlements at Sivas, Erzincan, Erzurum and Kars	**Low**	**High**	**Medium**	**Negligible**
Cultural Heritage	Registered Archaeological Sites	Kesdoğan Castle 1. Degree Archaeological Site	**Negligible**			
Socio-economic environent	Quality of Life	Access to healthcare, education, commercial facilities	**Positive**	**Positive**	**Positive**	**Positive**
		Air pollutants and noise	**Low**	**High**	**Medium**	**Negligible**
		Cumulative impact of past projects	**High**	**Low**	**Low**	**Low**

E&S Factor	VECs	Specified VESCs	*ETMIC*	*Existing Motorways*	*Quarries*	*TANAP*
	Traffic	Traffic Load	**Medium**	**Medium**	**Negligible**	**Negligible**
	Cumulative impact of past projects	Especially, İliç district of Erzincan Province can be sensitive due to the gold mining accident at Çöpler, the Dam and HEPP at Bağıştaş.	**Medium**	**Medium**	**Negligible**	**Negligible**

5.2.5 Step 5 and Step 6: Assessment of Significance of Predicted Cumulative Impacts and Management of Cumulative Impacts

The environmental impacts of a project on a specific receptor and/or resource may not be significant. However, when the individual impacts are considered in combination, the resulting cumulative impacts may be significant. At this point, the significance of cumulative impacts should be determined by the extent to which the impacts can be accommodated by the receptor and/or resource.

Significance of the assessed cumulative impacts are determined according to the significance levels presented below. In this regard, importance of the cumulative impact will be estimated in terms of the vulnerability and/or risk to the sustainability of the VESC assessed. Consequently, cumulative impact assessment will be directly related with the existing sensitivity/vulnerability conditions of the VESCs.[191]

Table 164. Criteria for the Determination of Significance of Cumulative Impacts

Significance	Impact
Severe	Impacts that the decision-maker must consider as the receptor/resource is irretrievably compromised.
Major	Impacts that may become key decision –making issue.
Moderate	Impacts that are unlikely to become issues on whether the project design should be selected, but where future work may be needed to improve on current performance.
Minor	Impacts that are locally significant.
Insignificant	Impacts that are beyond the current forecasting ability or are within the ability of the resource to absorb such change.

In this regard, the importance of cumulative effects on VESCs are given in Table 165.

Table 165. Significance of Cumulative Impacts on VESCs

VECs	Significance	Description
Biodiversity and Natural Resources	Minor	Nearly half of the Biodiversity Study Area defined for the Project, which is about 1,000 hectares, is composed of natural habitats. Due to the rehabilitation Project impacts will be low on biodiversity and natural habitats.
Land Use	Moderate	There are agricultural lands in question, however, the agricultural activities are not intense but only done for household consumption.
Air emissions and noise	Minor	Impact of the Project will be temporary and after the commencing of the Project, the traffic load is expected to be decreased resulting in less air emissions and noise generation
Cultural Heritage	Negligible	Access to cultural heritage sites is not blocked within the scope of projects.
Socio-economic environment	Moderate	As stated in Chapter 5.10, many issues such as influx of population, local employment and employment opportunity, agricultural and pasture lands are evaluated cumulatively, impact significance is determined as moderate when considered with negative and positive elements. The mining accident particularly experienced in the Erzincan İliç region may have led to a strong stance against new projects in the region due to the impact of dam and hydroelectric power plant projects.

It is important to highlight that the cumulative impacts typically result from actions of multiple stakeholders and the responsibilities for management of these potential impacts are versatile.

Project level mitigation measures are defined in this ESIA Report. Where project specific mitigation measures are not sufficient and prevention of an unacceptable cumulative impact

[191] UK Highways Directorate 205/08: Design Booklet for Bridges and Roads; http://www.standardsforhighways. co.uk /ha/standards/dmrb/

by project mitigation alone is not possible, collaborative engagement in regional management strategies will be necessary (IFC, August 2013). IFC recommends the following specific actions that may be required to effectively manage cumulative impacts:

- Project design changes to avoid cumulative impacts (where possible, location, timing and technology).
- Project mitigation to minimize cumulative impacts, including adaptive management approaches to project mitigation.
- Mitigation of project impacts by other projects (not under control of the proponent to further minimize impacts on VESCs).
- Collaborative protection and enhancement in other regional cumulative impact management strategies.
- Collaborative engagement in other regional cumulative impact management strategies.
- Participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts.

Overall management for the cumulative impacts will be the responsibility of AYGM. AYGM will make sure that project activities will be advancing with the knowledge of all the stakeholders defined during stakeholder management studies.

Authorities for each activity considered during this cumulative impact assessment, namely ETMIC Project, existing motorways, quarries and TANAP (General Directorate of Highways, each management of quarry and TANAP) will be informed by AYGM periodically and WB will be informed about the interactions between these authorities. AYGM will be the responsible party to provide the collaboration regarding cumulative impact management.

6 PROJECT ALTERNATIVES

6.1 Route Selection and Optimization

In the context of the project, the analysis of alternatives primarily focuses on the establishment of railway station locations. It is important to note that due to the nature of the project involving the rehabilitation of an existing railway route, there were no route alternatives available for analysis. However, the selection of station locations along the route is a critical aspect that requires careful consideration.

Certain constraints on the alternatives' analysis were dictated by the existing railway route, considering the rehabilitative nature of the project. The project aimed to enhance the efficiency and functionality of the existing railway infrastructure, acknowledging the historical significance and practicality of the established route.

Station Location Determinants

The decision-making process for selecting railway station locations involves a comprehensive analysis of various criteria to ensure optimal functionality, accessibility, and community integration. The following key determinants were considered in the evaluation:

Population Density and Urban Centers

Areas with high population density and proximity to urban centers were identified to cater to passenger demand effectively. Station locations were aligned with existing or planned transportation hubs to facilitate seamless connectivity with other modes of transportation.

Economic Viability and Accessibility

The economic viability of station locations was evaluated by considering factors such as potential for trade, commerce, and tourism. Accessibility for people with disabilities and the general public was ensured, emphasizing the need for inclusive infrastructure.

Environmental Impact

Environmental impact was minimized by avoiding ecologically sensitive areas and adhering to sustainable construction practices.

Infrastructure Integration

Station locations were integrated with existing infrastructure, such as roads and utilities, to optimize resources and reduce overall project costs.

Safety and Security

Safety and security considerations were prioritized when selecting station locations, taking into account factors such as crime rates and emergency response capabilities.

Stakeholder Involvement

Throughout the process, ensuring that the selection of railway station locations reflected the diverse needs and perspectives of the communities affected through stakeholder consultation. Public consultations, surveys, and feedback sessions were conducted to gather insights and preferences, contributing to a more inclusive decision-making process.

The affected communities were informed and given the opportunity to provide their feedback enabling decision-makers to understand their needs, concerns, and preferences regarding station locations.

In summary, while route alternatives were not applicable in this project context, the meticulous analysis of railway station locations considered a multifaceted approach, prioritizing factors

that contribute to the overall success, sustainability, and community acceptance of the railway project.

6.2 Technology Selection

In evaluating technology alternatives for the railway project, a comprehensive analysis was conducted to identify and select the most suitable technological solutions. The objective was to enhance the efficiency, safety, and sustainability of railway operations while considering advancements in rail technology. The analysis encompassed several key technological aspects, each contributing to the overall success of the project.

Rail Track Technology

Various rail track technologies were considered to optimize performance and durability. Advanced track systems, including concrete ties and continuously welded rail, were evaluated for their ability to reduce maintenance requirements and enhance the overall lifespan of the railway infrastructure. The analysis also incorporated considerations for high-speed rail technologies to accommodate potential future upgrades.

Signaling and Control Systems

The project examined modern signaling and control systems to improve operational safety and efficiency. Computer-based train control systems, automated signaling, and advanced communication technologies were analyzed for their capacity to enhance train coordination, reduce travel times, and minimize the risk of accidents.

Rolling Stock

The selection of rolling stock played a pivotal role in the analysis, focusing on technologies that would contribute to energy efficiency, reduced emissions, and enhanced passenger comfort. Evaluations included considerations for electric and hybrid locomotives, as well as advancements in passenger car design to meet modern standards for accessibility and sustainability.

Energy Supply

The analysis encompassed alternative energy sources to power the railway system. Options such as electrification, renewable energy, and energy-efficient technologies were explored to align with environmental sustainability goals. The goal was to minimize the carbon footprint of the railway operations and explore energy solutions that align with future trends in clean energy.

Digitalization and Information Systems

The integration of digital technologies and information systems was a key focus in the analysis. Emphasis was placed on implementing smart technologies for real-time monitoring, maintenance prediction, and passenger information systems. The goal was to enhance overall operational efficiency and provide a seamless travel experience for passengers.

Maintenance Technologies

Innovative maintenance technologies were explored to minimize downtime and reduce the overall cost of maintenance activities. Predictive maintenance, robotics, and remote monitoring systems were considered to ensure proactive identification of potential issues, allowing for timely interventions and improved reliability.

Sustainability Considerations

Throughout the analysis, sustainability remained a critical criterion. Technologies that aligned with environmentally friendly practices, such as energy-efficient systems and reduced noise

emissions, were prioritized to minimize the environmental and social risks and impacts of the railway project.

Cost-Benefit Analysis

A comprehensive cost-benefit analysis was conducted for each technological alternative, considering initial investment costs, long-term operational savings, and potential future upgrade requirements. This approach aimed to identify the most economically viable and sustainable technological solutions for the railway project.

In conclusion, the analysis of technology alternatives provided a robust foundation for the selection of cutting-edge solutions that align with the project's goals of efficiency, safety, and sustainability. The chosen technologies represent a forward-looking approach to railway development, incorporating innovations that contribute to the long-term success of the infrastructure.

Railway projects have a significant ecological footprint due to their linear nature and extensive infrastructure, including tracks, bridges, and tunnels. The choice of technology directly affects the impact on the environment. Opting for elevated tracks or tunnels can reduce the need for land clearance and fragmentation. Proper technology selection allows for minimizing disruption to ecosystems, habitats, and wildlife. Techniques like remote sensing, infrared camera traps, and manual investigations aid in assessing the impact on ecosystems, wild animals, and plants. By implementing environmental protection measures, such as habitat restoration and pollution control, adverse effects can be mitigated and sustainable coexistence between railways and the environment can be ensured.

Railways play a vital role in transportation, offering advantages like lower emissions, reliable service, and cost-effectiveness compared to road transport. However, the long construction period and the prevalence of bridges and tunnels pose challenges. These regions often have fragile ecosystems and significant terrain elevation differences. Proper technology choices enable us to strike a balance between efficient transportation and environmental stewardship. Whether it’s digitalization, failure prediction, or work elimination, technology can enhance safety, reduce environmental impact, and ensure a sustainable future for rail infrastructure.

6.3 Accommodation Camps (Camp Sites)

When selecting accommodation camps (camp sites) for a construction project, it is crucial to consider both environmental and social concerns to ensure the well-being of the local community and the surrounding environment. Environmentally, the chosen sites will avoid ecologically sensitive areas, such as wetlands, wildlife habitats, and floodplains, to minimize disruption to local ecosystems. The selection process should also include an assessment of potential impacts on water resources, air quality, and soil stability. Socially, it is important to select locations that do not negatively affect local communities or disrupt their daily lives. The camps should be situated at a sufficient distance from residential areas to prevent noise, dust, and other disturbances, while also considering the availability of local services and infrastructure. Engaging with local stakeholders and obtaining their input can help address community concerns and ensure that the accommodation facilities are designed to meet both environmental protection standards and social acceptance.

6.4 No Project Alternative

The consideration of a "No Project" alternative is an integral part of the ESIA process, providing a basis for comparison and evaluation of potential impacts and benefits associated with both implementing and not implementing the railway project. However, in the case of this railway rehabilitation project, the "No Project" alternative was deemed unviable for several compelling reasons.

Transportation Infrastructure Needs

The existing railway infrastructure along the route is outdated and in a state of disrepair, leading to operational inefficiencies, increased maintenance costs, and compromised safety. The rehabilitation project addresses these critical issues by modernizing the railway, ensuring enhanced safety standards, and improving overall transportation efficiency.

Economic Stimulus

The railway project is strategically aligned with broader economic development goals. It is anticipated to stimulate economic growth by facilitating the efficient movement of goods and passengers, fostering regional connectivity, and attracting investments to the areas along the railway route. The absence of the project would result in a missed opportunity to boost economic development in the region.

Enhanced Connectivity

The rehabilitated railway will significantly enhance connectivity between cities and regions, promoting trade, tourism, and cultural exchange. The lack of such improved connectivity would impede regional integration and limit the potential for social and economic interactions between communities.

Environmental Considerations

Neglecting the rehabilitation project would perpetuate the environmental challenges associated with the existing deteriorated railway infrastructure. The outdated system poses risks of environmental contamination, habitat disruption, and safety hazards. Implementing the project allows for the incorporation of modern, environmentally friendly technologies and practices.

Safety and Reliability

The existing railway infrastructure presents safety concerns due to its outdated design and compromised structural integrity. Rehabilitation is crucial for ensuring the safety of both passengers and cargo transportation. The absence of the project would perpetuate these safety risks, potentially leading to accidents and operational disruptions.

Strategic National Importance

The railway rehabilitation aligns with broader national strategic goals related to transportation and infrastructure development. The project's absence would hinder the realization of these strategic objectives, affecting the overall competitiveness and efficiency of the national transportation network.

In summary, the "No Project" alternative was carefully considered, but its feasibility was ruled out due to the pressing need for railway rehabilitation, the economic benefits associated with the project, improved connectivity, environmental considerations, safety concerns, and alignment with national development priorities. The railway project stands as a crucial initiative for addressing these challenges and fostering sustainable development in the region.

7 STAKEHOLDER ENGAGEMENT

7.1 Preliminary Stakeholder Participation Activities

Within the scope of the Environmental Impact Assessment (EIA) report prepared by the General Directorate of DLH Construction for the Kars Tbilisi Railway Project, regarding the Kars-Tbilisi Railway Project and Material Quarries; Pursuant to Article 9 of the EIA Regulation, which entered into force after being published in the Official Gazette dated December 16th 2003 and numbered 25318, "Public Participation Meeting" was held in order to ensure public participation in the EIA process, to inform about the activity, to receive opinions and suggestions in the places where the meeting dates, meeting places and names are given below. Announcement texts and project summaries were prepared to announce the Public Participation Meeting to the public;

- An advertisement was published in a national newspaper,
- Advertisement in the local newspaper,
- Announcement was made on the governorate bulletin board,
- Announcements were made in district governorships,
- Announced in municipalities,
- Announcements were made to settlements that may be affected by the railway route,
- Brochures about the project were distributed to the participants of the public participation meeting.

On 27.07.2006 at 14.00 at Kars Art Center Conference Hall in Kars and on 28.07.2005 at 12.00 in Yukarı Canbaz Village in Çıldır/Ardahan, 2 public participation meetings were held. Broad questions asked at the Public Participation Meetings are given below:

- Expropriation costs are low and how much area will be expropriated;
- How transitions to agricultural areas and animal crossings will be provided on the route;
- Whether the station locations are close to their own settlements and whether they can use these stations for transportation;
- Whether there will be any damage to the existing facilities and planned projects of the public institutions and organizations participating in the meeting around the railway route and what measures will be taken;
- In the Public Participation Meeting held in Yukarı Canbaz Village within the borders of Ardahan Province, it was requested that the Railway Route should pass west of Çıldır.

Necessary explanations were made to the local people who requested information on the above issues as stated in the relevant sections of the EIA Report. No further public consultations on the project have taken place.

7.2 List of the Interviewed Stakeholders

Out of the visited facilities, 11 of them have both male and female employees. Among these facilities, interviews were conducted with women in 6 out of the 11 cases. However, in facilities where there are female employees, but interviews could not be conducted (Topdağı, Süngütaşı, and Çaltı), it was due to the female employees being on a shift change day. In the Erzincan and Erzurum Stations, where there are female employees, no women participated in the interviews.

The key informants in this study primarily include station chiefs, movement officers, and train composition workers who are railway employees. All station chiefs and train composition workers are male, but some of the interviewed movement officers are female. Apart from specific interviews conducted at the Uzunahmet station, interviews were also conducted with the mukhtar and villagers in the settlement. The remaining participants are managers who hold

unit and branch responsibilities in the main stations, specifically Erzincan, Erzurum, and Kars. More information about the research can be found in Appendix-9 and Table 102.

Detailed information will be given within the project specific stakeholder engagement plan as a part of the ESIA package.

7.3 Planned Engagement

It is essential to conduct an effective stakeholder engagement process before commencing land preparation activities. Collaboration with key local stakeholders, including neighborhood/village councils, district governorships, and governorates, as well as municipal units, is crucial for ensuring successful communication activities.

In the information processes, special attention should be given to vulnerable groups such as the elderly, women who are heads of households, and informal users of the land who may be at a disadvantage.

Therefore, a comprehensive social impact assessment study was required. Within the scope of the research, household surveys, settlement surveys (also known as mukhtar survey), and questionnaires focused on livelihoods, which were implemented by a qualified social team, to facilitate the collection of quantitative data. Additionally, focus group meetings involving the elderly, women, people with disabilities, and youth, as well as meetings and in-depth interviews with individuals in professions such as farming, livestock, and fishing, allowed for the collection of qualitative data.

Stakeholder interview, which were conducted concurrently with the research, were guided by the institutions and organizations specified in Appendix-10. Choice of information tools and methods, as well as the identification of appropriate timings for effective consultations with communities, was instrumental in addressing topics that may have been sensitive from an ethnic, cultural, and religious perspective.

In all these assessments, a general approach to the expectations, questions, concerns, objections, and needs of PAPs and Other Interested Groups was established. of the project, identify issues in advance, and determine appropriate strategies. This approach identified to serve as a crucial foundation for understanding the project's impacts on communities and achieving positive outcomes.

In the information processes mentioned above, practices should be implemented locally and regionally based on the progress of the project. Starting from high-risk areas and PAPs, where the project's impacts are expected to be most intense, the process should progress towards interest groups that may be concerned or interested in the project. Effectively conducting stakeholder engagement will enable the long-term potential adverse impacts of the project to be reversible. Ensuring stakeholder engagement, particularly with PAPs and vulnerable groups, holds immense importance for project impacts. In this context, PAPs and vulnerable groups are particularly sensitive to community participation.

Detailed information is given within the project specific stakeholders engagement plan as a part of the ESIA package.

7.4 Stakeholder Consultation Meetings for Information Disclosure

As part of the project, stakeholder participation/consultation meetings have been held in three locations across the provinces of Kars, Erzurum, and Erzincan on 25.09.2024 and 26.09.2024. Leaflets prepared for the project have been posted in areas close to the meeting venues along with invitation letters, and stakeholders were also notified through an official letter. Additionally, efforts were made to reach the Mukhtars, who were consulted during the ESIA process, via social media using their contact numbers.

Information about the meetings is provided in Table 166.

Table 166. Information about the Stakeholder Consultation Meetings

Meeting Province	Meeting Place	Address	Date	Time	Number of Participants
Kars	Kars Train Station	İstasyon Neighborhood, 36100 Kars City Center/Kars	25.09.2024	15:00-17:00	25
Erzurum	Erzurum Train Station	Ömer Nasuhi Bilmen Neighborhood, İstasyon Square, 25200 Yakutiye/Erzurum	26.09.2024	10:00-11:30	18
Erzincan	Erzincan Train Station	Çarşı Neighborhood, 24040 Erzincan City Center/Erzincan	26.09.2024	16:00-18:00	28

The key outcome of the meetings was the decision to include TCDD personnel in the design and supervision processes to ensure close monitoring of the project's progress based on the experiences on operational activities and awareness of current deficiencies.

The project introduction and all environmental and social documents prepared as part of the project are available on AYGM's website (https://aygm.uab.gov.tr/dogu-turkiye-orta-koridor-demiryolu-gelistirme-projesi).

Detailed information about stakeholder participation meetings, the issues raised during these meetings, and stakeholders' opinions and suggestions are provided in the SEP document (see CNR-ETMIC-SEP-001).

7.5 Grievance Mechanism

The project's SEP document identified the stakeholders and provided guidelines and timetables for communicating with them. The SEP provides a thorough plan for involvement and communication that will guarantee project goals are met and the project is carried out in a transparent, responsive, cooperative, and participatory manner. It also establishes a procedure for handling complaints from interested parties.

A separate body is also a part of the procedure to settle disputes in an unbiased manner. It is anticipated that it will keep running during the planning and execution phases of the relocation.

The principal duty of the ETMIC sub-unit of PIU is to document and oversee grievances, including those related to environmental issues. Following the SEP's standards, the Contractor's social specialists will be on-site in addition to AYGM. One of their responsibilities is to record and handle complaints. These appointed staff members will supervise the prescribed mitigating actions while following the Grievance Mechanism to record and handle all complaints from stakeholders. The project website, information meetings, and project brochures will all be used to distribute project contact information in order to increase stakeholder awareness and enable open complaint reporting. Stakeholders can file concerns via a number of official ways;

For projects financed by the World Bank, stakeholders will be informed about the guide prepared by the World Bank regarding the prevention of SEA, SH and GBV. Complaints related to GBV and SEA can create a culture of silence due to negative societal reactions. To prevent this, stakeholders should be able to anonymously submit complaints related to the project on these issues. Authorities handling complaints should address such issues with confidentiality and an unbiased approach.

Detailed information will be given within the project specific stakeholder engagement plan as a part of the ESIA package. Please refer to CNR-ETMIC-SEP-001.

8 REFERENCES

AKURGAL, E. 1985. Ancient Civilizations and Ruins of Türkiye, 132-133, İstanbul.

ALTUNSABAK, E 2016, Somut Olmayan Kültürel Mirasın kuşaktan kuşağa Aktarımı ve Gençlik; Kars ili Örneği, Yayınlanmamış Yüksek Lisans Tezi

ATALAY, İ., K. Mortan 2003. Türkiye Bölgesel Coğrafyası. İnkılap Kitapevi, Ankara.

Baytaş, A. 2007. A Field Guide to the Butterflies of Türkiye. NTV Yayınları, İstanbul.

Berthoud, G. 2003. Introduction of biological and landscape diversity considerations in the development and management of rail transport networks in Europe. CO-DBP,PE-S-TE. Council of Europe. Nature and the Environmentseries132:81-104.

Burgin C. J., Wilson D. E., Mittermeier R. A., Rylands A. B., Lacher T. E., Sechrest W. (2020a) Illustrated Checklist of the Mammals of the World. Volume 1. Monotremata to Rodentia. Lynx Editions, Barcelona.

Burgin C. J., Wilson D. E., Mittermeier R. A., Rylands A. B., Lacher T. E., Sechrest W. (2020b) Illustrated Checklist of the Mammals of the World. Volume 2. Eulipotyphla to Carnivora. Lynx Editions, Barcelona.

Cálix, M., Alexander, K.N.A., Nieto, A., Dodelin, B., Soldati, F., Telnov, D., Vazquez- Albalate, X., Aleksandrowicz, O., Audisio, P., Istrate, P., Jansson, N., Legakis, A., Liberto, A., Makris, C., Merkl, O., Mugerwa Pettersson, R., Schlaghamersky, J., Bologna, M.A., Brustel, H., Buse, J., Novák, V. and Purchart, L. 2018. European Red List of Saproxylic Beetles. Brussels, Belgium: IUCN. Available at: http://www.iucnredlist.org/initiatives/europe/publications, Downloaded on 30. Kasım 2020.

Carpenter, T. 1994. The environmental impacts of railways. John Wiley, New York.

CEYLAN, A., 2003. “2002 yılı Erzincan, Erzurum, Kars ve Iğdır İlleri Arkeolojik Yüzey Araştırması” 21.Araştırma Sonuçları Toplantısı, 2.Cilt:263-273, T.C.Kültür ve Turizm Bakanlığı Yayınları, ANKARA

CEYLAN, A., 2004. “2003 yılı Erzincan, Erzurum, Kars ve Iğdır İlleri Arkeolojik Yüzey Araştırması” 22.Araştırma Sonuçları Toplantısı, 2.Cilt:189-200, T.C.Kültür ve Turizm Bakanlığı Yayınları, ANKARA

CEYLAN, A., 2005. “2004 yılı Erzincan, Erzurum, Kars ve Iğdır İlleri Arkeolojik Yüzey Araştırması” 23.Araştırma Sonuçları Toplantısı, 2.Cilt:163-183, T.C.Kültür ve Turizm Bakanlığı Yayınları, ANKARA

CITES 2021. CITES Appendices I, II and III. https://cites.org/eng/app/index.php

CRIBB, J. 1991. Nomads in Archaeology, Cambridge.

De Santo, R.S. and D.G. Smith. 1993. Environmental auditing: an introduction to issues of habitat fragmentation relative to transportation corridors with special reference to high-speed rail (HSR). Environmental Management 17:111-114.

Dijkstra, K.-D.B. and Lewington, R., 2006, Field guide to the Dragonflies of Britain and Europe, Gillingham: British Wildlife Publishing, 320 pp.

Dorsey, B.,M. Olssonand L.J. Rew. 2015. Ecological effects of railways on wildlife. Pages 219-227 in R van der Ree, D.J. Smith and C. Grilo, editors. Handbook of road ecology. John Wiley&Sons, UK.

DURBIN, G.E. S., 1971. “Iron Age Pottery from the provinces of Tokat and Sivas”, Anatolian Studies 21:99-124.

Environmental Status Reports of Sivas, Erzincan, Erzurum and Kars

European Commission Convention on Conservation of European Wildlife and Natural Habitats (Bern Convention). 2002.

GÜNERİ, S., 1987. “Erzurum Çevresindeki Huyuklerin Yüzey Araştırması” V. Araştırma Sonuçları Toplantısı: 45-60

GÜNERİ, S., 1993. “Doğu Anadolu’da Yeni Gözlemler” Türk Arkeoloji Dergisi XXX:149-195

Hanson, C.E. 2008. High speed train noise effects on wildlife and domestic livestock. In B. Schulte-Werning et al., editors. Noise and vibration mitigation, NMFM99. Springer, Berlin.

http: //www.railway-technical.com/trains/train-maintenance/

http://jncc.defra.gov.uk/page-1373 [November 28, 2014].

http://www.tramem.org/

https: //webdosya.csb.gov.tr/db/cygm/haberler/ulusal_at-k_yonet-m--eylem_plan--20180328154824.pdf

https://aregem.ktb.gov.tr/TR-344414/somut-olmayan-kulturel-miras-somut-olmayan-kulturel-miras-ulusal-envanteri.html

https://aregem.ktb.gov.tr/TR-50839/somut-olmayan-kulturel-miras-envanter-calismalari.html

https://ec.europa.eu/environment/waste/framework/

https://ich.unesco.org/en/state/turkiye-TR?info=elements-on-the-lists&cp=TR&topic=fr-etat

https://www.havaizleme.gov.tr/

https://www.unesco.org.tr/Pages/661/315/UNESCO-Representative-List-of-the-Intangible-Cultural-Heritage-of-Humanity

IFC. (2007). *Environmental, Health, and Safety Guidelines for Railways*. Erişim adresi: https://www.ifc.org/wps/wcm/connect/8a4a0318-9c7a-44f1-80bf-ff30cb3c9087/Final%2B-%2BRailways.pdf?MOD=AJPERES&CVID=jqevJUe&id=1323152551661

IFC. 2011. Update of IFC’s Policy and Performance Standards on Environmental and Social Sustainability and Access to Information Policy. World Bank Group: Washington DC.

IFC. 2012a. Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. World Bank Group: Washington DC.

IFC. 2012b. Performance Standards on Environmental and Social Sustainability. World Bank Group: Washington DC.

International Union for Conservation of Nature (IUCN). 2014. Red List of Threatened Species. Version 2013.1 [Online]: www.iucnredlist.org [November 28, 2014].

IUCN Standards and Petitions Committee. 2022. Guidelines for Using the IUCN Red List Categories and Criteria. Version 15.1. Prepared by the Standards and Petitions Committee. Downloadable from https://www.iucnredlist.org/documents/RedListGuidelines.pdf.

IUCN. (2017). *Protected Areas: IUCN Global Protected Areas Programme and IUCN World Commission on Protected Areas Delivering the Promise of Sydney*. Retrieved from : https: //www.iucn.org/theme/protected-areas

JNCC. 2014. Directive 2009/147/EC on the conservation of wild birds (codified version).

JONES, A.H.M., 1971. The Cities of the Eastern Roman Provinces.,

Kalkman, V.J.& Van Pelt,V.G. 2006. The distribution and flight period of the dragonflies of Türkiye. Brachytron 10(1): 83-153.

Kalkman, V.J., Boudot.J-P, Bernard.R, Knijf, G.D, .Suhling, F., Termaat, T. 2018. Diversity and conservation of European dragonflies and damselflies (Odonata). Hydrobiologia, 811:269–282.

Karaçetin, E. and H.J. Welch. 2011b. Red Book of Butterflies in Türkiye. Doğa Koruma Merkezi, Ankara. Available online: [www.dkm.org.tr]

Kars İlinin Somut Olmayan Kültürel Mirasının Haritalandırılması (Doğu Anadolu'da Kültür Turizmi için İttifaklar BM Ortak Programi Kars İlinin Somut Olmayan Kültürel Mirasının Haritalandırılması Projesi, 2011, Kars Kafkas Üniversitesi

KÖKTEN K., 1947. "İç ve Doğu Anadolu Bölgelerinde Gerçekleştirdiği Yüzey Araştırmaları", Belleten, Cilt XI, Sayı 43 (1947): 431-472.

KONYAR, E., 2013. Doğu Anadolu'da Erken Demir Çağ Kültürü: Arkeolojik Kazı ve Yüzey Araştırmaları Bulgularının Değerlendirilmesi, İstanbul, 1998-2004, Doktora tezi

KROLL, J., 1976. Keramik urartäischer Festungen in Iran: Ein Beitrag zur Expansion Urartus in Iranisch-Azarbaidjan, Berlin

Kryštufek B and Vohralík V (2001) Mammals of Türkiye and Cyprus. Introduction, checklist, Insectivora. Znanstveno-raziskovalno središče Republike Slovenije Koper.

Kryštufek B and Vohralík V (2009) Mammals of Türkiye and Cyprus (Rodentia II: Cricetinae, Muridae, Spalacidae, Calomyscidae, Capromyidae, Hystricidae, Castoridae). Univerza na Primorskem Koper., pp.25.

Krystufek, B. & Vohralik, V., (2005) Mammals of Türkiye and Cyprus. Rodentia I: Scuidae, Dipodidae, Gliridae, Arvicolinae. Zgodovinsko drustvo za juzno Primorsko Znanstveno-Raziskovalno sredisce Republike Slovenije Koper. 292 pp.

Kryštufek, B., Kefelioğlu, H. (2002): Redescription and species limits of Microtus Irani Thomas, 1921, and description of a new social vole from Türkiye (Mammalia: Arvicolidae). Bonner Zoologische Beiträge 50: 1-14.

MENDEŞ, S., 2021, Managing Intangible Cultural Heritage in Türkiye Four Cases Originating in Antiquity, Yayınlanmamış Yüksek Lisans Tezi

ÖKSE T., 1988. Mitteleisenzeitliche Keramik Zentral-Ostanatoliens, Berlin 1988.

ÖKSE T., 1994. "Sivas İli 1992 Yüzey Araştırması" XI. Araştırma Sonuçları Toplantısı: 243-258. Ankara, T.C. Kültür Bakanlığı, Anıtlar ve Müzeler Genel Müdürlüğü.

ÖKSE T., 1995,"Sivas İli 1993 Yüzey Araştırması" XII. Araştırma Sonuçları Toplantısı: 317-329. Ankara, T.C. Kültür Bakanlığı, Anıtlar ve Müzeler Genel Müdürlüğü.

ÖKSE T., 1996. "Sivas İli 1994 Yüzey Araştırması" XIII. Araştırma Sonuçları Toplantısı: 205-228. Ankara, T.C. Kültür Bakanlığı, Anıtlar ve Müzeler Genel Müdürlüğü.

ÖKSE T., 1997. "Sivas İli 1995 Yüzey Araştırması" XIV. Araştırma Sonuçları Toplantısı: 375-400. Ankara, T.C. Kültür Bakanlığı, Anıtlar ve Müzeler Genel Müdürlüğü.

ÖKSE T., 1999. "Sivas İli 1997 Yüzey Araştırması" XVI. Araştırma Sonuçları Toplantısı: 467-490. Ankara, T.C. Kültür Bakanlığı, Anıtlar ve Müzeler Genel Müdürlüğü.

ÖKSE T., 2000, "Sivas İli 1998 Yüzey Araştırması" XVII. Araştırma Sonuçları Toplantısı: 11-24. Ankara, T.C. Kültür Bakanlığı, Anıtlar ve Müzeler Genel Müdürlüğü.

ÖKSE T., 2001, "Sivas İli 1999 Yüzey Araştırması" XVIII. Araştırma Sonuçları Toplantısı: 89-100. Ankara, T.C. Kültür Bakanlığı, Anıtlar ve Müzeler Genel Müdürlüğü.

Önder, F., Karsavuran, Y., Tezcan, S. and Fent, M. 2006. Türkiye Heteroptera (Insecta) Kataloğu Heteroptera (Insecta) Catalogue Of Türkiye

ÖZFIRAT, A., 2001. Doğu Anadolu Yayla Kültürleri, Arkeoloji ve Sanat Yayınları, İstanbul.

RAMSAY, W.M., 1961. (Çev. M. Pekdaş). Anadolu'nun Tarihi Coğrafyası. MEB Yayınları, İstanbul.

REGIO Consultancy Co., 2012. Archaeological Baseline Survey Report of East Section (Posof/Ardahan- Bala/Ankara) of Nabucco Pipeline Project

REGIO Consultancy Co., 2012. Archaeological Field Survey and Impact Assessment Report of Iran-Türkiye -Europe Natural Gas Pipeline Project,

SAGONA, A. and P.ZIMANSKY, 2009. Ancient Türkiye. Routledge, London.

SAGONA, A., 1984. The Caucasian ZONE in the Early Bronze Age, BAR International Series 214.

SAGONA, A., 1999, "The Bronze Age-Iron Age Transition in Northeast Anatolia: A View from SosHuyuk" Anatolian Studies 49: 153-157.

SAGONA, C., 1999. "An Archaeological Survey of the Erzurum Province, 1999: The ZONE of Pasinler" Ancient Near Eastern Studies Vol.XXXVI:108-131, Melbourne University

Salur, A. & Kıyak, S. 2007. Additional records for the Odonata fauna of South-Western Anatolia - Part I: Anisoptera. Munis Entomology & Zoology 2 (1): 63-78

Salur, A. & Kıyak, S. 2007. Additional records for the Odonata fauna of South-Western Anatolia - Part II: Zygoptera. Munis Entomology & Zoology 2 (2): 499-510

Salur, A. and Kıyak S. 2006. Additional Records for the Odonata Fauna of East Mediterranean Region of Türkiye. Mun. Ent. Zool., 1, 239-252.

Salur, A., Kıyak, S., 2000a. On the systematic and faunistic studies of Anisoptera species (Insecta: Odonata) of Kızılırmak river basin (Kayseri province). Journal of Institute of Science and Technology of Gazi University, 13 (3), 829-841.

Salur, A., Kıyak, S., 2000b. On the systematic and faunistic studies of Zygoptera species (Insecta: Odonata) of Kızılırmak river basin (Kayseri province). Journal of Institute of Science and Technology of Gazi University, 13 (3), 843-854.

Salur, A., Özsaraç, Ö., 2004. Additional Notes on The Odonata Fauna of Çiçekdagı (Kırsehir), Türkiye. G.U. Journal of Science, 17 (1), 11-19.

ŞENYURT, S.Y., 2005. "Bakü-Tiflis-Ceyhan Ham Petrol Boru Hattı 2004 Yılı Arkeolojik Kurtarma Kazısı Çalışmaları", İdol 22 (2004): 16-20.

ŞENYURT, S.Y., 2006. "BTC Ham Petrol Boru Hattı Arkeolojik Kurtarma Kazıları", Cumhuriyet Bilim Teknoloji 1008 (14 Temmuz 2006): 16-17.

ŞENYURT, S.Y., 2007, "Bakü-Tiflis-Ceyhan Ham Petrol Boru Hattı Projesi Tetikom Huyuk (Erzurum) Kurtarma Kazısında Açığa Çıkarılan Orta-Geç Demir Çağı Mezarları", İdol 27 (2006): 10-14.

ŞENYURT, S.Y., 2008.Büyükardıç. Doğu Anadolu'da Bir Erken Demir Çağı Tepe Yerleşmesi / Büyükardıç. An Early Iron Age hilltop Settlement in Eastern Anatolia. Gazi Üniversitesi Arkeolojik Çevre Değerleri Araştırma Merkezi, Bakü-Tiflis-Ceyhan Ham Petrol Boru Hattı Projesi Arkeolojik Kurtarma Kazıları Yayınları: 2 / Gazi University Research Centre for Archaeology, Baku-Tbilisi-Ceyhan Crude Oil Pipeline Project Publications of Archaeological Salvage Excavations: 2, Ankara, 2006.

SEVIN, V., 2007. Anadolu'nun Tarihi Coğrafyası I, TTK Yayınları, Ankara.

STRABON (Çev. A Pekman), 2005. Geographika – Antik Anadolu Coğrafyası XII. Arkeoloji ve Sanat Yayınları, İstanbul.

Swaay C. V. ve Warren M.S. 1999. Red Data Book of European Butterflies (Rhopalocera).

The United Nations Environment Programme Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). [Online]. http://www.cites.org/eng/resources/species.html [November 28, 2014].

Türkiye Arkeolojik Yerleşmeleri I. Palelotik-Epipaleolitik, Ege Yayınları, İstanbul 1996.

Türkiye Arkeolojik Yerleşmeleri II. Neolitik I, Ege Yayınları, İstanbul 1997.

Türkiye Arkeolojik Yerleşmeleri II. Neolitik II, Ege Yayınları, İstanbul 1997.

Türkiye Arkeolojik Yerleşmeleri III. Kalkolitik, Ege Yayınları, İstanbul 1998.

Türkiye Arkeolojik Yerleşmeleri IV a- IV b. Erken Tunç Çağı, Ege Yayınları, İstanbul 2002.

Türkiye Arkeolojik Yerleşmeleri VI. Demir Çağı, Ege Yayınları, İstanbul 2008.

Türkiye İstatistik Kurumu (TÜİK)

ULAŞTIRMA VE ALTYAPI BAKANLIĞI (2019) 2018 Yılı Faaliyet Raporu, https: //www.uab.gov.tr/uploads/pages/butce-raporlari/2018-idare-faaliyet-raporu.pdf

ÜNSAL V., 2008. "III. Binde Kuzey Doğu Anadolu'' Uluslararası Sosyal Araştırmalar Dergisi 3: 396-410

URL 2: http://www.butterflies-moths-Türkiye.com/

URL 3: http://www.keybiodiversityareas.org/

Yiğit, N., Çolak, E., Sözen, M. and Karataş A., 2006. Rodents of Türkiye: Türkiye Kemiricileri. Editor: Demirsoy, A., Meteksan Yayınevi, Ankara. 154 pp.