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MINISTRY OF TRANSPORT
AND INFRASTRUCTURE

AYGM
Altyapı Yatırımları Genel Müdürlüğü

ÇINAR®
ENGINEERING
CONSULTANCY INC.



FİLYOS PORT AND INDUSTRIAL ZONE RAILWAY CONNECTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

CNR-ZNG-ESIA-002
Final

Official Use Only

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ABBREVIATIONS & DEFINITIONS

ABPRS	Address-Based Population Registration System
AFAD	Ministry of Interior Disaster and Emergency Management Presidency
AMP	Aggregate Management Plan
ANFO	Ammonium nitrate / fuel oil
AoI	Area of Influence
AQI	Air Quality Index
BMP	Biodiversity Management Plan
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
ÇAYORSAN	Çaycuma Organized Industrial Zone
CBD	Convention on Biological Diversity
CCTV	Closed Circuit Television
CHA	Critical Habitat Assessment
CHA-BMP	Critical Habitat Assessment and Biodiversity Management Plan
CHMP	Cultural Heritage Management Plan
CHS	Community Health and Safety
CHSMP	Community Health and Safety Management Plan
CIA	Cumulative Impact Assessment
CIMER	Presidency's Communication Center
CIMP	Construction Impacts Management Plan
ÇINAR	Çınar Engineering Consultancy Inc.
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	Community Liaison Officer
CLRTAP	Convention on Long Range Transboundary Air Pollution
CMS	Conservation of Migratory Species of Wild Animals
CPI	Consumer Price Index
CRMP	Community Relations Management Plan
ÇTSO	Çaycuma Chamber of Commerce
DCoM	Decision of Council of Ministers
DGII	Directorate General of Infrastructure Investments
DNP	Defect Notification Period
DPT	State Planning Organization
DSİ	State Hydraulic Works
DSM	Deep Soil Mixing
EAF	Environmental Impact Assessment Application File
EAFZ	Eastern Anatolian Fault Zone

EC	European Commission
e-ÇED	Online Environmental Impact Assessment Evaluation System
EEC	European Economic Community
EHS	Environmental, Health, and Safety
EHSG	Environmental Health and Safety Guidelines
EIA	Environmental Impact Assessment
EOOE JV	Supervision Consultant of the Project
EPRP	Emergency Preparedness and Response Plan
EPTISA	Leader of the Project
ESCP	Environmental and Social Commitment Plan
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMAP	Energy Sector Management Assistance Program
ESMP	Environmental and Social Management Plan
ESSs	Environmental and Social Standards
ETP	Employment and Training Plan
EU	European Union
EUNIS	European Nature Information System
EUROBATS	Agreement on the Conservation of Populations of European Bats
FAO	Food and Agriculture Organization of the United Nations
FI	Financial Intermediaries
FRS	Farmer Registration System
FUND	International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage
GBV	Gender Based Violence
GDCRN	General Directorate of Civil Registration and Nationality
GDP	Gross Domestic Product
GEF	Global Environment Fund
GHG	Green House Gas
GIIP	Good International Industry Practices
GIS	Geographical Information System
GISP	Global Invasive Species Programme
GRIIS	Global Register of Introduced and Invasive Species
GM	Grievance Mechanism
GRS	Grievance Redress Service
HDPE	High-Density Polyethylene
HEPP	Hydroelectric Power Plant
HSE	Health, Safety, and Environment

IAIA	International Association for Impact Assessment
IAS	Invasive Alien Species
IBA	Important Bird and Biodiversity Areas
ICH	Intangible Cultural Heritage
IEA	International Energy Agency
IEMA	Institute of Environmental Management and Assessment
ILO	International Labour Organization
IPA	Important Plant Areas
IPF	Investment Project Financing
ISCED	International Standard Classification of Education
IUCN	The International Union for Conservation of Nature
JEMIRKO	Türkiye Geological Heritage Protection Association
KBAs	Key Biodiversity Areas
KGM	General Directorate of Highways
KOERC	Kandilli Observatory and Earthquake Research Centre
KP	Kilometer Point
KVKK	The Law on Protection of Personal Data
LAUs	Local Administrative Units
LM Plan	Labor Management Plan
LMC	Last-Mile Infrastructure Connectivity
LMP	Labor Management Procedures
LPI	Logistics Performance Index
LRP	Livelihood Restoration Plan
LTV	Long Term Limit Value
LUC	Land Use Capability
MEG	Monoethylene Glycol
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MoM	Minutes of Meetings
MoTI	Ministry of Transport and Infrastructure
MTA	Mineral Research and Exploration General Directorate
NAFZ	North Anatolian Fault Zone
NGOS	Non-Governmental Organizations
NPAA	National Programmes for the Adoption of the European Union Acquis
NUTS	The Nomenclature of Territorial Units for Statistics
O.G.	Official Gazette
OHS	Occupational Health and Safety
OHSMP	Occupational Health and Safety Management Plan
OIZ	Organized Industrial Zone

PAH	Project Affected Household
PAP	Project Affected Parties
PDO	Project Development Object
PDoEUCC	Provincial Directorate of Environment, Urbanization and Climate Change
PIF	Project Introduction File
PIU	Project Implementation Unit
PMT	Project Management Team
PPE	Personal Protective Equipment
PPP	Pollution Prevention Plan
RP	Resettlement Plan
RCIAP	Regulation on the Control of Industrial Air Pollution
REZ	Renewable Energy Zones
RLE	IUCN Red List of Ecosystems
RLIP	Rail Logistics Improvement Project
RWIHC	Regulation on Water Intended for Human Consumption
SASF	Social Assistance and Support Foundation
SCADA	Supervisory Control and Data Acquisition
SEA	Sexual Exploitation and Abuse
SEA / SH	Sexual Exploitation and Abuse / Sexual Harassment
SEP	Stakeholder Engagement Plan
SGFDP	Sakarya Gas Field Development Project
SH	Sexual Harassment
SHA	Sexual Harassment and Abuse
SHW	State Hydraulic Works
SIA	Social Impact Assessment
SME	Small and Medium Enterprises
SNH	Scottish Natural Heritage
SPT	Standard Penetration Test
STV	Short Term Limit Value
SWQR	Surface Water Quality Regulation
TCDD	Directorate General of Turkish State Railways
TEPAV	The Economic Policy Research Foundation of Türkiye
TEU	Twenty-foot Equivalent Unit
TINA	Transport Infrastructure Needs Assessment
TL	Turkish Lira
TPAO	Turkish Petroleum Corporation (Türkiye Petrolleri Anonim Ortaklığı)
TPH	Total Petroleum Hydrocarbons

TP-OTC	Turkish Petroleum – Offshore Technology Center
TR	Republic of Türkiye
TTK	Türkiye Hard Coal Authority
TTMP	Traffic (Transportation) Management Plan
TurkStat	Turkish Statistical Institute
TVOCs	Total Volatile Organic Compounds
UGWL	Underground Water Level
UK	United Kingdom
UN	United Nations
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VESC	Valued Environmental and Social Components
WB	World Bank
WBG	World Bank Group
WHO	World Health Organization
WMP	Waste Management Plan
WPCR	Turkish Water Pollution Control Regulation
WWTP	Wastewater Treatment Plant
YIMER	Foreigners Communication Center
ZONÇEB	Zonguldak Special Administration and Municipalities Environmental Infrastructure Services Association

APPENDICES

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Appendix-12	Photographs taken during the interviews

EXECUTIVE SUMMARY

The Filyos Port and Industrial Zone Railway Connection Project ("Filyos Sub-project" or "the Project") route is planned in an area located within the borders of Filyos, in the Çaycuma District of Zonguldak Province. The route begins northwest of Derecikören Village and follows the surrounding natural geographical features, passing to the northeast of Gökçeler Village. Along the route, there are various natural and artificial obstacles, the most significant of which is the Filyos River, which will be crossed by a bridge as part of the project. After crossing the Filyos Industrial Zone and Filyos River, the route continues through the Turkish Petroleum Corporation (TPAO) facilities and extends to the end of the eastern quay of Filyos Port.

The World Bank's Board of Executive Directors approved a loan for the Türkiye Rail Logistics Improvement Project (RLIP) on 30.06.2020. The project is implemented by the Ministry of Transport and Infrastructure (MoTI) through its Directorate General of Infrastructure Investments (DGII), aims to increase rail freight efficiency in Türkiye by improving last-mile infrastructure connectivity (LMC), enhancing the operational efficiency of rail-enabled logistics centers, and strengthening institutional capacity in the rail intermodal and freight logistics sector. Filyos Sub-project is one of the sub-projects covered within the scope of RLIP.

The risk classification of the project is "Substantial" according to the World Bank Environmental and Social Framework (ESF). As a result, although the sub-projects have an exemption on Environmental Impact Assessment (EIA) according to the national legislation, an Environmental and Social Impact Assessment (ESIA), Resettlement Plan (RP), Stakeholder Engagement Plan (SEP), and Environmental and Social Management Plan (ESMP) have been prepared in compliance with the World Bank Environmental and Social Framework, and Environmental and Social Standards (ESSs) for the Project. Furthermore, additional 12 sub-management plans were prepared for the Project as part of the ESMP:

- Construction Impacts Management Plan (CIMP),
- Community Health and Safety Management Plan (CHSMP),
- Community Relations Management Plan (CRMP),
- Employment and Training Plan (ETP),
- Aggregate Management Plan (AMP),
- Traffic (Transportation) Management Plan (TTMP),
- Cultural Heritage Management Plan (CHMP),
- Pollution Prevention Plan (PPP),
- Waste Management Plan (WMP),
- Emergency Preparedness and Response Plan (EPRP),
- Occupational Health and Safety Management Plan (OHSMP), and
- Critical Habitat Assessment and Biodiversity Management Plan (CHA-BMP).

The Labor Management Procedures (LMP) have also been prepared for the Project, and the Contractor will prepare a Labor Management Plan in compliance with this procedure.

DGII is a public institution affiliated to the MoTI with a special budget for finance to realize this project. The roles and responsibilities of DGII comprises i.a. to prepare and approve the plans and projects of railways, logistic villages, centers or bases, ports, shelters, coastal structures, airports to be built by the state and to construct and/or be handed over these transportation infrastructures. The Project will be handed over to General Directorate of Turkish State Railways (TCDD) after the completion of construction. TCDD will include the Project in its environmental and social management system within the scope of railway management.

With the Project Implementation Unit (PIU) established within DGII, the Construction Contractor, 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

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and natural resources within the scope of the ESMP, by taking consultancy both from within its organizational structures and by obtaining consultancy from outside.

DGII Expropriation Department will be the main authority in the preparation of the expropriation plans and the realization of the expropriation process.

Mitigation measures and monitoring plans are defined in Environmental and Social Monitoring Plan of this project.

The Contractor undertakes to receive consultancy service from the following experts regarding the implementation of the management controls determined within the scope of the Environmental and Social Monitoring Plan of this project, when necessary:

- Environmental Experts
- Cultural Heritage Specialists
- Ecological / Biological Experts
- Soil / Landscape Experts
- Social / Stakeholder Relations Specialists
- Environmental and Social Trainers

A contract was signed between DGII and ÇINAR Engineering Consultancy Inc. (ÇINAR) in December 2019, for preparing the ESIA Report together with ESMP and the above listed sub-management plans of the Project according to the World Bank standards. The ESIA site studies were completed by ÇINAR in January and February 2020, and the ESIA Reports were disclosed in May 2020. The mentioned activities are defined as Phase-1 of the Project. During Phase-1 studies, environmental, social, and culturally sensitive areas in the project impact area were specified in the ESIA reports, and mitigation measures were proposed.

Within the framework of the Environmental and Social Commitment Plan (ESCP), the whole ESIA package is being revised and updated in line with the World Bank standards, where necessary, and this process is mentioned as Phase-2 of the Project. Therefore, the railway route was revised according to items specified in ESCP, and the studies and measurements that could not be performed due to the seasonal restrictions were carried out at Phase-2.

During Phase 1, the project was designed to include approximately 12 km of railway and 4.5 km of highway, to operate in an integrated manner with the railway for transportation purposes. During Phase-2 of the Project, the railway line was revised based on the commitments and issues outlined in ESCP, and stakeholders' suggestions and requests.

The project line begins at the Gökçeler Station on the Irmak-Zonguldak Railway line. As a result of improvement works, the station area has been expanded to a total of five tracks, with four additional tracks added next to the existing one. Additionally, the Gökçeler Station, located between KM=0+000 and KM=1+200, includes a 300-meter-long loading ramp for the industrial area to the right of the station, allowing it to utilize the railway line, as well as a platform building for passenger transportation.

After the station area, the project route continues as a double track alongside the existing line, heading northwest from KM=1+200, with the second track added to the right of the existing line. The route becomes a double track at the M12 switch located at KM=1+427. In this section, the project elevation has been designed at an altitude of 6.670 meters, with a vertical grade of ‰0.000, extending to KM=2+630.

Between KM=2+200 and KM=3+100, the project route diverges from the existing line and turns northeast with a horizontal curve of 350 meters in radius. Vertically, the route ascends with a grade of ‰7.804 to cross the Filyos River. In this section, the project elevation rises from 6.670 meters to 11.000 meters. Two circular vertical curves, each with a radius of 20,000 meters, have been used in the design of the vertical alignment.

In the continuation of this section, the Filyos River Bridge, which is 387.50 meters long and consists of 12 spans, has been designed between KM=3+359.420 and KM=3+746.920. The

bridge is aligned with both the horizontal and vertical alignments. This bridge enables the project route to cross from the south bank to the north bank of the Filyos River at a hydraulically appropriate height.

Immediately after the bridge, the route enters the Individual Investment Zone, owned by TPAO. In this section, a 74-meter-long Pipe Crossing Railway Bridge has been designed between KM=3+849 and KM=3+923 to prevent filling over the safe approach boundaries indicated by TPAO, where critical infrastructure related to the operation of the facility (including natural gas pipelines, Monoethylene Glycol (MEG) pipeline, umbilical pipeline, High-Density Polyethylene (HDPE) water recovery line, and electric and fiber optic cable lines) is located. This bridge ensures the safety of these infrastructures and facilitates their maintenance. All work within the TPAO area has been conducted in accordance with the conditions requested by TPAO.

Along with the mentioned bridge, the project elevation descends from 11.000 meters to the port area elevation of 3.500 meters with a vertical grade of 7.200‰. In the design of the vertical alignment, two circular vertical curves, each with a radius of 20,000 meters, have been used once again.

In the section following the bridge, the horizontal project alignment is positioned between the existing diversion canal and the internal port access roads, facilitated by a horizontal curve with a 400-meter radius between KM=4+050 and KM=4+250. Continuing in the northeast direction, the project line aligns with the southern port area via a horizontal curve with a 350-meter radius between KM=4+720 and KM=5+030. From KM=4+950 to the end of the project, the railway will be constructed as slab track.

Finally, the project line terminates at KM=6+685.908.

To facilitate future expansion of the project, connections to the West Pier and East Pier will be established through the design of the M15 switch at KM=4+650 and the M16 switch at KM=5+068, respectively.

The connection line within the project is designed as a double track with a total length of 6,685.5 meters. Of this, 1,735.5 meters will be constructed as slab track (concrete-based rail system). At Gökçeler Station, a total of 3,021 meters of additional track will be added, along with a 393-meter-long track designed for planned future quay extensions, bringing the total rail length to 16,785 meters. The operational speed of the line is set at 50 km/h.

The main works to be carried out within the scope of the project are as follows:

- A station with a 300-meter-long loading platform and associated structures, with a total length of 1,280 meters.
- 17 units of 1/9 switches.
- 1,735.5 meters of slab track construction for the Filyos Port Area.
- 4 box culverts, each 2.00x2.00 meters, totaling 207.63 meters in length.
- 1 box culvert, 10.00x5.00 meters, with a total length of 16.65 meters.
- 1 underpass, 12.00x5.00 meters, with a total length of 30.77 meters.
- 1 Filyos River Railway Bridge, 387.50 meters long.
- 1 Pipe Crossing Railway Bridge, 74.00 meters long.

Defining an Area of Influence (AoI) for a railway project in line with World Bank Group (WBG) ESSs involves a comprehensive and systematic assessment of potential impacts on the surrounding environment and communities. The study corridor defined for Filyos subproject consists of 500 m corridor extending each side of the proposed route, based on the assumption that the project facilities will remain within this corridor. The project's AoI can be revised and enlarged due to other separate Project facilities to be constructed, if necessary.

There is an official letter numbered 81195450-220.03-E.43932 (see Appendix-2) from Ministry of Environment and Urbanization (former Ministry of Environment, Urbanization and Climate

Change) stating that the Project is not included in the Annex-1 and Annex-2 of EIA Regulation as all the lines are junction and/or connection lines. However, it is also stated in the letter that the EIA evaluation process should also be conducted by Zonguldak Governorship Provincial Directorate of Environment, Urbanization and Climate Change via Online EIA Evaluation System (e-ÇED). Therefore, EIA Exemption letter should be obtained from Zonguldak Governorship Provincial Directorate of Environment, Urbanization and Climate Change prior to the commencement of construction activities.

During the construction phase of the Project, the construction activities on the railway routes and material supply activities from the quarries will be the potential sources of noise. During the operation phase of the Project, the movement of the freight trains will be the main potential source of noise. The noise modeling studies have been carried out for both the construction and operation phases. During the construction phase of the Project, the significance of the impact resulting from the increase in noise levels is assessed to be minor and after the proposed mitigation measures, the residual impact significance will be negligible. During the operation phase, the significance of the impact resulting from the increase in noise levels is assessed to be major and after the proposed mitigation measures, the residual impact significance is expected to be moderate.

Noise monitoring will be conducted during the operation phase as part of the environmental monitoring plan. Specifically, noise measurements will be undertaken quarterly during the first year of operation, and subsequently once every two years. In addition, noise and vibration monitoring will be conducted in response to any grievances received through the Grievance Mechanism.

If the monitoring results indicate that the noise levels exceed the applicable threshold values, additional mitigation measures will be implemented. These may include the installation of physical noise barriers such as sound walls or acoustic fencing, as well as the use of natural barriers like berms or vegetation. Furthermore, operational adjustments (e.g., speed restrictions), track maintenance, and the use of noise-reducing track materials (such as resilient rail pads) will also be considered to minimize noise and vibration impacts. All measures will be reviewed and implemented by TCDD in coordination with relevant stakeholders and in alignment with the mitigation hierarchy.

The potential impacts on ambient air quality during the construction phase of the Project will be due to the dust emissions that would result from the excavation and cut and fill works, material storage, unloading and transportation processes to be carried out through the construction works of the Project. During the construction phase of the Project, the significance of the impact resulting from the decrease in air quality is minor and after the proposed mitigation measures, the residual impact significance is negligible at all receptors. Since the railways will be electrified in terms of the traction system during the operational phase of the Project, the potential impacts on air quality are considered negligible.

During the construction phase of the Project, there will be no water use other than the drinking and utility water use of 200 Project personnel and moistening water to be used for minimizing uncontrolled dust emissions. Since there is no wastewater (sewage) system in the field of activity and its immediate surroundings, wastewater generated due to the construction activities will be collected in a 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 tanks 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 wastewater infrastructure system.

Drinking and utility water will be needed at the stations for the staff and visitors during the operation phase. No surface water and groundwater resources will be used during the operation phase. The domestic wastewater to be generated during the operation phase will be collected in septic tanks to be built at the stations and will be transmitted to the nearest

wastewater treatment plant with the sewage trucks of the relevant municipality. In addition to the domestic wastewater to be generated during the operation phase, there will be industrial effluents due to rail car maintenance and refurbishment activities.

Resource use for the Project will primarily be significant during the construction phase, which will require substantial quantities of construction materials such as aggregate, basalt, granite, gabbro, and limestone. Material borrow pits and quarries will be used to supply the Project's construction material requirements throughout the construction activities. During the operation phase, procurement of materials would be required for the maintenance and repair works to be conducted on the railway and associated structures.

The daily activities of the personnel will result in production of various types of non-hazardous and hazardous wastes during the construction phase of the Project. The load that could be added to the existing waste disposal infrastructure capacity by the Project would be negligible during the construction phase. During the operation phase, maintenance of the Project components including railway connection lines, stations and underpasses, overpasses and bridges and their use by the staff and visitors will result in waste generation. No intensive waste generation is expected during the operation phase. Solid wastes to be generated at the stations will be collected through the solid waste collection trucks of the relevant Municipalities from the collection areas that will be located during the operation period and taken to the municipal solid waste storage facilities.

No endemic or threatened species were found in the route and impact area during the biological surveys carried out as part of the project's scope. The proposed line predominantly traverses modified habitats, and most of the area is primarily designated for and is generally used for industrial purposes, and therefore, the construction works are not expected to have a significant impact on the biological environment. The construction of the Filyos River Railway Bridge is not expected to cause significant environmental impacts, as the works are temporary and localized. Potential effects such as increased turbidity, noise, and habitat disturbance will be short-term and mitigated through the implementation of standard construction best practices, including sediment control and restricted in-water works. Overall, with the proposed mitigation measures in place, no long-term or significant adverse impacts on the river ecosystem are anticipated.

In the cultural heritage impact assessment studies conducted during Phase-1 of the Filyos Port and Industrial Zone Railway Connection Project, it was realized that two (2) registered archaeological sites were located within the railway project expropriation border and impact corridor (These sites are Sazköy 3rd Degree Archaeological Site, and Öteyüz 1st and 3rd Degree Archaeological Sites). Since the railway route has been revised in the Phase-2, these areas are excluded and outside of the project expropriation boundary.

The revised design of the railway was also approved by Karabük Regional Council for the Conservation of Cultural Property with an official letter dated 10.07.2023 and numbered 3944694. For all kinds of projects, revisions and similar applications to be done in Sazköy 3rd Degree Archeological Site and its surroundings, it is necessary to consult Karabük Regional Council for the Conservation of Cultural Property as dictated by the law numbered 2863, and the decisions of the preservation committee should be followed in all phases of the project.

Another registered archaeological site that may be affected by the project activities in Filyos Sub-project is Öteyüz Neighbourhood 1st and 3rd Degree Archaeological Site. The project route near the Öteyüz 1st and 3rd Degree Archaeological Site was also approved by Karabük Regional Councils for the Conservation of Cultural Property with the aforementioned official letter.

In the cultural heritage impact assessment studies conducted during Phase-1 of the Filyos Port and Industrial Zone Railway Connection Project, it was found that two (2) registered archaeological sites were located within the railway project expropriation border and AoI (These sites are Sazköy 3rd Degree Archaeological Site, Öteyüz 1st and 3rd Degree

Archaeological Sites). Since the railway route has been revised in Phase-2, these areas are excluded and located outside of the project expropriation boundary. At the current situation, these sites are in the project AoI.

Therefore, all excavation, stripping, filling, splitting, etc. activities to be conducted inside the project construction borders are recommended to be conducted under the supervision of an archaeologist. When planning auxiliary activities for the project, such as opening up the access roads for the project, determining the locations of borrow pits and quarries, creating excavation material storage sites, the protection borders of registered archaeological site should be taken into account and any intervention to the site should be avoided.

Another registered archaeological site located in the vicinity of the project route is Tios (Tium, Tieion) Ancient City and Tios (Tium, Tieion) Necropolis Site. Tios (Tium, Tieion) Ancient City is outside the area of influence. Tios (Tium, Tieion) Necropolis Site is inside the area of influence.

Hence, it is required that the part of project construction site which are close to Tios (Tium, Tieion) Necropolis Site should be considered as areas that require “archaeological survey” in terms of cultural heritage.

When the general assessment of potential negative impacts of the project on the identified areas was reviewed, it was determined that the impacts of the Filyos Sub-project on the cultural areas was identified as “Neutral”. There was no negative general impact of the project construction activities in two (2) areas located in Filyos Sub-project area and project impacts on archaeological sites were minimized as a result of revisions done in the project design.

Following the determination of the project route within Phase 2, a social impact assessment field study was conducted in February 2025 to identify the socio-economic impacts of the project along with the effects of land acquisition. In addition, studies have also been conducted within the scope of the Resettlement Plan (RP). Details of the studies are given in RP.

The social Area of Influence (AoI) comprises the settlements (Derecikören, Gökçeler, and Sazköy within the Çaycuma District of Zonguldak Province, as well as the Sefercik settlement in the Filyos town of the same district) in which the 36 parcels located within the expropriation corridor, determined for the project’s land requirements, are situated. These areas are considered to be directly affected by physical and economic resettlement impacts. A RP has been prepared for the areas subject to land acquisition, and a separate study (census, asset inventory and valuation) has been conducted within this scope.

The settlements (Öteyüz and Aşağıihsaniye) that are not located within the expropriation corridor but are situated along the original project route (Phase 1) and have limited interaction with the project’s environmental and social impacts.

Summarized evaluation of social impacts of the project can be listed as the following;

- No labor influx of a scale that would affect the population size of the region is anticipated. Therefore, no observable impact is expected on permanent population movements. Due to the region's already high level of industrialization and the integration of industrial areas with rural areas, a stable structure has been established regarding accommodation, and other types of services. However, seasonal (temporary) population movements are likely to be triggered. During the peak periods of the construction phase, this seasonal mobility will increase.
- The purchase of goods and services from local businesses will have a positive impact on economic growth and create employment opportunities over the construction period by creating new businesses and jobs that serve the needs of construction activities and the workforce.
- An indirect labor flow is expected to occur due to the acceleration of urbanization and the opening of new investments.

  - In the finalized project route, 36 parcels will be subject to land acquisition within the scope of Phase 2, as opposed to the 471 parcels found to be affected in the original alignment in Phase 1.
- A total of 36 parcels are included in the land acquisition plan. Of these, 18 parcels are privately owned, 13 belong to the Treasury, and 5 are owned by TCDD. All privately owned parcels are located in Gökçeler, while the Treasury and TCDD parcels are situated in Derecikören, Sefercik, and Sazköy. The 18 privately owned parcels have a total of 102 owners.
- Of the 13 treasury parcels, 11 are located within the boundaries of TPAO and Filyos Port, and since these lands are located within the security zone, no area is available for private use. No official or unofficial users have been identified for the remaining seven public parcels (five TCDD and two Treasury parcels).
  - The role of agriculture and livestock among livelihood sources has declined due to industrial investments in the region. In the region, agricultural lands have decreased due to the pressure from industrial areas (TPAO, Organized Industrial Zone, etc.). Most agricultural and grazing areas have been allocated to these industrial areas. In addition, floods from the Filyos River have reduced the productivity of agricultural lands. Consequently, there has been an increased tendency towards agricultural activities that can be conducted on smaller areas, such as fruit tree cultivation, rather than activities requiring large-scale agricultural lands.
  - The cumulative impact of the existing highway (67-01), railway, ongoing tunnel construction, TPAO, the free zone, Filyos Port, and Organized Industrial Zone (OIZ) area has reinforced negative perceptions regarding public projects and land acquisition processes. The fact that many users leave their land fallow is also related to these experiences. Past expropriations that resulted in reduced parcel sizes, compensation set below market value, and delayed payments have weakened the connection between landowners and their land, and undermined the confidence in future projects.
- The direct impact on livelihoods is limited for the privately owned parcels affected by the Project, as these lands are suitable only for garden and tree cultivation due to their location and size, and their income-generating potential is low. On 17 of these private parcels, 14 individuals have been identified as actual users. Information could not be obtained for one private parcel as it is currently subject to litigation.
- For public parcels, no formal or informal users have been identified.
- Structures belonging to affected private landowners consist solely of garden structures and storage-type or idle assets. Measures to address the loss of these assets are defined within the RP under the Livelihood Restoration Plan (LRP). Similarly, measures concerning the loss of publicly used structures, such as station buildings located on public parcels, are also specified in the RP. In summary, no significant impact has been identified as a result of the loss of either the land or the assets on it.
- None of the lands subject to the expropriation plan are officially designated as pastures or grazing areas. No areas suitable for grazing were identified on either private or public lands. Many areas are unsuitable for animal passage due to barriers separating the parcels from the road. Other areas mostly extend as narrow corridors along the sides of the railway. These sites, which are open to active passenger and freight train traffic, are also not safe for pedestrian or animal passage.
- On the other hand, these areas are covered with dense shrub vegetation. This natural barrier renders pedestrian and animal passage across the lands impossible. The two plots numbered 124/2 and 105/43, which belong to the Treasury, could not be accessed due to dense vegetation cover.
- Although no access issues were identified for the private parcels, temporary restrictions may occur in these areas during construction activities. This situation should be taken into consideration with regard to community health and safety.

- To the west of the expropriation corridor, bridge and viaduct works related to the ongoing road project[1] on the opposite side of the highway[2] are continuing. These activities, located at the beginning of the internal road of Gökçeler village, have increased traffic density on the highway. In the mentioned section of the road, there is also an active construction site and excavation area. This area contributes to additional construction machinery traffic. The single-lane road has become even more congested due to existing vehicle traffic and construction machinery. These conditions also pose risks for animal crossings. Consequently, suitable and safe areas for pedestrian and animal passage along both sides of the highway are very limited.
- Among the opinions received on livelihood restoration, it has been suggested that the local population be included in programs such as agriculture and livestock.
- While some of the local population sees the investment in the railway as a solution and alternative to the region's transportation problems, others view it as an investment that further complicates access to the port and maritime areas.
- In the context of participation in information-sharing processes, the groups defined as vulnerable under the SEP are female heads of household, elderlies, people with handicapped, including home bound, bedridden individuals, and illiterates. These groups are also considered vulnerable in terms of environmental & social and Community Health and Safety (CHS) impacts. In addition to this assessment, individuals who have experienced a loss of more than 10% of their land due to land acquisition (Significantly Affected People) and those who actual users without land ownership have also been classified as vulnerable groups.

Once the final versions of the Project documents (ESIA, ESMP, RP and SEP) are finalized, they will be disclosed to the stakeholders with the aim of informing them about the possible environmental and social impacts of the Project and the respective measures/compensations defined for these impacts of the Project while receiving their feedback to consider during the final revisions of the Project documents.

[1] Kilimli-Filyos-Saltukova Dual Carriageway Project (ongoing) / https://www.bahadirgrup.com.tr/project/caycuma-bartin-ayr-hisaronu-zonguldak-yolu-ongermeli-kiris-yapim-isi/

[2] Saltukova-Kilimli Road, Control Section No. 67-01

1 INTRODUCTION

Among Türkiye's transportation investments, railways are the most substantial infrastructures, as highlighted by the 12th Development Plan[3] (2024-2028) prepared by the Republic of Türkiye Presidential Directorate of Strategy and Budget. The main purpose, in terms of railway transportation, is to enhance the efficiency, capacity, and safety of the railway system. This includes increasing the proportion of electrified and signaled railway lines, promoting the use of domestic means for designing and manufacturing rail system vehicles, and boosting the localization rate of critical components. The plan aims to advance the research and development, design, and production capabilities of the domestic industry, and to ensure comprehensive maintenance and repair of rail system vehicles and their sub-components, thereby contributing to the overall modernization and development of the railway transportation infrastructure in Türkiye.

During the 11th Development Plan period (2019-2023), studies were carried out to increase effectiveness and efficiency in transportation and logistics, reduce costs and ensure intermodal integration. The rate of electrified lines in railways has increased to 52 percent and the rate of signaled lines has increased to 58 percent, and significant modernization works are currently continuing. It is stated that the road-based system in freight and passenger transportation continued during the 11th Development Plan period, and that there is still a need to prioritize transportation investments focusing on freight transportation in order to increase road traffic safety, reduce environmental impacts, and transition to railway-connected multi-modal systems.

In this context, the following policies and measures are included in the 12th Development Plan:

- The share of railway freight transportation in manufacturing industry logistics will be increased, and connection lines will be established between production sites, ports, and logistics centers.
- High-speed train projects under construction will be completed, line capacity will be increased in bottleneck regions, and regions with high freight carrying potential will be connected to the railway network.
- Ongoing railway projects for the development of combined transportation opportunities by increasing the share of railways in freight and passenger transportation will be completed, and railway connections of important freight centers such as OIZs, ports and mines will be provided.

Türkiye's logistics objectives covered in the 12th Development Plan are summarized in Table 1.

Table 1. Logistics and Transportation Sector Objectives of Türkiye

Objective	2022	2023	2028
Türkiye's Ranking in the Logistics Performance Index	38	38	25
Share of Railways in Total Freight Transport (Land Transport, %)	5.37	5.76	7.60
Railway line Efficiency (Passenger-Km + Ton-Km) / (Main Line Length)	2.41	2.77	7.0
Cargo Amount Carried by Rail (Billion, Net Ton-Km)	16.6	19.4	40.0
Electrified Line Percentage (%)	48	52	72
Signaled Line Percentage (%)	55	58	80
Connection Line Length (km, Cumulative)	439	439	608
Total Container Handling (Million Twenty-foot Equivalent Unit (TEU))	12.4	12.3	17.4

[3] https://www.sbb.gov.tr/wp-content/uploads/2023/12/On-Ikinci-Kalkinma-Plani_2024-2028_11122023.pdf

Objective	2022	2023	2028
Transit Load Rate in Sea Freight Handling (million tons)	81.0	70.4	89.5
Turkish Commercial Fleet with 1000 GRT and Above Turkish Ownership (Million DWT)	39.1	41.7	57.5
International Airline Total Cargo Traffic (Thousand Tons)	1573	1325	3800

Source: Republic of Türkiye, Presidency of Strategy and Budget, 2023

As it is targeted with the 12th Development Plan, Transport and Logistics Master Plan[4], aims to increase the share of railways in freight transport through improvements in last kilometer connections and strengthening institutional capacity.

According to the Logistics Performance Index (LPI) tool created by the WB to help countries identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve their performance. The LPI data of Türkiye from 2014 to 2023 is presented in Table 2.

When the data of 2018 and 2023 are compared, it can be seen that the overall LPI of Türkiye ranking increased from 47 to 38, and the score increased from 3.15 to 3.4.

Table 2. Logistics Performance Index of Türkiye (2014-2023)

Sub indicators	2014		2016		2018		2023	
	Ranking	Score	Ranking	Score	Ranking	Score	Ranking	Score
Customs	34	3.23	36	3.18	58	2.71	47	3.0
Infrastructure	27	3.53	31	3.49	33	3.21	43	3.4
International Shipments	48	3.18	35	3.41	53	3.06	26	3.4
Logistics Competence	22	3.64	36	3.31	51	3.05	38	3.5
Tracking & Tracing	19	3.77	43	3.39	42	3.23	37	3.5
Timeliness	41	3.68	40	3.75	44	3.63	35	3.6
LPI	**30**	**3.50**	**34**	**3.42**	**47**	**3.15**	**38**	**3.4**

Source: https://lpi.worldbank.org/international/global

1.1 Project Background

The World Bank's Board of Executive Directors approved a loan for the Türkiye Rail Logistics Improvement Project (RLIP) on 30.06.2020. The RLIP is implemented by the Ministry of Transport and Infrastructure (MoTI) through its Directorate General of Infrastructure Investments (DGII), aims to increase rail freight efficiency in Türkiye by improving last-mile infrastructure connectivity (LMC), enhancing the operational efficiency of rail-enabled logistics centers, and strengthening institutional capacity in the rail intermodal and freight logistics sector.

The project development object (PDO) is to reduce transport costs in selected rail freight corridors and to strengthen institutional capacity at the Ministry of Transport and Infrastructure to deliver rail freight connectivity and manage rail-enables logistic centers.

The project is developed around three main components:

- Component 1: Construction of Railway Branch Lines and Multimodal Connections at Priority Network Nodes,

[4] https://www.uab.gov.tr/uploads/pages/bakanlik-yayinlari/20221025-2053-ulastirma-ve-lojistik-ana-plani-tr.pdf

- Component 2: Feasibility studies, detailed engineering designs, environmental and social documentation, and construction supervision for rail last-mile infrastructure connectivity at additional freight nodes,
- Component 3: Phase 2 Covid-19 response support, institutional strengthening, capacity building, and project implementation support.

Within the scope of the 1st Component of the Project for improving railway connections, it is planned to construct a railway connection line to the industrial facilities by Filyos Port and Industrial Zone Railway Connection Project ("the Project" or "Filyos Sub-project"). The main purpose of the Project is to carry out the transportation and distribution of goods arriving at Filyos Port in a safe and cost-effective way within the scope of Filyos Valley Project, which is planned to be built in Çaycuma District of Zonguldak province.

The risk classification of the project is "Substantial" according to the World Bank Environmental and Social Framework (ESF). As a result, although the sub-projects have an exemption on Environmental Impact Assessment (EIA) according to the national legislation; Environmental and Social Impact Assessment (ESIA), Resettlement Plan (RP), Stakeholder Engagement Plan (SEP), and Environmental and Social Management Plan (ESMP) have been prepared in compliance with the World Bank Environmental and Social Framework (ESF), and Environmental and Social Standards (ESSs) for the Project. Also, Labor Management Procedures (LMP) have been prepared for the RLIP, and the Contractor will prepare a Labor Management Plan (LM Plan) in compliance with this procedure.

The World Bank Group (WBG) General Environmental, Health, and Safety (EHS) Guidelines and Industry Sector EHS Guidelines for Railways, Toll Roads, and Electric Power Transmission and Distribution have been applied for the identification of measures to address the Environmental and Social risks. Furthermore, additional 12 sub-management plans were prepared for the project as a part of the ESMP:

- Construction Impacts Management Plan (CIMP),
- Community Health and Safety Management Plan (CHSMP),
- Community Relations Management Plan (CRMP),
- Employment and Training Plan (ETP),
- Aggregate Management Plan (AGM),
- Traffic (Transportation) Management Plan (TTMP),
- Cultural Heritage Management Plan (CHMP),
- Pollution Prevention Plan (PPP),
- Waste Management Plan (WMP),
- Emergency Preparedness and Response Plan (EPRP),
- Occupational Health and Safety Management Plan (OHSMP), and
- Critical Habitat Assessment and Biodiversity Management Plan (CHA-BMP).

A contract was signed between DGII and ÇINAR Engineering Consultancy Inc. (ÇINAR) in December 2019, for preparing the Environmental and Social Impact Assessment Report together with ESMP and the above listed sub-management plans of the Project according to the World Bank standards. The ESIA site studies were completed by ÇINAR in January and February 2020, and the ESIA Reports were disclosed in May 2020. The mentioned activities are defined as Phase-1 of the Project. During Phase-1 studies, environmental, social, and culturally sensitive areas in the project impact area were specified in the ESIA reports, and mitigation measures were proposed.

Within the scope of the Project, there is an Environmental and Social Commitment Plan[5] which sets out material measures and actions, any specific documents or plans as well as timing for each of these. DGII is responsible for compliance with all ESCP requirements, even when implementation of specific measures and actions will be conducted by third parties involved in the Project.

During Phase-2, Çınar Engineering Consultancy Inc. (ÇINAR) has been awarded as a Consultant to carry out the revision studies of environmental and social instruments prepared during Phase-1 period. The Contract was signed between DGII (the Client) and ÇINAR on August 4, 2022. The main purpose of the Phase-2 is to ensure compliance with the items specified in the ESCP.

Within the framework of the Environmental and Social Commitment Plan, the whole ESIA package has been revised and updated in line with the World Bank standards, where necessary, and this process is mentioned as Phase-2 of the Project. Therefore, the railway route was revised considering the issues specified in ESCP, and the studies and measurements that could not be performed due to the seasonal restrictions were carried out at Phase-2.

The comparison of railway design in Phase-1 and Phase-2 is presented in Figure 1 and Figure 2, respectively.

[5] https://aygm.uab.gov.tr/uploads/pages/dunya-bankasi-turkiye-de-demiryolu-lojistigini-gel/environmental-and-social-commitment-plan-escp.pdf

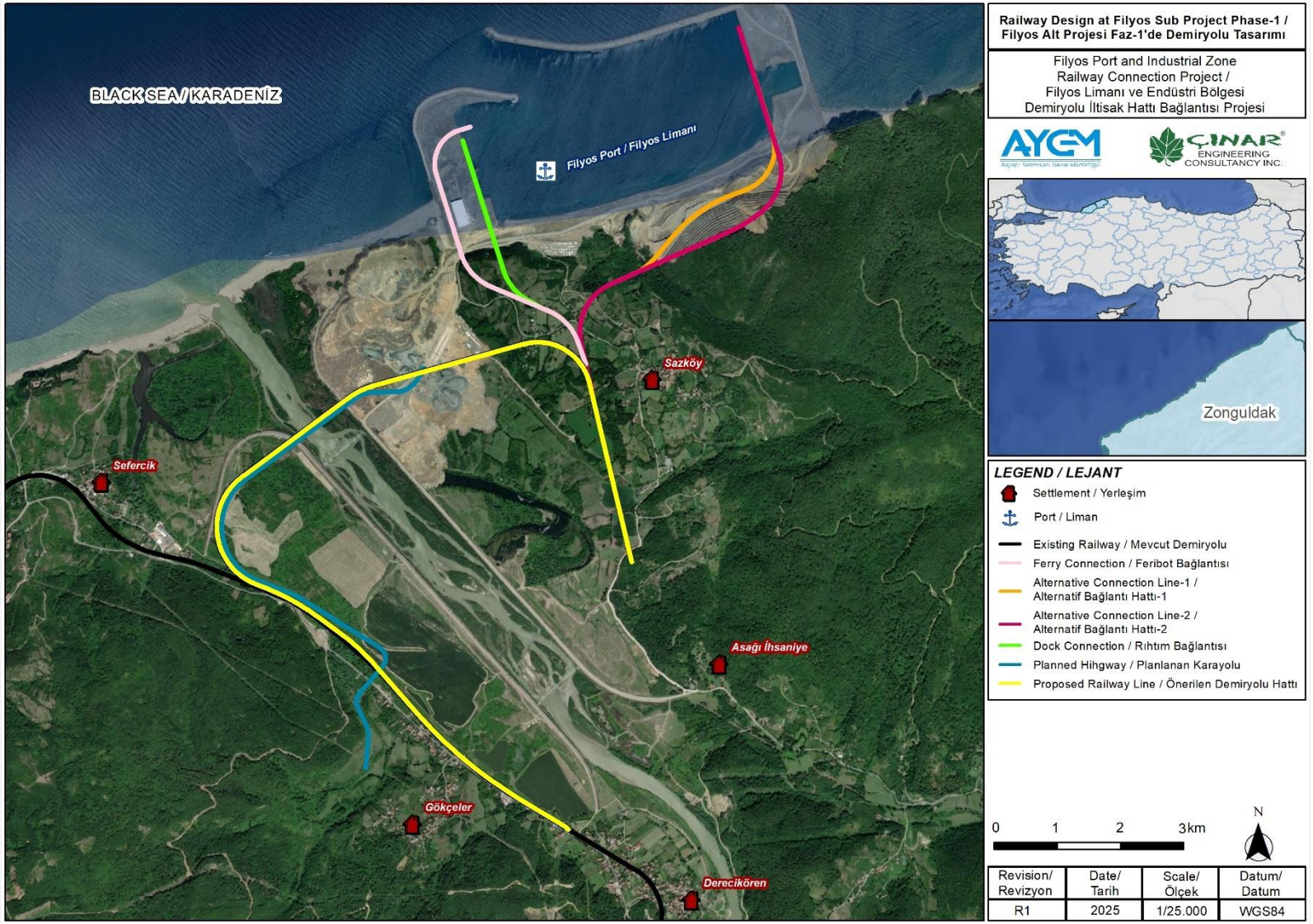


Figure 1. Filyos Sub-Project Railway Design in Phase-1 (Previous Design)

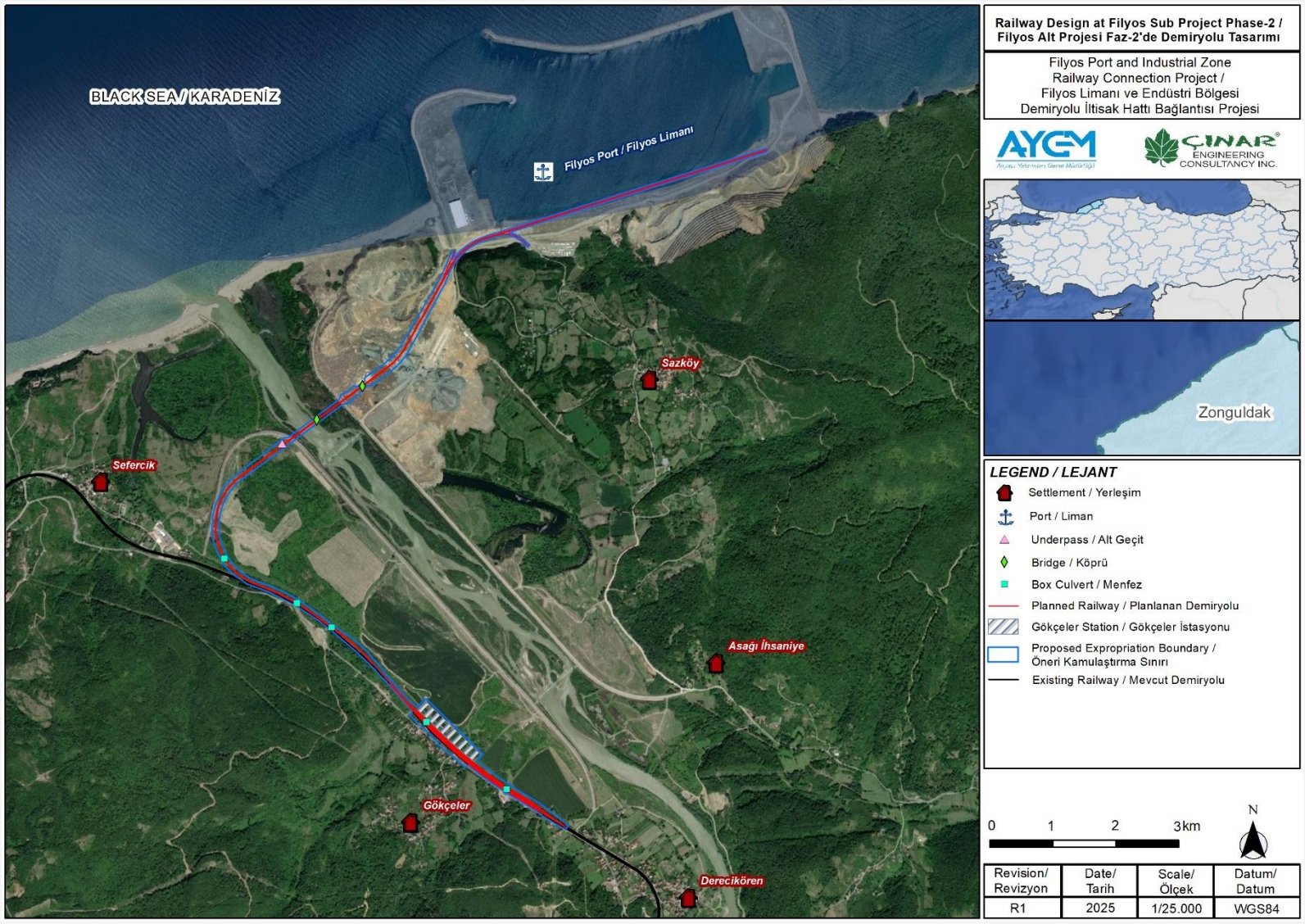


Figure 2. Filyos Sub-Project Railway Design in Phase-2 (Updated Design)

The Filyos Valley Investment Basin, which includes the Filyos Port, Filyos Industrial Zone, Filyos Free Zone, and Free Zone Development Area, is referred to as the Filyos Valley Project. Information on The Filyos Valley Project is taken from “Filyos Valley Report” written by the Western Black Sea Development Agency.

Filyos Valley is located in the delta where the Filyos Creek flows into the Black Sea, at a location between Zonguldak and Bartın. Filyos (Hisarönü) Town, Saltukova Town and Çaycuma District are the nearby settlements. Project site lies between 35 km east of Zonguldak province and 20 km north of Çaycuma District. Hisarönü (Filyos) Town is located 4 km west of the site.

Filyos Valley, the largest and most significant valley in Zonguldak Province, extends along the Filyos Creek. As it flows through the region, the creek widens to 300–400 meters, shaping the Çaycuma Plain in the center of Çaycuma District and the Filyos Plain in the Saltukova and Kokaksu–Hisarönü area. The valley encompasses both plains and follows the course of the creek. The Filyos Valley Project is one of the most significant initiatives aimed at stimulating economic development in the region, enhancing its recognition at national and international levels, and attracting investments. A key component of the project is the construction of the Filyos Port, which holds substantial importance. The Filyos Port Project, intended to serve the provinces of Zonguldak, Karabük, and Bartın, as well as neighboring provinces and the Central Anatolia Region, has been prioritized within the framework of TINA-2020 (Transport Infrastructure Needs Assessment for Türkiye), conducted as part of the European Union (EU) harmonization process.

The Filyos Valley Project, partially designated as a Mixed Industrial Zone (declared as an Industrial Zone under the Council of Ministers Decision No. 2012/3574, published in the Official Gazette No. 28405 on September 8, 2012) and partially as a Free Zone, is an integrated initiative alongside the Filyos Port. This project is of great significance to the region and its surroundings, given its potential to foster industrial development and create logistical opportunities.

Industries such as iron and steel production, allied sectors, wood-based industries, cement and cement-based products, glass manufacturing, and chemicals are already developing and operating in the area. These industries, which increasingly demand more space and infrastructure, are anticipated to be housed within the designated Industrial Zone and Free Zone of the Filyos Valley. Additionally, integrated iron and steel industries, oil refineries, petrochemical facilities, glass manufacturing, and metal-based industries are expected to create further potential in the region. Thanks to the port, industries in the region will be able to source a significant portion of imported raw materials via maritime routes from Black Sea countries, enhancing the area's logistical efficiency and industrial growth.

The Council of Ministers' Decisions regarding the Filyos Free Zone are summarized below:

- The location and boundaries of the Filyos Freezone, consisting of four sections, in the location of the Filyos Creek of Zonguldak Province was determined with the Decision of the Council of Ministers (DCoM) dated 04.04.1994 and published in the Official Gazette dated 05.04.1994 and numbered 21896. It was decided that the former Ministry of Public Works and Settlement would be appointed for the construction of riverbed remediation channel and the Ministry of Finance, General Directorate of National Estate is appointed for the urgent expropriation of the immovable properties. (Figure 3).

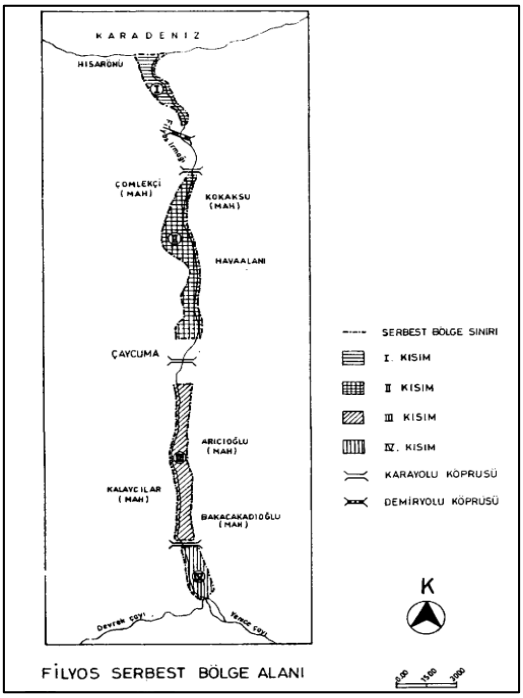


Figure 3. Borders of Filyos Freezone and Its Sections Declared by Decision of the Council of Ministers (No:94/5377)

- With Official Gazette Decision Number: 96/8692, it was decided to redefine the boundaries of the Filyos Free Zone. According to the decision, while the 1st and 2nd Zones remained part of the free zone, the 3rd and 4th Zones were excluded from its scope (see Figure 4).

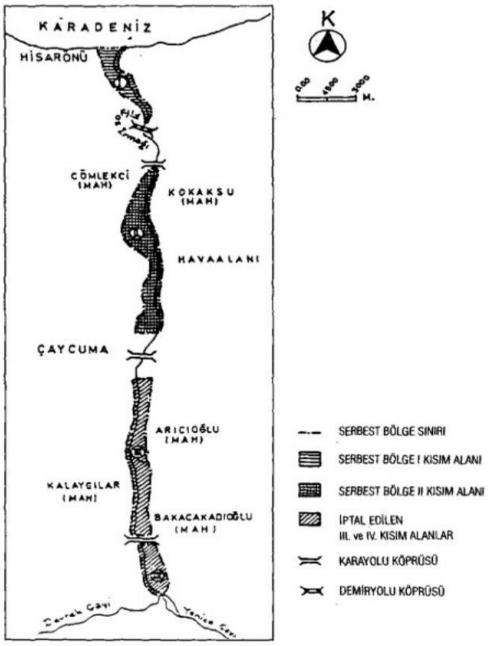


Figure 4. Borders of Filyos Freezone and Its Sections Declared by Decision of the Council of Ministers (No: 96/8692)

- With Official Gazette Decision Number: 2006/11566, it was decided to repeal Decree No. 94/5377 dated 04/04/1994, which defined the location and boundaries of the Filyos Free Zone, as well as the Decree No. 96/8692 dated 30/09/1996.
- With Official Gazette Decision Number: 2008/14087, it was decided to designate the area located in the Filyos River basin in the Çaycuma District of Zonguldak Province, consisting of four sections, as the Filyos Free Zone. Additionally, it was decided that the private properties within this area would be urgently expropriated by the Ministry of Finance (Directorate General of National Estate) (see Figure 5).

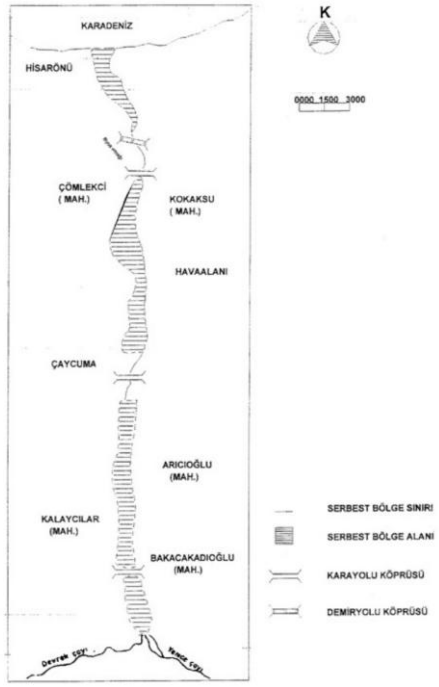


Figure 5. Borders of Filyos Freezone and Its Sections Declared by Decision of the Council of Ministers (No: 2008/14087)

- With Official Gazette Decision Number: 2009/14730, in addition to Decision Number 2008/14087, it was decided to redefine the boundaries of the Filyos Free Zone, located in the Filyos River basin in the Çaycuma District of Zonguldak Province, as shown in Figure 6. Furthermore, it was decided that the private properties within this area would be urgently expropriated by the Ministry of Finance (Directorate General of National Estate). In this decision, the 3rd and 4th Zones were designated as the free zone development area.

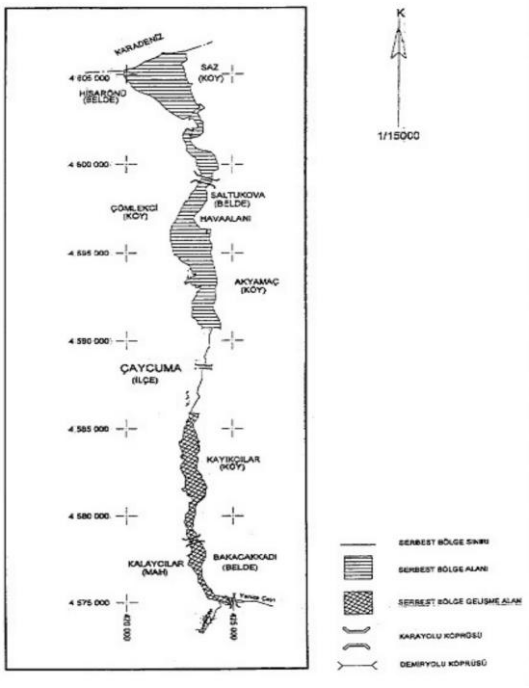


Figure 6. Borders of Filyos Freezone and Its Sections Declared by Decision of the Council of Ministers (No: 2009/14730)

- With Official Gazette Decision Number: 2010/975, in addition to Decision Number 2008/14087 dated 01/09/2008, it was decided to redefine the boundaries of the Filyos Free Zone, located in the Filyos River basin in the Çaycuma District of Zonguldak Province, as shown in Figure 7. With this decision, part of the 1st Zone was excluded from the free zone, and the 3rd and 4th Zones were designated as the free zone development area.

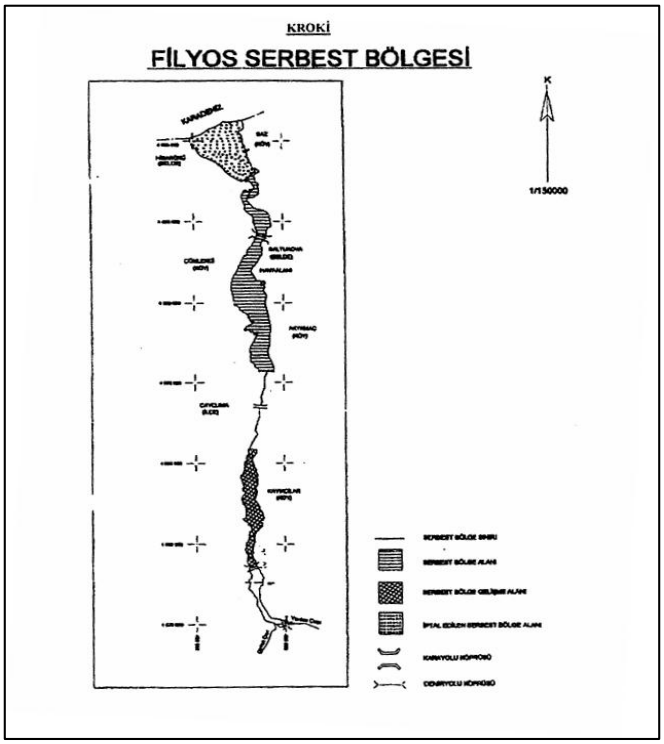


Figure 7. Finalized Filyos Freezone Boundaries and Sections with Decision of the Council of Ministers No. 2010/975

The Coordination Board of Industrial Zones, through its decision dated 29.06.2012 and numbered 2012/1, resolved to designate the area located north of the borders of the Filyos Free Zone as the Filyos Industrial Zone. Subsequently, this area was officially declared as the Filyos Industrial Zone by the Council of Ministers' decision dated 16.07.2012 and numbered 2012/3574. With the decision dated 01/06/2015 and numbered 29373, Tosyalı Filyos Industrial Zone Management Corporation was appointed as the legal entity responsible for the management and operation of a 344-hectare area within the Filyos Industrial Zone.

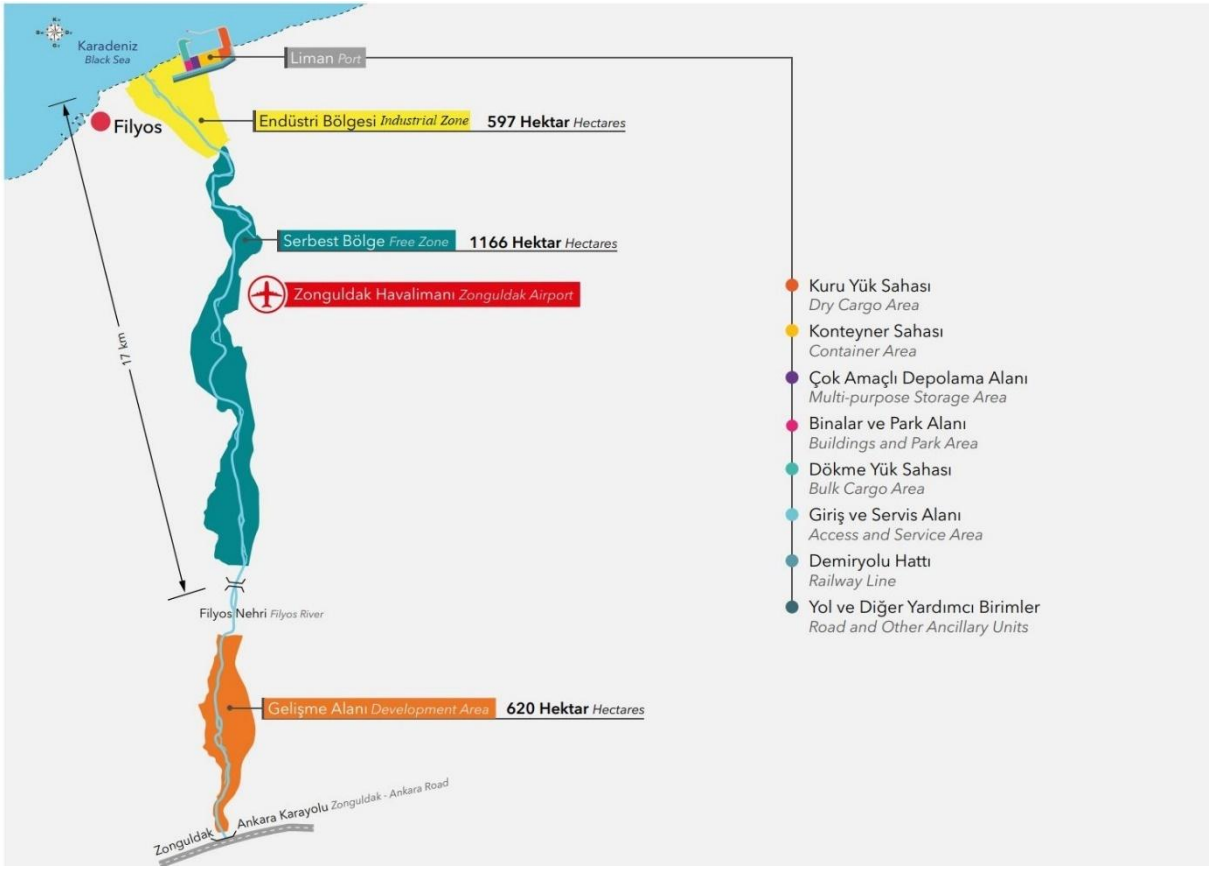


Figure 8. Filyos Port, Filyos Industrial Zone and Filyos Freezone

Source: The Western Black Sea Development Agency (BAKKA)
https://www.kalkinmakutuphanesi.gov.tr/assets/upload/dosyalar/filyos-kitapcik-haritali.pdf

During the Phase-2 of the ESIA studies, the borders of Filyos Industrial Zone (see Figure 8[6]) was changed as shown in Figure 9 , and the area shown in Figure 9 was declared as “Individual Investment Zone of Turkish Petroleum Corporation (TPAO)” with the Presidential Decision in Official Gazette dated 06.01.2022 and numbered 31711 (Decision No:5071). The aforementioned decision resulted in a reduction of the Filyos Industrial Zone's area from 597 hectares to 344 hectares. The remaining 253 ha area is being used by TPAO for the Sakarya Gas Field Development Project (SGFDP).

[6]https://www.kalkinmakutuphanesi.gov.tr/assets/upload/dosyalar/filyos-kitapcik-haritali.pdf

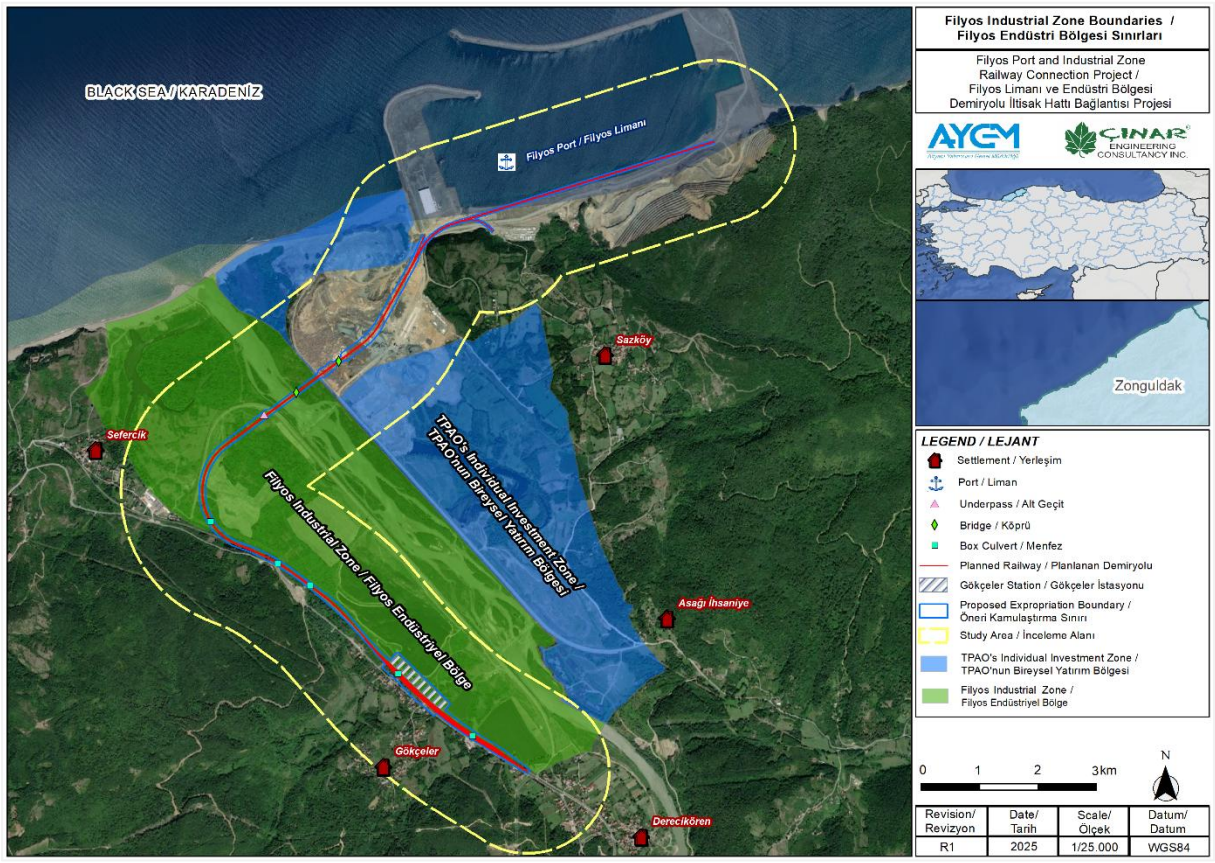


Figure 9. Revised Filyos Industrial Zone Boundaries

Filyos Industrial Zone is one of the most important industrial zones of Türkiye because of the opportunity of having integration between transportation networks such as railway, maritime transport, airway and highway, safe industry and industrial investment as a result of existence of flood prevention structures and having the Filyos port which is the closest port to Ankara and Central Anatolia reaching to Black Sea.

In this context, the Project is being planned to ensure both the proper carrying out of planned industrial activities and distributing the goods arriving at the Filyos Port in the safest and least costly manner.

Filyos Port and Filyos Industrial Zone Railway Junction Line (Including highway connection) Geological and Geotechnical Investigations Report was prepared by Altınok Cons. Eng. A.Ş. on 21.02.2018 and Engineering Design Review, Preparation of Bidding Documents for Civil Works, and Construction Supervision of Last-Mile Rail and Road Infrastructure Connectivity to/from Filyos Port and Filyos Industrial Zone Comparative Borehole Report was prepared by EOOE JV / Leader EPTISA in 2024.

1.2 Project Location

The project route is planned in an area located within the borders of Filyos, in the Çaycuma District of Zonguldak Province. The route begins northwest of Derecikören Village and follows the surrounding natural geographical features, passing to the northeast of Gökçeler Village. Along the route, there are various natural and artificial obstacles, the most significant of which is the Filyos River, which will be crossed by a bridge as part of the project. After crossing the Filyos Industrial Zone and Filyos River, the route continues through the TPAO facilities and extends to the end of the eastern quay of Filyos Port.

1.3 Project Owner

Directorate General of Infrastructure Investments (DGII) affiliated to the Ministry of Transport and Infrastructure (MoTI) is responsible for the implementation of the Rail Logistics Improvement Project financed by the World Bank.

DGII, through article 485 of the Presidential Decree No.1 dated July 10, 2018, has been authorized to be responsible for design and construction of public railways, logistics centers, ports, airports, as well as construction and operation of rail and road connections to major ports, airports, industrial facilities, organized industrial zones, mining areas.

DGII, with detailed, solid organizational structure and institutionalization, has 358 personnel (160 of which are technical staff) and consists of 13 departments which includes Railways Construction Department and Railways Survey Project Department. The Railways Construction Department and The Railways Survey Project Department are the main departments related to the planned projects in the context of this work. The Railways Construction Department works on the process of tender and construction of projects. The Railways Survey Project Department is responsible for surveys, budget estimates, feasibility studies on technically, economically, and environmentally viable projects.

The Railway Construction Department consists of 3 units: Railway Construction Unit, High Speed Train Construction Unit and External Funded Projects Unit.

The Railway Survey Department consists of 3 units: Modernization Unit, Logistics and Joint Projects Survey and Applications Unit and Railway Projects Survey and Tender Unit.

The project will be handed over to the General Directorate of Turkish State Railways (TCDD) after construction is completed, and the operational activities will be carried out by TCDD.

1.4 Environmental & Social Impact Assessment under National Legislation

EIA Regulation has classified the planned activities according to their capacities and possible environmental impacts in the Annex-1 and Annex-2 lists. Annex-1 List can be explained as-Projects to be subjected to Environmental Impact Assessment and Annex-2 List is explained as Projects to be subjected to Selection and Screening.

The Project is evaluated under Annex-1, Article 9 of the Environmental Impact Assessment Regulation, which was published in the Official Gazette dated 27.07.2022 and numbered 31907 as:

a) Construction of railway line (except connection and junction lines)

There is an official letter numbered 81195450-220.03-E.43932 (see Appendix-2) from Ministry of Environment and Urbanization (former Ministry of Environment, Urbanization and Climate Change) stating that the Project is not included in the Annex-1 and Annex-2 of EIA Regulation as all the lines are junction and/or connection lines.

However, it is also stated in the letter that the EIA evaluation process should also be conducted by Zonguldak Governorship Provincial Directorate of Environment, Urbanization and Climate Change via Online EIA System (e-ÇED). Therefore, the EIA Exemption letter should be obtained from Zonguldak Governorship Provincial Directorate of Environment, Urbanization and Climate Change prior to the commencement of construction activities.

1.5 Limitations and Uncertainties

The conditions, limitations and uncertainties affecting the studies and evaluations carried out within the scope of the Environmental and Social Impact Assessment study are as follows:

- Project description, project route and its components presented in Chapter 3 of the ESIA, are provided by DGII. During the preparation of ESIA report, the "Filyos Port and Filyos Industrial Zone Railway Connection Line Feasibility Report" was used. Railway route, engineering structures and locations of stations are determined however, during the land preparation and construction phase, it is possible to have some alterations due to unforeseen reasons, different from what is stated in ESIA report and the approval of DGII.
- The construction/camp sites that will be used during the construction phase of the project were not determined while ESIA was being prepared. Therefore, construction/camp sites could not be included in the assessments for the construction phase. These will, however, be subject to the WB ESF, and to E&S assessments, management plans and instruments.
- The locations, layouts and technical specifications of associated facilities such as energy transmission lines & substation, quarries and material burrow pits are not determined or finalized yet. Consequently, energy transmission lines & substation, quarries and material burrow pits are not included in the evaluations (e.g. Land Use, Air Quality). All associated facilities to be used for the Project shall comply with WBG ESF as well, and be subject to E&S assessments, management plans and instruments.
- Access roads to be used in the land preparation and construction stages of the project have not been determined yet. A detailed logistics study needs to be established before commencing the construction works.
- Blasting is a possibility that contractors 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.
- The local population mostly resides outside the settlement area, and the majority of the houses remain closed for most of the year. Winter months, in particular, are the periods with the lowest population density. Therefore,a second field visit was conducted in September 2025. This visit also aimed to establish contact with the Project Affected Households (PAHs) that could not be reached in February 2025. Considering the low population levels in the settlements during the winter months, it was assessed that the autumn season -when agricultural activities are at their peak and local residents are largely present in their villages- represents the most suitable period for accessing PAHs.
- The cumulative impact of the existing highway (67-01), railway, ongoing tunnel construction, TPAO, the free zone, Filyos Port, and OIZ area has reinforced negative perceptions regarding public projects and land acquisition processes. The fact that many users leave their land fallow is also related to these experiences. Past expropriations that resulted in reduced parcel sizes, compensation set below market value, and delayed payments have weakened the connection between landowners and their land.
- The presence of multiple other projects in the area, coupled with the fact that this project has been repeatedly raised but not yet implemented, has shaped the responses of the local population.
- An Asset Inventory was prepared by ÇINAR based on affected parcels. A valuation study was conducted for all assets (e.g., wire fences, walls), crops (e.g., trees), and other structures (e.g., abandoned or occupied buildings) located on the affected parcels. This effort was undertaken to ensure the RP remains accurate, current, and

fully aligned with World Bank standards. A detailed asset inventory, including all structures located on affected lands, will be conducted by PIU in coordination with the Department of Real Estate and Expropriation, following the completion of the land valuation and expropriation process and the payment of compensation to Project Affected People (PAP). It should be stated that RP requirements will be followed through protocols to be signed by owners/users during the entry and exit stages of the land, ensuring no access or entry to the land before RP is implemented and PAPs have received full compensation.

- At the Filyos Project site, there is another project carried out by the Sakarya Gas Field Development Project Directorate of Turkish Petroleum Corporation. The overlapping project areas are shown in Figure 9. Within the scope of this project, the project area is restricted as a private security zone and natural gas production construction and operation works are being carried out in this area. During the biodiversity studies conducted in the Filyos Project area, entry to the TPAO area was strictly forbidden. One of the major risks for the Filyos Project area is that the current proposed railway line passes through the private security zone. To clarify the land use of the Sakarya Gas Field Development Project, a site visit was conducted by DGII on 06.01.2023 to the Filyos Project area and meetings were held with Turkish Petroleum Offshore Technology Center (TP-OTC) authorities.

In addition, all environmental and social impacts will be assessed according to the Management of the Change Process detailed in the ESMP, and ESMP and respective sub-management plans will also be revised as needed.

1.6 Structure of the ESIA Report

The general outlines of the ESIA report covering the important environmental and social issues related to the Project are given in Table 3.

Table 3. Structure of ESIA Report

Chapter-1	Introduction
Chapter-2	Institutional and Legal Framework
Chapter-3	Project Description
Chapter-4	Methodological Approach to Impact Assessment
Chapter-5	Environmental and Social Baseline& Impact Assessment& Mitigation Measures ▪ Physical Environment ▪ Biological Environment ▪ Socio-Economic Environment
Chapter-6	Cumulative Impact Assessment
Chapter-7	Project Alternatives
Chapter-8	Stakeholder Engagement and Grievance Mechanism of the Project
Chapter-9	References

As part of the ESIA Study, an Environmental and Social Management Plan was also prepared, listing all of the management measures and commitments proposed in the ESIA Report and monitoring provisions and key indicators for the success of the identified implementation.

The Stakeholder Engagement Plan (SEP) document has been prepared for the management of communication and interaction processes that need to be established during the crediting period among institutions, organizations, and other stakeholders that may be directly and/or indirectly affected by the Project, which is conducted by the Project Owner in collaboration with ÇINAR. Additionally, SEP aims to contribute to minimizing the adverse social impacts of the Project and enhancing its positive effects through the inclusive engagement with stakeholders.

The Grievance Mechanism (GM) is an important tool of SEP and serves the purpose of addressing environmental and social impact-related complaints, opinions, suggestions, feedback, and questions by covering internal and external stakeholders under separate headings.

Project specific SEP will be submitted as a separate document including GM.

Brief information about stakeholder engagement and grievance mechanism is given in Section 8 of this ESIA.

2 INSTITUTIONAL AND LEGAL 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 regions 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

The basis of the central administration is established within the ministries in Türkiye. These ministries provide services through provincial and district organizations, to local areas.

MoTI is the main central administration in scope of the Filyos Port and Industrial Zone Railway Connection Project. The national institution responsible for implementation of the project is DGII under the Ministry.

The Ministry of Environment, Urbanization and Climate Change (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.

The main government institutional stakeholders of the Project are listed in Table 4.

Table 4. 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

Administrations at provincial, regional and district levels are field organizations of ministries and related institutions.

The Project is within the scope of Zonguldak Governorate, Provincial Directorate of Environment, Urbanization and Climate Change, Zonguldak Provincial Directorate of Agriculture and Forestry, Zonguldak Provincial Directorate of Culture and Tourism, Karabük Regional Board of Conservation of Cultural Heritage Directorate, State Hydraulic Works (DSİ) Kastamonu 23rd Regional Directorate, Zonguldak Forestry Regional Directorate, General Directorate of Highways (KGM) Kastamonu 15th Regional Directorate and Zonguldak Provincial Special Administration.

The institutional framework in Türkiye as pertains to the project is presented in Figure 10.

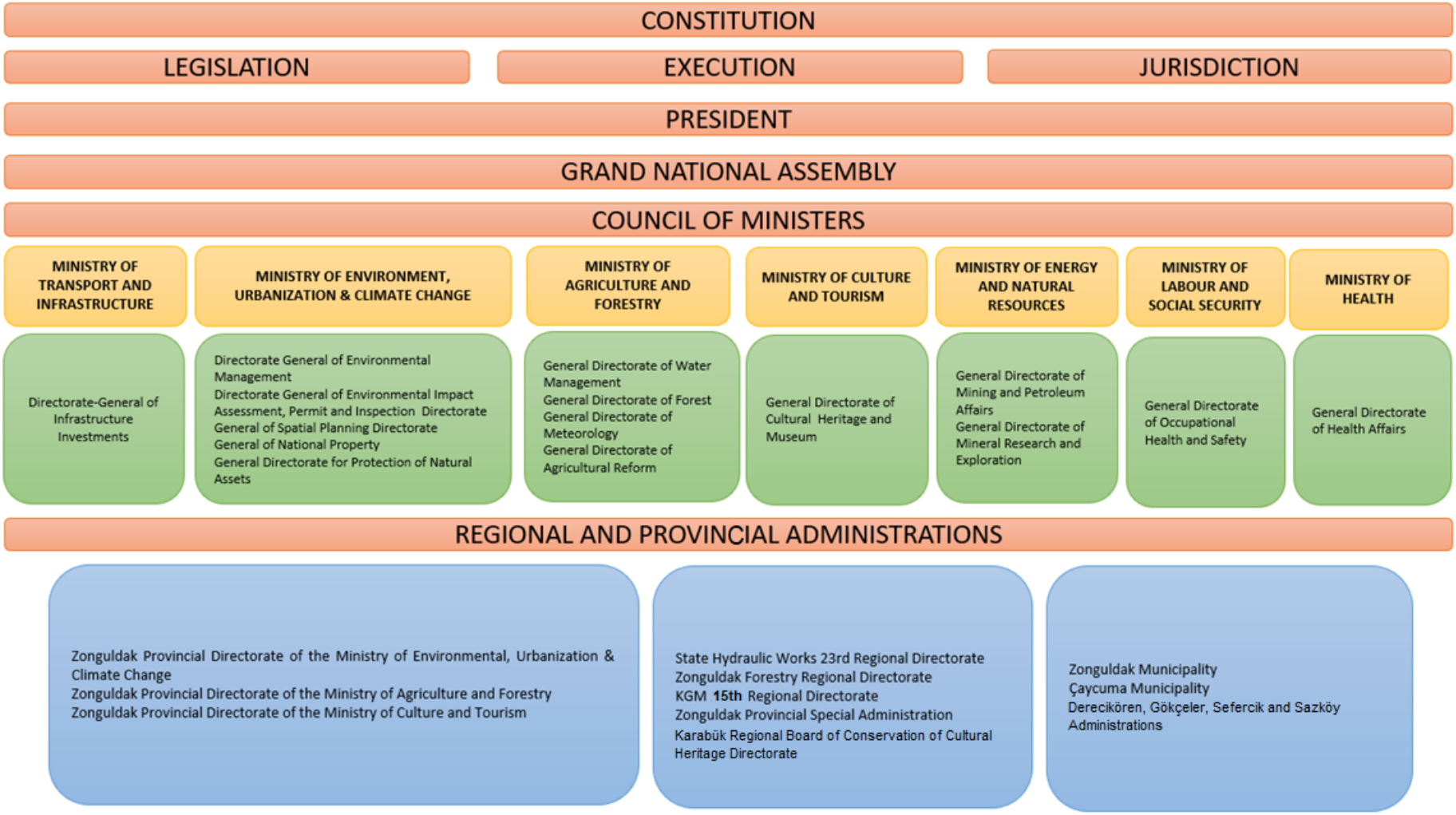


Figure 10. Legal Framework Related to the Project

2.1.3 Local Administrations

The Filyos Sub-project will be constructed in Çaycuma district of Zonguldak province, located in the western part of the Black Sea region of Türkiye. There are four settlements close to the proposed route namely Derecikören, Gökçeler, Sefercik and Sazköy. Zonguldak Province Municipality, Çaycuma District municipality and related village administrations are considered associated as local administrations.

2.2 National Legislation

The National Legislation in relation to environmental, social, health and safety management constructing the legal basis for the Project is identified in the following sections.

2.2.1 Environmental and Social Legislation

Turkish Environmental Law No. 2872, which was issued in the Official Gazette 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 to environmental protection, pollution prevention and control, human rights and safety are listed in Table 5.

Table 5. 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 on Conservation of Cultural and Natural Assets	2863
Law on Soil Conservation and Land Use	5403
Mining Law	3213
Municipality Law	5393
National Parks Law	2873
Occupational Health and Safety Law	6331
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 6.

Table 6. Environmental Regulations, By-laws and Communiques in Türkiye

Regulation Name	Official Gazette 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
Law on Measures to be taken and Aids to be provided for the Disasters Effective in Public Life	15.05.1959	7269
Soil Quality		
Regulation on the Control of Soil Pollution and Contaminated Lands by Point Sources	08.06.2010	27605
Climate Change		
Regulation on Minimization of Ozone Depleting Substances	07.04.2017	30031
Regulation on Monitoring of Green House Gas (GHG) Emissions	17.05.2014	29003
Land Use and Soils		
Regulation on Protection, Use and Planning of Agricultural Lands	09.12.2017	30265
Implementation Regulation of 17/3rd and 18th Articles of the Forestry Law	30.11.2021	31675
Implementation Regulation of Land Consolidation and On-Farm Development Services	07.02.2019	30679
Regulation Concerning the rehabilitation of the Lands Disturbed by Mining Activities	23.01.2010	27471
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 the 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 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 Name	Official Gazette Date	Issue
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 the 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 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 the 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 Name	Official Gazette Date	Issue
Regulation on Transportation of Explosives via Highways	24.04.2019	30754
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
Law on Right to Information	24.10.2003	25269
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 (EIA)

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 Environmental Law No. 2872, which was published in the Official Gazette dated 11/8/1983 and numbered 18132 in our country. On 7 February 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 29/07/2022 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 Ministry of Environment, Urbanization and Climate Change can now submit EIA applications through this digital platform.

The EIA process consists of three main phases;

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

EIA studies will 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 protected areas and sensitive ecosystems nearest to the project area. In 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 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 11.

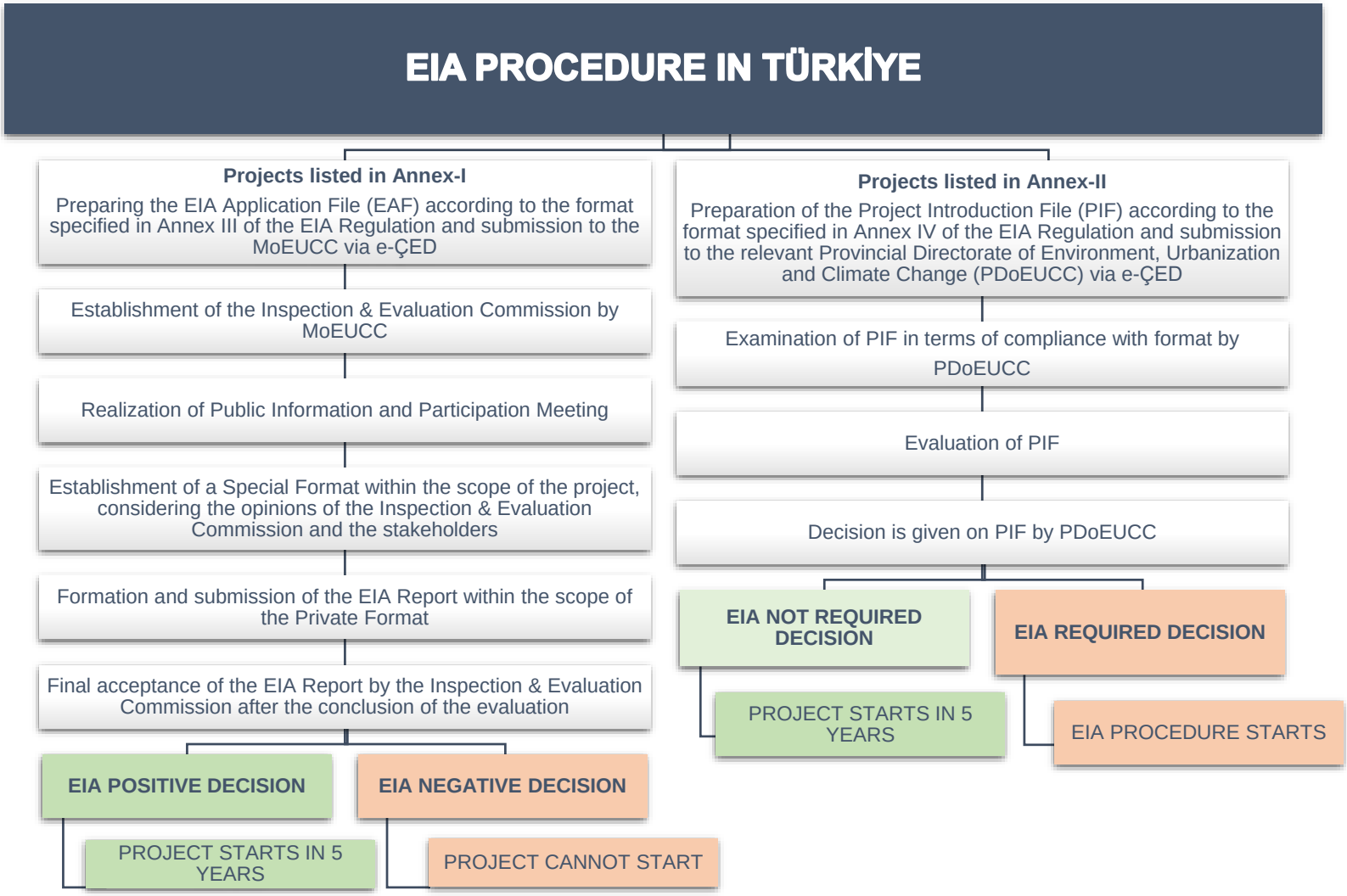


Figure 11. EIA Process in Türkiye

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. Pertinent national laws and regulations, international conventions and protocols ratified by Türkiye, as well as international standards and guidelines in this context, encompass the following.

International Conventions and Protocols (ratified by Türkiye)
United Nations (UN) Convention on Biological Diversity (CBD) and the Cartagena Protocol on Biosafety (ratified in 1997)
The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) (ratified in 1984)
The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (ratified in 1996)
The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) (ratified in 1994)
The Convention Concerning the Protection of World Cultural and Natural Heritage (United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Heritage Convention) (ratified in 1983)
Convention to Combat Desertification (ratified in 1998)
International Treaty on Plant Genetic Resources for Food and Agriculture (ratified in 2007)
European Landscape Convention (ratified in 2003)
Convention on the Conservation of Migratory Species of Wild Animals (CMS) / Agreement on the Conservation of Populations of European Bats (EUROBATS) (Türkiye is not a party)
CBD – Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets
National Laws and Regulations
Law on National Parks (No. 2873, dated 9 August 1983)
Law on Environment (No. 2872, dated 9 August 1983)
Law on Terrestrial Hunting (No. 4915, dated 1 July 2003)
Law on Forests (No. 6831, dated 31 August 1956)
Law on Protection of Animals (No. 5199, dated 24 June 2004)
Law on Water Products (No. 1380, dated 22 March 1971)
Law on Agriculture (No. 5488, dated 18 April 2006)
Law on Veterinary Services, Plant Health, Food and Feed (No. 5996, dated 11 June 2010)
Law on the Protection of Breeder's Rights for New Plant Varieties (No. 5042, dated 8 January 2004)
Seed Law (No. 5553, dated 31 October 2006)
Law on the Conservation of Cultural and Natural Assets (No. 2863, dated 21 July 1983)
Regulation on the Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Official Gazette No. 24623, dated 27 December 2001)
Regulation on the Preservation of Wetlands (Official Gazette No. 28962, dated 4 April 2014)
Regulation on Fisheries (Official Gazette No. 22223, dated 10 March 1995)
Regulation on the Collection, Storage and Use of Plant Genetic Resources (Official Gazette No. 21316, dated 15 August 1992)
2023-2024 Hunting Season Decision
International Standards and Guidelines
ESS 6 (2017) Biodiversity Conservation & Sustainable Management of Living Natural Resource
EU Habitats Directive (92/43/EEC)
EU Birds Directive (2009/147/EC)

2.2.1.3 Cultural Heritage

The Law on Protection of Cultural and Natural Assets was published in 23.07.1983 dated and 18113 numbered Official Gazette. This law addresses various concerns related to protecting both movable and immovable cultural and natural treasures. It has identified and defined the issues surrounding the preservation and care of these assets that require protection, as outlined in Article 6.

- Immovables built until the end of 19th century.
- Immovables that were constructed after the end of 19th century and which are stipulated to be preserved by the Ministry of Culture and Tourism due to their importance and specific properties.
- Immovable cultural assets within a protected area.
- Structures, buildings or places where significant historical events took place during the Turkish Independence War or during the foundation of the Turkish republic. Also, buildings that have been used by Mustafa Kemal ATATÜRK, regardless of time and registration.

The aforementioned law specifies that if any movable or immovable assets are discovered, they should be reported to the nearest museum directorate, village headman, or local authority (Article 4).

Furthermore, it is indicated that if cultural assets, both movable and immovable, belonging to public institutions and individuals governed by private law, are already known to exist or are intended for future protection, they will be considered state property (Article 5).

Any movable items identified under the aforementioned articles and reported to the Ministry of Culture and Tourism must be organized, registered, and placed in museums by the same Ministry. This process involves sorting and registering the items based on scientific principles before being properly curated in museums (Article 25).

In addition to the Law on the Protection of Cultural and Natural Assets, some regulations have been prepared that determine the procedures for the protection, storage, and management of the mentioned cultural and natural assets. The principal decision No. 658 of the High Council for the Protection of Cultural and Natural Assets of the Ministry of Culture and Tourism dated November 5, 1999, states that the archaeological sites should be classified and protected, and the three main classes are given below.

1st Degree Archaeological Sites: Archaeological Sites that should be preserved except for scientific studies with the intention of protecting this area. Constructions are not allowed in 1st degree archaeological sites. However, some exceptional cases such as infrastructure applications, may be permitted with the approval of museum and head of the scientific excavation team.

2nd Degree Archaeological Sites: In 2nd degree archaeological areas, protection and usage conditions are determined based on the judgement of Regional Preservation Boards. Similar to 1st degree archaeological sites, constructions are not allowed. However, in exceptional conditions, these activities can be allowed with the approval of museum and head of the scientific excavation team.

3rd Degree Archaeological Sites: In 3rd degree Archaeological sites, construction is permitted in accordance with protection and usage judgement. It is stated that test excavations must be performed before construction. Results must be evaluated by relevant museum. Construction may be allowed considering existing and potential archaeological assets and regional conditions.

2.2.1.4 Land Acquisition and Resettlement

The Legal Framework related to land acquisition and resettlement outlines the legislative framework that governs land expropriation and involuntary resettlement in Türkiye as it applies to Project. It provides a summary of the relevant Turkish legislations and WB policies.

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 the public interest and provide the basis for Article 46. The Article refers to the Expropriation Law.

In accordance with WB's ESS5, involuntary resettlement may cause severe long-term hardship, impoverishment, and environmental damage unless appropriate measures are carefully planned and carried out. ESS5 acknowledges that project related land acquisition and restrictions on land use may have negative impacts on communities and individuals. Project related land acquisition or land use restrictions may cause physical displacement (displacement, residential land or shelter loss), economic displacement (leading to loss of access to land, assets or assets, loss of income or other livelihoods), or both. Resettlement is considered involuntary when affected people or communities do not have the right to reject land acquisition or land use restrictions resulting in displacement. This standard emphasizes that mandatory resettlement should be avoided. If not avoided, necessary measures should be taken to reduce negative impacts on displaced people.

There are several gaps between international standards and national legislation with regard to land acquisition, resettlement and compensation and livelihood restoration. First, under Turkish law, RP is not a requirement for investments that cause economic and physical displacement. Similarly, an Environmental and Social Impact Assessment is a requirement under international standards, but only an Environmental Impact Assessment is required under Turkish law (only for the projects listed in Annex-1 and Annex-2 of the EIA Regulation). In addition, within the national legal framework, there is a lack of specific requirements for consultation and disclosure of RP and Social Impact Assessment (SIA). The activities relevant to RP consultations and disclosure are less explicit in Turkish national legislation, thus requiring the application of WB policies.

Details of the Project land use and related impacts are given in separate RP document. Besides, summary information about the land requirement of the Project are submitted in Section 5.12.2.5.

2.2.1.5 Labor Law and Regulations

Occupational health and safety related issues are governed by the Occupational Health and Safety Law. This law forms the basis of the legal framework that determines roles, obligations and responsibilities of employers and employees providing rules of health and safety in workplaces.

Additionally, labor and worker related issues are regulated by Labor Law.

Prominent regulations covered by national legislation regarding occupational health and safety and labor and working conditions are also given in Table 6.

2.2.2 Requirements for Environmental Licenses, Permits and Approvals

Throughout the project's construction and operational phases, the required environmental permits and licenses are specifically obtained for activities listed 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, and Law on Soil Conservation and Land Use are to be taken into consideration for the forests, and agriculture 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.

Opinions/permits for the Sazköy 3rd Degree Archaeological Site, Öteyüz Neighborhood 1st and 3rd Degree Archaeological Site and Ancient City of Tios and Tios Necropolis Area have been obtained from the relevant institutions in line with the Law on Protection of Cultural and Natural Assets.

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)
- 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 permit in case of groundwater utilization
- Environmental permit for wastewater discharge, if any
- Environmental permit for package wastewater treatment plants along with identity documents, if any

Wastes

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

Energy Transmission Lines

- Connection permits are issued by the relevant electricity transmission and distribution authority, along with the EIA opinion required depending on the voltage and continuous length of the electric energy transmission line

Quarry and Borrow Site

(Valid if operated by the contractor within the scope of the project)

- Raw material production license
- EIA Decisions for each quarry and material borrow site
- Blasting permit
- Related environmental permits for air emissions, wastewater discharges and/or environmental noise

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 7. International Agreements, Conventions and Protocols

International Agreements, Conventions and Protocols Names (Official Gazette (O.G.) 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 the 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)
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
European Convention on the Protection of the Archaeological Heritage (O.G. 08.08.1999, No: 23780)
Convention on the Protection of the World Cultural and Natural Heritage, Paris 1972 (O.G. 14.2.1983, No: 17959)
European Cultural Convention (O.G. 17.6.1957, No: 9635)
European Charter of the Architectural Heritage (O.G. 22.07.1989, No: 20229)
Convention for the Protection of Human Rights and Fundamental Freedoms (O.G. 06.02.1972, No: 14091)
UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property
UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage

Occupational Health and Safety
International Labour Organization Safety and Health in Construction Convention (O.G. 29.11.2014, No: 29190)
International Labour Organization Agreement on Occupational Health and Safety and Working Environment (O.G. 13.01.2004, No: 25345)
International Labour Organization Worst Forms of Child Labor Convention (O.G. 03.02.2001, No: 24307)
International Labour Organization Abolition of Forced Labor Convention (O.G. 27.01.1998, No: 23243)
International Labour Organization Minimum Age Convention (O.G. 02.06.1959, No: 10220)
International Labour Organization Right to Organize and Collective Bargaining Convention (O.G. 22.12.1992, No: 21432)
International Labour Organization Worker's Representatives Convention (O.G. 11.12.1992, No: 21432)
International Labour Organization Human Resources Development Convention (O.G. 12.12.1992, No: 21433)
International Labour Organization Employment Policy Convention (O.G. 20.11.1976, No: 15769)
International Labour Organization Social Security (Minimum Standards Convention (O.G. 10.08.1971, No: 13922)
International Labour Organization Equal Remuneration Convention (O.G. 22.12.1966, No: 12484)
International Labour Organization Discrimination (Employment and Occupation) Convention (O.G. 22.12.1966, No: 12484)
International Labour Organization Abolition of Forced Labor Convention (O.G. 21.12.1960, No: 10686)
International Labour Organization Right to Organize and Collective Bargaining Convention (O.G. 14.08.1951, No: 7884)

2.4 World Bank Environmental and Social Framework

The Environmental and Social Framework of the World Bank is a set of guidelines, policies, and standards designed to help World Bank-financed projects manage environmental and social risks and impacts. It aims to support sustainable development by ensuring that projects are environmentally and socially responsible, while enhancing development benefits for communities.

Projects supported by the World Bank through Investment Project Financing are required to meet corresponding Environmental and Social Standards. The ten (10) Environmental and Social Standards establish principles for the project will adhere to throughout its lifecycle. It should be noted that eight[7] (8) out of the ten (10) ESSs are applicable to this project.

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

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

ESS1, paragraph 26 states that all relevant environmental and social 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.)

[7] ESS1, ESS2, ESS3, ESS4, ESS5, ESS6, ESS8 and ESS10

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

ESS2: Labor and Working Conditions

ESS2 perceives the importance of employment creation and income generation for the aim of poverty reduction and inclusive economic growth. 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.

ESS3: Resource Efficiency and Pollution Prevention and Management

ESS3 points out to 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.

ESS4: Community Health and Safety

ESS4 emphasizes issues of health, safety, and security risks and impacts on communities resulting from project activities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts. The Borrower should specifically consider people who may be vulnerable due to impacts and risks of the project.

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

ESS5 recognizes that physical and economic displacement, if unmitigated, may cause severe economic, social and environmental risks. Hence, involuntary resettlement should be avoided. Where unavoidable, it will be minimized and necessary measures to mitigate adverse impacts on displaced people will be carefully planned and implemented.

ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Protection and conservation of biodiversity and sustainability of natural resources are the fundamental components 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, including Indigenous Peoples, whose access to, or use of, biodiversity or living natural resources may be affected by a project.

ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

This standard is not relevant for the Project as there are no Indigenous Peoples in Türkiye, who meet the definition of this standard.

ESS8: Cultural Heritage

This standard points out that cultural heritage provides continuity between tangible and intangible forms between past, present and future. ESS8 sets out measures designed to protect cultural heritage throughout the project life cycle.

ESS9: Financial Intermediaries (FIs)

Financial Intermediaries are set out to assess and manage environmental and social risks and impacts associated with project related investments or subprojects. Good environmental and social management in the subprojects the FIs finance are promoted. This standard is not relevant for the project as it does not involve any financial intermediaries.

ESS10: Stakeholder Engagement and Information Disclosure

The importance of open and transparent engagement between Borrower and stakeholders is recognized as a necessary element of good international practice. Inclusive stakeholder engagement contributes to the projects in terms of improvement of environmental and social sustainability, enhancement of project acceptance and successful project design.

2.5 Other Guidelines

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

The World Bank Group (WBG) Environment, Health and Safety 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 also published sector specific guidelines for a variety of industries. Relevant aspects of the WBG Environmental, Health, and Safety (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 EHS guidelines, the more stringent of the standards are required to be complied with. The World Bank Group’s sector-specific guidelines regarding the Railways are described below.

- WBG EHS Guidelines for Railways:

This guideline prepared for railways concerns infrastructure projects to be built for passenger and cargo transportation. The guideline consists of two main parts covering the construction phase of railways and maintenance of the railway infrastructure, locomotive and engine services and other maintenance activities.

- WBG EHS Guidelines for Construction Materials Extraction:

The WBG EHS Guidelines for Construction Materials Extraction outline environmental, health, and safety standards for the extraction, processing, and transportation of construction materials such as aggregates, limestone, slate, sand, gravel, clay, gypsum, feldspar, silica sands, quartzite, and dimension stone, aiming to minimize impacts on workers, communities, and the environment.

The following IFC guidance documents will be taken into consideration for the assessment and management of social and environmental aspects of the Project, where relevant:

- 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)

2.5.2 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. Relevant information is presented in Chapter 5.1.

2.6 Project Environmental and Social Categorization

The World Bank classifies all projects, including projects involving Financial Intermediaries (FIs), into one of four classifications: High Risk, Substantial Risk, Moderate Risk or Low Risk. In determining the appropriate risk classification, the WB takes into account relevant issues, such as the type, location, sensitivity, and scale of the project; the nature and magnitude of the potential environmental and social risks and impacts; and the capacity and commitment of the Borrower (including any other entity responsible for the implementation of the project) to manage the environmental and social risks and impacts in a manner consistent with the ESSs. Other areas of risk may also be relevant to the delivery of environmental and social mitigation measures and outcomes, depending on the specific project and the context in which it is being developed. These could include legal and institutional considerations; the nature of the mitigation and technology being proposed; governance structures and legislation; and considerations relating to stability, conflict or security. The WB discloses the project's classification and the basis for that classification on the WB's website and in project documents.

Both the environment and social risks of the Project have been rated as "Substantial". Two categories of risks are recognized: (i) those that relate to the impacts of project activities; and (ii) contextual risks. The former relates to: civil works related environmental disturbances, habitat degradation and land acquisition and resettlement. The latter, contextual risks, at times, could have a bearing on security to contractors and community safety. All the risks are identifiable and manageable. Environmental and social risks are limited to the impacts associated with railway construction and operation phases such as: (i) air pollution and noise from construction machinery and quarries and operation phase noise and vibration impacts, (ii) soil disturbance and loss during earthmoving, (iii) tree-cutting and loss of vegetation, pest management, (iv) waste generation and management (including hazardous waste), (v) construction camp management, (vi) community health and safety (traffic safety, earthquakes, avalanches etc.), (vii) labor and working conditions (including occupational health and safety), (viii) land acquisition induced physical and economic displacement for individuals and businesses, and (ix) potential impacts on culturally and naturally protected areas.

2.7 Gap Analysis

Major gaps between national legislation and WB ESSs are summarized in Table 8.

Table 8. Comparison Between National Legislation and WB ESSs

ESS*	Gaps between the Turkish Legislation and WB ESSs	Measures to Bridge Gaps/Standards to be Followed in this Project
ESS1 **Assessment and Management of Environmental and Social Risks and Impacts**	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 (CIA) 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.	According to the national EIA Regulation projects are classified into two categories as Annex I and Annex II projects, which is mainly based on magnitude or capacity of planned investment, rather than associated risks and impacts. Therefore, Projects are screened with respect to Annex I and Annex II of the EIA Regulation. However, The WB classifies all projects into one of four classifications: High Risk, Substantial Risk, Moderate Risk or Low Risk by taking into consideration the type, nature, location, sensitivity and scale of the Project, proportional to the significance of the Project's potential environmental and social risks and impacts. Projects are screened on a case-by-case basis. In this respect, this project is exempt from the national EIA Regulation, but it has been determined as Substantial risk under the WB ESF. In order to address this gap, within the scope of the Project, ESMP and relevant E&S sub-management plan (including Construction Impacts Management Plan, Community Health and Safety Management Plan, Community Relations Management Plan, Employment and Training Plan, Aggregate Management Plan, Traffic (Transportation) Management Plan, Cultural Heritage Management Plan, Pollution Prevention Plan, Waste Management Plan, Emergency Preparedness and Response Plan, Occupational Health and Safety Management Plan, and Critical Habitat Assessment and Biodiversity Management Plan, Labor Management Procedure) have been prepared together with this ESIA in line with WB ESF. Moreover, SEP including Grievance Mechanism (GM) has also been prepared to develop a gender-sensitive grievance mechanism procedure that also includes employee complaints, where anonymous complaints can be reported, and to eliminate/close this gap.
ESS2	Turkish national laws and regulations are generally close to the requirements of ESS2 in labor and working conditions. The grievance	Labor Management Procedures have been prepared for the RLIP. Moreover, the Contractor will prepare project level Labor Management

ESS*	Gaps between the Turkish Legislation and WB ESSs	Measures to Bridge Gaps/Standards to be Followed in this Project
Labor and Working Conditions	mechanism for workers is the most important gap between the national legislative requirements and ESS2. There are no specific requirements for the establishment and implementation of a grievance mechanism in Turkish national legislation. Türkiye is party to a multitude of ILO conventions, including but not limited to conventions on equal treatment of employees, gender equality, child labor, forced labor, Occupational Health and Safety (OHS), right of association and minimum wage. Accordingly, the current Turkish Labor Law (No.4857) is to large extent consistent with international requirements.	Plan accordingly, including measures to ensure gender equality and anti-discrimination, prevention of Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH), child labor, forced labor, and protection of labor rights and freedom of association. Workers will receive written contracts and be provided with access to Workers' Grievance Mechanism.
ESS3 **Resource Efficiency and Pollution Prevention and 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. 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 good international industry practice, as reflected in internationally recognized standards, such as the World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines.	Sub-management plans related to environmental issues have been prepared by considering both national legislation and international standards. 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) has been applied in the project specifications.
ESS4 **Community Health and 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 impacts and violence-based risks are more prominent under the ESS4 along with cumulative assessment and communication mechanism with external stakeholders.	A Community Health and Safety Management Plan has been prepared by considering both national legislation and international standards and by ensuring effective implementation of the Grievance Mechanism.

ESS*	Gaps between the Turkish Legislation and WB ESSs	Measures to Bridge Gaps/Standards to be Followed in this Project
ESS5 **Land Acquisition, Restrictions on Land Use and Involuntary Resettlement**	Turkish legislation on land acquisition basically corresponds to the requirements envisaged by ESS5. However, some gaps include Resettlement Plan (RP) preparation, the implementation of the plan, impact assessment on vulnerable groups, restoration of land-based livelihoods and the lack of recognition of informal land users and squatters. There are the following gaps between Turkish national legislation and international standards on land acquisition: ▪ Buildings and structures are compensated with depreciations; therefore, full replacement cost is not provided. ▪ According to the Resettlement Law (Law No. 5543), compensation in kind cannot be made except resettlement by the state. ▪ Disclosure and stakeholder engagement, Project level grievance mechanism are not defined as a part of the land acquisition process, ▪ Entitlements defining are limited to the legal title holders of the assets or lands for National Legislation; informal, users, tenants, common land users are not defined as beneficiary and the PAPs without recognizable claims are not eligible for expropriation compensation. ▪ In Turkish Resettlement Law, the cut-off date is defined a three-year residence time limit for non-owners. ▪ Restoration of livelihoods of PAPs is not covered in national legislation and no requirements are defined for the displaced poor or other vulnerable groups to improve their socioeconomic situation.	Within the scope of the ESS5, the Project includes a Project-specific ESIA report with mitigation measures on eliminating the negative impacts that may occur on the fixed assets, agriculture and livestock livelihoods of the local people during the construction or transportation process, and a risk assessment regarding the loss of livelihood and economic displacement of the local people in accordance with the WB requirements. A Resettlement Plan has been developed including livelihood restoration plan in accordance with the potential livelihood losses caused from the Project impacts, based on the determination of livelihoods of local people, socioeconomic status of households and vulnerable groups in accordance with WB ESS5 requirements.
ESS6 **Biodiversity Conservation and Sustainable Management of Living Natural Resources**	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 requirement for habitat assessment in national legislation as well.	Biodiversity assessments made within the scope of the ESIA cover internationally recognized areas of high biodiversity value and habitat assessment and Critical Habitat Assessment and Biodiversity Management Plan has been prepared in this respect.
ESS8 **Cultural Heritage**	The national legislation covers most of the requirements of the ESS8. However, as ESS8 defines the cultural heritage covering both tangible and intangible heritage, Law No. 2863 covers mainly the movable and immovable tangible cultural and natural assets. Under ESS8, the preparation of the Chance Find Procedure is primarily expected during construction activities, especially for the protection of tangible cultural heritage. In contrast, for intangible forms such as socio-	In terms of cultural management, intangible cultural heritage will be considered within the scope of the ESIA, and the Cultural Heritage Management Plan, including the Chance Find Procedure, has been prepared as one of the annexes of the ESMP document.

ESS*	Gaps between the Turkish Legislation and WB ESSs	Measures to Bridge Gaps/Standards to be Followed in this Project
	cultural aspects, the implementation of a code of conduct and providing training to all employees become prominent compared to the national legislation.	
ESS10 **Stakeholder Engagement and Information Disclosure**	Under the Turkish EIA legislation, the EIA Report for projects listed in Annex-I will be made available to the public at the headquarters of the MoEUCC or at provincial directorates. Following the MoEUCC's final assessment of the EIA report, the Governor's Office will publicly disclose its reasoned decision. For projects listed in Annex-II, the final Project Introduction File (PIF) will be disclosed publicly at the Provincial Directorates. Similar to the World Bank's approach, public information and consultation meetings are held only for projects listed in Annex-I of the Turkish EIA Regulation.	SEP including GM has been prepared. SEP/GM will also be disclosed to stakeholders in accordance with the WB requirements.

*ESS7 “Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities” and ESS9 “Financial Intermediaries (FIs)” are not applicable to this Project.

Environmental and Social Instruments to be Implemented

Since environmental and social risk categorization of the project was determined as "Substantial", the following E&S instruments have been prepared along with the preparation of the ESIA Report by considering both national legislation and international standards:

- Environmental and Social Management Plan (ESMP)
  - Construction Impacts Management Plan (CIMP)
  - Community Health and Safety Management Plan (CHSMP)
  - Community Relations Management Plan (CRMP)
  - Employment and Training Plan (ETP)
  - Aggregate Management Plan (AGM)
  - Traffic (Transportation) Management Plan (TTMP)
  - Cultural Heritage Management Plan (CHMP)
  - Pollution Prevention Plan (PPP)
  - Waste Management Plan (WMP)
  - Emergency Preparedness and Response Plan (EPRP)
  - Critical Habitat Assessment and Biodiversity Management Plan (CHA-BMP)
  - Occupational Health and Safety Management Plan (OHSMP)
- Labor Management Procedures (which will form the basis for the Labor Management Plan to be prepared by the Contractor)
- Stakeholder Engagement Plan (SEP) including Grievance Mechanism
- Resettlement Plan (RP)

Additionally, contractors and subcontractors are required to have their own ESMS and site-specific E&S management plans.

Within the scope of the project, ESHS trainings have been provided to DGII Project Implementation Unit (PIU) for capacity improvement. During the physical disclosure of the ESIA package, project posters and leaflets have been also prepared in order to increase project awareness and inform stakeholders.

3 PROJECT DESCRIPTION

The last mile of railway connecting Filyos Port and the Filyos Industrial Zone holds significant strategic and logistical importance. A design speed of 50 km/h has been targeted for the railway, determined by considering both its suitability for freight transport and the region's topographical conditions.

This project not only supports regional economic development but also plays a critical role in expanding and strengthening national logistics networks. In designing the route, careful attention has been paid to preserving the natural environment and creating infrastructure that aligns with the region. Additionally, integrating with existing railway networks has been prioritized to optimize transportation capacities in the area.

3.1 Project Route

3.1.1 Settlements along the Route

The project route is planned in an area within the boundaries of Filyos Town, located in the Çaycuma District of Zonguldak Province. The route begins northwest of Derecikören Village and follows the surrounding natural geographical features, passing to the northeast of Gökçeler Village. Along the route, there are various natural and artificial obstacles, the most significant of which is the Filyos River, to be crossed via a bridge. After crossing the Filyos River, the route continues through the TPAO facilities, extending to the end of the eastern quay at Filyos Port, which is positioned west of Sazköy Village (see Figure 12).

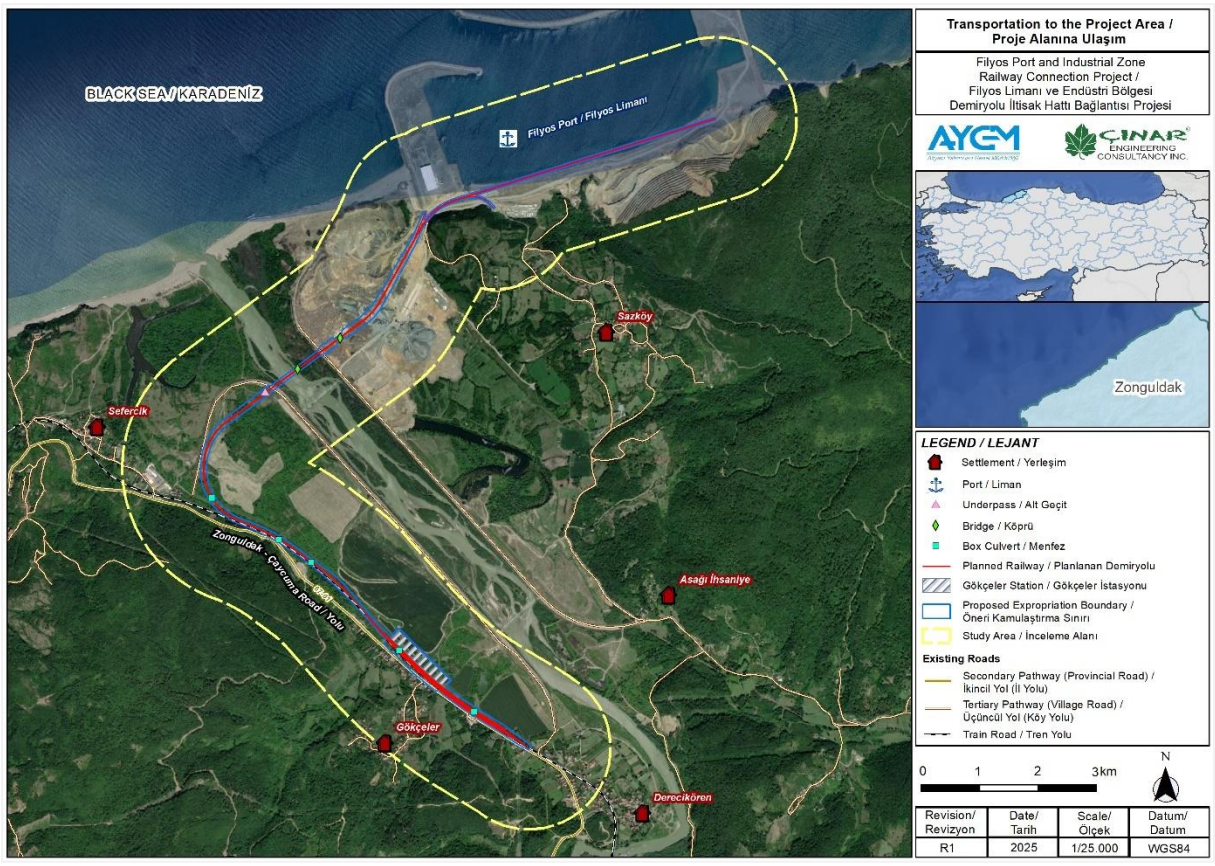


Figure 12. Filyos Sub-Project Route and Surrounding Settlements

3.1.2 Land Use Characteristics and Land Ownership

According to the land use/land cover data of the Ministry of Agriculture and Forestry, there are fallow-free dry land agricultural areas, residential areas, forests and river flood plains on the project route and construction site.

3.1.3 Legally Protected Areas of High Biodiversity Value

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 constitute an integral part of biodiversity conservation efforts, as well as ecosystem services provided by ecological functions they convey. In Türkiye, Ministry of Agriculture and Forestry is the main official body responsible for development and implementation of national biodiversity conservation policies, action plans, designation of conservation areas, and many other related tasks conducted by its central and local directorates within the Ministry's organizational structure. IUCN Protected Area Management Categories (Dudley et al.,2013) were adopted to restructure the Turkish Protected Area System in 2006 through the Biodiversity and Natural Resource Management Project undertaken by the Ministry's General Directorate of Nature Conservation and National Parks (Thomas, 2006). The IUCN Protected Area Management Categories provide a global framework and is recognized by the Convention on Biological Diversity, with an initial objective of creating 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 following:

- assignment to a category is a not a commentary on management effectiveness,
- the categories 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 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 9. Considering the distances between the railway route and the legally protected areas in the region, it is considered that there will be no Project-related impacts on these areas.

Table 9. Legally Protected Areas near the Project Route

Protected Area	IUCN Protected Area Category	Distance to the Project Route (km)
Güzelcehisar 1st Degree Natural Protected Area	Ia	8.96
Bartın Creek 1st Degree Natural Protected Area	Ia	15.58
Göldağı Nature Park	V	16.83
Balamba Nature Park	V	23.14
Milli Egemenlik Nature Park	V	24.30

3.1.4 Internationally Recognized Areas of High Biodiversity Value

In Türkiye, besides the Ministry's official work, there are various non-governmental organizations (NGOs), academic entities, as well as individual researchers and professionals who work in collaboration or independently to better understand Türkiye's natural resources and put forward effective conservation strategies to ensure survival of habitats and species, some of which constitute unique ecosystems of global conservation value.

Doğa Derneği, published an inventory on Key Biodiversity Areas (KBAs) in Türkiye in 2006 in collaboration with then the Ministry of Environment and Forestry, integrating survey results across the country with expert opinions (Eken et al., 2006). The preparation of the inventory was the first time the KBA approach was applied at a national scale, which was based on principles developed by BirdLife International for bird species in their "Important Bird Areas" studies. One of the fundamental functions of the inventory is defined as "providing resource for areas and species that should be worked upon to reach zero extinction".

Amasra Coasts is one of the KBAs identified by the inventory, which covers areas of about 17,413 hectares within Amasra, Bartın Central district and Çaycuma district boundaries of Zonguldak Province. The altitude changes from sea level to 480 meters in the KBA, where there are deciduous forests, pseudomaquis, coastal dunes and maquis assemblages. A portion of the Project Area lies within the Amasra Coasts KBA; therefore, potential project-related impacts on the biodiversity values of this KBA have been assessed. Considering the scale, nature, and location of the project activities, it has been determined that the works will not exert pressure that could disrupt habitat integrity, adversely affect species populations, or compromise the ecological functioning of the KBA. The working area is spatially limited, and the land-use changes associated with the project do not interfere with the broader ecosystem processes of the KBA. Accordingly, no significant or long-term project-related impacts are anticipated on the Amasra Coasts KBA. Additionally, the Project Area is located immediately adjacent to the boundary of the Sofular Hills KBA, and there is no direct overlap with this KBA. Due to its proximity to the KBA boundary, potential indirect effects have been assessed, and it has been concluded that the project activities do not extend beyond the designated working area, do not cause habitat loss, and do not create pressures that could compromise the integrity of the KBA. Therefore, no significant or lasting impacts are expected on the Sofular Hills KBA.Internationally recognized areas of high biodiversity value map including project area and AoI is provided in Figure 13. In addition, project-specific mitigation measures have been defined and incorporated into the ESMP to further avoid and minimize potential impacts. These measures include restricting construction activities strictly to designated working areas, preventing unnecessary vegetation clearance, implementing erosion and sediment control measures, and ensuring proper waste and wastewater management to avoid secondary impacts on sensitive habitats. Standard mitigation and good international industry practice measures outlined in the ESMP will also apply to activities near the KBA boundary, ensuring that indirect impacts are effectively managed.

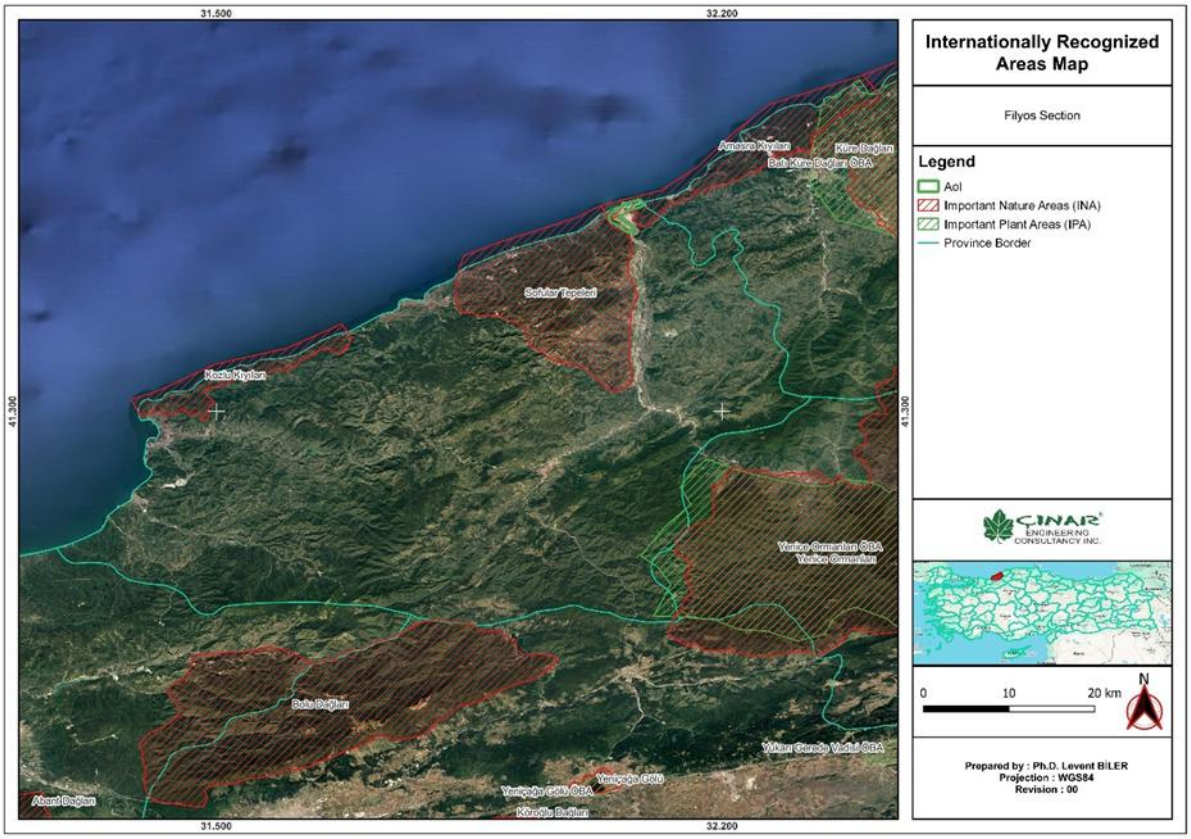


Figure 13. Internationally Recognized Areas of High Biodiversity Value Map

3.2 Project Components

3.2.1 Railway Connection Lines

The project line begins at the Gökçeler Station on the Irmak-Zonguldak Railway line. As a result of improvement works, the station area has been expanded to a total of five tracks, with four additional tracks added next to the existing one. Additionally, the Gökçeler Station, located between KM=0+000 and KM=1+200, includes a 300-meter-long loading ramp for the industrial area to the right of the station, allowing it to utilize the railway line, as well as a platform building for passenger transportation.

After the station area, the project route continues as a double track alongside the existing line, heading northwest from KM=1+200, with the second track added to the right of the existing line. The route becomes a double track at the M12 switch located at KM=1+427. In this section, the project elevation has been designed at an altitude of 6.670 meters, with a vertical grade of ‰0.000, extending to KM=2+630.

Between KM=2+200 and KM=3+100, the project route diverges from the existing line and turns northeast with a horizontal curve of 350 meters in radius. Vertically, the route ascends with a grade of ‰7.804 to cross the Filyos River. In this section, the project elevation rises from 6.670 meters to 11.000 meters. Two circular vertical curves, each with a radius of 20,000 meters, have been used in the design of the vertical alignment.

In the continuation of this section, the Filyos River Bridge, which is 387.50 meters long and consists of 12 spans, has been designed between KM=3+359.420 and KM=3+746.920. The bridge is aligned with both the horizontal and vertical alignments. This bridge enables the project route to cross from the south bank to the north bank of the Filyos River at a hydraulically appropriate height.

Immediately after the bridge, the route enters the Individual Investment Zone, owned by Turkish Petroleum Corporation (TPAO). In this section, a 74-meter-long Pipe Crossing Railway Bridge has been designed between KM=3+849 and KM=3+923 to prevent filling over the safe approach boundaries indicated by TPAO, where critical infrastructure related to the operation of the facility (including natural gas pipelines, MEG pipeline, umbilical pipeline, HDPE water recovery line, and electric and fiber optic cable lines) is located. This bridge ensures the safety of these infrastructures and facilitates their maintenance. All work within the TPAO area has been conducted in accordance with the conditions requested by TPAO.

Along with the bridge mentioned, the project elevation descends from 11.000 meters to the port area elevation of 3.500 meters with a vertical grade of 7.200‰. In the design of the vertical alignment, two circular vertical curves, each with a radius of 20,000 meters, have been used once again.

In the section following the bridge, the horizontal project alignment is positioned between the existing diversion canal and the internal port access roads, facilitated by a horizontal curve with a 400-meter radius between KM=4+050 and KM=4+250. Continuing in the northeast direction, the project line aligns with the southern port area via a horizontal curve with a 350-meter radius between KM=4+720 and KM=5+030. From KM=4+950 to the end of the project, the railway will be constructed as slab track.

Finally, the project line terminates at KM=6+685.908.

To facilitate future expansion of the project, connections to the West Pier and East Pier will be established through the design of the M15 switch at KM=4+650 and the M16 switch at KM=5+068, respectively.

3.2.2 Engineering Structures

The connection line within the project is designed as a double track with a total length of 6,685.5 meters. Of this, 1,735.5 meters will be constructed as slab track (concrete-based rail system). At Gökçeler Station, a total of 3,021 meters of additional track will be added, along with a 393-meter-long track designed for planned future quay extensions, bringing the total rail length to 16,785 meters. The operational speed of the line is set at 50 km/h.

The main works to be carried out within the scope of the project are as follows:

- A station with a 300-meter-long loading platform and associated structures, with a total length of 1,280 meters.
- 17 units of 1/9 switches.
- 1,735.5 meters of slab track construction for the Filyos Port Area.
- 4 box culverts, each 2.00x2.00 meters, totaling 207.63 meters in length.
- 1 box culvert, 10.00x5.00 meters, with a total length of 16.65 meters.
- 1 underpass, 12.00x5.00 meters, with a total length of 30.77 meters.
- 1 Filyos River Railway Bridge, 387.50 meters long.
- 1 Pipe Crossing Railway Bridge, 74.00 meters long.

The list of planned new culverts and underpasses is provided in Table 10 whereas the list of bridges is provided in Table 11.

Table 10. List of Culverts and Underpasses

Culvert or Underpass		Dimension	Type	FL (m)	MY	Skew (Gr)		Length (m)		
No	KM					Angle	Direction	Left	Right	Total
1	0+399.99	2.00 x 2.00	Box Culvert	1.302	% 2.00	0.31	Left	13.86	34.53	48.39
2	1+001.81	2.00 x 2.00	Box Culvert	0.971	% 2.00	0.17	Left	14.20	92.45	106.65
3	1+767.53	2.00 x 2.00	Box Culvert	1.943	% 1.00	1.60	Left	10.65	15.67	26.32
4	2+008.93	2.00 x 2.00	Box Culvert	1.281	% 1.00	1.38	Right	17.47	8.80	26.27
5	2+504.18	10.00 x 5.00	Box Culvert	-1.102	% 1.00	0.51	Left	10.51	6.14	16.65
6	3+322.04	12.00 x 5.00	Box Underpass	0.408	% 1.00	0.70	Right	19.12	11.65	30.77

Table 11. List of Bridges

Bridge Name	Start Km	End Km	Length	Purpose
Filyos River Railway Bridge	3+359.420	3+746.920	387.50 m	Hydraulic
Pipeline Pass Railway Bridge	3+849.000	3+923.000	74.00 m	Pipeline Pass

3.2.3 Associated Facilities

The associated facilities for the Project are substations for electrification of the railways, including the catenary, signaling and telecommunication systems along with electricity transmission lines.

Technical details of the associated facilities have not been determined yet and will be identified by the Contractor to be assigned to the project. The environmental and social impacts of the energy transmission line and substation (including resettlement subjects) as well as respective mitigation measures will be analysed and determined by DGII (and Design and Supervision Consultant) under supplementary site-specific ESMP in line with WB ESF requirements when the locations and technical specifications of these facilities are finalized prior to the construction activities. These supplementary ESMP's will be subject to WB approval. The operation of the energy transmission line and substation will be in line with the World Bank ESF requirements along with national legislation.

3.2.4 Related and Auxiliary Facilities

3.2.4.1 Quarries and Material Borrow Sites

Aggregate Material will be required during the construction phase of the project. But the types and volumes of materials to be used during the feasibility study have not been specified. The assigned contractor will define the roadmap and approach.

If the contractor decides to use materials sourced from licensed quarries, it must be ensured that these quarries have either an 'EIA Positive' or 'EIA Not Required' decision, along with the necessary environmental permits.

When quarries and borrow sites are identified, additional environmental and social assessments will be conducted by the DGII (and Design and Supervision Consultant) prior to the construction phase, using the impact assessment approach given in this ESIA report, and in a manner acceptable to the World Bank. After the need for material is met, air quality & noise & vibration assessments related to the quarries will be performed and activities for reinstatement will be planned. The Contractor will be required to design, open and manage quarry sites in line with WB ESS, WBG EHS Guidelines and Good International Industrial practices (GIIP) in addition to national requirements.

The environmental and social impacts of the areas will be assessed according to the Management of the Change Process detailed in the ESMP. The environmental and social impacts, along with the respective mitigation measures, will be analyzed and determined in a supplementary site-specific ESMP prepared by the assigned contractor.

3.2.4.2 Excavated Materials Storage Sites

Within the scope of the project, appropriate storage areas for the excavation material storage will be identified by the assigned contractor. Wherever possible, excavated materials will be reused for backfilling and landscaping purposes. The management of surplus excavated materials will be evaluated based on the contractor's proposed approach or roadmap, under the coordination of DGII, in a manner that minimizes environmental and social impacts and avoids new land use or occupation. All activities carried out will be ensured to comply with WB ESSs, WBG EHS Guidelines, GIIP in addition to national requirements.

The environmental and social impacts of the areas will be assessed according to the Management of the Change Process detailed in the ESMP. The environmental and social impacts, along with the respective mitigation measures, will be analyzed and determined in a supplementary site-specific ESMP prepared by the assigned contractor.

3.2.4.3 Construction Camp Sites

The contracted workers will be accommodated in “camp sites”, meeting the requirements of national labor legislation and WB ESSs. The construction camp sites to be used in the land preparation and construction phases of the project have not been determined yet and the site selection will be made within the scope of the items described below.

In addition, working environment, workplaces and accommodation places will be in line with all requirements covered by Article 26-28 of the Environmental and Social Standard 2. Labor and Working Conditions, Section D: Occupational Health and Safety (OHS) requirements of The World Bank Environmental and Social Framework.

The Contractor will ensure that the accommodations provided for workers are away from hazards created by the construction work, in good hygiene standards, with fresh drinking water, clean beds, enough blankets, restrooms and showers, clean bedrooms, good illumination, lockers, proper ventilation, safe electrical installation, fire and lightening protection, separate cooking and eating areas. There will be separate facilities provided for men and women.

According to Regulation on OHS in Construction Works (Article 59-65), accommodation places for workers:

- should be non–flammable,
- should be away from hazards created by the construction work,
- have heating, cooling and ventilation systems, electrical installations and lighting systems,
- have sufficient width and sufficient number of tables and chairs, enough bedsteads, beds, blankets, a recreation room,
- have an adequate shower, toilet, washbasin and cleaning equipment etc.

As indicated in the World Bank’s Appraisal Environmental and Social Review Summary[8] (2020) for the Rail Logistics Improvement Project, the camp sites previously utilized in nearby construction areas by other entities are planned to be used during the construction phase. Nevertheless, the footprints of the camp sites are yet to be identified. The information related to relevant baseline and impacts about the camp sites will be available after the contracting company is assigned. The additional studies for baseline data collection and environmental and social impact assessment for camp sites will be performed by DGII and the Contractor in line with World Bank Environmental and Social Framework requirements.

The environmental and social impacts, along with the respective mitigation measures, will be analyzed and determined in a supplementary site-specific ESMP prepared by the assigned contractor.

3.2.4.4 Access Roads

Access roads to be used during the land preparation and construction phases of the project have not yet been determined. As outlined in the World Bank’s Concept Appraisal Environmental and Social Review Summary (2020) for the Rail Logistics Improvement Project (Improving Rail Connectivity Project) in Türkiye, the utilities of existing construction sites in the region, including the Filyos Industrial Zone, Individual Investment Zone, and Filyos Port, are planned to be used to the extent possible.

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[8] Appraisal Environmental and Social Review Summary (ESRS) – Rail Logistics Improvement Project – P170532 - https://documents.worldbank.org/en/publication/documents-reports/documentdetail/500511589912913671/appraisal-environmental-and-social-review-summary-esrs-rail-logistics-improvement-project-p170532

If new access roads are deemed necessary based on the results of additional studies to be conducted during the final design stage by the assigned contractor, the environmental and social impacts of these roads will be identified and assessed through the Management of Change Process, as detailed in the ESMP. This will be in accordance with the World Bank Environmental and Social Framework requirements. The environmental and social impacts, along with the respective mitigation measures, will be analyzed and determined in a supplementary site-specific ESMP prepared by the assigned contractor.

3.3 Project Activities

3.3.1 Land Preparation and Construction Activities

The main activities to be carried out within the scope of land preparation and construction will include:

- Geodetic and topographic studies, mapping studies,
- Preparation of implementation projects and expropriation plans,
- Initial fieldwork activities (root ball removal, chopping, off-site transfer etc.),
- Earthworks (excavation and fill works, soil leveling, soil compaction, soil stabilization, etc.),
- Rail compression, rail welding, rail stretching, rail lubrication, rail grinding, rail system switch assembly works,
- Construction of engineering structures,
- Construction of railway superstructure elements (ballast and lower ballast layers, ties and connections and railway lines),
- Construction of Gökçeler Station (all rough and fine construction works and electrical and mechanical installation works of the station),
- Electrification, signalization and telecommunication works.

3.3.1.1 Earthworks

The projected details of the excavation activities to be undertaken as part of the project are presented in Table 12 and Table 13, respectively, concerning earthworks and topsoil.

Table 12. Information Regarding Earthworks

Excavation Works					
Km	**Excavation Length (m)**	**Excavation Depth (m)**	**Excavation Width (m)**	**Excavation Volume (m³)**	**Excavation Volume (tons)**
0+000.00-1+510.00	1,510.00	1.29	22.8	44,412.12	71,059.39
1+700.00-1+790.00	90.00	0.06	17.7	95.58	152.93
2+120.00-2+340.00	220.00	0.10	20.6	453.20	725.12
Total	**1,820.00**	**-**	**-**	**44,960.90**	**71,937.44**

Table 13. Information Regarding Topsoil

Topsoil					
Km	**Excavation Length (m)**	**Excavation Depth (m)**	**Excavation Width (m)**	**Excavation Volume (m³)**	**Excavation Volume (tons)**
0+000.00-0+300.00	300.00	0.30	21.1	1,899.00	3,038.40
0+300.00-0+915.00	615.00	0.30	28.2	5,202.90	8,324.64

Topsoil					
Km	**Excavation Length (m)**	**Excavation Depth (m)**	**Excavation Width (m)**	**Excavation Volume (m³)**	**Excavation Volume (tons)**
0+915.00-1+744.00	829.00	0.30	19.0	4,725.30	7,560.48
1+744.00-2+140.00	396.00	0.30	11.0	1,306.80	2,090.88
2+140.00-2+720.00	580.00	0.30	14.6	2,540.40	4,064.64
2+720.00-3+359.42	639.42	0.30	25.4	4,872.38	7,795.81
3+359.42-3+746.92	387.50	-		-	-
3+746.92-3+849.00	102.08	0.30	28.0	857.47	1,371.96
3+849.00-3+923.00	74.00	-		-	-
3+923.00-4+650.00	727.00	0.30	23.3	5,081.73	8,130.77
4+650.00-6+685.51	2,035.51	-	-	-	-
Total	**6,685.51**	**-**	**-**	**26,485.98**	**42,377.57**

At this stage, it should be noted that the final details will be determined upon the preparation of the work plan, following the appointment of the contractor, and will depend on the machinery and equipment to be utilized as well as the number of personnel to be assigned. The excavation works are anticipated to take approximately 5 months.

3.3.1.2 Construction Material Requirements

During the construction phase, aggregate materials, water, bitumen, additives, etc. will be used.

3.3.1.3 Use of Hazardous Substances

It is not anticipated that blasting will be required for excavation activities within the scope of the project. Taking into account all potential contingencies, including the material borrow areas, assessments have been conducted based on a worst-case scenario.

Ammonium nitrate / fuel oil (ANFO), an explosive consisting of ammonium nitrate and diesel fuel, can be used in the project route, where soil and rocks cannot be excavated using standard equipment. ANFO is an explosive substance obtained by mixing ammonium nitrate with fuel oil (or diesel oil) by 5-6%. It is the most consumed mixture in the world and Türkiye because it is cheaper and safer. Detonation rate reaches 4,400 m / s in a blasting hole with a diameter of 250 mm. Therefore, ANFO cannot reach a constant detonation speed in holes with diameters less than 25 mm. Ideally, ANFO achieves the highest velocity of detonation in medium and large diameter (75-250 mm) holes. In order for ANFO to be detonated, it must be fired with a higher primer (dynamite, etc.)

During the blasting operations, firstly, the holes where explosives will be placed in the blasting area will be opened with the help of the wagon-drill tool. ANFO will be placed in a sufficient amount (depending on the rock structure in the area to be blasted) in the holes drilled. After inserting ANFO explosive material into the holes, dynamite and then delayed detonators will be placed as igniters. After the delayed detonators are placed in the holes, the tightening process will be applied to close the holes, and then detonating will be performed after the necessary safety measures are taken.

In addition to blasting materials, fuels that will be used for construction equipment and machinery create hazardous material requirements.

3.3.1.4 Construction Machinery and Equipment

The types and number of vehicles planned to be used in the construction phase of the project are as follows:

Table 14. Types and number of vehicles planned to be used in the construction phase of the project

Equipment	Number
Excavator (minimum 20 tons)	5
Truck (minimum 10 tons)	10
Roller (minimum 6 tons)	2

* Following the commencement of the work, the equipment requirements may vary depending on the on-site work schedule of the appointed contractor, the progress rate, and the contractor's detailed equipment plan.

3.3.2 Operation and Maintenance Activities

Filyos Port and Industrial Zone Railway Connection Project will be handed over to TCDD after completion of its construction.

Line Cleaning

The fact that there is no element on the line that may affect the train movement is essential for the proper operation of the railway's operational activities. Regular inspections will be carried out in order to detect and clean the stones and rock pieces that can be found on the line. In addition, especially in the autumn season, the accumulation of leaves on the railway line caused by the defoliation from trees is one of the most important reasons for the trains to experience wheel damage[9]. As a result of the leaves being crushed by trains and contacting with rain, a rough and teflon-like layer forms on the rails, which may pose risks such as wheel slippage and skidding. In order to prevent this situation, regular inspections will be made on the line and to ensure that the line is clean. Moreover, the use of pesticides may be necessary for clearing railway vegetation as part of maintenance work.

Railway Failures

On the railway route, the suitability and robustness of the rails will be regularly monitored, and the safety of the rails will be inspected by the operating personnel, especially in the culverts, which are likely to experience breakage and cracking.

General Maintenance

Maintenance work will consist of routine and heavy maintenance. The Operation and Maintenance Contractor will be responsible for routine maintenance work. All operation and maintenance work will be carried out in accordance with the Conditions of Implementation Agreement, international standards and relevant national legislation. No construction activities have been planned other than regular maintenance activities on the road during the operation period. Routine maintenance tasks will generally include:

- General maintenance tasks (e.g. garbage collection, cleaning, sweeping, protecting wall cleanliness, removal of residues, watering of any kind of plants, oil, diesel, chemicals, detergents, objects, materials or similar things on road cover, removal of

9 http: //www.railway-technical.com/trains/train-maintenance/

damaged, defective or fuel-free vehicles, supply and renewal of all consumables during the operating period, snow removal including winter maintenance and de-icing, repair of all kinds of equipment caused by accidents, theft incidents or railway equipment maintenance and repair work, replacement of the operation equipment at the end of its life, change of equipment etc.);

- Inspections and investigations (e.g. routine visual inspections of the railway that do not require any training or equipment other than hand tools or similar non-special equipment, conducting routine, periodic or special inspections of the railway);
- Repair works (e.g. repair of holes, filling cracks on asphalt or concrete surface) or asphalt and concrete pavement maintenance including re-coating to a certain extent repair and renewal of asphalt or concrete curves to a certain extent (including poles, foundations, clamps, etc. or a certain extent of the walls), accidents, theft or repair / replacement of metal railings, tension cable type railings or concrete / plastic barriers due to operation failure;
- Maintenance of electrical and non-electrical signs;
- Maintenance and repair of lighting equipment;
- Landscaping work (e.g. maintenance of green areas, mowing, weeding, etc.);
- Dyes;
- Maintenance and repair of mechanical and electrical systems and components, traffic and toll systems, communication systems, traffic management systems, SCADA[10] systems etc.

3.4 Project Workforce

During the project's land preparation and construction phases, approximately 200 people will be involved, with 150 working for the contractor and the remaining personnel working for the design and supervision consultant team. This workforce will include heavy construction machine operators, railway superstructure and line workers, railway and highway infrastructure workers, workers involved in superstructures and engineering structures, station building construction workers, electromechanical workers, engineers, technicians, and other support staff.

The number of TCDD personnel foreseen to be employed during the operation phase is not determined yet. The evaluations have been conducted based on the assumption that approximately 50 people will be working.

3.5 Implementation Program

The estimated signing date of the contract is June 2025. The construction phase of the project is 2 years and defect notification period (DNP) is 1 year. Therefore, the Project is planned to be completed approximately in mid-2028.

[10] Supervisory Control and Data Acquisition

4 METHODOLOGICAL APPROACH TO IMPACT ASSESSMENT

This Chapter presents the proposed process for undertaking an ESIA for Project and the proposed methodology to be used for the assessment of identified potential impacts, which considers both receptor sensitivity and the magnitude of the impact.

4.1 ESIA Process and Approach to the Assessment

As of October 1, 2018, all investment projects financed by the World Bank are subject to the WB's Environmental and Social Framework (ESF). The ESF ensures that the WB and its borrowers (the beneficiary party) manage projects' environmental and social risks better and improve their development outcomes.

The ESF ensures that environmental and social risks/impacts are addressed comprehensively and systematically. The ESF has made significant progress, including extended roles for grievance mechanisms, on transparency, non-discrimination, public consultation and accountability. The ESF aligns the World Bank's environmental and social principles with that of other development agencies.

The ESF comprises:

- The World Bank’s Vision for Sustainable Development
- The World Bank’s Environmental and Social Policy for Investment Project Financing (IPF)
- The 10 Environmental and Social Standards (ESS), which set out the requirements that apply to Borrowers

The WB also issued the following directives in relation to the ESF:

- Bank Directive: Environmental and Social Directive for Investment Project Financing
- Bank Directive on Addressing Risks and Impacts on Disadvantaged or Vulnerable Individuals or Groups

According to the World Bank's ESF, the Project’s rating has been determined in terms of environmental and social risk as “Substantial”. Therefore, a detailed environmental and social impact assessment was conducted, and 12 additional sub-management plans were prepared according to requirements of World Bank’s ESF and relevant laws and requirements in force in Türkiye.

The site studies of the aforementioned ESIA package studies were completed in January and February 2020 for Phase-1. The ESIA package was disclosed in May 2020[11] and an Environmental and Social Commitment Plan (ESCP) was prepared in June 2020[12]. This ESCP sets out material measures and actions, any specific documents or plans required, as well as the timing for each of these.

The main purpose of Phase-2 studies is to comply with the provisions of any other E&S documents required under the ESF and ESCP. Accordingly, complying with the environmental and social items stated in ESCP were taken into consideration and the whole ESIA package, including the management/sub-management plans listed below, was revised and updated in line with the World Bank standards.

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11 https://aygm.uab.gov.tr/dunya-bankasi-turkiye-de-demiryolu-lojistigini-gelistirme-projesi

12 https://aygm.uab.gov.tr/uploads/pages/dunya-bankasi-turkiye-de-demiryolu-lojistigini-gel/environmental-and-social-commitment-plan-escp.pdf

- Environmental and Social Impact Assessment (ESIA) Report
- Stakeholder Engagement Plan (SEP) including Grievance Mechanism
- Resettlement Plan (RP)
- Labor Management Procedures for RLIP (which will form the basis for the Labor Management Plan to be prepared by the Contractor)
- Environmental and Social Management Plan (ESMP)
    - Construction Impacts Management Plan (CIMP),
    - Community Health and Safety Management Plan (CHSMP),
    - Community Relations Management Plan (CRMP),
    - Employment and Training Plan (ETP),
    - Aggregate Management Plan (AGM),
    - Traffic (Transportation) Management Plan (TTMP),
    - Cultural Heritage Management Plan (CHMP),
    - Pollution Prevention Plan (PPP),
    - Waste Management Plan (WMP),
    - Emergency Preparedness and Response Plan (EPRP),
    - Occupational Health and Safety Management Plan (OHSMP), and
    - Critical Habitat Assessment and Biodiversity Management Plan (CHA-BMP).

4.2 ESIA Methodology

The methodology to be used for characterization of environmental and social impacts/risks arising from the implementation of the Project has been developed based on the methodologies described in the UK's applicable government publications on Environmental Impact Assessment (Institute of Environmental Management and Assessment-IEMA, 2011: The State of Environmental Impact Assessment Practice in the United Kingdom (UK), Scottish Natural Heritage's (SNH) Handbook on Environmental Impact Assessment (2013) and other available guidance documents on impact assessment (Canter, 1993, Standards Association of Australia, 1999, etc.).

In accordance with good ESIA practice, the significance of impacts will be determined based on the sensitivity of the receptor and the overall magnitude of the Project's impact on that specific receptor. The magnitude of the impact is determined using quantitative or, where this is not possible, qualitative methods based mainly on professional judgement. An environmental and/or social impact may be beneficial or adverse. The sensitivity of the receptor will be determined on the basis of the baseline information, which takes into consideration 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 will be determined as a factor of the following magnitude components. The magnitude of an impact or impact is determined by a comprehensive analysis of criteria which may encompass the following:

- 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/rare)

Criteria for magnitude factors are provided in Table 15.

Table 15. Magnitude Factors and Scales

Factor	Scales		
Magnitude	**High**	**Medium**	**Low**
Geographical extent	Wide	Local	Restricted
	Beyond 1,000 m corridor	Within 1,000 m corridor	Within the construction site
Reversibility	Irreversible/Long term reversible	Medium term reversible	Short term reversible
	Reversible after 30 years of operation period or irreversible	Reversible within 30 years of operation period	Reversible within the construction period
Duration	Long-term	Medium-term	Short-term
	After 30 years of operation	Within 30 years of operation	Within the construction period
Frequency	Continuous/Recurrent	Intermittent	One-off/rare

General criteria to be taken into consideration when determining sensitivity of the receptor and the overall impact magnitude are provided in Table 16, whereas specific assessments and methodological variations (if any) for each environmental and/or social component are presented in relevant chapters of the ESIA Report.

Table 16. General Criteria for Identification of Receptor Sensitivity and Impact Magnitude Levels

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

Following the identification of receptor sensitivity and overall magnitude of an impact on that specific receptor, the significance of the impact will be determined by using a standard matrix style approach, which consists of a 4x4 matrix. The matrix and general descriptions of each significance level identified in the matrix are provided in Table 17.

Table 17. Significance Assessment Matrix

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

4.3 Area of Influence (AoI) and ESIA Study Area

World Bank Group ESS1 Guidance Note states that “where the project involves specifically identified physical elements, aspects, and facilities that are likely to generate impacts, environmental and social risks and impacts will be identified in the context of the project’s area of influence (AoI)”, which is defined as to encompass the following:

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

Selecting an AoI for a railway project in line with WBG ESSs involves a comprehensive and systematic assessment of potential impacts on the surrounding environment and communities. Based on the definition of AoI provided above, it is essential to conduct ESIA studies in areas that cover at least the AoI. This means the ESIA study area needs to be broad enough to encompass all the environmental and social impact aspects. Therefore, the study corridor defined for Filyos sub-project consists of 500 m corridor extending each side of the proposed route. The AoI can be revised and enlarged due to other separate Project facilities to be constructed, if necessary.

5 ENVIRONMENTAL & SOCIAL BASELINE, IMPACT ASSESSMENT AND MITIGATION MEASURES

Environmental and social baseline, impact assessment and mitigation measures are given in this chapter in three main sections;

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

Cumulative impact assessment is given in Chapter 6 as a separate section.

PHYSICAL ENVIRONMENT

The topics covered under the physical environment section are the land use, soil and geology, noise, air quality and greenhouse gas emissions, water resources, water quality and wastewater management, resource and waste management along with cultural heritage.

It should be noted that the baseline studies completed in 2020 are mentioned as Phase-1 studies (ESIA preparation phase) and the studies conducted during the ESIA package revision are mentioned as Phase-2 studies.

5.1 Land Use, Soils and Geology

5.1.1 Project Standards and Methodology

Assessment of land use, soils and geology impacts arising from the Project activities have been conducted in line with the World Bank Environmental and Social Standards, assessing the significance of impacts, considering characteristics of the baseline properties, developing effective 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 river flood plain, non-fallowed lands, coastal dunes and forest and residential areas within the Project 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
- 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

Methodology

The impacts on land use, soil and geology have been assessed over the area where the construction and expropriation activities of the project will be carried out. Basic data on land use, soil and geology for the project were compiled from the following sources:

- Land Asset Data of the Ministry of Agriculture and Forestry
- Database of General Directorate of Land Registry and Cadaster
- Geographical Information System (GIS)
- Public Database:
    - General Directorate of Mineral Research and Exploration (MTA)

- Disaster and Emergency Management Presidency (Earthquake Research Department Database)
- Disaster and Emergency Management Presidency (Natural Disasters Database).

The significance of the impacts was assessed based on the sensitivity of the receptors and the overall magnitude of the impact, as described in Section 4.2. The magnitude of the impact is determined using quantitative or, where this is not possible, qualitative methods based mainly on professional judgement.

5.1.2 Baseline Conditions

5.1.2.1 Land Use

The project route remains within the borders of Filyos Town, which is located in the Çaycuma district of the Zonguldak Province. The route begins from the northwest of Derecikören Village and passes through the northeast of Gökçeler Village, crossing the Filyos Creek and passing from the west of the village of Sazköy and ending to the northeast of this village.

The study corridor, AoI, defined for the Project, consists of 500 m corridor extending each side of the proposed route and covers an area of 670.11 hectares. According to the land asset data of the Ministry of Agriculture and Forestry, there are non-fallowed land, residential areas, forest areas, coastal dunes and river floodplains within the AoI. (Figure 14).

As it can be seen from Table 18, a large portion of the AoI is composed of non-fallowed land. Besides, there are river flood plain, coastal dunes, residential and forest areas within the AoI.

Railway bridge passing over Filyos Creek will be located on the area indicated as river flood plain. In the north of the project area, coastal dunes are located in an area of 78.18 hectares. However, this area has already been damaged due to the Filyos Port and Sakarya Gas Field Development Project's construction activities.

Table 18. Land Use Types in the Project AoI

Land Use Type	Total Area (ha)	Percentage
River Flood Plain	55.30	8.26%
Non-fallowed land	383.80	57.27%
Forest	152.38	22.74%
Coastal Dunes	78.18	11.67%
Residential Area	0.44	0.07%
Total	**670.11**	**100.0%**

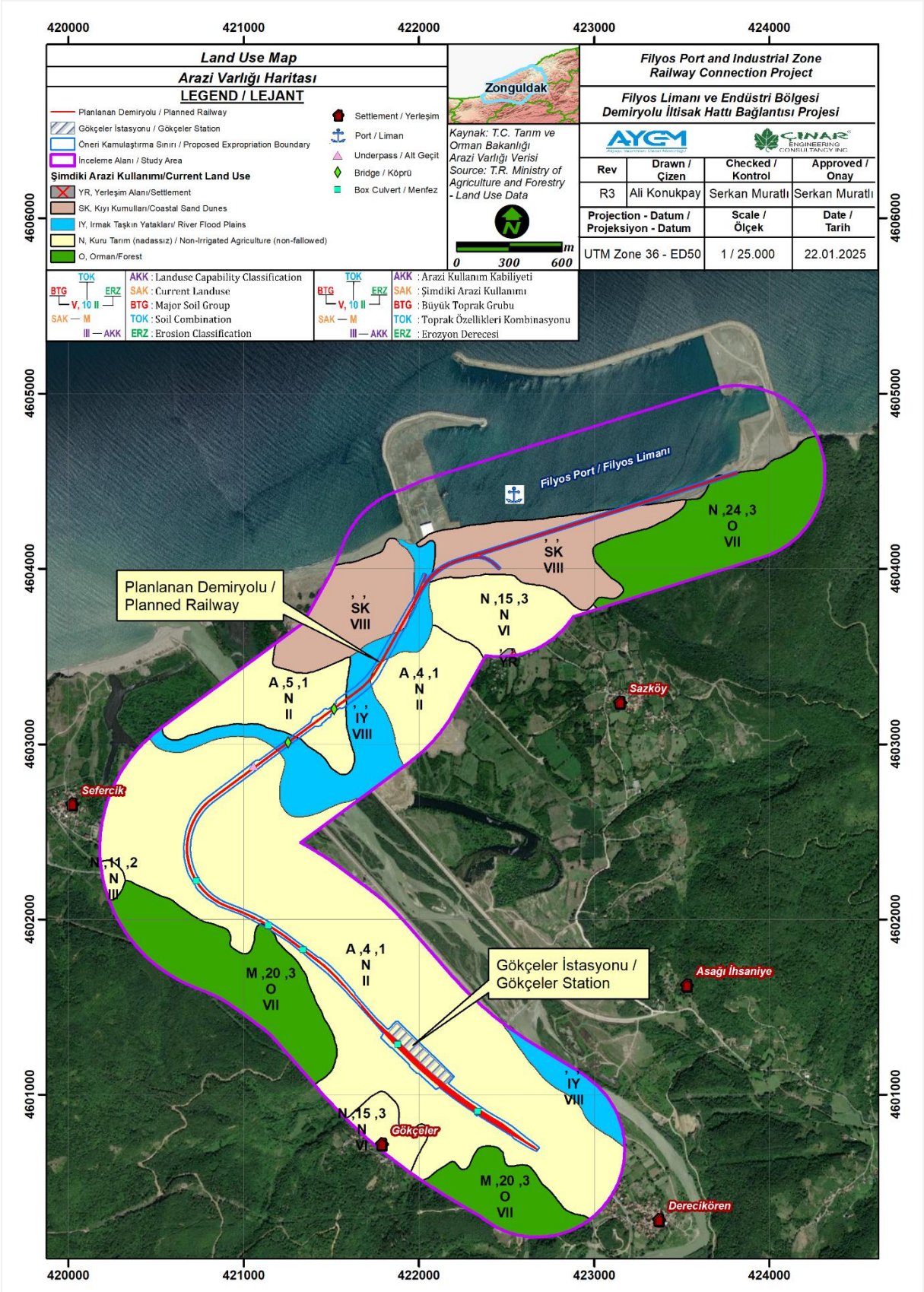


Figure 14. Land Asset Map of the Project AoI

Lands are classified according to the land use capability between the first-class lands, which can be cultivated with the easiest and most economical way without causing erosion and eight class lands which are not suitable for agriculture, cannot be used as meadow or forest, but can create an environment for natural life or recreational areas/parks for people (Ministry of Agriculture and Forestry). General definitions of land use capability classes are presented below.

Table 19. Land Use Capability (LUC) 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.
	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 wild life protection area.	There is no soil.

Source: Technical Procedure on Soil and Land Classification Standards, Ministry of Agriculture and Rural Affairs, 2008

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 20.

Table 20. 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									

Land Use Capability	——— Increase in Land Use Intensity ——►								
	Wildlife	Forestry	Grazing			Agriculture			
			Limited	Moderate	Intensive	Limited	Moderate	Intensive	Very Intensive
Class VIII									

Source: Technical Procedure on Soil and Land Classification Standards, Ministry of Agriculture and Rural Affairs, 2008

The distribution of land use capability classes of Project AoI is given in Table 21. It can be seen that 49.7 percent of the Project AoI consists of agricultural lands where soil is suitable for cultivation. All of these areas are fallow-free dry agricultural lands with a majority of Class-II LUC (Agricultural lands suitable for long-term soil cultivation for many types of crops).

Table 21. Land Use Capability Classes According to Land Use Types

Land Use Type	LUC Class	Area (ha)	Percentage
Dry farming (fallow-free)	II	330.81	49.37%
	III	2.16	0.32%
	VI	50.83	7.59%
Forests	VII	152.38	22,74%
Coastal Dunes	VIII	133.48	19.92%
Residential Area	-	0.44	0.07%
Total		**670.11**	**100,0%**

Approximately 50.3 percent of the area consists of agricultural land where the soil is not suitable for cultivation. Residential areas are not classified since these lands are not capable of being used as agricultural lands.

5.1.2.2 Soils

5.1.2.2.1 Major Soil Groups

The main soil types within the AoI were determined by using the land asset data of the Ministry of Agriculture and Forestry. Accordingly, 49.37% of the Project AoI is Alluvial Soils, 19.01% Non-Calcareous Brown Forest Soils, 11.64% Brown Forest Soils, and 11.67% is coastal dunes (see Table 22). The areas defined as river floodplain and residential area are not included in major soil group assessment. Major Soil Groups Map of the AoI is given in Figure 15.

Table 22. Distribution of Major Soil Groups in the Project Area

Major Soil Groups	Total Area(ha)	Percentage
Alluvial Soils	330.81	49.37%
Non-Calcareous Brown Forest Soils	127.4	19.01%
Coastal Dunes	78.18	11.67%
Brown Forest Soils	77.98	11.64%
River Flood Plains	55.3	8.25%
Residential Area	0.44	0.07%
TOTAL	**670.11**	**100%**

Detailed characteristics of the major soil groups in the AoI are described as the following:

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 take 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 Forest Soils (M)

Brown soils are formed on the main substance rich in lime. The distribution of horizons in the soil profile is A-B-C. In some cases, the B horizon may not be found in the profile. Generally, the A horizon is well developed, dark brown and in a clastic structure. The transition between horizons is gradual. B horizon is light brown, sometimes reddish brown in round or angular block structure. Lime deposits can be found in the lower parts of the B horizon.

These soils are generally formed and developed under broad-leaved forest cover under leafy trees. Soil reaction is slightly acidic or neutral. Soil formation processes that are effective in these are calcification and some podzolization. Their drainage is good, mostly used as forest or grassland. In agricultural area, their yields are high.

Non-Calcareous Brown Forest Soils (N)

The distribution of horizons in the soil profile is A-B-C. In some cases, the B horizon may not be found in the profile. The development of the A horizon is quite good. The A horizon is porous and clastic. The development in the B horizon is not as pronounced as the A horizon and it is weak. In general, clay accumulation in this horizon is very low or there is no accumulation. The transition between horizons is gradual. It is brown or dark brown, granules or block with rounded corners. Limeless brown forest soils are generally formed under deciduous forest cover.

Coastal Dune (SK)

Coastal dunes typically consist of sandy soils, often referred to as "dune sand." These soils are characterized by their high sand content, which can range from fine to coarse grains. The formation of coastal dunes is influenced by the interaction of wind, waves, and vegetation, leading to the accumulation of sand along the coastline. Dune sand is well-drained and tends to have low organic matter content due to the harsh environmental conditions of coastal areas. It is also highly susceptible to erosion and shifting, making it essential for dune stabilization and conservation efforts. The composition and texture of coastal dune soils play a crucial role in supporting unique ecosystems and protecting coastal areas from erosion and storm surges.

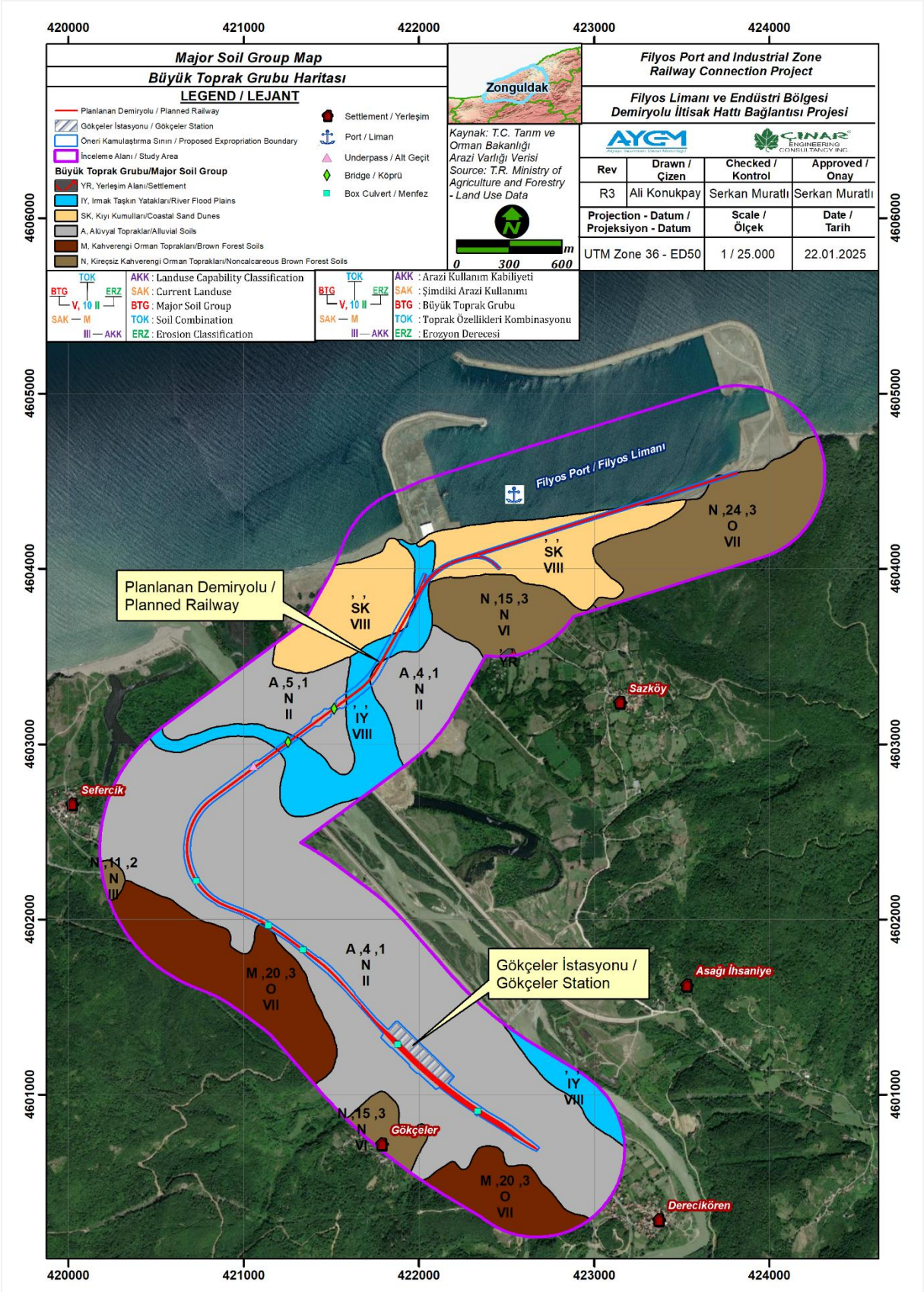


Figure 15. Major Soil Groups Map of Project AoI

5.1.2.2.2 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 GDRS Database has a four-degree classification as the following:

- 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 within the AoI by erosion degrees is presented in Table 23. Accordingly, 49.4% of the area is 1st degree, 30.3% 3rd degree, and 0.3% is 2nd degree which constitutes a very small area. Accordingly, the part of the area, where the dock and port connectors are located in the western part, is under the high risk of erosion.

Table 23. Erosion Degree Classification of the AoI

Erosion Degree	Total Area (ha)	Percentage (%)
Degree 1	330,81	49,4%
Degree 2	2,16	0,3%
Degree 3	203,21	30,3%
Sea Coverage	133.93	20%
TOTAL	670.11	100%

The erosion map of the AoI is presented in Figure 16.

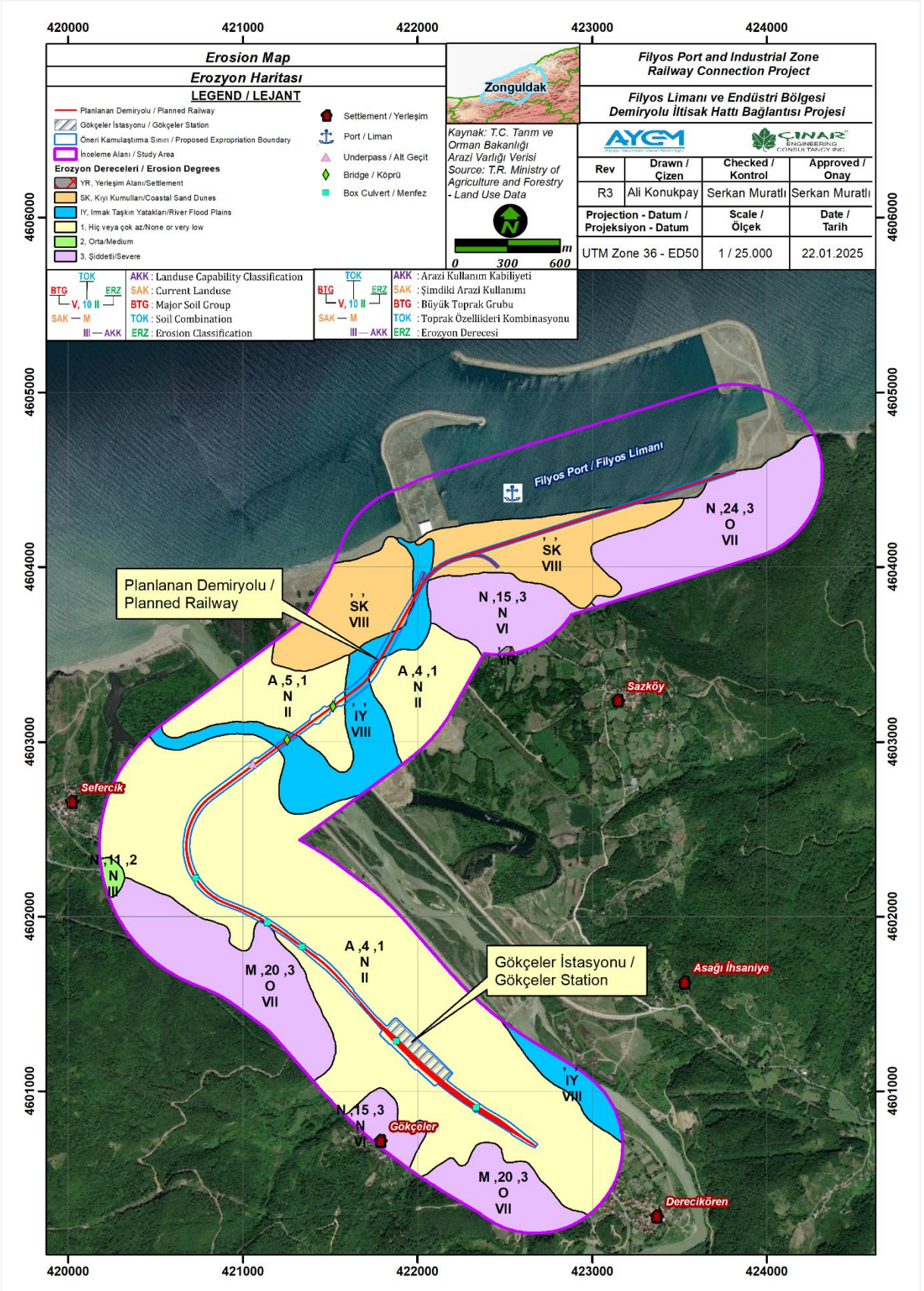


Figure 16. Erosion Map of the Project AoI

5.1.2.2.3 Baseline Soil Quality

In order to determine the baseline soil quality around the project area, samples were taken from two (2) points during Phase-1 studies. Two (2) additional sampling points have been selected according to the revised railway line during Phase-2 studies.

The soil sampling points are listed in Table 24 and shown in Figure 17.

Table 24. Information on Soil Sampling Points

No	Sampling Location	Sampling Date	Coordinates (WGS 84 – UTM Zone 36T)	
S-1	Industry	15.01.2020	422986.02 E	4602353.40 N
S-2	Gökçeler	14.01.2020	421991.77 E	4601093.98 N
S-3	Sazköy	28.07.2023	422619.57 E	4603526.98 N
S-4	Derecikören	28.07.2023	422873.66 E	4600823.88 N

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. According to mentioned parameters list, the industrial activity code of the Project is determined as “4920 – Freight transport by railway” and the regulatory required parameters are listed as Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), and Total Volatile Organic Compounds (TVOCs).

Soil samples taken are reference samples which determine the baseline conditions of the soil. In other words, the results of the analysis of soil samples will be used as reference values after the construction phase of the project or during the operation phase, if there is a suspicion of soil pollution at the project site.

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* in order to determine the baseline contamination status in the soil structure. The analysis reports are given in Appendix-3 and the analysis results are given in Table 25.

Upon evaluating the analysis results presented in Table 25, it has been observed that soil quality standards, with the exception of the pH parameter at Sazköy sampling location (S-3), were met at all monitoring locations. The absence of industrial activities in the vicinity of the monitoring points during the analysis periods, as well as the limited use of pesticides, may explain this outcome. Anthropogenic activities were identified solely in connection with port operations. At the Sazköy monitoring point, the location closest to the port, only the pH value exceeded the relevant guidance value.

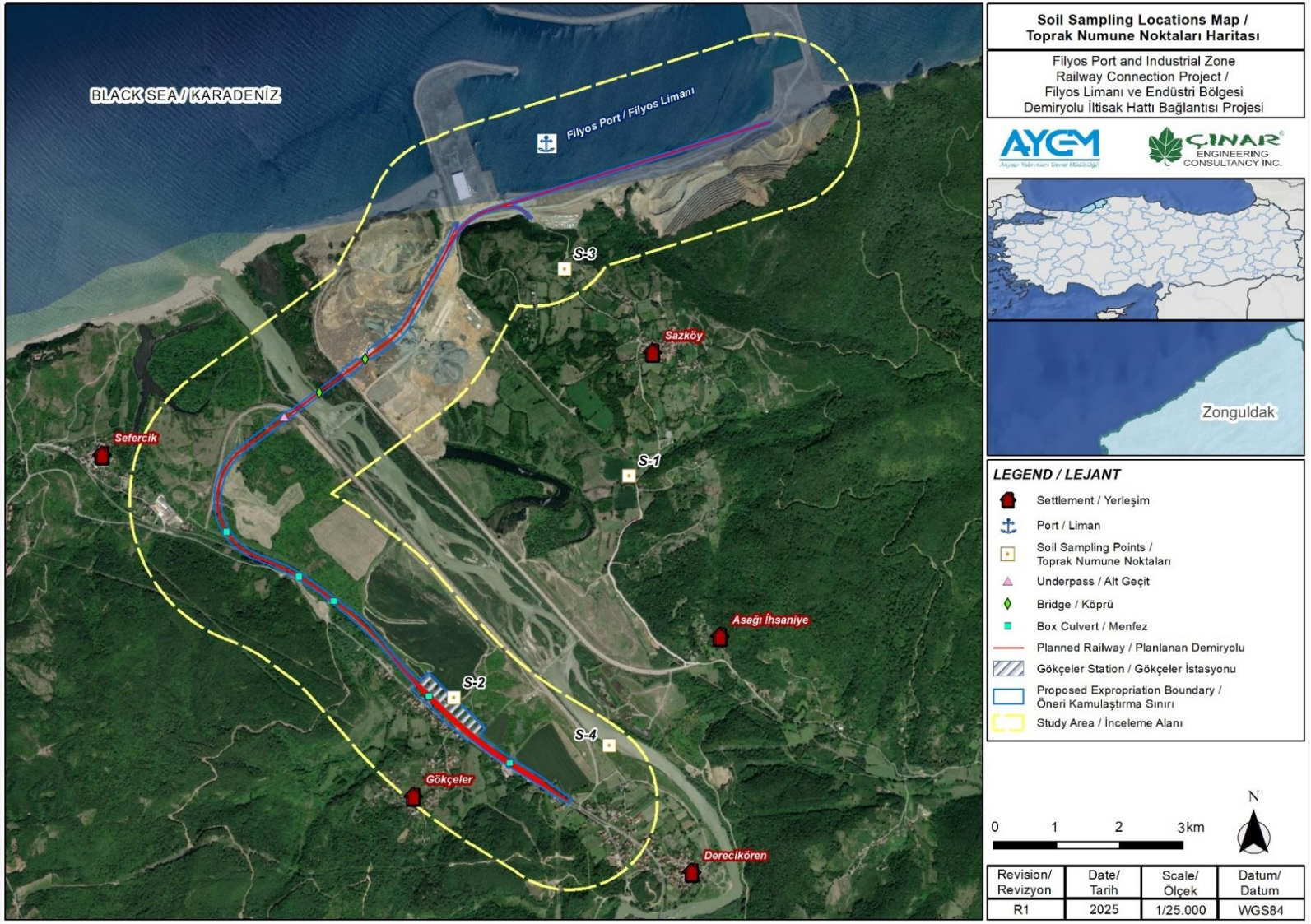


Figure 17. Soil Sampling Locations

Table 25. Analysis Results of Soil Samples

Parameter	Unit	S-1 Industry	S-2 Gökçeler	S-3 Sazköy	S-4 Derecikören	Soil Quality Standards[13]			
						Agricultural Use (mg/kg)	Use for Residential / Parking Areas (mg/kg)	Use for Commercial Purposes (mg/kg)	Use for Industrial Purposes (mg/kg)
pH	-	7.63	7.75	**8.13**	7.45	6 - 8	6 - 8	6 - 8	6 - 8
Antimony (Sb)	mg/kg	< 0.050	<0.05	< 0.05	0.077	20	20	40	40
Arsenic (As)	mg/kg	4.97	3.344	1.218	2.3	12	12	12	12
Copper (Cu)	mg/kg	33.2	15.274	13.6	10.6	63	63	91	91
Barium (Ba)	mg/kg	107	< 2	< 2	< 2	750	500	2.000	2.000
Beryllium (Be)	mg/kg	0.549	0.274	0.236	0.301	4	4	8	8
Boron (B)	mg/kg	< 2	< 2	< 2	< 2	2	-	-	-
Mercury (Hg)	mg/kg	0.297	< 0.1	< 0.1	< 0.1	6.6	6.6	24	50
Zinc (Zn)	mg/kg	72.8	< 0.5	< 0.5	< 0.5	250	250	410	410
Silver (Ag)	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	20	20	40	40
Cadmium (Cd)	mg/kg	0.226	< 0.05	< 0.05	< 0.05	1,4	10	22	22
Tin (Sn)	mg/kg	0.119	< 0.05	0.416	0.164	5	50	300	300
Cobalt (Co)	mg/kg	10.6	6.580	7.09	9.7	40	50	300	300
Lead (Pb)	mg/kg	14.1	1.54	5.6	3.63	70	140	260	600
Molybdenum (Mo)	mg/kg	0.253	< 0.05	0.147	0.301	5	10	40	40
Nickel (Ni)	mg/kg	15.4	22.322	11.7	22.2	45	45	89	89
Selenium (Se)	mg/kg	0.804	0.457	0.66	0.422	1	1	2,9	2,9
Thallium (Tl)	mg/kg	0.152	< 0.05	0.145	0.085	1	1	1	1
Titanium (Ti)	mg/kg	273	70.076	362	219	-	-	-	-
Uranium (U)	mg/kg	0.359	0.183	0.793	0.459	23	23	33	300
Vanadium (V)	mg/kg	60.2	24.343	13.9	21.2	130	130	130	130
Chromium (Cr)	mg/kg	14.4	19.567	5.26	8.33	64	64	87	87
Oil and Grease	%	< 0.02	< 0.02	0.036	0.039	-	-	-	-
BTEX	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-
TVOCs	mg/kg	< 0.01	< 0.01	< 0.1	< 0.1	-	-	-	-
TPH	mg/kg	131	120.3	< 100	< 100	-	-	-	-
TOX	mg/kg	< 20	< 20	< 20	20.32	-	-	-	-

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

5.1.2.3 Geology

For the general and structural geological properties of the region where the Filyos Port and Industrial Zone Railway Connection Project is located the approved Filyos Port and Filyos Industrial Zone Railway Junction Line (Including highway connection) Geological and Geotechnical Investigations Report prepared by Altınok Cons. Eng. A.Ş. on 21.02.2018 and Engineering Design Review, Preparation of Bidding Documents for Civil Works, and Construction Supervision of Last-Mile Rail and Road Infrastructure Connectivity to/from Filyos Port and Filyos Industrial Zone Comparative Borehole Report prepared by EOOE JV / Leader EPTISA on 2024 and Geological Map of Türkiye Series, Zonguldak-E28 Sheet prepared by the MTA of 1 / 100,000 scale were used.

5.1.2.3.1 General Geology

In the east of the Istanbul Zone, where the project AoI is located, in the north of Kastamonu-Araç and around Zonguldak, the lower parts of the Paleozoic sequence are deeper, shale-colored, graptolite shales dominant. There is a possible incompatibility before the Devonian. Carboniferous deposits are shallower than the west; In Lower Carboniferous (Turnstile), while radiolarian chert was deposited in the west, shallow marine limestones were deposited in the east. While turbidites were deposited in the Lower Carboniferous (Visean) in the west, coal was formed on the Zonguldak side in the east.

Collapsed rock units of the Middle Ordovician-Quaternary age range is observed in the Zonguldak E-28 sheet on a scale of 1/100 000. The base of the area, which covers the Bartın province and its surroundings, is formed by the Ereğli formation, consisting of the Middle Ordovician-Lower Devonian aged shale, sandstone, and limestone, and over this formation, the Yılanlı formation occurs, which contains the Middle Devonian-Lower Carboniferous aged claystone, dolomite limestone and dolomite. The Alacaağzı formation which consists of the Upper Visayan-Upper Namurian aged coal veined shale, wacky, and sandstone is transitive with Yılanlı formation from the bottom and Westphalen aged the Karadon formation which consists of conglomerates, sandstone, mudstone, and diatomite. The neritic limestone of the Malm-Aptian aged İnaltı formation that settles transgressively, flysch type sediments of the Lower-Cretaceous Aged Ulus formation and the Lower-Cretaceous aged sandstone and shale of Kilimli formation are transitive from bottom to top and placed in disharmony on older units.

The Upper-Cretaceous aged Yemişliçay formation, consisting of volcanic sandstone, tuff, agglomerate, and lava, is transitionally located on the Kilimli formation. On top of it, the Upper Campanian-Alt Eosen is transitionally represented by the old semi-pelagic squirrels of the Kilimli formation. On top of it is a transitional Upper Campanian-Lower Eocene aged Akveren formation which consists of semi-pelagic limestone, shale, calcarenite, sandstone and conglomerates and another member of this formation, the Çangaza formation, which is represented by basalt and andesite lava. The Lower-Middle Eocene aged Yığılca formation, which consists of agglomerate, tuff, volcanic sandstone, andesite, and basalt is transitive over the Akveren formation from the bottom and the Lower-Middle Eocene aged Çaycuma formation which consists of sandstone, shale, and conglomerates from the top. (MTA, 2002).

The units outcropping at and around the railway route from oldest to youngest are: Mesozoic Period Cretaceous aged Yemişliçay Formation (Ky), Cenozoic-Tertiary period Paleocene aged Akveren Formation (KTa), Eocene aged Çaycuma Formation (Teç) and Quaternary aged Alluvium (Qal) deposits. The generalized stratigraphic columnar section of the region where the project is located is given in Figure 18.

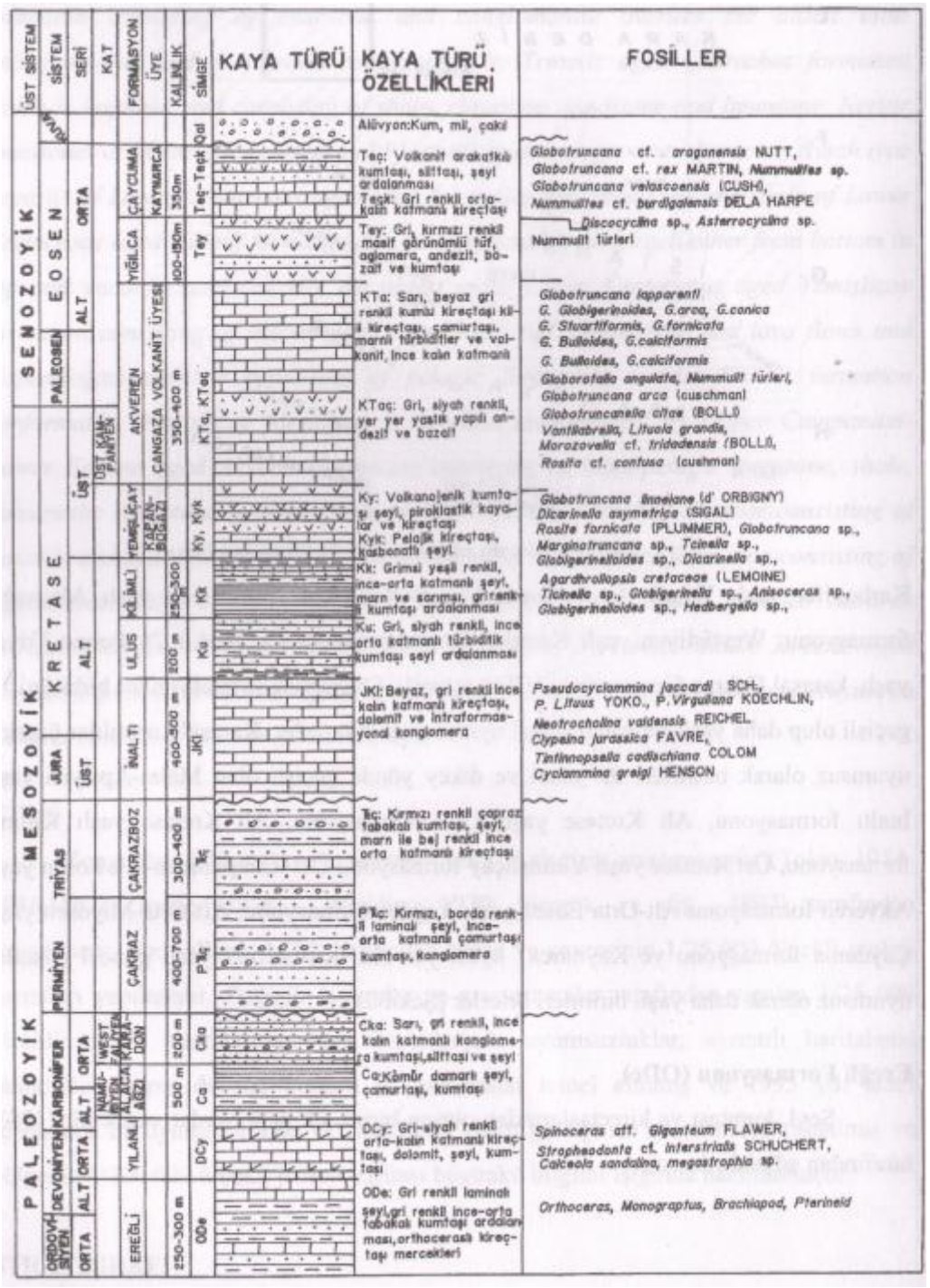


Figure 18. Generalized Stratigraphic Columnar Cross-Section of the Region of the Rocks

Source: (Zonguldak – E28 Sheet, MTA, 2002)

5.1.2.3.2 Structural Geology

Türkiye, along its geological history, formed through development of oceans, convergence-divergence-collision of continents, and by tectonic movements in many different characteristics.

During the Paleotectonic era, the opening of the Thethys Ocean (Paleothetys-Karakaya-Neothetys), occurred due to its expansion, narrowing, closure and collision of continents within its borders. The approaching of the African and Eurasian plates that started in the Late Cretaceous caused the closure of the oceanic basins (Thethys) and gathering of the continental fragments, Subsequently, it caused the formation of the shell structure formed by the plunging and sinking prisms of the present day Anatolia and the settlement of ophiolites (Şengör and Yılmaz, 1981). In this evolutionary period, Anatolia is located on an area shaped by the continents that come together and the remains of the oceanic environment that separates them.

Türkiye 's tectonic units are Rhodope-Strandja Zone, Istanbul Zone, Sakarya Zone, Massif, Tauride Anatolide- Block (Tavşanlı Zone, Afyon Zone, Bornova Flysch Zone, Menderes Massif) and the Arabian Platform. The main suture zones that separate these structures from each other are; starting from the north; the Inner-Pontid (Western Black Sea Fault, Western Crimean Fault) İzmir-Ankara, Ankara-Erzincan, Inner- Tauride, Pamphilia and Assyrian (Bitlis) -Zagros (Okay and Tüysüz, 1999).

Map of Türkiye's tectonic units is presented in Figure 19.

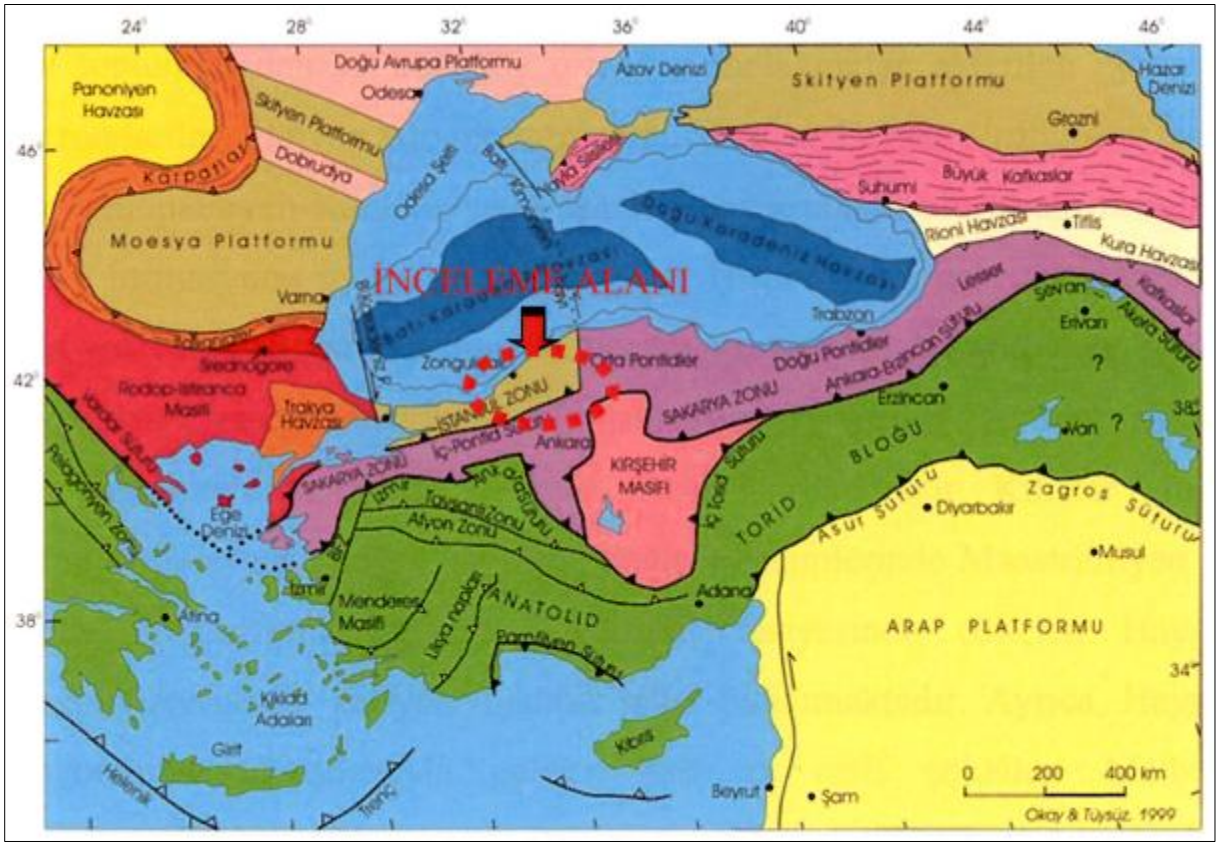


Figure 19. Türkiye's Tectonic Units

Source: Okay and Tüysüz, 1999., DGII and Altınok, 2018

This closure ended with the closure of the Çüngüş basin in the Late Serravilian (11 million years (My)) along the Bitlis-Zagros Clamp Belt east of Neotetis, between the Arab and Eurasian plates (Şengör and Yılmaz, 1981).

This is also the end of the paleotectonic period in Anatolia and the beginning of the neotectonic period. Since the beginning of the neotectonic period, as a result of the relative movements of the African and Arabian plates, it has been shortened continually under the East Anatolian compression regime between the end of the Middle Miocene (11 My) and the Early Pliocene (5 My) and increased by 2 m. When the continental crust thickness exceeds 46 km, the compressive tectonic regime at the beginning of the Pliocene (5 My) has been replaced by indenter tectonics. In this period, North Anatolian Fault Zone (NAFZ) and Eastern Anatolian Fault Zone (EAFZ) transform faults began to form.

As a result of the formation of the North Anatolian and Eastern Anatolian faults and the indention of the Anatolian plate to the west, 4 different neotectonic regions were defined. These are; Eastern Anatolian Compression Zone, the North Anatolian Zone, the Center Anatolian Zone and Western Anatolian Zone.

In today's Türkiye, tectonic regime continues to change.

The important geological phases of this period are; the formation of the Neotethys oceans in Anatolia, collision of the Arabian and Eurasian slabs, and as a result, the development of the North Anatolian and Eastern Anatolian Fault Zones and the Movement of the Anatolian plate to the West (Şengör et al., 1985). Map of Türkiye's neotectonic structures and fault zones are presented in Figure 20.

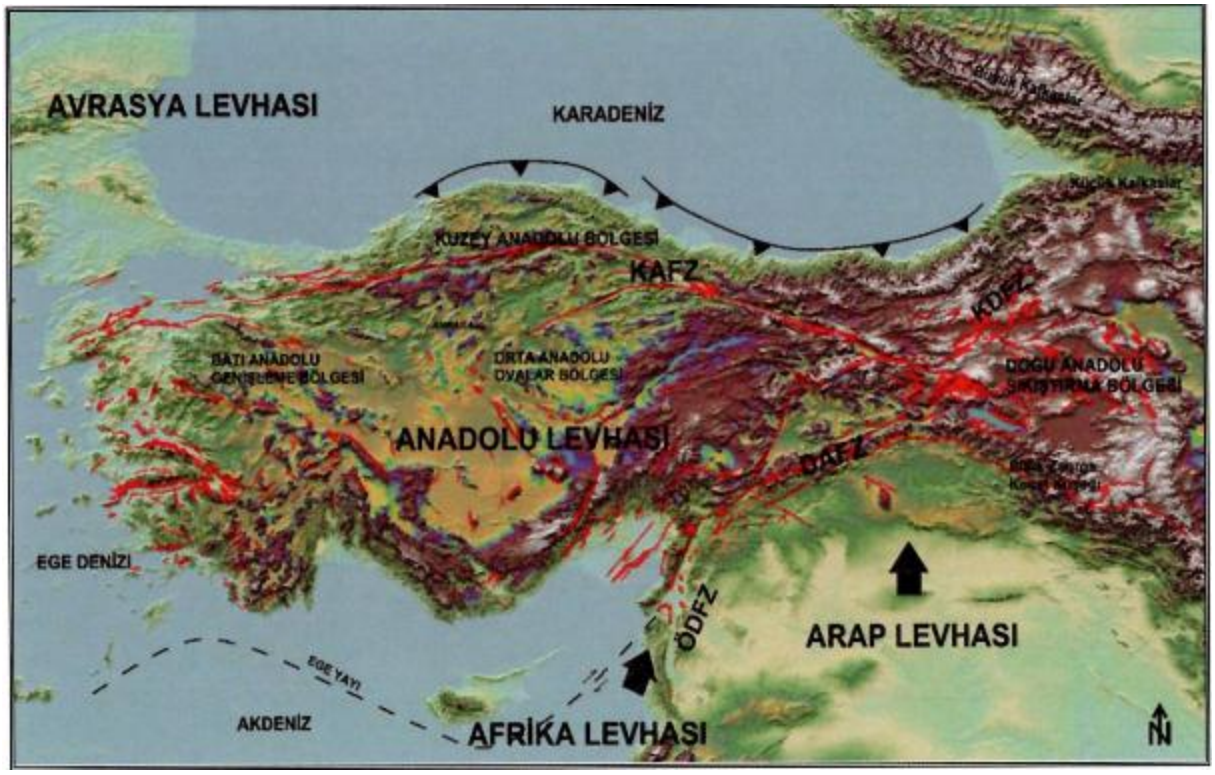


Figure 20. Map of Türkiye's Neotectonic Structures and Fault Zones

Source: Şengör, A.M.C. et.al., 1985.

Today, Central Anatolia is moving westward through the NAFZ and EAFZ systems. Along with this movement, it turns counterclockwise along with NE-SW and NW-SE strike slip component that leaves the NAFZ (Şengör et al., 1985).

The Istanbul Zone, which covers Zonguldak, its surrounding provinces and project area, was influenced by the orogenic movements which occurred in Neogene. In the region, a compressive regime with a K-G direction dominates the post-collision until the Late Miocene (Pontian).

From the Late Miocene, a NW-SE compressive regime started, and this regime continued until the Late Pliocene. In the Late Pliocene period, this compression was replaced by a compression in the K-G direction and an expansion in the K-G direction was observed in the region throughout the Middle Miocene.

In the Region where the project is located, pre-Malm tectonic activity has increased and the Ereğli, Yılanlı, Alacaağzı, Karadon, Çakraz and Çakrazboz formations have formed an area of abrasion.

The Malm-Early Aptian is a period of tectonic relief. During this period, the positive areas have moved to the sea position of the shelf-platform and the Aptian-Albiend. (In the Malmo-Early Albanian period, the basin became a suitable basin for the collapse of the Nation formation). Pre-Santonian (possibly Turonian) is a period of increased tectonic activity in the region. Due to the congestion, the İnaltı formation, rising in the basin, has been added northward, providing material to the Yemişliçay formation. The Campanian-Maastricht tectonic activity is increasing. During this period, both volcanic activities increased and the Çakraz, İnaltı, Kilimli and Ulus formations submerged with constricted horizontal movements. Maastricht is a period of tectonic constancy. During this period, the pelagic-half-pelagic craters of the Akveren formation have been intermittently collapsed with volcanitic activities.

There is no active fault at and around the near vicinity of project route as it is seen in the active fault map of the project area and its surroundings given in Figure 21. The active faults in the region are located at the south of project area at which Devrek fault is 45 km, Karabük fault is 57 km, Yığılca fault is 70 km and North Anatolian Faults is 85 km far from the project route.

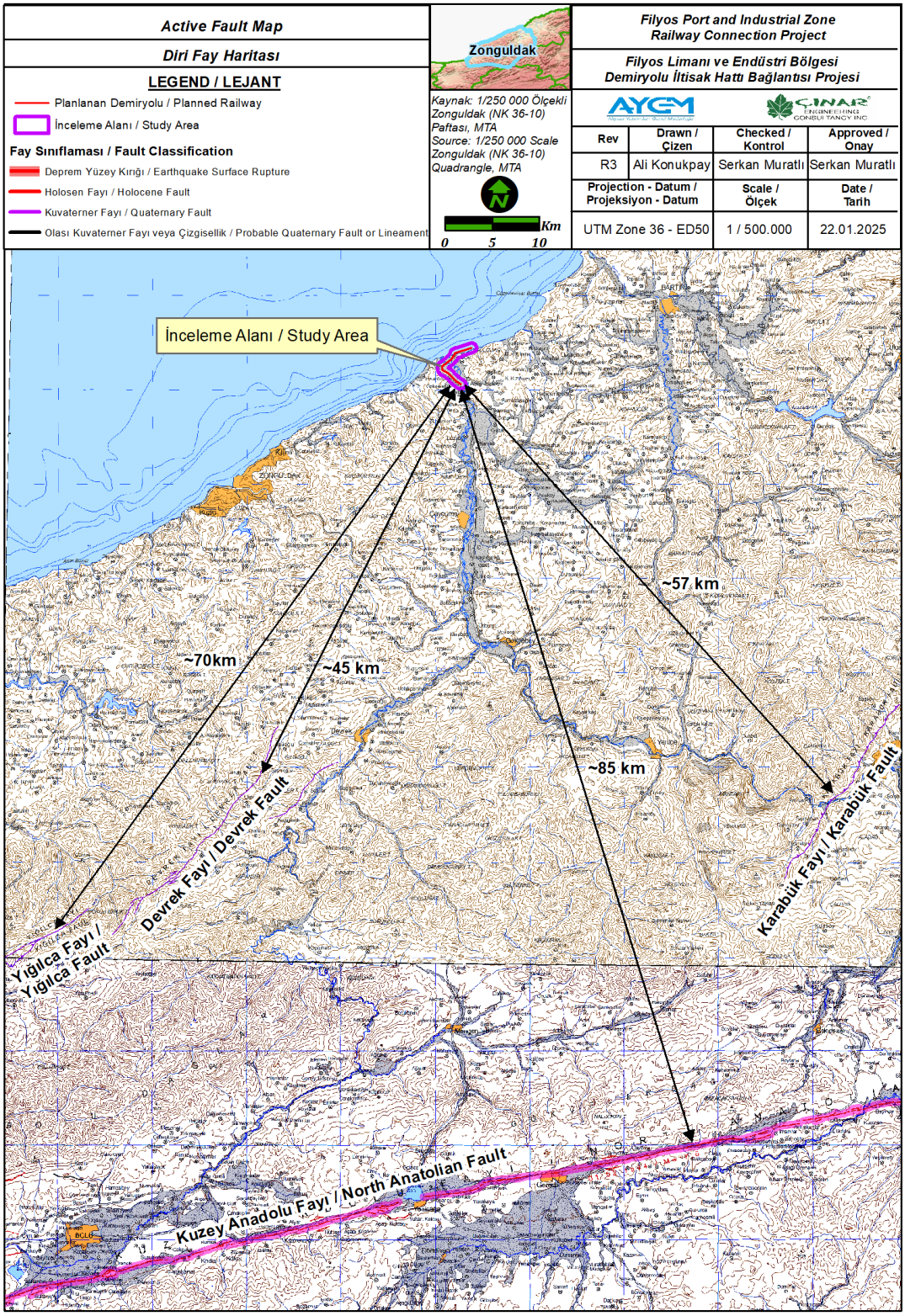


Figure 21. Active Faults Map at and Around the Project AoI

Source: Zonguldak (NK 36-10), Bolu (NK 36-14) Quadrangle, Serial No:9,19 2011, MTA

North Anatolian Fault Zone (NAFZ)

The fact that the North Anatolian Fault was evaluated as a transform fault that separates the Black Sea Plate and the Anatolian Plate from each other caused this fault to be widely included in the world literature. The length of the North Anatolian Fault, which cuts across Anatolia in the direction of the WE in more or less parallel to the Black Sea coast, is 1100 km between the Sakarya River (Geyve) in the west and Van Lake (Bulanik) in the east, which can be observed continuously on earth, and 1600 kilometers together with the extensions between the Aegean Sea and the Iranian border (Ketin, 1976).

It was first understood that the North Anatolian Fault is a strike-slip right-lateral fault zone, after the first Erzincan earthquake of 27 December 1939 (M = 8) and the following 1942, 1943 and 1944 earthquakes (Ketin, 1948). This fault is in East-West direction.

KAF is observed in a relatively narrow zone in the east of Bolu (Şaroğlu et al., 1987 and 1992; Barka, 1992). NAFZ is divided into two branches, north and south, between Bolu and Marmara Sea. Apart from these two main branches, Hendek and Çilimli faults located in the east of Adapazarı are other active faults in NAFZ (Şaroğlu et al., 1987 and 1992; Barka, 1992). The southern branch of the fault extending in the direction of the Bolu area is the Dokurcan valley, Geyve, Iznik line, it reaches Gemlik Bay, and this branch is bifurcated to the west of Dokurcun Valley. It forms the eastern part of the arm where the 1999 earthquakes developed (Şaroğlu et al., 1987 and 1992). These two faults limit the block of Almacık with a concave geometry to the south (Duman et al, 2005).

In the last century, NAFZ has caused devastating earthquakes that began with the 1939 Erzincan earthquake and migrated to the west regularly (Barka, 1992 and 1996). In the east, starting with the 1939 Erzincan earthquake (M = 7.9), which formed a 350 km long surface fracture, 9 medium and large earthquakes (M> 6.7) with a total surface fracture length over 1000 km occurred (Bozkurt, 2001). 5 of these earthquakes are February 1944 Bolu-Gerede (M = 7.3); May 1957 Abant (M = 7.0); July 1967 Mudurnu valley (M = 6.8); August 1999 Kocaeli (M = 7.4) and November 1999 Düzce (M = 7.2) earthquakes.

NAFZ is located in the 85 km south of the Filyos Port and Industrial Zone Railway Project Line along NEE-SSW direction

Karabük Fault

Karabük Fault; Holocene activity, which creates surface faulting in Quaternary-Pleistocene, is a suspicious reverse fault and its length is 30467.5 m. This fault: It is located approximately 35.0 km north of the KAF in the direction of NNE-SSW. After the earthquake in Bolu-Gerede in 1944, a 5.3-magnitude aftershock occurred near Karabük. While there were 6.8 magnitude earthquakes in Bartın in 1968, there was a loss of life during this earthquake.

Karabük fault is located approximately 57 km Southeast of the Filyos Port and Industrial Zone Railway Project Line.

Devrek Fault and Yığılca Fault

Devrek Fault consists of two faults parallel to each other at which these faults constitute surface faulting in Quaternary-Pleistocene with unknown Holocene activity. The Devrek fault is a strike-slip fault approximately 45 km southwest of Filyos Port and Industrial Zone Railway Project Line and its length is 25.4 km.

In addition, the Yığılca Fault in NEE-SWW direction lies to the west of this fault. Holocene activity, which creates surface faulting in Quaternary-Pleistocene, is an unknown reverse fault and its length is 10246.4 m. This fault is located approximately 70 km southwest of Filyos Port and Industrial Zone Railway Project Line.

5.1.2.4 Geology of the Railway Route

The geology and geotechnical properties of the planned Filyos Port and Industrial Zone Railway route was studied both by the Filyos Port and Filyos Industrial Zone Railway Junction Line (Including highway connection) Geological and Geotechnical Investigations Report prepared by Altınok Cons. Eng. AŞ. on 21.02.2018 and approved before and Engineering Design Review, Preparation of Bidding Documents for Civil Works, and Construction Supervision of Last-Mile Rail and Road Infrastructure Connectivity to/from Filyos Port and Filyos Industrial Zone Comparative Borehole Report prepared by EOOE JV / Leader EPTISA in 2024.

The geological units and their lithological properties along the planned railway route from oldest to youngest are given below.

5.1.2.4.1 Stratigraphy

Within the AoI of the project, Quaternary-aged alluvial deposits surface on the flat and low sloping areas in and around the Filyos Stream, while the Yemişliçay formation consisting of Cretaceous-aged volcanogenic sandstone, tuff, agglomerate, andesite and basalt succession is found on the sloping areas in the western and southern parts of the area.

While almost all of the planned railway route is located on Quaternary aged Alluvium consisting of sand, clay and silt, the Cretaceous aged Yemişliçay formation is located in the last 100 meters of the route.

The generalized stratigraphic column section of the railway route and its surroundings is given in Figure 22 and the geology map of the project AoI is given in Figure 23.

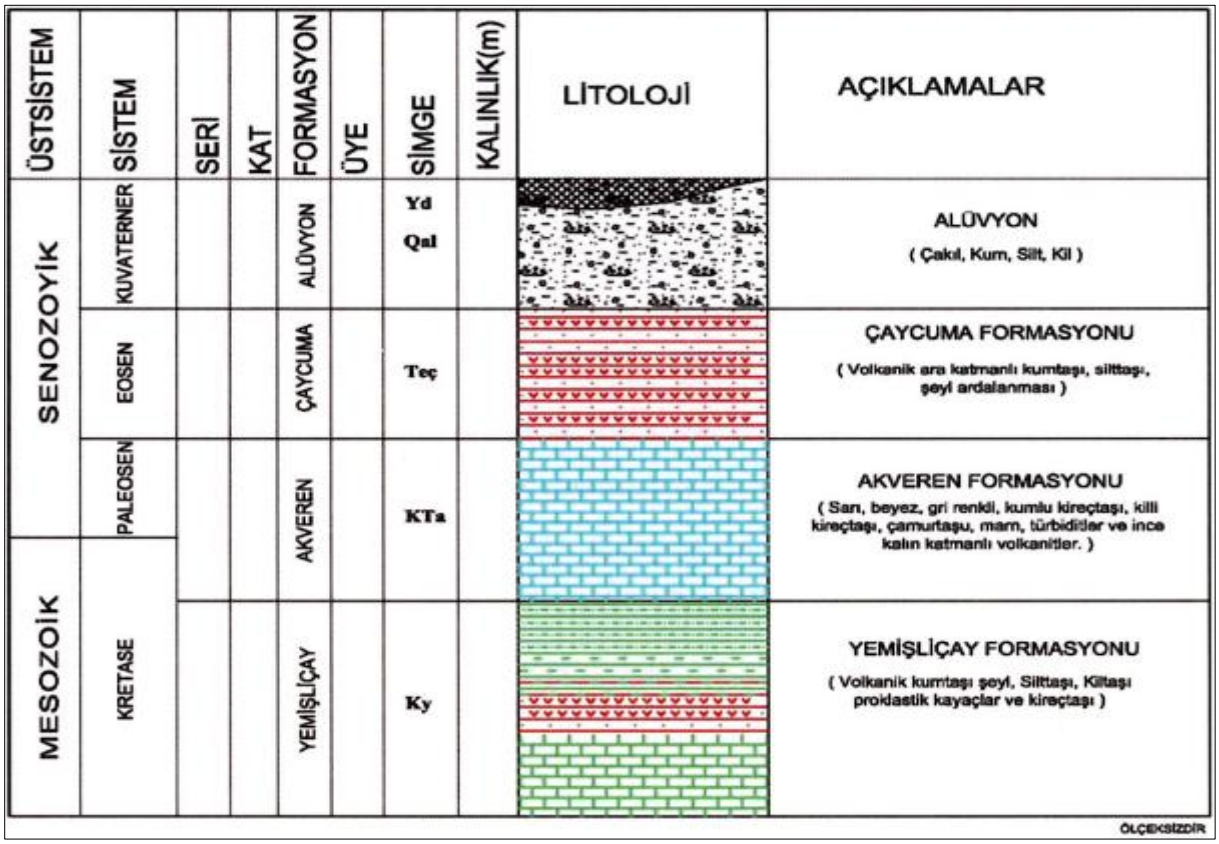


Figure 22. Generalized Stratigraphic Columnar Section of the Rock Routes of the of the Railway Route and Its Surrounding Project Routes and Its Surroundings

Source: DGII and Altınok,2018

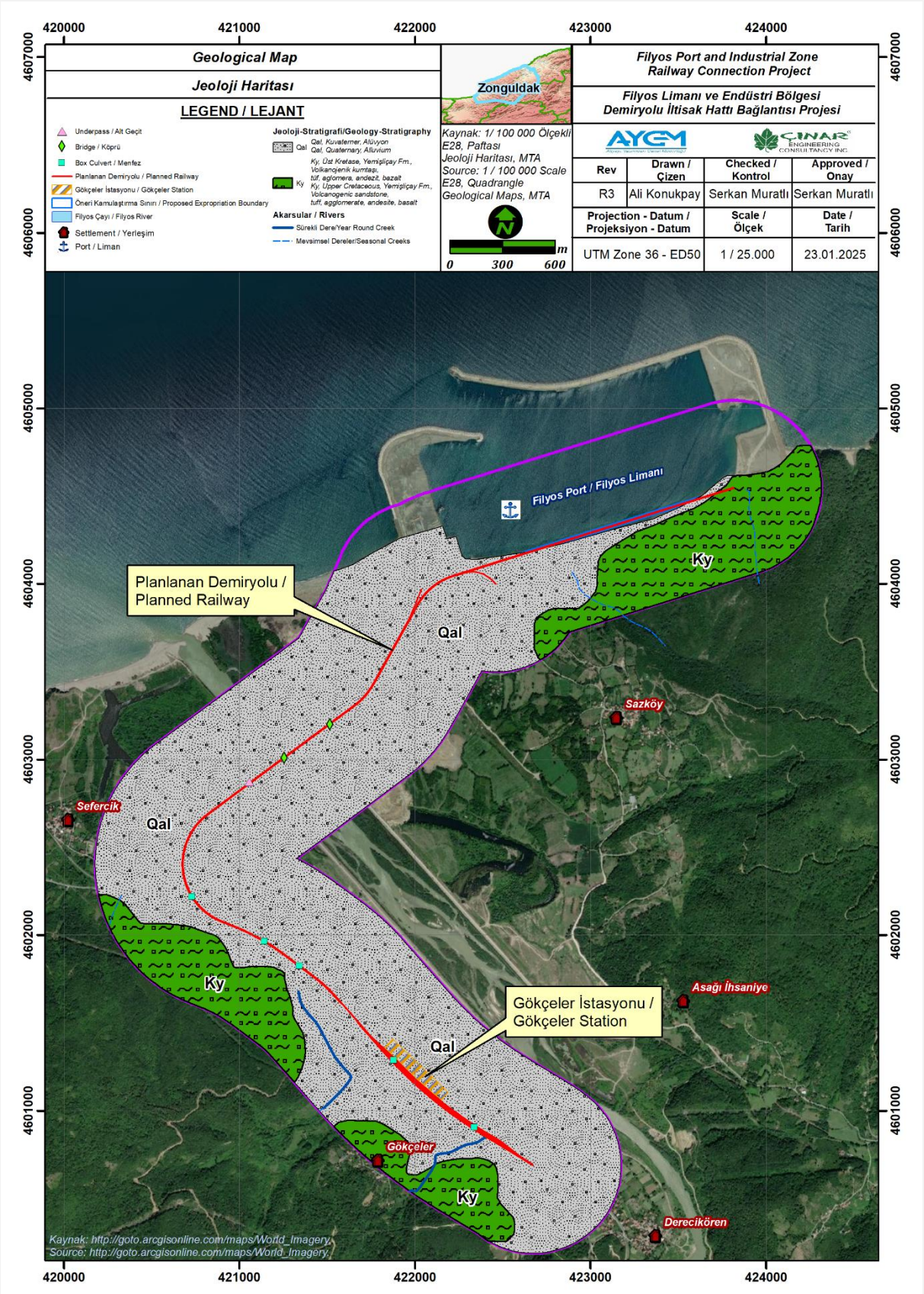


Figure 23. Geology Map of the Project AoI

Source: Akbaş, et.al., 2002

Mesozoic

Cretaceous

Yemişliçay Formation (Ky)

The unit consisting of volcanic sandstone, cylindrical and pyroclastic rocks and pelagic-half-pelagic rocks is named after the village of Yemişliçay in Sinop (Ketin and Gümüş, 1963). In the unit, the pelagic and semi-pelagic cysts were studied under the name of the Kapanboğazı member. The unit is best seen in the south of the district of Amasra (MTA, 2002).

The formation is generally represented at the bottom by brown, thin-middle-layer volcanic sandstone, greyish-green-coloured, fine-medium-layered thing and sandstone sequencing, tuff, tuffite, mid-layers beige and red-pink, pelagic-half pelagic clayed limestones with thin - medium layers, coffee, and dark grey agglomerates at the upper layers. (MTA, 2002).

Quaternary

Alluvion (Qal)

Alluvion (Qal) is the sediments of pebble, sand, and mud in the flat areas on the beds of the ancient cavities (MTA, 2002).

5.1.2.4.2 Geotechnical Characteristics

Within the scope of the project, in order to determine the geotechnical properties, vertical and lateral continuities of geological units and to determine groundwater levels drilling works has been carried out at Filyos Port and Filyos Industrial Zone Railway Junction Line (Including highway connection) Geological and Geotechnical Investigations Report prepared by Altınok Cons. Eng. AŞ. on 21.02.2018 and which was approved before and Engineering Design Review, Preparation of Bidding Documents for Civil Works, and Construction Supervision of Last-Mile Rail and Road Infrastructure Connectivity to/from Filyos Port and Filyos Industrial Zone Comparative Borehole Report prepared by EOOE JV / Leader EPTISA in 2024.

For the approved Phase-2 project route a total of five drilling operations at five different locations totaling 259 meters as part of the project titled "Engineering Design Review, Preparation of Bidding Documents for Civil Works, and Construction Supervision of Last-Mile Rail and Road Infrastructure Connectivity to/from Filyos Port and Filyos Industrial Zone" for confirmation purposes which was tendered to Altınok Cons. Eng. AŞ. on 21.02.2018 and whose report has been approved. The completed drilling operations corresponding to the confirmation drilling conducted within the approved project scope are shown in Table 26 and the drilling locations are presented in Figure 24. During the study both in-situ tests and laboratory tests were performed on the samples taken during drilling at which 156 Standard Penetration Test (SPT) samples and 10 Undisturbed (UD) samples being obtained.

Table 26. Confirmation Boreholes Corresponding to the Approved Project Boreholes

Altınok Cons. Eng. AŞ.	EOOE JV/LEADER EPTISA
SD-4	TSK-1
SD-11	TSK-2
SD-17	TSK-3
SD-24/SK-25	TSK-4
SD-26/SK-27	TSK-5



Figure 24. Google Earth Images of the Old / New Drillings (Filyos Port / Filyos Industrial Zone)

In drilling operations along the project route on the site, sand, clay, and silt units belonging to alluvial units are observed. Detailed information regarding these units is provided below.

TSK-1/SD-04

In the soil profile of the TSK-1 borehole, conducted by EOOE JV/LEADER EPTISA;

- 0.00-0.50 m; vegetable soil,
- 0.50-6.00 m; brown-colored, medium to firm consistency clay with a silt band between 1.50-1.95 meters,
- 6.00-45.50 m; grey-colored, silty-clayey, fine-gravelly, medium to tight sand units are observed.

In the soil profile of the SD-4 borehole, conducted by ALTINOK CONS. AND ENG.;

- 0.00-0.30 m; vegetable soil -fill,
- 0.30-4.50 m; light brown-colored, moisty, highly plastic, slightly gravelly, medium- firm silty clay with high plasticity,
- 4.50-13.50 m; greyish brown-colored, moisty, non-plastic, semi-rounded to semi-angular, gravelly with a maximum size of 1 cm, medium-firm, fine-grained, ranging from very loose to medium dense silty sand,
- 13.50-16.95 m; grey-colored, high plasticity, low silt content, very soft to soft-medium firm clay (with a sand band between 15.00-15.50 meters),
- 16.95-24.45 m; greyish brown-colored, moisty, non-plastic, semi-rounded to semi-angular, gravelly with a maximum size of 1 cm, medium-firm, fine-grained, ranging from very loose to medium dense silty sand units are observed together.

TSK-2/SD-11

In the soil profile of the TSK-2 borehole, conducted by EOOE JV/LEADER EPTISA;

- 0.00-6.00 m; fill,
- 6.00-31.00 m; grey-brown-colored, silty, fine to medium gravelly, medium to tight sand,
- 31.00-39.00 m; grey-colored, silty, firm to very firm clay,

- 39.00-45.80 m; grey-brown-colored, silty, fine to medium gravelly, medium to tight sand,
- 45.80-50.00 m; grey-colored, silty, firm consistency clay units are observed.

In the soil profile of the SD-11 borehole, conducted by ALTINOK CONS. AND ENG.;

- 0.00-0.30 m; vegetable soil,
- 0.30-4.50 m; light brown-colored, moisty, highly plastic, slightly gravelly, medium- firm silty clay with high plasticity,
- 4.50-13.50 m; greyish brown-colored, moisty, non-plastic, semi-rounded to semi-angular, gravelly with a maximum size of 1 cm, medium-firm, fine-grained, ranging from very loose to medium dense silty sand,
- 13.50-16.95 m; grey-colored, high plasticity, low silt content, very soft to soft-medium firm clay (with a sand band between 15.00-15.50 meters),
- 16.95-24.45 m; greyish brown-colored, moisty, non-plastic, semi-rounded to semi-angular, gravelly with a maximum size of 1 cm, medium-firm, fine-grained, ranging from very loose to medium dense silty sand units are observed together.

TSK-3/SD-17

In the soil profile of the TSK-3 borehole, conducted by EOOE JV/LEADER EPTISA;

- 0.00-6.00 m; fill,
- 6.00-9.50 m; grey-brown-colored, silty, sandy, firm to very firm clay,
- 9.50-14.10 m; grey-brown-colored, silty, fine to medium gravelly, medium to tight sand,
- 14.10-42.50 m; grey colored, occasionally containing turf, very firm to hard clay units are observed.

In the soil profile of the SD-17 borehole, conducted by ALTINOK CONS. AND ENG.;

- 0.00-0.30 m; vegetable soil,
- 0.30-2.00 m; light brown-greyish-colored, moisty, low to medium plasticity, occasionally gravelly, medium-firm silty clay,
- 2.00-6.45 m; greyish brown-colored, moisty, non-plastic, semi-rounded to semi-angular, gravelly with a maximum size of 3 cm, clayey, fine-grained, ranging from loose to medium dense silty sand,
- 6.45-19.50 m; greyish brown-colored, moisty, medium to low plasticity, medium-firm consistency, occasionally organic content, consolidated, silty clay,
- 19.50-24.00 m; greyish brown-colored, occasionally siliceous, hard, moderately weathered, heavily fractured, locally sandstone-bedded, weakly cohesive siltstone units are observed.

TSK-4/SD-24/SK-25

In the soil profile of the TSK-4 borehole, conducted by EOOE JV/LEADER EPTISA;

- 0.00-6.00 m; fill,
- 6.00-33.00 m; grey-brown-colored, silty, fine to medium gravelly, ranging from loose to medium dense (with clay bands between 30.00-30.45 meters and 31.50-31.95 meters) sand,
- 33.00-60.00 m; grey-colored, silty, sandy, firm to very firm consistency (with turf content between 43.95-45.00 meters) clay units are observed.

In the soil profile of the SD-24 borehole, conducted by ALTINOK CONS. AND ENG.;

- 0.00-5.00 m; road fill,
- 5.00-6.50 m; greyish brown to light grey-colored, semi-angular to semi-rounded, containing gravel with a maximum diameter of 3-4 cm, low in silt content, clayey, loose

to very loose to medium dense sand,

- 6.50-13.50 m; greyish brown to light grey-colored gravel containing gravel with a maximum diameter of 3-4 cm, occasionally interspersed with sand layers, angular to semi-rounded, loose to medium dense, gravelly sand,
- 13.50-27.45 m; greyish brown to light grey-colored, semi-angular to semi-rounded gravel with gravel up to a maximum diameter of 3-4 cm, low in silt content, interspersed with clay bands, loose to very loose to medium dense sand,
- 27.45-34.00 m; greyish-colored, moisty, highly plastic, occasionally gravelly, intermittently organic content, with sand layers, soft to firm consistency silty clay,
- 34.00-48.00 m; greyish brown-colored, moisty, low plasticity, high in sand-silt content, occasionally gravelly, firm to very firm consistency clay with silt,
- 48.00-49.95 m; greyish-brown-colored, moisty, non-plastic, clayey, sandy, fine-grained, very firm sandy silt units are observed.

In the soil profile of the SK-25 borehole, conducted by ALTINOK CONS. AND ENG.;

- 0.00-5.00 m; vegetable soil-road fill,
- 5.00-10.50 m; greyish brown to light grey-colored, semi-angular to semi-rounded gravel with gravel up to a maximum diameter of 3-4 cm, low in silt content, interspersed with clay bands, medium to tight sand with occasional loose sections,
- 10.50-14.50 m; greyish-light grey-colored, angular to semi-rounded gravel with a maximum size of 4-6 cm, sandy, medium to tight gravelly sand (The sand between gravel has been washed with drilling water.),
- 14.50-25.50 m; medium to coarse-grained, grey to dark grey colored, with few gravels, the gravel being angular to semi-rounded, loose to medium dense sand,
- 25.50-34.00 m; greyish-colored, moisty, highly plastic, occasionally gravelly, intermittently organic content, with sand layers, firm to very firm consistency silty clay,
- 34.00-48.00 m; greyish-brown-colored, moisty, low plasticity, high in sand-silt content, occasionally gravelly, firm to very firm consistency clay with silt (Drilling has advanced under its own weight between 39.45-45.00 meters. Lithological descriptions are made based on the data obtained from the Standard Penetration Test.),
- 48.00-49.95 m; greyish-brown-colored, moisty, non-plastic, clayey, sandy, fine-grained, firm to hard, sandy silt units are observed.

TSK-5/SD-26/SK-27

In the soil profile of the TSK-5 borehole, conducted by EOOE JV/LEADER EPTISA;

- 0.00-7.50 m; fill,
- 07.50-20.20 m; grey-brown-colored, silty, fine to medium gravelly, medium to tight sand,
- 20.20-60.50 m; grey-colored, silty, firm to very firm consistency clay units are observed between 54.60-58.00 meters, consisting of fine to medium gravelly sand.

In the soil profile of the SD-26 borehole, conducted by ALTINOK CONS. AND ENG.;

- 0.00-5.00 m; road fill,
- 5.00-12.00 m; greyish brown to light grey-colored, containing semi-angular to semi-rounded gravel, low in silt content, very dense (Gravel up to a maximum size of 3-4 cm) gravelly sand,
- 12.00-20.00 m; grey-colored, fine-grained gravelly, sands fine to coarse-grained, wet, interspersed with clay bands, medium to tight sand,
- 20.00-24.50 m; grey to dark grey-colored, organic content, moisty, highly plastic, with few gravels and little sandy content, firm to very firm consistency silty clay,
- 24.50-30.00 m; grey to dark grey-colored, fine-grained, variously sourced, angular gravelly, low in silt content, medium dense gravelly sand,
- 30.00-48.00 m; grey to dark grey-colored, moisty, silty, low in sandy content, medium

to high plasticity, intermittently organic, firm to very firm consistency silty clay,
- 48.00-49.95 m; greyish-brown-colored, moisty, clayey, sandy, fine-grained, dense silt units are observed.

In the soil profile of the SK-27 borehole, conducted by ALTINOK CONS. AND ENG.;

- 0.00-6.00 m; road fill,
- 6.00-15.00 m; greyish brown to light grey-colored, coarse-grained sandy, containing
- 15.00-16.50 m; grey-colored, medium to low plasticity, moisty, very firm silty clay,
- 16.50-18.00 m; grey-colored, fine-grained, gravelly, with gravel up to 1 cm in size, of various origins, very loose gravelly sand,
- 18.00-21.00 m; grey-colored, organic content, moisty, with very little clay, coarse-grained sandy, firm to very firm sandy silt,
- 21.00-37.40 m; greyish-colored, moisty, highly plastic, with low silt content, intermittently organic, firm to very firm consistency silty clay,
- 37.40-43.50 m; grey-colored, moisty, fine-grained sandy, intermittently interspersed with clay bands, very firm sandy silt,
- 43.50-52.95 m; greyish-brown-colored, moisty, medium to low plasticity, high in sand-silt content, very firm consistency silty clay units are observed

According to the laboratory test results of boreholes conducted by EOOE JV/Leader EPTISA;

For sand;

the average values are obtained in the interval of; No4= %2.1, No200 = %1.0-99.0 for sieve analysis and atterberg limits, LL = %24.99-54.17, PI = %8.77-27.61,

For clay;

the average values are obtained in the interval of; No4= %0.0, No200 = %9.3-99.6 for sieve analysis and atterberg limits, LL = %23.65-57.37, PI = %8.54-33.27 and triaxial compression test c (kPa) =0.51-78.60, (ϕ) = 6.0-10.0.

The details and summary of laboratory test results for the selected Standard Penetration Test (SPT) and Undisturbed (UD) samples representing the boreholes conducted by EOOE JV/Leader EPTISA and Altınok Consultancy and Engineering in the AoI are given in Comparative Borehole Report in Appendix-8.

In light of the data obtained from the drilling works conducted during the project phase and for confirmation purposes, considering the ground structure, it is predicted that settlement and liquefaction problems will be encountered in the project area. Due to the improvement needs arising from liquefaction compared to consolidation settlements (approximately 10-45 cm) are more critical, an improvement work has been carried out in this regard at Filyos Port and Filyos Industrial Zone Railway Junction Line (Including highway connection) Geological and Geotechnical Investigations Report prepared by Altınok Cons. Eng. A.Ş. on 21.02.2018 and which was approved before. Accordingly, in the sections to be backfilled on the project route, the top vegetative soil and weak soil will be filled with granular crushed stone backfill after stripping and the settlement and bearing capacity problems will be eliminated with the preloading to be applied afterwards.

In the soils determined as clayey silt and silty clay along the route, except for the beginning section of the railway route, against the liquefaction problem caused by the low SPT value and the groundwater level to the surface, the first 20 m will be improved with stone column/jet-grouting application considering the thickness of the liquefied layer.

According to the Engineering Design Review, Preparation of Bidding Documents for Civil Works, and Construction Supervision of Last-Mile Rail and Road Infrastructure Connectivity to/from Filyos Port and Filyos Industrial Zone Comparative Borehole Report prepared by

EOOE JV / Leader EPTISA in 2024, in the fill area before the Filyos River bridge, the first 20 m depth as per the specification, where liquefaction control and ground improvements are required, the Deep Soil Mixing (DSM) application has been deemed suitable as an improvement method in terms of both cost and ease of manufacture since the area has low clay and organic matter content and low plasticity.

Additionally, it is anticipated to use geogrid applications in areas with high fills to ensure equal load distribution. The planned DSM depths will be finalized with the geotechnical report to be made as a result of detailed analyses, but at this stage, it is planned to be 20 m according to the anticipated soil profile.

The geological plan and profile at Filyos Bridge along the railway route is given in Figure 25 and others are given at geological-geotechnical sheets in Appendix-9.

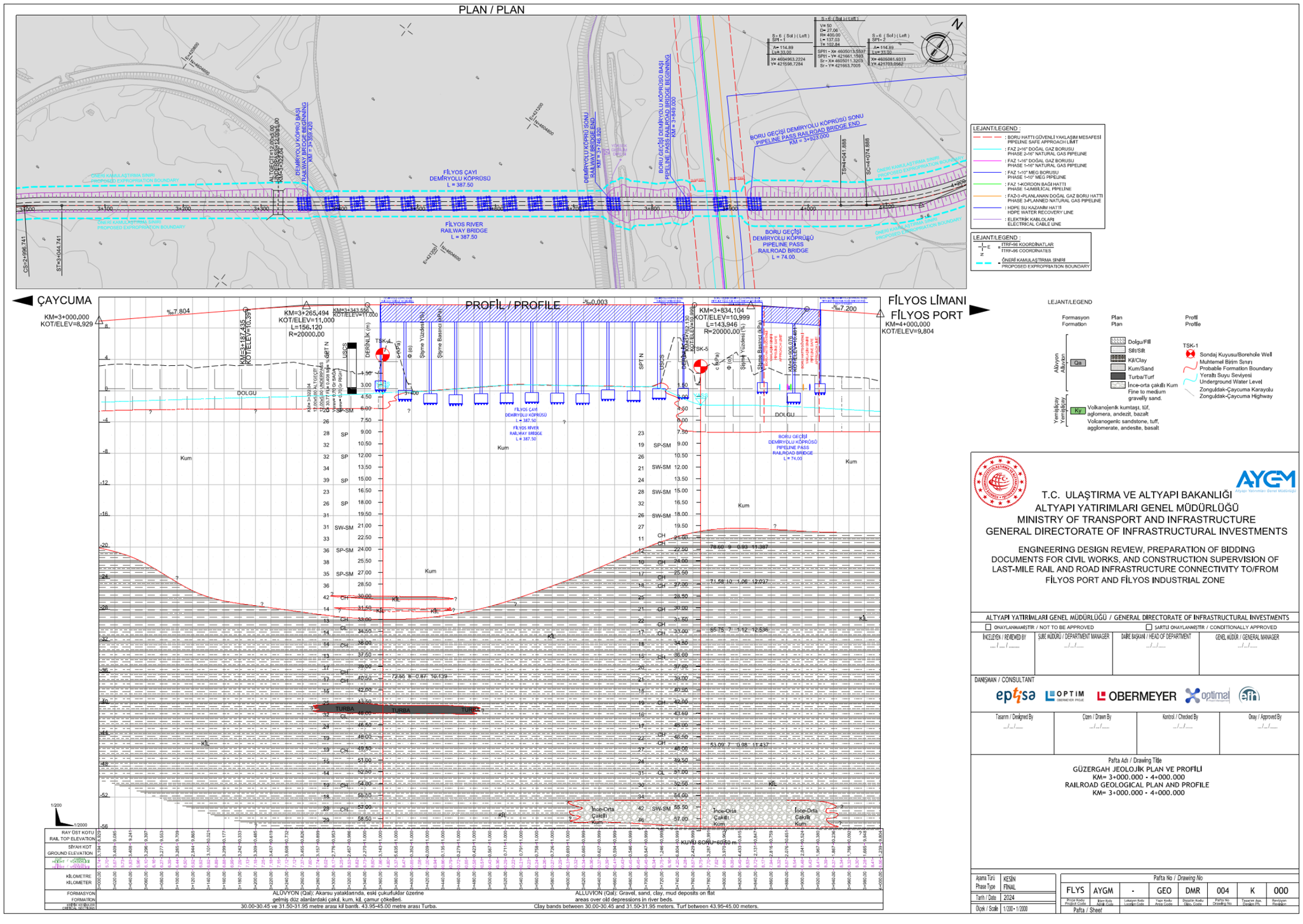


Figure 25. The Geological Plan and Profile Sheet at Filyos Bridge Crossing

5.1.2.4.3 Seismicity

Türkiye is located on Alps-Himalayan seismic belt which is one of the active seismic belts on the Earth. 42% of the country's acreage is in 1st grade seismic belt.

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 in Figure 26 and project area is marked on. The project area was examined on the interactive earthquake hazard map published by Ministry of Interior Disaster and Emergency Management Presidency (AFAD), and the largest ground acceleration value (PGA 475) for the 475 Year Recurrence Period was determined as 0.220 g (see Figure 27).

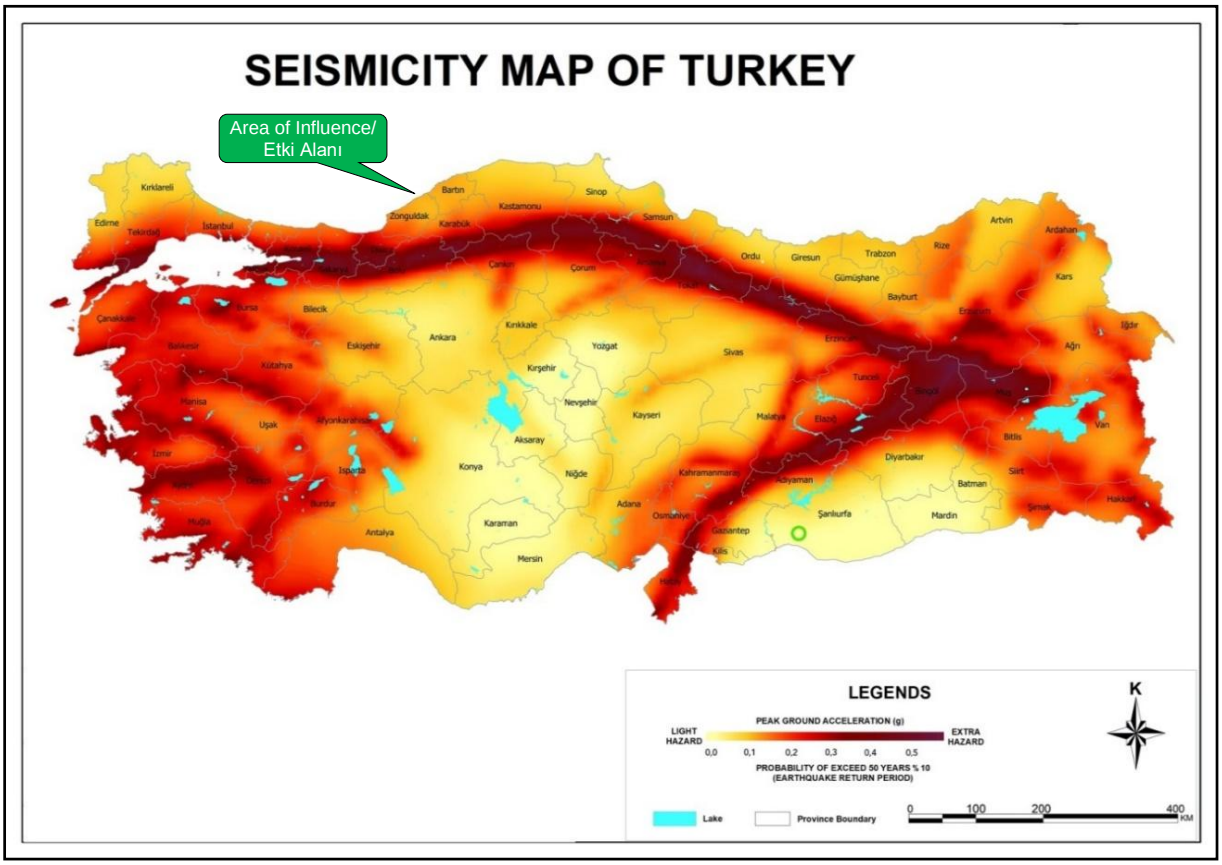


Figure 26. Earthquake Hazard Map for Project Route

Source: AFAD, 2018, Türkiye Earthquake Hazard Map



Figure 27. Project Area Peak Ground Acceleration (PGA 475)

Source: AFAD, 2018, Interactive Earthquake Hazard Map

The earthquake distribution in a radius of 100 km with project area being the center from year 1900-to-date is shown in Figure 28, and the earthquake catalogue of Kandilli Observatory and Earthquake Research Centre (KOERC) is presented in Table 27.

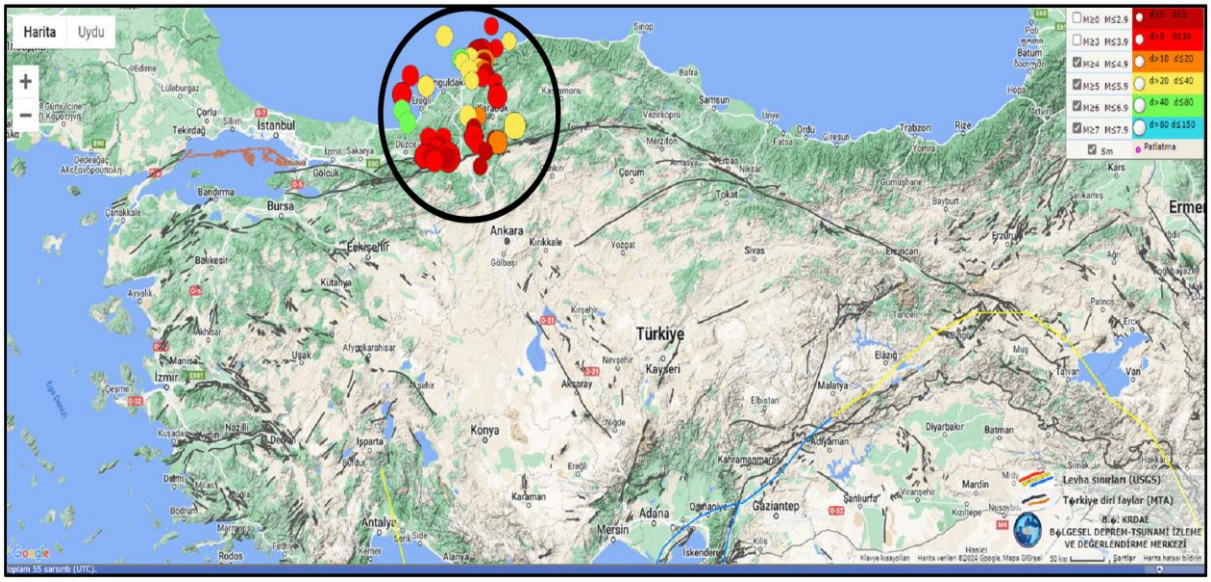


Figure 28. Earthquakes from 1900 to the present day with a magnitude of M ≥ 4 in a radius of 100 km (KOERC, 2024)

Table 27. Earthquakes occurring in a radius of 100 km from 1900 to the present day with magnitude ≥ 4,0

Occur Date	Lat.	Lon.	Depth (km)	Magnitude (M)	Location
14.10.2023	40.8932	31.7135	5	4.7	Mesciçele-(Bolu) [North 5.8 Km]
16.03.2023	40.7942	31.5332	9.1	4.7	Kızılağıl-(Bolu) [Northeast 1.7 Km]
7.04.2018	40.8617	31.6603	6	4.9	Yeşilçele- (Bolu) [Northwest 5.0 Km]
2.05.2015	40.8445	32.4925	1.8	4.1	İmamlar-Gerede (Bolu) [Northeast 0.9 Km]
4.09.2014	41.6437	32.5123	4.5	4	Kayadibi- (Bartın) [East 2.0 Km]
24.11.2013	40.7848	31.8763	7.6	4.8	Ulumescıt- (Bolu) [Northeast 0.4 Km]
12.11.2008	40.7808	31.9237	6.2	4.1	Erıcek- (Bolu) [Northeast 2.3 Km]
20.04.2006	41.69	32.47	8	4.1	Kocakoy-Amasra (Bartın) [Southwest 0.7 Km]
13.04.2004	40.75	31.64	10	4.6	Yenıkoy- (Bolu) [South 2.6 Km]
25.07.2003	40.89	31.53	8	4.3	Bekırler-Yıgılca (Duzce) [South 7.3 Km]
23.07.2002	40.96	32.64	5	4	Topcalı-Eskıpazar (Karabük) [Northeast 2.3 Km]
26.08.2001	40.98	31.54	6	4.6	Cıftlıkkoy-Yıgılca (Duzce) [South 0.9 Km]
14.02.2000	40.98	31.78	9	4.8	Yesıloz-Devrek (Zonguldak) [Southwest 7.3 Km]
29.11.1999	40.84	31.53	9	4	Kızılagıl- (Bolu) [North 6.7 Km]
17.11.1999	40.8	31.46	9	5	Kızılagıl- (Bolu) [Northwest 5.9 Km]
16.11.1999	40.79	31.6	1	4.9	Kozlu- (Bolu) [Southwest 1.3 Km]
13.11.1999	40.82	31.57	8	4.3	Kozlu- (Bolu) [Northwest 3.7 Km]
26.05.1990	42.1	32.6	10	4	Kurucasıle Açıkları-Bartın (Black Sea)
17.10.1986	41.2	32.39	12	4.4	Kuzdag-Yenıce (Karabük) [Northwest 1.1 Km]
14.02.1983	41.95	32.89	33	4.1	Irmakkoy-Cıde (Kastamonu) [Northwest 8.9 Km]
28.06.1979	40.78	31.85	0	4.7	Yayladınlar- (Bolu) [Southeast 0.8 Km]
3.11.1978	40.91	32.35	10	4.2	Adıller-Eskıpazar (Karabük) [Northwest 3.1 Km]
18.02.1976	41.88	32.42	3	4.4	Akkonak-Amasra (Bartın) [Northwest 12.0 Km]
4.06.1975	41.09	32.3	0	4	Hısarkoy-Yenıce (Karabük) [Southwest 5.9 Km]
21.10.1973	40.7	32.41	5	4.1	Kavacık-Gerede (Bolu) [Southwest 2.8 Km]
4.07.1972	41.7	32.44	10	4.1	Saray duzu-Amasra (Bartın) [North 0.5 Km]
20.09.1971	41.58	32.44	10	4.3	Gerıs- (Bartın) [Northeast 1. 1 Km]
20.09.1971	41.54	32.66	10	4.1	Dorucasahıncı-Ulus (Bartın) [West 0.7 Km]
5.07.1971	41.75	32.48	5	4.4	Topallar-Amasra (Bartın) [Southwest 1.5 Km]
4.05.1970	41.88	32.67	10	4.3	Hısarkoy-Kurucasıle (Bartın) [North 5.6 Km]
25.02.1969	41.56	32.27	31	4.3	Ahmetpasa- (Bartın) [Southeast 0.7 Km]
10.01.1969	41.66	32.47	18	4.6	Dogası- (Bartın) [Southeast 1.7 Km]
28.09.1968	41.75	32.1	38	4.1	Türkalı Açıkları-Zonguldak (Black Sea)
10.09.1968	41.69	32.39	33	4.2	Ugurlar- (Bartın) [Southwest 0.8 Km]
9.09.1968	41.66	32.22	33	4.6	Karasu- (Bartın) [Northwest 1.3 Km]
3.09.1968	41.77	32.08	55	4.5	Türkalı Açıkları-Zonguldak (Black Sea)
3.09.1968	41.81	32.33	14	4.7	Amasra (Bartın) [Northwest 8.4 Km]
3.09.1968	41.78	32.45	33	4.4	Cakrazbuz-Amasra (Bartın) [Northwest 1.7 Km]
3.09.1968	41.76	32.5	11	4.7	Topallar-Amasra (Bartın) [Northeast 0.5 Km]

Occur Date	Lat.	Lon.	Depth (km)	Magnitude (M)	Location
3.09.1968	41.78	32.25	33	4.6	Tarlaagzı-Amasra (Bartın) [Northwest 10.0 Km]
3.09.1968	41.81	32.39	5	6.5	Amasra (Bartın) [North 7.0 Km]
27.05.1957	41.14	31.19	80	4.5	Beyhanlı-Akcakoca (Duzce) [Northwest 6.5 Km]
26.05.1957	41.42	31.09	10	5.2	Akçakoca Açıkları-Düzce (Black Sea)
7.09.1953	41.09	33.01	40	6	Soganlı-Ovacık (Karabük) [Southwest 1.9 Km]
12.03.1951	42	31.8	30	4.9	Türkalı Açıkları-Zonguldak (Black Sea)
13.05.1949	40.94	32.71	20	5.3	Incebogaz-Eskıpazar (Karabük) [West 0.3 Km]
8.03.1945	41.85	32.44	10	5.3	Akkonak-Amasra (Bartın) [Northwest 8.4 Km]
10.02.1944	41	32.3	10	5.5	Ilyaslar-Mengen (Bolu) [North 4.1 Km]
1.02.1944	41.4	32.7	10	5.5	Incecay-Safranbolu (Karabük) [Northwest 2.5 Km]
1.02.1944	40.7871	31.8723	10	7.2	Ulumescıt-(Bolu)
15.05.1933	41.26	31.09	60	4.9	Akçakoca Açıkları-Düzce (Black Sea)
5.02.1933	41.5	31.5	10	4.6	Kozlu Açıkları-Zonguldak (Black Sea)
8.04.1929	41.2	32.2	30	4.8	Yesılkoy-Yenıce (Karabük) [Southwest 0.9 Km]
5.04.1929	41.5	31.5	33	4.9	Kozlu Açıkları-Zonguldak (Black Sea)
5.04.1929	41.61	31.23	10	4.8	Ereglı Açıkları-Zonguldak (Black Sea)

Source: The Earthquake Catalogue of Kandilli Observatory and Earthquake Research Centre (KOERC), http://www.koeri.boun.edu.tr/sismo/2/earthquake-catalog/

Zonguldak and surroundings, which is located on West Black Sea region and rich for coalfields, were affected by very active North Anatolia Fault earthquakes recently. Inherently, the town of Filyos and surroundings has potential of being affected by earthquakes occur on west part of North Anatolia Fault which is located 85 km south. According to Boğaziçi University, Kandilli Observatory and Earthquake Research Institute, Regional Earthquake-Tsunami Monitoring Center, 2 major earthquakes, with magnitude 6.5 and above, occurred in the region since 1900[14]. At Gerede-Çerkeş (Bolu) Eq. on 01.02.1944, with magnitude of 7.2, casualty of 3959 dead and 20865 displaced. At Bartın (Zonguldak) Eq. on 03.09.1968, with magnitude of 6.5, casualty of 29 dead and 2478 displaced.

Active faults map at and around the Project Area is given in Figure 21.

All the structures and buildings to be built within the scope of the project must be in accordance with the principles of the "Regulation on the Buildings to be Constructed in Disaster Areas" published in the Official Gazette dated 14/07/2007 and numbered 26582 of the Ministry of Public Works and Settlement, and the Disaster and Emergency Services published in the Official Gazette dated 18.03.2018 and numbered 30364 and entered into force on 01.01.2019. Also, the provisions of the "Turkish Building Earthquake Regulation" of the Situation Management Presidency must be strictly followed.

[14] http://www.koeri.boun.edu.tr/sismo/2/deprem-bilgileri/buyuk-depremler

5.1.2.4.4 Landslides

According to the Landslide Inventory Map of Türkiye Zonguldak Sheet, MTA, 2005 there are no active or passive landslide areas at and around the planned Filyos Port and Industrial Zone Railway Line. The nearest area susceptible to landslide in the region are in form of creep, slide and flow form are at hilly areas 2.8 km southeast of project area. The landslide inventory map of the project route and its surroundings is given in Figure 29.

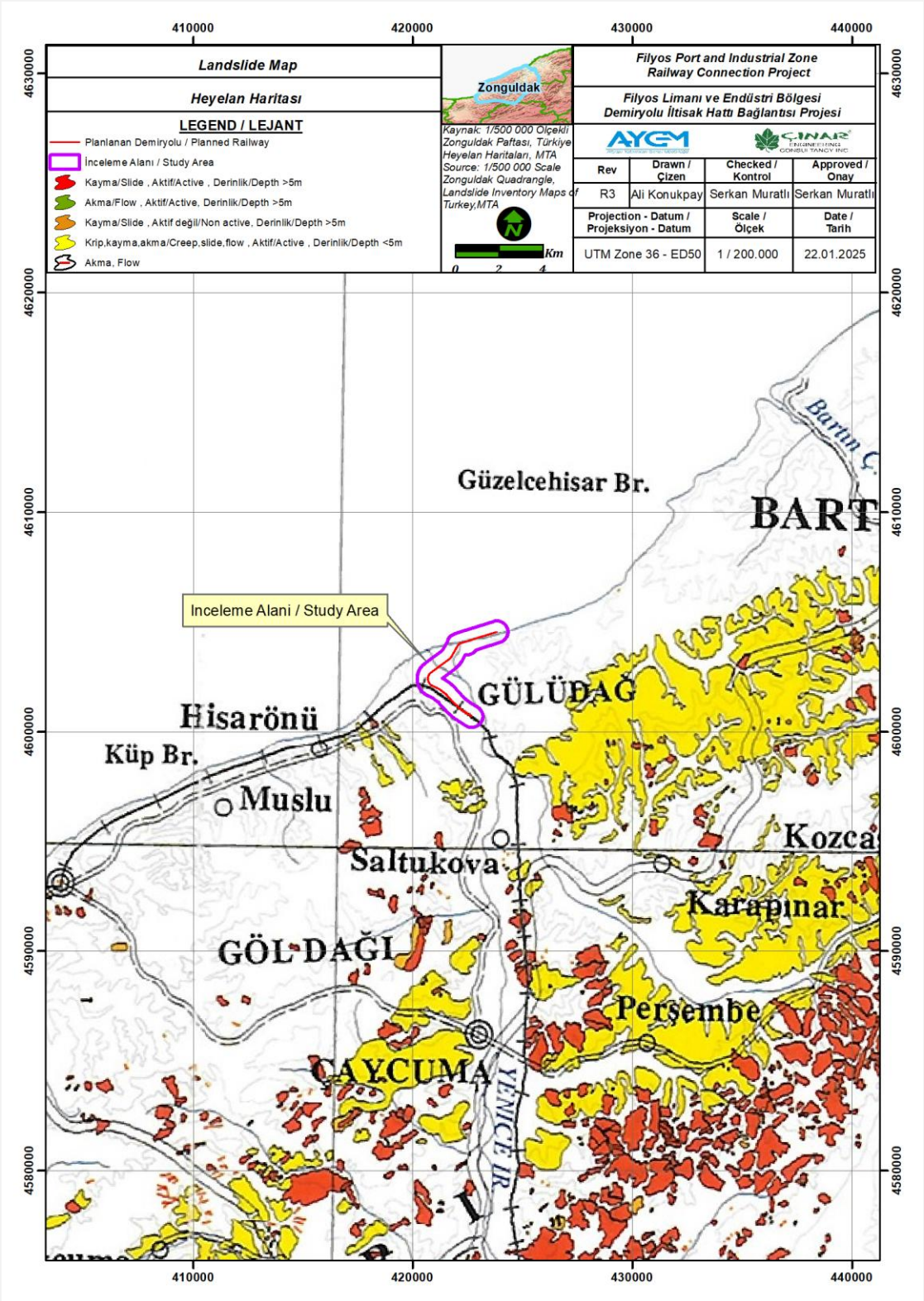


Figure 29. Landslide Map of the Project Area and Surroundings

Source: Landslide Inventory Map of Türkiye, Zonguldak Sheet, MTA, 2005

5.1.2.4.5 Geosites

Türkiye Geological Heritage Protection Association (JEMIRKO), having the importance of geology in Türkiye, provides that geological heritage, rocks, fossils, structure, geographical formations, mines, minerals to be protected, introduced to the public and transferred to future generations.

Typical localities that explain the evolution of the Earth's crust are geological elements with a large visual side, representatives of well-known events or processes and formations with rare occurrences are "Geological Heritage" fragments need to be preserved. They can be important fossil deposits, tectonic structures, mineral groups, mineral deposits, rocks, etc.

In its broadest extent, it is a rock, mineral, fossil groups, structure, stowage, landform, or terrain that expresses any current or ancient geological process, event or feature. Those with archaeological or historical value are Cultural Geosite. The area where the same or different types of geosites is the Geopark. Geo-inventory, which expresses the presence of geosite and geological heritage and its spatial distribution, is the most important data source for the planning of conservation studies and development of geotourism (https://www.jemirko.org.tr).

The "Geological Heritage Inventory" data prepared by JEMİRKO is examined and it is determined that there is no protected geological heritage site at and around near vicinity of Filyos Port and Industrial Zone Railway route. The nearest geological heritage site is at 10.2 km northeast of the project area called columnar structured lavas found in the Upper Cretaceous volcanic series in Güzelcehisar town.

5.1.3 Impact Assessment

Potential impacts of the Project on existing land use characteristics, soils and geology will occur mainly during the land preparation and construction phase, due to the earthworks and construction activities that will be conducted. Main activities to be conducted in the scope of land preparation and construction phase will include the following:

- Preparation of the topographical measurements, application designs and expropriation plans
- Utility works
- Topsoil stripping
- Cut and fill works
- Filyos Creek construction works
- Construction of engineering structures
- Traffic signs, marking of track and guardrail
- Service areas, parking areas
- Construction of a station and provision of infrastructure
- Electrification and signaling works
- Installation of security systems such as lighting, emergency communication facilities and wire fence

After the expropriation works are completed, the construction of the railway will begin with the stripping of the topsoil, removal of the soft soil, completing the cut and fill operations. After these activities, land use will have both temporary and permanent impacts on soil and geology.

In addition to the physical impacts arising from the project activities, possible impacts on land acquisition and property are evaluated in detail in Section 5.1.3 and Section 5.1.4. As mentioned in Chapter 3, region around the project route have the potential to develop in the future, as the project will operate in integration with the Filyos Port and it may trigger further urbanization in the area around the route.

5.1.3.1 Land Preparation and Construction Phase

Land Use

There are several types of land use along the land acquisition (expropriation) corridor of the project. Some of the direct impacts of the land preparation and construction phase of the Project can be listed as the following:

- Land take that will result in permanent changes in land use characteristics such as arable lands, etc.
- Temporary changes in land use during project construction
- Temporary changes in land use due to the areas to be used during the construction of the project (excavation storage area, construction site area, temporary access roads, etc.) (rehabilitation works will be carried out after construction activities)
- Restriction of access in some lands
- Evacuation of residential areas
- Fragmentation of lands

The total area intersected by the expropriation corridor is 1,481,037.15 m², of which 130,142.01 m² will be subject to land acquisition.

Temporary land acquisition may be required for necessary excavation storage area, construction site, temporary access roads etc. that will be located outside the corridor.

The following measures will be taken to minimize impacts of the Project during the land preparation and construction phase, on adjacent lands located outside of the expropriation corridor:

- Land preparation and construction works will be conducted at designated sites that will be visibly and appropriately marked.
- Training will be provided to the construction personnel 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.
- In case of direct or indirect damage to adjacent state- or privately-owned property as a result of Project-related activities, the Project Company will ensure that necessary corrective measures are taken at its own cost in line with the provisions of the DGII or other related authorities.

Soil

Within the scope of the project, cut and fill works and topsoil stripping will take place. In addition, during the excavation activities, the thickness of the topsoil to be removed will be approximately 30 cm. The amount of excavated topsoil as a result of the works to be carried out in the project area is summarized in the Table 12 and Table 13.

During the excavation and earthworks to be carried out during the land preparation and construction activities of the project, there is a risk of topsoil loss (decrease in quantity and / or degradation of vegetation quality, etc.), due to soil erosion and soil pollution caused by accidents and improper management of hazardous materials and wastes.

The excavation works will be done according to provisions of Regulation on Control of Excavation, Construction and Demolishing Wastes which came into force after being published in the Official Gazette No. 25406 dated 18.03.2004 (Amended: Regulation on Storage of Wastes in Landfills which came into force after being published in the Official Gazette No. 27533 dated 26.03.2010).

According to article 9 of this regulation, excavation soil and construction / demolishing waste producers are obliged to provide waste management in a way that minimizes the negative

effects of waste on the environment and human health in accordance with the provisions of the regulation.

During the construction works, provisions of the Regulation on the Control of Soil Pollution and Lands Polluted by Point Sources which came into force after being published in the Official Gazette No. 27605 dated 08.06.2010 will also be followed.

Stripped topsoil will be stored in lands with slope no more than 5% within the project area in accordance with the Regulation on Control of Excavation, Construction and Demolishing Wastes which came into force after being published in the Official Gazette No. 25406 dated 18.03.2004.

The losses that may occur during the storage of topsoil will be prevented and the quality of the soil will be preserved. Topsoil temporary storage areas will be established so that the height of the bulk material does not exceed 5 meters and is not affected by vehicle movements. In this context, marking will be done around these areas and control and monitoring works will be carried out at certain intervals. If the topsoil will be exposed for a long time, its surface will be covered with fast growing plants.

With the stripping of the topsoil, filling will be carried out in parallel and temporary storage of the topsoil will be provided for a short time.

In addition, temporarily stored topsoil can also be used in the landscaping activities to be made around the project area by Zonguldak Municipality or other relevant public institutions if needed.

Within the scope of taking necessary control measures to prevent erosion risk, before the land preparation and construction activities, erosion controls such as drainage channels, settling structures, etc. will be applied.

´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.

After the completion of the excavation works, all erosion control measures will be implemented with the culvert outlets and the slopes will be strengthened.

In the designated storage area, soil loss will be prevented by installing embankments around the excavation material stored.

All degraded sites will be restored as much as possible following the completion of the stripping and excavation work.

Soil contamination during the land preparation and construction phase of the Project may occur as a result of accidental spills and releases of hazardous materials and wastes. Therefore, these accidental amounts cannot be estimated before the incident actually takes place. Management and mitigation strategies to be implemented in case soil contamination takes place will also vary depending on the level and extent of contamination. However, i to develop an understanding of source-pathway-receptor relationship in case of an accidental spill or leakage and managing the contaminated media in a timely manner is important in terms of effective management of soil contamination. Some of the fundamental measures are listed below, to ensure that with avoidance and response measures in place, the amount of release can be taken under control before reaching substantial amounts and the significance of the spill or leakage can be kept at minimum levels, even if not considered negligible:

- Discharge of materials into soil that would cause contamination will be prohibited.
- 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 at project sites will be further managed

through implementation of the related management plans (Waste Management Plan, Pollution Prevention Plan, etc.).

Geology

Geological and Geotechnical Risks

According to the Geological and Geotechnical Report prepared by EOOE JV / Leader EPTISA in 2024, In light of the data obtained from the drilling works conducted during the project phase and for confirmation purposes, considering the ground structure, it is predicted that settlement and liquefaction problems will be encountered in the mentioned area. Due to the improvement needs arising from liquefaction compared to consolidation settlements (approximately 10-45 cm) are more critical, an improvement work has been carried out in this regard. In the fill area before the Filyos River bridge, the first 20 m depth as per the specification, where liquefaction control and ground improvements are required, the Deep Soil Mixing (DSM) application has been deemed suitable as an improvement method in terms of both cost and ease of manufacture since the area has low clay and organic matter content and low plasticity.

Additionally, it is anticipated to use geogrid applications in areas with high fills to ensure equal load distribution. The planned DSM depths will be finalized with the geotechnical report to be made as a result of detailed analyses, but at this stage, it is planned to be 20 m according to the anticipated soil profile.

Landslide Risk

According to the Landslide Inventory Map of Türkiye Zonguldak Sheet, MTA, 2005 there are no active or passive landslide areas at and around the planned Filyos Port and Industrial Zone Railway Line. The nearest area susceptible to landslide in the region are in form of creep, slide and flow form are at hilly areas 2.8 km southeast of project area.

Seismicity Related Risks

Zonguldak and its surrounding area, located in the western Black Sea region where major coal reserves of Türkiye are located, was affected by the earthquakes occurred in the North Anatolian Fault Line due to the region’s geological and geological structure and tectonic features. There is no active fault at and around the near vicinity of project route according to the Zonguldak (NK 36-10), Bolu (NK 36-14) Quadrangle, Serial No:9,19 2011, MTA Active fault maps. The North Anatolian Fault, 85 km south of the project area, is an active fault zone andthe main cause of seismic events in the region. The project area was examined on the interactive earthquake hazard map published by AFAD, and the largest ground acceleration value (PGA 475) for the 475 Year Recurrence Period was determined as 0.220 g

Geosite Loss and Damage

The "Geological Heritage Inventory" data study prepared by JEMİRKO is examined and it is determined that the there is no protected geological heritage site within or near the Filyos Port and Industrial Zone Railway route. The nearest geological heritage site is 10.2 km northeast of the project area called columnar structured lavas found in the Upper Cretaceous volcanic series in Güzelcehisar town.

5.1.3.2 Operation Phase

Soil

The operation phase of the Project will not cause any direct impact 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.

Geology

Geological and geotechnical risks (i.e. geotechnical risks such as settlement, liquefaction problems and stability at high fills) described above for land preparation and construction phase will be solved during land preparation and construction phase by applying crushed stone backfill, preloading, Deep Soil Mixing (DSM) and use of geogrid application.

There will be no impact on geosites during this phase as well.

5.1.4 Impact Significance, Mitigation Measures and Residual Impacts

Assessment of impacts on land use, soil and geology was done based on the methodology presented in Chapter 4. Accordingly, the magnitude of each impact was estimated as a factor of the foreseen: geographic extent, duration, reversibility, and frequency of the impact, based on expert's judgement. Sensitivity/value of the associated resource/receptor was determined in consideration of the baseline conditions described in the previous sections. Specific sensitivity/value criteria considered in assessing the impacts on land use and soils is provided below.

Table 28. 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 (agricultural lands suitable for agricultural soil cultivation)	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)	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)	Lands having land use capability of Class VIII according to database of the Ministry of Agriculture and Forestry (Non-arable lands)
Top soil	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 (Erosion)	Soils of Degree 4: Very severe erosion risk	Soils of Degree 3: Severe erosion risk	Soils of Degree 2: Moderate erosion risk	Soils of Degree 1: None or very low level of erosion risk
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-VII land use capability, industrial and mining areas.

Mitigation Measures to Address Geological-Geotechnical Impacts

In light of the data obtained from the drilling works conducted during the project phase and for confirmation purposes, considering the ground structure, it is predicted that settlement and liquefaction problems will be encountered in the project area. Due to the improvement needs arising from liquefaction compared to consolidation settlements (approximately 10-45 cm) are more critical, an improvement work has been carried out in this regard at Filyos Port and Filyos Industrial Zone Railway Junction Line (Including highway connection) Geological and Geotechnical Investigations Report prepared by Altınok Cons. Eng. AŞ. on 21.02.2018 and

which was approved before. Accordingly, in the sections to be backfilled on the project route, the top vegetative soil and weak soil will be filled with granular crushed stone backfill after stripping and the settlement and bearing capacity problems will be eliminated with the preloading to be applied afterwards.

In the soils determined as clayey silt and silty clay along the route, except for the beginning section of the railway route, against the liquefaction problem caused by the low SPT value and the groundwater level to the surface, the first 20 m will be improved with stone column/jet-grouting application considering the thickness of the liquefied layer.

According to the Engineering Design Review, Preparation of Bidding Documents for Civil Works, and Construction Supervision of Last-Mile Rail and Road Infrastructure Connectivity to/from Filyos Port and Filyos Industrial Zone Comparative Borehole Report prepared by EOOE JV / Leader EPTISA on 2024, in the fill area before the Filyos River bridge, the first 20 m depth as per the specification, where liquefaction control and ground improvements are required, the Deep Soil Mixing (DSM) application has been deemed suitable as an improvement method in terms of both cost and ease of manufacture since the area has low clay and organic matter content and low plasticity.

Additionally, it is anticipated to use geogrid applications in areas with high fills to ensure equal load distribution. The planned DSM depths will be finalized with the geotechnical report to be made as a result of detailed analyses, but at this stage, it is planned to be 20 m according to the anticipated soil profile.

Mitigation Measures to Address Seismic Impact – Earthquake Impact

The route of project is marked on renewed “Seismic Risk Map of Türkiye” which is valid since 01.01.2019 and published on official gazette, no. 30364, on 18.03.2018. Routes planned within the project and close environments are investigated on interactive seismic risk map published by AFAD (The Disaster and Emergency Management Presidency). The project area was examined on the interactive earthquake hazard map published by AFAD, and the largest ground acceleration value (PGA 475) for the 475 Year Recurrence Period was determined as 0.220 g.

All the structures and buildings to be built within the scope of the project must be in accordance with the principles of the "Regulation on the Buildings to be Constructed in Disaster Areas" published in the Official Gazette dated 14/07/2007 and numbered 26582 of the Ministry of Public Works and Settlement, and the Disaster and Emergency Services published in the Official Gazette dated 18.03.2018 and numbered 30364 and entered into force on 01.01.2019. Also, the provisions of the "Turkish Building Earthquake Regulation" of the Situation Management Presidency must be strictly followed.

Mitigation Measures to Address Landslide Risks

According to the Landslide Inventory Map of Türkiye Zonguldak Sheet, MTA, 2005 there are no active or passive landslide areas at and around the planned Filyos Port and Industrial Zone Railway Line. The nearest area susceptible to landslide in the region are in form of creep, slide and flow form are at hilly areas 2.8 km southeast of project area. Almost all of the route passes over alluvial deposits with low slopes, and shotcrete, wiremesh and rock bolt applications should be made if necessary to prevent local small slides in the slopes close to the Yemişliçay formation consisting of clastic and volcanic rocks forming the sloping areas.

In line with the geological-geotechnical survey studies carried out within the scope of the Project, the earthquake hazard map and landslide map developed by the relevant institutions, the information in the online databases of these institutions, and the recommendations of the experts studying in this field, the assessments of these mitigation measures and the residual impacts after implementation of these measures are performed and presented in detail in Table 29.

Table 29. Land Use, Soils and Geology Impacts, Mitigation Measures and Residual Impacts

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 arable lands	Land preparation and construction	Local communities	Restricted	Irreversible	Short-term	One-off	Medium	Medium	**Moderate**	▪ The Resettlement Plan (RP) will be implemented. ▪ Land preparation and construction works will be conducted at designated sites that will be visibly and appropriately marked. ▪ Training will be provided to the construction personnel so that they maintain the pre-established construction boundaries. ▪ A grievance mechanism will be developed and implemented to ensure that all complaints and comments regarding the project are received and addressed promptly. This mechanism will provide solutions and take corrective measures as necessary to resolve issues effectively. ▪ DGII 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. ▪ In order to mitigate fragmentation impacts, agricultural underpasses and culverts are either available or will be constructed throughout the entire Project route. ▪ Trainings and timely and regular information sharing will be performed with community members who are using arable lands during land preparation before construction.	**Minor**
		Arable lands	Restricted	Irreversible	Short-term	One-off	Medium	Medium	**Moderate**		**Minor**
Topsoil stripping	Land preparation and construction	Arable lands	Restricted	Irreversible	Short-term	One-off	High	High	**Major**	▪ Regulation on the Control of Excavation Soil, Construction and Demolition Wastes (Amended with Regulation on the Landfill of Wastes published in Official Gazette No. 27533 dated 26.03.2010) provisions will be complied. ▪ Stripped topsoil will be temporarily stored in designated areas within the scope of the project, ensuring a maximum slope of 5% and a height not exceeding 1.5 meters. ▪ Strip fertile topsoil along the Project area including the railway route, quarries/material borrow sites, storage sites at a 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 so as 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. ▪ In addition, temporarily stored topsoil can also be used in the landscaping activities to be made around the project area by Zonguldak Municipality or other relevant public institutions if needed. ▪ 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 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.	**Moderate**
		Non arable lands	Restricted	Irreversible	Short-term	One-off	Low	Low	**Negligible**		**Negligible**
		Lands with no topsoil	Restricted	Irreversible	Long-term	One-off	Low	Negligible	**Negligible**		**Negligible**
Soil Erosion	Land preparation and construction	Lands with Erosion Degree 4 and 3	Local	Irreversible	Short-term	Intermittent	Low	High	**Minor**	▪ Before the onset of land preparation and construction works, erosion control measures like drainage channels, settling structures, etc. will be implemented. ▪ In order 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 of the disturbed sites will be restored to the most possible extent in a timely manner following the completion of stripping and excavation works.	**Negligible**
		Lands with Erosion Degree 2 and 1	Local	Irreversible	Short-term	Intermittent	Low	Low	**Negligible**		**Negligible**

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Reversibility	Duration	Frequency	Overall Magnitude				
Soil Contamination	Land preparation and construction	Lands Project Personnel Local Communities	Local	Short-term reversible	Short-Term	One-off	Low	Medium	**Minor**	▪ Discharge of materials into soil that would cause contamination will be prohibited. ▪ 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 (Waste Management Plan, and Pollution Prevention Plan). ▪ Soil sampling will be conducted in the event of contamination or suspicion of contamination to assess the situation and determine necessary actions, or in case of a complaint.	**Negligible**
Geological and Geotechnical Risks (settlement, bearing capacity, liquefaction, slope stability)	Land preparation and construction	Project Railway Route and Filyos River Bridge Crossing	Restricted	Irreversible	Short-term	One-off	High	High	**Major**	▪ Drainage measures will be implemented to effectively manage and remove both groundwater and surface water from the project area. ▪ In the sections to be backfilled on the project route, the top vegetative soil and weak soil will be filled with granular crushed stone backfill after stripping and the settlement and bearing capacity problems will be eliminated with the preloading to be applied afterwards. ▪ In the soils determined as clayey silt and silty clay along the route, except for the beginning section of the railway route, against the liquefaction problem caused by the low SPT value and the groundwater level to the surface, the first 20 m will be improved with stone column/jet-grouting application considering the thickness of the liquefied layer. ▪ In the fill area before the Filyos River bridge, the first 20 m depth as per the specification, where liquefaction control and ground improvements are required, the Deep Soil Mixing (DSM) application has been deemed suitable as an improvement method in terms of both cost and ease of manufacture since the area has low clay and organic matter content and low plasticity. ▪ Use of geogrid application in areas with high fills will ensure equal load distribution and stability at slopes. ▪ Periodic control and maintenance activities will be conducted along the routes to ensure safety and functionality. When necessary, additional durability and structural measures will be developed and implemented in cut and fill areas to address potential issues such as cracks, breaks, slips, and deformations in engineering structures, particularly those that may occur after natural disasters.	**Minor**
Seismicity	Land preparation and construction, Operation	Project Railway Route and Filyos River Bridge Crossing Project Personnel / Railway Users	Wide	Irreversible	Medium-term	Intermittent	High	High	**Major**	▪ All structures, including buildings, culverts, bridges, and others within the project, will be designed and constructed in accordance with the earthquake resistance parameters defined in the regulations currently in force. ▪ All the structures and buildings to be built within the scope of the project must be in accordance with the principles of the "Regulation on the Buildings to be Constructed in Disaster Areas" published in the Official Gazette dated 14/07/2007 and numbered 26582 of the Ministry of Public Works and Settlement, and the Disaster and Emergency Services published in the Official Gazette dated 18.03.2018 and numbered 30364 and entered into force on 01.01.2019. Also, the provisions of the "Turkish Building Earthquake Regulation" of the Situation Management Presidency must be strictly followed. ▪ Periodic control and maintenance activities will be conducted along the routes to ensure safety and functionality. When necessary, additional durability and structural measures will be developed and implemented in cut and fill areas to address potential issues such as cracks, breaks, slips, and deformations in engineering structures, particularly those that may occur after natural disasters.	**Minor**
Landslide Risk	Land preparation and construction, Operation	Project Railway Route and Filyos River Bridge Crossing Project Personnel / Railway Users	Local	Short-term reversible	Medium-term	One-off	Low	Negligible	**Negligible**	▪ According to the Landslide Inventory Map of Türkiye Zonguldak Sheet, MTA, 2005 there are no active or passive landslide areas at and around the planned Filyos Port and Industrial Zone Railway Line. Almost all of the route passes over alluvial deposits with low slopes, and shotcrete, wiremesh and rock bolt applications should be made if necessary to prevent local small slides in the slopes close to the Yemişliçay formation consisting of clastic and volcanic rocks forming the sloping areas.	**Negligible**

* In terms of geosit loss and damage, the "Geological Heritage Inventory" data study prepared by JEMİRKO is examined and it is determined that the there is no protected geological heritage site at and around near vicinity of Filyos Port and Industrial Zone Railway route. The nearest geological heritage site is at 10.2 km northeast of project area called columnar structured lavas found in the Upper Cretaceous volcanic series in Güzelcehisar town. The project activities do not pose a risk for the area.

5.2 Noise and Vibration

5.2.1 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 regulations.

- Environmental Noise Control Regulation (ENCR)
- WBG General EHS Guidelines - 1. Environmental - 1.7: 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 30.

Table 30. Limit Values in Regulation on Environmental Noise Control [15]

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 day and night-time. Limit values stated in the guideline is given in Table 31. 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 31. 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

Since the WBG EHS Guideline noise limit values established for residential areas are stricter than ENCR noise limits, the WBG EHS Guideline limit values were adopted as project standards.

[15] Table 1.1 in Appendix-2 of Regulation on Environmental Noise Control

Methodology

Environmental noise measurements were carried out by ÇINAR 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 measurements were performed at each point, with the measurements in 10-minute periods.

Noise modeling studies were carried out for both construction and operation periods. SoundPLAN 8.2 software was used in the noise modeling works carried out for both the construction and operational periods of the project. Information about the data used for noise modeling studies is given in the table below.

Table 32. SoundPLAN Model Methodology

Model Input		Data Source
Receptors		Established from aerial photo of the surrounding area (Google Earth view) and site visits
Calculation Method	Industry	ISO 9613-2: 1996
	Air absorption	ISO 9613
Temperature (ºC)		10
Relative Humidity (%)		70
Air Pressure (mbar)		1013,3
Assessment		Lden EU (Ld & Ln)
Grid Noise Map	Grip Space (m)	10
	Height above ground	4

Potential noise sources during the land preparation and construction phases of the project can be listed as the equipment and machinery usage within the scope of construction activities and material supply works from quarries and/or borrow pits. During the operation phase of the project, the noise that will result from the movement of the freight trains is the main source of noise.

Assumptions and Limitations

The following assumptions were made during modeling:

- During the construction phase, it was assumed that all the machinery and equipment planned to be used will operate simultaneously.
- Railway route is defined as a line noise source.
- When calculating the noise levels in the residential area affected by the project, the closest household in the residential area was taken into consideration.
- It was assumed that in the construction phase, all machinery and equipment will operate only in day time.
- It was assumed that in the operation phase, railway will be operated throughout the day.

5.2.2 Baseline Conditions

During the Phase-1 studies, five (5) 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 had recorded in 10 minutes logs with L_{eq} at 5 points for 48 hours.

The noise measurement locations are shown in Figure 30. The noise measurement results and details related to measurement locations (coordinates, neighborhood, receptor type etc.) are given in Table 33 regarding the time intervals specified in ENCR and WBG EHS Guidelines.

Environmental noise may differ at different times of the day or from season to season. It is generally not possible to continuously measure sound pressure levels for a long enough time (one year) to precisely define environmental noise exposure. As shown in Table 33, the point with the highest noise level is the N-5 (Derecikören) point. Additionally, N-1 (Sefercik) and N-2 (Gökçeler) points exceeded the limit values. These points are adjacent to the existing Zonguldak-Çaycuma road and the existing railway. The high noise levels are thought to be the caused by the existing road and railway.

The analyses reports are given in Appendix-3.

Table 33. Noise Measurement Results

Project Phase	Measurement Location				Date	Results (dBA)				
						Turkish Regulation (ENCR)			WBG EHS Guidelines	
	No	Coordinates (WGS 84 – UTM Zone 36T)	District/ Province	Neighborhood & *Receptor Type*		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)
Phase-1	N-1	420491 E, 4602066 N	Çaycuma/Zonguldak	Sefercik *Residential*	13.01.2020	49.7	49.9	49.5	49.8	**49.8**
					14.01.2020	55.1	54.6	49.5	54.9	**49.7**
					15.01.2020	**67.7**	-	**57.4**	**67.6**	**57.4**
	N-2	421932 E, 4600926 N	Çaycuma/Zonguldak	Gökçeler *Residential*	13.01.2020	61.4	**60.6**	46.4	**61.3**	**54.7**
					14.01.2020	58.2	57.2	46.2	**58.2**	**46.2**
					15.01.2020	**65.7**	-	50.4	**65.7**	**50.4**
	N-3	422452 E, 4603346 N	Çaycuma/Zonguldak	Sazköy-1 *Residential*	15.01.2020	45.7	**60.2**	54.5	**57.8**	**60.8**
					16.01.2020	52.6	53.2	41.0	53.0	41.0
					17.01.2020	59.6	-	42.5	**59.6**	42.3
	N-4	423047 E, 4602304 N	Çaycuma/Zonguldak	Sazköy-2 *Residential*	15.01.2020	43.0	43.5	37.1	43.7	40.8
					16.01.2020	53.8	49.5	38.2	53.3	38.2
					17.01.2020	49.1	-	39.4	47.0	39.4
	N-5	422560 E, 4600522 N	Çaycuma/Zonguldak	Derecikören *Residential*	17.01.2020	-	**60.7**	**69.0**	**61.6**	**66.9**
					18.01.2020	**65.2**	**62.2**	**59.9**	**64.7**	**59.8**
					19.01.2020	**70.8**	-	**57.9**	**70.8**	**57.9**
Turkish Regulation (ENCR) Noise Limit Values						**65**	**60**	**55**	**-**	**-**
World Bank Group EHS Guidelines Environmental Noise Limit Values – Residential, institutional, educational						**-**	**-**	**-**	**55**	**45**
World Bank Group EHS Guidelines Environmental Noise Limit Values – Industrial, commercial						**-**	**-**	**-**	**70**	**70**

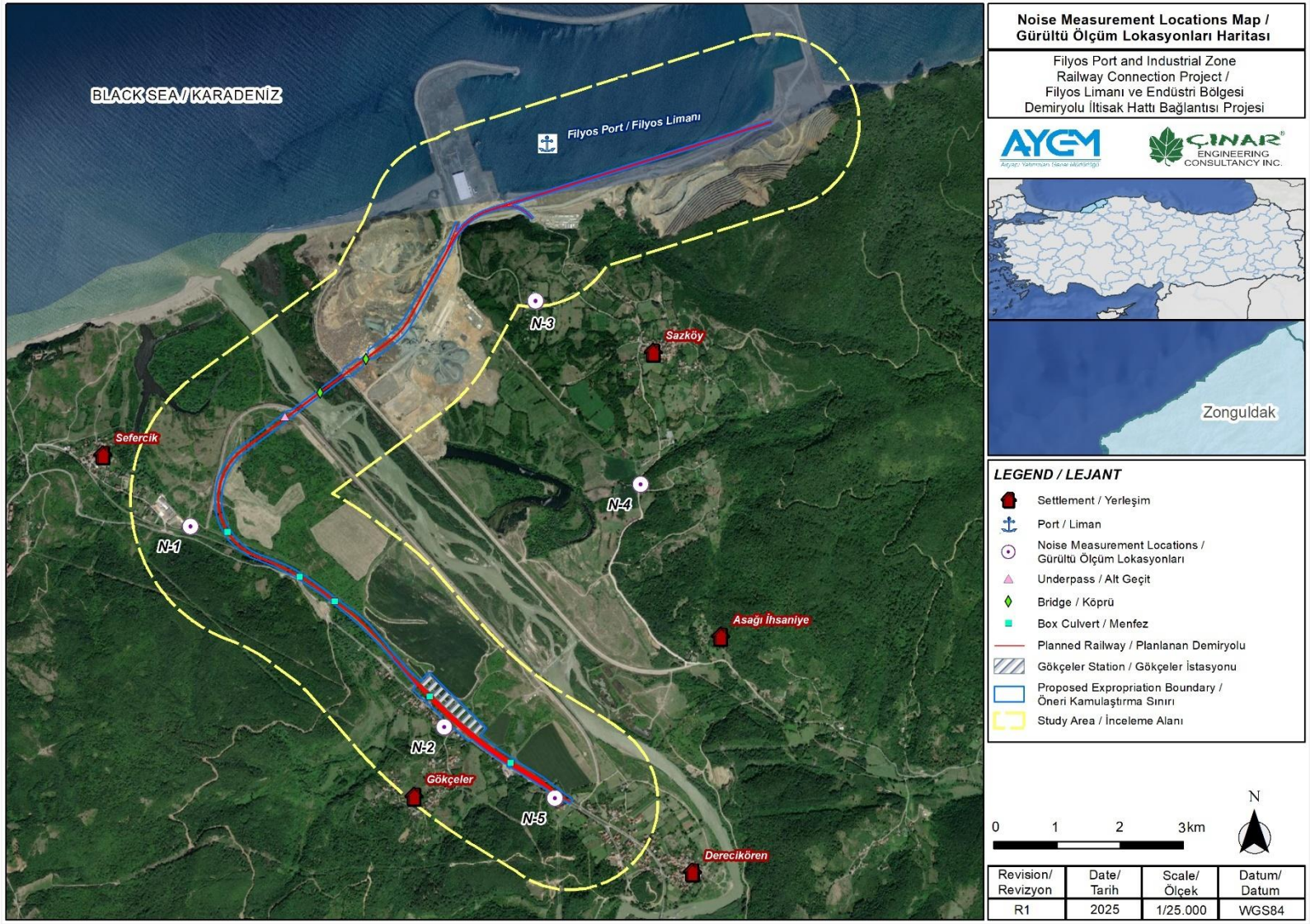


Figure 30. Background Noise Measurement Locations

5.2.3 Impact Assessment

5.2.3.1 Land Preparation and Construction Phase

Noise

During the land preparation and construction phase, the work will be carried out in the open area, usually between 08:00 and 18:00 as a single shift.

Within the scope of the project, the machinery, tools and equipment and their numbers that will operate during the land preparation and construction phase are given in Table 14.

The machines and equipment listed in **Hata! Başvuru kaynağı bulunamadı.** will work in a certain order and are unlikely to be in the same place at the same time. However, since noise calculations are based on the worst-case scenario, it is assumed that they all work along the route at the same time.

In the calculations, information about the noise levels of the vehicles and equipment selected as the noise source was provided from the database in the library of the program used. For the machinery and equipment that cannot be found in the said database, the data of similar machinery and equipment have been selected and used as reference.

In this context, noise levels of equipment and machinery that are taken from the library of SoundPLAN 8.2 are provided below.

Excavator

The sound power level of the Excavator selected from the SoundPLAN 8.2 program library is 105.0 dBA and its distribution according to the 1/1 octave frequency band is given below.

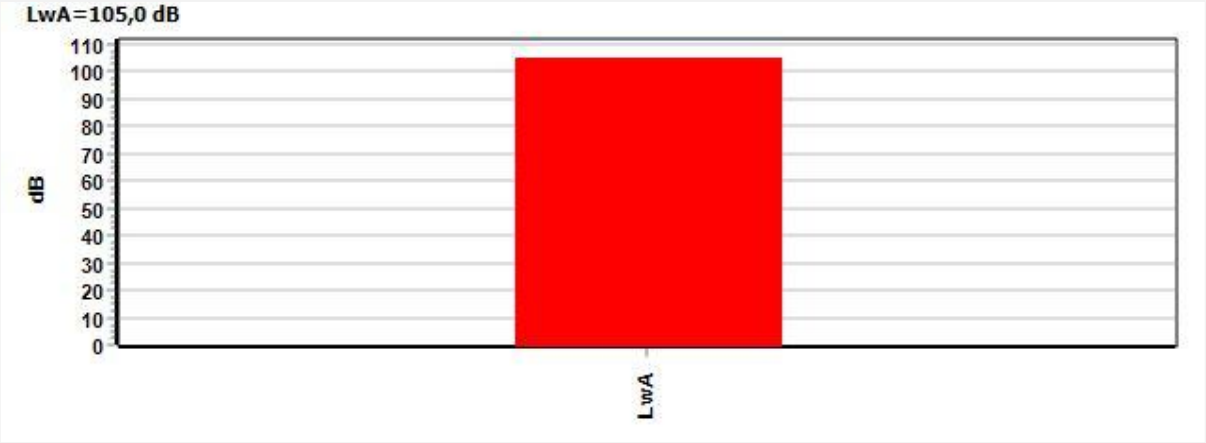


Figure 31. Excavator Noise Level Frequency Analysis

Truck

The sound power level of the Truck selected from the SoundPLAN 8.2 program library is 100.7 dBA and its distribution according to the 1/1 octave frequency band is given below.

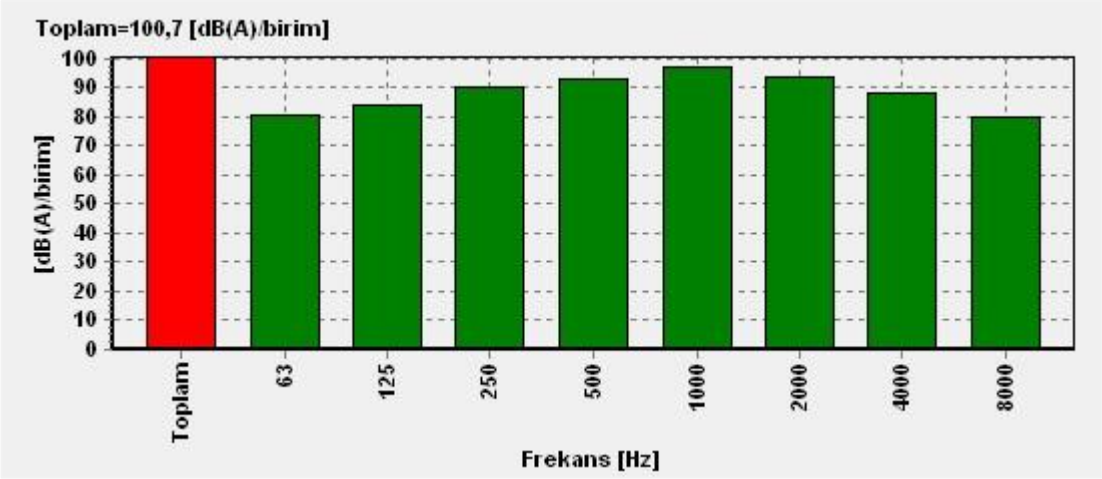


Figure 32. Truck Noise Level Frequency Analysis

Cylinder

The sound power level of the Cylinder selected from the SoundPLAN 8.2 program library is 91.8 dBA and its distribution according to the 1/1 octave frequency band is given below.

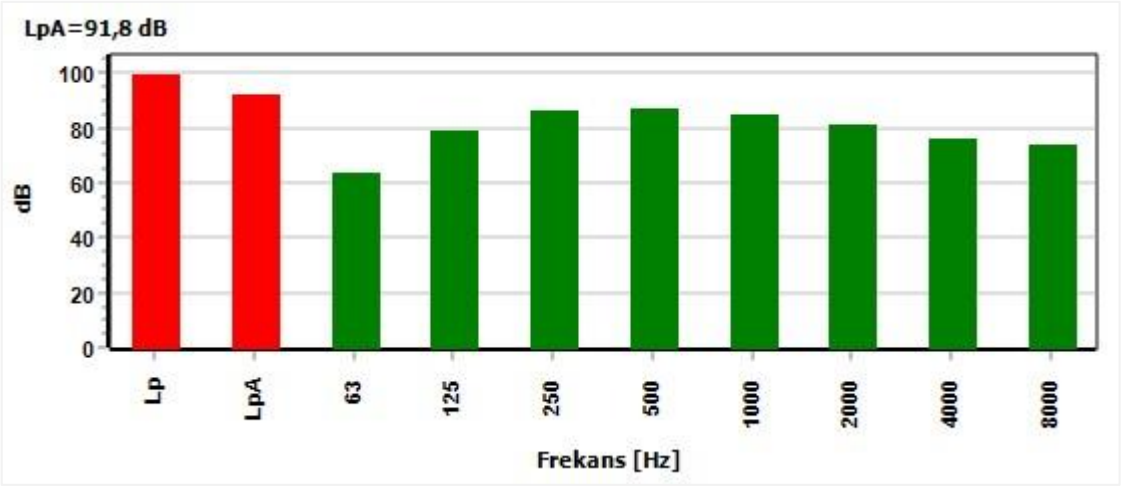


Figure 33. Concrete pump Noise Level Frequency Analysis

Calculation of Total Noise Level during Construction Activities

In the model, firstly, elevation model of the natural ground was introduced which directly affects the noise distribution. In order to do so, topographical data was digitized. After that, in order to introduce the data generated to the model, a digital elevation model (DEM) was created. Then, the noise source was drawn by introducing the data in the software in accordance with the model standards. As a result of these studies, noise calculation area was defined, and receptor points were located. For the receptor points, noise levels arising from the machinery and equipment that will operate during the construction period and noise levels arising from the railway during operation phase were calculated.

The noise maps created as a result of the calculations made in this context are presented in Figure 34.

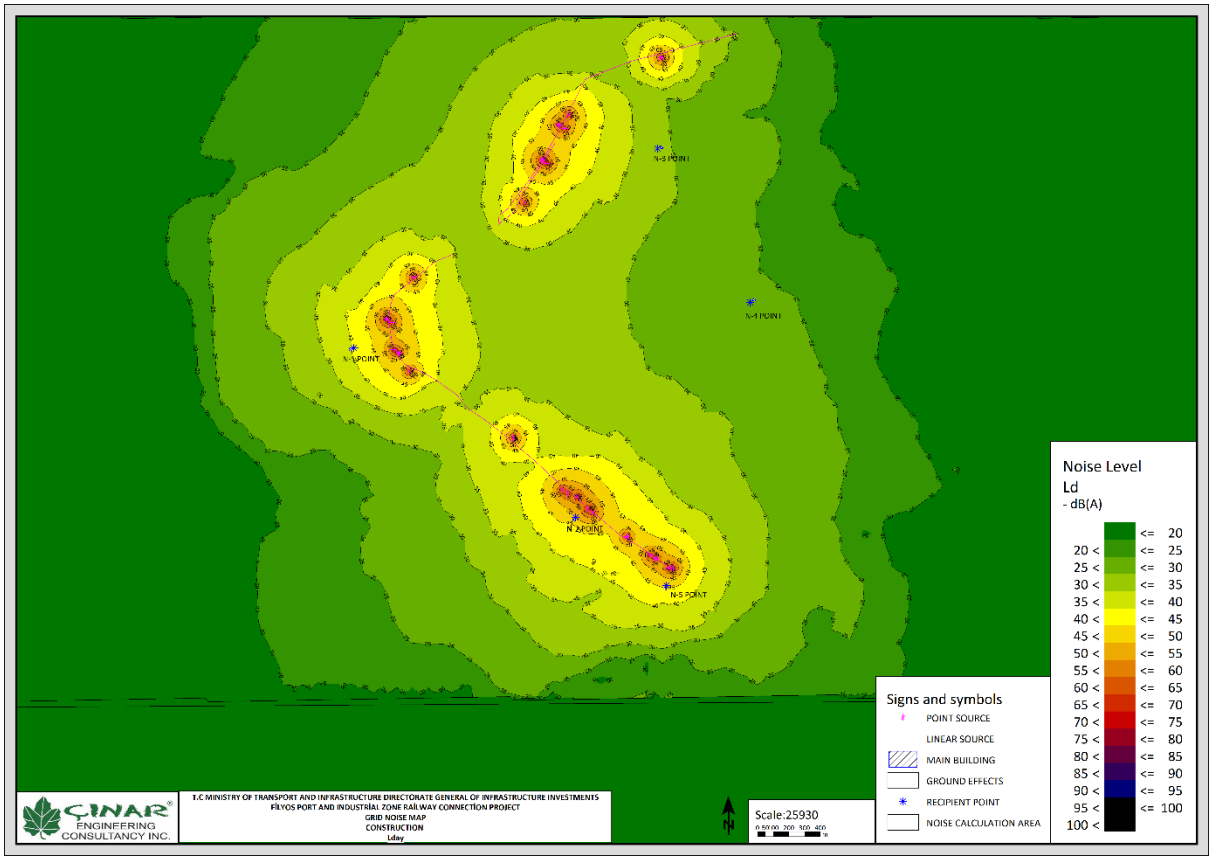


Figure 34. Grid Noise Map (Land Preparation and Construction Phase)

As a result of the calculations made and as can be seen on the noise maps given above, the noise level arising from the vehicles that will work during the construction works of the project rises to high values especially in the region where the vehicles operate. However, the noise level changes with the effect of ground and distance between 24.5 dB(A)- 48.6 dB(A) as can be seen from Table 34. The calculated noise level values are below the project standard at all receptors. In the noise level assessment, the calculations and modeling studies were conducted using the baseline measurements. The calculated and modeled noise levels include both the Project-related and the baseline noise levels, thus reflecting the cumulative condition.

Table 34. Noise Emission Values Calculated in the Receptors During Construction Phase

Receptor	X (m)	Y (m)	Z (m)	Ld dB(A)	Project Standards dB(A)
Sefercik	420491.00	4602066.00	13.68	38.8	55
Gökçeler	421932.00	4600926.00	6.59	48.6	
Sazköy-1	422452.00	4603346.00	23.85	30.6	
Sazköy-2	423047.00	4602304.00	19.28	24.5	
Derecikören	422560.00	4600522.00	14.00	45.6	

In the calculations made, the vehicles that will work at the land preparation and construction stages are considered as they will work simultaneously. However, during the construction works, the vehicles will work in a certain order. Therefore, it is expected that noise levels will be lower than the calculated noise levels during the land preparation and construction works of the project. Noise barriers were deemed unnecessary during the construction phase since modeling results showed that limit values were not exceeded.

Vibration

Blasting is a possibility that contractor might consider during construction. If blasting is decided to be conducted and location of the blasting, amount and type of the explosives and timeframe of the blasting is determined assessment on noise and vibration will be done.

5.2.3.2 Operation Phase

Noise

As the noise source, trains that will work on the main project route were selected. In the modelling studies for the operation phase, it was assumed that the train will work 24 hours every day.

During modelling studies, it has been assumed that trains will work along all lines at the same time. The reason for this is to be able to evaluate the worst-case scenario. During the operation phase, it is not possible for all trains to operate on all lines at the same time.

Train

The sound power level of the Freight Train selected from the SoundPLAN 8.2 program library is 103.6 dBA and its distribution according to the 1/1 octave frequency band is given below.

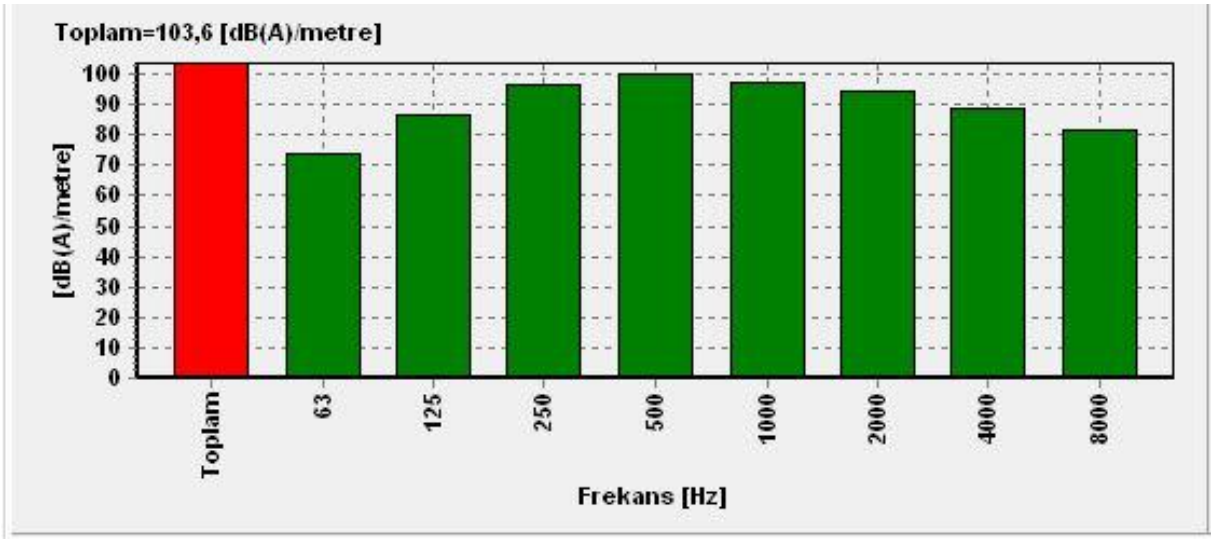


Figure 35. Freight Train Noise Level Frequency Analysis

Calculation of Total Noise Level during Operation

The noise levels in the day and nighttime periods created as a result of the noise modelling and calculations of the operational phase of the project is calculated separately and the noise maps of the mentioned time periods are presented below.

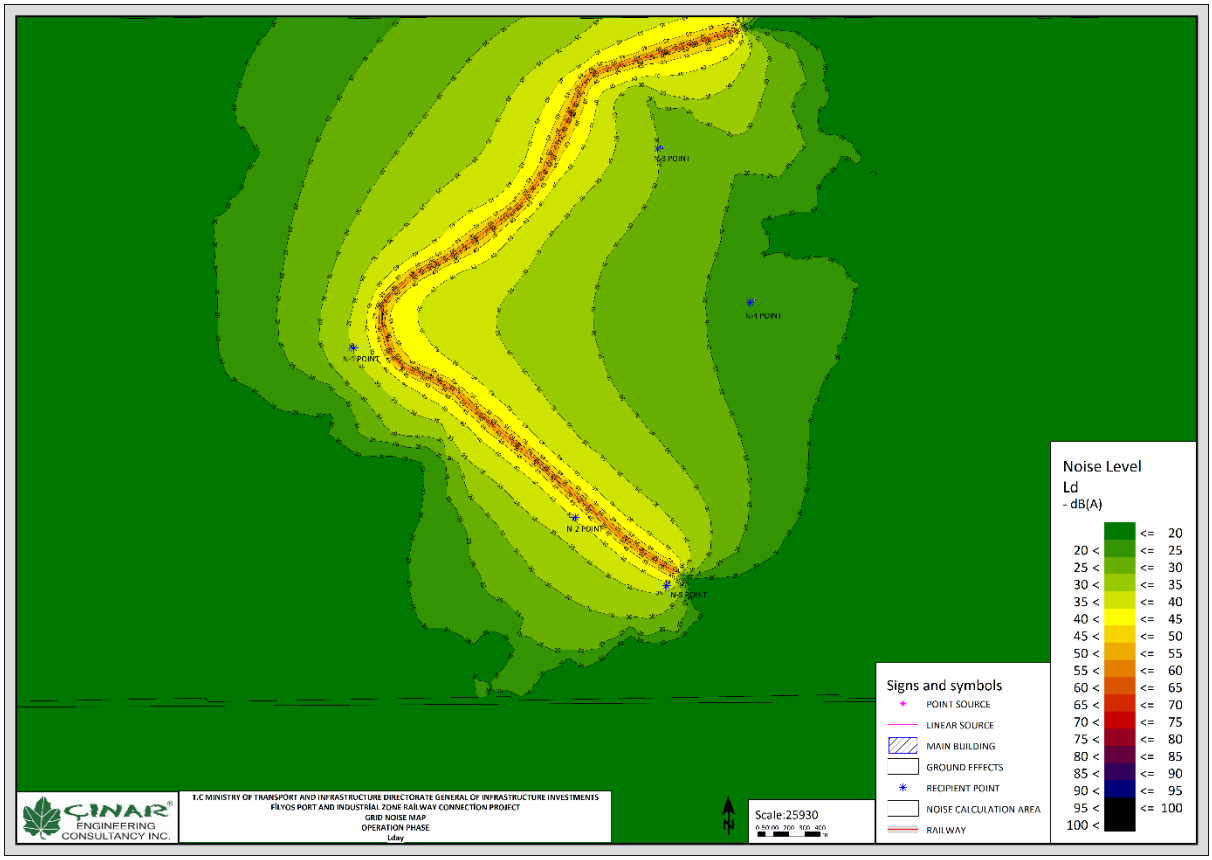


Figure 36. Grid Noise Map (Operation Phase – Day)

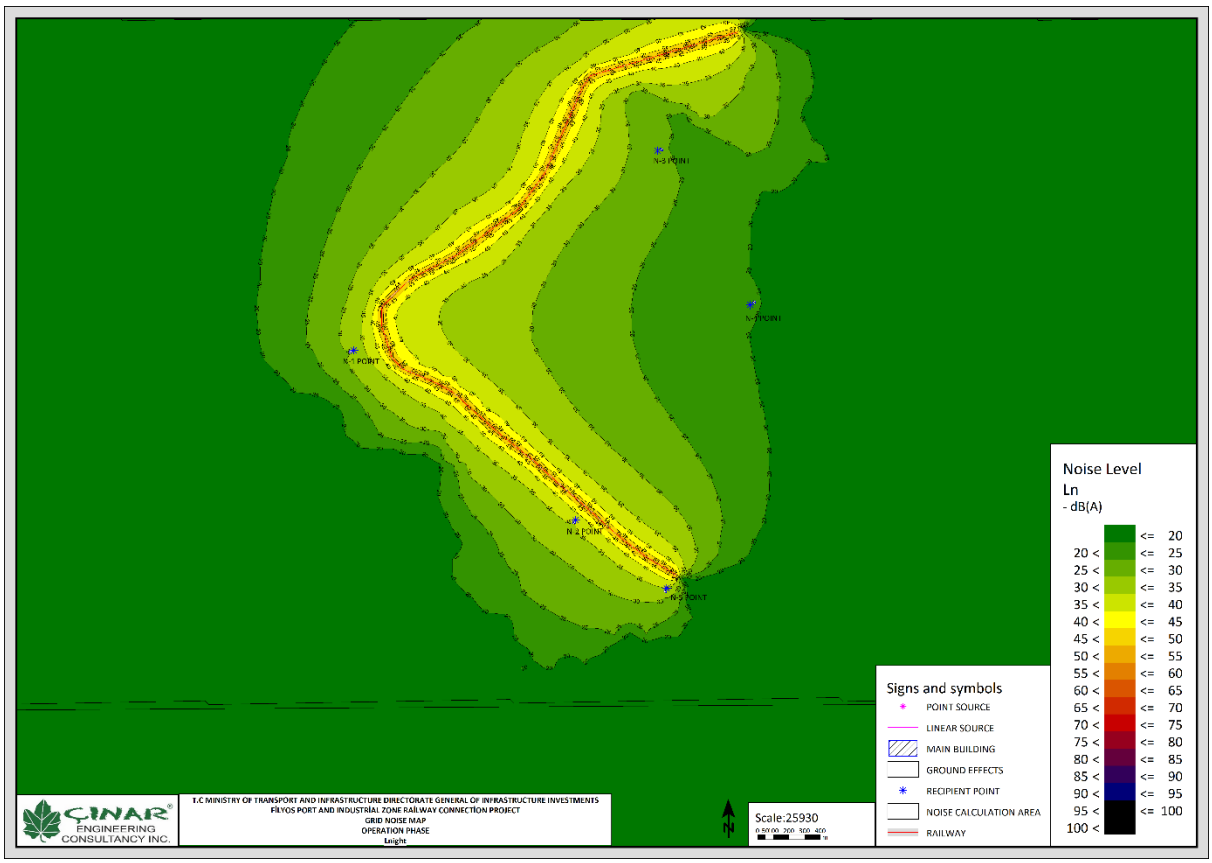


Figure 37. Grid Noise Map (Operation Phase – Night)

In the modelling of noise emissions, the closest settlements have been identified as receptors and the noise levels calculated at these points are given below. The calculated noise level values for the operation phase are below the project standards at all receptors. In the noise level assessment, the calculations and modeling studies were conducted using the baseline measurements. The calculated and modeled noise levels include both the Project-related and the baseline noise levels, thus reflecting the cumulative condition. Noise barriers were deemed unnecessary during the operation phase since modeling results showed that limit values were not exceeded.

Table 35. Noise Emission Values Calculated in the Receptors During Operation Phase

Receptor	X (m)	Y (m)	Z (m)	L_{day}	Project Standard Daytime (07:00-22:00)	L_{night}	Project Standard Nighttime (22:00-07:00)
Sefercik	420491.00	4602066.00	13.68	35.4	55	31.4	45
Gökçeler	421932.00	4600926.00	6.59	40.3		36.3	
Sazköy-1	422452.00	4603346.00	23.85	29.9		25.9	
Sazköy-2	423047.00	4602304.00	19.28	21.9		17.9	
Derecikören	422560.00	4600522.00	14.00	38.1		34.1	

Vibration

Vibration characteristics vary greatly between tram, freight and high-speed rail locomotives partly because increasing speeds shift the frequency of excitation to a higher spectrum. Additionally, differences between unsprung mass and the typical defects associated with each account for additional variation in vibration generation. Despite this, the vibrations generated from each type have the potential to cause negative environmental effects, particularly to humans and sensitive machinery. Regarding humans, this concerns feelable vibration and structural vibration which causes walls/floors to shake, thus generating indoor noise. This is of particular concern in the absence of airborne noise, such as is the case for underground railways. For the sensitive machinery case, structures that rely on the operation of such equipment (e.g. hospitals or manufacturing plants) can be negatively affected by even small levels of vibration.

The generation of vibrations is solely a consequence of the vehicle forces passing from the wheel into the track. These forces arise from the weight of the vehicle and irregularities/discontinuities at the wheel/rail interface and then propagate outwards from the track. The vibration level experienced at all other locations within the track, soil or nearby structures is a function of this force, depending on the natural frequency of each component.

Vehicle dynamics influence the low-frequency range (up to 15 Hz), and are efficiently transmitted to the ground if significant defects in the wheel/rail contact excite the vehicle's natural modes. The upper limit of this low-frequency range is not well defined, and depends on the main vehicle dynamic modes (pitch and bounce modes), on the sprung and unsprung masses, and on their distribution. The high-frequencies (over 150 Hz) constitute another range with rolling noise due to wheel/rail sliding. They cause ground vibrations because the soil efficiently absorbs them (this is known as material and geometrical damping). Between them, the ground vibration spectrum is characterized by the track and soil flexibility, with possible soil resonance due to their geometry and difference of rigidity of the upper soil layers[16].

Many of these excitation frequencies are approximated in Figure 38.

[16] International Union of Railways, "*Railway Induced Vibration – State of Art Report*", 2017

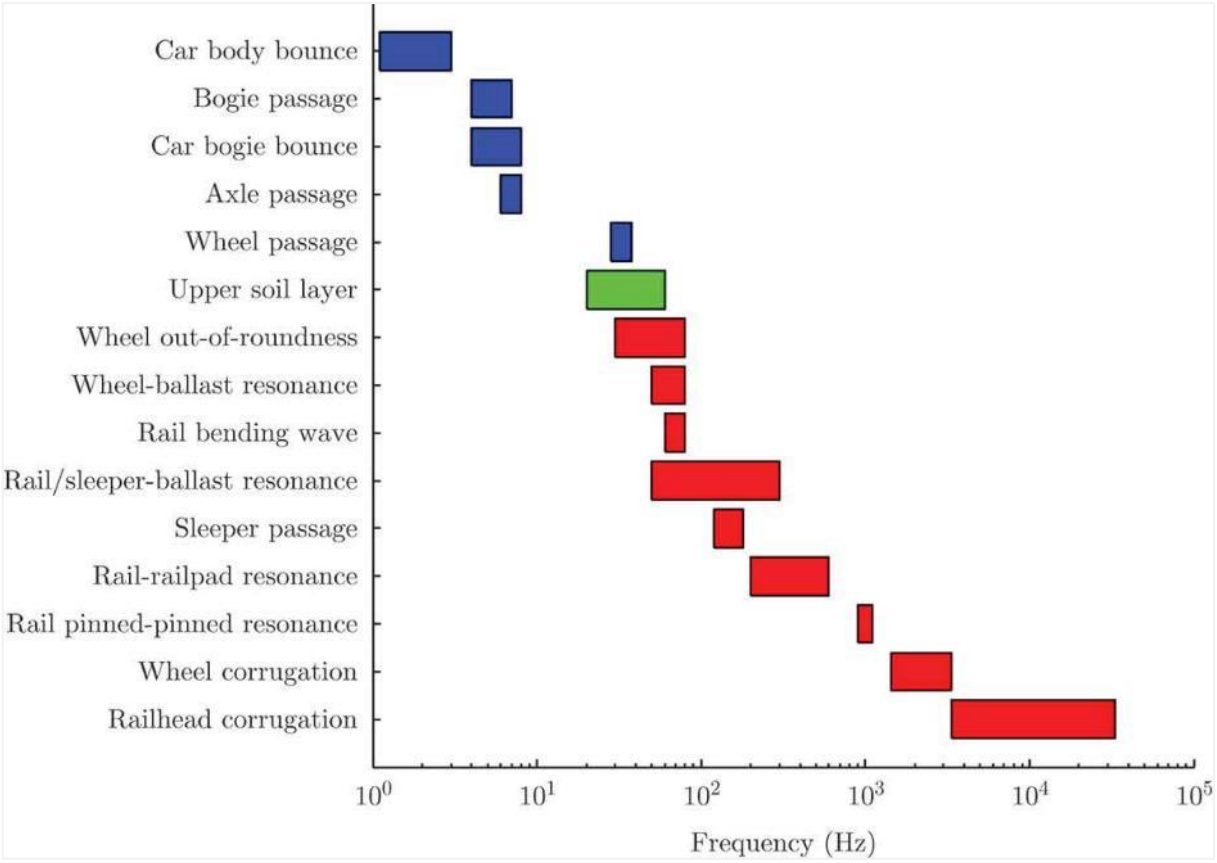


Figure 38. Main contribution of dynamic vehicle/track and soil interactions

Source: International Union of Railways, "*Railway Induced Vibration – State of Art Report*", 2017

Ground-borne vibration can be a serious concern for nearby neighbours of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, ground-borne vibration is not a common environmental problem.

The impacts of ground-borne vibration include perceivable movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for normal transportation projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin (Threshold for perception is determined by ISU 2631-1:1997 as 0.0015 m/s^2 of vertical vibration). A vibration level that causes annoyance will be well below the damage threshold for normal buildings.

The basic concepts of ground-borne vibration are illustrated for a rail system in Figure 39. The train wheels rolling on the rails create vibration energy that is transmitted through the track support system into the transit structure. The amount of energy that is transmitted into the transit structure is strongly dependent on factors such as how smooth the wheels and rails are and the resonance frequencies of the vehicle suspension system and the track support system. These systems, like all mechanical systems, have resonances that result in increased vibration response at certain frequencies, called natural frequencies[17].

17 G. Kouroussis, D.P. Connolly & O. Verlinden (2014) Railway-induced ground vibrations – a review of vehicle effects, International Journal of Rail Transportation, 2:2, 69-110, DOI: 10.1080/23248378.2014.897791

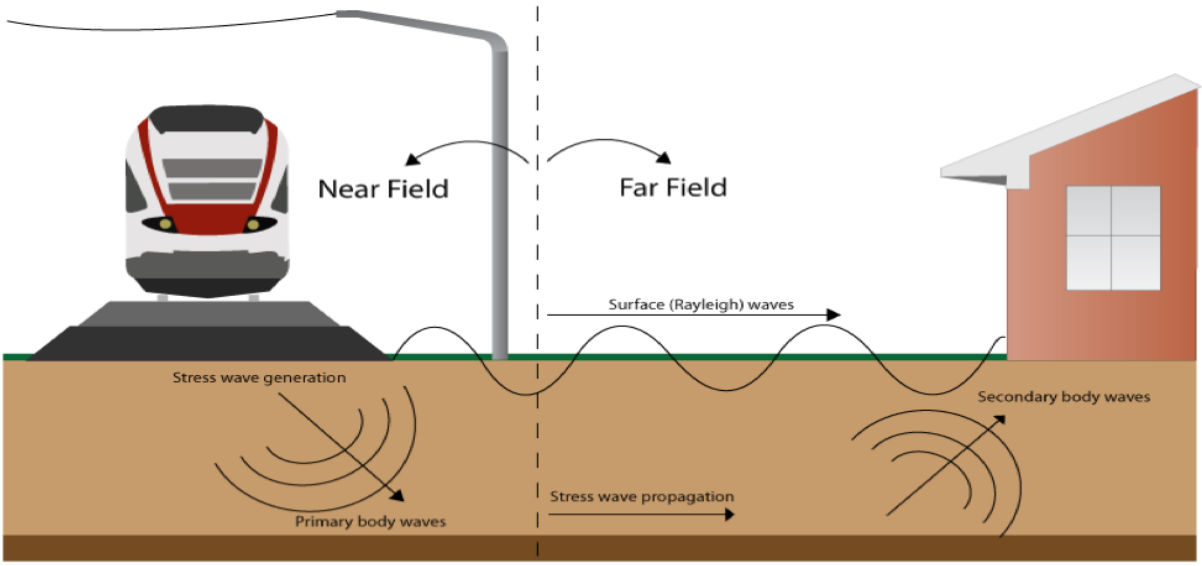


Figure 39. Ground borne vibration

Source: G. Kouroussis, D.P. Connolly & O. Verlinden (2014) Railway-induced ground vibrations – a review of vehicle effects, International Journal of Rail Transportation, 2:2, 69-110, DOI: 10.1080/23248378.2014.897791

Considering that the Project will have low-speed trains and the nearest dwellings will be 25-30 meters away from the railway, vibration is not considered to be significant. Still, quarterly vibration monitoring should be conducted, and an appropriate grievance mechanism should be established.

5.2.4 Impact Significance, Mitigation Measures and Residual Impacts

Noise impact levels of construction and operation activities related to the project were assessed according to noise modelling results and baseline measurements. Apart from the mitigation measures developed within the scope of the ESIA Report, there are also noise reduction methods to be considered and recommended by the WBG EHS Guidelines, such as:

- Selection of equipment with lower sound power levels,
- Reducing rail roughness through design measures,
- Regular maintenance of wheels and tracks,
- Installing silencers for fans,
- Optimizing the average speed of trains by 50 km/h,
- Developing vegetative barriers to create strong vegetative areas between the noise source and receptor(s),
- Construction of noise shoulders using soil materials,
- Design and construction of noise barrier structures (e.g., panels).

As stated in the ESCP – ESS3: Resource Efficiency and Pollution Prevention and Management, it is required to incorporate the post-mitigation operational phase noise modeling after design of the mitigation measures (barns, noise barriers). In this context, the noise modeling studies were conducted for the operation phase by considering the worst-case scenario. The implementation of noise barriers was found to be not required as explained in Section 5.2.3 in detail.

The following procedure is developed to make sure the balance is achieved between economic and beneficial purposes of the mitigation measures;

- Mitigation measures will be considered for receptors unless the impact significance is negligible;

- For receptors which have impact significance levels of “High” and distance to the railway is less than 500 meters construction of noise barrier structures is considered;
- For receptors with impact magnitude levels of “High” and distance to the railway is between 500- and 1,000-meters, application of noise berms and vegetation is considered;
- For every impact level except “Negligible”, vegetation is considered for distances higher than 1000 meters;
- For receptors whose impact levels are “Medium” and distance between the receptor and the railway less than 1,000 meters, application of noise berms and vegetation is considered.

In addition, the following items will be taken into account regarding the assessments made on the project's noise impacts:

- Modeling studies conducted for the impact assessment of construction and operation phases are done in accordance with the construction equipment stated in the feasibility phase.
- During the construction period, noise monitoring will be conducted to assess the effectiveness of implemented measures and identify any residual impacts. Corrective actions will be taken for any residual impacts deemed to have moderate or high significance. Noise monitoring will be conducted quarterly during the construction phase and also upon complaint.
- Noise monitoring will be conducted once every three months in the first year of operation. After one year, monitoring will be done every two years. Noise monitoring will also be conducted upon complaint.

To determine the baseline noise level for the impact assessment, the points where noise measurements are made were selected as receptors and the impact on the change in the baseline noise level was defined.

On the other hand, significant levels of noise levels can be expected during the material borrow site/quarry activities such as blasting, extraction and transportation of the materials. For noise emissions, the following measures must be considered if construction contractor decides to operate its own quarries and borrow sites but firstly it will be necessary to conduct an environmental impact assessment by considering the noise measurements to be carried out and the grievance(s) received (see also Table 38):

- 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 plant screening equipment. Adequately designed foundations for these facilities should sufficiently limit vibrations.

The magnitude of noise impacts was assessed due to the deviation from the background noise levels and applicable standards (regulatory limits and international guidelines). As summarized in Table 36, it should be noted that the perception threshold of the human ear is about 3 dB, and a change of 5 dB clearly attracts attention. This is primarily due to logarithmic measurement metrics that are generally associated with decibels.

Table 36. Perceived Change to the Human Ear with Changes in Sound Level

Change in Sound Level	Perceived Change to the Human Ear
+1 dB	Not perceptible
+3 dB	Threshold of perception
+5 dB	Clearly noticeable
+10 dB	Twice as loud

Taking the experienced change with regard to decibel levels into consideration, the magnitude criteria to be integrated into the magnitude determination is presented in Table 37.

Table 37. Magnitude Criteria for Noise Impact

Impact Magnitude	Description
Negligible	Generation of noise that exceeds background noise levels up to 3 dBA
Minor	Generation of noise that does exceeds background noise levels by 5 dBA
Medium	Generation of noise that exceeds background noise levels by 5-10 dBA
High (Severe)	Generation of noise that exceeds background noise levels by 10 dBA

Table 38. Noise Impacts, Impact Mitigation Measures and Residual Impacts

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 and vibration levels	Land Preparation and Construction	G-1 (Gökçeler)	Local	Short Term Reversible	Short-term	Continuous	Low	High	**Minor**	▪ All construction activities will be carried out in compliance with the provisions of ENCR and noise/vibration limit values specified in the ENCR and WBG General EHS Guidelines. ▪ Project Grievance Mechanism will be implemented. If any comment related with noise and vibration 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 will be provided with necessary environmental training 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 Personal Protective Equipment (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. ▪ The ESMP and Pollution Prevention Plan will be implemented. ▪ To mitigate noise impacts resulting from the potential operation of quarry and/or borrow sites by the Contractor, quieter drilling methods, such as downhole or hydraulic drilling, should be employed, and processing plants should be enclosed and clad. Sound barriers, enclosures, or curtains should be installed near noisy equipment, such as crushers and grinders, while soundproof materials like rubber linings can be applied to processing equipment and transfer points. Additionally, rubber-belt transport systems and conveyors should be utilized, and natural barriers like vegetation or soil berms should be created at facility boundaries. Optimizing internal traffic flow to reduce reversing alarms, using electrically powered machinery, enforcing truck speed limits, avoiding flame-jet cutting, and constructing berms for noise and visual screening are also recommended. ▪ To mitigate vibration related impacts resulting from the potential operation of quarry and/or borrow sites by the Contractor, specific blasting plans should be implemented, including proper charging procedures, optimal blasting ratios, and the use of delayed or electronic detonators. Blast designs should incorporate blasting-surface and drill-hole surveys to prevent over-confined charges and allow for recalculations. Ground vibration and overpressure can be controlled with appropriate drilling grids, charging processes, and stemming methods to minimize fly rock and air blasts. Hydraulic hammers or mechanical methods are preferred over secondary blasting to reduce risks, while mechanical ripping should be prioritized to limit the use of explosives. Additionally, vibrations from primary crushers and screening equipment can be minimized by constructing adequately designed foundations.	**Negligible**
		G-2 (Sefercik)	Local	Short Term Reversible	Short-term	Continuous	Low	Medium	**Minor**		**Negligible**
		G-3 (Sazköy-1)	Local	Short Term Reversible	Short-term	Continuous	Low	Medium	**Minor**		**Negligible**
		G-4 (Sazköy-2)	Local	Short Term Reversible	Short-term	Continuous	Low	Low	**Negligible**		**Negligible**
		G-5 (Derecikören)	Local	Short Term Reversible	Short-term	Continuous	Low	Medium	**Minor**		**Negligible**
	Operation	G-1 (Gökçeler)	Local	Medium Term Reversible	Medium-term	Intermittent	Medium	High	**Moderate**	▪ Noise monitoring will be conducted quarterly during the first year of operation. After the first year, monitoring will be carried out every two years. Additionally, noise and vibration monitoring will be conducted promptly in response to any complaints. ▪ Physical barriers, such as sound walls or acoustic fencing along the railway corridor should be installed by TCDD to block or absorb sound waves if deems required according to the noise monitoring results and/or noise-related complaints. ▪ The use of natural barriers like earth berms or vegetation should be considered by TCDD to help reduce noise transmission. ▪ The average speed of trains should be optimized by 50 km/h. ▪ Continuous welded rail should be used to reduce the noise generated by train wheels passing over joints in the track. ▪ Tracks should be maintained regularly to minimize irregularities that can contribute to increased noise levels.	**Minor**
		G-2 (Sefercik)	Local	Medium Term Reversible	Medium-term	Intermittent	Medium	Medium	**Moderate**		**Minor**
		G-3 (Sazköy-1)	Local	Medium Term Reversible	Medium-term	Intermittent	Medium	Medium	**Moderate**		**Minor**

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Reversibility	Duration	Frequency	Overall Magnitude				
		G-4 (Sazköy-2)	Local	Medium Term Reversible	Medium-term	Intermittent	Medium	Low	**Minor**	▪ 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. ▪ High-quality, well-compacted ballast, optimized subgrade materials, and vibration-absorbing rail coatings or track materials should be used, where possible, to reduce vibration transmission. ▪ 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. ▪ Project Grievance Mechanism will be implemented. If any comment related with noise and vibration is received through the Grievance Mechanism, evaluate the complaint and where necessary plan and implement corrective actions. ▪ Regular and timely engagement with local communities, in compliance with the SEP of the Project, will be performed to understand their concerns and gather feedback on noise and vibration related issues.	**Negligible**
		G-5 (Derecikören)	Local	Medium Term Reversible	Medium-term	Intermittent	Medium	Medium	**Moderate**		**Minor**

5.3 Air Quality and Greenhouse Gas (GHG) Emissions

5.3.1 Project Standards and Methodology

5.3.1.1 Methodology

Air Quality

According to the methodology given in Chapter 4, generic criteria for determining the sensitivity of a receptor have been established, and the sensitivity of receptors was classified based on the importance/rarity of the receptor in question. In this context, the air quality measurement sampling points were selected based on the receptors identified within the scope of the Project. The general criteria presented in Chapter 4 have been used to define the magnitude of impacts on air quality.

The impacts of project activities on air quality have been identified and assessed, and corresponding mitigation measures have been proposed.

Within the scope of the Project, AERMOD Air Quality Dispersion Modeling Program [AERMOD Version: Breeze 9.0 (Trinity Consultants, 19191 Executable)] was used according to one scenario[18]:

- **Construction Phase**: Includes settled dust (annual value) and PM_{10} (annual value and highest 24-hour average value).

Greenhouse Gases

Greenhouse gas emissions refer to the release of greenhouse gases (GHG) to the atmosphere. United Nations Framework Convention on Climate Change (UNFCCC) lists greenhouse gases (GHG) as below:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Sulfur hexafluoride (SF_6)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)

During the construction phase of the project, approximately 18 pieces of machinery and equipment will be used, although not simultaneously. Therefore, exhaust gas emissions will be minimal. In this context, a GHG calculation was not deemed necessary for the construction phase. In the operation phase, since the train will run on an electric system, no GHG emissions are expected.

[18] Since the electrical system will be used on the railway during the operational phase of the project, possible effects on air quality are considered negligible. Since these emissions will be of short duration and in trace amounts, baseline measurements including exhaust emission gases (e.g. SO_2 and NO_2 concentrations) were made only to obtain baseline measurement data. In the future, these data can be used as reference values to assess the SO_2 and NO_2 emission impacts of the project if need be. Therefore, the operation phase of the Project is not considered in the air quality modeling study.

5.3.1.2 Project Standards

5.3.1.2.1 National Legislation and Air Quality 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 the Control of Industrial Regulation on Control of Industrial Air Pollution published in the Official Gazette No. 27277 dated 03.07.2009 (Amended: OG-20/12 / 2014-29211).

The main objective of the Regulation on the Control of Industrial Air Pollution (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 39.

Table 39. 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/m³	350	350
	LTV*		60	60
NO_2	Hour (cannot exceed more than 18 times annually)	µg/m³	250	200*
	Annual		40*	40
PM_{10}	24 hours (cannot exceed more than 35 times annually)	µg/m³	50	50
	Annual		40	40
Settled Dust	STV**	mg/m²day	390	390
	LTV		210	210
CO	Maximum daily 8 hours average	mg/m³	10	10
VOC	Hourly	µg/m³	280	280
	STV		70	70
Pb	Annual	µg/m³	0,5	0,5
CO	Maximum daily 8-hour average	mg/m³	10	10
Cd	LTV	µg/m³	0.02	0,02
HCl	STV	µg/m³	150	150
	LTV		60	60
HF	Hour	µg/m³	30	30
	STV		5	5
H_2S	Hour	µg/m³	100	100
	STV		20	20
Total Organic Compounds	Hour	µg/m³	280	280
	STV		70	70

Parameter	Time	Unit	2019-2023	2024 and after
(In terms of carbon)				

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

5.3.1.2.2 International Requirements

The WBG EHS Guidelines and requirements therein are applicable to the Project. According to the WBG 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 don't go beyond the limits set in the relevant national laws. If those laws don't exist, then the World Health Organization (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 WBG EHS Guidelines are presented in Table 40.

Table 40. WBG EHS Guidelines– WHO – Ambient Air Quality Guideline Values (The World Bank Group, 2007)

Parameter	Duration	Guideline Value (µg/m^3)
SO_2	10 minutes	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

5.3.2 Baseline Conditions

5.3.2.1 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 time-scales 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[19].

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)[20].

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 41.

Table 41. 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 below.

Table 42. 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

[19] 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

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

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
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	>1,101	>2,001	>32,001	>701	>521

Zonguldak province is one of the provinces with high air pollution risk according to the "Air Quality Assessment and Management Circular" numbered 2013/37 under the "Air Quality Assessment and Management Regulation". Within the scope of Air Pollution Caused by Heating in Zonguldak Province, the control of fuels is carried out by the municipalities in provinces and districts (Center, Ereğli, Çaycuma, Alaplı, Devrek, Gökçebey) with the Transference of Authority No. 2006/19.

Currently, there are eight (8) air quality measurement stations in Zonguldak, 4 in the Central District, 1 in Ereğli District, 1 in Kilimli District, 1 in Çaycuma District and 1 in Kozlu District.

Within the scope of the project, data from the Muslu Tepeköy Station, the closest station to the area and located east of the project site, was evaluated to provide insight into the baseline air quality of the project area for the one-year period spanning 2024 to 2025. At this Station, PM_{10}, SO_2, NO_2 and O_3 measurements are performed. The RCIAP limit values for 2024 and beyond, along with the air quality index classification of the data for January 20, 2025, are as follows:

Table 43. Ambient Air Quality According to Muslu Tepeköy Station (20.01.2025)

Parameter	PM_{10} (µg/m³) 24-hour average	SO_2 (µg/m³) 1-hour average	NO_2 (µg/m³) 1-hour average	O_3 (µg/m³) 8-hour average
Muslu Tepeköy Station	90	6.6	10.9	52.2
The RCIAP limit values for 2024 and beyond	50	350	200	-
Air Quality Index	Medium	Good	Good	Good

As seen above, only the PM_{10} value exceeds the RCIAP limit values and the air quality index for PM_{10} is classified as "Medium".

Within the scope of the ESIA studies, ambient air quality measurements were conducted in the AoI in order to determine the baseline air quality.

The measurement points were selected near the emission sources, based on the proximity to settlements and topographic conditions. The measured parameters include $PM_{2.5}$, PM_{10}, settled dust, NO_2, and SO_2. $PM_{2.5}$ and PM_{10} were measured over a 7-day period, while NO_2, SO_2, and settled dust were measured over the course of 1 month.

The maps showing the sampling points are provided in Figure 40, Figure 41 and Figure 42. The measurement results are presented in Table 44, Table 45 and Table 46. Upon evaluating the analysis results, it is observed that particulate matter and settled dust levels are below the project standards. On the other hand, the passive diffusion analysis indicates that while NO_2 limit values are met, the SO_2 levels exceed the limit values at the Derecikören (PD-3) and Sazköy (PD-5) locations. It is anticipated that exhaust emissions at the Derecikören monitoring point and anthropogenic activities related to port construction at the Sazköy monitoring point are contributing to the exceedance of these limit values.

The analyses reports are given in Appendix-3.

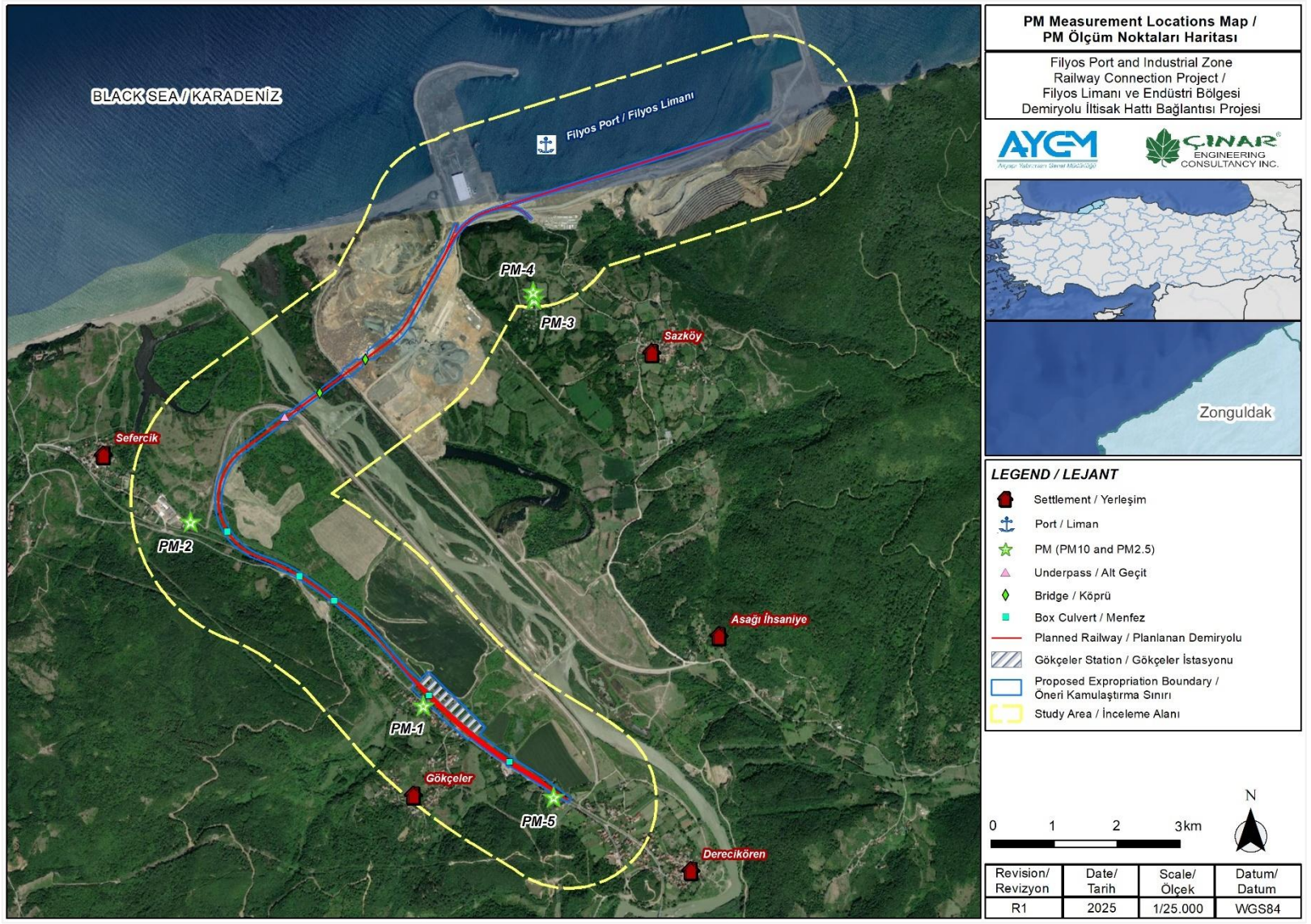


Figure 40. Air Quality Sampling Points (Particulate Matter)

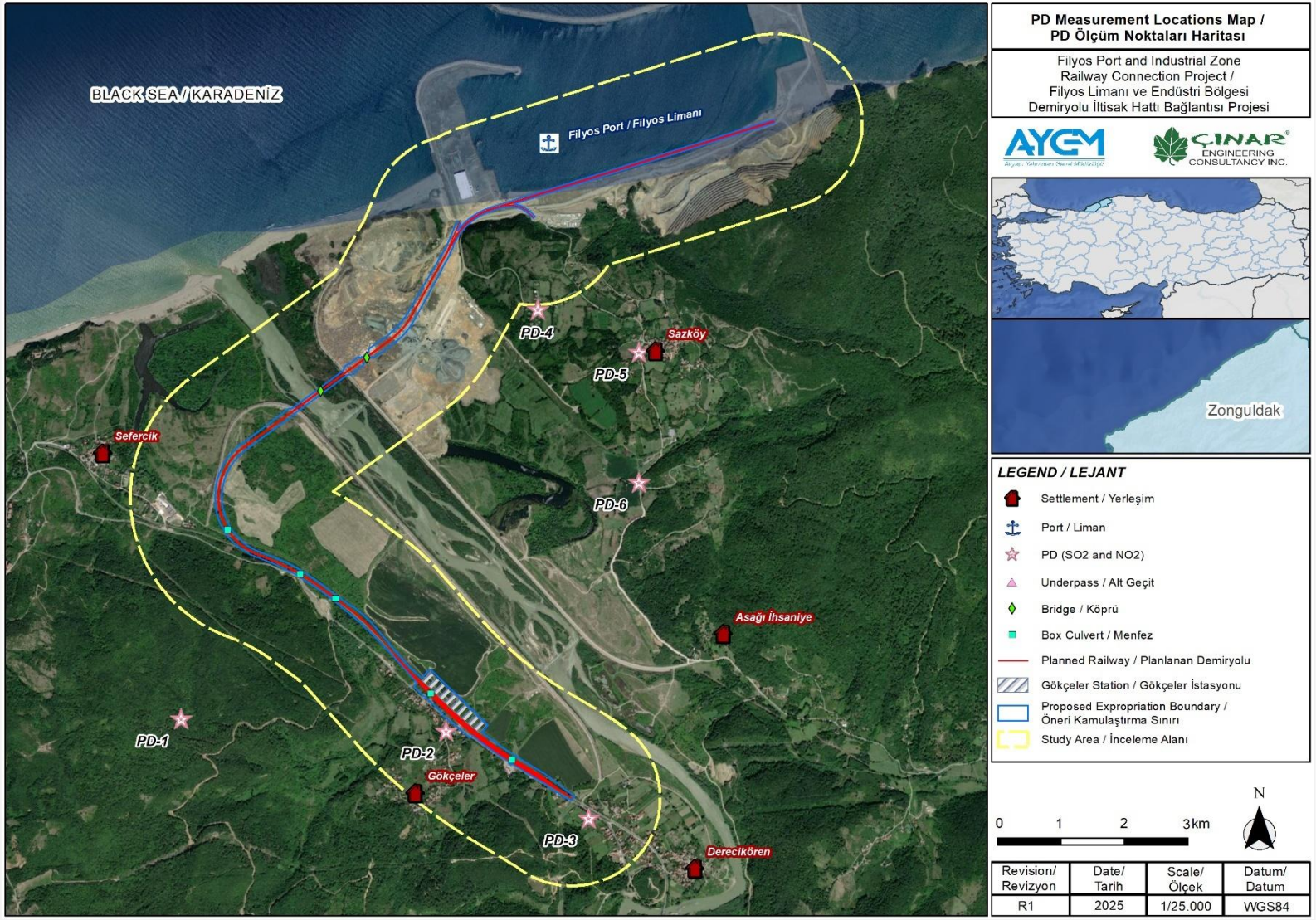


Figure 41. Air Quality Sampling Points (Passive Diffusion)

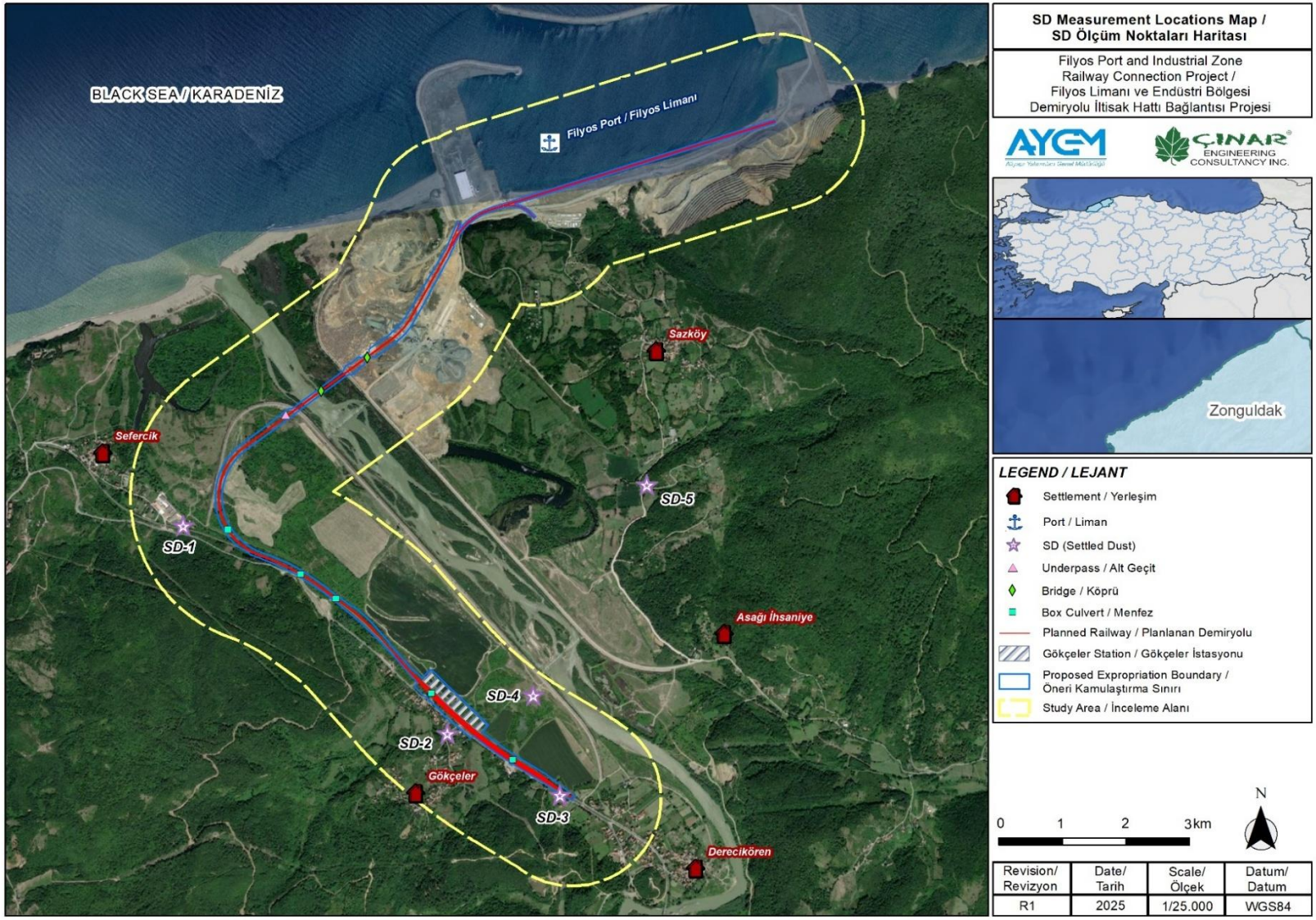


Figure 42. Air Quality Sampling Points (Settled Dust)

Table 44. PM_{10} and $PM_{2.5}$ Measurement Results (Particulate Matter)

Project Phase	Measurement Location				Date	Measurement Results (µg/m³)	
	No	Coordinates (WGS 84 – UTM Zone 36T)	District/ Province	Neighborhood		PM_{10}	$PM_{2,5}$
Phase-1	PM-1	421818 D; 4601044 K	Çaycuma / Zonguldak	Gökçeler	13-19.01.2020	25,80	6,44
	PM-2	420491 D; 4602090 K	Çaycuma / Zonguldak	Sefercik		26,75	6,75
	PM-3	422449 D; 4603361 K	Çaycuma / Zonguldak	Sazköy-1		27,23	6,88
	PM-4	422445 D; 4603400 K	Çaycuma / Zonguldak	Sazköy-2		27,55	6,88
	PM-5	422560 D; 4600522 K	Çaycuma / Zonguldak	Derecikören		27,33	6,85
Turkish Air Quality Standards						**50**	**-**
WBG General EHS Guidelines-WHO Ambient Air Quality Standards						**50**	**25**

Table 45. SO_2 and NO_2 Measurement Results (Passive Diffusion)

Project Phase	Measurement Locations				Date	Measurement Results (µg/m³)	
	No	Coordinates (WGS 84 – UTM Zone 36T)	District/ Province	Neighborhood		SO_2	NO_2
Phase-1	PD-1	420438 E; 4600956 N	Çaycuma / Zonguldak	Gökçeler	13.01.2020-02.02.2020	<10	<10,0
	PD-2	421936 E; 4600886 N	Çaycuma / Zonguldak	Gökçeler		14,75	<10,0
	PD-3	422742 E; 4600389 N	Çaycuma / Zonguldak	Derecikören		**31,69**	<10,0
	PD-4	422456 E; 4603291 N	Çaycuma / Zonguldak	Sazköy		10,58	<10,0
	PD-5	423027 E; 4603047 N	Çaycuma / Zonguldak	Sazköy		**26,84**	<10,0
	PD-6	423027 E; 4602305 N	Çaycuma / Zonguldak	Sazköy		<10,0	<10,0
Turkish Air Quality Standards						**60**	**40**
WBG General EHS Guidelines-WHO Ambient Air Quality Standards						**20**	**40**

Table 46. Settled Dust Measurements Results

Project Phase	Measurement Location				Date	Results (mg/m² day)
	No	Coordinates (WGS 84 – UTM Zone 36T)	District/ Province	Neighborhood		
Phase-1	SD-1	420450 E; 4602056 N	Çaycuma / Zonguldak	Sefercik	13.01.2020-02.02.2020	12
	SD-2	421941 E; 4600872 N	Çaycuma / Zonguldak	Gökçeler		20
	SD-3	422576 E; 4600521 N	Çaycuma / Zonguldak	Derecikören		22
	SD-4	422426 E; 4601090 N	Çaycuma / Zonguldak	Gökçeler		69
	SD-5	423067 E; 4602289 N	Çaycuma / Zonguldak	Sazköy		16
Turkish Air Quality Standards						**390**

5.3.2.2 Greenhouse Gases

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 (International Energy Agency (IEA), 2019).

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 (International Energy Agency (IEA), 2019).

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 (International Energy Agency (IEA), 2019).

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 CO2-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 (International Energy Agency (IEA), 2019).

The graph showing sector-based CO_2 emissions in Türkiye are presented in Figure 43.

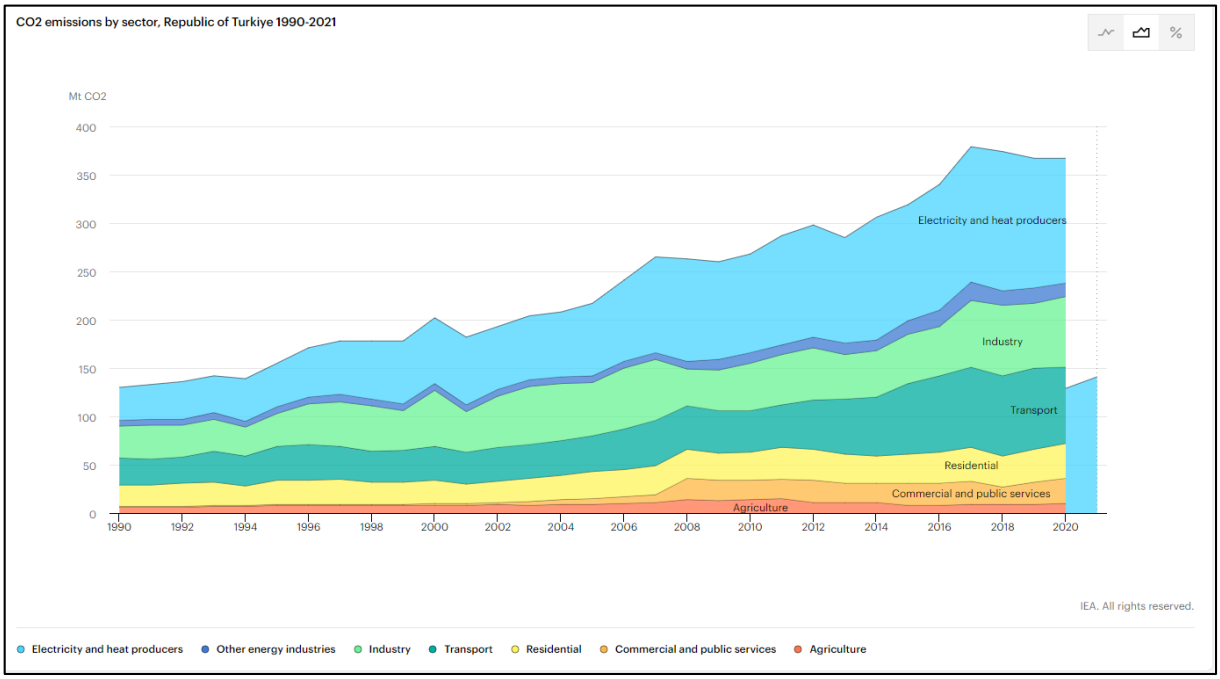


Figure 43. Sector-based CO_2 emissions in Türkiye (1990 – 2021) (International Energy Agency, 2023)

CO_2 emissions from the transport sector in Türkiye, as shown in Figure 43 and Table 47 represents a significant portion of CO_2 emissions. The distribution of CO_2 emissions within the transport sector is illustrated in Figure 44. In Türkiye, road transport accounts for the largest share of CO_2 emissions in the sector (approximately 95% in 2021) according to TURKSTAT database (2023). Railways, on the other hand, represent the transportation type with the lowest CO_2 emissions, constituting only 0.4% of the sector's emissions.

Table 47. GHG emission by transport type (kilotons CO_2 equivalent)

Transport Type	Years									
	1990	1995	2000	2005	2010	2015	2018	2019	2020	2021
Total	26.969	34.113	36.465	42.041	45.392	75.798	84.617	82.428	80.680	91.200
Airway	923	2.775	3.099	4.089	2.862	4.205	3.688	3.509	2.164	2.856
Road	24.777	29.760	31.850	35.532	39.941	69.309	78.907	76.720	76.601	86.499
Railway	721	768	713	757	517	480	435	400	323	356
Maritime	509	726	623	1.299	1.682	1.147	931	1.217	1.264	1.128
Other	39	83	180	364	390	656	657	581	328	361

Source: TURKSTAT, 2023

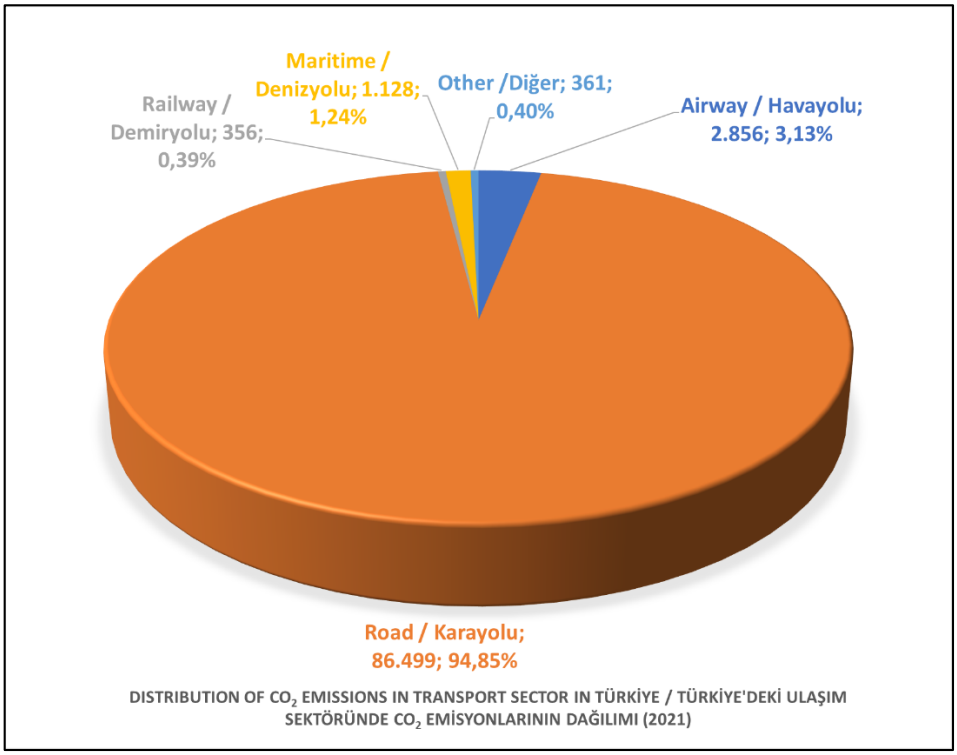


Figure 44. Distribution of CO_2 Emissions in Transport Sector in Türkiye (2021)

Source: TURKSTAT, 2023

5.3.3 Impact Assessment

5.3.3.1 Land Preparation and Construction Phase

Air Quality

Possible effects on air quality within the scope of the project are especially the dust emissions during the construction of the railway route and the exhaust gas emissions from the construction vehicles.

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 construction of the railway route 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.

In order to minimize the dust and effects that may occur in 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.

Calculations for dust emissions that may occur during land preparation and construction works, comply 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 (see Table 48) 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 given in “Emission Factor Documentation (1998, EPA)”.

Table 48. 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
Transport of Materials (Round-trip total distance)	0.7 kg/km	0.35 kg/km
Unloading of Materials	0.01 kg/ton	0.005 kg/ton
Storage of Materials (kg / ha-day)	5.8 (kg/ha-day)	2.9 (kg/ha-day)

The excavation works to be carried out within the scope of the project are planned to be completed in approximately 5 months, working 10 hours a day, 26 days a month. 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.

Within the scope of the project, approximately 44,960.90 m^3 cut and 22,480.45 fill m^3 works are planned. Moreover, approximately 26,485.98 m^3 topsoil will be stripped. It is assumed that all activities will be carried out in a controlled manner during the construction phase.

Accordingly, the amount of emission that will occur during topsoil stripping, cut and fill operations to be carried out within the scope of the project is shown in Table 49. 4.99 kg/hour

uncontrolled and 2.49 kg/hour controlled emissions will be generated during excavation works of the Project.

Table 49. Emission to be Generated During Excavation Works

Removal (Excavation Material + Topsoil Stripping)		Loading		Unloading	
Uncontrolled	Controlled	Uncontrolled	Controlled	Uncontrolled	Controlled
3.41	1.71	0.79	0.39	0.79	0.39

In the Annex-2 of the Regulation on the Control of Industrial Air Pollution published in the Official Gazette No. 27277 dated 03.07.2009, it is stated that: “if the emissions caused by sources other than stacks are smaller than 1 kg/hour, it is not necessary to establish the values representing air pollution levels, air quality values obtained by measurements, calculated air pollution values and determination of total air pollution values”.

It was assumed that the dust emission that will occur during material removal, loading unloading and unloading in the construction phase, will be done simultaneously (the worst-case scenario) and dust emissions were calculated accordingly as 2.49 kg/hour (all works will be done in controlled conditions). Therefore, as stated in the Annex-2 of the Regulation on the Control of Industrial Air Pollution (RCIAP) (Amended R.G. 20.12.2014-29211), “Calculation 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 Table 2.1 of the regulation are exceeded, for new facilities to be established.

Calculation of Air Pollution Contribution

Air distribution modeling has been performed considering possible dust emissions from land preparation and construction phase.

AERMOD (AERMIC Modeling) Model, which was developed by EPA and approved by the same organization for EIA studies in the USA, was used as air distribution modeling.

In this context, “Addition Values to Air Pollution” of PM10 has been calculated by using AERMOD Model to determine the effects of dust emissions on air quality and atmospheric distribution profile depending on the processes to be performed in the construction area.

Meteorological Data Used in Modeling: Meteorology is the most important factor affecting the transport of pollutants in the air. The meteorological data required for the modelling studies were gathered from the General Directorate of Meteorology, “Zonguldak Meteorology Station”.

In order to obtain information about the general meteorological conditions in the region, averages of the data station have been investigated, and the 2018 data was chosen to be used in modelling as it is up-to-date. AERMOD provides the meteorological data required for the model by AERMET, the preprocessor. To be used in modeling studies; temperature, wind direction, wind speed, pressure, humidity, cloudiness and cloud base height data were provided.

Model inputs such as wind speed, wind direction, temperature and stability class are introduced to AERMOD Model on an hourly basis. Therefore, data preparation is necessary.

At this stage, meteorology files to be introduced to the model were created using the AERMET Program, a pre-processor that organizes meteorology data so that it can be used in AERMOD.

Three types of data sets were used to run the AERMOD model. These are;

- Topographic data (DEM File created with AERMAP)
- Meteorological data (Profile and Surface Files created with AERMET) and
- Emission parameters

Modeling study is performed as stated in RCIAP Annex-2; in a square-shaped area measuring 56,26 km² (7,5 km x 7,5 km). Possible pollution levels within this area were examined and the results were calculated in terms of ground level pollutant concentrations (µg / m3).

Through the AERMAP software, which is the preprocessor of the AERMOD model; by creating 1000 m reference points, the data file of the modeling area was created. Thus, a physical relationship is provided between the properties of the land and the distribution of air pollution. As a result, AERMAP generates altitude data for each receiver location (grid points). Also, the dispersion model provides data to provide continuous dispersion model for air flow around elevated areas

With this DEM file created with the help of AERMAP, in AERMOD; to determine the effects of the planned facility on the existing air quality; A grid system was created within the AoI and in this system the sides of the created square area were 1,000 m.

The corner points of the squares in the grid system were defined as receptors, and the topographic elevations were determined with the help of the DEM file created. The AoI was digitized with this method and used as model input.

Ground level concentration (GLC) values in the receiving environments estimated with the help of the model were calculated for 1-year modeling period.

The values obtained as a result of modeling (STV and LTV) were compared with the limit values stated in RCIAP Annex-2 Table 2.2, according to the modeling study, average daily pollutants in the region (STV) and annual (LTV) GLC has been identified. STV, LTV, short-term and long-term limits are defined as follows in relation to atmospheric pollutants in the Regulation on the Control of Industrial Air Pollution (RCIAP):

- Short Term Value (STV): When the maximum daily average values or statistically all the measurement results are arranged according to the size of their numerical values, the value corresponding to 95% of the measurement results,
- Long Term Value (LTV): The value that is the arithmetic mean of all measurement results performed

As a result of these comparisons, the impacts of emissions to the atmosphere on air quality were determined. Maximum GLC values, STV and LTV and UVS limit values obtained with the modeling studies are given in Table 50 and Table 51.

Table 50. PM_{10} Values of Land Preparation and Construction Phase

Pollutant	Period	Model Results		RCIAP Limit Values (µg/m³)	WBG EHS Guidelines-WHO Ambient Air Quality Guideline Values (µg/m³)
		Max GLC Values (µg/m³)	Limit Value Exceedance Number		
Particulate Matter (PM 10)	24 Hours	27.32	-	50	50
	Annual	8.19	-	40	20

Table 51. Settled Dust Values of Land Preparation and Construction Phase

Emission	Average period	Max GLC Value (mg/m².day)	RCIAP Limit Value Exceedance number	RCIAP Limit Values for STV and LTV (mg/m².day)
				2019-2023
Settled Dust	Monthly	21.29	-	390
	Annual	15.64	-	210

Maps showing the 24-hour and annual PM_{10} and Settled Dust concentrations contour obtained as a result of modeling studies are given in Figure 45, Figure 46, Figure 47 and Figure 48 respectively.

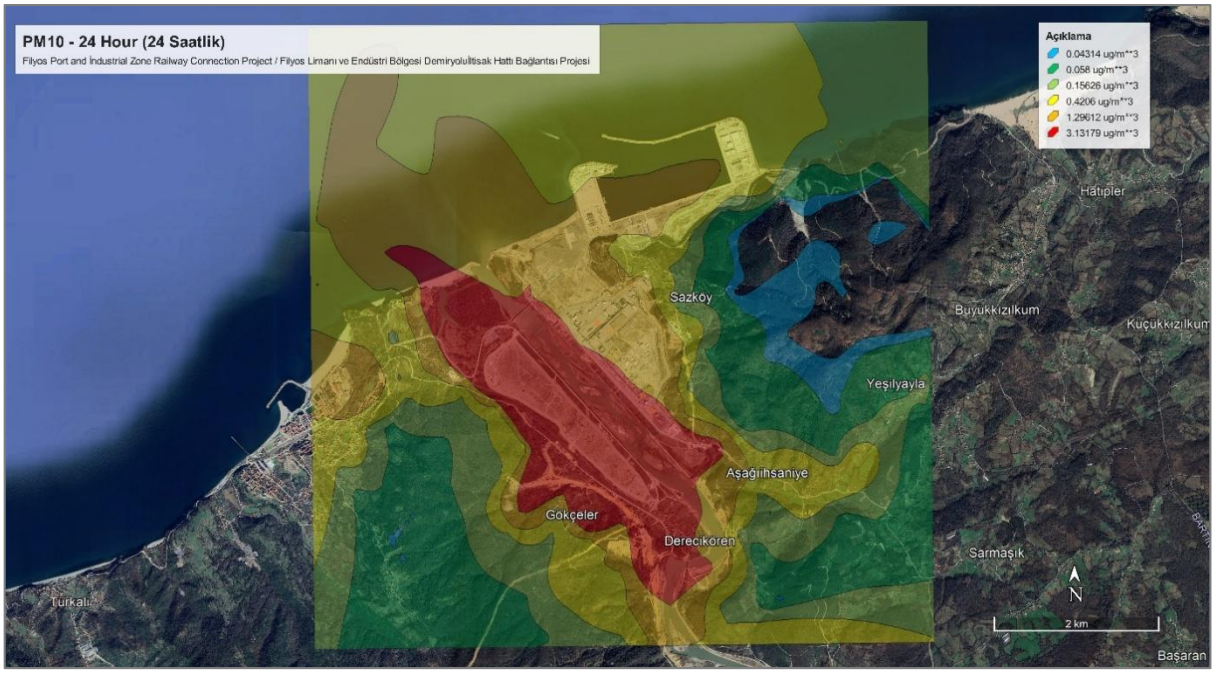


Figure 45. 24-Hour PM_{10} Concentration Contours

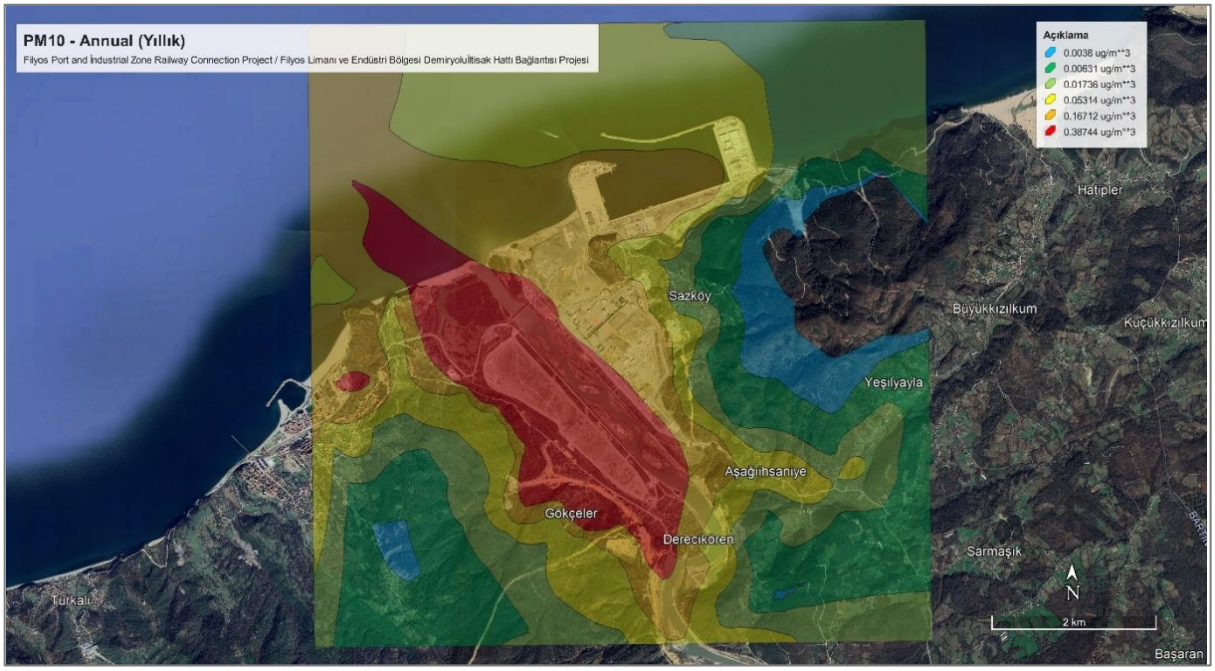


Figure 46. Annual PM10 Concentration Contours

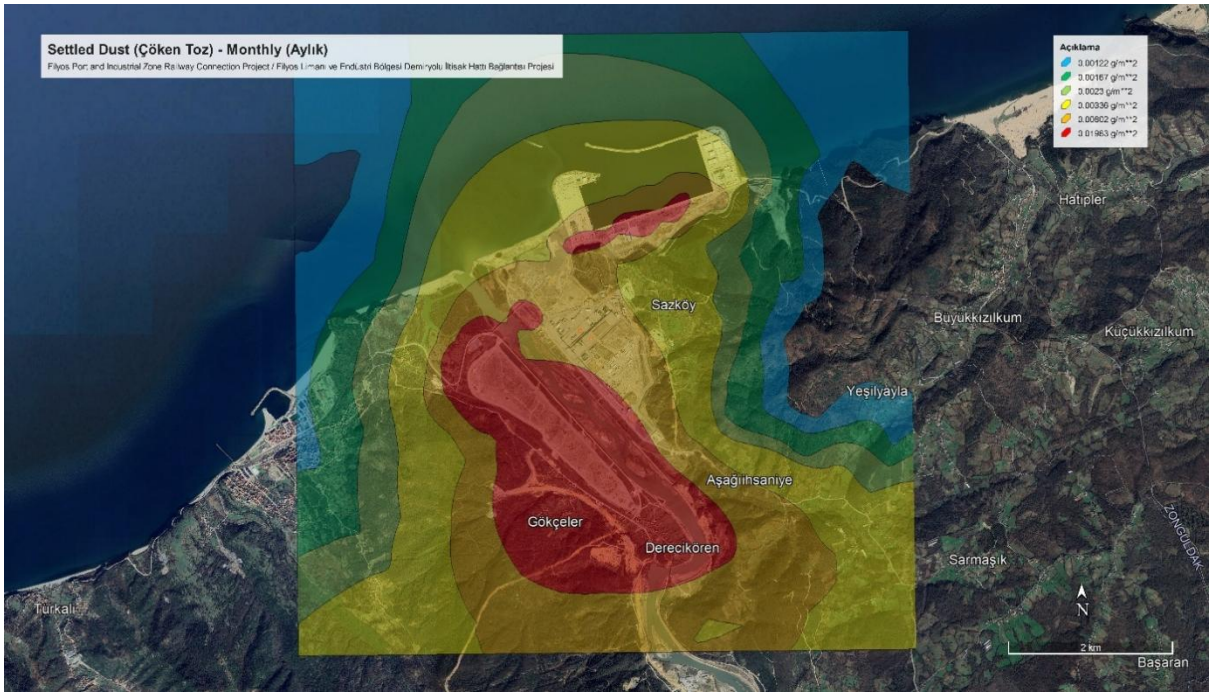


Figure 47. Monthly Settled Dust Concentration Contours

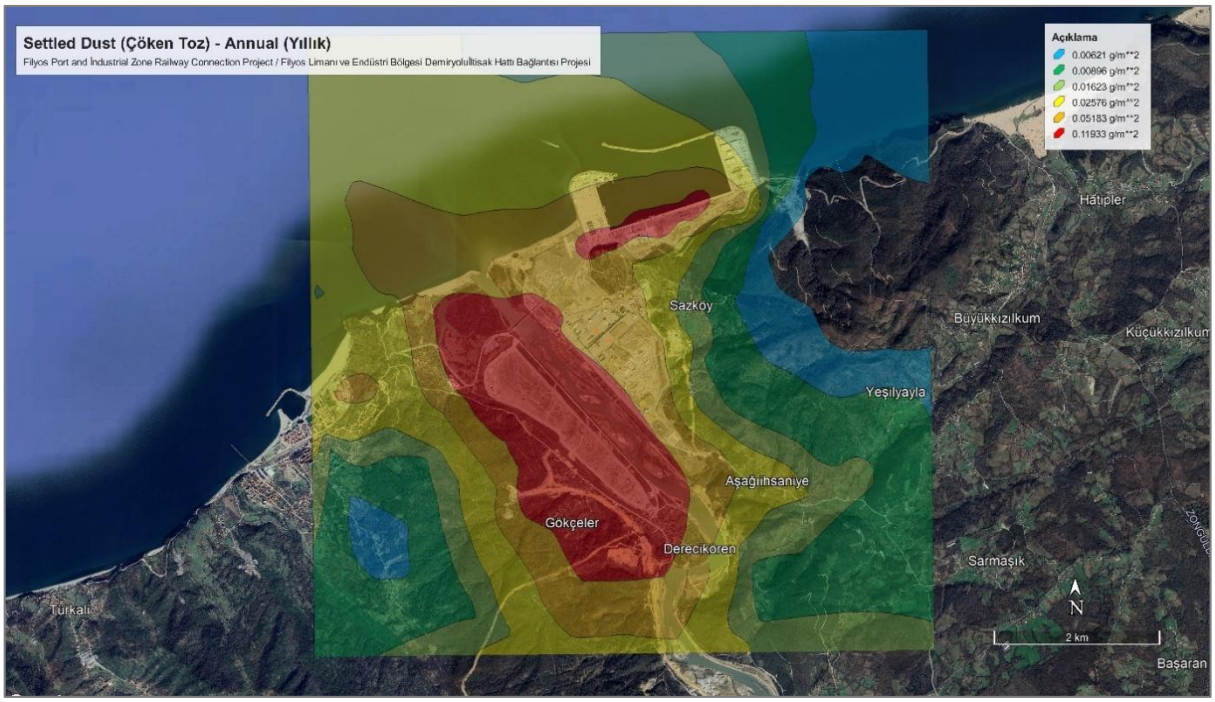


Figure 48. Annual Settled Dust Concentration Contours

The cumulative values obtained from the baseline measurement results and modeling results are given in Table 52 and Table 53 for PM10 and Settled Dust, respectively.

Table 52. PM10 Values of Land Preparation and Construction Phase in Receptor Points

ID	Location		Measurement Results (µg/m³)	Modeling Results (µg/m³)	Cumulative Value	RCIAP Limit Values (µg/m³)	WBG EHS Guidelines-WHO Ambient Air Quality Guideline Values (µg/m³)
	x	y					
PM-1	421818	4601044	25.80	6.89951	32.69951	**50**	**50**
PM-2	420491	4602090	26.75	0.68351	27.43351		
PM-3	422449	4603361	27.23	0.15388	27.38388		
PM-4	422445	4603400	27.55	0.1423	27.6923		
PM-5	422560	4600522	27.33	2.87044	30.20044		

Table 53. Settled Dust Values of Land Preparation and Construction Phase in Receptor Points

ID	Location		Measurement Results (mg/m²day)	Modeling Results (mg/m²day)	Cumulative Value	Turkish Air Quality Standards (mg/m²day)
	x	y				
SD-1	420450	4602056	12	0.377	12.377	**390**
SD-2	421941	4600872	20	7.064	27.064	
SD-3	422576	4600521	22	7.281	29.281	
SD-4	422426	4601090	69	1.508	70.508	
SD-5	423067	4602289	16	0.104	16.104	

For PM_{10}, the 24-hour limit value is 50 µg/m³ (it cannot be exceeded more than 35 times in a year) and the annual limit value is 40 µg/m³ in RCIAP - Annex-2 Table 2.2 (see Table 52). For settled dust, the monthly and annual limit values are given as 390 mg/m².day and 210 mg/m².day, respectively. Accordingly, the 24-hour and annual maximum PM_{10} values obtained from the modeling study, as well as the maximum settled dust values for monthly and annual periods, comply with the limit values. The results table displaying 24-hour and annual PM_{10} GLC values, along with the settled dust GLC values for monthly and annual periods obtained from the modeling studies and iso-concentration map formed with the GLC values, are presented above.

As can be seen above, the STV and LTV values obtained from the maximum GLC values obtained from the modeling studies for dust emissions likely to occur during the land preparation works comply with the limit values (STV and LTV) stated in Table 2.2 of RCIAP.

It should be noted that the modeling studies reflect the worst-case scenario since all land preparation and construction works were assumed to be carried out at the same time on the proposed railway line. Therefore, the real-life results are expected to be lower than the modeling results during the implementation of the project.

There is no limit value for $PM_{2.5}$ according to national legislation. However, a modeling study was carried out for $PM_{2.5}$ concentrations and distribution maps were examined, and it was seen that these results were in parallel with PM_{10} emissions. For these reasons, the results and maps of the modeling study for $PM_{2.5}$ emissions are not given separately.

The model studies performed for $PM_{2.5}$ emissions will be used as reference values in the future for the cumulative assessment of $PM_{2.5}$ emissions.

Exhaust emissions will be generated from the vehicles that will operate during the construction works. Since these emissions will be of short duration and in trace amounts, baseline

measurements including exhaust emission gases (e.g. SO_2 and NO_2 concentrations) were made only to obtain baseline measurement data. In the future, these data can be used as reference values to assess the SO_2 and NO_2 emission impacts of the project if need be.

Greenhouse Gas Emissions

Greenhouse gas formation is not expected due to tools and equipment to be used during land preparation and construction phase as number of equipment planned to be used is very low. Therefore, this effect is considered as negligible.

5.3.3.2 Operation Phase

Since the electrical system will be used on the railway during the operational phase of the project, possible effects on air quality are considered negligible.

5.3.4 Impact Significance, Mitigation Measures and Residual Impacts

5.3.4.1 Air Quality

The assessment of impacts depends on the sensitivity of the recipients and the overall impact size. As detailed in ESIA Methodology section, the overall impact size is based on a number of factors such as geographic extent, duration, reversibility, frequency, and impact size. Pollutant concentration in each location was determined by the model results together with the baseline measurement results. As it can be seen from Table 50 and Table 51, the cumulative values of PM_{10} and settled dust do not exceed the limit values during construction phase according to the modeling results. In conclusion, the magnitude of impact is defined as "low" in construction phase and “negligible” in operation phase.

Fuel consumption during the construction phase is only required for the machinery. There will be no fuel consumption for heating and other activities. For the exhaust controls of the vehicles, provisions of “Exhaust Gas Emission Control and Gasoline and Diesel Quality Regulation” published in the Official Gazette No. 28837 dated 30.11.2013 will be complied with. In this context, fuel systems of the vehicles will be continuously controlled. Vehicles that need maintenance will be taken into maintenance, after routine checks and other vehicles will be used until their maintenance is completed. 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.

To minimize the dust and associated impacts that may 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.

Additionally, to mitigate potential dusting issues on the land, compliance with the air quality standards pertaining to dust emissions from materials stored in open areas, as outlined in the "Emission Limits for Authorized Facilities" (Annex-1), will be ensured.

Moreover, to control, NO_2, CO and NO emissions resulting from the operation of quarries and borrow sites, following measures must be taken into consideration if construction contractor decides to operate its own quarries and borrow sites but firstly it will be necessary to conduct an environmental impact assessment:

- 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.

Table 54 indicates air quality impacts, mitigation measures and residual impacts.

5.3.4.2 Greenhouse Gas Emissions

Although GHG emissions for the construction and operation phase of the project were anticipated to be negligible, alternatives that are technically and financially feasible and cost effective, to reduce the project-related GHG emissions, will be implemented during the construction phase of the project. In this regard, alternative fuel types, consumption of low carbon energy sources and applications aiming the reduction of fugitive emissions will be considered. Furthermore, GHG emissions will be quantified annually during the construction phase in accordance with the internationally recognized methodologies. In addition, the following measures will be applied:

- Construction activities will be carried out in line with GIIP.
- While alternative fuel and energy resources are not applicable for the construction machinery to be used in the Project, DGII will provide trainings to the operators/drivers that cover practices for reducing unnecessary equipment idling time and unnecessary operator moves/behaviors that increase fuel consumption (e.g. shifting hydraulic levers unnecessarily, use of excess horsepower).
- Fuel efficiency of construction vehicles will be optimized by implementing strategies such as speed restrictions and minimizing uphill movements whenever possible.
- DGII will ensure proper maintenance of machinery/equipment, including systematic equipment inspection, detection of potential failure and prompt correction to ensure fuel savings.
- The energy/fuel consumption of construction machinery, equipment and vehicles will be closely monitored.
- Comprehensive trainings sessions will be provided to on-site personnel, focusing on energy efficiency and best practices.

If the main contribution to greenhouse gas emissions exceeds 100,000 tons per year during the operational phase of the project, greenhouse gas emissions will be publicly reported, and an analysis of alternative options will be conducted.

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Table 54. Air Quality Impacts, Mitigation Measures and Residual Impacts

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	Gökçeler	Local	Short Term Reversible	Short-term	Continuous	Low	High	**Minor**	▪ Maximize the use of excavation material in fill operations. ▪ Store excess or unsuitable excavated materials at designated storage sites within the construction corridor, ensuring sufficient capacity. ▪ Ensure that all excavation activities are implemented in line with the cut and fill program to minimize excavation waste. ▪ To minimize dust and potential impacts during soil stripping, cut and fill activities in the land preparation and construction phase, take measures such as watering at emission sources, conducting filling and unloading operations without tossing, covering vehicles with tarpaulin during material transportation, and maintaining the upper part of the material at 10% humidity. ▪ Regularly moisten the project site using water trucks throughout the entire activity. ▪ Comply with the "Exhaust Gas Emission Control and Gasoline and Diesel Quality Regulation," published in the Official Gazette No. 28837 dated 30.11.2013. Perform traffic inspections, exhaust gas emission measurements, and ensure vehicles needing maintenance undergo necessary repairs after routine checks. Other vehicles will be used only after completing maintenance. ▪ Ensure that employees adhere to the Traffic Law, with particular attention to proper loading according to loading standards. ▪ Establish procedures to limit the drop height of falling materials. ▪ Apply dust suppression methods 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. ▪ Apply water suppression, pressurized distribution or spraying systems to minimize dust where and when necessary, on paved or unpaved road surfaces. ▪ Carry out loading and unloading of materials without throwing and scattering. ▪ Cover excavated materials during transportation with nylon canvas or materials with grain sizes larger than 10 mm. ▪ Prefer local licensed quarries and material borrows sites for the reduction of transportation distance of materials. ▪ To control NO_2, CO, and NO emissions from quarries and borrow sites if operated by the construction contractor, an environmental impact assessment must first be conducted. Measures include exploring alternatives to blasting, such as hydraulic hammers or mechanical methods; carefully planning blasting operations, including the arrangement, dimensions, and direction of blast holes; and ensuring the proper combustion of explosives by minimizing excess water and ensuring the correct mixing of ammonium nitrate and fuel oil. ▪ Install wind shields or barriers around material storage sites as needed to prevent the spread of dust emissions. ▪ Upgrade and maintain access roads (to construction camp sites, construction sites, quarries/material borrow sites, and material storage areas) when necessary. ▪ Whenever possible, avoid driving construction vehicles through settlements. ▪ Implement Project Grievance Mechanism. Evaluate and address any comments related to dust and air quality received through the Grievance Mechanism, and implement corrective actions as required. ▪ Implement Traffic Management Plan and Pollution Prevention Plan. ▪ PM_{10}, $PM_{2.5}$ and settled dust will be monitored during the land preparation and construction phase quarterly or in case of a compliant.	**Negligible**
		Sefercik	Local	Short Term Reversible	Short-term	Continuous	Low	Medium	**Minor**		**Negligible**
		Sazköy	Local	Short Term Reversible	Short-term	Continuous	Low	Medium	**Minor**		**Negligible**
		Derecikören	Local	Short Term Reversible	Short-term	Continuous	Low	Medium	**Minor**		**Negligible**
Greenhouse Gas Contribution	Land preparation and construction	Atmosphere Regional Community	Wide	Long-term reversible	Long-term	Intermittent	Medium	Negligible	**Negligible**	▪ Construction activities will be carried out in accordance with good industry practices. ▪ Alternative fuel and energy resources are not applicable to the construction machinery to be used for the Project. However, operators and drivers will receive necessary training on practices to reduce unnecessary equipment idling time and avoid behaviors that increase fuel consumption (e.g., unnecessarily shifting hydraulic levers or using excessive horsepower). The training will also cover 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. ▪ Project Company 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**

5.4 Water Resources, Water Quality and Wastewater Management

5.4.1 Project Standards and Methodology

Project Standards

The national legislation and international standards that will be considered for the impacts/risks related with the water resources and water quality during the project activities and will be complied are as follows:

- 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
- Decisions made by the Çaycuma Municipality Water and Sewerage Directorate, Zonguldak Municipality, and Zonguldak Special Provincial Administration.
- Guidelines for Drinking Water Quality – WHO, 2022
- 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 General EHS Guidelines – 1. Environment – 1.4 Water Conservation
- WBG EHS Guidelines for Railways, 2007

The limit 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 WHO Drinking Water Guidelines (see Table 55).

Table 55. 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	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

Parameter	Unit	Limit Values in RWIHC	Limit Values of WHO
Selenium	mg/L	0.01	0.04
Aluminum	mg/L	0.2	-
Ammonium	mg/L	0.5	-
Chloride	mg/L	250	-
Conductivity	|jS/cm	2,500	-
pH	-	6.5<pH<9.5	6.5-8.5
Iron	mg/L	0.2	0.3
Manganese	mg/L	0.05	0.08
Sulphate as SO_4	mg/L	250	-
Sodium	mg/L	200	50
Uranium	mg/L	-	0.03

The quality of surface water resources is evaluated according to the principles of the Surface Water Quality Regulation (SWQR). The purpose of this regulation is to determine and classify the biological, chemical, physicochemical 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.

SWQR evaluates surface waters in three different classes in terms of general chemical and physicochemical parameters. This classification is made by comparing the analysis result with the relevant limit value for each parameter analyzed in the sample. The water quality classes, and limit values of the parameters defined in Table-2 in SWQR Annex-5 are given in Table 56.

Table 56. Surface Water Classification and Limit Values According to the SWQR

Parameter	Unit	Water Quality*		
		Class I (High)	Class II (Good)	Class III (Medium)
Color (436 nm)	m^{-1}	RES 436 nm: ≤ 1.5 RES 525 nm: ≤ 1.2 RES 620 nm: ≤ 0.8	RES 436 nm: 3 RES 525 nm: 2.4 RES 620 nm: 1.7	RES 436 nm: > 4.3 RES 525 nm: > 3.7 RES 620 nm: 2.5
Color (525 nm)	m^{-1}			
Color (620 nm)	m^{-1}			
pH	-	6-9	6-9	6-9
Conductivity	µS/cm	<400	1000	>1000
Oil and Grease**	mg/L	<0.2	0.3	>0.3
Dissolved Oxygen	mg/L	>8	6	<6
Chemical Oxygen Demand	mg/L	<25	50	>50
Biological Oxygen Demand	mg/L	<4	8	>8
Ammonium Nitrogen	mg/L	<0.2	1	>1
Nitrate Nitrogen	mg/L	<3	10	>10
Total Kjeldahl Nitrogen	mg/L	<0.5	1.5	>1.5
Total Nitrogen	mg/L	<3.5	11.5	>11.5
Ortho Phosphate Phosphorus	mg/L	<0.05	0.16	>0.16
Total Phosphorus	mg/L	<0.08	0.2	>0.2
Fluoride	µg/L	≤1000	1500	>1500
Manganese	µg/L	≤100	500	>500
Selenium	µg/L	≤10	15	>15
Sulfur	µg/L	≤2	5	>5

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 57 will be complied.

Table 57. 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

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:

- National Catchment Protection Action Plan of Batı Karadeniz Catchment (2013)
- TUIK Database
- Database of the Turkish State Hydraulic Works (SHW),
- 1/25,000 scale topographical maps of the Project route,
- Long-term Extreme Meteorological Events Reports obtained from Zonguldak Meteorological Station
- 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 Chapter 4, taking the both the receptor sensitivity and the magnitude of the impact into consideration.

Information about the surface and groundwater resources on the project route are presented. This information is based on the reports and online database of the related institutions given below.

- Geological-Geotechnical Survey Report of Filyos (Zonguldak) Industrial Zone Construction Plan prepared by Abolished Ministry of Science, Industry and Technology and Geoteknik Müh. Jeot. Son. Ltd. Şti in 2016, (BSTB, 2016)
- "Preparation of Basin Protection Action Plan Project-Western Black Sea Basin" final report prepared by Abolished Ministry of Forestry and Water Affairs and TUBITAK MAM (OSIBE, MAM 2013)
- "Impact of the Climate Change on the Water Resources in Western Black Sea Basin Project" prepared by the Ministry of Forestry and Water Affairs (OSİB), General Directorate of Water Management (SYGM) (SYGM, 2016),
- "Abolished Ministry of Forestry and Water Affairs Data - Bartın province, Karabük province and Zonguldak province" maps prepared in 2012 by Ministry of Forestry and Water Affairs (OSİB), IT Department, Geographic Information Systems (GIS) Branch Directorate (OSIB, 2012),

- T. C. '2018 Annual Report' published by the Ministry of Agriculture and Forestry (TOB) General Directorate of State Hydraulic Works (SHW),
- "Western Black Sea Basin Flood Management Plan" report prepared by the Ministry of Agriculture and Forestry, General Directorate of Water Management in 2019 (SYGM, 2019,
- "Filyos Port and Filyos Industrial Zone, Railway Connection Line Connection (Including Required Highway Connection) Survey-Project, Feasibility and Engineering Services Work Geological-Geotechnical Survey Report" prepared by T. C. Ministry of Transport and Infrastructure, General Directorate of Infrastructure Investments (DGII) and Altınok Müş. Müh AŞ. In 2008 (DGII and Altınok, 2018),
- The online 'Geodata Application' database of the Ministry of Agriculture and Forestry (http://www.geodata.gov.tr).

5.4.2 Baseline Conditions

5.4.2.1 Surface Water Resources

The project area is located in the Western Black Sea basin, one of the watersheds allocated throughout Türkiye (see Figure 49). The Western Black Sea Basin consists of a collection of rainfall areas of small rivers flowing into the Black Sea. It is surrounded by Çangal Mountain, Zindan Mountain, Küre Mountains, Ilgaz Mountains, Benli Mountain, Bolu Mountains, Kara Mountain, Işık Mountain, Elmacık Mountain from the east and the Black Sea from the north.

The Western Black Sea Basin is one of Türkiye's 25 basins. Covering approximately 3.7% of Türkiye's surface area, the Western Black Sea Basin has a rainfall area of 28,855 km^2. The Western Black Sea Basin is located between 40°34'42“- 41°27'52” north latitude and 30°52'33“ - 35°12'12” east longitude. The Western Black Sea Basin is bounded by the Sakarya Basin in the southwest, the Kızılırmak Basin in the southeast and the Black Sea in the north. The Western Black Sea basin is divided into 5 sub-basins: Melen Sub-Basin, Filyos Stream Sub-Basin, Devrekani Stream-Gerze Sub-Basin and Bartın Sub-Basin (see Figure 50). There are 61 streams and 97 creeks with continuous flow and many streams with seasonal flow in the Western Black Sea Basin.

Important lakes in the basin are Abant Lake, Yedigöller, Yeniçağ Lake, Efteni Lake and Sarıkum Lake. Apart from these lakes, there are 33 dams, 37 ponds, 7 flood traps and 2 flood protection structures built on rivers and streams in the basin.

30.6% (882.117 ha) of the land within the drainage area of the Western Black Sea Basin is an agricultural area; 67.8% (1.954.149 ha) of forest and semi-natural area; 1.3% (36.737 ha) of urban area that are anthropogenically modified. Surface waters in the basin cover an area of approximately 0.4% (10.157 ha).

Filyos Sub Basin: Filyos Port and Industrial Zone Railway Line.Project is located within the Filyos Creek subbasin of Western Black Sea Basin (see Figure 50). Filyos Sub-basin is a basin rich in rivers. There are five main rivers in the basin. These rivers are Büyüksu Stream, Soğanlı Stream, Filyos Stream, Araç Stream and Devrek Stream. The largest and most important of these rivers is Filyos Stream. Filyos subbasin has 13.3 km^2 catchment area and the Filyos River has 104.6 m^3/s yearly average flowrate. Filyos River has the maximum flowrate of 230 m^3/s in April and minimum flowrate of 28 m^3/s in August having a continuous flow *(BSTB, 2016).*



Figure 49. Water Basins in Türkiye

Source: SHW, 2023

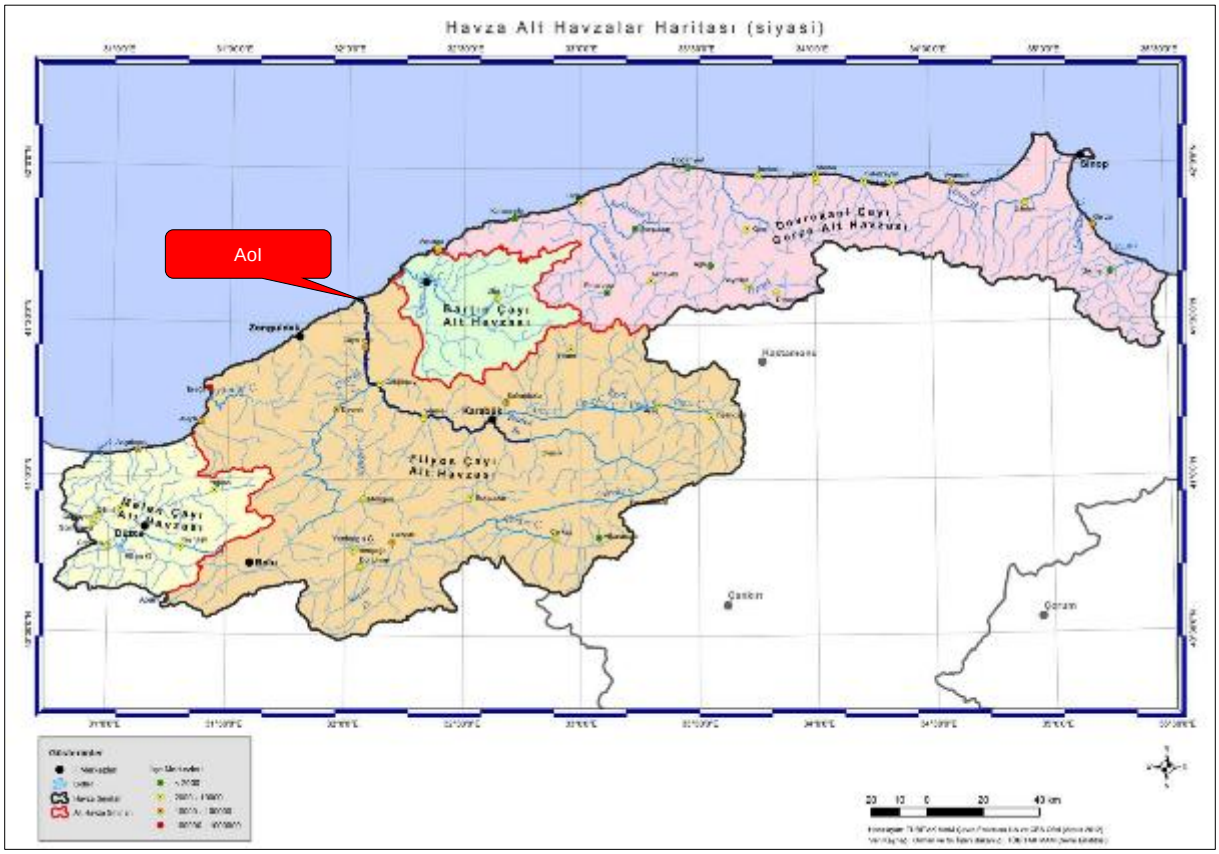


Figure 50. Subbasins of Western Black Sea Basin where Project Route is located

Source: https://6rbmp.tarimorman.gov.tr/tr/proje-havzalari/bati-karadeniz-havzasi

Rivers and Streams

The most important surface water where the Filyos Port and Industrial Zone Railway Line route intersects, and the intersection point is crossed by a 387.5 m long bridge is the Filyos River. Filyos River, which is the most important surface water in the region where the project area is located and gives its name to the sub-basin where it is located, provides drainage of all surface waters coming from the hilly areas in the northeast and southwest around the AoI and flows into the Black Sea approximately 900 m north of the project route. In addition, small surface water discharges with seasonal flow from the sloping areas in the southwestern part of the route from Gökçeler station to the Filyos stream bridge crossing along the route were provided by culvert crossings at 5 points.

Filyos River: The Filyos River, with a length of approximately 360.0 km in the Western Black Sea Basin, originates in the north of Seben Town under the name of Ulusu from Benli Mountain. The stream descends to the Gerede Plateau and merges with the Gerede Stream. It flows in the northeast direction. It merges with many streams at the foothills of Ilgaz Mountains and turns northwest. The Araç Stream and Soğanlı Stream merge in Karabük Province Center and take the name Yenice Stream downstream, passing through Yenice and turning north and descending to Çaycuma Plain. Here it merges with Devrek Stream, which originates from Efteni Lake in Bolu Mountains, and takes the name of Filyos Stream and reaches the Black Sea at Hisarönü. The Filyos River splits into many branches along its course. For this reason, it has been known by different names in many regions. For this reason, it has been called by different names in many regions. It has many names such as Yenice River, Köroğlu Stream, Ulusu, Gerede Stream, Melan Stream, Akçay, Soğanlı Stream etc.

The Filyos River Basin is quite large and is formed by the merger of many streams and side streams with quite different basin and river basin characteristics. Therefore, it shows quite different hydraulic and topographical characteristics along its 360 km long course. In Bolu and Gerede region, it generally continues in plains and is surrounded by meadows and fields. In these sections, sediment flow is also very low. In the basins of Ilgaz Stream, Boyalı Stream and Soğanlı Stream, which come from the foothills of Ilgaz Mountain, there are large landslides and slope collapses, and they are very turbid. Sand-gravel quarries, ongoing construction of HEPPs and roads in the basin create sediment.

Soğanlı Stream is formed by the combination of Gerede water irrigating the southern part of Eskipazar and Çerkeş Stream coming from Çerkeş. When Soğanlı Stream and Araç Stream merge in Karabük City Center, Yenice Stream is formed downstream. Further downstream, Filyos Stream is formed by the combination of Devrek Stream and Yenice Stream.

The hydrological map at and around the project area is given in Figure 51.

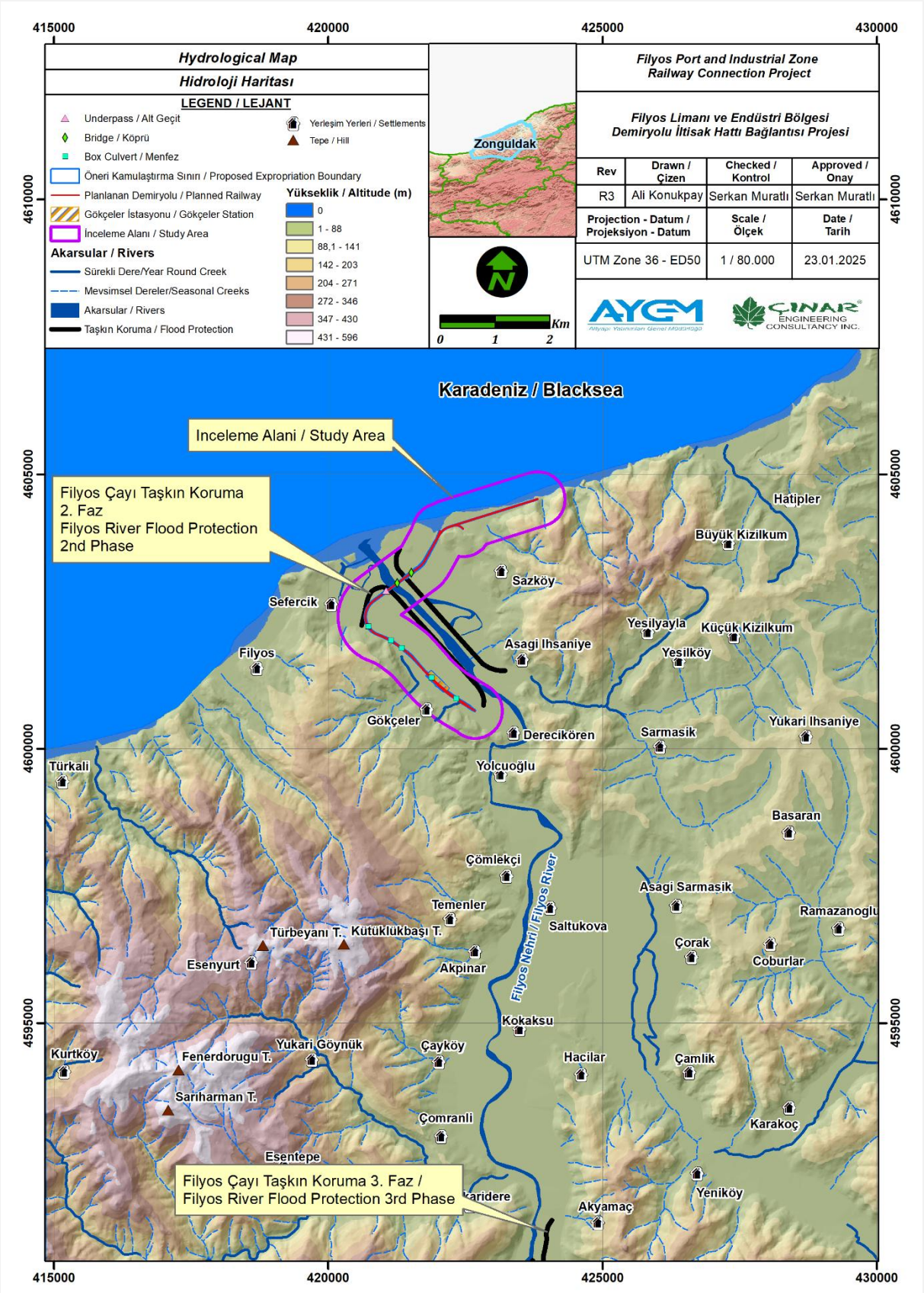


Figure 51. Hydrology Map in and Around Project Route

Lakes, Dams, Ponds and Flood Protection Structures

There are no lakes, ponds or dams in and around the Project AoI and the closest surface water to the AoI is Dereköy Pond, which is used for industrial water supply, located approximately 14 km southwest of the Project route. The Project AoI is not within the protection area of any surface water source.

The Filyos stream, which flows in a meandering structure in a wide bed from south to north in the region, has been rehabilitated within the scope of flood control and prevention works carried out in 3 stages in 2014-2015 in the vicinity of Gökçeler village, where the project route is located, and at the crossing of Çaycuma district approximately 11 km south of the project area, and thus the controlled flow of the Filyos stream has been ensured. At the Filyos River crossing of the project route, passage is provided with a bridge over the Flood Protection Structure and the height of the bridge from the river thalweg elevation is 10.25 m on average and the height from the flood protection embankment is 6 m on average.

Irrigation Area Projects

There is no irrigation project within the project route and project AoI. The closest irrigation project in the region is Çaycuma Irrigation Project, which starts approximately 750 m south of the project route and covers Çaycuma district and its surroundings. The planned irrigation area in question is in the project phase and it is planned to irrigate 7400 ha net with 0.402 l/s/ha water within the scope of the project.

Surface Water Quality

During Phase-1 studies, four (4) sampling points near the proposed railway line had selected in order to determine the baseline quality of surface water resources. These sampling locations had been selected from areas with water crossings near the railway lines routes. To be able to assess the impacts of construction and operational activities on surface water resources, two additional points have been selected from the Filyos Creek within the scope of Phase-2 studies. In addition, the 3rd sampling point (SW-3) was revisited, and a surface water sample was taken from this point during Phase-2 studies since sampling could not be performed at SW-3 which was dry during Phase-1.

The surface water samples were taken in accordance with TS EN ISO 5667-6 standards and analyses were carried out by ÇINAR Lab. both during Phase-1 and Phase-2 studies. The analyses reports were given in Appendix-3.

The information on the surface water sampling points is given in Table 58 and sampling points are shown in Figure 52.

Table 58. Surface Water Sampling Locations

Sampling Location	Coordinates (WGS 84 – UTM Zone 36T)	Neighborhood	Sampling Date
SW-1	423682.10 E / 4602501.99 N	Industrial area	15.01.2020
SW-2	421244.96 E / 4602713.34 N	Filyos Creek	14.01.2020
SW-3	421050.58 E / 4601784.88 N	Sefercik	28.07.2023
SW-4	421602.43 E / 4601121.74 N	Gökçeler	14.01.2020
SW-5	422891.90 E / 4600797.81 N	Filyos Creek	28.07.2023
SW-6	420995.63 E / 4603114.91 N	Filyos Creek	28.07.2023

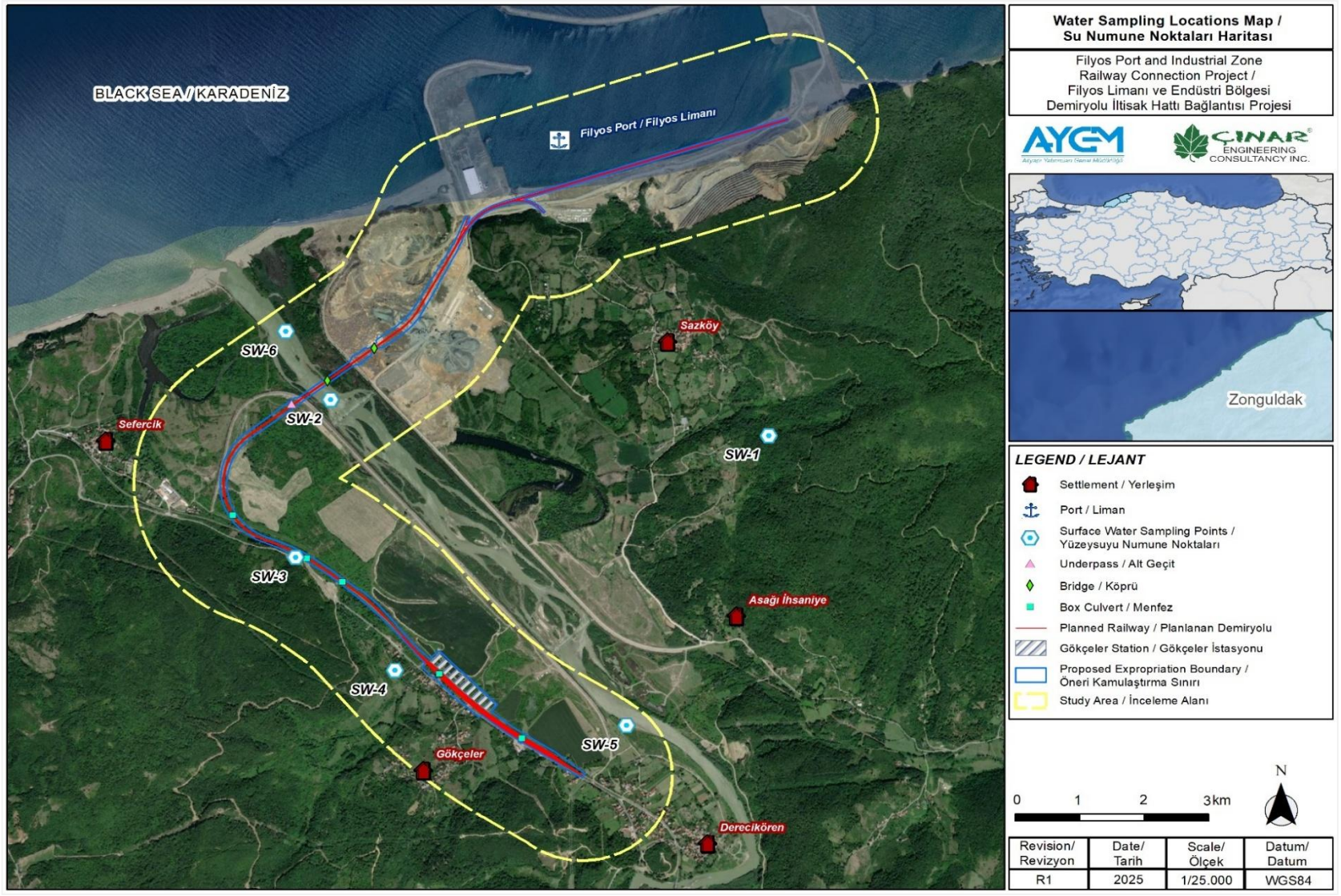


Figure 52. Surface Water Sampling Locations

Table 59. The Analysis Results of Surface Water Samples

Parameter	Unit	Water Quality*			SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
		Class I (Very Good)	Class II (Good)	Class III (Moderate)						
pH	-	6-9	6-9	6-9	7.82	7.25	8,02	8.01	8,69	8,42
Oil And Grease**	mg/L	<0.2	0.3	>0.3	< 0.2	< 0.2	< 10	< 0.2	< 10	< 10
Color (436 Nm)	m^{-1}	RES 436 nm: ≤ 1,5	RES 436 nm: 3	RES 436 nm: > 4,3	<0.1	<0.1	0,4	<0.1	0,2	0,3
Color (525nm)	m^{-1}	RES 525 nm: ≤ 1,2	RES 525 nm: 2,4	RES 525 nm: > 3,7	<0.1	<0.1	0,1	<0.1	<0,1	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
Conductivity	µS/cm	< 400	1000	> 1000	515	545	1170	511	960	1010
Dissolved Oxygen	mg/L	> 8	6	< 6	10.32	11.29	2,18	10.58	4,4	5,1
Chemical Oxygen Demand	mg/L	< 25	50	> 50	< 10	29.1	26,4	< 10	15,5	32,6
Biochemical Oxygen Demand	mg/L	< 4	8	>8	< 3	12.4	10,8	< 3	6,36	13,4
Ammonium Nitrogen	mg/L	< 0,2	1	>1	< 0.016	0.595	< 0,016	0.094	< 0,016	< 0,016
Nitrate Nitrogen	mg/L	< 3	10	> 10	0.263	1.3	0,326	0.44	1,08	0,159
Total Kjeldahl-Nitrogen	mg/L	< 0,5	1,5	> 1,5	0.457	2.268	0,16	1.007	0,337	0,547
Total Nitrogen	mg/L	< 3,5	11,5	> 11,5	0.72	3.571	0,486	1.447	1,43	0,71
Ortho Phosphate Phosphorus	mg/L	< 0,05	0,16	> 0,16	< 0.01	< 0.01	< 0,01	< 0.01	2,05	< 0,01
Total Phosphorus	mg/L	< 0,08	0,2	> 0,2	0.066	0.077	0,013	0.057	0,058	0,026
Fluoride	µg/L	≤ 1000	1500	> 1500	< 0.1	0.118	139	< 0.1	100	<100
Manganese	µg/L	≤ 100	500	> 500	0.004	0.112	110	0.011	73,7	63,7
Selenium	µg/L	≤ 10	15	> 15	< 0.0005	0.0006	< 0,5	< 0.0005	0,62	0,55
Sulfur	µg/L	≤ 2	5	> 5	< 2	< 2	< 2	< 2	< 2	< 2

** (a) Purpose of use of water as per quality classes:* *Class I - Water with High Quality (implies that the status of water is "Very good");*	*1) Surface waters with a high potential of being utilized as drinking water,* *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) Surface waters with a high potential of being utilized 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 relevant laboratory. Therefore, it could not be classified.*	

According to the analysis results given in Table 59:

- SW-1 is classified as Class II in terms of Conductivity.
- SW-2 is classified as Class III in terms of BOD and Total Kjeldahl Nitrogen parameters.
- SW-3 is classified as Class III concerning the Conductivity, BOD and Dissolved Oxygen parameters.
- SW-4 is classified as Class II in terms of Conductivity and Total Kjeldahl Nitrogen parameters.
- SW-5 is classified as Class III regarding Dissolved Oxygen and Ortho Phosphate Phosphorus parameters.
- SW-6 is classified as Class III regarding Conductivity, BOD and Dissolved Oxygen parameters.

The relatively high conductivity values observed at the monitoring points may be attributed to seawater interference. Diffuse pollution sources, which are responsible for the increase in nutrient parameters, particularly those associated with agricultural and livestock activities, are generally more prevalent in the region. However, a comparison of the changes observed at the SW-5 upstream point and the SW-6 downstream point of the Filyos River during the Phase-2 period indicates that activities within the Individual Investment Zone are the primary contributors to the observed variations in water quality. Furthermore, with the commencement of activities in the Filyos Industrial Zone along with the Free Zone, the cumulative impact of industrial activities on water quality in the area is expected to increase.

5.4.2.2 Groundwater Resources

According to the Western Black Sea Basin Groundwater Planning Filyos Groundwater Sub-Basin Hydrogeological Study Report, 2023 prepared by DSI in the Filyos Stream Sub-Basin where the project area is located, the total groundwater reserve is 844.17 hm^3/year, and the safe groundwater reserve is calculated as 633.13 hm^3/year.

The alluvium on which the Project route is located has hydrogeologically permeable and granular aquifer characteristics and is fed by rainfall and surface runoff. The Yemişliçay formation consisting of Cretaceous aged volcanogenic sandstones, tuffs and agglomerates observed in the project area is hydrogeologically impermeable, does not carry or transmit groundwater.

Filyos Port and Filyos Industrial Zone Railway Junction Line (Including highway connection) Geological and Geotechnical Investigations Report was prepared by Altınok Cons. Eng. A.Ş. on 21.02.2018 and Engineering Design Review, Preparation of Bidding Documents for Civil Works, and Construction Supervision of Last-Mile Rail and Road Infrastructure Connectivity to/from Filyos Port and Filyos Industrial Zone Comparative Borehole Report was prepared by EOOE JV / Leader EPTISA in 2024.

According to these reports Underground Water Level (UGWL) data are given in Table 60.

Table 60. Information on Groundwater Levels Measured in Geological-Geotechnical Drills

Altınok Cons. Eng. AŞ.		EOOE JV/LEADER EPTISA	
Borehole No	**UGWL (m)**	**Borehole No**	**UGWL (m)**
SD-4	4.80	**TSK-1**	4.00
SK-11	3.10	**TSK-2**	5.00
SD-17	2.40	**TSK-3**	4.50
SD-24/SK-25	5.93/5.98	**TSK-4**	4.00
SD-26/SK-27	5.10/5.15	**TSK-5**	4.00

Source: Comparative Borehole Report, EOOE JV / Leader EPTISA, 2024

5.4.2.3 Flood Events near Project Area

In the Western Black Sea Basin, 225 floods have been recorded and the biggest floods that occurred in the basin and caused loss of life occurred in 1983 in Ayancık District of Sinop Province and in 1998 in Devrek District of Zonguldak Province and caused deaths of 10 people in total.

Flood events caused by the Filyos River which is within the impact area of the Project area are given in Table 61.

Table 61. Flood Events around the Project Area

No	Province	District	Settlement	River Name	Date	Loss of Life
26	Zonguldak	Çaycuma	Filyos Town	Filyos River	15.06.1964	0
27	Zonguldak	Çaycuma	District center		15.06.1964	0
28	Zonguldak	-			27.06.1991	2
29	Zonguldak	-			07.07.1991	2

The rivers in Zonguldak Province carry plenty of water in winter and spring and all of these waters flow into the Black Sea. The total water potential of the river basins in Zonguldak is 3.664 hm^3/year and the total rainfall area formed by these rivers is 15.942 km^2. There are 9 streams connected to the Filyos River, 5 streams connected to the Gülüç River, 1 stream connected to the Alaplı Stream, 1 stream connected to the Ulutan Stream and 4 other streams in Zonguldak Province. The most important stream in the province is the Filyos Stream, which has a length of 228 km. The average flow of Filyos Stream is 102.23 m3/s and the total annual flow capacity is 3213.90 hm^3/year (DSİ, 2018).

Within the scope of the “Western Black Sea Basin Master Plan Report Work” tendered by the General Directorate of State Hydraulic Works, the existing flood protection facilities in the basin and the existing flood protection facilities in the Western Black Sea Basin were obtained from the General Directorate of DSİ, Operation and Maintenance Department and 298 flood protection facilities were identified in the Western Black Sea Basin and 42 of them are located in Zonguldak Province.

In this context, in 2014-2015, reclamation works for flood prevention purposes consisting of 3 stages were carried out in the region and completed on the Filyos River which is within the project AoI. There are 1761 m of embankment and gabion wall on the river, some of which was constructed within the scope of Section 1 in addition to the gabion coating works carried out in the past. Within the scope of Section 2; for the regulation of the downstream section of Filyos Stream, a total of 7643 m of sediment was constructed, 3667 m on the right bank and 3976 m on the left bank and covered with stone fortifications. Within the scope of the 3rd Section, in the section where Filyos Stream passes through Çaycuma District Center; 3750 m double-sided stacked stone fortification covered sedge arrangement, as well as side stream connections and 2 low retaining walls were constructed. Within the scope of Section 4 in Filyos Stream, a total of 9100 m of stone fortified embankment will be constructed on the membrane of Çaycuma bridge (Zonguldak IRAP, AFAD, 2021).

As a result, through the aforementioned flood prevention structures, the Filyos stream has been rehabilitated in the upstream and downstream parts of the project area and its flow has been taken under control.

5.4.3 Impact Assessment

5.4.3.1 Land Preparation and Construction Phase

5.4.3.1.1 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 use of 200 project personnel and moistening water to be used for minimizing uncontrolled dust emissions.

Daily needs 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;

200 people x 223 L/day-capita[21]= 44.6 m^3/day

In addition, it is estimated that approximately 5 m^3 of water is required per day to prevent dust formation.

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.

5.4.3.1.2 Wastewater Generation

It is planned to employ 200 people during the land preparation and construction phase, and the amount of domestic wastewater to be generated is calculated as 44.6 m^3 / day on the assumption that a person's daily water use requirement is 223 L/capita-day and this water will turn into 100% wastewater.

Since there is no wastewater (sewage) system in the field of activity and its immediate surroundings, 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 disposed of in accordance with a protocol to be established with the municipality, which operates a licensed wastewater treatment plant (WWTP) and having sufficient capacity and infrastructure. According to Environmental Status Report of Zonguldak Province (2023), near the project area, there is a WWTP in the Çaycuma district with a capacity of 3,950 m^3/day, providing physical and biological treatment, as well as another WWTP in Filyos town with a capacity of 1,850 m^3/day. 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[22].

Additionally, efforts are ongoing to establish an industrial WWTP in the area designated as a free industrial zone within the boundaries of Çaycuma district and Filyos town.

On the other hand, it is planned to use an average of 5 m^3 of water per day in order to minimize dust emissions that will occur on the work site and on the roads. Since the water to be used in moistening processes will remain within the soil, there will not be any wastewater formation.

5.4.3.1.3 Impacts on Surface Water Flow

The crossings of surface waters by the project route are with the Filyos Creek and influent streams of Filyos Creek with seasonal flow. In case those surface waters are not crossed with

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21 (TURKSTAT) 2022 According to Türkiye Municipality Water Statistics; Drinking and utility water requirement per person has been determined as 223 L/capita-day for Zonguldak Province.

22 Related investigation has been made via "https://eizin.cevre.gov.tr/Rapor/BelgeArama.aspx"

properly designed engineering structures and techniques, deformation is possible around them. Other than this impact, the stability of cut and 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 should be taken under control for the protection of project route and its environment. Surface waters will not be utilized during the land preparation and construction phase of the project.

Due to its location in the Western Black Sea Basin, Filyos Valley has witnessed important flood events in the past. There of assessment of possible flood risks were necessary.

During the assessment of the possible flood risks, the below listed steps were followed:

- Identification of important historical floods
- Identification of possible floodplains
- Identification of areas with potential high flood risk

Filyos River Basin Master Plan Report was revised in February 2001 under the control of the 23rd Regional Directorate of DSI and a flood protection project was planned with these three steps in the area covering the Filyos Valley Project. Within the scope of the project, dams (flood, irrigation, drinking water and energy purposes), flood traps, hydroelectric power plants covering the land 20,898 ha were evaluated.

From these facilities, which include 26 major projects, several dam constructions and branches have been started to date, master plans of other projects have been completed and some of them have been accepted (BAKKA, 2013). Therefore, with the completion of the Filyos Industrial Zone project, the region will be protected from flood hazard.

Dams planned to be built:

- Köprübaşı Dam and HEPP (on Devrek Stream)
- Çay Dam and HEPP (on Devrek Stream)
- Andıraz Dam and HEPP (on Soğanlı Stream)
- Aktaş Dam and HEPP (on Soğanlı Stream)
- Vehicle Dam (on the Vehicle Stream)
- Hacılar Dam and Irrigation
- Akhasan Dam and Irrigation
- Kirazlıköprü Dam

Flood detention dam planned to be made:

- Karasu flood detention dam
- Buldan flood detention dam
- Pirinçlik flood detention dam
- Şimşirdere flood detention dam
- İncedere flood detention dam
- Kılıçlar flood detention dam
- Akgeçit flood detention dam
- Karıt flood detention dam

In 2014-2015, reclamation works for flood prevention purposes consisting of 3 stages were carried out for the Filyos River. There are 1761 m of embankment and gabion wall on the river, some of which was constructed within the scope of Section 1 in addition to the gabion coating works carried out in the past. Within the scope of Section 2; for the regulation of the downstream section of Filyos Stream, a total of 7643 m of sediment was constructed, 3667 m on the right bank and 3976 m on the left bank and covered with stone fortifications. Within the scope of the 3rd Section, in the section where Filyos Stream passes through Çaycuma District Center; 3750 m double-sided stacked stone fortification covered sedge arrangement, as well as side stream connections and 2 low retaining walls were constructed. Within the scope of

Section 4 in Filyos Stream, a total of 9100 m of stone fortified embankment will be constructed on the membrane of Çaycuma bridge (Zonguldak IRAP, AFAD, 2021).

As a result, through the abovementioned flood prevention structures, the Filyos stream has been rehabilitated in the upstream and downstream parts of the project area and its flow has been taken under control.

The area, including Filyos Industrial Zone and Free Zone, is included in the "Zonguldak Governorate Filyos Free Trade Zone Zoning Geological-Geotechnical Investigation Report" approved by the General Directorate of İller Bank in 2010. In the report approved by İller Bank General Directorate, Department of Underground Investigations in 2010, the evaluations for the AoI whose limits are specified in Figure 53 are as follows:

Filyos Valley, which was declared Free Zone with the decision of the Council of Ministers dated 05.04.1995, and in the area of about 200 hectares, whose boundaries are indicated with a red line in Figure 53, Geotechnical investigations were conducted to determine the conditions that may adversely affect the construction and to determine the existing soil types that will constitute the basis for the structures and the suitability of the area for the settlement was evaluated. In the report, it is stated that there are no objectionable areas or disaster-exposed areas in the AoI and it is stated that there will be no flood hazard for the region with the Filyos River Flood Prevention Project.

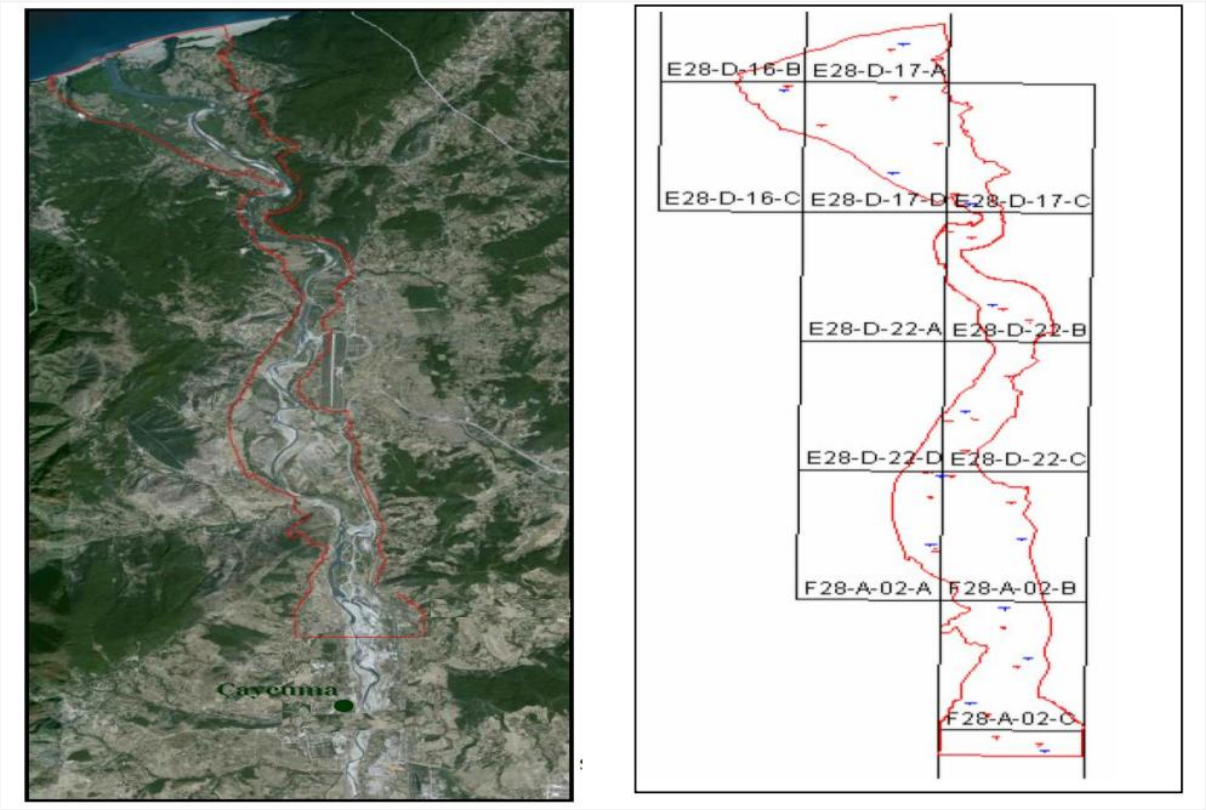


Figure 53. Report Approved by İller Bank General Directorate, Department of Underground Studies and 1/5,000 Scale Layout Index
Source: Scientific Review Report on Environmental, Economic and Social Assessment of Filyos Industrial Zone and Its Possible Effects on the Economic Development Process of the Region, 2015, Ankara University, Institute of Science, Department of Real Estate Development, Ankara

Furthermore, during flood prevention projects, climate change factors should be considered. The most important consequences of climate change related to water resources; Increasing temperatures, precipitation pattern and snow cover slippage are increases in flood and drought frequency and possible future seawater level. Climate change affects water resources in terms of quantity and quality by changing the hydrological cycle and systems. The affected

variables include flood and drought severity and frequency. Thus, during the preparation of the Filyos Flood Prevention Project these were taken into consideration. Two different timeframes were considered while creating scenarios regarding rainfall pattern. First timeframe was 2015 – 2040 and the second timeframe is 2040 – 2070. During these timeframe scenarios, extreme rainfall events that could be faced due to climate change were also considered.

5.4.3.1.4 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. Groundwater may be encountered in the deep soil mixing method to be applied within the scope of ground improvement at the Filyos River bridge crossing. Groundwater will not be utilized during the project land preparation and construction phase.

5.4.3.2 Operation Phase

5.4.3.2.1 Water Use

During the operation phase of the project, the total number of employees working at the station and passengers visiting the station will be approximately 100 people (50 employees and 50 passengers). In this context;

The amount of water required for 100 people during the operation phase is calculated as;

100 people x 223 L/day-capita= 22.3 m^3/day

Daily water needs will be provided through the existing drinking water network of Zonguldak Municipality for the station to be built.

In the activities to be carried out within the scope of the project, the provisions of the Regulation Concerning water Intended for Human Consumption, which was published in the Official Gazette No.25730 dated 17.02.2005, and the Water Pollution Control Regulation that enter into force after it was published in the Official Gazette No.25687 dated 31.12.2004. If the drinking and potable water of the personnel will be purchased from the market, they will be provided with the waters permitted by the relevant Directorate of Public Health.

5.4.3.2.2 Wastewater Generation

During the operation phase of the project, the amount of domestic wastewater to be generated is calculated as 22.3 m^3 / day on the assumption that a person's daily water use requirement is 223 L/capita-day and this water will turn into 100% wastewater.

After wastewater is collected in septic tanks to be constructed at the stations, it will be transported to the nearest licensed WWTP having sufficient capacity using sewage trucks provided by the relevant municipality. This process will be carried out in accordance with a protocol to be established with the municipality, similar to the land preparation and construction phases.

In addition to the domestic wastewater to be generated during the operation phase, there may be industrial effluents due to rail car maintenance and refurbishment activities. Rail car maintenance and refurbishment typically involves a high-pressure water wash which may contain residues from transported materials, paint, oil and grease, and other contaminants. Caustic solutions are often used to remove grease and dirt from axles and other metal parts. Acids and caustics may also be used for rust removal. Locomotive coolants are usually water-based with corrosion inhibitor additives.

The WBG EHS Guidelines for Railways (2007) recommends the measures listed below to prevent, minimize, or control wastewater effluents generated in the rail car maintenance areas:

- 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.
- The wastewater from the service bays and the floor drains in maintenance areas will be kept out of the storm drains and will be collected separately.
- The effluents from the service bays and the floor drains in maintenance areas will be pretreated to reduce contaminant concentrations before collection in septic tanks. Pretreatment systems typically consist of oil / water separators, biological and chemical treatment, and activated carbon systems.

5.4.3.2.3 Impacts on Surface Water and Groundwater

During the operation phase, impacts on Filyos Creek and other 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.

Surface water and groundwater sources will not be used for potable or drinking water purposes during the operation phase. Crossings with the Filyos Creek and other creeks and canals will be monitored during route checks in order to control the adequacy of the culverts.

5.4.4 Impact Significance, Mitigation Measures and Residual Impacts

Mitigation Measures for Impacts on Surface Water Flow

Crossings of the project routes are with the Filyos Creek and influent streams of Filyos Creek with seasonal flow. Those surface waters will be crossed with properly designed engineering structures (bridge, culverts, box culverts) and techniques. In the crossings of project route with surface waters, necessary projects will be implemented in line with the principles of “Disaster Regulation on Highway Roadside Engineering Structures”.

Within the scope of the project, a series of drainage measures will be taken to the right and left side of the routes, such as heel ditch, cut ditch and head ditch for the control of surface and groundwater, as well as the stability of the cut and fills to be constructed along the routes.

In order to prevent floods that may occur in the region, especially on the Filyos Creek, rehabilitation works carried out within 1st, 2nd and 3rd sections of the creek in 2014-2015 by DSI 23rd Regional Directorate. In the creek, 1,761 meters of embankment and riprap are present, part of which was constructed in the past as an addition to the riprap cladding works completed in Section 1. As part of Section 2, to regulate the downstream portion of the Filyos River, a total of 7,643 meters of embankment was constructed and covered with stone riprap—3,667 meters along the right bank and 3,976 meters along the left bank. In Section 3, where the Filyos River passes through the Çaycuma district center, 3,750 meters of double-sided stacked stone riprap-covered embankments were constructed (Zonguldak Provincial Disaster

Risk Reduction Plan, 2021)[23]. Additionally, lateral stream connections and two weirs were built. Consequently, flood events along the project route are prevented.

All wastes that may arise from the project activities, excavation materials to be stored periodically / temporarily and accidental spill of fuel, oil, oil, cement etc. to the streams that are crossed by the project route will be taken under control immediately and surface waters will be protected against pollution.

Moreover, dewatering of the quarrying pit, diamond-wire cutting, and surface water runoff can generate a wastewater discharge high in suspended solids. If the construction contractor decides to operate its own quarries and borrow sites, an environmental assessment should be conducted first and following measures must be taken into consideration to prevent or minimize the suspended sediments in discharged water;

- 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.

Mitigation Measures on Groundwater

When selecting locations for temporary fuel or oil storage areas, the proximity to water resources will be carefully considered. In the event of accidental spills involving hazardous materials such as fuel, oil, or cement, immediate containment and control measures will be implemented. While some interaction with groundwater may occur during the construction of bridge abutment foundations, underpasses, and culverts, no significant impact on groundwater quality or quantity is anticipated. This is due to the limited area of disturbance and the implementation of appropriate mitigation measures.

Although there is no groundwater utilization downstream of the Filyos bridge crossing, the interaction with groundwater will be prevented and minimized by applying the method locally and using a containment pipe. In this way, there will be no significant impact on groundwater quality and quantity.

The mitigation measures and assessments of the residual impacts have been thoroughly determined and are presented in detail in Table 62.

[23] Provincial Disaster Risk Reduction Plan. (2021). Zonguldak Provincial Disaster and Emergency Directorate. Retrieved from https://zonguldak.afad.gov.tr/kurumlar/zonguldak.afad/Genel/ZONGULDAK_IRAP.pdf

Table 62. Impacts on Water Resources, Mitigation Measures and Residual Impacts

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				
Wastewater Generation	Land Preparation and Construction	Construction Area	Restricted	Short-term reversible	Short-term	Intermittent	Low	Medium	**Minor**	▪ Since there is no wastewater (sewage) system in the field of activity and its immediate surroundings, 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 with enough capacity.	**Negligible**
Wastewater Generation	Operation	Station	Restricted	Medium-term reversible	Medium-term	Intermittent	Medium	Medium	**Moderate**	▪ Wastewater generated due to the operational 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 with enough capacity. ▪ In addition to the domestic wastewater to be generated during the operation phase, there will be industrial effluents due to rail car maintenance and refurbishment activities. To prevent, minimize, or control the industrial effluents generated in the rail car maintenance areas; ○ 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; ○ The wastewater from the service bays and the floor drains in maintenance areas will be kept out of the storm drains and will be collected separately; ○ The effluents from the service bays and the floor drains in maintenance areas will be pretreated to reduce contaminant concentrations before collection in septic tanks. Pretreatment systems typically consist of oil / water separators, biological and chemical treatment, and activated carbon systems.	**Negligible**
Impact on surface water quality, flow/hydrological regime of the rivers to be crossed	Land Preparation and Construction Operation	Surface Water Resources, Project elements, Project Personnel, Railway	Wide	Long-term reversible	Long-term	Intermittent	Medium	High	**Moderate**	▪ Crossings of the project routes are with the Filyos Creek and influent streams of Filyos Creek with seasonal flow. Those surface waters will be crossed with properly designed engineering structures (bridge, culverts, box culverts) and techniques by also considering the principles of “Disaster Regulation on Highway Roadside Engineering Structures”. ▪ Within the scope of the project, a series of drainage measures will be taken to the right and left side of the routes, such as heel ditch, cut ditch and head ditch for the control of surface and groundwater, as well as the stability of the cut and fills to be constructed along the routes. ▪ All wastes that may arise from the project activities, excavation materials to be stored periodically / temporarily and accidental spill of fuel, oil, oil, cement etc. to the streams that are crossed by the project route will be taken under control immediately and surface waters will be protected against pollution. ▪ Personnel will be trained regarding waste disposal to the rivers and creeks. ▪ To monitor the quality of the surface waters in the project AoI, periodically at least two times a year (rainy and dry periods), the water sources will be evaluated at the points to be determined by taking into consideration the locations of the pollutant sources in the land preparation-construction period. ▪ Pollution Prevention Plan and Emergency Preparedness and Response Plan that covers management of hazardous and chemical substances will be implemented. ▪ Project Grievance Mechanism will be implemented. If any comment related to water quality is received through the Grievance Mechanism, evaluate the complaint and where necessary plan and implement corrective actions. ▪ Periodic checks will be maintained to monitor waste disposal to streams. ▪ It will be prohibited to store any type of chemical and hazardous material near 50 meters of any creek or river.	**Minor**
Impact on groundwater	Land Preparation and Construction Operation	Groundwater resources	Local	Medium-term reversible	Medium-term	Intermittent	Medium	High	**Moderate**	▪ Within the scope of the project, drainage measures (concrete underground drainage, head ditch) to be used for the control of surface waters and groundwater to ensure the stability of the cuts and fillings to be produced along the routes and to remove them from the fill body will be provided. ▪ At Filyos Bridge crossing during the deep soil mixing ground improvement method the interaction with groundwater will be prevented and minimized by applying the method locally and using a containment pipe.	**Minor**

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Reversibility	Duration	Frequency	Overall Magnitude				
										▪ While determining the locations of temporary fuel or oil storage areas, the locations of water resources will be taken into consideration and dangerous material spills / leaks such as fuel, oil, oil, cement etc. will be taken under control immediately. ▪ In the event of contamination, suspicion of contamination, or any related complaints, the quality of groundwater resources and wells in the AoI will be monitored. Groundwater samples will be collected and analysed at locations determined based on the proximity to potential pollution sources. ▪ Pollution Prevention Plan and Emergency Preparedness and Response Plan that covers management of hazardous and chemical substances will be implemented. ▪ It will be prohibited to store any type of chemical and hazardous material near 50 meters of any creek or river. ▪ Periodic checks will be maintained to monitor waste disposal to streams. ▪ Project Grievance Mechanism will be implemented. If any comment related to water quality is received through the Grievance Mechanism, evaluate the complaint and where necessary plan and implement corrective actions.	

5.5 Resource and Waste Management

The Project will face challenges in managing resources, particularly during the construction phase, as there will be a high demand for construction materials (aggregate, basalt, granite, gabbro, limestone, etc.). Thereby, material borrow sites and quarries will be used to supply the Project's construction material requirements throughout the construction activities. During the operation phase, procurement of materials would be required for the maintenance and repair works to be conducted on the railway and associated structures.

During both the construction and operation phases of the Project, the daily activities of the personnel will produce various types of non-hazardous and hazardous wastes. Similarly, the railway maintenance and the users of the railway will also contribute to waste generation during the operation phase.

The potential impacts associated with waste generation are being addressed through the establishment of a comprehensive assessment methodology and defined of stringent standards for waste management. By adhering to this approach, the relevant impacts can be systematically identified, and appropriate measures can be executed to efficiently manage and mitigate them.

5.5.1 Project Standards and Methodology

Project Standards

In the scope of resource and waste management, the project is evaluated according to following international standards and national regulations.

- Regulation on Waste Management
- Regulation on the Landfill of Wastes
- Regulation on Control of Packaging Wastes
- Regulation on Control of Medical Wastes
- Regulation on the Control of Waste Batteries and Accumulators
- Regulation on the Control of Waste Electrical and Electronic Equipment
- Regulation on the Management of Waste Oils
- Regulation on the Control of Waste Vegetable Oils
- Regulation on Zero Waste
- Regulation on the Control of Excavation Soil, Construction and Demolition Wastes
- Regulation on the Control of End-of-Life Tires
- Regulation on Mining Wastes
- Regulation on the Control of End-of-Life Vehicles
- Notice on Fuel, Auxiliary Fuel and Alternative Raw Material Derived from Waste
- Regulation on the Control of Collecting Wastes from the Vessels
- Regulation on Recovery of Some Non-Hazardous Wastes
- WB ESF – ESS1: Assessment and Management of Environmental and Social Risks and Impacts
- WB ESF – ESS3: Resource Efficiency and Pollution Prevention and Management
- WBG General EHS Guidelines – 1. Environment – 1.6. Waste Management
- WBG General EHS Guidelines for Construction and Decommissioning
- WBG General EHS Guidelines for Construction Materials Extraction
- WBG General EHS Guidelines for Railways

The key national legislation regarding the management of wastes in Türkiye is the Regulation on Waste Management. Alongside this, there are specific regulations in force to manage different types of wastes. These include waste streams from excavations, construction and demolitions, waste oils, packaging wastes, waste batteries and accumulators, medical wastes,

waste electrical and electronic materials, and waste tires. The full list of national waste legislation that the Project will comply with is provided in Chapter 2 of this ESIA Report. Key standards or requirements defined in the national legislation regarding the management of wastes are summarized in Table 63.

Table 63. Key Standards/Requirements Defined in the National Waste Management Regulations

National Regulation	Standards/Requirements
Regulation on Waste Management	A Waste Management Plan will be developed and implemented to reduce waste generation at the source, encourage reuse and promote recycling of solid wastes. Different types of waste (municipal, recyclables, hazardous, etc.) are stored in separate containers. Hazardous wastes are stored in a designated temporary storage area. Closed containers are utilized to store hazardous wastes; and these containers are well-maintained, secure, and placed on an impermeable surface, such as concrete. Labels are affixed to hazardous waste containers to indicate the type, quantity, and storage date of the waste. Records of generated wastes are maintained on-site. Waste declaration forms for waste generated in the preceding year are completed and submitted to the MoEUCC in March of the subsequent year. Agreements have been established with municipalities or licensed companies for the purposes of recovery, recycling, and final disposal.
Regulation on Control of Packaging Wastes	Packaging wastes stored temporarily at a designated place separate from other wastes and chemicals. Recyclable wastes delivered to licensed recycling companies.
Regulation on the Management of Waste Oils	Characteristics of waste oils analyzed according to the parameters outlined in the Regulation on Control of Waste Oils, and the categorization of waste oils is subsequently conducted
Regulation on the Control of Excavation Soil, Construction and Demolition Wastes	Store topsoil at a designated storage area separately from the coarse/excavated materials and implement necessary measures during the storage period to ensure that it can be reused in rehabilitation or landscaping activities

At the international level, the primary standard relevant to the potential impact of the Project on materials and waste is WB ESF - ESS3: Resource Efficiency and Pollution Prevention and Management, which requires;

- Development and implementation of technically and financially feasible and cost effective measures for improving efficiency in a project's consumption of energy, water, as well as other resources and material inputs; and
- Avoidance of generation of hazardous and non-hazardous waste materials; where waste generation cannot be avoided, reduction in the generation of waste; recovery and reuse of waste in a manner that is safe for human health and the environment and finally, treatment or dispose of waste in an environmentally sound manner that includes the appropriate control of emissions and residues resulting from the handling and processing of the waste material.

Similarly, the WBG General EHS Guidelines on Environmental Waste Management (Part 1.6), also requires the establishment of a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes.

Methodology

In the ESIA, both qualitative and quantitative approaches have been utilized to assess the Project's utilization of materials and waste management.

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

- 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 Zonguldak Provincial Directorates of Environment, Urbanization and Climate Change
- Waste statistics published by TURKSTAT (2022),
- Environmental Indicators published by MoEUCC (2023) and,
- Information on waste disposal sites and their capacities published in the internet sites of the municipalities along the Project route.

Potential impacts and risks have been identified, taking into account the typical impacts/risks associated with a Project's scale and type. The significance of impacts has been assessed using professional judgment. Relevant national legislation (e.g. Waste Management Regulation) has been referenced to establish the legal responsibilities and measures required for waste management within the scope of the Project.

5.5.2 Baseline Conditions

It is stipulated in the national Environmental Law No. 2872 that it is prohibited to deliver, store, transport, dispose directly or indirectly of all kinds of waste to the receiving environment, in violation of the standards and methods determined in the national legislation.

5.5.2.1 Material Requirements

The economy of the province of Zonguldak whose geographical structure consists of 56% mountains, 31% plateaus and 13% plains, is based on mining and industry. Zonguldak province, takes the first place in terms of hard coal production, also has the reserves of manganese, barite, dolomite, phosphate, quartz and chiferton. Zonguldak province has an important potential especially in terms of quartzite and quartz.

The material need of the project during the construction phase is planned to be met from existing concrete facilities, borrow areas and quarries. The borrow areas and quarries around the project area have been identified (see Table 64) and the map showing the locations of the identified sites is given in Figure 54.

Table 64. Potential Concrete Facilities, Borrow Areas and Quarries around the Project Area

Name	Production Type
Pelenkoğlu Gökçebey Ready-Mixed Concrete Facility	Ready-Mixed Concrete
Pelenkoğlu Kozlu Ready-Mixed Concrete Facilty	Ready-Mixed Concrete
Pelenkoğlu Arabacı Sand Gravel Production Facility	Sand-Gravel
Alagözler Sand-Gravel Facility	Sand-Gravel
Ekşioğlu Quarry - Sand Gravel Production Facility	Sand-Gravel
Sayılı Mixed-Concrete Facility	Ready-Mixed Concrete
Sayılı Quarry Facility	Quarry
Deka Mining Ready-Mixed Concete	Quarry and Ready-Mixed Concrete
Dekar Quarry Facility	Quarry
Saltukova Sand Gravel Pit	Sand-Gravel

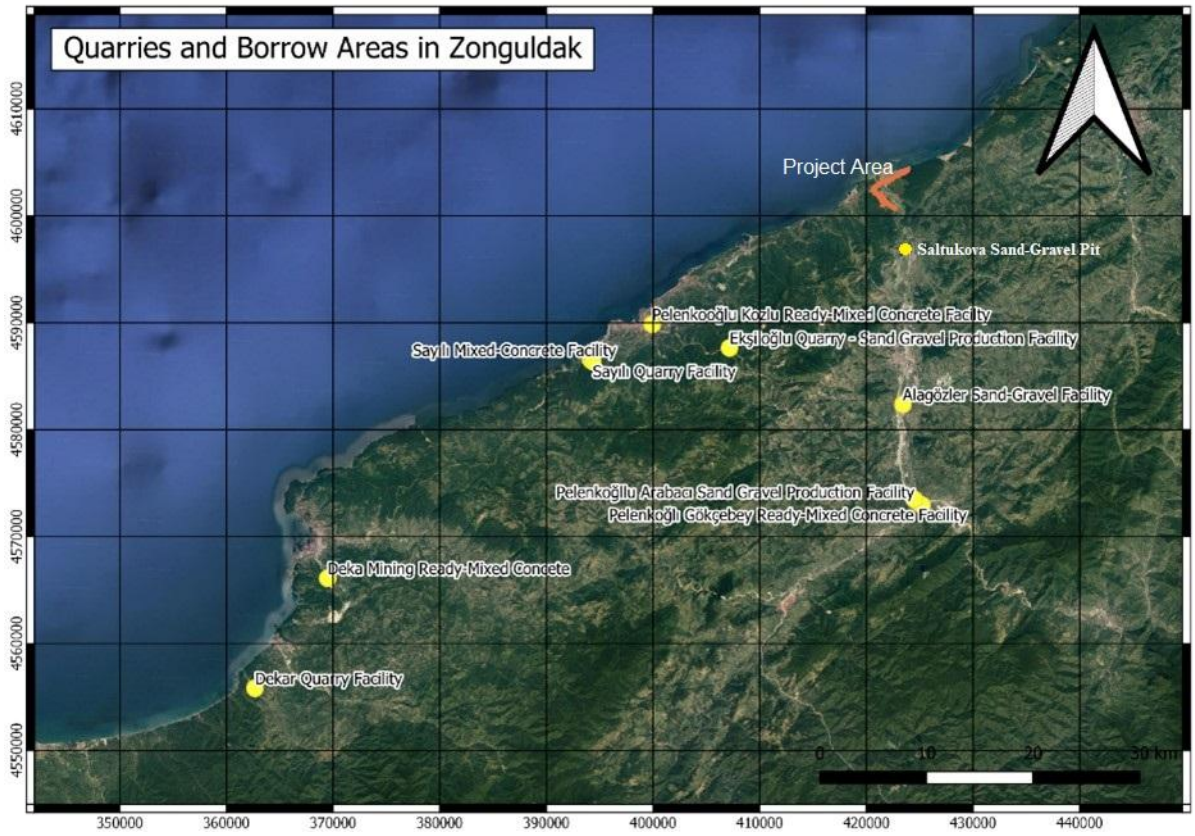


Figure 54. Potential Borrow Areas and Quarries around the Project Area

5.5.2.2 Provincial Waste Generation Rates and Waste Management Infrastructure in the Region

Zonguldak Province and Türkiye's average daily waste generation values are given in Table 65. As shown in the table, the average per capita municipal solid waste generation value for Türkiye in 2022 was 1.03 kg/day, while that of Zonguldak was 0.89 kg/day.

Table 65. Waste Statistics of Zonguldak Province

Location	Waste Generation (kg/day/person)		
	Domestic (Non-Recyclable) *	Recyclable*	Total
Zonguldak	0.62	0.27	0.89
Türkiye	0.72	0.31	1.03

** Recyclable and non-recyclable wastes have been calculated based on the Environmental Indicators[24] (2023) published by the Ministry of Environment, Urbanization and Climate Change, according to the national action plan for waste management, 30.13 % of waste generated have been recycled.*

Source: Turkstat Municipality Waste Statistics (2022)

[24] Directorate General of Environmental Impact Assessment, Permit and Inspection. (2023). Environmental Indicators. Retrieved from https://webdosya.csb.gov.tr/db/cevreselgostergeler/haberler/cevresel-gostergeler-turkce-2023-20240722155552.pdf

For the disposal of solid waste generated within the borders of the province of Zonguldak, the solid waste disposal facility (sanitary landfill) located in the Tombalaklar District of Sofular Village, Central District, is utilized[25]. This facility is operated by the Zonguldak Special Administration and Municipalities Environmental Infrastructure Services Association (ZONÇEB), an organization established by the Municipalities and the Special Provincial Administration. Domestic solid wastes are collected by being separated in a certain rate at the source. In addition, there are mechanical pre-treatment units in the landfill and energy is produced from landfill gas. Solid wastes are transferred to landfills by compressed semi-trailers from central and district municipalities.

5.5.3 Impact Assessment

In general, wastes need to be properly managed to avoid/minimize potential impacts on community health, safety and environment and unbalanced loads on local waste management facilities (i.e. landfills). Assessment of the impacts and measures to be taken for the minimization of resources use and management of wastes is provided below during various phases of the Project.

5.5.3.1 Land Preparation and Construction Phase

Wastes anticipated to be generated during the land preparation and construction phase include; municipal solid waste including the recyclable (packaging) waste, excavation waste (i.e. the portion of excavation material that will not be reused on site for cut and fill works), construction waste, wood and timber scraps, and hazardous waste such as waste oils, waste vegetable oils, end-of-life tires, waste batteries and accumulators, waste electric and electronic equipment, filters resulting from machine operation and maintenance and medical waste. Even though the number of workforce and construction machinery and equipment to be involved in the construction will be high and significant volumes of earthworks will take place, the Project will avoid and/or minimize impacts due to waste generation by complying with the requirement of national legislation and applying international standards on waste management.

Origins of the waste, waste types and final disposal measures are given in the waste stream diagrams below (see Figure 55).

[25] https://www.zonceb.gov.tr/kati-atik-bertaraf-ve-duzenli-depolama-tesisi/

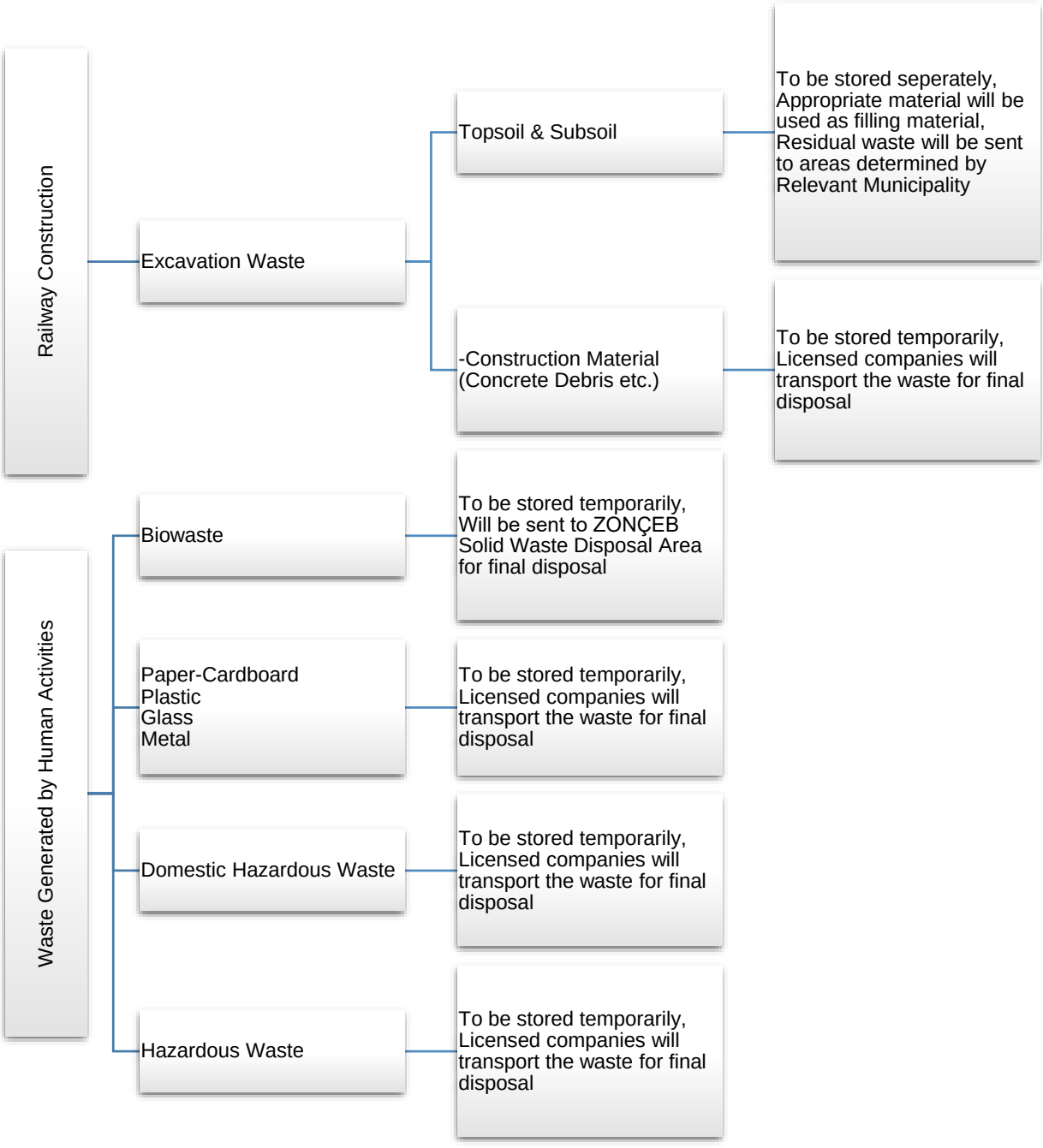


Figure 55. Waste Stream Diagram for Land Preparation and Construction Phase

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 given in Table 66.

Table 66. General List of Wastes from Land Preparation and Construction Phase

Waste Code	Waste Code Definition
07	**Wastes Resulting from Organic Chemical Processes**
07 02	Wastes Resulting from Manufacturing, Formulation, Supply and Usage of Plastics, Synthetic Rubber and Synthetic Fiber
07 04	Wastes Resulting from Manufacturing, Formulation, Supply and Usage of Organic Plant Protection Products (excluding 02 01 08 and 02 01 09), Materials (Agents) used for Wood

Waste Code	Waste Code Definition
	Preservative (excluding 03 02) and Other Biocides
08	**Wastes Resulting from Manufacturing, Formulation, Supply and Usage of Lining (Dyes, Varnishes and Vitreous Enamels), Adhesives, Putty and Printing Inks)**
08 01	Wastes Resulting from Manufacturing, Formulation, Supply and Usage and Detachment of Dye and Varnish
08 03	Wastes Resulting from Manufacturing, Formulation, Supply and Usage of Printing Inks
08 04	Wastes Resulting from Manufacturing, Formulation, Supply and Usage of Adhesives and Insulators
13	**Oil Wastes and Liquid Fuel Wastes (except food oils, 05 and 12)**
13 01	Waste Hydraulic Fluid
13 02	Waste Engine, Transmission and Lubricating Oils
13 03	Waste Insulating and Heat Transfer Oils
13 05	Oil/Water Separator Contents
13 07	Waste Liquid Fuels
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)
15 02	Absorbents, Filter Materials, Cleaning Cloths and Protective Clothing
16	**Wastes Not Predefined in the List**
16 01	Scrap Vehicles (including heavy machinery) and Wastes Resulting from Detachment of Pieces and Vehicle Maintenance (excluding 13,14, 16 06 and 16 08)
16 06	Batteries and Accumulators
17	**Construction and Demolition Waste (Including Excavation Excavated from Contaminated Areas)**
17 01	Concrete, Brick, Roof Tile, Ceramic
17 02	Wood, Glass and Plastic
17 03	Bituminous Mixtures, Coal Tar and Tarred Products
17 04	Metals (including alloys)
17 05	Soil (Including Excavated Materials from Contaminated Places), Stones and Dredging Muds
17 08	Gypsum-Based Construction Materials
17 09	Other Construction and Demolition Waste
18	**Wastes Resulting from Studies on Human and Animal Health and/or Similar (Excluding Kitchen and Restaurant Wastes that are not Directly Related to Health)**
18 01	Wastes Resulting from Birth, Diagnosis, Cure or Disease Prevention Studies for Humans
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

Within the scope of the project, the minimum use of excavation material is aimed to ensure efficient use of resources, minimize the amount of waste to be extracted and reduce associated costs. Excavated material of sufficient quality for filling operations will be reused in construction works. The remaining part should be disposed of in excess storage areas as excavation material.

The Contractor Company will determine the storage areas with sufficient capacity to store all excavated material. When sufficient storage areas are identified, the Project will not have an additional impact on existing local excavation waste disposal infrastructure capacities.

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.

Municipal Solid Waste (Non-hazardous)

Municipal waste is defined in the twentieth section of Annex-IV of the Waste Management Regulation as waste that is classified as non-hazardous and originated from houses or that is similar in content or structurally. These kinds of wastes include separately collected fractions such as paper, cardboard, glass, metal, plastic and biodegradable waste. Medical wastes, hazardous wastes, excavated soil, construction-wreckage wastes and special wastes do not include in these kinds of wastes.

During the land preparation and construction phase, approximately 200 personnel are planned to be employed for the Project. Considering these peak personnel numbers and assuming a daily municipal waste generation rate of 0.89 kg per person, the amount of waste estimated to be generated at the Project sites has been calculated. The approximate total municipal waste generated daily is estimated to be 178 kg, of which 54 kg will be recyclable (see Table 65).

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 contribute to the waste production of the province where they live, therefore, the actual increase that will occur due to the Project will be even lower.

The collection, storage, recovery and disposal of solid waste will be complied with in accordance with the issues specified in the “Waste Management Regulation”.

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 construction site 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.

Hazardous and Special Wastes

During the land preparation and construction phase of the Project, various hazardous wastes will be generated as a result of the activities/works involving use of fuels, chemicals, paints, oils, solvents, etc. If not managed properly, hazardous wastes may result in soil, surface water and groundwater contamination, as well as health and safety issues for the local communities and the Project personnel.

The following hazardous and specials wastes are anticipated to be generated as a result of the land preparation and construction activities. It should be noted that the earthworks will constitute a major part of the land preparation and construction phase and the amount of chemicals/hazardous substances to be used for the construction works are anticipated to be limited:

- Waste and materials (PPEs, rugs, clothes, etc.) contaminated with hazardous substances such as lubricants hydraulic fluids or fuels,
- The operation and maintenance of construction equipment and machinery requiring the use, storage and transfer of varying quantities of fuels and oils/lubricants,
- Solvents and paints to be used in construction activities,
- Herbicides and pesticides to be used in landscaping activities,
- Vegetable oils, batteries, electrical/electronic equipment, cables, fluorescent lamps, medical supplies to be consumed by Project personnel.
- Scrap metals and materials that contact with fuels, hazardous substances/chemicals, etc. at the workshops, laboratories, concrete plants, fuel stations, etc.,
- Waste tires and accumulators of the construction machinery.

Maintenance and repairs will be carried out on the sealed ground. 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 site 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.

Hazardous and special wastes need to be properly managed to avoid significant impacts on both environmental receptors and human health. The Project will fully comply with the national waste legislation and apply international waste management standards in line with a Waste Management Plan based on the waste hierarchy, thus no significant impact is anticipated due to waste generation during the land preparation and construction phase of the Project.

5.5.3.2 Operation Phase

During the operation phase, maintenance of project components including railway connection lines, stations, underpasses, culverts and bridges and their use by staff and visitors will result in waste generation. Therefore, waste management will focus on recyclable waste and solid waste management. However, hazardous waste generated during maintenance activities should also be managed properly. Generation of the following types of wastes is anticipated during the operation phase:

- Solid waste generated at railway and project components along with their use by staff and visitors,
- Railway litter (including illegally dumped non-hazardous waste),
- Sediment and sludge removed from storm water drainage systems, and
- Vegetation waste such as vegetation trimmings and mowed grass (non-hazardous).

No intensive waste generation is expected during the operation phase. All waste management activities will be carried out in accordance with the “Waste Management Regulation” dated 02.04.2015 and numbered 29314.

Origins of the waste, waste types and final disposal measures are given in the waste stream diagrams below (see Figure 56).

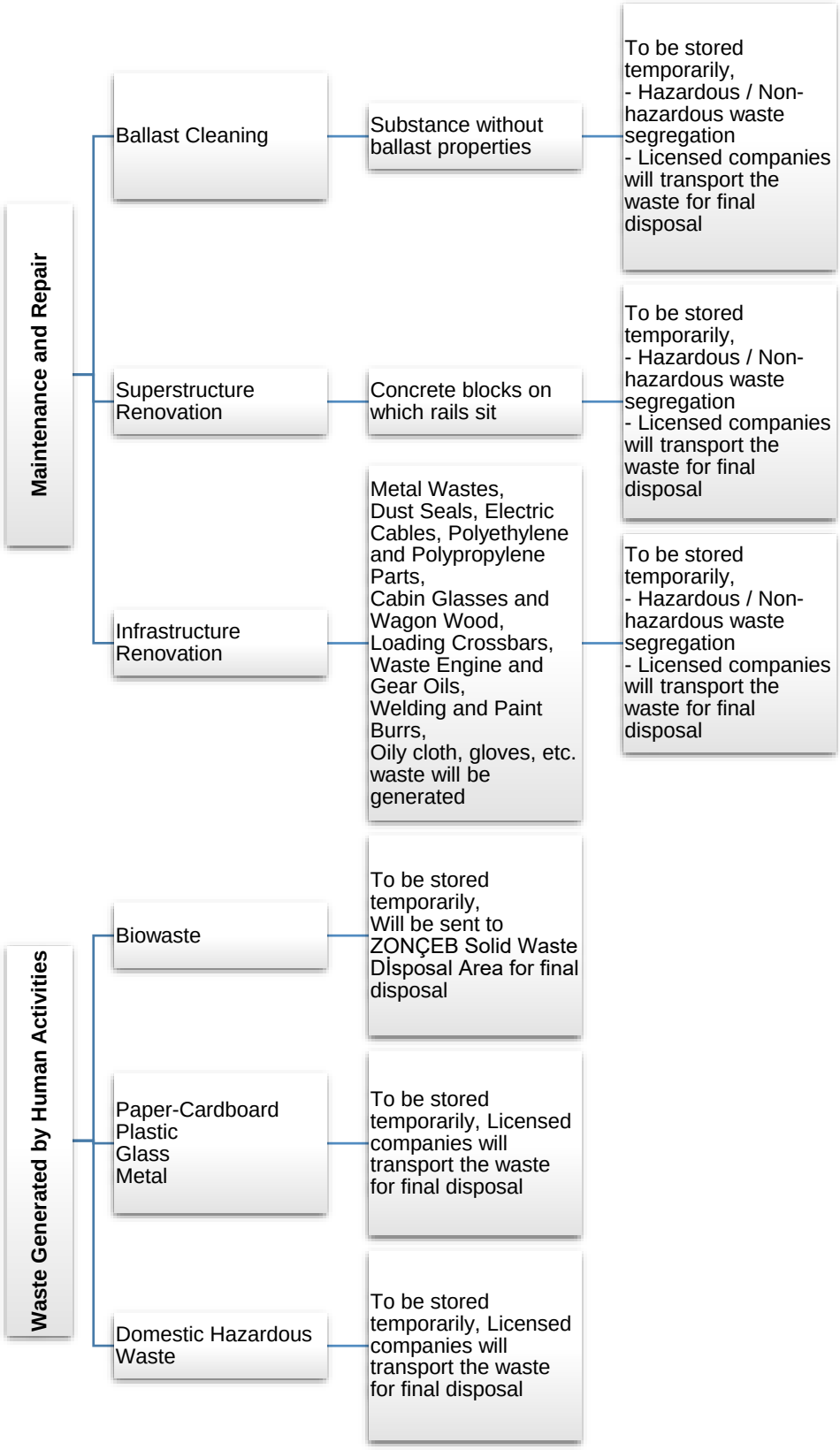


Figure 56. Waste Stream Diagram for Operation Phase

Municipal Solid Waste (Non-hazardous)

During the operation phase, urban waste generation that will arise from the personnel work at the stations to be built and the passengers to visit the stations will continue.

During the operation phase of the project, the total number of employees working at the station and passengers visiting the station will be approximately 100 people (50 employees and 50 passengers). Therefore, the number of people generating waste during the operation phase is 100. Accordingly, the daily amount of solid waste produced during this phase is as follows:

100 people × 0.89 kg/person/day = 89 kg/day, of which 27 kg will be recyclable (refer to Table 65).

Priority will be given to recruitment local people as employees in the project. Hence, a significant part of the personnel to be employed already contributes to the solid waste production of the province where they live, and therefore, the actual increase that will occur due to the Project will be even lower.

In addition, as an infirmary is not expected to be present at the station, the nearest health center will be utilized for medical interventions in the event of an unexpected accident during activities. Consequently, significant medical waste will not be generated during the operation phase. However, a negligible amount of medical waste (e.g., band-aids) may be produced due to first aid practices.

The solid waste to be generated at the station will be collected from the collection areas to be placed in the station by TCDD during the operation period and will be transported to the ZONÇEB sanitary landfill by the relevant municipality solid waste collection trucks. ZONÇEB Sanitary Landfill is properly licensed and managed in an environmentally acceptable manner therefore it can be used for the project purposes.

In addition, visual control of the wastes and garbage along the railway route will be provided. In addition, it will be ensured that these wastes are collected periodically, and separated according to their recyclability, and the separated wastes are stored in separate containers and disposed according to the Waste Management Regulation.

Wastes from Maintenance and Repair Operations

In the operation phase, there will be waste generated from the maintenance and repair of the trains. Maintenance-repair wastes can be generally listed as follows:

Ballast Screening: In this activity, which is repeated every 5 years on average, waste generation (substance without ballast properties) is estimated.

Superstructure Renewal: Wastes that will arise from concrete sleepers (concrete blocks on which rails sit) as a result of superstructure renewal activities performed every 30 years on average.

Infrastructure Renewal: It is the work to be carried out in extraordinary situations during the operation of the railway lines, and its frequency cannot be estimated.

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

- Metal waste (rivets, screws, sheet-machine parts, washers, locks, etc.),
- Dust seals, electrical cables, polyethylene and polypropylene parts,
- Cab glasses and wagon woods, loading sleepers,
- 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

The limited amount of hazardous and special waste to be generated during this phase will include the following:

- Maintenance related hazardous waste (waste oils from maintenance vehicles, paint containers, hydraulic oils, packaging materials, Personal Protective Equipments (PPEs), filters, and other material contaminated with hazardous substances, etc.),
- Removed paint materials,
- Illegally dumped hazardous waste (hazardousness to be identified by analysis),
- Landscape and vegetation related waste (herbicide and pesticide containers).

5.5.4 Impact Significance, Mitigation Measures and Residual Impacts

The international standard to be taken into account regarding the potential impacts of material use and waste generation during the construction and operation phases of the Project is World Bank ESS 3: Resource Efficiency and Pollution Prevention and Management and this standard requires;

- With the development and implementation of technically and financially feasible and cost-effective measures to improve the project's effectiveness in using energy, water consumption, as well as other resources and material inputs,
- Prevention of hazardous and non-hazardous waste generation; reduction of waste generation where it cannot be prevented; appropriate disposal for the environment, including the safe recovery and recycling of wastes for human health and the environment and, finally, the proper control of emissions and wastes from waste handling.

Similarly, the WBG General EHS Guidelines on Environmental Waste Management emphasize the establishment of a waste management hierarchy that prioritizes prevention, reduction, reuse, recycling, and, as a last resort, disposal. This waste management hierarchy will form the foundation of the waste management approach to be implemented during the land preparation, construction, and operation phases of the Project. Accordingly, priority will be given to waste prevention, followed by decreasing emphasis on reuse, recycling, recovery, and disposal, as illustrated in Figure 57.

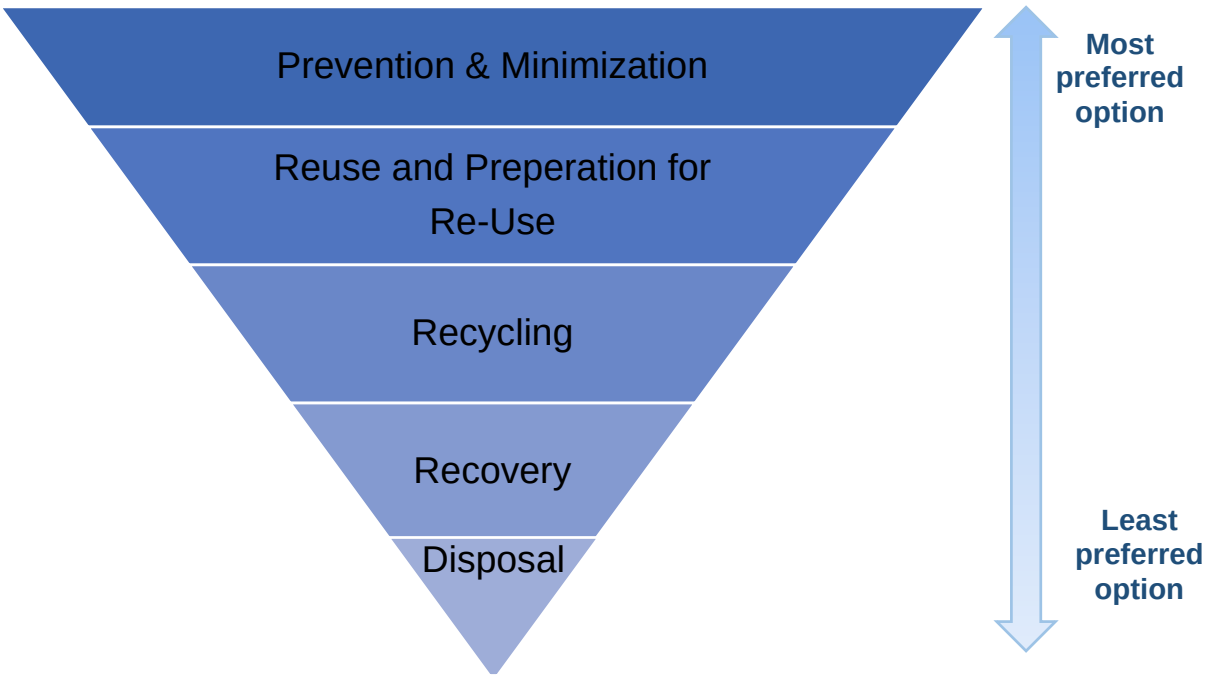


Figure 57. Waste Management Hierarchy

Project waste management will be carried out in accordance with national and international standards / good practices. A Waste Management Plan will be in place during all land preparation, construction, and operational phases of the project. The implementation of best practices in waste management will be regularly reviewed and updated as needed.

It is essential that all personnel receive the necessary training during the construction phase in order to minimize waste generation and effectively implement the Waste Management Plan along with relevant sub-management plans such as Pollution Prevention Plan within the scope of the project. 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 on the construction site is not applicable (such as reuse of suitable excavation material in filling works), waste will be transported by licensed firms, based on the type of waste, for other 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.

Material Use

Aggregate material will be needed during the construction phase of the Project. Thus, if construction contractor decides to operate its own quarries and borrow sites, firstly it will be necessary to conduct an environmental impact assessment that covers;

- Air Emissions (see also Chapter 5.3.4)
- Noise and Vibrations (see also Chapter 5.2.4)
- Water Use (see also Chapter 5.4.4)
- Waste Generation
- Land Conversion (Reinstatement) (see also Chapter 5.1.4)

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_2, CO and NO 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 plant 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-term extraction sites should be reclaimed immediately, while larger sites with a useful lifespan beyond 3–5 years should undergo ongoing rehabilitation (e.g., borrow pits)
- 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.

The Contractor will develop a site-specific Aggregate Management Plan, based on the Aggregate Management Plan prepared as part of the Project, and submit it to DGII for approval. 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. The Aggregate Management Plan will include mitigation measures for environmental and social risks and environmental monitoring needs.

On the other hand, if the contractor sources materials from borrow pits and quarries operated by third parties, it will be ensured that these sites are licensed and possess 'EIA Positive' or 'EIA Not Required' decisions, along with the necessary environmental permits.

Impacts on resources and waste management, along with mitigation measures and residual impacts, are presented in Table 67.

Table 67. Impacts on Resources and Waste Management, Mitigation Measures and Residual Impacts

Impact Description	Project Phases	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				
Potential impacts that may arise due to storage of excess excavated materials	Land preparation and construction	▪ Environmental resources (soil, surface water, groundwater) ▪ Ecological receptors ▪ Community Health and Safety	Restricted	Medium-term reversible	Short-term	Continuous	Medium	Medium	**Moderate**	▪ Maximize the amount of excavation use in fill works. ▪ Store excess/unsuitable excavated materials at designated storage sites located within the construction corridor and having sufficient capacity. ▪ Ensure that all excavation activities are implemented in line with the cut and fill program to minimize excavation waste.	**Minor**
Potential impacts of wastes (municipal solid wastes, recyclables, hazardous and special wastes), if not managed properly	Land preparation and construction	▪ Environmental resources (soil, surface water, groundwater) ▪ Ecological receptors ▪ Community health and safety ▪ Project personnel's health and safety	Wide	Medium-term reversible	Short-term	Continuous	Medium	Medium	**Moderate**	▪ Develop and implement the Project-specific Waste Management Plan. ▪ Submit official waste declarations for all waste generated to the online system of MoEUCC. ▪ Ensure compliance with the requirements of applicable waste management regulations for the management of all wastes generated as a result of Project activities. ▪ Segregate wastes (i.e. hazardous/non-hazardous, recyclable/non-recyclable) and store them temporarily in designated storage areas. ▪ Ensure that the waste storage areas meet the standards specified by related legislation: ○ Provide adequate and appropriate storage areas. ○ Ensure container types, labelling, classifying, etc., within the storage areas are in in line with Project standards. ○ Use reinforced concrete or similar impermeable materials such as epoxy on the floors of storage areas to prevent potentials soils and groundwater contamination. ○ The top and four sides of the storage area will be covered to prevent the entrance of precipitation into the area. ○ Provide adequate ventilation in case storage of volatile wastes is required. ○ Establish effective drainage systems to collect any potential leaks. ○ Apply physical access restrictions at waste storage areas through use of gates and fences; allow only authorized persons in storage areas. ○ Put cautionary signage and boards with the name and contact number of authorized personnel in the storage areas. ○ Keep absorbents, firefighting equipment, etc. ready at a close location for immediate response in case of an emergency such as spills and fires. ▪ Ensure by means of trainings and stipulations that wastes are not dumped at locations other than areas specifically designated for this purpose. ▪ Provide basic waste management trainings (e.g. waste reduction, general waste management and housekeeping) to all personnel and repeat periodically. ▪ Under no circumstances, dispose of or bury waste on site. ▪ Mark waste explosives and used explosive canisters as explosive waste and store separately in storage areas designated for this purpose, where only authorized personnel will be allowed to conduct works; these wastes will also be transported by firms with relevant licenses. ▪ Ensure contractors' and their subcontractors' full compliance with Project Standards and implementation of the Waste Management Plan and the measures identified by this ESIA.	**Minor**
	Operation	▪ Environmental resources (soil, surface water, groundwater) ▪ Ecological receptors ▪ Community health and safety ▪ Project personnel's health and safety	Wide	Medium-term reversible	Medium-term	Continuous	Medium	Medium	**Moderate**	• Develop and implement the Project-specific Waste Management Plan. • Submit official waste declarations for all waste generated to the online system of MoEUCC. • Obtain Zero Waste Certificate as appropriate. • Conduct visual checks along the railway route to identify illegally dumped waste and litter; collect these wastes periodically, identify their characteristics (hazardous or nonhazardous) by analysis to be conducted in line with related legislation, ensure segregation based on recyclability; store the segregated litter in separate containers and dispose of the wastes in line with relevant Turkish waste management regulations. • Use lead-free paints for maintenance activities. • Collect the garbage that will be generated at the stations from the collection areas to be placed in the station and forward them to the landfill and solid waste storage facilities of the relevant Municipalities.	**Minor**
An additional burden on the region's waste management facilities	Land preparation and construction, operation	▪ Regional waste management infrastructure	Wide	Irreversible	Long-term	Continuous	Medium	Low	**Minor**	• Construct and utilize excavated material storage sites with an adequate number and capacity, storing all excavated materials at designated storage sites located within the construction corridor and having sufficient capacity.	**Negligible**

Impact Description	Project Phases	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				
(e.g. landfills, recovery / recycling facilities etc.)										• Execute waste recycling, recovery, and disposal agreements with the authorized municipality or licensed recovery and disposal firms to ensure the proper management of both hazardous and non-hazardous wastes.	
Material Use	Land preparation and Construction	Borrow areas and quarries to be selected	Wide	Irreversible	Short-term	Continuous	Medium	Low	**Minor**	• It will be ensured that the borrow areas and quarries are licensed and possess 'EIA Positive' or 'EIA Not Required' decisions, along with the necessary environmental permits. • The Contractor will identify potential borrow areas and quarries with indication of capacities, while providing measures for site reinstatement within the site-specific Aggregate Management Plan to be prepared, and supervise the implementation of the plan.	**Negligible**

5.6 Cultural Heritage

5.6.1 Project Standards and Methodology

5.6.1.1 Methodology

Evaluating the present status of the tangible and intangible cultural heritage assets for the Project has been conducted in five different phases which are;

- Desktop Study
- Field Research
- Risk Assessment
- Impact Assessment
- Reporting

5.6.1.1.1 Desktop Study

Publications on archaeological, ethnographic and intangible 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 construction and the impact areas. Existence of archaeological or cultural heritage which has already been recorded in the project construction areas and the project impact areas has been researched. Resources used during desktop study are as follows:

- Academic Publications
- Historical Maps
- Previous Cultural Heritage Studies and Surface Survey Results Reports.
- Inventory Records of the Ministry of Culture and Tourism[26].

5.6.1.1.2 Field Research

The field survey on tangible and intangible cultural heritage have been conducted separately. Within the scope of the Project, site surveys were carried on the project route, impact areas and its surroundings between 9 January 2020 and 16 January 2020 by REGIO Cultural Heritage Field Team[27] during Phase-1 and Phase-2 studies.

The railway routes and newly planned station area of the project have been studied with walkover survey to identify tangible cultural heritage during the field research. During the field survey conducted along the project route to identify possible archaeological and immovable cultural assets and observe the latest conditions of registered archaeological sites, the methods of “Field (Route) Walking”, “Intensive Field Survey”, and Extensive Field Survey” were used. These studies were conducted within the 100 m corridor, which encompasses the construction impact area. The details of the Field (Route) Walking, Intensive Field Survey, and Extensive Field Survey are presented in the following paragraphs:

Field Walking

The “Field Walking” was used as the main research method during the field survey conducted within the 100 m corridor of the project route. The field survey was realized mainly within the project construction corridor and the area which is considered as its impact area (100 m corridor covering the 50 m right and 50 m left of the construction axis). During field walking,

[26] Decision No 1180, decision no 2237 and decision no 4456 of the Directorate of Karabük Regional Preservation Board of Cultural Assets.

[27] Senior Archaeologist H. Uğur DAĞ, Senior Archaeologist Kılıçhan SEVMEN, Senior Archaeologist Serkan AKDEMİR, Senior Archaeologist Seray AYAZ

the field survey team leader walked along the main axis of the project construction corridor using a GPS device, while two specialists of the archaeology team walked at both edges of the 100 m corridor. The instant communication between the members of the field team who move forward in parallel was provided by walkie-talkies. During the field walking, all archaeological traces (ceramic shards spread on the surface, architectural elements or traces, graves or traces of graves, mounds, tumuli, etc.) observed on the surface were noted on the Archaeological Baseline Table (Appendix-5). When archaeological traces were encountered in a region, the method of Intensive Field Survey, which is defined below, was used to collect data.

Intensive Field Survey

This method was followed when an archaeological site was encountered within the boundaries of the 100m impact corridor. The aim of this method is to determine the spread of the archaeological site, identifying its association with the project route on the map, revealing the area of distribution of archaeological surface findings and completing entire documentation, which would aid in interpreting the history of the site on the basis of archaeological artefacts on the surface. During this activity, by taking sufficient number of GPS coordinates (at least four different points) from each site, surface area of the site in current geography, and its location were determined. Moreover, detailed photographs of each site were taken from different angles and archived to be used in the reports. The area was divided into 10x10 m wide squares in the north-south direction and the samples of archaeological material such as pottery, stone tool shards etc. on the surface were systematically documented (photographing, etc). This document was also used as reference sources in preparation of the impact assessment report after the survey. By processing the GPS coordinates which were taken on the site (WGS 1984, 6 Degree UTM) by using Esri ArcGIS software, the locations of the sites in association with the project route and other construction impact areas were reviewed in the GIS environment and it has been used as the baseline information for impact assessment studies.

Extensive Survey

The greater part of the works for identifying the archaeological and immovable cultural assets within the 100 m corridor alongside the railway route was completed by using the method of field walking. In cases when walking was not possible (private property requiring permission, restricted zones, forested/bush lands, sunflower and grain fields etc.) the method of “Extensive Field Survey” was followed. In this method, in order to determine the presence of archaeological and immovable cultural assets, the archaeological traces on the surface were observed at the most accessible points of the areas, where the field walking could not be conducted. The archaeological data retrieved from desk research and the results of archaeological potential modelling were taken into consideration in estimating the observed areas. For the sections, where the field survey was conducted using this method, the “Archaeological Potential Modelling” works were also implemented in order to develop risk projection for these sections.

Field Study for Intangible Cultural Heritage

Field studies for intangible cultural heritage were carried out by conducting face-to-face interviews in 10 settlements in the immediate vicinity of the project sections. During the interviews, participants were encouraged to give their own answers without any limitation. With this method, it is aimed to uncover the cultural structures of the group / individual and the behaviors and experiences that make up these structures. Within the scope of the study, 20 people were interviewed. Strategically, priorities were given to people who have been living in the region for at least 3 generations and have an average age of 55 and over, who have accurate and reliable information about the history of the region. Apart from the profile in question, people who are knowledgeable about the history, traditions and customs, and geography of the region were interviewed. In addition, the observations made during the studies were used as part of field studies on intangible cultural heritage.

5.6.1.1.3 Risk Assessment Methodology

As mentioned above, the field studies were conducted as field walking as much as possible within the 100 m impact corridor of the railway project. However, the vegetation on the surface of the project route may have hidden some archeological asset. Therefore, an "archaeological potential modeling" study was carried out for places where such possible chance finds could be encountered.

With the modeling study and the modeling maps (see Appendix-6) produced as the result of the study, it is intended to identify the sections likely to encounter chance finds in the construction and impact area of the project. The developed model was prepared for a 100-meter-wide corridor covering the construction and impact area of the project by using QGIS software. During the modeling study, 5 main factors were taken into consideration. These factors were: the presence of water resources and proximity to water resources, the slope of the land, the classification of the land (woodland, grassland, agricultural field, irrigated farming area, etc.), proximity to ancient roads or known archaeological sites and modern settlements. Each factor is divided into sub-factors and assigned different scores. Positive weighted values were determined as positive effect during evaluation, while negative weighted values were determined as negative effect. For example, in the land classification, the forest area category was evaluated with -2 points, while dry agricultural production land was evaluated with +2 points. Since many ancient settlements, etc. exist around modern villages or settlements, this modelling is based on the assumption of the similarity of the convenience of the present environment for settlement with the convenience of the environmental conditions in ancient times.

After determining the score values of the sub-factors, the project route and the impact corridor were divided into fields, and the points corresponding to the relevant sub-factor were summed for each field depending on the characteristics of that field and as a result, positive or negative total scores were obtained for each field.

The areas with positive scores were evaluated as "Areas with High Archaeological Potential" and the areas with negative scores as "Areas with Low Archaeological Potential". Predictive parameters and sub-categories taken into consideration in modelling and the points defined for them are given in Table 68.

Table 68. Predictive Parameters and Sub-Categories Taken into Consideration in Modeling

Predictive Parameters	Predictive Sub-category	Critical Value	Predictive Weight
Hydrology/ Proximity to Water	Stream Order 1	750 m	2
	Stream Order 2	1,000 m	2
	Stream Order 3	1,000 m	1
	Stream Order 4	1,000 m	2
	Stream Order 5	1,500 m	-1
	Stream Order 6	1,750 m	-2
	Lake/Sea Order 7	2 km	3
Slope	Slope	0-10	0
	Slope	10-90	-5
Land Classification	Patch Agriculture	Yes	2
	Fruit Tree Grove	Yes	2
	Arable Non-Irrigated	Yes	2
	Arable Irrigated	Yes	-2
	Forest Area	Yes	-2
	Grasslands	Yes	-2
	Barren Land	Yes	-2
	Wetlands or Water	Yes	-4

Predictive Parameters	Predictive Sub-category	Critical Value	Predictive Weight
	Industry/Built Area	Yes	-4
	City Area	Yes	-4
	Proximity to wetlands	1 km	2
Proximity to Rural/Ancient Roads and Settlements	Proximity to Rural/Ancient Roads and Settlements	0-1 km	2
Proximity to Modern Settlements	Proximity to Modern Settlements	0-2 km	2

5.6.1.1.4 Impact Assessment Methodology for Tangible Cultural Heritage

The impact of construction activities on the identified areas are evaluated based on "Guidance on Heritage Impact Assessments for Cultural World Heritage Properties" document prepared by ICOMOS and adopted by the Ministry of Culture and Tourism for its use to properly assess the impact of construction activities on cultural sites. In line with the document, the archaeological and tangible cultural assets identified in the area are classified based on their level of importance (see Table 69).

Table 69. Example Guide for Assessing Value of Heritage Assets

Value	Criteria According to ICOMOS (2011)	Criteria According to Turkish Law	Value According to WB/IBRD ESS8
Very High	Sites of acknowledged international importance inscribed as WH property.	Tangible cultural heritage: 1st Degree Archaeological Sites (registered) Tangible cultural heritage: 2nd Degree Archaeological Sites (registered) or other sites depending on their value	
	Individual attributes that convey outstanding universal value (OUV) of the WH property.		
	Assets that can contribute significantly to acknowledged international research objectives.		
	Sites or structures of acknowledged international importance inscribed as of universal importance as WH property.		
	Individual attributes that convey OUV of the WH property.		
	Other buildings or urban landscapes of recognized international importance.		
High	Nationally- designated Archaeological Monuments protected by the State Party's laws		
	Undesignated sites of the quality and importance to be designated.		
	Assets that can contribute significantly to acknowledged national research objectives.		
	Nationally- designated structures with standing remains.		
	Other buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade.		
	Conservation Areas containing very Important buildings.		
	Undesignated structures of clear national importance.		
Medium	Designated or undesignated assets that can contribute significantly to regional research objectives.	Tangible cultural heritage: 3rd Degree Archaeological Sites (registered) and Archaeological sites presently unknown or unregistered archaeological sites or other sites (Unregistered Bridge, Cistern etc.) depending on their value (if present)	Complex paleontological and archaeological remains (if present) Critical Cultural Heritage (cemeteries and burial grounds) Isolated paleontological and archaeological sites and findspots (if present)
	Designated buildings. Historic (unlisted) buildings that can be shown to have exceptional qualities or historical associations.		
	Conservation Areas containing buildings that contribute significantly to its historic character.		
	Historic townscapes or built-up areas with important historic integrity in their buildings, or built settings.		
Low	Designated or undesignated assets of local importance.		
	Assets compromised by poor preservation and/or poor survival of contextual associations.		
	Assets of limited value, but with potential to contribute to local research objectives.		
	"Locally Listed" buildings.		
	Historic (unlisted) buildings of modest quality in their fabric or historical associations.		
	Historic Townscape or built-up areas of limited historic integrity in their buildings or built settings.		

Value	Criteria According to ICOMOS (2011)	Criteria According to Turkish Law	Value According to WB/IBRD ESS8
Negligible	Assets with little or no surviving archaeological interest.	Unregistered potential archaeological sites	
	Buildings or urban landscapes of no architectural or historical merit; buildings of an intrusive character.		
Unknown	The importance of the resource cannot be ascertained. Buildings with some hidden (i.e. inaccessible) potential for historic significance.		

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 70 presents a description of the impact magnitude for archaeology and cultural heritage receptors based on ICOMOS (2011).

Table 70. Change / Impact Assessment Chart

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.		Change to many key historic landscape elements, parcels or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to historic landscape character.
Moderate 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.	
	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.	
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.

The general impact assessment of the archaeological and tangible cultural assets within the project impact area has been made by considering “scale and severity of impact” and “value of the archaeological and tangible cultural asset” (see Table 71).

Table 71. General Impact Assessment Matrix

Value of Archaeological or Immovable Cultural Heritage	SCALE & SEVERITY OF CHANGE/IMPACT				
	No Change	**Negligible change**	**Minor change**	**Moderate change**	**Major change**
For Word Heritage List Properties **VERY HIGH** – Attributes Which Convey Outstanding Universal Value	**SIGNIFICANCE OF EFFECT OR OVERALL IMPACT (EITHER ADVERSE OR BENEFICIAL)**				
	Neutral	Slight	Moderate/ Large	Large/very Large	Very Large
For Other Cultural Heritage Assets	**SIGNIFICANCE OF IMPACT (EITHER ADVERSE OR BENEFICIAL)**				
Very High	Neutral	Slight	Moderate/ Large	Large/very Large	Very Large
High	Neutral	Slight	Moderate/ Slight	Moderate/ Large	Large/Very Large
Medium	Neutral	Neutral/Slight	Slight	Moderate	Moderate/ Large
Low	Neutral	Neutral/Slight	Neutral/Slight	Slight	Slight/ Moderate
Negligible	Neutral	Neutral	Neutral/Slight	Neutral/Slight	Slight

5.6.1.1.5 Impact Assessment Methodology for Intangible Cultural Heritage

Assessment of the impact of the project on Intangible Cultural Heritage (ICH) has been conducted in the Project Area and its vicinity in compliance with international standards and local legislation. Findings of the ICH studies conducted within the project are presented in Section 5.6.2.

In line with the ICOMOS Guidelines, sensitivity of intangible cultural assets and the magnitude of impact of the Project on those (if present) will be identified with respect to the criteria stated via Table 72.

Table 72. Criteria for the Sensitivity of Intangible Cultural Heritage Receptors and Magnitude of Impact

Value Level	Criteria	Magnitude Level	Criteria
Very High	Areas associated with Intangible Cultural heritage activities as evidenced by the national register. Associations with particular innovations, technical or scientific developments or movements of global significance. Associations with particular individuals of global importance.	Major Change	Major changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
High	Nationally designated areas or activities associatedwith globally important Intangible Cultural Heritage activities. Associations with particular innovations, technical or scientific developments or movements of national significance. Associations with particular individuals of national importance.		
Medium	Areas associated with Intangible Cultural heritage activities as evidenced by local registers. Associations with particular innovations or developments of regional or local significance. Associations with particular individuals of regional	Moderate Change	Considerable changes to area that affectthe ICH activities or associations or visual links and cultural appreciation.

Value Level	Criteria	Magnitude Level	Criteria
	importance.		
Low	Intangible Cultural heritage activities of local significance. Associations with particular individuals of local importance. Poor survival of physical areas in which activities occur or are associated.	Minor Change	Changes to area that affect the ICH activities or associations or visual linksand cultural appreciation.
Negligible	Few associations or Intangible Cultural Heritage vestiges surviving.	Negligible Change	Very minor changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
Unknown	Little is known or recorded about Intangible Cultural Heritage of the area.	No change	No change

5.6.1.1.6 Reporting

During all studies, all data collected for tangible and intangible cultural assets are evaluated in different mapping and analysis platforms[28] and the reporting was completed by considering geographical positioning of tangible and intangible cultural assets and by developing mitigatory actions for protection/salvation of these assets.

The data collected related to the intangible cultural heritage during interviews has been transcribed after face-to-face interviews with local residents. The transcribed data was later analysed to evaluate the effects of the project on intangible assets, and the analysis has been reported and presented in section 5.6.3.2.

5.6.1.2 Project Standards

In Türkiye, movable and immovable cultural and natural assets are protected and should be conserved as per the “Law on Preservation of Cultural and Natural Assets”, 2863 (amended by law numbered 3386), published in the Official Gazette numbered 18113 and dated 23 July 1983. According to the Law, essential assets which are identified as cultural and natural heritage under legal protection are defined as follows:

- Natural and immovable cultural assets belonging to 19th Century and before;
- Any immovable cultural asset constructed after the end of the 19th Century but categorized as “a significant asset which requires preservation” by the Ministry of Culture and Tourism;
- Immovable cultural assets located within the Protection Sites (in the Law, Protection Sites are defined as ancient sites and ruins which reflect the main social, economic or architectural characteristics of their era. Protection Sites may also be locations where fundamental historical events took place or areas containing considerable natural or cultural assets with natural or cultural features requiring preservation);
- Structures, buildings or places that have witnessed significant historical events during the Turkish Independence War or the foundation of the Turkish Republic, regardless of time and registration; and all dwellings and buildings that have been used by Mustafa Kemal ATATÜRK without considering their time of construction or status of registration.

In addition to the Law on Preservation of Cultural and Natural Assets, some regulations govern the procedures about the protection and preservation of cultural and natural assets. The most

[28] QGIS.

predominant one being the Principle Decision (No. 658, issued 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 should be preserved except for scientific excavations. The area should 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 should be preserved based on the conditions of protection and utilisation set by the Regional Preservation Boards. Additional construction is prohibited. As the 1st Degree Sites, for exceptional cases such as necessity for infrastructure construction among others, Regional Preservation Boards may permit such activities based on the approval of the relevant museum and the head of the scientific excavation team.
- **3rd Degree Archaeological Sites:** Lowest level of protection area. Construction is permitted based on the decisions of Regional Preservation Boards. Before applying for a construction permit, test pit excavations should be conducted, and the outcomes of these excavations should be reviewed by the relevant museum and, if present, the head of the scientific excavation team. Reviews should be submitted to Regional Preservation Boards. The Boards may ask for extension of the coverage of test pits before taking any decision.

The Intangible Cultural Heritage which are located within the borders of the Republic of Türkiye, is officially protected by "Law No. 5448 on 19/01/2006 on the Law on the Approval of the Convention for the Protection of the Intangible Cultural Heritage". The intangible cultural heritage legally protected by the relevant law is defined as follows:

- Any cultural value created by public in oral cultural environments and included in folklore research; verbal expressions and cultural traditions such as oral traditions, performing arts, social practices, rituals and festivals, popular knowledge, practices related to the universe and nature, tradition of handicrafts and production processes.

In addition to the laws and regulations described above, the guidelines given below, and the guiding principles of international organizations have been taken into consideration during the work carried out:

- World Bank ESS8: Cultural Heritage
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, ICOMOS 2011.

5.6.2 Baseline Conditions

The length of the main route of the project planned to be constructed between Zonguldak Province, Çaycuma District, Derecikören Village, and Filyos Town, which covers the operating limits of the second section of the Project, is 7+520 km (see Figure 58).



Figure 58. Proposed Project Route and Its Vicinity

5.6.2.1 Archaeological and Historical Background

5.6.2.1.1 Background for Tangible Cultural Heritage

Today, the region located in the borders of Filyos in Çaycuma District of Zonguldak Province was referred as Tios in ancient times. Tios was established in a strategic region to the west of the delta formed by the Filyos (Billaios) Stream[29] pouring into the Black Sea. The settlement is located within the Roman road network along the coast extending from the Straits to the Eastern Black Sea, while it is connected with the inner regions via Claudiopolis (Bolu)[30].

The city was founded in the second half of the 7th century BC as a Colonial City of the Miletus by a priest named Tios[31]. The city also minted coins for Tios until the 3rd century AD[32]. Rich mineral deposits of the region, having timber resources ideal for shipbuilding and trade of slaves and livestock can be considered among the main factors that attract Miletus people to

[29] The name of the Billaios (Sönmez ve Öztürk 2008: 134)-Ladon River (Robert, 1980: 176-190), which separates Bithynia from Paphlagonia, has changed to the present day and has taken the name Filyos.

[30] Engin, Şenay Doruk, Tios ve Çevresinde Kültler, Tekirdağ Üniversitesi Sosyal Bilimler Enstitüsü, Edirne, 2019:5; Anderson 2009: 266.

[31] Tios is defined by Louis Robert as the Greek Colonial City. Stating that the city was founded by the Miletians, Robert supports this view with ancient sources. (Robert, 1937: 270).

[32] Gür, Durmuş, Zonguldak İli, Filyos Beldesi, Tios Akropolü Kilise A Yapısı, Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara, 2015: 10; Bean, 1976: 4593

the region[33]. Filyos, which did not have a politically brilliant history in the Black Sea coast until the 4th century BC, became an important city starting in this period[34].

In the beginning of the 3rd century BC, one of the generals of Alexander the Great, Thracian king Lysimakhos, conquered Tios with Herakleia Pontike (Black Sea Eregli) and Amastris (Amasra), but this rule ended when Lysimakos died in 281 BC. Then the city came under the domination of Pontus King Mithridates VI[35].

In the 3rd century BC, the city of Tios was located in the "Northern Alliance" formed by the cities of Herakleia Pontike, Byzantion, Khalkedon (Kadıköy) and Kierios (Konuralp), and later became a part of the Kingdom of Pontus[36].

The city of Tios came under the rule of the Roman Republic in 63 AD. In this period, the Bithynia and Pontus regions were united under the name of Bithynia and were granted the status of imperial state. Thus, the entire Black Sea Region is included in the Roman state system. As Rome expanded its borders in the east, the strategic importance of Tios increased and it became an important military base of Rome. Apart from Tios, among the other settlements of the region in this period; Ahmetler, Maltepe, Türbetepe Huyuk, Putunburnu Huyuk, Derecikören, Çomranlı, Öteyüz, Sazköy can be listed. (Table 73, Figure 59*)*.

The city, which was an important transportation network and trade center during the Roman period, remained within the borders of Eastern Rome empire after Rome was divided into two in 395 AD.

An important religious structure emerged itself in Tios in the early Byzantine period. In the 5th century, the city became an important episcopal center. The city, which benefited from religious privileges until the 13th century, gained prominence with its economic independence over time and had great military and commercial importance. Other settlements in the region dated to this period are: Ahmetler, Türbetepe Huyuk, Derecikören, Çomranlı, Sazköy (Table 73, Figure 59*)*.

Filyos, which came under the rule of Genoese for a short period in 1261, came under the domination of Turks in the 14th century. It lost its importance in the Seljuk and Ottoman periods and turned into a small fishing village. Other settlements dated to this period include the Ahmetler and Ateş Tuğla Fabrikası settlements (see Table 73 and Figure 59*)*.

33 Çapar 1991: 319-326; Emir 2011: 666-667.

34 Gür, Durmuş, Kuzeybatı Karadeniz'de Bizans Dönemi Eserleri, Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara, 2019: 274; Boutkowski, 1864: 12.

35 Engin, Şenay Doruk, Tios ve Çevresinde Kültler, Tekirdağ Üniversitesi Sosyal Bilimler Enstitüsü, Edirne, 2019:7; Atasoy 2015a: 18-19; B. Öztürk 2008: 65-66; 2011: 487; Yıldırım 2017: 209.

36 Atasoy 2015a: 18; Baran-Dirlik-Kendirci 2015: 125; B. Öztürk 2008: 64-67; 2011: 487; 2012b: 161-164.

Table 73. Archaeological Sites Near the Project Route

NO	Name of the Archaeological / Immovable Cultural Heritage	Province	District	Nearest Distance to Project Expropriation Border (km)	HISTORICAL PERIODS												
					Paleolithic Period	Neolithic Period	Chalcolithic Period	Bronze Age	Hittite Period	Geometric Period	Archaic Period	Classical Period	Hellenistic Period	Roman Period	Byzantine Period	Ottoman Period	Early Republican Period
1	Ahmetler 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Aşağısarmaşık	2.93													
2	Maltepe 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Aşağısarmaşık	3.49													
3	Türbetepe Hoyuk	Zonguldak	Çaycuma/Hacılar	6.81													
4	Putunburnu Hoyuk	Zonguldak	Çaycuma/Hacılar	7.44													
5	Derecikören 1st Degree Archaeological Site	Zonguldak	Çaycuma/Derecikören	0.45													
6	Çomranlı 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Çomranlı	7.48													
7	Çomranlı 1st and 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Çomranlı	7.42													
8	Öteyüz Mahallesi 1st and 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Filyos/Öteyüz	0.01													
9	Filyos/Tios Ancient City Necropolis Area	Zonguldak	Çaycuma/Filyos/Öteyüz	0.15													
10	Ateş Tuğla Fabrikası 1st and 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Filyos/Hisarönü	1.43													
11	Filyos/Tios Ancient City	Zonguldak	Çaycuma/Filyos/Hisarönü	0.90													
12	Sazköy 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Sazköy	0.02													
13	Sazköy 3rd Degree Archaeological Site 120th Block 16th Plot	Zonguldak	Çaycuma/Sazköy	0.49													

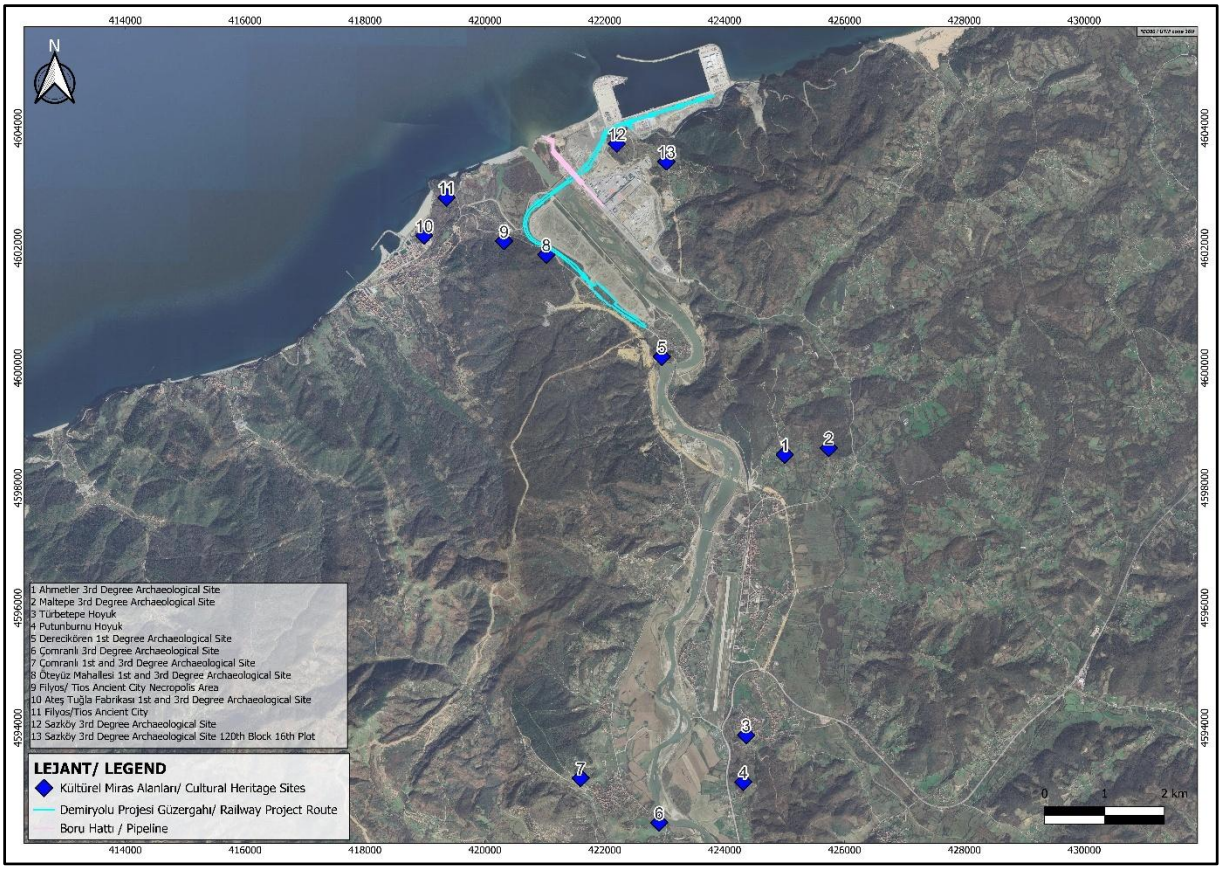


Figure 59. Archaeological / Historical Sites Located on the Project Route and Its Vicinity

5.6.2.1.2 Background for Intangible Cultural Heritage

Kipchak Turkmens, Laz people, Abazins and Bulgarian immigrants live in the region. This wide cultural diversity is reflected in the local people's traditions. Between 1967-2009, NATO Radar Base served on the hill where the Filyos Acropolis is located. Officers from different NATO member countries have lived with their families at the housings in the center of Filyos. This feature has more integrated the people of the region with different peoples of the world compared to geographically isolated societies.

It has been determined that some traditions of the transitional periods of life are still maintained in the project route and its surroundings. The transition periods of life, which starts with birth and ends with death, manifests itself as local customs in the region. In addition to the transition periods of life, national and religious holidays are of great importance for the local people. Public economy in the region is based on fishing, animal husbandry, coal mine labor and agriculture.

Finally, the cultural characteristics of the region are as remarkable as its natural structure and history. The multicultural character of the region, as Greek, Christian, Turkish and Muslim customs are intertwined over time, is reflected in traditions, dances, food and the transition periods of life.

5.6.3 Overall Assessment

5.6.3.1 Overall Assessment of Tangible Cultural Heritage

In the cultural heritage impact assessment studies conducted during Phase-1 of the Filyos Port and Industrial Zone Railway Connection Project, it was found that two (2) registered archaeological sites were located within the railway project expropriation border and AoI (These sites are Sazköy 3rd Degree Archaeological Site, Öteyüz 1st and 3rd Degree Archaeological Sites). Since the railway route has been revised in Phase-2, these areas are excluded outside of the project expropriation boundary (see Figure 60). At the current situation, these sites are in the project AoI.

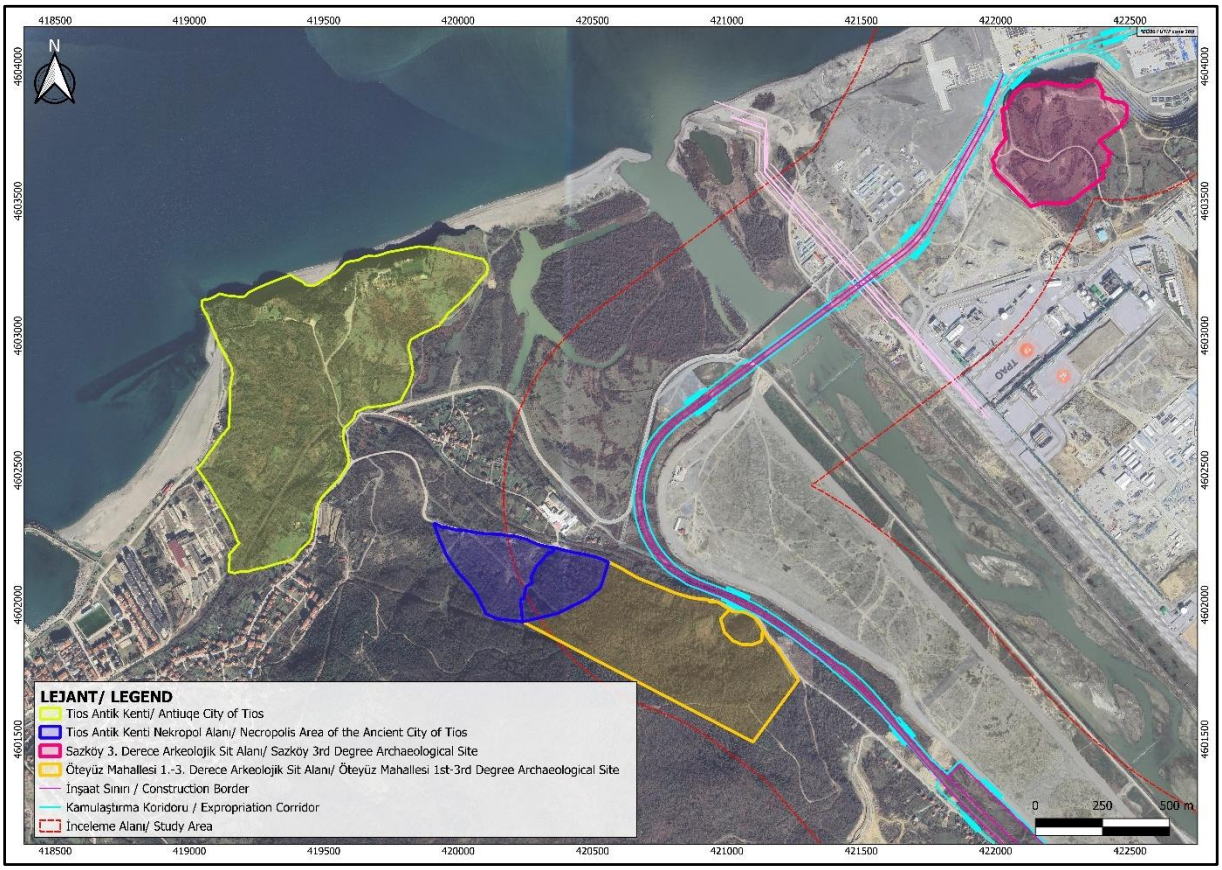


Figure 60. Archaeological Sites on the Project Route and AoI

Sazköy Archaeological Site is a registered archaeological site (see Figure 61). Most of the surface of the area thought to be a necropolis is covered with vegetation and grass (Figure 62). In addition, the information was reached through the village people that the sarcophagus lid found in the Sazköy settlement opposite the fountain structure was brought from this necropolis area to the village center[37] (Figure 63).

[37] Coordinates of the Sarcophagus Cover: 41576117 North, 32077205 East

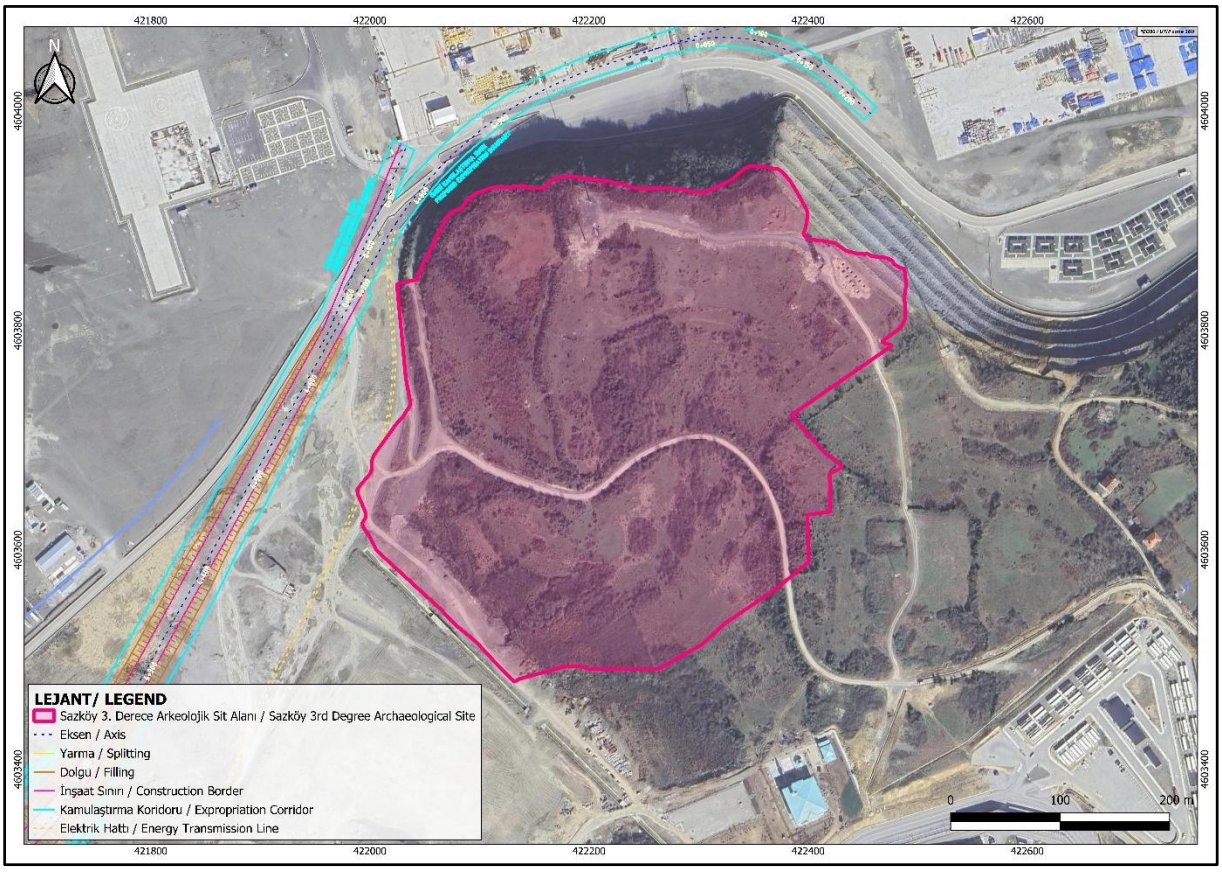


Figure 61. Sazköy 3rd Degree Archaeological Site and Project Route



Figure 62. Sazköy Necropolis



Figure 63. The Sarcophagus Lid Said to Come from the Sazköy Necropolis

The other registered archaeological site, Öteyüz 1st and 3rd Degree Archeological Site, is located to the west of the railway branch line (Figure 64). The area is outside the expropriation border; however, it remains within the AoI. Salvage excavations were carried out in 2016 by the Ereğli Museum Directorate in the area that was found as chance find during a highway construction project. As a result of the excavations, two vaulted roofs chamber tombs dated to the 3rd-4th century AD were identified.

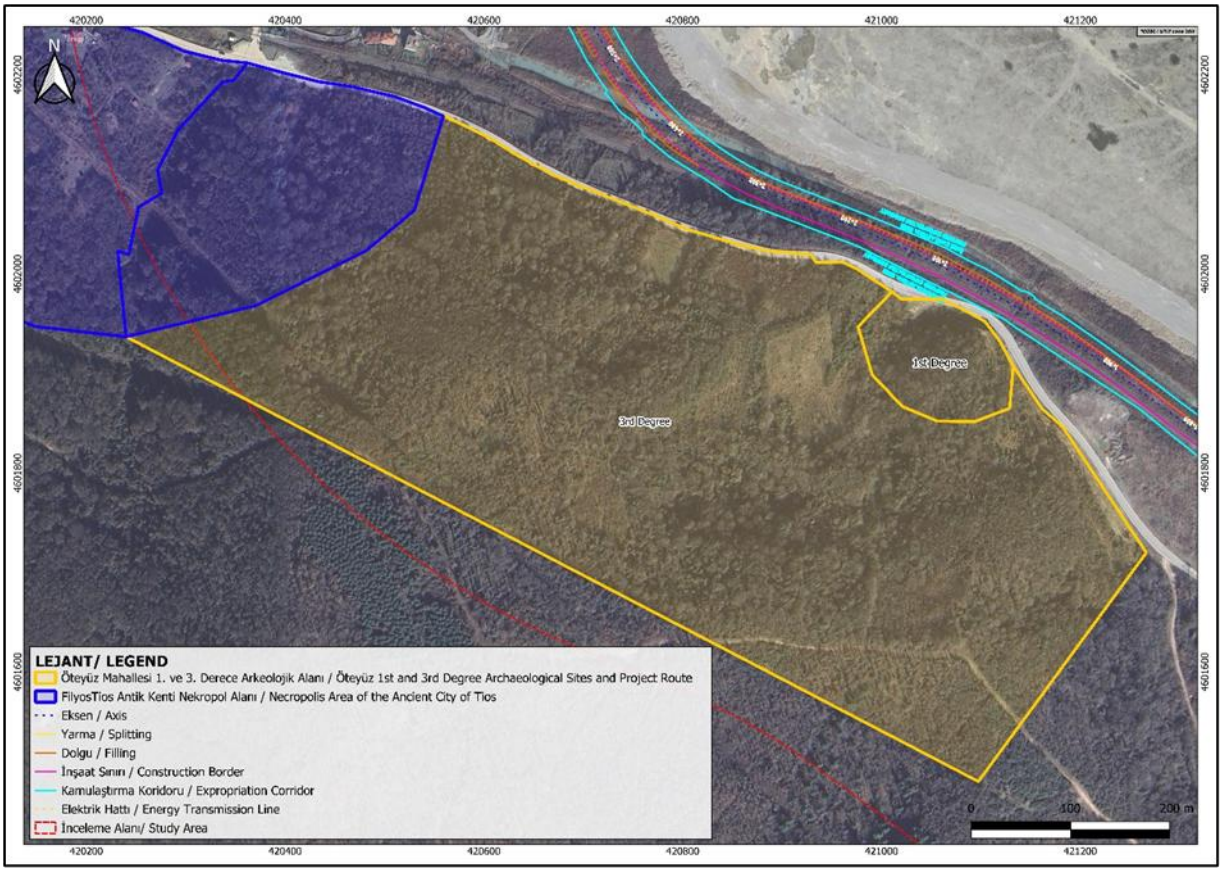


Figure 64. Öteyüz 1st and 3rd Degree Archaeological Sites and Project Route

Another registered archaeological site located near the project route is Tios Ancient City and Tios Necropolis Area (Figure 65). Both areas are outside the expropriation border. Tios Ancient City is north of the railway branch line (2 + 700) and 903 meter from the expropriation border. The Tios Necropolis Area is located northwest of the branch line (2 + 550) and 153 meters from the expropriation border. The Necropolis Area has been registered as another site adjacent to the Öteyüz 1st and 3rd Degree Archeological Site. Scientific studies have been continuing in the Ancient City since 2006.

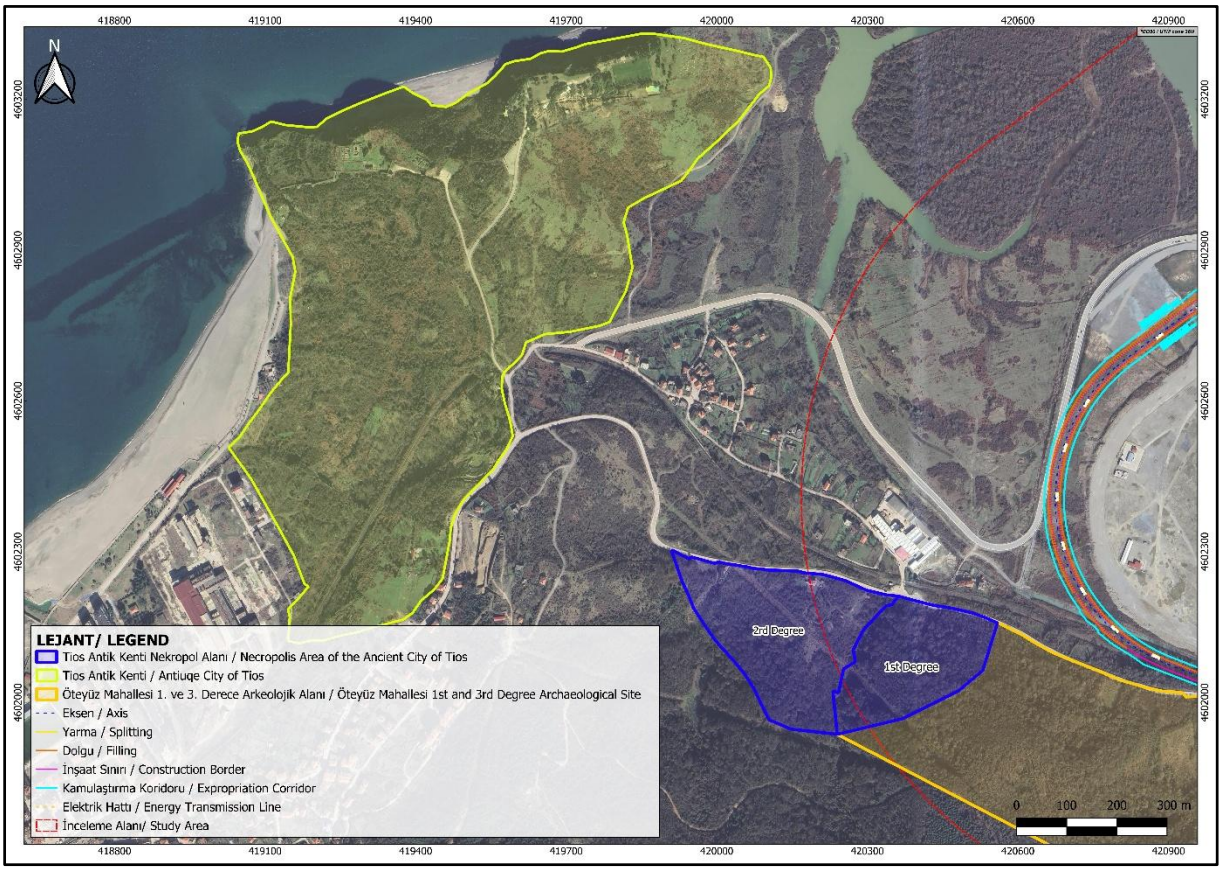


Figure 65. Project Route with Tios Ancient City and Tios Necropolis

In the field studies carried out within the scope of the project, no other tangible cultural heritage assets were found within the project AoI (see Table 74). A large part of the surface scanned project route consists of forest cover and thickets. There are also agricultural activity areas on a part of the route. The presence of known important archaeological sites such as Tios in the immediate vicinity of the construction site strengthens the possibility of “chance finds” occurring during the construction works on the project route.

Table 74. List of Tangible Cultural Assets on the Railway Route and Its Vicinity

No	Name of the Area	Province	District/ Neighborhood	Distance to Expropriation Border	Registration Decision
1	Sazköy 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Sazköy	25 m.	The decision of Karabük Cultural Heritage Preservation Regional Board dated 10.06.2010 and numbered 1880
2	Öteyüz Mahallesi 1st and 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Filyos/Öteyüz	10 m.	The decision of Karabük Cultural Heritage Preservation Regional Board dated 30.05.2018 and numbered 4456
3	Antiuqe City of Tios	Zonguldak	Çaycuma/Filyos	903 m.	The decision of Ankara Cultural Heritage Conservation Regional Board dated 14.01.1977 and numbered 288
4	Necropolis Area of the	Zonguldak	Çaycuma/Filyos	153 m.	The decision of Karabük Cultural Heritage Preservation Regional Board dated

No	Name of the Area	Province	District/ Neighborhood	Distance to Expropriation Border	Registration Decision
	Ancient City of Tios				25.09.2020 and numbered 6282.

5.6.3.2 Overall Assessment for Intangible Cultural Heritage

Field studies for intangible cultural heritage were carried out by qualitative interview technique in 5 settlements in the immediate vicinity of the project route. Participants were encouraged to give their own answers without any limitation in the interviews. With this method, it is aimed to identify the cultural structures of the group / individual and the behaviors and experiences that make up these structures. Within the scope of the study, 20 people were interviewed. 4 of these participants live in Filyos, 1 in Gökçeler, 5 in Derecikören, 8 in Sazköy and 2 live in Aşağı İhsaniye (Table 75).

The information of the rural settlements included in this study are as follows;

Table 75. Settlement Information Included in the Study

Province	District	Neighborhood	Distance to Project License Area (km)
Zonguldak	Çaycuma	Filyos	1.2 km
Zonguldak	Çaycuma	Gökçeler	0.5 km
Zonguldak	Çaycuma	Sazköy	0.76 km
Zonguldak	Çaycuma	Derecikören	0.7 km
Zonguldak	Çaycuma	Aşağı İhsaniye	0.5 km

In the settlements of Filyos, Gökçeler, Derecikören and Sazköy, located close to the project route, Turkmens, Abazins, Muhajirs, and Lazi people live. Many oral traditions (such as fairy tales, lullabies, legends, beliefs, heroic stories, idioms, proverbs, folk songs, chansonettes, etc.) are still continuing in the region.

Weddings, one of the turning points of life, are generally celebrated in the village square and are continued for 3 days. On the first day of the wedding, various ceremonies are held in the girl's house, on the second day in the boy's house, and on the third day in the village square. However, it has been observed that this tradition has been gradually replaced by wedding halls today. The tradition of "köçek oynatma" at (a young male dancer, who was employed as an entertainer) weddings still continues today. The most remarkable tradition before the wedding is the "Urba Kesimi (Urba Cut)" tradition. According to this tradition, in which the boy's house takes the girl's house to shopping 1 week before the wedding, the family of the groom goes to the bride's house to take her dowry 3 days before the wedding on horse or by truck depending on their economic status. During the implementation of this tradition, which is also referred as "Çeyiz Çıkarması (dowry removal)", celebrations are performed with musical instruments such as drum-flutes (davul&zurna). Besides the invitation cards, gifts referred as "okuntu" ("recited") such as hens, cloth, handkerchiefs and socks are given to the guests according to their degree of closeness. In addition to these traditions, some of which have disappeared in time, oyun havası (traditional folk music), dokuz sekizlik (a kind of traditional folk music played in various parts of Anatolia) are played in weddings. Traditional musical instruments such as davul (drums), zurna (flutes) and darbuka (goblet drum) are used in weddings today.

There are no different traditions for circumcision ceremony or farewell rituals for military service, which are among the turning points of life. In deaths, relatives of the deceased do not prepare food. Relatives and neighbors handle the food preparation organization with the division of work they do among themselves.

There is a fishing cooperative in Filyos settlement and a Village Mansion in Derecikören settlement (see Figure 66). There is no cooperative or charity association in other settlements.



Figure 66. Derecikören Village Mansion

It was determined that mushrooms and rose hips were collected from the nearby mountains and forests for traditional medicine and healing practices in 5 settlements within the scope of the study. Within the scope of traditional treatment and healing methods, it has been determined that bonesetters and healers that used to exist in every village, still are found in Saltukova located approximately 4 km from Filyos and the project side. In traditional belief practices, it has been observed that customs such as evil eye beads and pouring lead to repel evil eye continue today.

The public economy based on production and consumption, which is implemented by local people to maintain their lives, is cattle farming, fishery and coal mine work done according to the information obtained from the ancestor. It was also learned that the two female participants in the Derecikören settlement are selling vegetables grown, in their own gardens using traditional methods, in the Filyos market.

Apart from religious and national holidays in the region, the only special day celebrated is Hıdırellez. While Hıdırellez celebrations were celebrated collectively in village squares in the past, today it has lost its former importance. While there used to be torchlight procession in Filyos coast for the celebration of Republic Day, it is understood that this tradition has not been continued for 5 years.

During the interviews, it was found that traditional games such as tipcat, hide-and-seek, marble and leapfrogging were widely played by children in the past but today, these games were mostly replaced by computer games.

In the name of traditional handicraft production, tel kırma (one of the traditional handicrafts of the region), cross stitch and wool knitting are performed in 5 settlements. However, today, it has been determined that the young people no longer do these traditional practices and that some courses have been organized by Public Education Centers in Filyos and Derecikören in order to revive these traditions.

There are some buildings in the region that belongs to the traditional architecture. Even though they are preserved until the present day, they are empty (see Figure 67). It was also determined that the traditions of the construction of this type of architecture were abandoned and reinforced concrete materials were started to be used in house construction.



Figure 67. Traditional House Architecture

Products of traditional culinary culture such as kesme pilav (a kind of dough dish), köy mancarından[38] bulgurlu dolma (a stuffing with a vegetable referred as mancar and bulghur), soğan dolması (stuffed onions), kabak böreği (zucchini pie), baklalı pırasa (a meal consisting of broad beans and leeks) are still used in daily life. Making pickles, tomato paste and canned food for winter by using local products is still ongoing. Due to cow breeding, cow yogurt is of great importance for the local people.

As a result of the studies, it has been determined that the project will not have any negative impact on intangible cultural heritage. On the other hand, the economic mobility that the project will create, the expectations that commercial movements will increase in the region during the post-project period may also have positive effects on intangible cultural heritage. The preparation of social investment projects for rural tourism, including various projects including the city of Ancient City of Tios, which is included in the project impact area, and the implementation of it with the local actors in the region together with the financial support of the

[38] Savoy Cabbage

railway project, can create added value in the protection of cultural heritage and economic development of the people of the region.

5.6.4 Impact Significance, Mitigation Measures and Residual Impacts

During all studies, all data collected for tangible and intangible cultural assets are evaluated within the project expropriation area and impact corridor. Data on tangible and intangible cultural assets were evaluated in different mapping and analysis platforms[39] and the assessment was completed by considering geographical positioning of tangible and intangible cultural assets and by developing mitigatory actions for protection/salvation of these assets.

The data collected related to the intangible cultural heritage during interviews has been transcribed after face-to-face interviews with local residents. The transcribed data was later analysed to evaluate the effects of the project on intangible assets and the analysis has been reflected in Section 5.6.3.2. of this ESIA Report.

Sazköy 3rd Degree Archaeological Site

The registered "Sazköy 3rd Degree Archaeological Site" was located on the planned route of railway port connection and ferry connection in the Phase-1 design of the Project. Therefore, it was recommended to revise the project route in a manner that would not destroy the registered site. In line with the mentioned recommendation, the railway route was revised to avoid overlapping with the archaeological sites as outlined in ESCP, and the new route was designed in a manner that would not have an impact on Sazköy 3rd Degree Archaeological Site.

Revised design of the railway was also approved by Karabük Regional Council for the Conservation of Cultural Property with an official letter dated 10.07.2023 and numbered 3944694 (see Appendix 2.2.). For all kinds of projects, revisions and similar applications to be done in Sazköy 3rd Degree Archeological Site and its surroundings, it is necessary to consult the Karabük Cultural Heritage Preservation Regional Board as dictated by the law numbered 2863, and the decisions of the preservation committee should be followed at all phases of the project.

Öteyüz Neighbourhood 1st and 3rd Degree Archaeological Site

Another registered archaeological site that may be affected by the project activities in Filyos Sub-project is Öteyüz Neighbourhood 1st and 3rd Degree Archaeological Site. Project route near the Öteyüz 1st and 3rd Degree Archaeological Site was also approved by Karabük Regional Councils for the Conservation of Cultural Property with the aforementioned official letter. However, the site falls within the AoI between railway junction line's kilometer points of 1+750 - 2+600. Therefore, all excavation, stripping, filling, splitting, etc. activities to be conducted inside the project construction borders are recommended to be conducted under the supervision of an archaeologist. When planning auxiliary activities for the project, such as opening up the access roads for the project, determining the locations of barrow pits and quarries, creating excavation material storage sites, the protection borders of registered archaeological site should be taken into account and any intervention to the site should be avoided. Revision and similar applications to be carried out in Öteyüz Neighbourhood 1st and 3rd Degree Archeological Site and its surroundings, the Karabük Cultural Heritage Conservation Regional Board should be consulted, and the decisions of the conservation board made should be followed at all phases of the Project as dictated by the Law No. 2863.

Tios Ancient City and Tios Necropolis Site

[39] ESRI ArcGIS

Another registered archaeological site located in proximity to the project is the Tios (Tium, Tieion) Archaeological Area, which includes the ancient city and its associated necropolis. Within this context, the Tios Ancient City is situated outside the defined boundaries of the project's AoI, whereas the Tios Necropolis lies within the AoI, in close vicinity to the expropriation border. There are no negative impacts from the project expected on the Tios Ancient City and Tios Necropolis Site.

However, due to its location within the project footprint and in close proximity to the expropriation boundary, it is recommended that all ground-disturbing activities, such as excavation, grading, stripping, filling, and trenching within the boundaries of the project construction site, should be carried out under the supervision of a qualified archaeologist. Additionally, when planning associated project facilities such as the construction of access roads, identification of sand and stone quarry sites, and designation of spoil and material storage areas, particular attention must be given to the legally defined protection boundaries of the registered archaeological site. No physical intervention should occur within the designated boundaries of the archaeological protection zone to avoid potential irreversible impacts on the cultural heritage asset.

For any revision and similar applications to be carried out along the current revised railway route in the vicinity of the Tios Ancient City and Tios Necropolis Site, it should first be clarified whether the route intersects or is in close proximity to these registered archaeological areas. If such an interaction exists, an application to the Karabük Cultural Heritage Conservation Regional Board shall be made prior to the commencement of construction works, and all decisions of the Board must be followed in accordance with Law No. 2863. If there is no direct or adjacent interaction, implementation of the chance finds procedure would be considered sufficient.

Evaluation of Impacts on Cultural Assets

Areas that are located within the project route's construction site and that may be directly and negatively impacted by the project activities as well as the potential negative impact of construction activities on these areas are presented in an extensive way in Table 76.

When the general assessment of potential negative impacts of the project on the identified areas was reviewed, it was determined that the impacts of the Filyos Sub-project on the cultural areas was identified as "Neutral". There was no negative general impact of the project construction activities in two (2) areas located in Filyos Sub-project area and project impacts on archaeological sites were minimized as a result of revisions done in the project design.

Table 76. Impact Assessment Table

Name of the Area	Province	District	Registration Status	Distance to the Expropriation Border (m)	Scale and Severity of Change / Impact	The Value of Cultural Heritage	General Impact
Sazköy 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Sazköy	Registered	25	No change	High	Neutral
Öteyüz Mahallesi 1st and 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Filyos/Öteyüz	Registered	10	No change	High	Neutral
Antiuqe City of Tios	Zonguldak	Çaycuma/ Filyos	Registered	903 m.	No change	High	Neutral
Necropolis Area of the	Zonguldak	Çaycuma/ Filyos	Registered	153 m.	No change	High	Neutral

Name of the Area	Province	District	Registration Status	Distance to the Expropriation Border (m)	Scale and Severity of Change / Impact	The Value of Cultural Heritage	General Impact
Ancient City of Tios							

As a result of field surveys and archaeological excavations in the region where the railway project route is located, many archaeological sites have been identified. For this reason, it should be kept in mind that while planning all kinds of activities (opening service roads, determining the locations of sand and quarries, excavation storage area), archaeological sites that have not yet been identified can be found outside the archaeological sites[40] mentioned in the report.

For this reason, an "Archaeological Potential Modeling Study" was also conducted for the project route. Model Maps for Estimating Archaeological Potential related to this modeling study was prepared and presented in Appendix-6. The probability of archaeological or immovable cultural heritage assets calculated according to the results of these assessments is given in Table 77 on the basis of mileage intervals. The areas identified as “Very High, High and Medium Risk” in the Table 77 constitute the sections of the project route that are “likely to encounter chance finds”.

Table 77. Risk Levels of the Areas where Archaeological Potential Modelling was conducted

Project	Section Code		Line Name	Risk Level
Filyos Port/ Industrial Zone Connections Project	Section-1	Section 1/A	Branch Line	High
		Section 1/B	Branch Line	Very High
		Section 1/C	Branch Line	Very High
	Section-2	Section 2/A	Branch Line	Very High
		Section 2/B	Branch Line	Low
	Section-3	Section 3/A	Branch Line	Low
		Section 3/B	Branch Line	Low

For the reasons stated above, "Cultural Heritage Management Plan" and the "Chance Find Procedure” were prepared to be used during the project construction activities and any activity requiring intervention to the soil within the project route and its impact area. This plan and procedure should be shared with the other construction subcontractors of the project. Construction contractor and sub-contractors shall adhere to these plans as part of the project ESMP.

According to the results of desktop studies and site surveys, no negative impact is predicted on the intangible cultural heritage elements due to Project activities for all settlements in the work area.

[40] Chance Find

BIOLOGICAL ENVIRONMENT

5.7 Project Standards and Methodology

ESIA biodiversity studies within the scope of Filyos Port and Industrial Zone Railway Connection Project have been conducted in line with provisions of WB ESS6 standards based on previously published scientific work, reports on habitats and species, field surveys 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.

5.7.1 Project Standards

The legal framework on biodiversity conservation and assessment applicable to the Project is given below.

International Conventions and Protocols (ratified by Türkiye)

- UN Convention on Biological Diversity (CBD) and the Cartagena Protocol on Biosafety (ratified in 1997)
- The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) (ratified in 1984)
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (ratified in 1996)
- The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) (ratified in 1994)
- The Convention Concerning the Protection of World Cultural and Natural Heritage (UNESCO World Heritage Convention) (ratified in 1983)
- Convention to Combat Desertification (ratified in 1998)
- International Treaty on Plant Genetic Resources for Food and Agriculture (ratified in 2007)
- European Landscape Convention (ratified in 2003)
- Convention on the Conservation of Migratory Species of Wild Animals (CMS) / Agreement on the Conservation of Populations of European Bats (EUROBATS) (Türkiye is not a party)
- CBD – Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets

Main National Laws and Regulations

- Law on National Parks (No. 2873, dated 9 August 1983)
- Law on Environment (No. 2872, dated 9 August 1983)
- Law on Terrestrial Hunting (No. 4915, dated 1 July 2003)
- Law on Forests (No. 6831, dated 31 August 1956)
- Law on Protection of Animals (No. 5199, dated 24 June 2004)
- Law on Water Products (No. 1380, dated 22 March 1971)
- Law on Agriculture (No. 5488, dated 18 April 2006)
- Law on Veterinary Services, Plant Health, Food and Feed (No. 5996, dated 11 June 2010)
- Law on the Protection of Breeder's Rights for New Plant Varieties (No. 5042, dated 8 January 2004)
- Seed Law (No. 5553, dated 31 October 2006)
- Law on the Conservation of Cultural and Natural Assets (No. 2863, dated 21 July 1983)
- Regulation on the Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Official Gazette No. 24623, dated 27 December 2001)

- Regulation on the Preservation of Wetlands (Official Gazette No. 28962, dated 4 April 2014)
- Bylaw on Fisheries (Official Gazette No. 22223, dated 10 March 1995)
- Regulation on the Collection, Storage and Use of Plant Genetic Resources (Official Gazette No. 21316, dated 15 August 1992)
- 2024-2025 Hunting Season Decision

Main National Strategy Documents

- 11th Development Plan (2019-2023)
- National Biodiversity Action Plan (2018-2028)
- EU Integrated Environment Strategy (2007-2023)

National Guidelines

Protected Areas

- Important Bird Areas (IBA's) of Türkiye (Magnin and Yarar, 1997)
- Key Biodiversity Areas (KBA's) of Türkiye (Eken et al., 2006)
- 122 Important Plant Areas (IPA's) of Türkiye (Ozhatay et al., 2008)

Flora

- Flora of Türkiye and East Aegean Islands (Davis, 1965-1988)
- Turkish Plant Names (Baytop, 1994)
- Red Data Book of Turkish Plants (Ekim et al., 2000)

Fauna

- Pocket Book of Birds of Türkiye
- General and Turkish Zoogeography (Demirsoy, 2002)

International Standards and Guidelines

- ESS 6 (2017) Biodiversity Conservation & Sustainable Management of Living Natural Resource
- EU Habitats Directive (92/43/EEC)
- EU Birds Directive (2009/147/EC)

5.7.2 Methodology for Biodiversity Studies

5.7.2.1 Flora, Habitat and Ecosystems

Data on flora and vegetation were acquired via standardized quadrate method (Sutherland, 2006) to estimate population abundance (number), density, frequency and distributions.

Floristic list was given according to the phylogenetic order in the Flora of Türkiye in the form of Pteridophyta, Gymnospermae, and Angiospermae, and families under each group were sorted in accordance with the phylogenetic order in the Flora of Türkiye. Species were given with their auteur names and if any, names in Turkish, English, phytogeographical region, whether it is endemic or not, danger categories of endemic and rare species, elevations they grow within the habitat, their habitat, and abundance of each species within the area were given respectively.

Plants collected from the AoI were determined using relevant floras, the work Flora of Türkiye and the East Aegean Islands (Davis, 1965-1988) being the first. In order to determine endemic species and endangered species although they are not endemic, Red Book of Turkish Plants (Ekim et al., 2000) was taken as reference. Since Red Book of Turkish Plants was prepared in accordance with the criteria of IUCN 1994, danger categories were revised in accordance with IUCN 2001.

Endemic, rare species and species under international preservation, as well as significant habitats were determined within the determined species. Areas where endangered species concentrates along the line and sensitive ecosystems were reported including reasons and such areas were referred as "Ecologically Sensitive Areas." Because such areas are highly sensitive to deterioration either due to rare species they contain or to the fact that necessary measures were not taken. Additional information was given on what kind of measures need to be taken in these determined areas, when should the construction be carried out in order to minimize impact, and whether there are species requiring collecting seeds or to make translocation.

5.7.2.2 Mammals

Although small terrestrial mammals are abundant, they are hardly observed, their prints are hardly seen, and species are determined with difficulty. However, they can be caught easily with traps at a sufficient number (e.g., standard Sherman live animal trap). Species specific to habitat types shall be determined by setting live animal traps at sufficient number, in order to represent habitat types.

Observation method is suitable for medium and large mammals: especially (i) direct observation and (ii) excretion analysis, prints, or identifying other signs.

Priority aim in site studies shall be to find out species diversity in locations to be determined according to habitat types along the line.

Monitoring studies for mammals were performed due to the breeding periods by walking 500 m - 2 km direct transects to be determined in different habitats. It is possible to find different habitat types even in such an area of 1 km^2. In such cases, sampling areas of 20 x 50 m (2500 m^2) were determined in areas where different features are found within a larger area, and inside of these areas was walked by minimum 30 minutes to record all mammal traces (nest, excretion, food remnants, physically seeing the animal, etc.). Species were tried to be determined by photo trap method at appropriate areas in potentially critical habitats.

According to previous surveys and literature there are no breeding areas determined for mammals. Previously prepared reports were revised by comparing the determined species with previous studies.

5.7.2.3 Amphibians

Within the scope of the Project, determination of the Amphibian species within the project area and impact area contained three main techniques for surveying.

Visual search of water body and surrounding area

During the daytime, at any water body in project area, the water body edge and surrounding terrestrial habitat were walked and looked for Amphibians in the water – including tadpoles and newt efts. The amphibians can travel several hundred meters away from the water body; therefore, they were searched far away from the water body and under refugia such as logs and large stones. Amphibians' calling is species-specific. Therefore, species identification can be made from the Amphibian calling. If an Amphibian call is heard during the herpetological survey, the species were also be identified from calling.

Netting in pond

Netting can be useful for detecting: Adult newts, frog and toad tadpoles. A net was used with a rigid frame and a mesh of approximately 2 mm. The net was sweep in a strong agitating motion through vegetation at the water body edge every two meters. The animals were avoided to be touched and they were quickly released back into the water after they are photographed.

Night Survey

Some Amphibians are nocturnal and most active after dark, and advertising calling is more frequent at night. A powerful torch (lights) is an effective way to spot them in open water. A powerful torch in the range of 500,000 to 1 million candlepower was used. The waterbody was searched by torchlight from the banks.

Previously prepared reports were revised by comparing the determined species with previous studies. If the presence of an endemic or rare species is detected, necessary precautions and information about the species was given in detail.

5.7.2.4 Reptiles

Reptiles are ectothermic like Amphibians. This means they require an external 'boost' to their body temperature to become fully active. Reptiles achieve this effect by positioning themselves in places of increased warmth. This can involve 'basking' on a heat gathering surface in the sunshine (in the open or amongst some vegetation) or under objects (refugia) that absorb heat. Much of this behavior occurs during the morning and late afternoon but potentially at any time of the day depending on season and weather patterns. This presents us with an opportunity to lead to their discovery.

The best survey timing varies with location, weather patterns and species, but generally reptiles are active from March to October. The best time to survey is a mixture of time of year, time of day and weather conditions. The reptiles may appear near hibernation sites if conditions are suitable in March and April. Late August to late September can be useful for seeing juvenile animals. July and early August are generally less useful months for surveying due to the days being hotter (even reptiles can get too hot and seek shade). Time of day: In late June, when the weather is generally warmer, reptiles may be found earlier in the morning and later in the afternoon. Weather conditions: peak air temperature is between 9-20°C. Bright sunshine is favorable on cooler days and hazy or intermittent sunshine is favorable when warmer. Rain or wind is unsuitable. Also, weather sequence is important: a hot spell after several days of cold weather or showery weather after a prolonged dry period are favorable.

Reptile habitat generally has open aspect areas, is well drained and south facing, is mostly sunny, sheltered and relatively undisturbed. Therefore, grasslands, open woodland, forests, sand dunes, disused corners/edges of allotments, road and rail verges/embankments garden walls were searched. However, under refugia such as logs, and large stones were checked. Each sampling location was searched about 30-90 minutes in duration. For each sampling points, identified species were recorded. Also, species' photos were taken when it was possible.

Previously prepared reports were revised by comparing the determined species with previous studies. If the presence of an endemic or rare species is detected, necessary precautions and information about the species was given in detail.

5.7.2.5 Birds

Observations were performed using point and line transects method. In addition to determination of bird species by observation during the field studies, the existence of habitats eligible for preferences of birds such as mud flat and rocky places, bird traces (nests-fledglings, feathers, claw prints, vomits and excretions, identifiable bone parts), and feeding signs were utilized in determining bird species.

Previously prepared reports were revised by comparing the determined species with previous studies. If the presence of an endemic or rare species is detected, necessary precautions and information about the species was given in detail.

5.7.2.6 Invertebrates

Insects live in asocial, semi-social or social groups, and organize their lives in line with their ecological acquisition. This should be taken into account in activities to be carried out in areas where insects are found. If insects perceive a life-threatening response from their ecological acquisition, or when their habitats deteriorate, these creatures can leave their ecological habitat. Insects consisted of a wide variety of groups. Each group (generally Lepidoptera, Odonata, Hymenoptera, Diptera) according to its own biological needs; They should be investigated by taking into account their feeding, habitat, reproductive and socializing behaviors. Also, their impacts on ecosystem services were also evaluated.

At the evaluation stage, suggestions were presented by making a two-step evaluation.

- Interaction with insects during the activity;
- Interaction with insects was evaluated after the activity.

The status of the insects' diversity criteria and risk categories are only applied according to IUCN and NRL for butterflies. IUCN only includes two main orders of insects Lepidoptera and Odonata. Turkish National Red List for Butterflies includes only Butterfly species.

Planning of Field Studies

For the surveys to be done, it is necessary to carry out field studies in three seasons (spring, summer and autumn) for insects. For beekeeping field surveys were carried out for all seasons, as wintering activities were also important for sustainable beekeeping. Before starting the field surveys, the area was studied and the possible locations for surveys were determined. For each location a pre-determined time period (like an hour) spent for determination of insect biodiversity. Photographing of insects, habitat types, population density were among the parameters to be taken.

Data collecting

- Evaluation of literature and study records;

The studies conducted up to the study of the insect species living in the designated research area were compiled and the data related to the insect species living in the field were collected based on the literature records and suggestions were provided for the later stages of the study. The activity area and the ecological impact limits of the area were evaluated seasonally in terms of nutrition, habitat, reproduction and social behavior.

- Habitat assessment;

With the start of the surveys, determination of the general habitat types (EUNIS) in the area by evaluating the habitats seasonally. Depending on the habitats, insect species likely to be present in each habitat type were identified.

- Gathering information by interviewing local people living in the project area and surroundings;

During the surveys, information was collected from the local people about the area types and their populations by questionnaire or one-to-one interviews.

- Interim evaluation;

The information obtained as a result of the literature, habitat assessment and interviews with local residents were evaluated; A general evaluation was made on the insect species and populations of the area. As a result of this evaluation, the areas, species and populations to be concentrated were determined. As a result of these determinations, the activity plan was revised to determine how the area, species and populations will be affected and how the negative effects will be minimized. Most of the data was obtained through the observation (and photographing), no sampling (by hand or catching by insect trap) of the individuals, nest, different developmental stages of the species if possible were also recorded in the areas.

- Sampling of insect species and Observation;

No sampling was carried out during field studies. All data are based on the insect groups that were encountered in the area, especially butterflies (Lepidoptera), bees (Hymenoptera), dragonflies (Odonata), flies (Diptera), were documented by photographing. During the observations, the coordinates of the location where a species was determined were recorded with GPS. For collecting the insect necessary equipment (forceps, nets, aspirators, etc.) was used. After photographing and recording the individual insects, they were released back to its habitats.

- Ecosystem Services:

Methodological research in beekeeping

The beekeeping activities in the project area and its surroundings was investigated both at the provincial and district level, and the beekeeping potential was evaluated. In the AoI and its environs if there were hives to be encountered, information on beekeeping activities and potential was obtained by contacting the beekeeper and the importance of the area in terms of beekeeping activities was studied.

- Analysis / evaluation;

Analysis and evaluation of the AoI in terms of biological needs of insects were done seasonally. The following evaluations were made to determine the seasonal use of insects and the seasonal distribution of populations.

a) Do insects use the work area continuously or intermittently?
b) Do populations of insects change seasonally?
c) Do the insect species' existences differ due to the climatic changes in the area?
d) Do any of insects' groups provide ecosystem services (especially beekeeping potential)?

After determining the data in these four items, the interaction states of the insect's species determined to live in the area during and after the activity were determined.

- Identification of vulnerable or threatened species;

The species determined in the AoI were categorized according to their affects; Vulnerable and/or threatened species, if any, were identified according to internationally signed criteria (BERN, IUCN, etc.).

- Mitigation measures:

In general, or in special cases, possible risks, adverse effects and threats arising from the project were determined for insect species whose presence was determined in the area. Measures, remediation and protection measures were identified and recommended against these adversities.

Post-study

After surveys, changes in the species, population and behaviors of invertebrates can be determined and the forecasts to be taken in possible situations are determined.

Species to be monitored were suggested to the practitioner by determining the invertebrate species that was the basis for monitoring specifically for the project implementation planned in the field in the long term.

5.7.2.7 Aquatic Habitat

Possible aquatic habitat crossings were monitored, and habitat structures were determined. During monitoring studies;

- Broad site/crossing point description, including details on whether the watercourse has been engineered or whether it is natural,
- Water chemistry information (if possible, using a hand-held water chemistry meter),
- Flow types (% of each type present),

- Water depth,
- Substrate types (% of each type present),
- Neighboring land use,
- Bank cover/characteristics,
- Fish habitat presence, including potential spawning areas,
- Instream vegetation (type and % cover),
- Photographs will be taken at each crossing point location and upstream/downstream (so minimum three photographs at each location),
- Notes will be taken on any visible poor water quality/pollution evidence; and
- Any flora/fauna will also be noted.

Phytoplankton, zooplankton, benthic and fish species were studied and given in detail.

5.7.3 Biodiversity Area of Influence

In order to identify impacts of the Project on biodiversity and to conduct critical habitat assessment, in line with the provisions of the World Bank ESS6, the ESIA study area, which consists of a 500-m corridor extending on each side of the proposed route was considered as the Biodiversity AoI.

Some of the surveys carried out within the scope of Phase 1, were not carried out during the animals' active period and flowering period of plant species. Therefore, further surveys were proposed in this respect. For this reason, Phase 2 studies were conducted covering all biodiversity issues and appropriate seasons.

In Phase 2 of the Project biodiversity field surveys covered the entire Biodiversity AoI, in addition to which reference areas outside the Project footprint, and habitats with similar ecological features and carrying capacities were also considered.

In Phase 2 of the Project detailed flora and fauna sampling surveys were conducted at 6 locations for flora, 6 locations for invertebrates, 5 locations for herpetofauna, 10 locations for birds, 6 locations for mammals, 2 locations for bats, and 2 locations for hydrobiological sampling locations within the Biodiversity AoI. These sampling points were selected considering habitat characteristics, as well as habitat preferences of flora and fauna species. Natural habitats and species that are of high conservation concern (CR, EN, VU, NT and those that require special conservation measures) were prioritized during field surveys. Ornithological surveys were conducted at vantage points, representing different habitats, and also along transect lines. A map showing sampling/vantage points is presented in Figure 68.

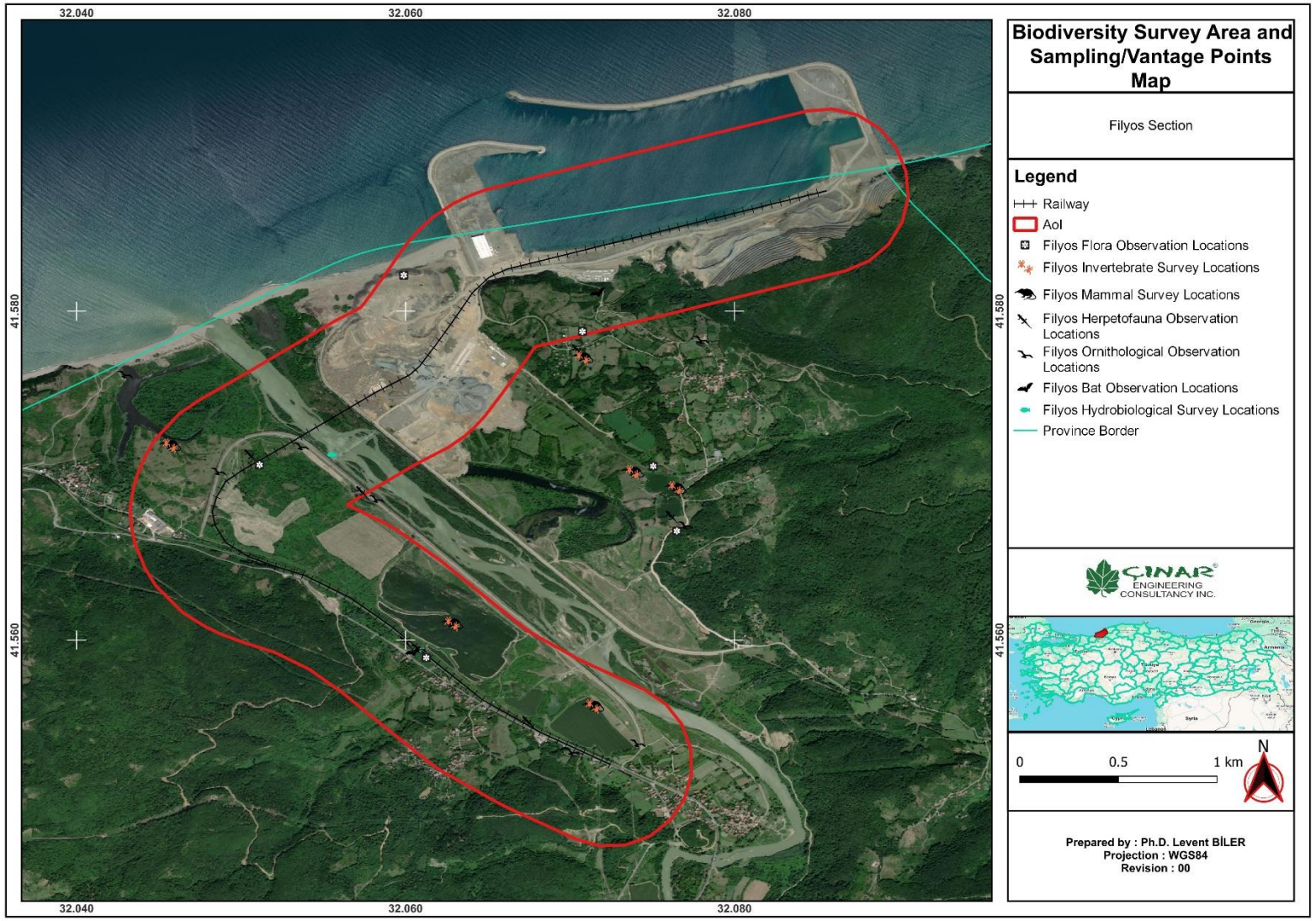


Figure 68. Biodiversity AoI and Sampling/Vantage Points

5.7.4 Protected Areas

The World Bank ESS6 identify two different types of protected areas; Legally Protected and Internationally Recognized Areas of High Biodiversity Value. Legally Protected Areas as defined by ESS6 are those that meet the 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.”, while Internationally Recognized Areas of high biodiversity value include World Heritage Natural Sites, Biosphere Reserves, Key Biodiversity Areas, Important Bird Areas, Alliance for Zero Extinction Sites and Ramsar Wetlands of International Importance, among others. When a project is located within a legally protected or internationally recognized area, ESS6 sets requirements in addition to those that are related to critical habitat. Accordingly, it is required to;

- demonstrate that the proposed development in such areas is legally permitted,
- act in a manner consistent with any government recognized management plans for areas
- consult protected area sponsors and managers, affected communities, indigenous peoples and other stakeholders on the proposed project, as appropriate; and
- implement additional programs to promote and enhance conservation aims and effective management of the area.

In line with this approach, areas designated under the Turkish protected area system, as well as Key Biodiversity Areas (KBAs), Important Bird and Biodiversity Areas (IBAs) and Important Plant Areas (IPAs), were screened for the purposes of this ESIA. In Phase 2, this screening was complemented by on-site observations and field evaluations to ensure that assessments were carried out at the appropriate season and with adequate ground verification.

5.7.4.1 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 constitute an integral part of biodiversity conservation efforts, as well as ecosystem services provided by ecological functions they convey. In Türkiye, Ministry of Agriculture and Forestry is the main official body responsible for development and implementation of national biodiversity conservation policies, action plans, designation of conservation areas, and many other related tasks conducted by its central and local directorates within the Ministry’s organizational structure. IUCN Protected Area Management Categories (Dudley et al.,2013) were adopted to restructure the Turkish Protected Area System in 2006 through the Biodiversity and Natural Resource Management Project undertaken by the Ministry’s General Directorate of Nature Conservation and National Parks (Thomas, 2006). The IUCN Protected Area Management Categories provide a global framework and is recognized by the Convention on Biological Diversity, with an initial objective of creating 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:

i) assignment to a category is not a commentary on management effectiveness,
ii) the categories systems are international; national names for protected areas may vary, and

iii) all categories are important; and gradation of human intervention is implied.

Accordingly, legally protected areas in Türkiye, were re-classified under the 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 78, and a map showing the locations of the protected areas with respect to the Project route is presented in Figure 69. Considering the distances between the railway route and the legally protected areas in the region, there will be no Project-related impacts on these areas.

Table 78. Legally Protected Areas near the Project Route

Protected Area	IUCN Protected Area Category	Distance to the Project Route (km)
Göldağı Nature Park	V	16.83
Milli Egemenlik Nature Park	V	24.30
Danaağzı Nature Park	V	37.12
Balamba Nature Park	V	23.14

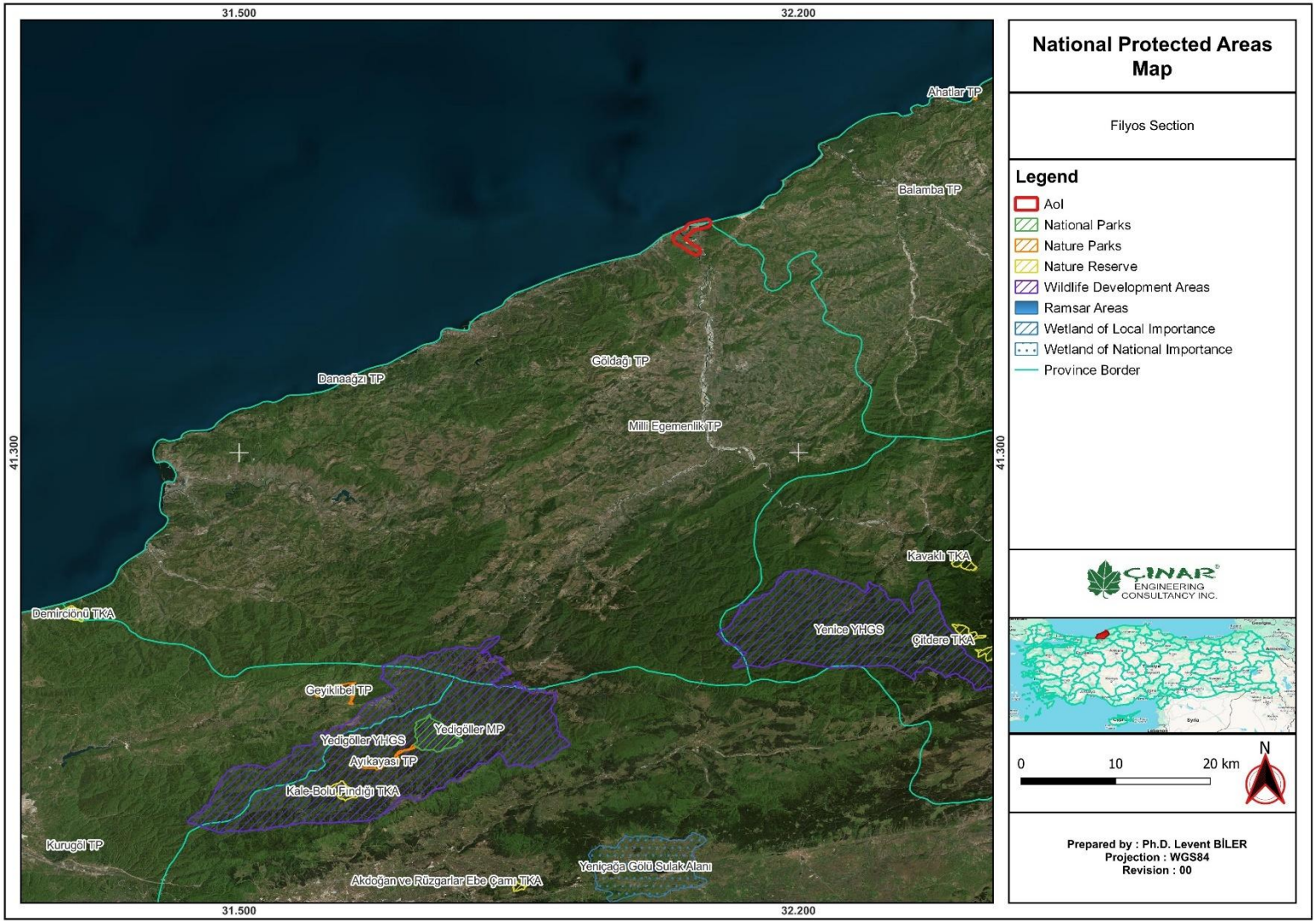


Figure 69. Legally Protected Areas

5.7.4.2 Internationally Recognized Areas of High Biodiversity Value

ESS6 defines Internationally Recognized Areas of High Biodiversity Value as “areas of recognized importance to biodiversity conservation but are not always legally protected”. Internationally Recognized Areas of high biodiversity value as per ESS6 include World Heritage Natural Sites, Biosphere Reserves, Key Biodiversity Areas, Important Bird Areas, Alliance for Zero Extinction Sites and Ramsar Wetlands of International Importance, among others. Guidance Note 6 also addresses that internationally recognized areas of high biodiversity value will often qualify as critical habitat; for instance, areas that meet the criteria of the IUCN’s Protected Area Management Categories Ia, Ib and II, or the majority of Key Biodiversity Areas (KBAs), which encompass, among others, Important Bird and Biodiversity Areas (IBAs).

In Türkiye, besides the Ministry’s official work, there are various non-governmental organizations (NGOs), academic entities, as well as individual researchers and professionals who work in collaboration or independently to better understand Türkiye’s natural resources and put forward effective conservation strategies to ensure survival of habitats and species, some of which constitute unique ecosystems of global conservation value.

Doğa Derneği, published an inventory on Key Biodiversity Areas (KBAs) in Türkiye in 2006 in collaboration with the former Ministry of Environment and Forestry, integrating survey results across the country with expert opinions (Eken et al., 2006). The preparation of the inventory was the first time the KBA approach was applied at a national scale, which was based on principles developed by BirdLife International for bird species in their “Important Bird Areas” studies. One of the fundamental functions of the inventory is defined as “providing resource for areas and species that should be worked upon to reach zero extinction”.

Amasra Kıyıları (Coasts) is one of the KBAs identified by the inventory, which covers areas of about 17,413 hectares within Amasra, Bartın central district and Çaycuma district boundaries of Bartin Province. The altitude changes from sea level to 480 meters in the KBA, where there are deciduous forests, pseudomaquis, coastal dunes and maquis assemblages.

The Project route and its AoI are located at the western tip of the KBA. However, in terms of the KBA-listed species, only *Lutra lutra* (Eurasian otter) was identified to be found within the Biodiversity AoI. The other KBA-listed species have been confirmed through expert judgement to be those that had previously been identified at different locations within the large KBA boundaries. Species related to the KBA is given in Table 79.

Table 79. Amasra Kıyıları (Coasts) Species

Species	IUCN
Seseli resinosum	VU
Gavia arctica	LC
Phalacrocorax aristotelis desmarestii	LC
Lutra lutra	NT

There is no information available on *Lutra lutra* population at the Biodiversity AoI, or the larger region. Additional field surveys in Phase-2 have been conducted in an appropriate season to directly observe *Lutra lutra* individuals and to confirm the presence of *Lutra lutra* population and habitat preferences in the area. Areas suitable for *Lutra lutra* along Filyos Creek were identified during fauna field surveys. However, reclamation works conducted by the General Directorate of State Hydraulic Works (SHW), Filyos Creek banks have lost their natural characteristic and have been transformed into stony/rocky areas.

Photographs taken at one such location in Derecikören are provided in Figure 70. The Project field ecologists concluded that these areas are not suitable for *Lutra lutra* breeding or nesting. Therefore, the project will not have any adverse impact on the *Lutra lutra* population, based on the additional surveys conducted and the expert judgement.

The map showing the updated route assessed in this ESIA Report and KBA boundaries is presented in Figure 71.



Figure 70. Filyos Creek Derecikören Site

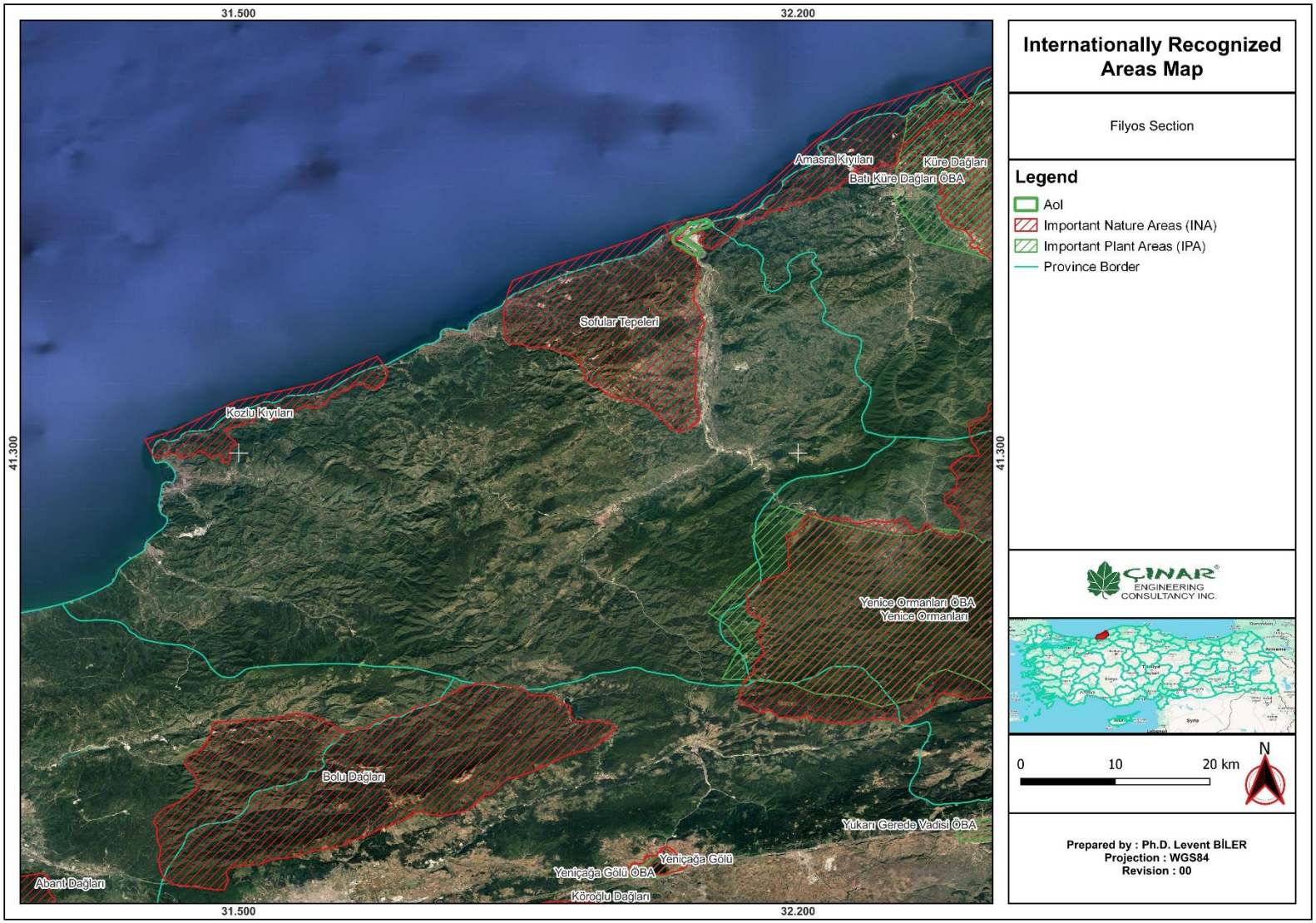


Figure 71. International Recognized Areas of High Biodiversity Value Map

5.8 Baseline Conditions

Baseline studies conducted in the Biodiversity AoI as shown in Figure 68, rely on previously conducted studies, literature information on habitats and species, as well as direct observations and Project-specific data collected on site by field experts. Field methodologies developed by each of these experts and study results are presented in the previous sections. 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.

5.8.1 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 AoI 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 AoI, 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 80. In addition to habitats explained in the table there are also modified and artificial habitats that can be listed as; I1.2 : Mixed crops of market gardens and horticulture, J1.2: Residential buildings of city and town centers, J2.3: Rural industrial and commercial sites still in active use, J3.2: Active opencast mineral extraction sites, including quarries, J4.2 : Road networks, J4.3: Rail networks and J4.5: Hard-surfaced areas of ports.

Photographs of the natural and modified EUNIS habitat types of the Biodiversity AoI are presented in Figure 72. and a map showing the habitats is provided in Figure 73.

Table 80. Habitats of the Biodiversity AoI

EUNIS Habitat Type	Habitats Directive Annex I	Habitat Characteristics
B1.2 : Sand beaches above the drift line	1610: Baltic esker islands with sandy, rocky and shingle beach vegetation and sublittoral vegetation	• Grows only along marine coasts • Filyos coasts is one the best representatives of the habitat in Türkiye. • Characteristic species are; *Centaurea kilaea, Pancratium maritimum, Medicago marina, Otanthus maritimus, Eryngium maritimum, Polygonum maritimum, Leymus racemosus, Salsola ruthenica, Euphorbia paralias, Glaucium flavum.*
C1.2: Permanent mesotrophic lakes, ponds and pools	-	• Pond formed due to DSI's work at Filyos Creek. • Species composition was not identified as the habitat was not observed during field surveys.
C2.2: Permanent non-tidal, fast, turbulent watercourses	3210: Fennoscandian natural rivers	• Observed along Filyos Creek. • There are no plant species due to the fast flow rates of the Creek.
C2.5: Temporary running waters	-	• Gently sloping sand-covered shorelines fashioned by wind action along coasts and beside associated coastal lagoons.
D5.1: Reedbeds normally without free-standing water	-	• Formed around Filyos Creek in areas where water table is higher. • Characteristic species with high water demand are; *Phragmites australis, Cyperus longus, Juncus littoralis, Typha domingensis, Sambucus ebulus, Rubus sanctus, Aster subulatus, Artemisia vulgaris.*
G1.A: Meso- and eutrophic *Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus* and related woodland	9020: Hemiboreal natural old broad-leaved deciduous forests (*Quercus, Tilia, Acer, Fraxinus* or *Ulmus*) rich in epiphytes	• Widespread across Western Black Sea Region. • The habitat has a scattered distribution along the Project route. The woodland in general is in climax phase where there are no anthropogenic impacts. However, along the route it is degraded. • Deciduous tree species of the habitat are; C*arpinus betulus, Quercus petraea, Quercus hartwissiana*. • Shrubs of the subflora are; *Laurus nobilis, Ruscus aculeatus, Phillyrea latifolia, Ligustrum vulgare, Jasminum fruticans.* • There are also herbaceous species like *Dactylis glomerata, Oenanthe pimpinelloides, Ranunculus ficaria, Sanguisorba minor*.
I1.2: Mixed crops of market gardens and horticulture	-	• Limited along the Project route. • Local people mostly grow vegetables in these areas.

		
B1.2 : Sand beaches above the drift line	D5.1: Reedbeds normally without free-standing water	
		
F5.3: Pseudomaquis	G1.1: Riparian and gallery woodland, with dominant *Alnus, Betula, Populus* or *Salix*	G1.A: Meso- and eutrophic *Quercus, Carpinus, Fraxinus*

Figure 72. Habitats of the Biodiversity AoI

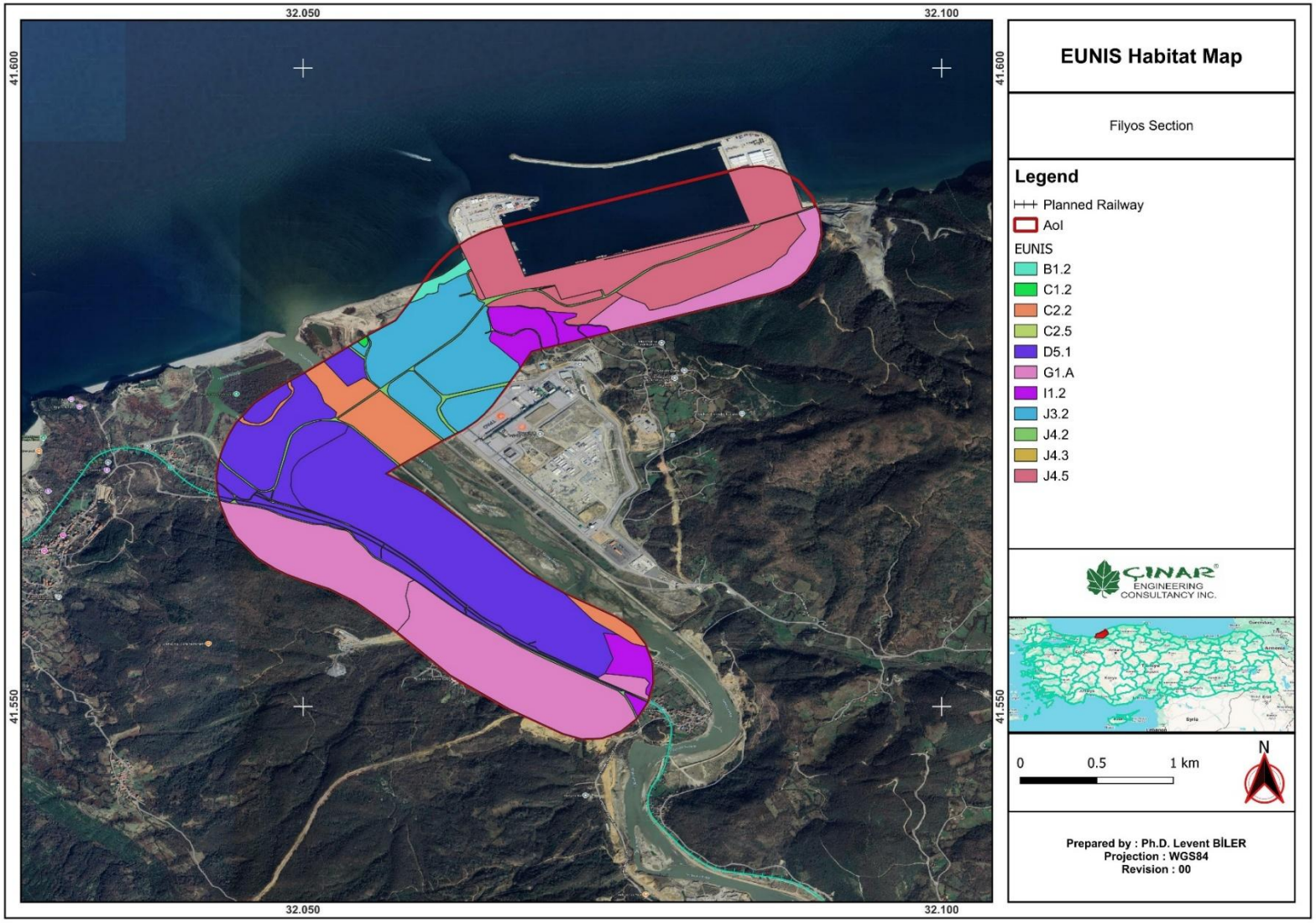


Figure 73. Habitat Map

5.8.2 Terrestrial Flora

In order to determine the flora species distributed in the area within the AoI, field surveys were carried out between 03.10.2022, 21.07.2023 for Filyos Section. Flora survey locations are shown in Figure 75. The daily activity reports of the site surveys are given in Appendix-4.

To identify the flora composition of the Biodiversity AoI, first sampling points representing different habitat types in the area were determined during the scoping phase of the ESIA process and revision process. For assessment of Project-related impacts, field surveys were conducted in the ESIA study area which consists of 500m corridor extending on each side of the proposed route. At each of the sampling locations, habitats were studied in detail, and flora species were identified based on related findings and observations.

Western Black Sea Region of Türkiye, where the Project route is located, is under the influence of oceanic climate. In sections closer to the shore, Mediterranean climatic properties can also be observed. Vegetation in the area carries characteristics of both climate types. There are vegetation types representing deciduous forests, pseudomaquis, riparian, meadows and reedbeds. There are also intensive agricultural areas in the region, where hazelnut is the main produce.

Forest and shrub species found along the Project route are mostly composed of natural species. Deciduous forests are composed of *Carpinus betulus*, *Quercus hartwissina*, *Quercus petraea*, *Tilia argentea,* and *Castanea sativa*, while *Laurus nobilis*, *Arbutus unedo*, *Phillyrea latifolia*, and *Erica arborea* form evergreen maquis in the area. There are also cultivated plants like; *Coryllus avell*ana (hazelnut), *Juglans regia* (walnut), *Morua alb*a (mulberry), *Ficus carica* (fig), *Prunus x domestica* (prune), *Pyrus communis* (pear), *Brassica oleracea* (black cabbage), *Zea mays* (corn), *Phaseolus vulgaris* (green bean), *Lycopersicum esculentum* (tomato), *Capsicum annuum* (pepper), *Solanum tuberosum* (potato), *Solanum melongena* (eggplant), and *Cucurbita pepo* (zucchini).

A total of 203 plant taxa were identified during flora surveys conducted at the Biodiversity AoI, which belong to 65 plant families (see Table 81). The flora list is given in the order of ferns (Pteridohyta), open-seeded (Gymospermae) and closed-seeded (Angiospermae) plants. Plant families in each group are provided in the phylogenetic order. Species are listed with their Turkish names, phytogeographic regions they belong to, endemism level, Red List categories for endemic and rare species, Bern and CITES statuses, EUNIS habitat types where they are distributed and their relative abundance in the area.

Centaurea kilaea is the only regional endemic species identified. There are also rare like *Pancratium maritimum*, and *Cyclamen coum* var. *coum,* which are listed in Annex II of CITES. *Centaurea kilaea* is distributed at dune habitats of the Black Sea coasts of the Thrace and the Western Black Sea. Its range narrows due to continues pressures on coastal dune habitats. Although the current population of the species is viable it is continuous decline due to reduction in its habitat extent. The species is listed as Endangered according to the National IUCN Red List.

Pancratium maritimum, which is not an endemic but a rare species, is also found across coastal dune habitats in Türkiye. Its population is in severe decline as well, again due to continuous reduction in the extent of its habitats and is also listed as Endangered.

Photographs of endemic and rare species are presented in Figure 74. and a list of all flora species identified at the Biodiversity AoI are given in Table 81.



Centaurea kilaea (regional endemic)



Pancratium maritimum (CITES Appendix II)



Cyclamen coum var. *coum* (CITES Appendix II)

Figure 74. Endemic and Rare Plant Species

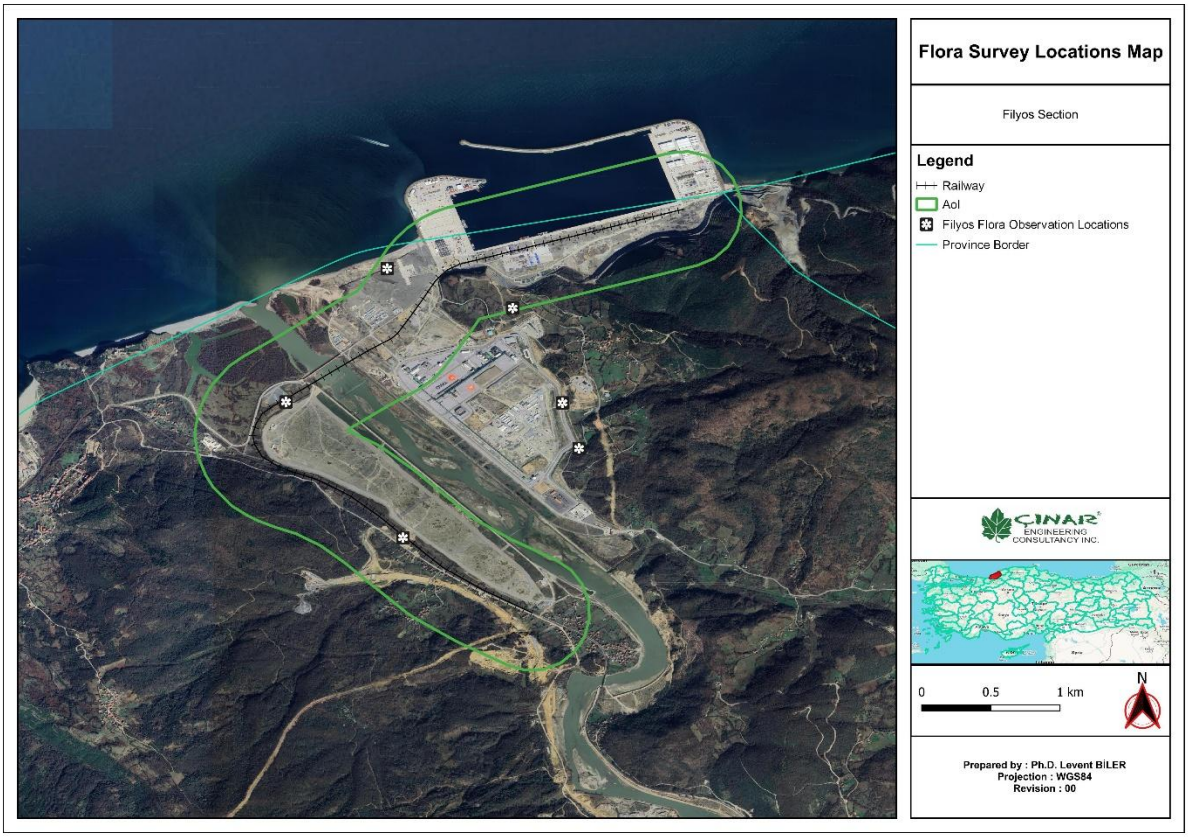


Figure 75. Flora Survey Locations

Table 81. Flora Species Identified at the Biodiversity AoI

NO	FAMILY	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	IUCN	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W			Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
	PTERIDOPHYTA																							
1	EQUISETACEAE	*Equisetum telmateia* Ehrh.	At kuyruğu	Widespread				LC							x	x	x				x			
2	HYPOLEPIDACEAE	*Pteridium aquilinum* (L.) Kuhn	Eğrelti	Widespread				LC					x	x								x		
3	ASPLENIACEAE	*Asplenium trichomanes* L.	Baldırıkara	Widespread				LC					x							x	x			
4		*Phyllitis scolopendrium* (L.) Newm.	Eğrelti	Widespread				LC					x								x			
5	ATHYRIACEAE	*Athyrium filix-foemina*(L.) Roth	Eğrelti	Widespread				LC					x				x				x			
6	ASPIDIACEAE	*Polystichum aculeatum* (L.) Roth	Eğrelti	Widespread				LC					x				x				x			
7		*Dryopteris filix-mas* (L.) Schott	Eğrelti	Widespread				LC					x		x						x			
	SPERMATOPHYTA																							
	GYMNOSPERMAE																							
	DICOTYLEDONES																							
8	RANUNCULACEAE	*Ranunculus arvensis* L.	Dugun cicegi	Mediterranean				NE					x	x						x				
9		*Ranunculus ficaria* L. subsp. *ficariiformis* Rouy & Fouc	Düğün çiçeği	Widespread				NE					x	x							x			
10		*Ranunculus repens* L.	Düğün çiçeği	Widespread				LC					x				x			x				
11		*Helleborus orientalis* Lam.	Çöpleme	Widespread				NE					x	x							x			
12		*Clematis vitalba* L.	Akasma	Widespread				NE					x		x						x			
13	PAPAVERACEAE	*Papaver rhoeas* L.	Gelincik	Widespread				NE					x	x							x			
14		*Corydalis solida* (L.) Swartz subsp. *solida*	Kazgagası	Widespread				NE					x		x					x				
15		*Glaucium flavum* Crantz	Gündürmelalesi	Widespread				LC										x		x				
16	BRASSICACEAE	*Descurainia sophia* (L.)	–	Widespread				NE								x	x				x			
17		*Brasica oleracea* L. Subsp. acephala (DC.) Metag.	Karalahana	Cultivated				NE							x						x			
18		*Cardamine bulbifera* (L.) Crantz	–	Euro-Siberian				NE					x								x			
19		*Eruca sativa* Miller	–	Widespread				NE								x					x			
20		*Thlaspi perfolatum* L.	Kulakçıklı akça çiçeği	Widespread				NE								x				x				
21		*Capsella bursa-pastoris* (L.) Medik.	Cobancantasi	Widespread				LC								x					x			
22		*Sisymbrium officinale* (L.) Scop.	Çalgıcı otu	Widespread				LC								x					x			
23	VIOLACEAE	*Viola odorata* L.	Menekşe	Widespread				NE						x	x						x			
24	POLYGALACEAE	*Polygala supina* Schreb.	–	Widespread				NE						x	x					x				
25	CARYOPHYLLACEAE	*Minuartia hamata* (Hausskn.) Mattf.	–	Widespread				NE					x	x	x					x				
26		*Holosteum umbellatum* L. var. *Umbellatum*	–	Widespread				NE					x	x	x						x			
27		*Velezia rigida* L.	–	Euro-Siberian				NE					x		x						x			
28		*Silene vulgaris (Moenc) Garcke var. vulgaris*	Gıvışkan otu	Widespread				NE					x	x	x						x			
29		*Silene dichotoma* Ehrh	–	Euro-Siberian				NE					x		x					x				
30		*Silene italica*(L.) Pers.	–	Widespread				NE						x	x						x			
31		*Silene alba* (Miller) Krause subsp. *alba*	–	Widespread				NE					x	x						x				
32		*Stellaria holostea* L.	–	Euro-Siberian				NE							x						x			
33		*Stellaria media* (L.) Vill. Subsp. *media*	–	Widespread				NE							x						x			
34	POLYGONACEAE	*Polygonum lapathifolium* L.	Söğüt otu	Widespread				NE									x			x				
35		*Polygonum maritimum* L.	Sicimlik	Widespread				NE										x		x				
36		*Rumex scutatus L.*	–	Widespread				NE						x							x			
37	CHENOPODIACEAE	*Salsola ruthenica* Iljin		Widespread				NE										x		x				
38	TILIACEAE	*Tilia argentea* Desf. ex DC.	Ihlamur	Euro-Siberian				NE					x								x			
39	GERANIACEAE	*Erodium cicutarium* (L.) L. Herit subsp. *cicutarium*	Turna gagası	Widespread				NE					x		x					x				
40		*Geranium molle* L. subsp. *molle*	–	Widespread				NE						x	x						x			
41		*Geranium purpureum* Vill.	–	Widespread				NE							x						x			
42	ACERACEAE	*Acer campestre* L. Subsp. *campestre*	Akçaağaç	Widespread				NE					x								x			
43	STAPHYLEACEAE	*Staphylea pinnata* L.	Patlak	Widespread				LC					x	x							x			

NO	FAMILY	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	IUCN	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W			Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
44	CELASTRACEAE	*Euonymus latifolius* (L.) Miller subsp. *latifolius*	–	Euro-Siberian				NE					x							x				
45	RHAMNACEAE	*Paliurus spina-christi* Miller	Karaçalı	Widespread				NE						x							x			
46	AQUIFOLIACEAE	*Ilex colchica* Poj.	Işılgan	Euro-Siberian				NE					x							x				
47	FABACEAE	*Astragalus glycyphyllos* L. subsp. *glycyphyllos*	Geven	Euro-Siberian				NE						x	x						x			
48		*Genista tinctoria* L.	Boyacı katırtırnağı	Euro-Siberian				NE					x	x							x			
49		*Chamaecytisus hirsutus* (L.) Link	–	Widespread				NE					x	x	x						x			
50		*Psoralea bituminosa* L.	Katran yoncası	Mediterranean				NE						x							x			
51		*Coronilla varia* L. subsp. *varia*	–	Widespread				NE						x							x			
52		*Melilotus alba* Desr.	Yonca	Widespread				NE						x							x			
53		*Dorycnium graecum* (L.) Ser.	–	Euro-Siberian				LC						x							x			
54		*Vicia cracca* L. subsp. *stenophylla* Vel.	Fiğ	Widespread				NE					x								x			
55		*Trifolium stellatum* L. var. *stellatum*	Ucgul	Widespread				NE					x								x			
56		*Trifolium campestre* Schreb.	Ucgul	Widespread				NE					x								x			
57		*Trifolium arvense* L. subsp. *arvense*	Üçgül	Widespread				NE					x		x						x			
58		*Lathyrus laxiflorus* (Desf.) O.Kuntze subsp. *laxiflorus*	–	Widespread				NE					x	x	x						x			
59		*Lathyrus aphaca* L. var. *biflorus* Post.	–	Widespread				NE							x						x			
60		*Medicago sativa* L.	Yonca	Widespread				LC					x								x			
61		*Medicago marina* L.	Sahil yoncası	Widespread				LC										x			x			
62	ROSACEAE	*Pyrus elaeagnifolia* Pallas subsp. *elaeagnifolia*	Ahlat	Widespread				NE					x		x						x			
63		*Prunus x domestica* L.	Erik	Cultivated				NE								x						x		
64		*Agrimonia eupatoria* L.	Kasık otu	Widespread				LC					x			x					x			
65		*Crataegus pentagyna* Waldst	Alıç	Euro-Siberian				DD						x							x			
66		*Fragaria vesca* L.	Yaban çileği	Widespread				LC					x								x			
67		*Mespilus germanica* L.	Muşmula	Euro-Siberian				LC					x								x			
68		*Potentilla recta* L.	Beşparmak otu	Widespread				NE					x	x							x			
68		*Potentilla reptans* L.	Beş parmak otu	Widespread				NE									x				x			
69		*Rubus hirtus* Waldst ex. Kit.	Böğürtlen	Euro-Siberian				LC									x				x			
70		*Rubus sanctus* Schreber	Böğürtlen	Widespread				NE						x			x				x			
71		*Geum urbanum* L.	Su karanfili	Euro-Siberian				LC					x				x				x			
72		*Pyracantha coccinea* Roemer	Ateş dikeni	Widespread				NE					x	x							x			
73		*Sanguisorba minor Scop. Subsp. muricata (Spach)Brig*	Çayırdüğmesi	Widespread				NE					x		x					x				
74		*Rosa canina* L.	Kusburnu	Widespread				LC					x							x				
75	ONAGRACEAE	*Epilobium parviflorum* Schreber	Yakı otu	Widespread				LC									x							
76	APIACEAE	*Torilis leptophylla* (L.) Reichb.	–	Widespread									x							x				
77		*Eryngium campestre* L. var. *campestre*	Şekerdikeni	Widespread				LC					x							x				
78		*Eryngium maritimum* L.	Kumboğadikeni	Widespread				LC										x			x			
79		*Oenanthe pimpinelloides* L.	Kazayağı	Widespread				NE					x							x				
80		*Seseli campestre* Besser	–	Widespread				NE					x	x						x				
81		*Pastinaca sativa* L. Subsp. *urens* (Req. Ex Godron) Celak	–	Widespread				NE					x		x						x			
82		*Daucus carota* L.	Yabani havuc	Widespread				LC					x				x				x			
83	ARALIACEAE	*Hedera helix* L.	Duvar sarmaşığı	Widespread				LC						x	x						x			
84	CORNACEAE	*Cornus sanguinea* L. Subsp. *australis* (C.A.Meyer) Jav.	Dişi kızılcık	Euro-Siberian				NE					x	x			x					x		
85		*Cornus mas* L.	Kızılcık	Euro-Siberian				NE					x				x				x			
86	CARIFOLIACEAE	*Sambucus ebulus* L.	Mürver	Euro-Siberian				LC					x				x				x			
87		*Lonicera etrusca* Santi.	Hanımeli	Widespread				LC					x								x			
88	CRASSULACEAE	*Sedum album L*	Damkoruğu	Widespread				NE						x							x			
89		*Sedum pallidum* Bieb. Var. *pallidum*	Damkoruğu	Widespread				NE						x							x			

NO	FAMILY	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	IUCN	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W			Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
90	DIPSACACEAE	*Scabiosa columbaria* L. Subsp. *columbaria* var. *columbaria*	–	Widespread				NE					x								x			
91	ASTERACEAE	*Senecio vernalis* Waldst. et Kit	–	Widespread				NE					x								x			
92		*Doronicum orientale* Hoffm.	–	Widespread				NE							x							x		
93		*Inula ensifolia* L.	–	Euro-Siberian				NE						x							x			
94		*Inula viscosa* (L.) Aiton	Zimbit	Mediterranean				NE						x							x			
95		*Bellis sylvestris* Cyr..	Koyungözü	Mediterranean				NE							x						x			
96		*Carlina intermedia* Schur.	–	Widespread				NE						x							x			
97		*Centaurea iberica* Trev. Ex Sprengel	Peygamber cicegi	Widespread				NE					x								x			
98		***Centaurea kilaea* Boiss.**	**Kilyos düğmesi**	**Euro-Siberian**	**x**		**EN**	**EN**										**x**				**x**		
99		*Anthemis cretica* L. Subsp. *pontica* (Wild.) Grierson	Papatya	Widespread				NE						x							x			
100		*Anthemis tinctoria* L	Papatya	Widespread				NE					x		x						x			
101		*Artemisia vulgaris* L.	Kabayavşan	Widespread				LC													x			
102		*Eupatorium cannabinum* L.	–	Euro-Siberian				NE					x		x		x				x			
103		*Pallenis spinosa* (L.) Cass	–	Mediterranean				NE						x							x			
104		*Carduus nutans* L. sensu lato	Kenger	Widespread				NE					x								x			
105		*Cirsium hypoleucum* DC.	Devedikeni	Euro-Siberian				NE					x								x			
106		*Cirsium ligulare* Boiss.		Widespread				NE					x								x			
107		*Otanthus maritimus* (L.) Hoffmans. & Link		Mediterranean				NE										x			x			
108		*Pulicaria dysenterica* (L.) Bernh.	-	Widespread				NE						x		x	x		x		x			
109		*Senecio vulgaris* L.	-	Widespread				NE								x					x			
110		*Tanacetum parthenium* (L) Schultz.	Solucan otu	Widespread				NE					x								x			
111		*Tussilago farfara* L.	Öksürük otu	Euro-Siberian				NE					x			x					x			
112		*Hieracium vagum* Jordan.	–	Euro-Siberian				NE					x								x			
113		*Lapsana communis* L.	–	Widespread				NE					x		x					x				
114		*Chondrilla juncea* L . var. *juncea*	–	Widespread				NE					x							x				
115		*Aster subulatus* (Michx.) Hort.eEx Michx.	–	Widespread				LC						x							x			
116		*Sonchus asper* (L.) Hill subsp. *glaucescens* (Jordon) Ball	–	Widespread				NE							x						x			
117		*Crepis sancta* (L.) Babcock	–	Widespread				NE					x							x				
118	ERICACEAE	*Arbutus unedo* L.	Kocayemiş	Widespread				LC						x								x		
119		*Arbutus andrachne* L.	Sandal ağacı	Widespread				LC						x							x			
120		*Erica arborea* L.	Çalı fundası	Widespread				LC					x	x									x	
121	PRIMULACEAE	*Androsace maxima* L.	–	Widespread				NE					x								x			
122		***Cyclamen coum* Miller var. *coum***	**Sıklamen**	**Widespread**				LC			**EK 2**		**x**								**x**			
123		*Primula vulgaris* Huds. subsp. *vulgaris*	Çuhaçiçeği	Euro-Siberian				NE					x		x						x			
124	OLEACEAE	*Jasminum fruticans* L.	Yasemin	Euro-Siberian				NE					x	x	x						x			
125		*Phillyrea latifolia* L.	Ak kesme	Mediterranean				LC						x	x								x	
126		*Ligustrum vulgare* L.	Kurtbağrı	Euro-Siberian				NE					x		x					x				
127		*Fraxinus angustifolia* Vahl. subsp. *oxycarpa* (Bieb. Ex Willd.) Franco & Rocha	Dişbudak	Euro-Siberian				NE					x								x			
128	ASCLEPIADACEAE	*Periploca graeca* L. var. *graeca*	–	Mediterranean				NE					x				x				x			
129	CONVULACEAE	*Ipomea purpurea* (L.) Roth	–	Widespread				NE								x					x			
130	BORAGINACEAE	*Echium italicum L.*	–	Mediterranean				NE					x		x						x			
131		*Buglossoides arvensis* (L.) Johnston	–	Mediterranean				NE					x		x						x			
132		*Trachystemon orientalis* (L.) G. Don	Ispıt	Euro-Siberian				NE					x									x		
133		*Lithospermum officinale* L.	–	Euro-Siberian				NE							x						x			
134	SCROPHULARIACEAE	*Verbascum blattaria* L.	Sığırkuyruğu	Widespread				NE					x		x						x			
135		*Parentucellia latifolia* (L.) Caruel *subsp. latifolia*	–	Mediterranean				NE					x		x						x			
136	CONVOLVULACEAE	*Convolvulus arvensis L.*	–	Widespread				NE					x		x						x			

NO	FAMILY	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	IUCN	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W			Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
137	VERBANACEAE	*Vitex agnus-castus* L.	Hayıt	Mediterranean				NE													x			
138	LAMIACEAE	*Lamium amplexicaule* L.	Ballibaba	Widespread				NE					x		x						x			
139		*Lamium purpureum* L. var. *purpureum*	–	Widespread				NE					x		x						x			
140		*Calamintha nepeta* (L.) Savi subsp. *glandulosa* (Req.) P.W. Ball	–	Widespread				NE					x	x							x			
141		*Calamintha sylvatica* Bromf. Subsp. *sylvatica*	–	Euro-Siberian				NE					x	x							x			
142		*Stachys maritima* Gouan	Kumkarabaşı	Mediterranean				NE										x			x			
143		*Origanum vulgare* L. Subsp. *viride* (Boiss.) Hayek	Kekik	Widespread				NE						x							x			
144		*Prunella vulgaris* L.	–	Euro-Siberian				LC					x		x						x			
145		*Melissa officinalis* L. Subsp. *altissima* (Sm.) Arcangeli	Oğul otu	Mediterranean				NE					x				x				x			
146		*Teucrium chamaedrys* L. subsp. *chamaedrys*	Acıyavşan	Euro-Siberian				NE					x	x	x						x			
147		*Teucrium polium L.*	–	Widespread				NE					x		x						x			
148		*Salvia forskahlei* L.	Adaçayı	Euro-Siberian				NE					x	x	x							x		
149	SANTALACEAE	*Osyris alba* L.	–	Mediterranean				NE						x							x			
150	THYMELAEACEAE	*Daphne pontica* L.	–	Euro-Siberian				NE					x								x			
151	LAURACEAE	*Laurus nobilis* L.	Defne	Mediterranean				LC					x	x	x								x	
152	PLANTAGINACEAE	*Plantago major* L. Subsp. *major*	Sinir otu	Widespread				NE							x	x					x			
153		*Plantago lanceolata* L.	Sinir otu	Widespread				LC								x					x			
154	URTICACEAE	*Urtica dioica* L.	Isırgan	Euro-Siberian				NE					x		x						x			
155	CANNABACEAE	*Humulus lupulus* L.	Şerbetçi otu	Euro-Siberian				LC					x								x			
156	MORACEAE	*Morus alba* L.	Dut	Cultivated				NE								x					x			
157		*Ficus carica* L. subsp. *carica*	İncir	Widespread				NE								x					x			
158	ULMACEAE	*Ulmus minor* Miller subsp. *minor*	Karaağaç	Widespread				NE									x				x			
159	PLATANACEAE	*Platanus orientalis* L.	Çınar	Widespread				DD									x				x			
160	FAGACEAE	*Castanea sativa* Miller	Kestane	Euro-Siberian				LC					x								x			
161		*Quercus hartwissiana Steven*	Istranca meşesi	Euro-Siberian				DD						x	x							x		
162		*Quercus petraea* (Mattuschka) Liebl. Subsp. *iberica* (Steven ex Bieb.) Krassiln.	Sapsız meşe	Widespread				NE					x	x	x							x		
163	CORYLLACEAE	*Carpinus betulus* L.	Gürgen	Euro-Siberian				LC					x		x								x	
164		*Ostrya carpinifolia* Scop.	Kayacık	Mediterranean				LC														x		
165		*Coryllus avellana* L. Var. *avellana*	Fındık	Euro-Siberian				NE					x		x						x			
166	BETULACEAE	*Alnus glutinosa* (L.) Gaertner subsp. *glutinosa*	Kızılağaç	Euro-Siberian				NE									x					x		
167	SALICACEAE	*Salix alba* L.	Aksöğüt	Euro-Siberian				LC									x				x			
168		*Salix cinerea* L.	Boz Söğüt	Euro-Siberian				LC									x				x			
169	LORANTHACEAE	*Viscum album* L. subsp. *album*	Ökse otu	Widespread				NE					x		x						x			
170	EUPHORBIACEAE	*Euphorbia rigida* Bieb.	Sütleğen	Mediterranean				NE					x								x			
171		*Euphorbia amygdaloides* L. var. *amygdaloides*	Sütleğen	Euro-Siberian				NE					x								x			
172		*Euphorbia paralias* L.	Kumsütleğeni	Mediterranean				NE										x			x			
173		*Mercurialis annua* L.	–	Widespread				NE								x					x			
174	RUBIACEAE	*Galium fissurense* Ehrend.& Schönb. -Tem.	Yogurt otu	Iran-Turan				LC					x								x			
175		*Rubia peregrina* L.	–	Mediterranean				NE					x								x			
	MONOCOTYLEDONES							NE													x			
176	ARACEAE	*Arum italicum* Miller	Domuzlahanası	Widespread				NE					x								x			
177	LILIACEAE	*Allium scorodoprasum* L. subsp. *rotundum* (L.) Stearn	Yabani sarımsak	Mediterranean				NE					x			x					x			
178		*Ruscus aculeatus* L. Var. *aculeatus*	Tavşan memesi	Widespread				NE					x	x	x						x			
179		*Ruscus hypoglossum* L.	Atdili	Euro-Siberian				LC					x								x			
180		*Asparagus aphyllus* L. Subsp. *orientalis* (Baker) P.H. Davis	Kuşkonmaz	Mediterranean				NE					x	x	x						x			
181		*Smilax excelsa* L.	Silcan	Euro-Siberian				NE					x	x							x			

NO	FAMILY	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	IUCN	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W			Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
182		*Scilla bifolia* L.	–	Mediterranean				LC							x						x			
183	**AMARYLLIDACEAE**	***Pancratium maritimum* L.**	**Kumzambağı**	**Mediterranean**			**EN**	**EN**										**x**				**x**		
184	ORCHIDACEAE	*Spiranthes spiralis* (L.) Chevall	Orkide	Mediterranean				LC							x					x				
185	DIOSCOREACEAE	*Tamus communis* L. Subsp. *communis*	–	Widespread				NE					x								x			
186	TYPHACEAE	*Typha domingensis* Pers.	Hasır otu	Widespread				NE											x		x			
187	JUNCACEAE	*Juncus littoralis* C.A. Meyer	Kofa	Mediterranean				NT										x	x			x		
188	CYPERACEAE	*Carex distachya* Desf. Var. *distachya*	–	Mediterranean				NE					x					x	x		x			
189		*Carex distans* L.	–	Euro-Siberian				LC									x	x	x		x			
190		*Cyperus longus* L.		Widespread				LC													x			
191	POACEAE	*Poa bulbosa* L.	–	Widespread				NE					x						x		x			
192		*Lolium perenne* L.	Cim otu	Widespread				LC					x								x			
193		*Brachypodium sylvaticum* (Hudson) P. Beauv.	–	Euro-Siberian				NE					x		x					x				
194		*Bromus japonicus* Thunb. subsp. *japonicus*	–	Widespread				NE					x								x			
195		*Cynodon dactylon* (L.) Pers. var. *dactylon*	Ayrık otu	Widespread				NE								x					x			
196		*Leymus racemosus* (Lam.) Tzvelev		Widespread				NE										x			x			
197		*Phragmites australis* (Cav.) Trin. ex Steudel	Kamış	Euro-Siberian				LC									x		x				x	
198		*Dactylis glomerata* L. subsp. *hispanica* (Roth) Nyman	Parmak otu	Mediterranean				NE					x		x						x			
199		*Briza media* L.	–	Widespread				NE							x						x			
200		*Phleum phleoides* (L.) Karsten	–	Euro-Siberian				NE					x		x						x			
201		*Hordeum murinum* L.	Yabani arpa	Widespread				LC					x		x						x			
202		*Piptatherum coerulescens* (Desf.) P. Beauv.	–	Widespread				NE					x		x						x			
203		*Bothriochloa ischaemum* (L.) Keng	–	Widespread				NE					x		x						x			

Endemism:
R: Regional Endemic
W: Widespreaad Endemic

Habitat
1: B1.2
2: C1.2
3: C2.2:
4: C2.5:
5: D5.1:
6: G1.A
7: I1.2, J1.2, J2.3, J3.2, J4.2, J4.3, J4.5

Relative Abundance
1: Locally Rare
2: Uncommon
3: Common
4: Abundant
5: Dominant

According to the surveys performed in the area *Centaurea kilaea*, *Pancratium maritimum*, and *Cyclamen coum* var. *coum* species are located outside the project footprint and the AoI. Therefore, endemic and rare species habitats and locations will not be affected by the Project.

5.8.3 Fauna

5.8.3.1 Invertebrates

The scope and the methodology used during the field surveys were given above. The daily activity reports of the site surveys are given in Appendix-4.

Insects live in asocial, semi-social or social groups, and organize their lives in line with their ecological acquisition. This should be taken into account in activities to be carried out in areas where insects are found. If insects perceive a life-threatening response from their ecological acquisition, or when their habitats deteriorate, these creatures can leave their ecological habitat. Insects consisted of a wide variety of groups. Each group (generally Lepidoptera, Odonata, Hymenoptera, Diptera) according to its own biological needs; They should be investigated by taking into account their feeding, habitat, reproductive and socializing behaviors. Also, their impact on ecosystem services were also evaluated.

At the evaluation stage, suggestions should be presented by making a two-step evaluation.

1. Interaction with insects during the activity,
2. Interaction with insects should be evaluated after the activity.

Field surveys were conducted between 6.10.2022 and 21.05.2023. Surveys were performed at 6 locations (see Figure 76). During field survey each location is visited and spent equal amount of time to observe invertebrate species and if possible, the pictures were taken with a Canon N70 digital camera. 29 different insects were observed belonging to 7 insect orders. Among these 11 species of butterflies were observed in Lepidoptera order were observed (see Table 82). Based on the IUCN categories all species observed in 6 locations are not threatened. They are all in LC “Least concern” risk category.

Table 82. Observed Invertebrate Species at Filyos Section

Species	Turkish Name	English Name	Loc 1	Loc 2	Loc 3	Loc 4	Loc 5	Loc 6
Hymenoptera								
Vespa crabro	Avrupa Yaban arısı	European hornet	x		x			
Vespa orientalis	Doğu Yaban arısı	Oriental hornet						x
Apis mellifera	Balarısı	Honeybee	x		x	x	x	x
Vespula vulgaris	Sarıca arı	Yellow jacket						x
Diptera								
Spaerophoria scripta	Arı sineği	Hover fly				x		x
Episyrphus balteatus	Arı sineği	Hover fly				x	x	
Eristalis tenax	Arı sineği	Hover fly	x				x	x
Chyrsotoxum cautum	Arı sineği	Hoverfly					x	x
Lucilia sericata	Ölü sineği	Blow fly						x
Orthoptera								
Acrida bicolor	Ekin Çekirgesi	Crop grasshopper				x		
Odonata								
Ischnura elegans								x
Sympetrum fonscolombii	Kırmızı damarlı yusufçuk	Red veined darter	x			x	x	x
Sympetrum striolatum							x	x
Platycnemis pennipes							x	x
Hemiptera								
Lygaeus equestris		Seed bug						x
Philaenus spumarius	Tükrük böceği	Spittle bugs	x			x	x	x
Coleoptera								
Coccinella septempunctata	Uğur böceği	Lady bug					x	
Harmonia axyridis	Uğur böceği	Lady bug		x			x	x
Lepidoptera								
Vanessa cardui	Diken kelebeği	Painted lady		x			x	x
Colias crocea	Sarı azamet	Dark clouded yellow					x	
Coenonympha pamphilus	Küçük zıpzıp perisi	Small heath	x					

Species	Turkish Name	English Name	Loc 1	Loc 2	Loc 3	Loc 4	Loc 5	Loc 6
Vanessa atalanta	Atalanta	Red admiral		x				
Pontia edusa	Yeni benekli melek	New bath white						x
Leptidea sinapis	Narin orman beyazı	Wood white						x
Pararge aegeria	Karanlık orman esmeri	Speckled wood		x	x			x
Pieris rapae	Küçük beyaz	Small white						x
Polyommatus icarus	Çokgözlü mavi	Common blue	x					x
Pieris brassicae	Büyük beyaz	Large white						x
Lycaena phlaeas	Küçük bakır	Small copper						x

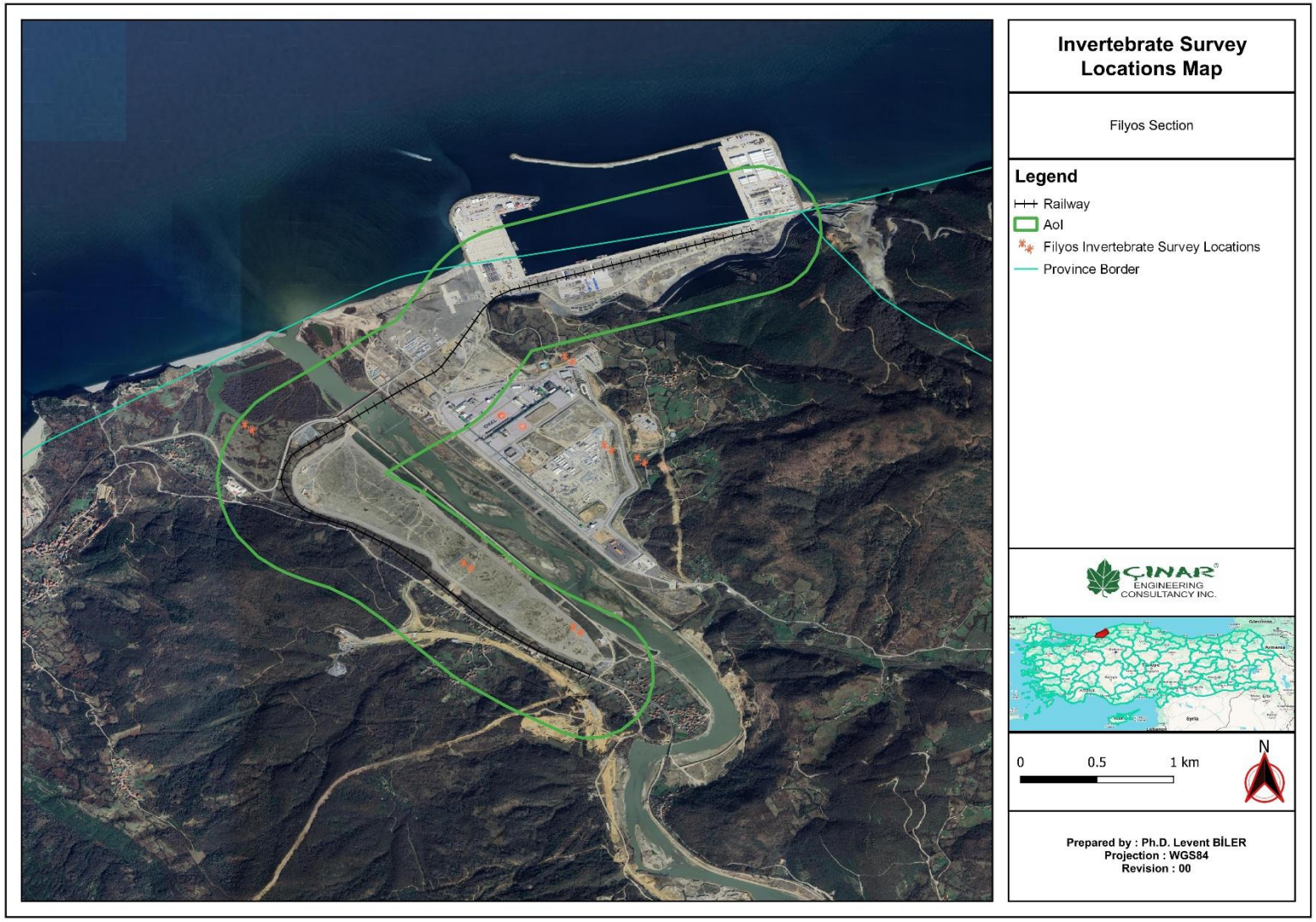


Figure 76. Invertebrate Survey Locations Map

5.8.3.2 Amphibian and Reptile Species

In order to determine the herpetofauna species distributed in the area within the AoI, field surveys were carried out for Filyos Section between 14.06.2023-15.06.2023. The daily activity reports of the site surveys are given in Appendix-4.

Field surveys were performed at 5 locations (see Figure 77). As a result of the field observation studies carried out on the Filyos line, 8 herptile species were identified in total, including 2 amphibians, 1 turtle, 4 lizards, and 1 snake species. The detailed data on observed species are given at Table 83. 7 species were listed as “LC”, 1 as “VU” according to the IUCN. 4 species were listed in Ann-2 and 4 species in Ann-3 according to the Bern Convention.

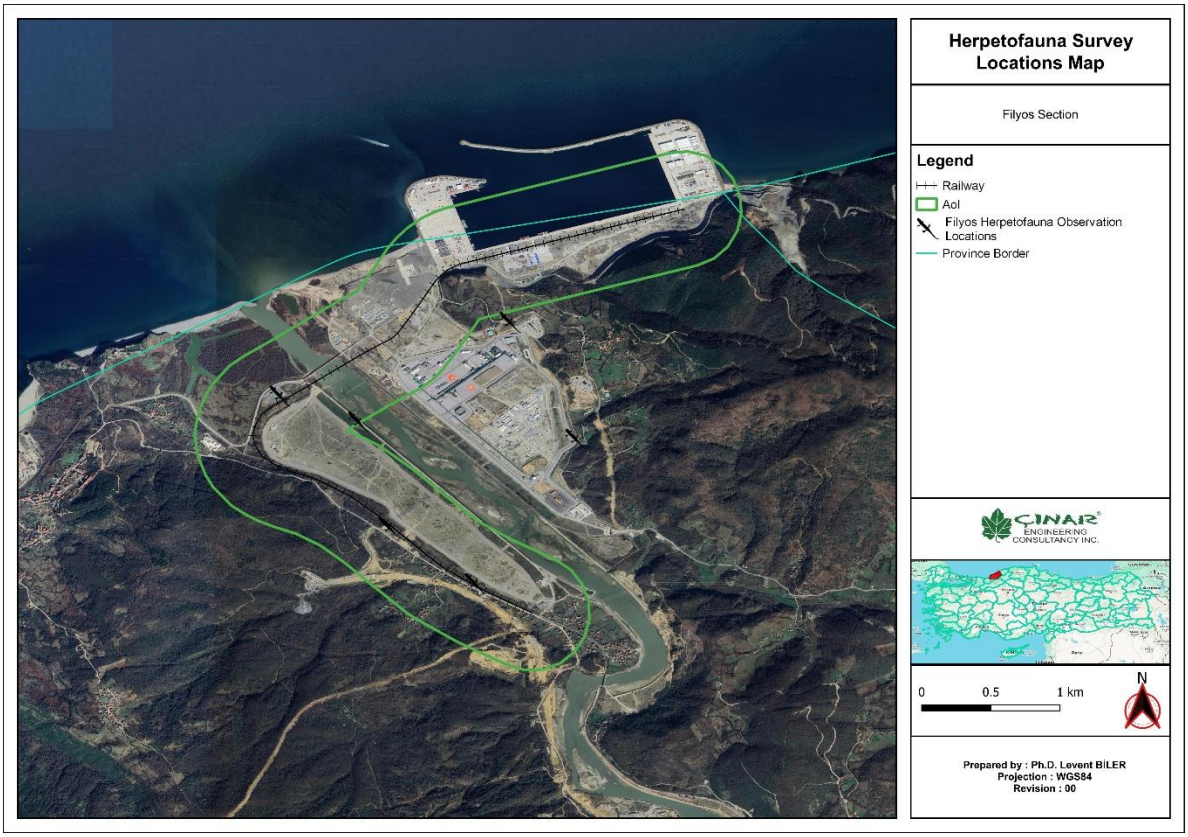


Figure 77. Herpetofauna Survey Locations for Filyos Section

Table 83. Detailed data on Amphibia and Reptile Species Determined in Filyos Section

Family	Turkish Name	Scientific name	Endemizm	IUCN	CITES	BERN	MAF	CHC	OT
Bufonidae	Siğilli Kurbağa	*Bufo bufo*	0	LC	Unlisted	Annex 3	Unlisted	Unlisted	Literature+questionary
Ranidae	Ova Kurbağası	*Pelophylax ridibundus*	0	LC	Unlisted	Annex 3	Unlisted	Unlisted	Direct Observation
Testudinidae	Tosbağa	*Testudo graeca*	0	VU	Annex 2	Annex 2	UP	Unlisted	Direct Observation
Anguidae	Yılanımsı Kertenkele	*Anguis colchica*	0	LC	Unlisted	Annex 3	UP	Unlisted	Literature+questionary
Lacertidae	Yeşil Kertenkele	*Lacerta viridis*	0	LC	Unlisted	Annex 2	UP	Unlisted	Direct Observation
Lacertidae	Duvar Kertenkelesi	*Podarcis muralis*	0	LC	Unlisted	Annex 2	UP	Unlisted	Direct Observation
Lacertidae	İstanbul Kertenkelesi	*Podarcis siculus*	0	LC	Unlisted	Annex 2	UP	Unlisted	Direct Observation
Natricidae	Küpeli Su Yılanı	*Natrix natrix*	0	LC	Unlisted	Annex 3	UP	Unlisted	Literature+questionary

IUCN Red List: DD= Data Deficit, NE= Not Evaluated, LC=Least Concern, VU= Vulnerable, EN=Endangered, CR=Critically Endangered

MAF: Ministry of Agriculture and Forestry
OT: Observation Type

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora)
Appendix-I: species, which are under the threat of extinction. Trade in the specimens of these species is not allowed except in extraordinary circumstances
Appendix-II: species, which are not threatened with extinction but trade in specimens is restricted to prevent utilization incompatible with their survival
Appendix-III: species for which other parties of CITES is applied for assistance in controlling trade and which are conserved at least in one country

BERN: Bern Convention
Appendix II: List of strictly protected fauna species
Appendix III: List of protected fauna species

CHC: 2021-2022 Decisions of Central Hunting Commission
Appendix -I (species protected by the CHC)
Appendix -II (species allowed to be hunted for some time)

5.8.3.3 Bird Species

Field surveys for ornithological assessments within the scope of the project have been conducted in Filyos Section survey area between 17.04.2023-18.04.2023. 10 observation locations were selected (see Figure 78).

Based on the autumn observations in Filyos and other previous observations, a total of 106 bird species identified during the field studies (see Table 84). Red-footed Falcon and European Turtle Dove are listed as “VU-Vulnerable”, Northern Lapwing, Eurasian Oystercatcher and Eurasian Curlew are listed as “NT-Near Threatened” according to the IUCN Red List criteria. The other species have the “LC-Least Concern” Criteria. 26 species are listed in Annex-1 of Birds Directive. These species are: Glossy Ibis, Little Egret, Great White Egret, Purple Heron, Squacco Heron, White Stork, Western Marsh Harrier, Hen Harrier, Long-legged Buzzard, Lesser Spotted Eagle, Short-toed Snake Eagle, Ruff, Wood Sandpiper, Northern Lapwing, Mediterranean Gull, Gull-billed Tern, Sandwich Tern, Syrian Woodpecker, Common Kingfisher, Red-footed Falcon, Great Short-toed Lark, Red-backed Shrike, Masked Shrike, Lesser Grey Shrike, Tawny Pipit and Red-breasted Flycatcher. According to the Birds Directive, for all species listed Annex-1 the member states must conserve their most suitable territories in number and size as Special Protection Areas.

According to the BERN Convention, 73 bird species are listed in Annex-2, which are listed as the strictly protected fauna species, and 25 bird species are listed in Annex-3, which are listed as protected fauna species.

Little Egret and Purple Herons were seen migrating over the Black Sea and used the area as a stopover site after they have crossed the Black Sea. Purple herons may also breed in the Kuş Cenneti part. Marsh Harrier, Syrian Woodpecker, Common Kingfisher, Red-backed Shrike may use the area as breeding site as well. The other species listed in the Bird Directive are migratory species, using the Filyos area in different periods during spring and autumn migration, as well as during the winter. The Northern Lapwing use the grasslands and mudflats, the Eurasian Curlew use the coastal areas and the grasslands for staging and feeding site. The Red-footed Falcon is a passage migrant in Türkiye and stays only for few days in stopover sites to replenish its fuel reserves. The European Turtle Dove (Streptopelia turtur) has been recorded in the Filyos area of Zonguldak, where it is observed using the site primarily during its migration and foraging periods.

In Filyos a total of 260 bird species were recorded since 2006. Until the harbor was built, active birdwatching took part there through local birdwatchers. Due to the high number of species diversity, the area is referred as "bird paradise" by local institutions. Most of the detected species are migratory birds, stopping over there to refuel before they continue to migrate. In order to complete their migration successfully, such stopover areas are of critical importance for birds before and after crossing the sea.

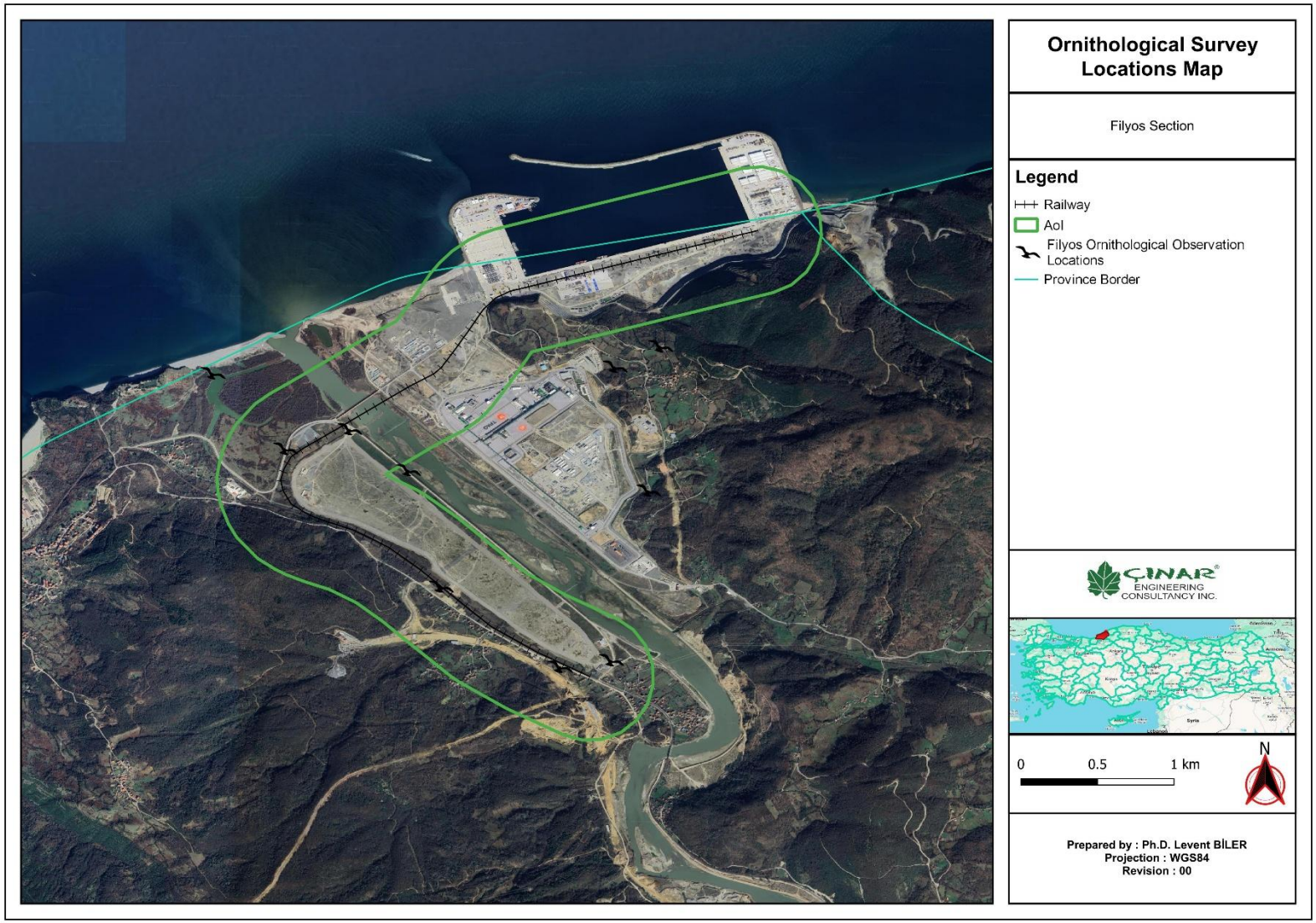


Figure 78. Ornithological Observation Locations for Filyos Section

Table 84. List of bird species identified at Filyos Section

No	Family	Scientific name	English name	Turkish name	IUCN	BERN	Bird Directive
1	Podicipedidae	*Tachybaptus ruficollis*	Little Grebe	Küçük batağan	LC	Annex-3	
2	Podicipedidae	*Podiceps cristatus*	Great Crested Grebe	Bahri	LC	Annex-2	
3	Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant	Karabatak	LC	Annex-3	
4	Phalacrocoracidae	*Microcarbo pygmeus*	Pygmy Cormorant	Küçük karabatak	LC	Annex-2	
5	Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	Çeltikçi	LC	Annex-2	Annex-1
6	Anatidae	*Anas crecca*	Eurasian Teal	Çamurcun	LC	Annex-3	
7	Anatidae	*Anas platyrhynchos*	Mallard	Yeşilbaş	LC	Annex-3	
8	Anatidae	*Spatula clypeata*	Northern Shoveler	Kaşıkgaga	LC	Annex-3	
9	Ardeidae	*Egretta garzetta*	Little Egret	Küçük ak balıkçıl	LC	Annex-2	Annex-1
10	Ardeidae	*Ardea alba*	Great White Egret	Büyük ak balıkçıl	LC	Annex-2	Annex-1
11	Ardeidae	*Ardea cinerea*	Grey Heron	Gri balıkçıl	LC	Annex-3	
12	Ardeidae	*Ardea purpurea*	Purple Heron	Erguvani balıkçıl	LC	Annex-2	Annex-1
13	Ardeidae	*Bubulcus ibis*	Cattle Egret	Sığır balıkçılı	LC	Annex-2	
14	Ardeidae	*Ardeola ralloides*	Squacco Heron	Alaca balıkçıl	LC	Annex-2	Annex-1
15	Ciconiidae	*Ciconia ciconia*	White Stork	Leylek	LC	Annex-2	Annex-1
16	Accipitridae	*Circus aeruginosus*	Western Marsh Harrier	Saz delicesi	LC	Annex-2	Annex-1
17	Accipitridae	*Circus cyaneus*	Hen Harrier	Gökçe delice	LC	Annex-2	Annex-1
18	Accipitridae	*Accipiter nisus*	Eurasian Sparrowhawk	Atmaca	LC	Annex-2	
19	Accipitridae	*Buteo buteo*	Common Buzzard	Şahin	LC	Annex-2	
20	Accipitridae	*Buteo rufinus*	Long-legged Buzzard	Kızıl şahin	LC	Annex-2	Annex-1
21	Accipitridae	*Clanga pomarina*	Lesser Spotted Eagle	Küçük orman kartalı	LC	Annex-2	Annex-1
22	Accipitridae	*Circaetus gallicus*	Short-toed Snake Eagle	Yılan kartalı	LC	Annex-2	Annex-1
23	Scolopacidae	*Calidris alba*	Sanderling	Ak kumkuşu	LC	Annex-2	
24	Scolopacidae	*Calidris alpina*	Dunlin	Karakarınlı kumkuşu	LC	Annex-2	
25	Scolopacidae	*Calidris pugnax*	Ruff	Döğüşkenkuş	LC	Annex-3	Annex-1
26	Scolopacidae	*Calidris minuta*	Little Stint	Küçük kumkuşu	LC	Annex-2	

No	Family	Scientific name	English name	Turkish name	IUCN	BERN	Bird Directive
27	Scolopacidae	*Tringa ochropus*	Green Sandpiper	Yeşil düdükçün	LC	Annex-2	
28	Scolopacidae	*Tringa glareola*	Wood Sandpiper	Orman düdükçünü	LC	Annex-2	Annex-1
29	Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	Taşçeviren	LC	Annex-2	
30	Scolopacidae	*Numenius arquata*	Eurasian Curlew	Kervançulluğu	**NT**	Annex-3	
31	Charadriidae	*Charadrius hiaticula*	Common Ringed Plover	Halkalı cılıbıt	LC	Annex-2	
32	Charadriidae	*Charadrius dubius*	Little Ringed Plover	Halkalı küçük cılıbıt	LC	Annex-2	
33	Charadriidae	*Pluvialis squatarola*	Grey Plover	Gümüş yağmurcun	LC	Annex-3	
34	Charadriidae	*Vanellus vanellus*	Northern Lapwing	Kızkuşu	**NT**	Annex-3	Annex-1
35	Haematopodidae	*Haematopus ostralegus*	Eurasian Oystercatcher	Poyrazkuşu	**NT**	Annex-3	
36	Rallidae	*Gallinula chloropus*	Common Moorhen	Sutavuğu	LC	Annex-3	
37	Rallidae	*Fulica atra*	Eurasian Coot	Sakarmeke	LC	Annex-3	
38	Laridae	*Ichthyaetus melanocephalus*	Mediterranean Gull	Akdeniz martısı	LC	Annex-2	Annex-1
39	Laridae	*Chroicocephalus ridibundus*	Black-headed Gull	Karabaş martı	LC	Annex-3	
40	Laridae	*Larus fuscus*	Lesser Black-backed Gull	Karasırtlı martı	LC	-	
41	Laridae	*Larus michahellis*	Yellow-legged Gull	Gümüş martı	LC	Annex-3	
42	Laridae	*Gelochelidon nilotica*	Gull-billed Tern	Gülen sumru	LC	Annex-2	Annex-1
43	Laridae	*Thalasseus sandvicensis*	Sandwich Tern	Karagagalı sumru	LC	Annex-2	Annex-1
44	Picidae	*Dendrocopos syriacus*	Syrian Woodpecker	Alaca ağaçkakan	LC	Annex-2	Annex-1
45	Picidae	*Dryobates minor*	Lesser Spotted Woodpecker	Küçük ağaçkakan	LC	Annex-2	
46	Alcedinidae	*Alcedo atthis*	Common Kingfisher	Yalıçapkını	LC	Annex-2	Annex-1
47	Meropidae	*Merops apiaster*	European Bee-eater	Arıkuşu	LC	Annex-2	
48	Upupidae	*Upupa epops*	Eurasian Hoopoe	İbibik	LC	Annex-2	
49	Apodidae	*Apus apus*	Common Swift	Ebabil	LC	Annex-3	
50	Falconidae	*Falco subbuteo*	Eurasian Hobby	Delice doğan	LC	Annex-2	
51	Falconidae	*Falco tinnunculus*	Common Kestrel	Kerkenez	LC	Annex-2	
52	Falconidae	*Falco vespertinus*	Red-footed Falcon	Ala doğan	**VU**	Annex-2	Annex-1
53	Aegithalidae	*Aegithalos caudatus*	Long-tailed Tit	Uzunkuyruklu baştankara	LC	Annex-3	

No	Family	Scientific name	English name	Turkish name	IUCN	BERN	Bird Directive
54	Alaudidae	*Calandrella brachydactyla*	Greater Short-toed Lark	Bozkır toygarı	LC	Annex-2	Annex-1
55	Alaudidae	*Galerida cristata*	Crested Lark	Tepeli toygar	LC	Annex-3	
56	Cettiidae	*Cettia cetti*	Cetti's Warbler	Kamışbülbülü	LC	Annex-2	
57	Cisticolidae	*Prinia lepida*	Graceful Prinia	Dikkuyruklu ötleğen	LC	Annex-2	
58	Columbidae	*Columba livia*	Rock Dove	Kaya güvercini	LC	Annex-3	
59	Columbidae	*Columba palumbus*	Common Wood Pigeon	Tahtalı	LC	-	
60	Columbidae	*Streptopelia decaocto*	Eurasian Collared Dove	Kumru	LC	Annex-3	
61	Columbidae	*Streptopelia turtur*	European Turtle Dove	Üveyik	**VU**	Annex-2	
62	Corvidae	*Garrulus glandarius*	Eurasian Jay	Alakarga	LC	-	
63	Corvidae	*Pica pica*	Eurasian Magpie	Saksağan	LC	-	
64	Corvidae	*Coloeus monedula*	Western Jackdaw	Küçük karga	LC	-	
65	Corvidae	*Corvus cornix*	Hooded Crow	Leş kargası	LC	-	
66	Fringillidae	*Fringilla coelebs*	Common Chaffinch	İspinoz	LC	Annex-3	
67	Fringillidae	*Chloris chloris*	European Greenfinch	Florya	LC	Annex-2	
68	Fringillidae	*Carduelis carduelis*	European Goldfinch	Saka	LC	Annex-2	
69	Fringillidae	*Spinus spinus*	Eurasian Siskin	Karabaşlı iskete	LC	Annex-2	
70	Fringillidae	*Linaria cannabina*	Common Linnet	Ketenkuşu	LC	Annex-2	
71	Fringillidae	*Serinus serinus*	European Serin	Küçük iskete	LC	Annex-2	
72	Hirundinidae	*Hirundo rustica*	Barn Swallow	Kır kırlangıcı	LC	Annex-2	
73	Hirundinidae	*Riparia riparia*	Collared Sand Martin	Kum kırlangıcı	LC	Annex-2	
74	Laniidae	*Lanius collurio*	Red-backed Shrike	Kızılsırtlı örümcekkuşu	LC	Annex-2	Annex-1
75	Laniidae	*Lanius minor*	Lesser Grey Shrike	Karaalınlı örümcekkuşu	LC	Annex-2	Annex-1
76	Laniidae	*Lanius nubicus*	Masked Shrike	Maskeli örümcekkuşu	LC	Annex-2	Annex-1
77	Motacillidae	*Anthus campestris*	Tawny Pipit	Kır incirkuşu	LC	Annex-2	Annex-1
78	Motacillidae	*Anthus pratensis*	Meadow Pipit	Çayır incirkuşu	LC	Annex-2	
79	Motacillidae	*Anthus trivialis*	Tree Pipit	Ağaç incirkuşu	LC	Annex-2	
80	Motacillidae	*Motacilla flava*	Western Yellow Wagtail	Sarı kuyruksallayan	LC	Annex-2	

No	Family	Scientific name	English name	Turkish name	IUCN	BERN	Bird Directive
81	Motacillidae	*Motacilla cinerea*	Grey Wagtail	Dağ kuyruksallayanı	LC	Annex-2	
82	Motacillidae	*Motacilla alba*	White Wagtail	Ak kuyruksallayan	LC	Annex-2	
83	Muscicapidae	*Erithacus rubecula*	European Robin	Kızılgerdan	LC	Annex-2	
84	Muscicapidae	*Phoenicurus ochruros*	Black Redstart	Kara kızılkuyruk	LC	Annex-2	
85	Muscicapidae	*Phoenicurus phoenicurus*	Common Redstart	Kızılkuyruk	LC	Annex-2	
86	Muscicapidae	*Saxicola rubetra*	Whinchat	Çayır taşkuşu	LC	Annex-2	
87	Muscicapidae	*Saxicola rubicola*	European Stonechat	Taşkuşu	LC	Annex-2	
88	Muscicapidae	*Oenanthe oenanthe*	Northern Wheatear	Kuyrukkakan	LC	Annex-2	
89	Muscicapidae	*Muscicapa striata*	Spotted Flycatcher	Benekli sinekkapan	LC	Annex-2	
90	Muscicapidae	*Ficedula parva*	Red-breasted Flycatcher	Küçük sinekkapan	LC	Annex-2	Annex-1
91	Paridae	*Parus major*	Great Tit	Büyük baştankara	LC	Annex-2	
92	Passeridae	*Passer domesticus*	House Sparrow	Serçe	LC	-	
93	Phylloscopidae	*Phylloscopus trochilus*	Willow Warbler	Söğütbülbülü	LC	Annex-2	
94	Phylloscopidae	*Phylloscopus collybita*	Common Chiffchaff	Çıvgın	LC	Annex-2	
95	Remizidae	*Remiz pendulinus*	Eurasian Penduline Tit	Çulhakuşu	LC	Annex-3	
96	Sturnidae	*Sturnus vulgaris*	Common Starling	Sığırcık	LC	-	
97	Acrocephalidae	*Acrocephalus scirpaceus*	Eurasian Reed Warbler	Saz kamışçını	LC	Annex-2	
98	Acrocephalidae	*Iduna pallida*	Eastern Olivaceous Warbler	Ak mukallit	LC	Annex-2	
99	Sylviidae	*Curruca melanocephala*	Sardinian Warbler	Maskeli ötleğen	LC	Annex-2	
100	Sylviidae	*Curruca communis*	Common Whitethroat	Akgerdanlı ötleğen	LC	Annex-2	
101	Sylviidae	*Sylvia borin*	Garden Warbler	Boz ötleğen	LC	Annex-2	
102	Sylviidae	*Sylvia atricapilla*	Eurasian Blackcap	Karabaşlı ötleğen	LC	Annex-2	
103	Turdidae	*Turdus merula*	Common Blackbird	Karatavuk	LC	Annex-3	
104	Turdidae	*Turdus philomelos*	Song Thrush	Öter ardıç	LC	Annex-3	
105	Emberizidae	*Emberiza cirlus*	Cirl Bunting	Bahçe kirazkuşu	LC	Annex-2	
106	Emberizidae	*Emberiza calandra*	Corn Bunting	Tarla kirazkuşu	LC	Annex-3	

5.8.3.4 Mammal Species

The scope and the methodology used during the field surveys were given above. The daily activity reports of the site surveys are given in Appendix-4.

Surveying and monitoring animal communities in terrestrial ecosystems is an important component element in an ecosystem structure; due to the fact that they are in a permanent and close contact with most important man-made factors that has an impact on the environment.

Monitoring of wildlife in an environment includes routine surveillance over the major taxonomic groups of animals distributed in the project region (invertebrates, amphibian, reptiles, birds and mammals), parameters of inhabitation, state and size of population, population distribution at the studied territory, and dominant population have been determined. During field survey reproduction and biodiversity criteria's have been applied and national and international criteria of nature protection, (IUCN, BERN, CITES, Natura 2000-attached at the end of introduction), endemism status and EUNIS codes have been updated.

Data was gathered at the project area; its impact are and at the terrestrial ecosystem in which the project site is found and also conversations were made with the local residents and hunters. Moreover, former studies about the terrestrial invertebrates and vertebrates at the project site and ecosystem areas in which the project site is included were evaluated. The diversity in species points out the existence of convenient habitats for the vertebrate's species at the project site. These habitats are generally agricultural lands, deciduous and evergreen forest lands, rocky areas, maquis, river and creek banks and residential areas. Habitat types were classified according to EUNIS Habitat Directive habitat types.

Surveys were performed at 6 locations (see Figure 79) on 20.05.2023. According to the location of the Project site, general habitat types, general distribution of species in Türkiye, literature data and our experiences along project site 53 probable mammal species (including bats) were listed for the Project site (see Table 85).

Additionally, bat survey was performed by Assistant Assoc. Dr. Serdar Gözütok and M.Sc.c. Mehmet Gül using Pettersson model D240x bat-corder on 20 May 2023. 2 observation locations were selected in the Filyos Section (see Figure 79). According to the survey 3 bat species were recorded at 2 observation locations. Among these species 2 species were in "LC" and 1 species in "NT" category according to the IUCN. Recorded and literature data of bat species were added to Table 85.

53 Mammal species were listed according to mammal surveys. 3 species were listed as "VU", 3 species were listed as "NT", and 47 species were listed as "LC" according to the IUCN. 4 species were listed in CITES Annexes. 25 species were listed in Ann-II and 11 species were listed in Ann-III according to the Bern Convention.

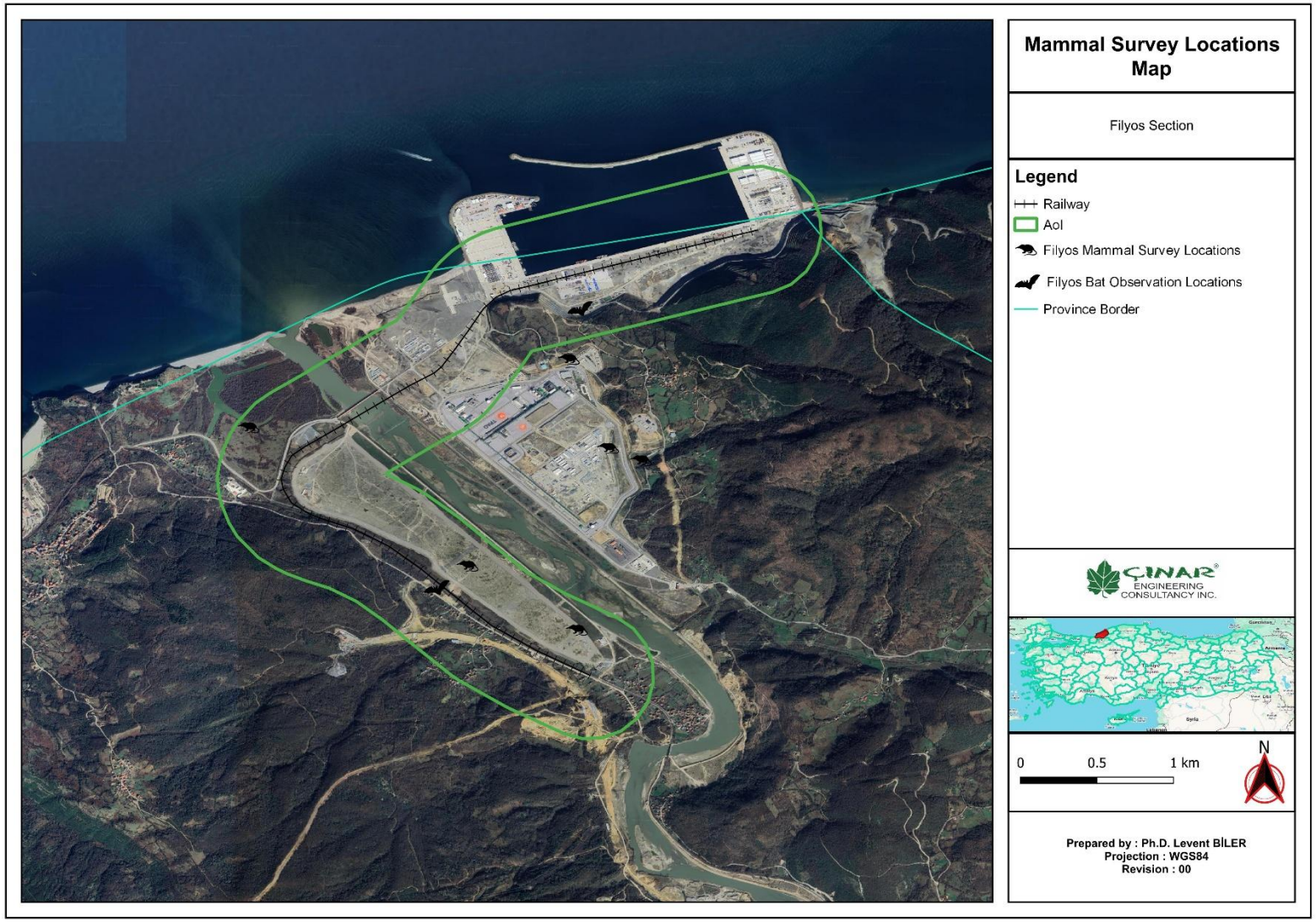


Figure 79. Mammal Observation Locations for Filyos Section

Table 85. List of mammal species at Filyos Section

Family	Species	Common Name	Endemism	IUCN	CITES	Bern	MAK	EU Habitat Direvtive	Obs. Loc.
Canidae	*Canis aureus*	Golden Jackal	-	LC	III	-	Ann-II	Ann-V	2,4,5,6
Canidae	*Vulpes vulpes*	Red Fox	-	LC	-	-	Ann-II	-	2,4,5,6
Cervidae	*Capreolus capreolus*	Roe Deer	-	LC	-	Ann-III	-	-	2
Cricetidae	*Cricetulus migratorius*	Grey (or Migratory) Hamster	-	LC	-	-	-	-	2,4,6
Cricetidae	*Microtus mystacinus*	Eastern (or Balkan) Vole	-	LC	-	-	-	-	2,4,6
Cricetidae	*Microtus subterraneus*	European Pine Vole	-	LC	-	-	-	-	2,4,6
Cricetidae	*Myodes glareolus*	Bank Vole	-	LC	-	-	-	-	2
Erinaceidae	*Erinaceus concolor*	Eastern European Hedgehog	-	LC	-	-	-	-	2,4,5,6
Felidae	*Felis silvestris*	European Wildcat	-	LC	II	Ann-II	-	Ann-IV	2
Gliridae	*Glis glis*	Edible Dormouse	-	LC	-	Ann-III	-	-	2
Miniopteridae	*Miniopterus schreibersii*	Schreiber's Bent-Winged Bat	-	NT	-	Ann-II	-	-	
Molossidae	*Tadarida teniotis*	European Free-tailed Bat	-	LC	-	Ann-II	-	-	1,2
Muridae	*Apodemus flavicollis*	Yellow-necked Mouse	-	LC	-	-	-	-	2,4,5,6
Muridae	*Apodemus mystacinus*	Broad-toothed Field Mouse	-	LC	-	-	-	-	2,4,5,6
Muridae	*Apodemus sylvaticus*	Wood Mouse	-	LC	-	-	-	-	2,4,5,6
Muridae	*Apodemus uralensis*	Ural Field Mouse	-	LC	-	-	-	-	2,4,5,6
Muridae	*Apodemus witherbyi*	Steppe field mouse	-	LC	-	-	-	-	2,4,5,6
Muridae	*Mus domesticus*	House Mouse	-	LC	-	-	-	-	All
Muridae	*Mus macedonicus*	Macedonian Mouse	-	LC	-	-	-	-	2,4,5,6
Muridae	*Rattus norvegicus*	Brown Rat	-	LC	-	-	-	-	All
Muridae	*Rattus rattus*	Black Rat	-	LC	-	-	-	-	2,4,5,6
Mustelidae	*Lutra lutra*	Eurasian Otter	-	NT	I	Ann-II	-	Ann-II, IV	4,5,6
Mustelidae	*Martes foina*	Beech Marten (Stone Marten)	-	LC	III/NC	Ann-III	Ann-II	-	2,4,5,6
Mustelidae	*Meles meles*	European Badger	-	LC	-	Ann-III	Ann-I	-	2
Mustelidae	*Mustela nivalis*	Least Weasel	-	LC	-	Ann-III	Ann-I	-	2,4,5,6
Rhinolophidae	*Rhinolophus blasii*	Blasius's Horseshoe Bat	-	LC	-	Ann-II	-	Ann-II	
Rhinolophidae	*Rhinolophus ferrumequinum*	Greater Horseshoe Bat	-	LC	-	Ann-II	-	Ann-II	
Rhinolophidae	*Rhinolophus hipposideros*	Lesser Horseshoe Bat	-	LC	-	Ann-II	-	Ann-II	

Family	Species	Common Name	Endemism	IUCN	CITES	Bern	MAK	EU Habitat Direvtive	Obs. Loc.
Rhinolophidae	*Rhinolophus mehelyi*	Mehely's Horseshoe Bat	-	VU	-	Ann-II	-	Ann-II	
Sciuridae	*Sciurus anomalus*	Caucasian Squirrel	-	LC	-	Ann-II	-	-	2
Soricidae	*Crocidura leucodon*	Bicolored Shrew	-	LC	-	Ann-III	-	-	2,4,5,6
Soricidae	*Crocidura suaveolens*	Lesser White-Toothed Shrew	-	LC	-	Ann-III	-	-	2,4,5,6
Soricidae	*Neomys anomalus*	Mediterranean Water Shrew	-	LC	-	Ann-III	-	-	
Soricidae	*Sorex satunini*	Satunin’s Shrew	-	LC	-	Ann-III	-	-	2,4,5,6
Suidae	*Sus scrofa*	Wild Boar	-	LC	-	Ann-III	Ann-II	-	2,4,5,6
Talpidae	*Talpa levantis*	Levantine Mole	-	LC	-	-	-	-	2,4,6
Vespertilionidae	*Barbastella barbastellus*	Western Barbastelle	-	NT	-	Ann-II	-	Ann-II	
Vespertilionidae	*Eptesicus serotinus*	Serotine Bat	-	LC	-	Ann-II	-	-	
Vespertilionidae	*Hypsugo savii*	Savi's Pipistrelle	-	LC	-	Ann-II	-	-	
Vespertilionidae	*Myotis blythii*	Lesser Mouse-Eared Myotis	-	LC	-	Ann-II	-	Ann-II	
Vespertilionidae	*Myotis capaccinii*	Long-Fingered Bat	-	VU	-	Ann-II	-	Ann-II	
Vespertilionidae	*Myotis daubentonii*	Daubenton's Myotis	-	LC	-	Ann-II	-	-	
Vespertilionidae	*Myotis emarginatus*	Geoffroy's Bat	-	LC	-	Ann-II	-	Ann-II	
Vespertilionidae	*Myotis myotis*	Greater Mouse-Eared Bat	-	LC	-	Ann-II	-	Ann-II	
Vespertilionidae	*Myotis mystacinus*	Whiskered Myotis	-	LC	-	Ann-II	-	-	
Vespertilionidae	*Myotis nattereri*	Giant Noctule	-	LC	-	Ann-II	-	-	1,2
Vespertilionidae	*Nyctalus lasiopterus*	Lesser Noctule	-	VU	-	Ann-II	-	-	1,2
Vespertilionidae	*Nyctalus leisleri*	Noctule	+	LC	-	Ann-II	-	-	1,2
Vespertilionidae	*Nyctalus noctula*	Kuhl's Pipistrelle	-	LC	-	Ann-II	-	-	1,2
Vespertilionidae	*Pipistrellus kuhlii*	Common Pipistrelle	-	LC	-	Ann-II	-	-	1,2
Vespertilionidae	*Pipistrellus pipistrellus*	Pygmy Pipistrelle	-	LC	-	Ann-III	-	-	1,2
Vespertilionidae	*Pipistrellus pygmaeus*	Particoloured Bat	-	LC	-	Ann-II	-	-	1,2
Vespertilionidae	*Vespertilio murinus*	Particoloured Bat	-	LC	-	Ann-II	-	-	1,2

5.8.3.5 Hydrobiology

Within the scope of the project site surveys were conducted between 6.10.2022 and 20.05.2023 for Filyos Section. The daily activity reports of the site surveys are given in Appendix-4.

The specific objectives are to:

- Visit each watercourse where natural and in-channel works are to take place;
- Whilst at each watercourse, the following information will be collected
  - Broad site/crossing point description, including details on whether the watercourse has been engineered or whether it is natural
  - Water chemistry information (if possible, using a hand-held water chemistry meter)
  - Flow types (% of each type present)
  - Water depth
  - Substrate types (% of each type present)
  - Neighbouring land use
  - Bank cover/characteristics
  - Fish habitat presence, including potential spawning areas
  - Instream vegetation (type and % cover)
- Photographs will be taken at each crossing point location and upstream/downstream
- Notes will be taken on any visible poor water quality/pollution evidence; and
- Any flora/fauna will also be noted.

The survey was designed to corroborate desk study findings about the general aquatic ecology sensitivity across the Project, as well as to identify any specific features/habitat characteristics that would be at risk due to the increased impact levels expected at the locations during the in-channel works and Filyos River/Creek railway bridge.

Hydrobiological surveys were performed at 2 Locations at Filyos Section (see Figure 80). At each location physio-chemical analyses and hydrobiological surveys were performed. At Location 1, no measurements could be performed since the flow was low and the area was not accessible.

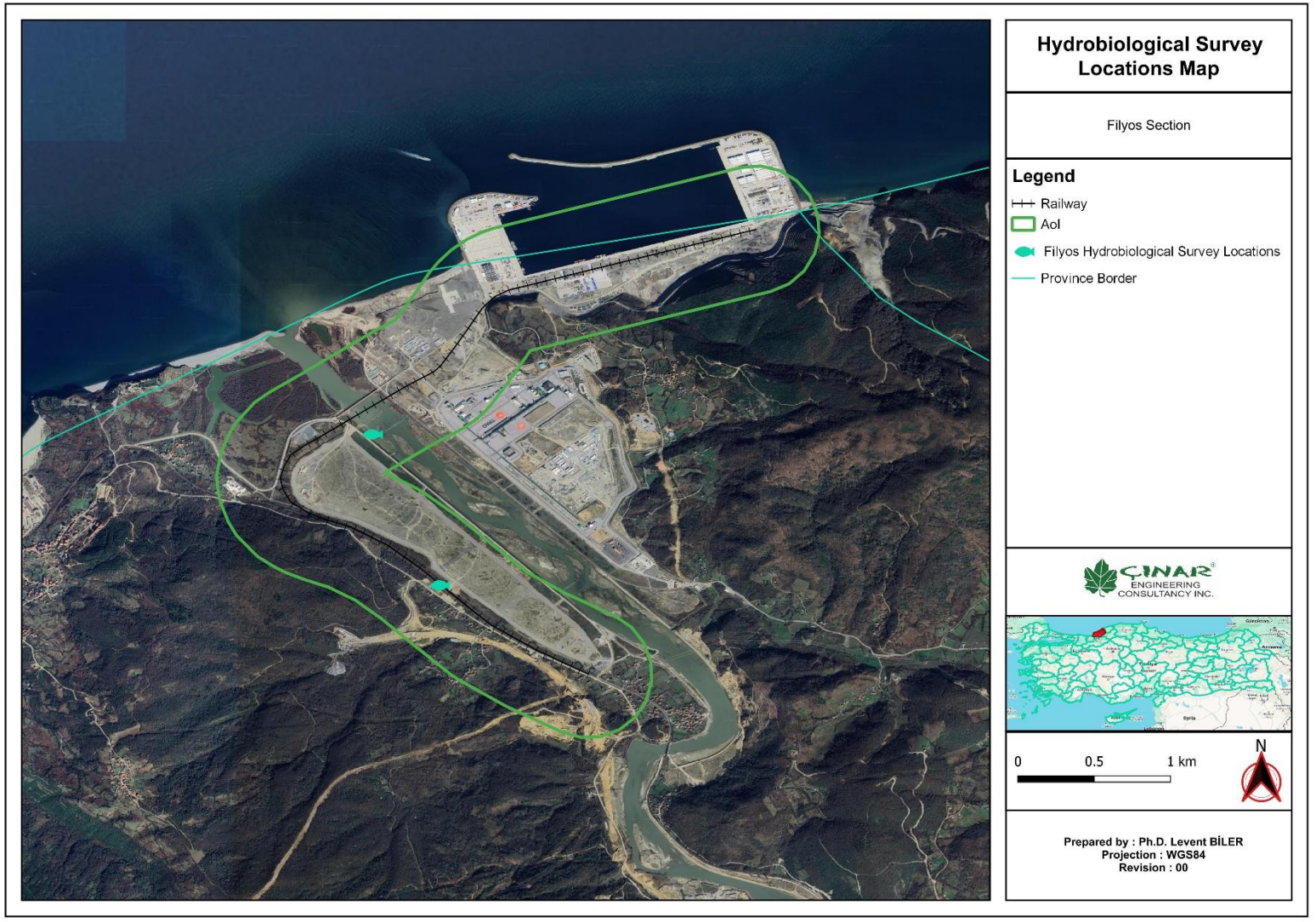


Figure 80. Hydrobiological Survey Locations at Filyos Section

At each location physio-chemical analyses and hydrobiological surveys were performed. The hydrobiological surveys included phytoplankton, zooplankton, benthic, and fish surveys. The results were summarized below. A total of 13 phytoplankton, 3 benthic, and 7 fish species were observed. According to the IUCN 1 fish species is listed as “VU” and 6 are listed as “LC”.

Table 86. Physio-Chemical Results

Location	Conductivity	Temperature	Alkalinity	pH	Dissolved Oxygen
1	Measurements could be performed since the flow was low and the area was not accessible				
2	566	21.1	275	7.59	0.27

Table 87. Phytoplankton Results

Cylindrotheca closterium	*Scenedesmus opoliensis*
Cymbella affinis	*Cylindrospermopsis raciborskii*
Diatoma vulgaris	*Cyclotella ocellata*
Gomphonema truncatum	*Gomphonema olivaceum*
Melosira varians	*Scenedesmus elongata*
Ulnaria ulna	*Scenedesmus quadricauda*
Actinastrum hantzschii	

Table 88. Benthic Results

Spio decoratus Bobretzky, 1870
Oligochaeta (spp.)
Pontogammarus sp.

Table 89. Fish Results

	Location		Common Name	Endemic	IUCN	Bern	CITES
	Location 1	Location 2					
Alburnus chalcoides		**X**	Caspian Shemaya	-	LC	Ann-III	-
Alosa tanaica		**X**	Black Sea Shad	-	LC	-	-
Capoeta sieboldii		**X**	Colchic Khramulya	-	LC	-	-
Cyprinus carpio		**X**	Common Carp	-	VU	-	-
Mugil cephalus		**X**	Flathead Grey Mullet	-	LC	-	-
Squalius pursakensis		**X**	Sakarya Chub	+	LC	-	-
Vimba vimba		**X**	Baltic Vimba	-	LC	-	-

5.8.4 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.

An “Invasive Alien Species Procedure” was prepared and given as Appendix-3 of Critical Habitat Assessment/Biodiversity Management Plan for control and management of IAS.

5.8.5 Critical Habitat Assessment

5.8.5.1 Critical Habitat Concept

As stated by ESS6, habitats constitute "a terrestrial, freshwater or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment". To meet ESS6 requirements, clients would have different obligations for different kinds of habitats. This enables to provide a better understanding of specific species and habitat requirements and establish meaningful management units to define a mitigation strategy. These habitat types are: modified, natural and critical, which can be a subset of natural or modified habitats. These habitat types refer to the biodiversity value of a given area, as determined by species, ecosystems and ecological processes, and are required to be identified within a project's area of influence (AoI) to define habitat-specific ESS6 requirements accordingly.

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 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 ESS6.

Critical habitat criteria as put forward by 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

ESS6 requires the Borrower (clients) not to implement any project activities in areas of critical habitat unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project in habitats of lesser biodiversity value;
- 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;
- 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;
- 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;
- 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;
- The project's mitigation strategy will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated; and

- A robust and appropriately designed, long-term biodiversity monitoring and evaluation program aimed at assessing the status of 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 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.

5.8.5.2 Critical Habitat Methodology

In order 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 assessment do not always cover Turkish habitats and species, experts' judgment was often consulted to interpret data and 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 AoI, 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 extent 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.
- For 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 and freshwater species identified at the Biodiversity AoI 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 ESS6. 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. Phase 2 surveys were performed to clarify and assess the migratory and congregatory species. Therefore, a "Critical Habitat" was defined and given in Figure 81.

Criterion 4: Highly Threatened or Unique Ecosystems

To identify highly threatened or unique ecosystems, World Bank requires the Client 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.

Amasra Coasts KBA has no legal protection status, and there are no national/regional strategy documents, management plans, or action plans prepared for the area. In order to appoint an IUCN protected area management category to the KBA within the scope of the ESIA process, existing information on the biodiversity value of the area and land use characteristics were utilized.

There are ongoing fishing, mining, agriculture, husbandry and port activities within the KBA boundaries. Therefore, while existing species and habitats in the area require conservation measures to be taken, it is expected that activities area managed in a way that does not produce a substantial impact on these ecosystems. Although there is no management objective

set for Amasra Coasts KBA, based on all available data, it has been assessed to be a Category VI protected area. The main objective in Category VI is sustainable use of natural resources in reaching nature conservation targets. Management units in protected areas of this category may be required to develop new tools to enable such synergy. If the KBA is considered for an official protected area status within the scope of a management plan, the process should be undertaken with the engagement of all interested stakeholders.

Considering the size of Amasra Coasts KBA, as recognized by the IUCN, different zones in larger protected areas can have their own categories. Accordingly, the two 1st Degree Natural Protected Areas; Güzelcehisar and Bartin Creek, in line with the adoption of the IUCN categories by the Turkish Protected Area System, these two legally protected areas that are outside the Biodiversity AoI but in the KBA are considered as Category Ia: Strict nature reserves.

Amasra Coasts KBA, with the exception of the two legally designated 1st Degree Natural Protection Areas (Güzelcehisar and Bartın Creek) within its boundaries, does not meet the critical habitat criteria. In the western part of the KBA, where the Biodiversity AoI is located, the habitat types presented in Table 80 are present, and these habitats have been assessed under Criterion 4 in terms of potential critical habitat triggers. Based on this assessment, no habitat type within the Biodiversity AoI was identified as triggering Criterion 4 according to the European Red List or national priority habitat classifications.

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 AoI 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.

5.8.5.3 Critical Habitat Triggering Biodiversity Features

Criterion 1: Critical (CR) and/or Endangered (EN) Species and Criterion 2: Endemic and/or Restricted-Range Species

CR, EN, VU and endemic species that were identified during the site surveys and are also presumed present based on literature data were assessed against the IUCN Red List, European Red Lists, and The Red Data Book of Turkish Plants, in terms of their global and regional threat statuses. To reach an understanding on the current statuses of species in the area, expert judgement was also consulted. Endangered and endemic species that are potential critical habitat triggers are presented in Table 90.

Table 90. Potential Critical Habitat Triggering Taxa as per Criterion 1 and 2

Biodiversity Feature	IUCN Red List Category	Endemic / Restricted-Range
Plants		
Centaurea kilaea	EN	Regional Endemic
Pancratium maritimum	EN	-
Birds		
Falco vespertinus	VU	-
IUCN Category: **EN: Endangered** **VU: Vulnerable** **NT: Near Threatened**		

According to Table 90, 11 species were evaluated as potential critical habitat triggering species.

One of the potential critical habitat triggering species is Endangered *Centaurea kilaea* is native to coastal dune habitats along the Black Sea coasts of the Thrace and Western Black Sea regions of Türkiye. Population identified within the Phase 1 studies consists of about 5,000 individuals and was quite healthy. It represents about 5-10% of the entire Turkish population. Therefore, according to Phase 1 Biodiversity AoI, which supports more than 0.5% of the species' global population, has been identified as a critical habitat for the species.

Pancratium maritimum is the only Pancratium species that naturally grows in Türkiye. It is a perennial Mediterranean plant, which is found along the coasts of the Mediterranean, the Atlantic Ocean, the Black Sea and the Caspian Sea. In Türkiye, it is found naturally at dune habitats of Kirklareli, Istanbul, Bolu, Bartin, Sinop, Samsun, Giresun, Trabzon, Antalya, Mersin and Adana provinces (Demir & Çelikel, 2017). It also had a population of about 5,000 individuals at the Phase 1 Biodiversity AoI, which represents about 1-2% of its known population in Turkiye. Considering its wide range, Pancratium maritimum does not meet Critical Habitat Assessment Criterion 1 threshold values.

Although the *Testudo graeca* species is classified as Vulnerable by the IUCN, it has a wide distribution throughout Türkiye. As it has a widespread distribution in Türkiye, the species does not meet the Critical Habitat Criterion and the population of this specie within the Biodiversity AoI is not large enough that if lost would not cause its IUCN Red List category to change. However, in order to ensure the species' survival and continuity, necessary mitigation measures, as explained in the below section, will be taken. The vulnerable species *Testudo graeca* uses especially the area. Which means the area is the most suitable area for this species. The habitat does not carry critical habitat feature, but actions have to be taken, which are explained beneath, to protect the species.

Streptopelia turtur does not use the area for breeding, wintering or feeding purposes but use Filyos Kus Cenneti, that is 0.15 km to the project area, as breeding. As the Biodiversity AoI does not sustain regular or cyclical population of *Streptopelia turtur*, this species does not meet thresholds for Criterion 1. The railway line will not pass through the Filyos Kus Cenneti (Bird Paradise) and no project-related activities will be performed in this area to avoid impacts on species and habitats. *Streptopelia turtur* is breeding in Filyos Kuş Cenneti part.

Red-footed Falcon (*Falco vespertinus*)—listed as a passage migrant in Türkiye—was evaluated under Criterion 3. This species only uses stopover sites for a few days to replenish fuel reserves during migration and does not occur in numbers that represent ≥ 1 percent of the global population at any point in its life cycle, nor does the sustain ≥ 10 percent of a population during periods of environmental stress. Consequently, The Filyos Project footprint does not meet Critical Habitat Criteria 3.

Lutra lutra (Eurasian Otter), which is one of the KBA-listed species for Amasra Coasts KBA, was historically associated with the creeks and coastal areas of the site. However, due to intensive construction activities, degradation of riparian vegetation, and increased human

disturbance, no individuals were recorded during the current surveys. Based on field observations and interviews with local stakeholders, there is no evidence that another population continues to regularly feed along the creek within the Biodiversity AoI. Consequently, under the ESS6 criteria, the species does not currently trigger critical habitat within the surveyed area.

Myotis capaccinii (Long-fingered Bat) was also not detected during the surveys despite targeted sampling. There were no nesting areas for this bat specie in the project route but included to the baseline from literature. Therefore, it has been evaluated that this bat specie will not be affected by the planned railway and it does not have population within the Biodiversity AoI is not large enough that if lost would not cause their IUCN Red List categories to change. Therefore, this species does not trigger critical habitat under Criterion 1.

Nyctalus lasiopterus (Greater Noctule Bat), another species listed for Amasra Coasts KBA, was recorded using the area during the surveys. Its presence highlights the importance of the KBA for foraging and potential roosting opportunities for this rare bat species, which has been considered particularly in the assessment due to its KBA status.

Although no species currently meet the quantitative thresholds for Critical Habitat as defined under IFC Performance Standard 6 and World Bank ESS6, the area nevertheless supports habitats and species of regional conservation importance. In line with the precautionary approach embedded in these standards, and recognising the site's role as a key stopover and feeding ground for migratory and waterbird species, the area has been identified as Critical Habitat for the purpose of this assessment. This designation ensures that the conservation of the habitats and associated species is prioritised, and that any activities in or around the area are managed to maintain or enhance the ecological values that underpin its significance. A Critical Habitat Map showing the locations of *Critically Endangered and Endangered species'* populations is presented in Figure 81.

The railway line will not pass through the Critical Habitat and no project-related activities will be performed in the Critical Habitat Area to avoid impacts on species and habitats.

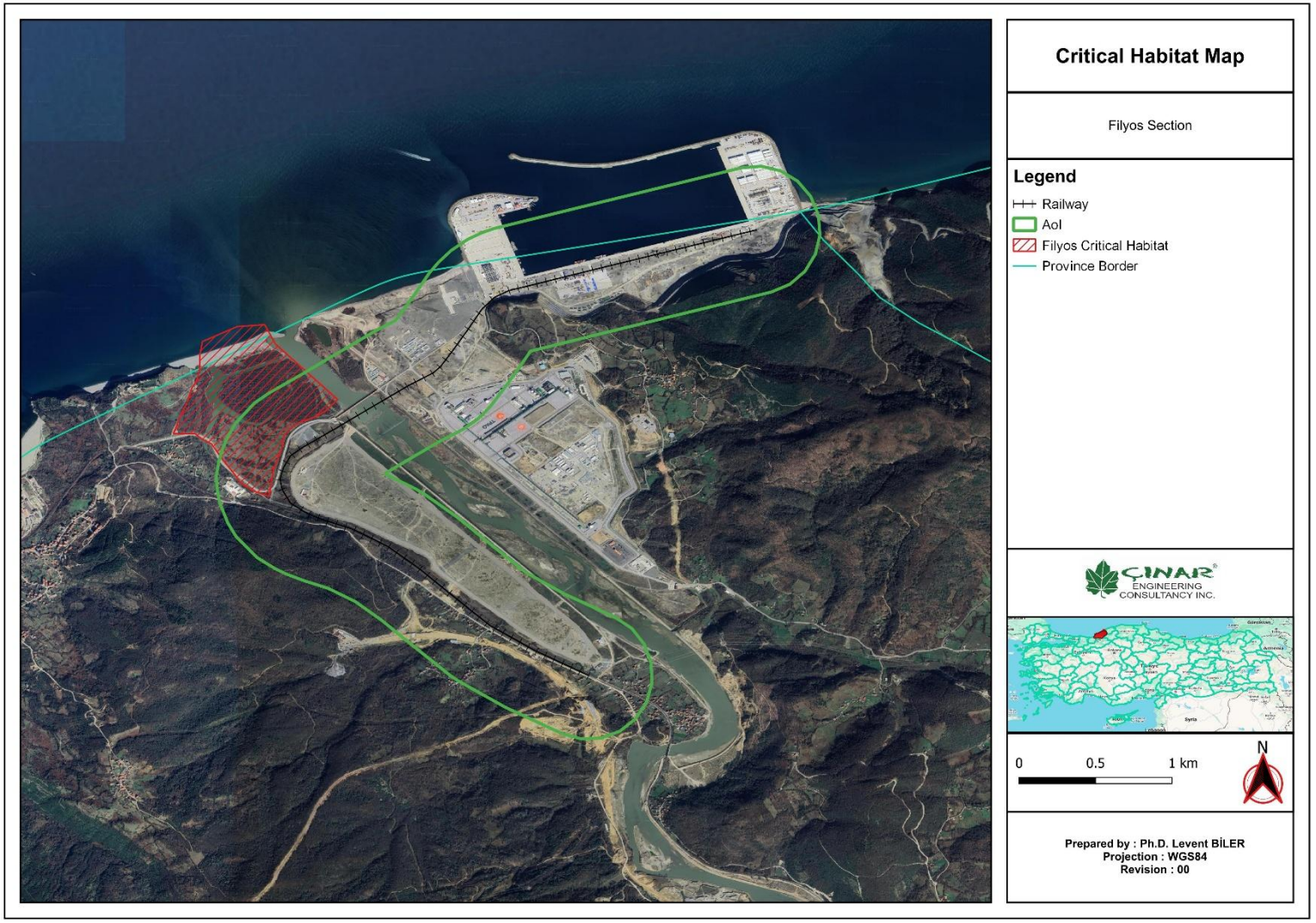


Figure 81. Critical Habitat Map

Criteria 3: Migratory or Congregatory Species

The Filyos Project footprint has been assessed against IFC Performance Standard 6 / World Bank ESS6 Critical Habitat criteria. Although migratory and congregatory species were recorded during surveys, the area does not meet the thresholds of Criterion 3. For example, the potential triggering species Red-footed Falcon (*Falco vespertinus*)—listed as a passage migrant in Türkiye—was evaluated under Criterion 3. This species only uses stopover sites for a few days to replenish fuel reserves during migration and does not occur in numbers that represent ≥ 1 percent of the global population at any point in its life cycle, nor does the Biodiversity AoI sustain ≥ 10 percent of a population during periods of environmental stress. Similarly, other migratory species recorded during surveys are irregular and transient users of the area. Consequently, The Filyos Project footprint does not meet Critical Habitat Criteria 3.

By contrast, the Bird Paradise (Kuş Cenneti) wetland complex has been evaluated as Critical Habitat (see Figure 81). This area is known to support, on a cyclical and predictable basis, large aggregations of migratory and waterbird species, including species for which ≥ 1 percent of the global population may be present during certain parts of the annual cycle. For this reason, it has been designated as Critical Habitat under Criterion 3.

The Biodiversity Management Plan (BMP) prepared separately for the Project includes specific actions for migratory birds and outlines detailed monitoring during both the construction and operation phases. The railway line will not pass through the Critical Habitat and no project-related activities will be performed within the Critical Habitat area to avoid impacts on the species and habitats that underpin its importance.

Criterion 4: Highly Threatened or Unique Ecosystems

Coastal and terrestrial habitats identified in the Biodiversity AoI were first evaluated in terms of their corresponding EUNIS codes and Habitats Directive Annex I statuses. Then, those that are potential critical habitat triggers were assessed against the European Red List of Habitats. Considering the current statuses of habitats in Türkiye, and major threats they are facing, based on expert judgment, a national assessment in line with the Red List criteria (Janssen, 2016) was also made and presented in Table 91.

Table 91. Potential Critical Habitats as per Criterion 4

Habitat Description	European Red List		National Assessment		Critical Habitat Status
	Category	Criterion	Category	Criterion	
B1.2: Sand beaches above the driftline	EN	B1, B2	EN	B1	Critical Habitat
C1.2: Permanent mesotrophic lakes, ponds and pools	NT	CD1	LC	-	Potential Critical Habitat (CH Likely)
C2.5: Temporary running waters	NT	CD1	LC	-	Natural Habitat (Not CH)
C2.2: Permanent non-tidal, fast, turbulent watercourses	VU	A1	NT	A1	Potential Critical Habitat (CH Likely)
G1.A: Mediterranean-type riparian woodland / gallery woods (subtype, common variant in Türkiye	NT	CD1	LC	CD1	Natural Habitat (Not CH)

Sand beaches above the driftline has been assessed to be Endangered as per criteria B1 and B2 due to its extent of occurrence, extent of occupancy and reduction in its abiotic and/or biotic quality (Janssen, 2016), both at the European and Turkish scales.

Due to ongoing activities undertaken by Türkiye Petrolleri Anonim Ortaklığı (TPAO), habitat conditions previously supporting *Pancratium maritimum* and *Cyclamen coum* var. *coum* populations have been significantly degraded within the Project Area, and no individuals of these species were recorded during the field surveys. Therefore, the Project Area does not meet the ESS6 criteria for designation as Critical Habitat for these species. *The railway line*

will not pass through the Critical Habitat and no project-related activities will be performed in the Critical Habitat Area to avoid impacts on species and habitats.

Although other habitats that are potential critical habitat triggers do not meet Criterion 4 thresholds, they are still considered as priority habitats as natural habitats supporting significant assemblages of flora and fauna, as well as ecosystem functions.

5.8.6 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 categorisation of ecosystem services (MA, 2005).

ESS6 also recognizes the importance of maintaining benefits that people, including businesses, derive from ecosystems. ESS6 defines ecosystem services as “the benefits that people derive 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. The four broad categories of ecosystem services that the MA puts forward, as recognized by ESS6 can be listed as the following, with definitions widened by the World Resources Institute (WRI), in its report entitled “Weaving Ecosystem Services into Impact Assessment: A Step-by-Step Method” (Landsberg et al., 2013):

- Provisioning services; are goods or products obtained from ecosystems, such as food, timber, fiber and freshwater.
- Regulating services; are the contributions to human well-being arising from an ecosystem’s control of natural processes, such as climate regulation, disease control, erosion prevention, water flow regulation, and protection from natural hazards.
- Cultural services; are the non-material contribution of ecosystems to human well-being, such as recreation, spiritual values, and aesthetic enjoyment.
- Supporting services; are the natural processes, such as nutrient cycling and primary production that maintain other services.

In line with the provisions of the ESS6, 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, 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,

Socio-economic and biodiversity studies conducted within the scope of the ESIA process identify relevant ecosystem services as explained in Table 92.

Table 92. Ecosystem Services

Ecosystem Service	Sub-Category	Ecosystem Service on the Project Route	Status
Provisioning Services			
Food	Crops	Vegetable gardens	Mostly for household consumption. Loss of limited agricultural land may cause economic impacts.
		Grains	
	Livestock	Large / small cattle	Animal products are produced for household consumption.
		Poultry	
	Apiculture	Stationary beehives	75% of honey is sold at the local markets.
	Wild foods	Mushroom, arbutus, wild strawberry	Bay leaves and hazelnut are commercial plants. There is potential loss of livelihoods due to deforestation.
		Hazelnut and bay leaves	
Biological raw material	Timber and other wood products	Firewood	Derived from the forest for household consumption.

The second step in ESR is to identify ecosystem services for which the Project impacts could affect the ability of others to derive benefits, those that are significant to beneficiaries' livelihoods, health, safety or culture, and finally ecosystem services that have no viable alternatives.

Accordingly, ecosystem services relevant to the Project that are explained in Table 92, have been further assessed to determine which are priority ecosystem services. The decision tree developed by the WRI (Landsberg et al., 2013), as presented in Figure 82 provides a useful tool to prioritize relevant ecosystem services according to potential project impacts on beneficiaries.

Assessment of each identified ecosystem service according to the decision tree yielded priority ecosystems as listed in Table 93, which also shows how the decision tree has been implemented to prioritize relevant ecosystem services.

A detailed assessment on significance of ecosystem services in terms of livelihoods, and Project-related impacts is provided in Socio-Economic Environment.

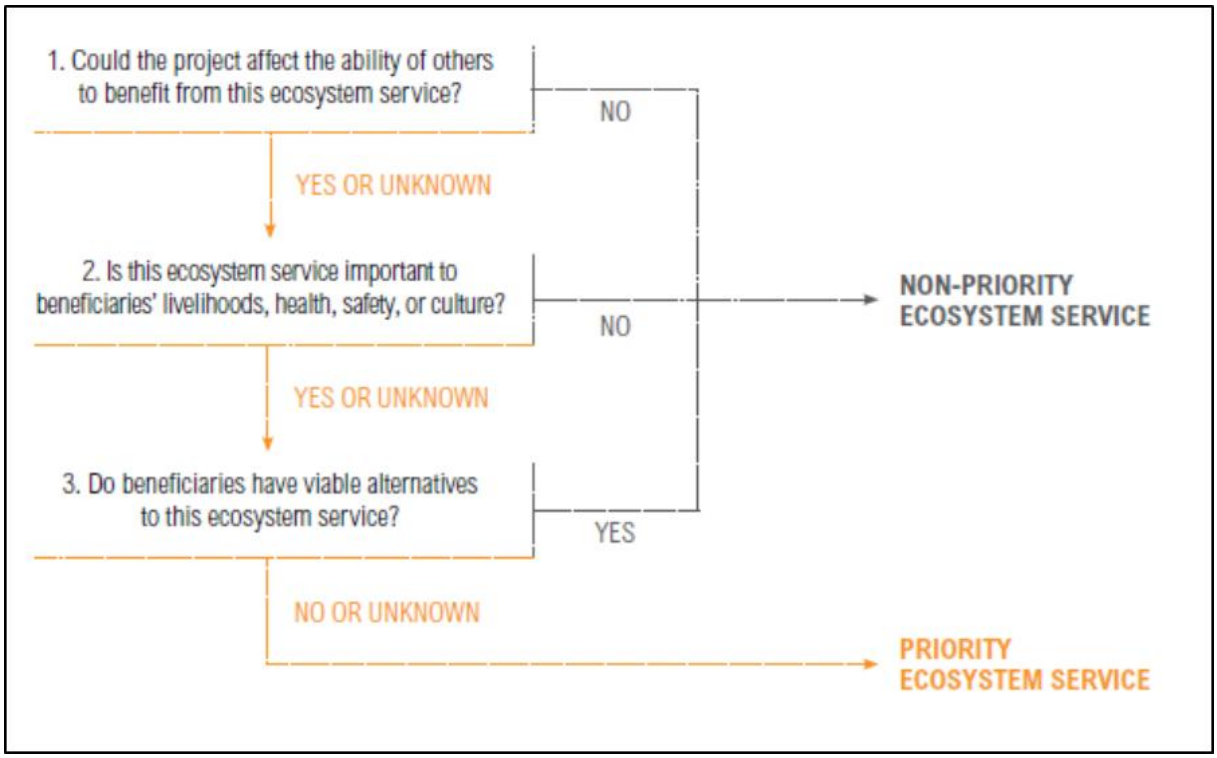


Figure 82. Decision Tree to Prioritize Ecosystem Services

Table 93. Prioritization of Relevant Ecosystem Services

Ecosystem Service	Decision-Tree Question			Decision
	1	2	3	
Vegetable gardens	Yes	No	-	Non-priority service
Grains	Yes	No	-	Non-priority service
Large/small cattle	No	-	-	Non-priority service
Poultry	No	-	-	Non-priority service
Stationary beehives	No	-	-	Non-priority service
Mushroom, arbutus, wild strawberry	Yes	No	-	Non-priority service
Hazelnut and bay leaves	Yes	Unknown	Unknown	Potential priority service
Firewood	Yes	No	-	Non-priority service

5.9 Impact Assessment

The impacts of railways on wildlife are convert a strip of land into an area where fast-moving trains can collide with and kill or injure animals. Railways also emit noise, light and chemical pollution (Dorsey et al. 2015), and can act as barriers to movement.

Railways are known to have a negative impact on ecosystems during the construction phase (e.g. laying of tracks and erecting buildings, bridges and other infrastructure) and in the operational phase (e.g. running of trains, maintenance of tracks, etc.).

Impacts of railway lines contains:

1. Direct loss of habitat

The construction of new railways destroys or damages vegetation such as trees, shrubs and grasses; this vegetation may provide valuable habitat for wildlife and endemic plant species. The degree of impact is likely to be proportional to the width and length of the disturbance corridor.

2. Degradation of habitat quality

The condition of wildlife habitats adjacent to railways often suffers as a result of construction activities such as trenching and digging and the presence of construction camps. Impacts typically include invasion by exotic weeds, and pollution due to liquid or solid wastes or emissions. The effects of heavy metals such as lead from motor vehicle on trees and soils, and numerous chemical elements arising from roads, vehicles, fuels and corrosion, and wear and tear of vehicle components, are recognized impacts. In addition, the habitat may become less attractive to wild animals due to noise, lights or human presence.

Likewise, railways may pollute water and air, cause noise, act as a source of garbage and human wastes, and facilitate the spread of invasive species within wildlife habitats. Altered drainage patterns and pollution or sedimentation of aquatic ecosystems can also lead to degradation of habitats.

Disturbance from poorly supervised construction workers could pose additional threats of unauthorized activities.

Water, land and air pollution may adversely impact the general health and fertility of wild animals (and livestock). Trains transporting petroleum products, compressed/ liquefied gases, chemicals and other toxic or hazardous materials are akin to factories in their potential impacts.

3. Noise-induced physiological and behavioral changes

The impact of noise on wild animals is a contentious issue: Berthoud (2003) reported that, in general, wild animals seem to adapt well to the frequent passing of trains. Hanson (2008) refers to the debate between the sceptics on the one hand, who hold that habituation to

transportation noise is common among wild animals, and the environmentalists on the other hand, who insist that loud noise interferes with the communication systems of wild animals, brings out a 'flight or fight' response, and interferes with the behavior of both predator and prey. He points out that research has been inconclusive regarding effects on wild animals from transportation noise sources. According to Parris (2015), if the noise is loud enough and present for long it can have serious and significant impacts.

4. Habitat loss and fragmentation

Railway lines dissect contiguous habitat patches, resulting in smaller patch sizes and higher edge-to-interior ratios, making them increasingly vulnerable to outside disturbance. The fragmentation of habitat into spatially isolated parts is a major cause of the decline of biodiversity, e.g. habitat loss and fragmentation of amphibian populations worldwide has led to a substantial decline in their numbers during the last century (Stuart et al. 2004).

Habitat fragmentation has become a global issue associated with most linear forms of infrastructure development, including road and rail. The fragmentation process initiates a shrinking in available habitat, which in turn leads to a progressive reduction in species diversity in the landscape, with consequent isolation of species. The contraction in available habitat together with isolation becomes the most important impact (Harris 1984).

5. Rail avoidance

Repeated disturbances along railway corridors may deter animals from using habitats in their vicinity. Avoidance of habitats close to transport corridors may vary diurnally, seasonally and in relation to traffic in these corridors (Brumm 2004; Slabbekoorn & Ripmeester 2008; Kociolek et al. 2011).

6. Injury and mortality

Rail induced mortality is probably the most acknowledged effect on wildlife: kills ranging from those of snakes to small rodent to deer, to large cats and mega herbivores such as elephant are a common view along on the rail tracks (Singh et al. 2001; Williams et al. 2001; Roy et al. 2009; Sharma 2009; Joshi 2010; Rangarajan et al. 2010).

7. Barrier to movement

Railways can serve as a corridor for species moving across landscapes, they may restrict, inhibit or prevent the movement of species. This barrier effect on wildlife results from a combination of factors, from traffic noise, train movement, pollution and human activity to physical hindrances and traffic mortality (Trocme et al. 2003).

A railway line can act as a strong barrier on a number of counts: the embankment may be too high to climb, constructed of material (e.g. loose gravel or large stones) that cannot be navigated by some species, or present a visual barrier that discourages crossing by species used to long lines of sight. The railway tracks themselves may deter passage, and traffic movement or volumes may hinder or prevent crossing by many species.

The rate of animal movement through road or rail corridors may be lower than in intact natural habitat. Linear infrastructure thus acts as a filter to movement in that corridor, affecting its so-called 'permeability'.

5.9.1 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 impact 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.

Mitigation measures proposed at this stage are targeted at flora and fauna species that are known to be inhabiting the area from literature records, habitat suitability and surveys, and have been assessed based on expert judgement.

The World Bank Group Environmental, Health, and Safety Guidelines for Railways (2007), proposes the following measures to be implemented to minimize impacts of 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;
- 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.

There are no foreseen Project-related impacts on critical habitat triggering dune habitats, and the *Centeaurea kilaea* and *Pancratium maritimum* populations they hold. Land preparation and construction activities will be limited to pre-designated working areas avoiding any potential impact on critical habitat. In natural habitats, where impacts cannot be avoided, temporary impacts resulting from land preparation and construction activities will be controlled in line with the best practices and risks on biodiversity will be minimized. Changes in biodiversity features will be monitored in line with the provisions of ESS6, where monitoring results will be used to develop additional measures and management strategies through implementation of an adaptable management approach.

5.9.2 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 and 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).

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 (the World Bank Group, 2007).

The World Bank Group (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 World Bank Group Environmental, Health, and Safety Guidelines for Railways, herbicides for the Project will be used following the manual on pesticides prepared by the World Health Organization (WHO) and Food and Agriculture Organization of the United Nations (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 impact 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 ve 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 impact. To prevent such measures to enhance the barrier impact, 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 like bridges and culverts that can be part of the Project design, can also serve as wildlife passages, although their original purposes might be different. In some cases, it is possible to transform these structures into wildlife passages, or design new ones for wildlife. Significant locations for animal passages and adequacy of planned structures should be determined based on habitat use of fauna features, which will be identified prior to construction. This should be assessed during pre-construction phase with the coordination of DGII. In determining the need and location for new passages, socio-economic impacts should also be considered. Passages that will also enable human should be identified through consultations within the scope of the Stakeholder Engagement Plan (SEP), and addressed through an integrated approach.

5.9.3 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 83. In order 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 identified within the scope of the Project will be avoided at the first step of the mitigation hierarchy, there will not be offset requirements for net gains in critical habitat.

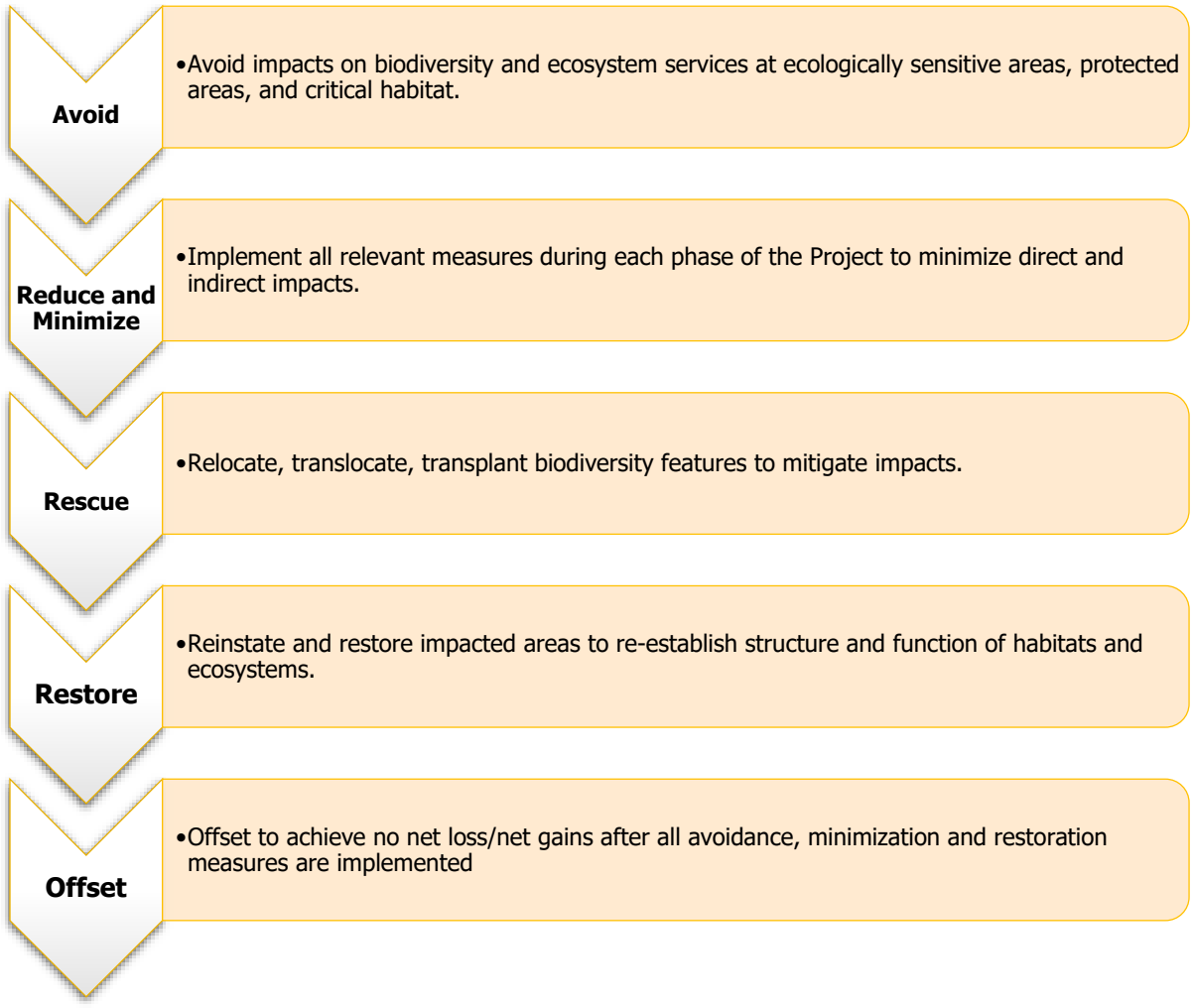


Figure 83. The Mitigation Hierarchy

5.9.4 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 94.

Table 94. 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)
Moderate	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 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 95. 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.

Table 95. Biodiversity Receptor Sensitivity

Biodiversity Receptor	**Sensitivity Level**
Critical Habitat	
	High
B1.2 : Sand beaches above the driftline	
Natural Habitats	
C2.5: Temporary running waters	Moderate
C1.2: Permanent mesotrophic lakes, ponds and pools	
C2.2: Permanent non-tidal, fast, turbulent watercourses	
D5.1: Reedbeds normally without free-standing water	
Flora and Fauna Species of High Conservation Concern	
Endemic and/or CR, EN, VU, NT flora species	Moderate
Endemic and/or CR, EN, VU, NT fauna species	

5.10 Impact Significance, Mitigation Measures, and Residual Impacts

Biodiversity impact assessment for Filyos Port and Industrial Zone Railway Connection Project was undertaken according to the methodology presented above. Accordingly, magnitude of each impact was estimated as a factor of the foreseen geographic extent, duration, and frequency of the impact.

The land beaches above the driftline habitatand *Centeaurea kilaea* population, both of which have been identified to trigger habitat within the scope of the ESIA work, will not be impacted due to foreseen Project activities. Similarly, although not triggering critical habitat, globally Endangered *Pancratium maritimum* of the The land beaches above the driftline habitatwill not be impacted by the Project activities either.

Nearly half of the Biodiversity AoI defined for the Project, which is about 1,000 hectares, is composed of natural habitats. Direct impacts on natural habitats will occur in an area of 23 hectares, which corresponds to approximately 4.6% of the natural habitat extent. The most sensitive habitats after land beaches above the driftline are the water-dependent C1.2: Permanent mesotrophic lakes, ponds and pools, C2.2: Permanent non-tidal, fast, turbulent watercourses, and B1.2: Sand beaches above the driftline

Impacts on the permanent mesotrophic lake habitat, which had been formed as a result of the DSI's reclamation works at Filyos Creek, will also be avoided in line with the mitigation hierarchy. About 1.9% of the stream habitat, which covers a total area of about 290 hectares in the Biodiversity AoI, will be directly impacted. For the riparian habitat this corresponds to 4.9%. Residual impact significance will be lowered to the extent that the ecosystem integrity will not be disrupted through conserving the water system in the area and allowing continuous waterflow to minimize impacts on vegetation.

In the assessment of Project-related potential impacts on biodiversity receptors addressed in the ESIA Report, the mitigation hierarchy presented in Figure 83 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 96.

Table 96. Impacts on Biodiversity Receptors, Mitigation Measures and 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	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Habitat loss / fragmentation	Land preparation and construction	Critical habitat	-	-	-	-	-	-	High	No impact (Avoided)	Indirect impacts on the land beaches above the driftlinehabitat and also the mesotrophic lake habitat will be avoided in line with the related environmental management plans (waste management plan, pollution prevention plan).	-
		Natural habitats: (C1.2: Lakes)	-	-	-	-	-	-	High	No impact (Avoided)	The Project personnel will be informed on the sensitivity of the habitats and the Directorate General of Infrastructure Investments (DGII) will train internal staff to be able to provide advice to contractors with input and advice, if required, and enable an informed overview of the biodiversity input from the contractors. Workers will be made aware of the ecological sensitivities of the areas and will be trained in mitigation for unforeseen events, including the presence of uncommon habitats and species. Health and safety recommendations regarding poisonous or otherwise dangerous plants or animals will also be provided by Biodiversity Specialists through toolbox talks and trainings. Emergency numbers will be provided in case of attacks or injuries that may occur by wildlife. Critical Habitat Assessment and Biodiversity Management Plan will be implemented. No project related activities will be performed in the defined Critical Habitat and necessary precautions (such as marking the critical habitat, fencing or any other as appropriate) will be taken in this respect. Storage of any project related waste and/or machinery in Critical Habitat will be avoided. Statuses of habitats and associated species populations will be monitored throughout land preparation and construction. Where necessary, habitat and species specific measures will be developed and implemented with an adaptable management approach. Whether or not the habitat will be impacted by the works to be done will be monitored through regular observations and the results will be reported by an ornithologist."In this context, if any habitat impact is observed as a result of construction, appropriate precautions will be taken (Twice a year (in spring and autumn for 15 days/period) until the construction is completed).	-
		Natural habitats: (C2.2: Streams, G1A: Deciduous woodland,D5.1: Reedbed, C2.5: Temporary running water)	Limited	Low	Irreversible	Long-term	One-off	Medium	Medium	Moderate	Land preparation and construction activities will be limited to designated work areas. Impacts on natural habitats outside the Project route will be prevented. Vegetation clearance at riparian habitats will be minimized. There will be no tree cutting/vegetation clearance other than in areas required for the Project. Project-related impacts on water quality and water flow will be avoided. Mitigation measures related to land use and soil quality will be taken in line with the related management plans ensuring conservation of natural habitats. Statuses of habitats and associated species populations will be monitored throughout land preparation and construction. Where necessary, habitat000 and species specific measures will be developed and implemented with an adaptable management approach. The Project personnel will be informed on the sensitivity of natural habitats and species, and conservation priorities. Any direct impact on plant and animal species will be prevented. Critical Habitat Assessment and Biodiversity Management Plan will be implemented.	Minor
		Fauna species of high conservation concern	Limited	High	Irreversible	Long-term	One-off	Medium	Low	Moderate	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 order 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. Nesting areas for fauna species will be identified before the construction works commence, and experts will be consulted if nests are to be displaced. If any bird nest is encountered during the work, the work in that area will be restricted and after the chicks fly out of the nest, the nest will be moved to a suitable place and the work will continue. Critical Habitat Assessment and Biodiversity Management Plan will be implemented. 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.	Minor

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	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											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 reduce the impacts on reptile species, especially *Testudo graeca* fencing and turtle stuck will be installed. Bird migration monitoring will be performed.	
Use of machinery and equipment	Land preparation and construction	Natural habitats Flora and fauna species of high conservation concern	Limited	Low	Reversible	Short-term	Intermittent	Negligible	Low	Moderate	Trainings will be organized for the Project personnel to inform them about the on-site speed limits and of importance of animal passages. Machinery and equipment that arrive in work areas will be checked for the 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.	Negligible
Indirect impacts (dust, air emissions, noise, waste, and impacts on water and soil quality)	Land preparation and construction	Natural habitats Flora and fauna species of high conservation concern	Limited	Low	Reversible	Short-term	Intermittent	Negligible	Low	Moderate	In order to control dust emissions, vegetation clearance will only be undertaken in pre-determined activity areas, and habitats will be rehabilitated upon completion of 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. Hunting of fauna species will be prohibited. In case of illegal hunting activities, authorities will be notified. 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.	Negligible
Invasive alien species	Land preparation and construction	Natural habitats Flora and fauna species of high conservation concern	Local	Low	Reversible	Medium-term	Intermittent	Low	Low	Moderate	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. The separately prepared Invasive Alien Species Procedure will be implemented.	Negligible
Habitat loss / fragmentation	Operation	Natural habitats and Critical Habitat	Limited	Medium	Irreversible	Long-term	One-off	Medium	Low	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 throughout operation phase. Where necessary, habitat and species-specific measures will be developed and implemented with an adaptable management approach. During the operation phase, monitoring will be conducted twice a year (May and September) 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. Critical Habitat Monitoring will be performed and reported. Following the construction, observation studies will be conducted twice a year (in spring and autumn for 15 days/period) to determine whether there has been any impact on the habitat by an Ornithologist. Following the one-year study, the need for ongoing monitoring of the areas will be re-assessed.	Minor

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	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Habitat loss / displacement	Operation	Flora and fauna species of high conservation concern	Limited	Medium	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 that will be identified during pre-construction and monitored throughout construction. 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. Bird migration monitoring will be performed.	Minor
Indirect impacts (dust, air emissions, noise, waste, and impacts on water and soil quality)	Operation	Natural habitats Flora and fauna species of high conservation concern	Limited	Low	Reversible	Medium-term	Intermittent	Medium	Low	Minor	Use of chemicals for maintenance will be limited. Wastes will be recycled and disposed on a regular basis to prevent pollution of receiving environment due to operational activities. Noise barriers will be used to minimize impacts on animals. Measures to minimize risk of erosion will be taken within the scope of integrated vegetation management. Necessary measures will be taken to minimize risk of erosion during integrated vegetation management. To identify and respond to any hazard related to erosion, landslide, etc., verges and sloped will be checked periodically. Solid wastes, hazardous wastes, and wastewater that will result from operation activities will be managed through implementation of related management plans (Waste Management Plan, Water and Wastewater Management Plan, etc.).	Minor
Invasive alien species	Operation	Natural habitats Flora and fauna species of high conservation concern	Local	Low	Reversible	Medium-term	Intermittent	Low	Low	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

5.11 Project Standards and Methodology

5.11.1 Project Standards

The Environmental and Social Framework (ESF) of the World Bank is a set of guidelines, policies, and standards designed to help World Bank-financed projects manage environmental and social risks and impacts. It aims to support sustainable development by ensuring that projects are environmentally and socially responsible, while enhancing development benefits for communities.

The World Bank's Environmental and Soacial Standards are given in Section 2 in detail. The social-related ESSs are listed below;

- ESS1: Assessment and Management of Environmental and Social Risks and Impacts:
- ESS2: Labor and Working Conditions
- ESS4: Community Health and Safety
- ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- ESS10: Stakeholder Engagement and Information Disclosure

Other guidelines;

- The World Bank Group General Environmental, Health and Safety (EHS) Guidelines
- Good Practice/Guidance Notes and Handbooks
- Good International Industrial practices (GIIP)
- WBG EHS Guidelines for Railways

5.11.2 Methodology

The main purpose of Social Impact Assessment (SIA) studies is to determine the current social and economic conditions of the settlements within the Project Area.

Before moving on to the methodology applied for the social impact assessment of the Project, it is necessary to point out that as a result of the revisions made to the Project alignment, the records pertaining to the Phase-1 consultations were not incorporated into the ESIA and SEP documents. The meeting minutes from this period are retained within AYGM's internal archives.

5.11.2.1 First part of the social survey

A contract was signed between DGII and CINAR in August 2022 for the preparation of the Environmental and Social Impact Assessment Report of the Project, including both subprojects in Çukurova and Filyos in line World Bank standards. Under the contract additional studies were requested from ÇINAR for guidance because the detailed projects would be prepared after the arrival of the Supervision Consultants. In this context, the consultation meetings were held on September, 2022 with the stakeholders.

Details of the mentioned stakeholder interviews are provided in Appendix-11. Please see also Appendix-10 to examine the Project's stakeholders.

5.11.2.2 Second part of the social survey

The change in the project route necessitated the updating of the ESIA package.

In August 2023, stakeholder consultations were held with governmental institutions, mukhtars, and local authorities. Since the project route could not be determined, a sample could not be

drawn from the affected area and the project's social AoI. The settlements along the assumed project route were limited to the district, township, and provincial levels, and stakeholders for institutional consultations were identified.

During these meetings with local institutions and representatives, the Project Owner's efforts to inform stakeholders about the Project were reviewed. The most important limitation arose during Phase 2 due to the absence of the final project route and station locations. As a result, an AoI specific household survey was not conducted, and research pertaining to land acquisition and livelihood restoration was postponed until ~~such~~ information about final project route became available. The uncertainty regarding the project's alignment and stations locations limited effective stakeholder consultations, as many stakeholders questioned the relevance of providing feedback and recommendations in the absence of route clarity.

Stakeholders also shared their views on the potential impacts of the Project within their respective areas of responsibility. Finally, expectations from the Project Owner and overall feedback on the Project were collected.

In Phase 2, village and neighborhood mukhtars (local leaders) were actively engaged as stakeholders. Additionally, instead of employing a standardized questionnaire for mukhtars to gather settlement-level data, Focus Group Meetings (FGMs) were held with their participation. In preparation for the consultations, the mukhtars were contacted to facilitate field planning. One mukhtar indicated that all village mukhtars would convene on the same day for a subsequent meeting and emphasized the need to conduct the consultation collectively. This preference reflected the prevailing practice among mukhtars in the area, characterized by joint decision-making and coordinated action.

During FGM mukhtars were asked questions similar to those posed to other stakeholders.

In addition to these questions, they were asked about any changes in livelihoods, infrastructure services, and demographics that may have occurred from Phase 1 to the present. The discussions also covered regional expectations and suggestions for potential measures to address these changes.

Detailed information on the interviews conducted is provided in Appendix-11.

5.11.2.3 Third part of the social survey

5.11.2.3.1 Identification of Social AoI

Following the determination of the project route during Phase 2, a social impact assessment field study was carried out in February 2025 to assess the socio-economic impacts of the Project, including the effects of land acquisition.

The social AoI comprises the settlements (Derecikören, Gökçeler, and Sazköy within the Çaycuma District of Zonguldak Province, as well as the Sefercik settlement in the Filyos town of the same district) in which the 36 parcels located within the expropriation corridor, determined for the project's land requirements, are situated. These areas are considered to be directly affected by physical and economic resettlement impacts. A RP has been prepared for the areas subject to land acquisition, and a separate study (census, asset inventory and valuation) has been conducted within this scope.

The settlements (Öteyüz and Aşağıihsaniye) that are not located within the expropriation corridor but are situated along the previous project route (Phase 1) and have limited interaction with the project's environmental and social impacts. This population is not located within the AoI; however, it is considered to be indirectly affected by the general environmental and social impacts within the AoI.

5.11.2.3.2 Identification of Stakeholders

Project affected parties;

The population affected by the general environmental and social impacts within the AoI has been defined as “project-affected parties” (PAP) in accordance with ESS10 terminology.

Persons affected by land acquisition under the project have been defined as Project-Affected Households (PAHs), and related details are provided in the RP.

Project workforce included during Land Preparation and Construction, and Operation will also be considered as part of the PAPs.

During the project’s land preparation and construction phase, approximately 200 people will be involved, with 150 working for the contractor and the remaining personnel working for the design and supervision consultant team.

The number of TCDD personnel foreseen to be employed during the operation phase is not determined yet. The evaluations have been conducted based on the assumption that approximately 50 people will be working.

Passengers during the land preparation and construction phase and operation phase are also considered as part of the PAPs. No up-to-date source is available regarding the current passenger numbers at the stations. During the operation phase of the project, the total number of passengers visiting the station will be approximately 100 people.

Other interested parties;

The following stakeholders, expected to have an interest in or be directly/indirectly affected by the project, are initially recognized, with the possibility of additional stakeholders being identified throughout the project's lifespan:

(i) Potentially Affected Parties
- Project-Affected Households (PAHs) affected by land acquisition
- Vulnerable Gropus who may be disproportionately impacted or have limited ability to benefit from the project
- People / communities living in the vicinity of the Project area
- Project-Affected Parties (PAPs) within the AoI

(ii) Other Interested Parties
- International organizations
- National organizations
- National / regional governmental bodies

Disadvantaged / Vulnerable Individuals or Groups (DVIG);

In the context of participation in information-sharing processes, the groups defined as vulnerable under the SEP are females, especially who are the head of household, elderlies, people with handicapped, including home bound, bedridden individuals, and illiterates.

These groups are also considered vulnerable in terms of environmental & social and CHS impacts.

In addition to this assessment, individuals who have experienced a loss of more than 10% of their land due to land acquisition (Significantly Affected People) and actual users without land ownership have also been classified as vulnerable groups. The details about land-acquisition related vulnerability conditions are given in RP.

The identified DVIG among PAP is illustrated in Table 97.

Table 97. DVIGs among PAP within the AoI[41]

Settlement	Gökçeler		Sazköy		Sefercik		Derecikören	
DVIG	Number of Individuals within PAPs	Number of Affected Households (PAPs)	Number of Individuals within PAPs	Number of Affected Households (PAPs)	Number of Individuals within PAPs	Number of Affected Households (PAPs)	Number of Individuals within PAPs	Number of Affected Households (PAPs)
Female household head	8	8	5	5	1	1	1	1
Disabled individuals	3	3	3	3	3	3	6	6
Elderly people	27	18	32	21	15	9	21	15
Elderly individuals who are in need of care, bedridden, and homebound	9	7	4	3	0	0	4	4
Illiterates	1	1	3	3	0	0	4	4

5.11.2.3.3 Steps of the survey

In these settlements within the social AoI, the following studies were conducted:

- Household survey with PAPs,
- Mukhtar survey,
- Resettlement Plan field survey with PAHs,
- Stakeholder interview with institutions, and
- Focus Group Meetings with disadvantaged groups.

In line with stakeholder identification the relevant groups and the related engagement communication activities are given in Project specific Stakeholder Engagement Plan (SEP).

[41] **Note:** For the purposes of this table, a PAP refers to a project-affected household. The "Number of Affected Households (PAPs)" indicates the number of households that include at least one individual falling under the relevant DVIG category, while the "Number of Individuals within PAPs" represents the total number of individuals belonging to that category within those households. Differences between these figures reflect the presence of more than one individual from the same DVIG category within a single household

In addition to the above-mentioned studies, face-to-face meetings and focus group discussions were conducted with the project's stakeholders to assess the socio-economic impacts of the project.

In the finalized project route, 36 parcels will be subject to land acquisition within the scope of Phase 2, as opposed to the 471 parcels affected in Phase 1. Among these 36 parcels, 18 are privately owned, 13 belong to the Treasury, 5 are owned by TCDD, and one parcel, currently under litigation, is located within the expropriation corridor. The total number of shareholders on privately owned parcels is 102.

Details of economic and physical resettlement impacts of the Project are given within the project specific Resettlement Plan. Illustration of the expropriation corridor is provided in Figure 84, Figure 85, and Figure 86. Summary information also indicated within Section 5.12.2.5 in this ESIA.

Sampling

The social AoI was chosen to reflect the expected socio-economic impacts. It included all settlements within 3 km of the railway and road lines, which are part of the project. This area coveres the direct effects like land acquisition, pasture loss, and environmental impacts such as noise and vibration. In total, there were one town center and five villages within this social AoI. Populations of the settlements in the social AoI were taken through the Turkish Statistical Institute (TurkStat) Address Based Population Registration System (ABPRS), and the approximate number of households in the neighbourhoods was calculated using the average household size data of the provinces.

With 90% reliability level and ± 0.09 error margin were calculated based on the calculation currently used in the statistical sampling literature. Total sampling was distributed across to the settlements in proportion to the household population of the settlements. In addition, criteria such as expropriation and proximity to the project area were taken into consideration in the sample distribution. Only the number of households included in the sample was increased by using the ± 0.05 variable as a higher margin of error. The targeted sample size was determined to be 132.

Details of the interviews conducted using the sampling and research techniques mentioned in this section are provided in Appendix-11. Please see also Appendix-10 to examine the Project's stakeholders.

Limitations

The encountered limitations can be listed as follows:

- The local population mostly resides outside the settlement area, and the majority of the houses remain closed for most of the year. For instance, the census conducted within the scope of the RP revealed that nearly half of the landowners reside outside the village. These include settlements affiliated with Filyos and Çaycuma, as well as the Ereğli and Kilimli districts of Zonguldak. Additionally, there are households residing in other major provinces such as İzmir, Ankara, Istanbul, and Kocaeli, in addition to those living abroad. Winter months, in particular, are the periods with the lowest population density. Therefore, it was not possible to reach the individuals required for both household interviews and assessing the impacts of land acquisition.
- Another issue is the presence of other project activities in the region. In this area, where investment projects have become increasingly concentrated, the local population is hesitant to participate in interviews.
- Some groups are also reactive due to the negative impacts caused by investment projects. In the region, agricultural lands have decreased due to the pressure from industrial areas (TPAO, Organized Industrial Zone, etc.). Most agricultural and grazing areas have been allocated to these industrial areas. There has been an increased tendency towards agricultural activities that can be conducted on smaller areas, such

as fruit tree cultivation, rather than activities on large-scale agricultural lands. This information has been compiled based on responses provided by participants, other stakeholder interviews conducted in the settlements,in depth interviews with local residents, and data obtained from mukhtars. As a result, similar impacts arising from land acquisition due to the project would likely be experienced by the local population, who have already encountered such effects from previous projects, including transport projects. Similarly, despite this Project being on the agenda since 2020 (or even earlier), there has been no progress, which has led to dissatisfaction among the local community. Due to the loss of trust in the project, they have been reluctant to engage in interviews.

- Some institutions planned for in-depth face-to-face interviews requested official letters to solicit feedback.

The outcomes of these limitations are as follows:

- The household sample size remained below the targeted level.
- In face-to-face interviews, individuals who could not be reached were intended to be contacted via phone. However, due to sensitivities and concerns regarding the sharing of phone numbers within the scope of the Law on the Protection of Personal Data (KVKK), it was not possible to access contact information through the mukhtars or the local population.
- Meetings with key stakeholders such as TPAO[42] and ŞÖNİM[43], who were included in the stakeholder consultations but declined the meeting request, were either refused by the stakeholders or yielded limited results during the discussions. This has resulted in gaps regarding critical information that could have been obtained from these stakeholders.
- Due to the pending finalization of the design phase, the land acquisition processes were not fully elaborated, which led to limited evaluation during and after the fieldwork.

Research Techniques

As in the previous phase, both quantitative and qualitative techniques were used together for this study.

In terms of quantitative techniques;

- Three questionnaires were developed to collect quantitative data. The first is the household questionnaire, the second is the resettlement questionnaire for land acquisition impacts, and the third is the mukhtar questionnaire.
- The household questionnaire was applied in the Gökçeler, Derecikören, Sefercik, and Sazköy regions, where the project's land acquisition impacts are expected. The mukhtar questionnaire was also applied in these settlements. The main objective of both questionnaires is to understand the general demographic structure of the region, identify disadvantaged groups, determine the general economic conditions of the households, gather the local population's opinions on improving livelihoods, and collect positive and negative views regarding the project.
- The main aim of the questionnaire applied for resettlement was to assess the impacts on a parcel-by-parcel basis. As some parcels belong to private individuals and others to the Treasury, representatives from public institutions, along with mukhtar, were included in the interviews.

[42] Türkiye Petrolleri Anonim Ortaklığı-Turkish Petroleum Petroleum Distribution Corporation

[43] Şiddet Önleme ve İzleme Merkezi-Violence Prevention and Monitoring Centers

- For private parcels, the household questionnaire was also applied to the individuals interviewed, while no household interviews were conducted with the mukhtars and other public institution representatives.

As qualitative data collection tools;

- Semi-structured in-depth interview questionnaires were used in meetings with public institutions and other stakeholders, and the full list is provided in the Appendix-10. In general, face-to-face in-depth interviews were conducted with the municipality, district governorship, agricultural institutions, and the neighbouring facility, Çaytaş Ateş Tuğla Sanayi ve Ticaret A.Ş.
- FGMs were designed to offer a deeper opportunity for discussion with disadvantaged groups. A women's focus group meeting was held in Gökçeler village, which will experience the most significant land acquisition impacts of the project (All 18 privately owned parcels among the total 36 parcels are located within this village.).

Details of the mentioned stakeholder interviews are provided in Appendix-11. Please see also Appendix-10 for a list of the Project's stakeholders. Photographs taken during the interviews are given via Appendix-12, too.

5.12 Baseline Conditions

5.12.1 Demography

5.12.1.1 Administrative structure

At the beginning of the 1970s, European Statistics Office (Eurostat) set up the Nomenclature of territorial units for statistics (NUTS) classification as a single, coherent system for dividing up the European Union (EU) territory to produce regional statistics[44].

- NUTS 1: major socio-economic regions
- NUTS 2: basic regions for the application of regional policies
- NUTS 3: small regions for specific diagnoses

To meet the demand for statistics at a local level, Eurostat maintains a system of Local Administrative Units (LAUs) compatible with NUTS. These LAUs are the building blocks of the NUTS and comprise the municipalities and communes of the EU[45].

The use of NUTS in Türkiye has started within the scope of the National Programmes for the Adoption of the European Union Acquis (NPAA)[46], adopted by the decision of the Council of Ministers dated March 19, 2001, and the Accession Partnership Document adopted at the Environmental Council dated March 8, 2001, prepared by the European Commission. Within this framework, Statistical Regional Units were defined in Türkiye with the study started in 2001 under the coordination of the under secretariat of State Planning Organization (DPT) and the

[44] European Commission, Eurostat. NUTS - Nomenclature of Territorial Units for Statistics. https://ec.europa.eu/eurostat/web/nuts. Access date: March, 2025.

[45] European Commission, Eurostat. LAU - Local Administrative Units. https://ec.europa.eu/eurostat/web/nuts/local-administrative-units. Access date: March, 2025.

[46] Republic of Türkiye Ministry of Foreign Affairs Directorate for EU Affairs. National Programmes for the Adoption of the Acquis. https://www.ab.gov.tr/58_en.html. Access date: March, 2025.

Turkish Statistical Institute, and this classification entered into force by the Decision of the Council of Ministers dated August 28, 2002[47].

Türkiye has constituted seven geographical regions, 12 NUTS region, 26 subregion 81 provinces, 922 districts, 32,274 quarters, 18,247 villages, 23,803 affiliated settlements and 1,401 municipalities in accordance with administrative structure under local authority units[48]. In this structure, Zonguldak is a province, Çaycuma is a district, and Filyos is a town. It is considered that Öteyüz and Sefercik settlements of Filyos Town are as quarter, and Sazköy, Derecikören, Gökçeler and Aşağıihsaniye settlements are as villages.

- TR, State, Türkiye
- TR8, NUTS 1 West Black Sea
- TR81, NUTS 2 Sub region, Zonguldak Subregion (Zonguldak, Karabük, Bartın)
- TR811, NUTS 3 Province, Zonguldak Province
- Subprovince Level, Çaycuma District
- LAU, Zonguldak Municipality, Çaycuma Municipality and Filyos (Town) Municipality

The other administrative quarters/villages also place as quarters/villages in accordance with NUTS.

5.12.1.2 Population figures

The Project area is within the borders of Çaycuma district, including Filyos town of Zonguldak province.

According to the 2024 population data from TurkStat, Zonguldak ranks[49] 37th among Türkiye's 81 provinces in terms of population with 586,802 people[50]. The population density in the province is 111.41 people/km² in 2024[51]. For Zonguldak province, annual population growth rate between 2023-2024 is -7.96‰.

Zonguldak has 8 districts including central district. Çaycuma district is the third-largest district with 90, 423 people in Zonguldak, following Alaplı and Merkez districts. For Çaycuma district, annual population growth rate between 2023-2024 is -16.94‰[52].

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47 Republic of Türkiye Ministry of Industry and Technology General Directorate of Development Agencies. Classification of Statistical Regional Units in Development Planning. https://ka.gov.tr/sayfalar/kalkinma-planlamasinda-istatistiki-bolge-birimleri-siniflandirmasi--24. Access date: March, 2025.

48 Republic of Türkiye Ministry of Interior Inventory of Local Authority Units https://www.e-icisleri.gov.tr/Anasayfa/MulkiIdariBolumleri.aspx. Access date: March, 2025.

49 From the most populous province to the least populous one

50 Population of provinces by years, 2000-2024, TurkStat, Population Estimates, 2000-2006, Address Based Population Registration System (ABPRS), 2007-2024, https://data.tuik.gov.tr/Bulten/DownloadIstatistikselTablo?p=Nn2LgUBrm8OUNA/pMzlkIXwwwapQZ5t7VcSJR/ixRTFM9b1sTfFkTbwS1jQCk8s9, Access Date: March 2025.

51 Annual growth rate of population and population density of provinces by years, 2007-2024, TurkStat, Address Based Population Registration System (ABPRS), 2007-2024, https://data.tuik.gov.tr/Bulten/DownloadIstatistikselTablo?p=CAjff7PKVIByewXwgLdAFLfFp0GivvXsrtmobxd5Jq1jypIgWwqa89fURHN3bZFs, Access Date: March 2025.

52 Population of province/district centers, towns/villages and annual growth rate of population by provinces and districts, 2024, TurkStat, Address Based Population Registration System (ABPRS), 2024, https://data.tuik.gov.tr/Bulten/DownloadIstatistikselTablo?p=Wry5DgNWD0brS4f1jlMpLFclye0SkWUfUuI9NMFb3w8eaTvtYHgYrupSgT2Gi8/G, Access Date: March 2025.

The trend of population decline in the Zonguldak region after 2000 are associated with the reduction in employment capacity of the Türkiye Hard Coal Authority (TTK), a major industrial investment in the region that significantly impacts the socioeconomic structure. According to the Zonguldak Central Implementation Zoning Plan – Plan Explanatory Report[53], the province exhibits a low natural population growth rate. The same report states that Zonguldak is among the provinces with stagnant population growth and that its fertility rate is below the national average. Following the closure of unprofitable mines by the Türkiye Hard Coal Authority in the mining sector, the provincial economy experienced significant stagnation, and population growth ceased. Within the province, migration occurs from rural areas to urban centers, while at the provincial level, there is migration toward major metropolises such as Istanbul. According to the Zonguldak Provincial Investment Environment Assessment[54], high unemployment rates and financial difficulties particularly lead the young population to leave Zonguldak. Furthermore, research on "Socio-Economic Causes of Migration in Zonguldak and Possible Measures"[55] indicates that limited access to education and healthcare services in villages encourages migration to city centers.

Population figures of the settlements located within the social AoI are given via Table 98.

Table 98. Population data based on TurkStat, 2024[56]

Province	District	Settlement[57]	Type of settlement	Population
Zonguldak	Çaycuma	Gökçeler	Village	179
Zonguldak	Çaycuma	Sazköy	Village	268
Zonguldak	Çaycuma / Filyos town	Sefercik	Neighborhood	169
Zonguldak	Çaycuma	Derecikören	Village	271
Zonguldak	Çaycuma	Aşağıihsaniye	Village	147
Zonguldak	Çaycuma / Filyos town	Öteyüz	Neighborhood	2,343

In 2024, the average household sizes are 3.11 in Türkiye, 2.74 in Zonguldak, and 2.83 in Çaycuma[58]. As a result of the household survey conducted during Phase 2, the average household size was found to be approximately 3.11. The highest average household size was recorded in Derecikören (3.26). The lowest average household size was observed in Sazköy (2.94).

53 Zonguldak Belediyesi. (2014). Zonguldak 1000 UİP Plan Açıklama Raporu ve Plan Notları. https://www.zonguldak.bel.tr/images/basaran/bilgiislem3askiicin/Zonguldak%201000%20U%C4%B0P%20Plan%20A%C3%A7%C4%B1klama%20Raporu%20ve%20Plan%20Notlar%C4%B1.pdf.

54 Türkiye Ekonomi Politikaları Araştırma Vakfı (TEPAV). (2014). Zonguldak İli Yatırım Ortamı Değerlendirmesi. Batı Karadeniz Kalkınma Ajansı. https://www.kalkinmakutuphanesi.gov.tr/assets/upload/dosyalar/tepav-zonguldak-yod-kitap-baski.pdf.

55 Vergil, H., & Yılmaz, M. (2019). Zonguldak ilinde göçün sosyo-ekonomik nedenleri ve alınabilecek tedbirler. Batı Karadeniz Kalkınma Ajansı. https://bakkakutuphane.org/upload/dokumandosya/zonguldak_ilinde_gocun_sosyoekonomik_nedenleri.pdf

56 Address-Based Population Registration System, Population of localities, Population of municipalities, villages and quarters, 2024, Turkish Statistical Institute, https://biruni.tuik.gov.tr/medas/?locale=en

57 The settlements are listed in descending order based on the number of affected parcels in each settlement.

58 Address-Based Population Registration System, 2024, Household, Average Size of Households, Turkish Statistical Institute, https://biruni.tuik.gov.tr/medas/?locale=en

5.12.1.3 Urban and rural population

The urban population (the population of provincial and district centers) constitutes 63.70% of the total population, while the population ratio of rural population (towns and villages) is 36.30%. In Çaycuma, these ratios are reversed. The rural population ratio is 64.73%, while the urban population ratio is 35.27%. In this regard, Çaycuma is the district with the highest rural population ratio among all districts in Zonguldak. This district is followed by Gökçebey, Devrek, and Alaplı. In the other districts, including the central district, the urban population ratio is higher[59].

As indicated by Table 101, three of the settlements (Gökçeler, Sazköy, and Derecikören) are villages located in the Çaycuma District of Zonguldak Province. Sefercik is a neighborhood of the Filyos Town, also situated in the Çaycuma District of Zonguldak Province. All four of these settlements exhibit entirely rural characteristics. Aşağıihsaniye, located in the Çaycuma District of Zonguldak Province, while Öteyüz, is a neighborhood of the Filyos Town, also situated in the Çaycuma District of Zonguldak Province. These settlements also possess rural characteristics. According to the livelihood data provided by Table 103 under Economy, agriculture and livestock are frequently among the top three livelihood sources.

Socio-Economic Development Index of Districts (SEDI) for 2022[60] was conducted across all 973 districts in Türkiye using a total of 56 variables[61] ,and the development scores, rankings, and development levels of the districts were determined. According to this study, Çaycuma ranks 4th out of 8 districts in Zonguldak. In the distribution of the third-level developed districts by geographic region, 45 districts from the Black Sea Region participate, and one of them is Çaycuma.

5.12.1.4 Gender

In Türkiye, the distribution of the total population by gender shows a slight difference in favor of the male population (50.02%), whereas in Zonguldak, this ratio is in favor of females (50.36%)[62].

According to the obtained data by household survey dated February 2025, the number of women is close to the number of men, yet women still constitute a lower percentage of the total population (371) compared to men. The proportion of women in the sample is approximately 49%.

In the women's focus group meeting held in the Gökçeler settlement on 04.02.2025, it was stated that the most significant problems for women in the region are floods, insufficient

59 Population of province/district centers, towns/villages and annual growth rate of population by provinces and districts, 2024, TurkStat, Address Based Population Registration System (ABPRS), 2024, https://data.tuik.gov.tr/Bulten/DownloadIstatistikselTablo?p=Wry5DgNWD0brS4f1jlMpLFclye0SkWUfUuI9NMFb3w8eaTvtYHgYrupSgT2Gi8/G, Access Date: March 2025.

60 General Directorate of Development Agencies. Socio-Economic Development Index of Districts. SEDI 2022. The Number of Publishment of General Directorate of Development Agencies: 37. Research Report Number: 10 September 2023, Ankara. ISBN: 978-605-7887-22-1 https://www.sanayi.gov.tr/merkez-birimi/b94224510b7b/sege/ilce-sege-raporlari. Access Date: March 2025.

61 See also: 2. Variables pages 6-19.

62 Population by province, age group and sex, 2007-2024, https://data.tuik.gov.tr/Bulten/DownloadIstatistikselTablo?p=qMqS9RarJHGf4fv9wAx9EbekKQQcSXXUWhZGu/m80Efhx3YIW6oAxFgs8tsKQqkY, TurkStat, Address Based Population Registration System (ABPRS), 2007-2024, Access Date: March 2025.

transportation and social activities. A striking finding that is deemed appropriate to include is the following quote: "*Livestock is disappearing, and agriculture is vanishing along with it. Nothing is being done for the children and women of our village. The sea is just 1 km away, but the children don't know how to swim. Women are always at home; courses could be organized for them, and they could go to the theater or cinema.*" (Gökçeler Village, 21.02.2025, Male, 48 aged, Phone call household interview).

During consultations with household representatives on improving livelihoods, one of the two female household heads suggested establishing a cooperative to support women's enterprises, while the other proposed creating employment opportunities for women. The fact that women are lagging behind in employment has also been recognized by female household heads.

5.12.1.5 Age distribution

In Türkiye, the population of children (ages 0-14) is higher (20.93%) than the elderly population (65 years and older) (10.64%). However, for Zonguldak, these figures are almost at the same level. The elderly population ratio is 15.83%, while the child population ratio is 15.12%[63]. Nevertheless, passing the proportion of 10.0% of the elderly population in the total population is an indicator of the aging population. In Türkiye, the elderly population increased with a rate higher than that of other age groups. Elderly dependency ratio means that the number of elderly persons per hundred persons in working age. While the elderly dependency ratio was 13.4% in 2019, this ratio increased to 15.5% in 2024.[64]

Considering these data, when examining age dependency ratios, the total age dependency ratio in Türkiye is 46.1%, while it is 44.8% in Zonguldak. In Zonguldak, the elderly dependency ratio (22.9%) is higher than the child dependency ratio (21.9%)[65].

In light of these data, the situation in Zonguldak, which differs from the national average, is confirmed by field study data collected via household survey dated February 2025. According to the results of the survey, approximately 25% of the total population (371) consists of elderly individuals, while around 8% of the population is under the age of 14. The high proportion of the population aged 65 and above has necessitated the consideration of elderly individuals among PAPs as a vulnerable group.

When the opinions of household heads about the project were gathered, it was stated that the young population in the villages could benefit from the increasing employment opportunities, and therefore, the project was evaluated positively. No positive or negative impact of the project on the elderly has been mentioned. The same applies to children as well.

Other stakeholder meetings also considered the project beneficial in terms of employment but did not mention any impact on the elderly or children. Therefore, the impact of the project on age groups is likely to be related to the employment participation rates of the working-age young population.

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63 Population by province, age group and sex, 2007-2024, https://data.tuik.gov.tr/Bulten/DownloadIstatistikselTablo?p=qMqS9RarJHGf4fv9wAx9EbekKQQcSXXUWhZGu/m80Efhx3YIW6oAxFgs8tsKQqkY, TurkStat, Address Based Population Registration System (ABPRS), 2007-2024, Access Date: March 2025.

64 TurkStat, Press Release numbered 54079, dated, 13.03.2025, Elderly Statistics, https://data.tuik.gov.tr/Bulten/Index?p=Elderly-Statistics-2024-54079. Access Date: March 2025.

65 Age dependency ratio by provinces, 2007-2024, TurkStat, Address Based Population Registration System (ABPRS), 2007-2024, https://data.tuik.gov.tr/Bulten/DownloadIstatistikselTablo?p=sCwY8GNjTxTWvG725SpwSJ6tKp4u9lFk0ZWvDbnNG/FoQEAM6Wqfci/MhkxU7tMJ, Access Date: March 2025

5.12.1.6 Population movements

When the population changes of the settlements in the region over the past ten years are closely examined, a trend of population decline is observed. However, the population changes are not very pronounced. The highest change rate compared to the previous year occurred between 2022 and 2021 in Sazköy, with a positive change of 83.46%. A similar change was recorded between 2023 and 2022 in Sazköy as well, with a positive change of 41.20%. Another significant population change occurred between 2018 and 2016 in Aşağıihsaniye, with an increase of over 25% and a decrease of more than 21%. The presence of significant industrial investments and strategic facilities in the region has influenced population mobility. Nevertheless, the rural structure in the region continues to exhibit a declining trend, consistent with the overall pattern of population movement observed across Türkiye. Apart from these data, population movements show a negative trend (see Table 99).

Table 99. Population changes within the last ten years, TurkStat 2015-2024

Years	Gökçeler	%	Sazköy	%	Sefercik	%	Derecikören	%	Aşağıihsaniye	%	Öteyüz	%
2024	179	-	268	-	169	-	271	-	147	-	2,343	-
2023	174	2.87	329	-18.54	176	-3.98	272	-0.37	163	-9.82	2,282	2.67
2022	152	14.47	233	41.20	161	9.32	276	-1.45	149	9.40	2,200	3.73
2021	157	-3.18	127	83.46	166	-3.01	295	-6.44	156	-4.49	2,233	-1.48
2020	161	-2.48	134	-5.22	159	4.40	287	2.79	156	0.00	2,205	1.27
2019	161	0.00	141	-4.96	166	-4.22	293	-2.05	160	-2.50	2,164	1.89
2018	166	-3.01	148	-4.73	171	-2.92	301	-2.66	163	-1.84	2,126	1.79
2017	169	-1.78	139	6.47	170	0.59	285	5.61	130	25.38	2,142	-0.75
2016	173	-2.31	155	-10.32	175	-2.86	297	-4.04	165	-21.21	2,165	-1.06
2015	195	-11.28	161	-3.73	175	0.00	307	-3.26	178	-7.30	2,127	1.79

The outputs related to Filyos Valley Project were reflected in the mukhtar interviews conducted in 2020. It was reported that after the expropriation for the Filyos Valley Free Zone in 1998, many households left the area. It was stated that 30-35 households had migrated from Sazköy due to the expropriation, and it was learned that most of these people had moved to Çaycuma, Filyos, Saltukova, and Zonguldak. However, it was noted that the population had slightly increased recently, and some young people, who had heard about the employment opportunities provided by the Filyos Valley Project, had returned to the village. It was also learned that more than 100 households had migrated from Aşağıihsaniye village after the expropriation in 1998, while 20 households from Derecikören and 10 households from Gökçeler had migrated due to the expropriation.

In the interviews with the mukhtars in February 2025 it was learned that the region generally receives immigrants, and most of the immigrants are men who work as laborers in the industrial sector. When the mukhtar was asked to assess the changes that occurred in the settlement over the last 5 years, examples were found for all situations, including population increase, decrease, and stability. While the reason for the population increases in Gökçeler, Sazköy, and Öteyüz in the last 5 years is the industrial investments made in the region, the same reason has led to a population decrease in Aşağıihsaniye. The representative of Derecikören mentioned a population increase, but this has not been confirmed (see Table 100).

Table 100. Population changes within the last five years, Mukhtar Interviews, February 2025

Settlement	Population changes in the last 5 years	Reason, if available
Gökçeler	Increased	The reason for this is both the return of those who emigrated abroad and those who immigrated to work in the Filyos Port[66].
Sazköy	Increased	The region receives immigration in general. Most of the immigrants are male and work as workers in industry.
Sefercik	No change	No information
Derecikören	Increased	No information
Aşağıihsaniye	Decreased	The reason for this is the decrease in economic activities in the village due to the expropriation of land for the Filyos Port area in 1998, in 2008 and in 2018 to enlarge the area.
Öteyüz	Increased	The reason for this is the immigration to the region due to the OIZ[67] and TPAO[68].

The most populous area is Öteyüz settlement, while the least populated area is Aşağıihsaniye.

In line with the available data, seasonal population increases are observed in all settlements. In many settlements, the number of households during the summer period (temporary population) is almost twice the number of households during the winter period (permanent population). Many individuals who have migrated to urban areas, including near-district and town center, tend to return to their hometowns during the summer period, either for agricultural activities or for holiday. This temporary return significantly increases the household count. Besides, some households have dual residences — one in urban centers for the winter and another in the village for the summer. Especially in larger settlements (such as Öteyüz), the significant increase in population may also be linked to the presence of second homes and/ or village houses.

The data obtained during mukhtar interviews dated February 2025 are as follows (see Table 101).

Table 101. Seasonal population changes based on mukhtar Interviews, 2025

	Current conditions, 2025	
Settlement	**Permanent population**	**Permanent and Temporary population**
Gökçeler	185 people within 60 households	No information
Sazköy	120 people within 40 households	250 people within 90 households
Sefercik	170 people within 50 households	200 people within 55 households
Derecikören	300 people within 120 households	No information
Aşağıihsaniye	185 people within 60 households	300 people within 115 households
Öteyüz	2,000 people within 250 households	7,500 people within 750 households

66 Republic of Türkiye, Ministry of Transport and Infrastructure, Directorate General of Investment Infrastructure. Filyos Port. https://aygm.uab.gov.tr/filyos-limani

67 Çaycuma Organized Industrial Zone (ÇAYORSAN). http://www.caycuma.gov.tr/organize-sanayi-bolgesi Organized Industrial Zone

68 Turkish Petroleum Corporation (TPAO) Filyos Shorebase. https://tp-otc.com/en/shorebase-logistics-center-management/

When all the findings mentioned under Methodology are examined, none of the opinions conveyed about the project contain an outcome that would affect the population structure of the region.

The opinions suggesting that Project will lead to an increase in employment are indirectly related to the population structure of the region. On the other hand, the negative impact of the Project on agricultural and livestock activities also indirectly concerns the population structure. Similarly, it is assumed that the implemented projects also have negative impacts on tourism.

As a prominent finding, the project's capacity to generate employment has been frequently emphasized. This is related to the region's long-standing experience with investments from various sectors and sources. In this context, the presence of OIZ, TP-OTC[69], the Filyos Port, and Tosyalı[70] has been decisive.

On the other hand, household data indicate that the project could be beneficial for the development of villages. Another point reflected in the interviews is that the individuals interviewed do not see the effects of the project as significant for themselves, due to their limited connection with the region. The below quotes reflect base of this kind of opinions;

- *"We go to the village occasionally, so it won't negatively affect us."*
- *"We don't have much connection with the village anymore, so I think it won't negatively affect us."*
- *"I live in the city center, so it's not a project that will affect me much."*

In the household interviews, there were individuals who settled in the region after the February 6th earthquake and, therefore, had limited knowledge about the area. There is no finding in the other interviews regarding the migration to the region following the mentioned earthquake.

In the interview with Çaycuma District Governorship - District National Real Estate Service Chief Office, it was emphasized that if there is an influx of workers, rents in the region will increase (Çaycuma District Governorship - District National Real Estate Service Chief Office, 05.02.2025, Face to face stakeholder interview).

5.12.2 Economy

5.12.2.1 General features

The study on the transformation and current state of economic activities in the region was conducted in 2015[71]. This study on the use of natural resources in the region, the low plateau area starting from the Filyos Delta in the north and continuing through the Saltukova and Çaycuma plains, ending in the Gökçebey plain, has been subjected to deforestation due to activities such as settlement, agriculture, and livestock. Although village and neighborhood settlements are located on this unit, it exhibits a scattered structure. The activities carried out intensively in these areas include dry farming (mainly wheat and barley), gardening, and small-scale greenhouse farming in some suitable areas. Additionally, cattle farming is conducted in the pasture areas of these fields.

While the Zonguldak and Amasra hard coal quarries constituted an important employment area in the region until the end of the 1990s, there was a contraction in employment due to the changes in the mining policy at the end of the 1990s and as a result, migration from the region to the outside. In Zonguldak, which experienced heavy immigration between 1950 and 1985, employment capacity decreased and resulted in unemployment problems in the 1990s as a

69 Turkish Petroleum Offshore Technology Center (TP-OTC).https://tp-otc.com/en/.

70 Tosyalı Gübre Sanayi A.Ş. https://www.tosyaliholding.com.tr/faaliyet-alanlarimiz/grup-sirketleri/yurt-ici-istirakler#

71 https://tucaum.ankara.edu.tr/wp-content/uploads/sites/280/2015/08/semp8_28.pdf. Access date: March 2025.

result of negative developments such as Türkiye Hard Coal Authority (TTK) economic losses causing significant costs to the Treasury, failure to modernize production technology, and reduced productivity. This situation led to the reversal of the immigration, in other words, emigration to other settlements from the province of Zonguldak. In addition, according to the data of the Ministry of Science, Industry and Technology Zonguldak Provincial Directorate, it is known that industrial investments in Zonguldak are inadequate and there are only small scale Small and Medium Enterprises (SMEs) investments. The main problem of Zonguldak is the lack of land and the existing lands do have the capacity to enable the development of the industrial sector. All these negativities brought along an internal emigration from Zonguldak to the outside of the early 1990s[72].

The migration in Zonguldak is primarily driven by two main factors: the decline in employment due to the mining sector crisis and the inability to implement alternative investments within the city. TTK has played a significant role in influencing and shaping the socio-economic landscape of the city, both during the urbanization phase in the mining basin and in the years following its completion[73].

However, today, the economic landscape of the region has changed with industrial and manufacturing investments. In a study published in 2022, it was stated that agriculture, fishing, and timber trade had initially been important sources of livelihood for the local population. However, it was mentioned that, over time, these activities had been replaced by coal mining and the iron and steel industry[74].

As of 2022[75], the region includes the Filyos Fishermen's Shelter, Eren Port[76], where general cargo, bulk cargo, and ro-ro vessels can dock, and in the hinterland, the Filyos Industrial Zone. While the manufacturing of medium-high technology products (such as electrical equipment production) has been designated as the main sector for the Filyos Industrial Zone, it is also assumed that high-tech industries (such as the manufacturing of computers, electronic, and optical products) and medium-high technology sectors (such as the production of medical and dental instruments and devices) will develop in the region[77].

In the TR81 Level 2 Region Sector Identification, Prioritization, and Competitiveness Analysis Report, priority sectors have been identified. In Zonguldak, machinery manufacturing and furniture manufacturing sectors have emerged as prominent. Industrial areas such as

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72 Socio-Economic Reasons of Migration in Zonguldak Province and Suggested Measures, Bülent Ecevit University Publications, No: 1. https://bakkakutuphane.org/upload/dokumandosya/zonguldak_ilinde_gocun_sosyoekonomik_nedenleri.pdf. Access date: March 2025.

73 DPT (2009), 9th Development Plan Mining Specialization Commission Report, Ankara. https://www.sbb.gov.tr/wp-content/uploads/2022/08/Dokuzuncu-Kalkinma-Plani-Madencilik-OIK.pdf. Access date: March 2025.

74 Altinpinar, İshak & Aladag, Omer. (2022). Filyos Liman Bölgesinde Bulunan Liman ve Balıkçı Barınaklarının Güncel Durumu. October 2022. In book: Bölgesel Kalkınma Bağlamında Filyos Limanı (pp.27-42)Chapter: 3Publisher: Akademisyen Kitabevi A.Ş. https://www.researchgate.net/publication/364378819_Filyos_Liman_Bolgesinde_Bulunan_Liman_ve_Balikci_Barinaklarinin_Guncel_Durumu/citation/download. Access date: March 2025.

75.https://webdosya.csb.gov.tr/db/zonguldak/duyurular/1_1000-plan-aciklama-raporu-20220829145958.pdf.Access date: March 2025.

76.https://www.erenlimani.com.tr/. Access date: March 2025.

77 https://www.bakka.gov.tr/haber/filyos-endustri-bolgesinde-yer-alabilecek-sektorler-belirlendi/920. Access date: March 2025.

Çaycuma and Gökçebey OIZs highlight the Zonguldak Valley region, which stands out in the manufacturing of bathroom furniture[78].

One of the details that shapes the economic landscape of the region is The Filyos Valley Project. Key steps for project implementation were initiated in 1994, including the declaration of the Free Zone and urgent expropriation of properties. The Industrial Area, covering about 607 hectares, was officially designated in 1998, with a substantial portion allocated for industrial use[79].

In addition, fishing is carried out in Filyos. There are a total of 185 boats in the Filyos Fishermen's Shelter. Those engaged in fishing under the Filyos Fishermen's Shelter practice small-scale coastal fishing[80].

In summary, while traditional livelihoods such as agriculture, livestock, and fishing, which have long relied on the region's natural resources, continue to a lesser extent, employment in these sectors has increased with the development of the industrial and manufacturing sectors.

According to the press release related to labor force statistics 2024 (Issue No. 54059), published on March 20, 2025, in Türkiye, 14.8% of the employed population works in agriculture, 20.7% in industry, 6.6% in construction, and 57.9% in the service sector. When compared to the previous year, the share of employment in the service and construction sectors increased by 0.3 percentage points, while the share in the industrial sector decreased by 0.5 percentage points. The share in the agricultural sector remained unchanged[81]. The regional results related to the topic are provided by Table 102.

Table 102. Employment by sector, 2024[82]

Thousand person / 15+age	Total	Agriculture	%	Industry[83]	%	Service	%
Male	263	48	18.4	85	32.4	129	49.2
Female	144	46	32.3	21	14.9	76	52.8
TR81 *(Zonguldak, Karabük, Bartın)*	406	95	23.3	106	26.2	205	50.5

5.12.2.2 Income sources

The topic of primary and secondary livelihoods has been examined at every stage of the study, including mukhtar interviews, household surveys, stakeholder consultations, and focus group meetings.

78 Batı Karadeniz Kalknma Ajansı 2025 Yılı Çalışma Programı. https://bakkakutuphane.org/upload/dokumandosya/-2025-yili-calisma-programi-.pdf?v=67e179af42ac0. Access date: March 2025.

79 Çetinkaya, M. "Filyos Valley Project", http://bakkakutuphane.org/upload/flip-page/Filyos%20Vadisi%20Projesi/HTML/files/assets/common/downloads/publication.pdf. Access date: March 2025.

80 https://webdosya.csb.gov.tr/db/zonguldak/duyurular/1_1000-plan-aciklama-raporu-20220829145958.pdf. Access date: March 2025.

81 TURKSTAT, Press Release. https://data.tuik.gov.tr/Bulten/Index?p=Isgucu-Istatistikleri-2024-54059. Access date: March 2025.

82 TURKSTAT, Labour Force Statistics, Employment by sector (SRE, Level 2), Results at the Regional and Provincial Level. https://data.tuik.gov.tr/Bulten/Index?p=Isgucu-Istatistikleri-2024-54059. Access date: March 2025.

83 Including construction sector

The household survey conducted in February 2025 placed retirement income at the top of the primary income sources (89 out of 124 households).

Salaried jobs ranked second among the main livelihood sources, while commercial activities ranked third.

Agriculture and livestock remain at the bottom of the primary livelihood sources.

These findings, which reflect household data, were also observed in the mukhtar interviews, where parallel results were seen. In 2025, the mukhtars presented retirement as the most common main income source. The vast majority of salaried employees in the private sector, as presented in Table 103 are employed in facilities within OIZs.

Table 103. **Income sources based on mukhtar Interviews, 2025**

	Current conditions, 2025		
Settlement	**Primary**	**Secondary**	**Tertiary**
Gökçeler	Agriculture / crop production	Animal husbandry	Retirement Income
Sazköy	Retirement Income	Animal husbandry	Permanent employment[84]
Sefercik	Retirement Income	Construction and industrial labor	Animal husbandry
Derecikören	Retirement	NA	NA
Aşağıihsaniye	Agriculture / crop production [85]	Retirement Income	Animal husbandry
Öteyüz	Permanent employment	Construction and industrial labor	Tourism

It has been stated that the settlements under the heading “Urban and rural population” are of a rural nature. In fact, Çaycuma is the district with the highest rural population ratio within Zonguldak. Nevertheless, agriculture and livestock hold low proportions among the primary livelihood sources. In this sense, the rural characteristics of the region cannot be defined by agricultural and livestock activities.

Another cross-assessment regarding income sources is related to age groups. According to the heading “Age distribution”, in the region, the proportion of the elderly population (65 years and over) exceeds that of the child population (0-14 years) in terms of age dependency ratios and the distribution of the population by age groups. This situation is related to the high frequency of retirement income as a livelihood source. On the other hand, the labor force required for labor-intensive agricultural and livestock activities has preferred to work in permanent jobs as workers or civil servants.

In households that indicate retirement as a source of income, there is often no secondary source of income. Activities accompanying retirement as a secondary income source are quite diverse. Among these are other agricultural activities such as farming, beekeeping, fishing, and animal husbandry. Rental income, commercial activities, wage labor in seasonal and daily jobs, and employment as a worker or civil servant in permanent jobs are also secondary income sources accompanying retirement. Excluding households without any other source of income and not dependent on a primary income source, retirement remains the most common secondary income source. Among secondary income sources, retirement is followed by farming, animal husbandry, and employment as a worker or civil servant in permanent jobs. Other data, such as hazelnut cultivation, beekeeping, and fishing, are specific and uncommon

84 Port staff

85 Hazelnut

income sources reported by only one household each. In fact, these activities are not represented among primary income sources at all.

5.12.2.3 Income level and expenditures

Household representatives who were interviewed within the scope of household survey dated February, 2025, were asked to evaluate the approximate monthly income of their households. Before evaluating the approximate monthly income of the households, it is important to look at the distribution of income groups in Türkiye.

Monthly incomes of households in Türkiye were evaluated according to income groups. The following classifications were used for these income groups[86]:

- Below minimum wage (starvation line)
- Minimum wage and 22,000 TL[87] (Cost of living)
- 22,000 and 55,000 TL (Poverty line)
- 55,000 and 88,000 TL (Highest annual average main job income-Employee)
- 88,000 TL and 221,000 TL (Highest annual average main job income-Employer)
- Over 221,000 TL

When excluding household representatives who refrain from providing information about their monthly income, the most common income level is poverty line. This is followed by cost of living.

At the household level, monthly expenditure items were examined. Food and kitchen expenses were reported as almost the sole expenditure item (above 87%). Among other primary expenditure items, albeit at low levels, responses were compiled as follows: "Heating and fuel," "Transportation and fuel," "Loan debts," "Education," "Agriculture and livestock expenses," "Commercial expenses," "Rent," and "Bill payments." Among the secondary expenditure items of households, the most common expenses are " Heating and fuel " with a rate of approximately 40%.

After examining the sources of income, monthly income, and expenditure items of households, the proportion of monthly income allocated to expenses was analyzed. Approximately 80% of households reported spending their entire monthly income.

When the findings are considered, the income level, life satisfaction, and concerns about making ends meet of the people in the research area do not present a satisfactory picture. In this regard, the risks related to the loss of livelihood sources should be considered among the significant risks carried by the Project.

5.12.2.4 Land use

In the meetings held with the mukhtar in February 2025 to provide information at the community level, land use on common areas and its relation to the Project were questioned (see Table 104**Hata! Başvuru kaynağı bulunamadı.**). It has been observed that the mukhtar generally struggled to make comments on the issue. This situation is related to the fact that many different projects and investments have been carried out in the region before.

During the household interviews, while opinions about the project were being shared, the impacts of the project on land use were also mentioned. The opinions shared about the project's impact on land use are primarily grouped under three main headings: The first concerns the land acquisition and income loss effects related to previous projects. The second

86 https://data.tuik.gov.tr/Bulten/Index?p=Income-Distribution-Statistics-2023-53711

87 Turkish Lira

group of opinions is about the loss of existing land and the resulting income loss. Finally, concerns about access to technical infrastructure and services are mentioned. The relevant opinions are listed below under the above-mentioned headings.

Previous projects

- *Compensation amounts are low; my lands were affected this way before. Therefore, it might be negative for me.*
- *If the land where my house is located is affected by the project, it wouldn't be good. The compensation is usually insufficient, and I might not be able to buy an apartment instead.*
- *Negative effects, many places are expropriated.*
- *All the land in the village is taken from us, these projects have negatively affected us.*
- *Negative. Our land was taken for the project, and we have no land left.*
- *Due to the port, my living space has already been eliminated. I have been deprived of my agriculture and fishing, and we have experienced income loss.*
- *Due to the work done in the port area, our houses were flooded. When everything was raised, our houses were submerged. I couldn't get any support from the government for this. If the same* happens again tomorrow, I will be negatively affected.
- *Before, we could enter the sea from the left side of the port, but now we can't. Since it is within the Türkiye Petrolleri[88] area, they don't let us in.*

Income loss concerns

- *I have one acre of land left, and if it is affected, it will negatively impact me.*
- *It's the only field I cultivate, so it would negatively affect my life, but I believe it will have a positive impact on the local community.*
- *Negatively, my house might be affected.*

Technical infrastructure and services

- *We do not want to encounter any obstacles in our transition to Filyos. They should design it in a way that ensures our access to Filyos.*
- *During the construction phase, buildings should not be damaged, and secondary roads should not encroach on the lands.*

As emphasized above, land loss has been raised from various perspectives. While household heads shared their suggestions for improving livelihoods, they also mentioned issues related to land development and expropriation. One participant stated, "*All the lands here are common lands, which is why we can't properly carry out agriculture. We expect the government to mediate and make these lands productive.*"

Table 104. **Land use practices on common areas, Mukhtar interviews 2025**

Settlement	Pasture and grazing areas	Agricultural areas	Forest areas	Fishery
Gökçeler	Pastures are not included in the areas to be affected by the Project. In order to develop alternative pastures in the village, it was stated that areas could be	There are 10 people whose own lands are not affected by the project, but whose public lands where they carry out agricultural activities may	No information	There are no areas for fishing activities

[88] There is no definite information about which facility is being referred to. The relevant facilities in the area are as follows: Filyos Shorebase (https://tp-otc.com/en/shorebase-logistics-center-management/) ,and Offshore Center (https://tp-otc.com/en/).

Settlement	Pasture and grazing areas	Agricultural areas	Forest areas	Fishery
	allocated from treasury lands to the village legal entity	be affected by the project.		
Sazköy	Pastures are not included in the areas to be affected by the Project. The Project is not considered to negatively affect people's access to pastures.	In order to improve economic activities in the settlement, it was stated that it would be useful to provide training to men on agriculture, animal husbandry (especially cattle breeding) and aromatic plants	The Project is not considered to negatively affect people's access to forests	There are no areas for fishing activities
Sefercik	Pastures are not included in the areas to be affected by the Project. The Project is not considered to negatively affect people's access to pastures.	Previous expropriation was made within the scope of TPAO and Tosyalı Fertilizer Plant Project. There are 50 households whose owner or user parcels were previously affected by another project.	It is considered that forests/forest lands will not be affected by the Project. The Project is not considered to negatively affect people's access to forests	There are no areas for fishing activities
Derecikören	Pastures are not included in the areas to be affected by the Project. The Project is not considered to negatively affect people's access to pastures. There are no alternative pasture opportunities.	There is no public land likely to be affected by the Project	The Project is not considered to negatively affect people's access to forests	There are no areas for fishing activities
Aşağıihsaniye	There is no pasture use in the village. The Mukhtar stated that beekeeping activities used to be carried out in the area that was used as pasture but later allocated to TPAO. The 4 households registered to the Beekeeping Association moved to different areas to produce chestnut honey	The village has not been expropriated before. There are no people whose parcels of land owned or used by them were previously affected by another project. In order to improve income sources in the village, employment and support for agriculture and animal husbandry were suggested.	It is considered that forests/forest lands will not be affected by the Project. The Project is not considered to negatively affect people's access to forests.	Prior to TPAO activities, fishing activities were carried out in Filyos stream.
Öteyüz	Pastures are not included in the areas to be affected by the Project. The Project is not considered to negatively affect people's access to pastures.	There are parcels in the village that were previously affected by the expropriation of the TPAO project Agriculture and animal husbandry activities are not carried out in the village.	It is considered that forests/forest lands will not be affected by the Project. The Project is not considered to negatively affect people's access to forests.	There is no area for fishing activities. Fishing activities are carried out at the Fishing Port in Filyos Center and 200 people are engaged in fishing.

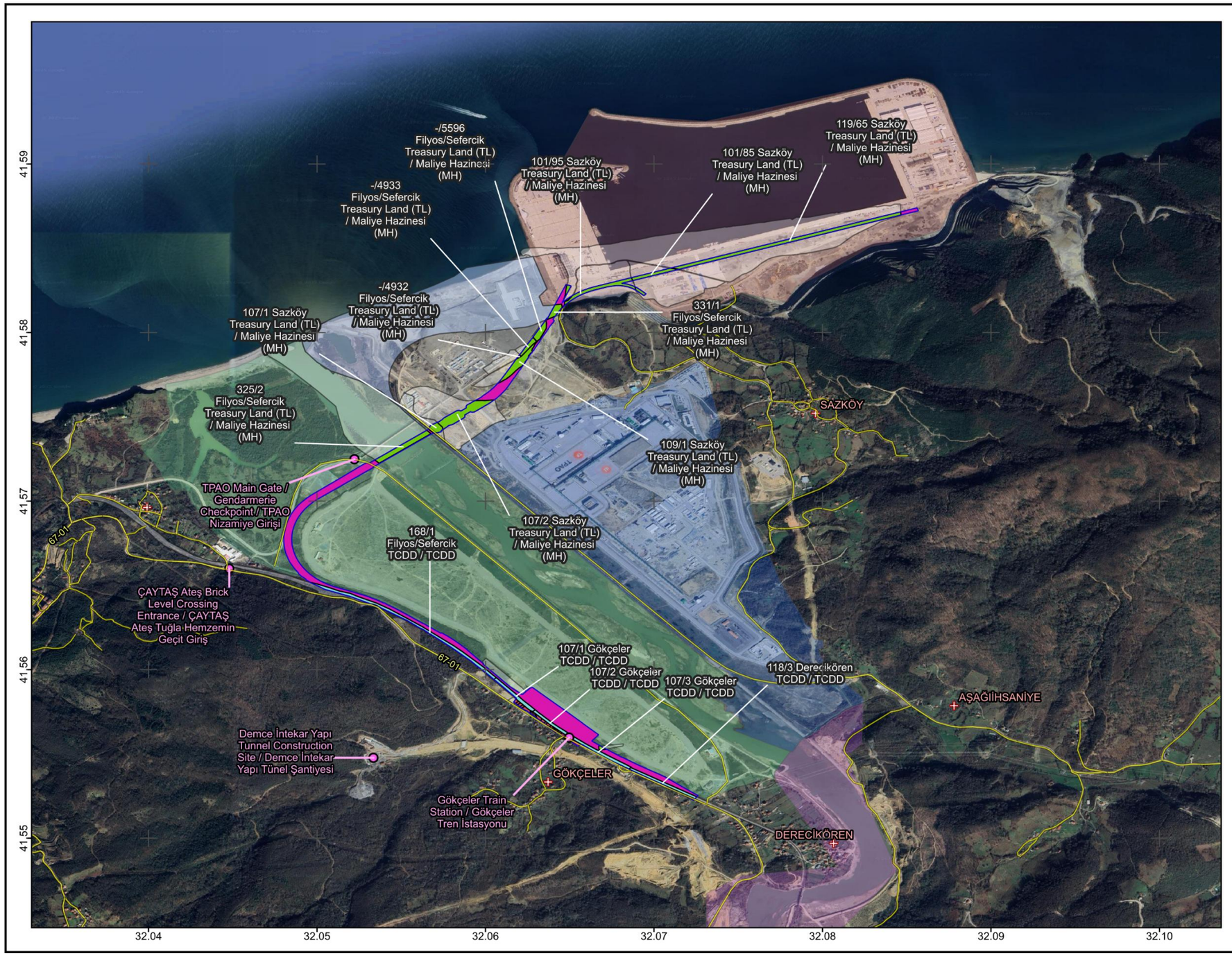
5.12.2.5 Physical and economic resettlement

The expropriation activities in the public lands and details of economic and physical resettlement impacts of the Project are given within the project specific Resettlement Plan. In

summary, there is no formal and/or informal user on public lands. These areas only public assets such as the station building, which are used for communal purposes.

According to the land requirements data for Phase 1 of the project, it was reported that a total of six settlements were affected by the project's land acquisition. These settlements (Sazköy, Aşağıihsaniye, Derecikören, Gökçeler, Sefercik, and Öteyüz) are located within the borders of the Çaycuma District of Zonguldak Province. It was also stated that a total of 471 parcels would be affected by project components such as railways, roads, engineering structures, stations, and substations. Among these parcels, 139 were privately owned land with 715 PAPs, while 322 were registered in the name of the Treasury (as of January 2020).

In the finalized project route, 36 parcels will be subject to land acquisition within the scope of Phase 2. Among these 36 parcels, 18 are privately owned, 13 belong to the Treasury, 5 are owned by TCDD, and one parcel, currently under litigation, is located within the expropriation corridor. The total number of landowners on privately owned parcels is 102. The number of actual users identified for 17 private parcels is 14. For the one parcel currently subject to litigation, the heir of the deceased landowner (sole titleholder) has refused to participate in the interview. There is no identified formal and /or informal user in public lands. Details of economic and physical resettlement impacts of the Project are given within the project specific Resettlement Plan. Detailed list of the affected land is also given in RP. The illustration of the expropriation corridor is provided in Figure 84, Figure 85, and Figure 86.



FİLYOS PORT AND INDUSTRIAL ZONE RAILWAY CONNECTION PROJECT / FİLYOS LİMANI VE ENDÜSTRİ BÖLGESİ DEMİRYOLU İLTİSAK HATTI BAĞLANTISI PROJESİ

AYGM Altyapı Yatırımları Genel Müdürlüğü

ÇINAR ENGINEERING CONSULTANCY INC.

Legend / Lejant

- Roads / Yollar
- Point of Interest / İlgili Nokta
- Settlements / Yerleşim Yerleri

Parcels / Parseller

- Private Land (PL) / Şahıs Arazisi (ŞA)
- TCDD / TCDD
- Treasury Land (TL) / Maliye Hazinesi (MH)
- Expropriation Corridor / Kamulaştırma Koridoru
- Land Parcel / Parsel Alanı
- Land parcel (Out of Expropriation) / Parsel alanı (Kamulaştırma Dışı)

Areas / Alanlar

- Filyos Free Zone/Filyos Serbest Bölge
- Filyos Industrial Zone/Filyos Endüstriyel Bölge
- Filyos Port/Filyos Limanı
- TPAO's Individual Investment Zone/TPAO'nun Bireysel Yatırım Bölgesi

Satellite Map / Uydu Haritası
General View / Genel Görünüm

Map Scale / Harita Ölçeği:

0 250 500 m

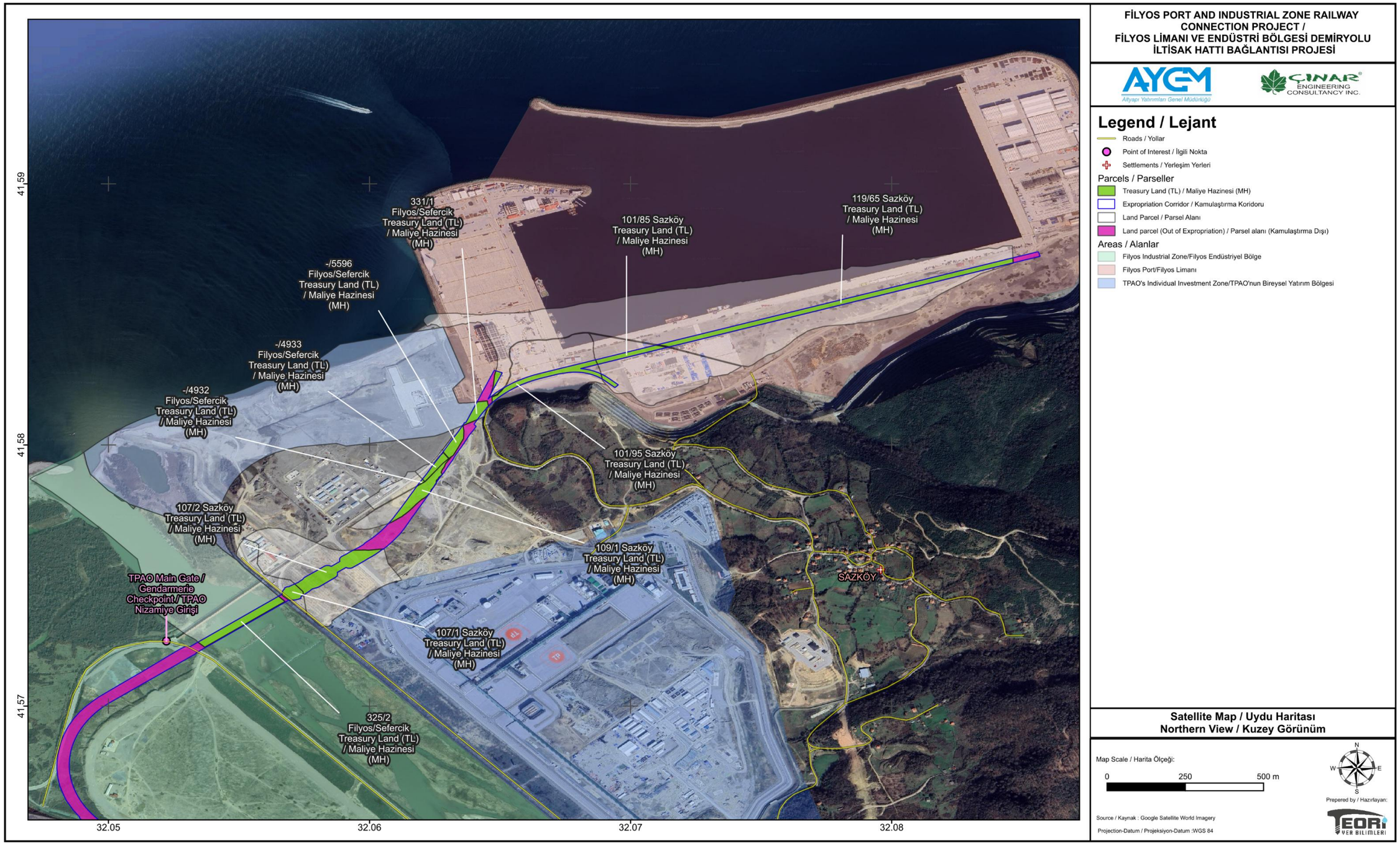
Source / Kaynak : Google Satellite World Imagery

Projection-Datum / Projeksiyon-Datum :WGS 84

Prepered by / Hazırlayan:

TEORİ YER BİLİMLERİ

Figure 84 Filyos Sub-Project Railway Design in Phase-2 - General View



FİLYOS PORT AND INDUSTRIAL ZONE RAILWAY CONNECTION PROJECT / FİLYOS LİMANI VE ENDÜSTRİ BÖLGESİ DEMİRYOLU İLTİSAK HATTI BAĞLANTISI PROJESİ

AYGM Altyapı Yatırımları Genel Müdürlüğü

ÇINAR ENGINEERING CONSULTANCY INC.

Legend / Lejant

- Roads / Yollar
- Point of Interest / İlgili Nokta
- Settlements / Yerleşim Yerleri

Parcels / Parseller

- Treasury Land (TL) / Maliye Hazinesi (MH)
- Expropriation Corridor / Kamulaştırma Koridoru
- Land Parcel / Parsel Alanı
- Land parcel (Out of Expropriation) / Parsel alanı (Kamulaştırma Dışı)

Areas / Alanlar

- Filyos Industrial Zone/Filyos Endüstriyel Bölge
- Filyos Port/Filyos Limanı
- TPAO's Individual Investment Zone/TPAO'nun Bireysel Yatırım Bölgesi

Satellite Map / Uydu Haritası
Northern View / Kuzey Görünüm

Map Scale / Harita Ölçeği:

0 250 500 m

N W E S

Prepered by / Hazırlayan:

TEORİ VER BİLİMLERİ

Source / Kaynak : Google Satellite World Imagery

Projection-Datum / Projeksiyon-Datum :WGS 84

Figure 85. Filyos Sub-Project Railway Design in Phase-2 - Northern View

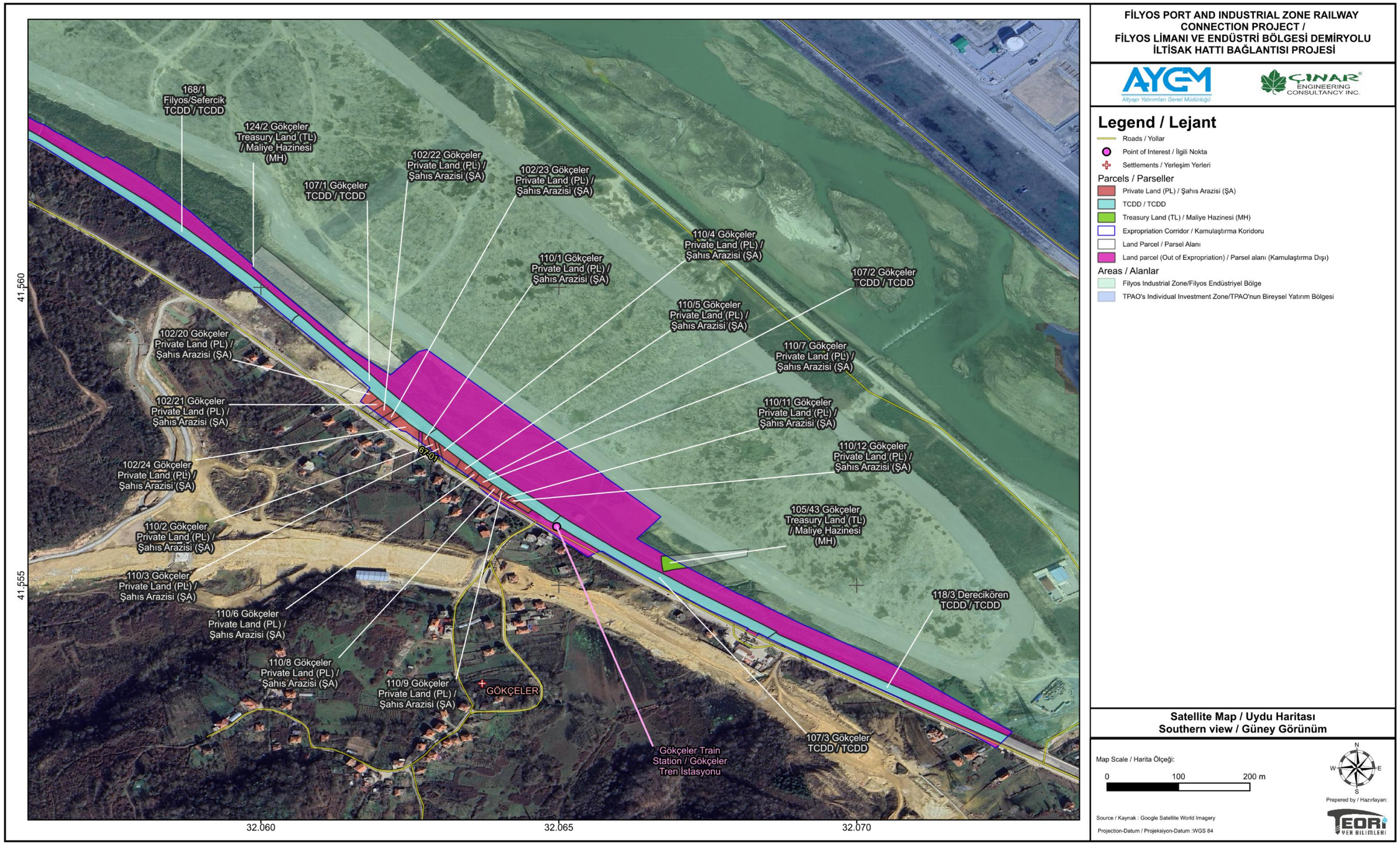


Figure 86. Filyos Sub-Project Railway Design in Phase-2 - Southern View

5.12.2.6 Agricultural activities

Only 3 out of 124 households have identified agricultural activities as their primary source of livelihood. Agriculture and related secondary sources of income (such as hazelnut cultivation) are observed in only 12 households.

One of the most frequently mentioned issues during household interviews regarding the project is the reduction of areas available for agricultural and livestock activities. As a result of land acquisition efforts carried out in previous periods for other investments, areas designated for agricultural and livestock activities have almost entirely been transferred to industrial and commercial zones.

There are suggestions for improving livelihoods and focus on providing support for agricultural activities. Among these suggestions, there is a proposal for the cultivation of a region-specific agricultural product and greenhouse support. Another participant expressed their opinion by saying, "*Most of the people living in the village are retired and make a living through gardening. Therefore, if new lands are provided to those whose fields have been expropriated, such negative impacts would not occur.*"

It is noteworthy that agriculture accounts for the lowest proportion of the opinions gathered on improving livelihoods. This issue is discussed in more detail in Employment, unemployment, and labor influx. In summary, the allocation of agricultural land to industrial and commercial investments has also hindered expectations for improvement in this area.

The results of the data collected through the questionnaire developed for land acquisition will be presented in general terms within this report, while the related evaluations will be provided in the Project specific Resettlement Plan.

In the finalized project route, 36 parcels will be subject to land acquisition within the scope of Phase 2. Among these 36 parcels, 17 are privately owned with102 landowners.

Nine participants (4 women and 5 men) who provided information about 12 out of the 17 parcels in the expropriation corridor mentioned that agricultural activities are present in 6 of these parcels. There are two participants who stated that agricultural activities on the relevant parcel are the primary source of livelihood for their households. Four of the relevant parcels were reported as vacant. The remaining parcels contain crops such as peppers, eggplant, beans, corn, tomatoes, and onions. Some of the vacant parcels will remain unused in the upcoming periods, while one parcel will be used for wheat cultivation in the following period. There is no significant difference in the crop patterns in the coming periods. In the event of land loss through land acquisition, respondents have suggested reactions such as limiting activities.

This quote, conveyed among the opinions regarding the Project, provides insight into the current state of agricultural activities in the region. "*The presence of the Organized Industrial Zone has already restricted farming. We used to have our fields where the port is now. What's done is done. It won't have any impact at this point.*" (Derecikören Village, 04.02.2025, Male, 71 aged, Face to face household interview).

Vineyard activities were encountered in two of the parcels where agricultural activities are being carried out; however, these activities are conducted for subsistence purposes and are used for household consumption. While no risk related to the project's impact has been reported, respondents have suggested limiting the activity as a reaction to mitigate the potential loss of livelihood resulting from possible land acquisition.

Horticultural activities are being carried out on two parcels. One of these activities is for subsistence purposes, while the other serves as the primary source of livelihood. The crop pattern, in line with agricultural activities, includes peppers, eggplant, beans, corn, tomatoes, and onions. Limiting the activity has been suggested as a result of the potential losses of land.

The most important result that emerged during the interviews is that agricultural activities are shifting from dry and/or irrigated farming and/or horticulture to tree planting activities in smaller areas. In fact, in 9 out of the 12 parcels where information was gathered, both fruit and non-fruit tree cultivation is practiced. The crop pattern is richer compared to other agricultural activities. In addition to fruit trees such as figs, walnuts, apples, plums, hazelnuts, and persimmons, there are also non-fruit trees, such as willows. The relevant orchard area has not been mentioned as a primary source of livelihood; instead, production is intended for subsistence purposes, specifically for household consumption. In response to potential impacts such as land acquisition from the project, "Completely abandoning fruit cultivation" has been the most commonly proposed reaction, while some participants have preferred the approach of "Limiting / reducing the activity."

The information gathered from the mukhtar interviews regarding agricultural activities has been presented in Table 105. The other finding relevant to the agricultural areas are illustrated via Table 104**Hata! Başvuru kaynağı bulunamadı.**.

Table 105. **Agricultural activities, Mukhtar interviews 2025**

Settlement	Products	Quantity Produced (kg)
Gökçeler	Apple	1,000
	Hazelnut	2,000
	Walnut	500
	Tomato	1,000
	Beans	1,000
	Corn	1,000
Sazköy	Hazelnut	10,000
	Bay Leaf	250,000
Sefercik	Corn	1,000
Derecikören	No information	No information
Aşağıihsaniye	Hazelnut	200,000
Öteyüz[89]	NA	NA

Opinions on agricultural activities in the region have been obtained from various types of research. In general, agriculture and livestock farming are considered together by participants as well as local people, and mukhtars. Some of these opinions can be given as following paragraphs:

The mukhtar of Aşağıihsaniye village suggested that providing employment and supporting agriculture and livestock would be beneficial for developing the village's income sources.

The relevant official of Çaytaş stated that, due to land acquisition carried out because of the organized industrial zone in the region, agricultural and livestock activity areas have been limited. Therefore, it is believed that the project will not have an impact on agriculture and livestock. (Çaytaş Ateş Tuğla Sanayi ve Ticaret A.Ş., 04.02.2025, Face to face stakeholder interview).

Similarly, in the interview with Çaycuma District Governorship, it was stated that agricultural and livestock activities were carried out before the establishment of OIZs. (Çaycuma District Governorship - District National Real Estate Service Chief Office, 05.02.2025, Face to face stakeholder interview).

[89] In accordance with the expression of the Öteyüz village's mukhtar that agriculture and animal husbandry activities are not carried out in the village.

According to the view of Zonguldak Municipality, since tourism and industrial activities are predominant in the region, there will be no impact on agricultural and livestock activities (Zonguldak Municipality, 06.02.2025, Face to face stakeholder interview).

In the focus group meeting with women in Gökçeler Village, the following topics related to agriculture and livestock were discussed (Gökçeler village, F1 60 aged, F2 66 aged, F3 60 aged, 04.02.2025, Focus group meeting).

- *Railway works will further narrow the area in the region.*
- *Agricultural activities are almost over, and economic activities are carried out with the remaining trees.*
- *The acquisition of fields in previous expropriations and the lack of local employment in hiring was negative for the region.*
- *The increasing unemployment rate due to the inability to carry out agriculture and animal husbandry activities was emphasized.*

In the focus group meeting with the mukhtars held on 24.08.2023, their primary request was an immediate disclosure of the expropriation list, as the lack of information has hindered their agricultural investments for nearly three years.

5.12.2.7 Husbandry activities

There is no evidence in the household and land acquisition data indicating that agricultural production is carried out for livestock purposes, and fodder crops are not present in the crop patterns. Only two households have identified livestock as their primary income source. In one household where agricultural activities are the main livelihood, livestock serves as a secondary income source. Alongside occupations such as retirement and employment in permanent jobs (as workers or civil servants), livestock appears as a secondary source of income.

In summary, livestock serves as the primary livelihood in two households and as a secondary income source in eight households. Only one household relies solely on livestock as its single income source.

It has been observed that household heads, consulted to identify measures to mitigate the potential impacts of the Project, emphasized the need to support livestock activities alongside agriculture. A striking finding that is deemed appropriate to include is the following quote: "*Livestock is disappearing, and agriculture is vanishing along with it. Nothing is being done for the children and women of our village. The sea is just 1 km away, but the children don't know how to swim. Women are always at home; courses could be organized for them, and they could go to the theater or cinema.*" (Gökçeler Village, 21.02.2025, Male, 48 aged, Phone call household interview).

Although livestock farming is carried out at a lower rate compared to agriculture in the region, efforts related to livestock have found more focus than agriculture in the improvement of livelihoods. The support activities proposed for livestock farming can be listed as small ruminant livestock support, poultry support, and feed support. The impact of the reduction in agricultural land on livestock farming has also been emphasized in these opinions. One participant stated, "*Sharecropping is gone, and livestock farming ended because of it. Support can be provided in these areas.*"

The issue of reduced agricultural land is also being considered in terms of grazing areas. In this regard, one participant mentioned, "*If incentives are given for livestock farming, livelihoods can be improved. There is a land problem. There are no pastures".* Another participant said, "*There is no land left for agriculture, and there is no land focused on livestock farming. If the government allocates land, livelihoods can be improved.*"

Beekeeping activities are carried out in the region as a form of livestock activity. In the research area, one household head (Sefercik) engages in beekeeping as a secondary activity to

supplement retirement income. Although he did not mention beekeeping as an income source, one of the household heads interviewed about the Project expressed the following opinion: "*My bees are being affected... They haven't been healthy for the past two years, they are dying. I think my bees might be affected by the smoke from the construction sites... They roam around the port area. For this reason, I still believe the project could have a negative impact.*" (Sefercik Village, 04.02.2025, Male, 62 aged, Face to face household interview).

Findings related to beekeeping were also obtained during the interview with the Mukhtar of Aşağıihsaniye. The Mukhtar stated that beekeeping activities used to be carried out in the area that was used as pasture but later allocated to TPAO. The 4 households registered to the Beekeeping Association moved to different areas to produce chestnut honey (see Table 104**Hata! Başvuru kaynağı bulunamadı.**).

Participants have suggested implementing initiatives to support beekeeping activities in order to mitigate the project's impact on livelihoods.

The information gathered from the mukhtar interviews regarding livestock activities has been presented in Table 106. The other finding relevant to the pasture and grazing areas are illustrated via **Hata! Başvuru kaynağı bulunamadı.**.

Table 106. **Husbandry activities, Mukhtar interviews 2025**

Settlement	Animal type	Number of households with animals	Total number of animals in the village	Number of households selling animals
Gökçeler	Cattle	7	50	7
	Fowl	15	1,000	-
Sazköy	Cattle	6	30	6
	Small Cattle	1	235	1
	Fowl	20	50	-
	Beehive	3	-	-
Sefercik	Cattle	20	70	20
	Fowl	5	50	-
	Beehive	6	-	6
Derecikören	Cattle	4	80	-
Aşağıihsaniye	Cattle	30	150	30
	Small Cattle	2	80	2
	Beehive	4	-	4
Öteyüz[90]	-	-	-	-

In Sefercik Village, the mukhtar reported that products are obtained from livestock activities. According to the mukhtar, the village produces milk, eggs, and honey. The produced goods are used both for household consumption and for sale. The number of households producing dairy products (such as butter and yogurt) is 20, the number of households producing eggs is 5, and the number of households producing honey is 6.

Due to the presence of hazelnut production in the region, the existence of seasonal agricultural workers was questioned during the interviews with the mukhtars. However, no findings related to seasonal agricultural workers have been encountered in any of the villages within the project's impact area.

[90] In accordance with the expression of the Öteyüz village's mukhtar that agriculture and animal husbandry activities are not carried out in the village.

Most of the participants within the stakeholder interviews, including focus group discussions, stated their opinion on both agriculture, and livestock, together. Therefore, please refer to Agricultural activities to follow relevant issues related to husbandry, too. Especially, interview with Çaytaş, Çaycuma District Governorship, and Zonguldak Municipality should be considered in line with husbandry activities.

There was an interview focused on especially for livestock, and grazing areas. According to the findings of the meeting with representatives of Zonguldak Provincial Directorate of Republic of Türkiye, Ministry of Agriculture and Forestry, pasture division due to railway construction may pose problems, and underpasses or crossings should be considered to connect grazing areas, benefiting both livestock and local wildlife (Zonguldak Provincial Directorate of Republic of Türkiye, Ministry of Agriculture and Forestry, 24.08.2023, Face to face stakeholder interview).

5.12.2.8 Fishery

During the mukhtar focus group discussions conducted in August 2023, it has been obtained that fishing activities in the region are a minority and not considered a primary source of livelihood.

In current, as of 2025, given the geographical components of the region (please refer to General features of Economy section), it is surprising that fishing activities remain at such a low level. However, according to both interviews with local leaders (see Table 104**Hata! Başvuru kaynağı bulunamadı.**), and other sources, the transformation of the region into an industrial, commercial, and logistics area has not only limited agricultural activity areas but also reduced the spaces available for fishing. Therefore, fishing is carried out only as a secondary income source at a low level (recreational fishing).

5.12.2.9 Tourism

The relationship between tourism activities in the region and the project has been interpreted in different ways by the household heads who participated in the interviews. It is widely believed that the allocation of the region as an area for industry and manufacturing restricts the use of the sea and beaches. Although not directly related to tourism, the same restriction has also been emphasized for fishing activities.

During the mukhtar focus group discussions conducted in August 2023, it was found that the residents of the settlements have no employment related to tourism activities in the region.

In February 2025, only the Mukhtar of Öteyüz Village identified tourism as one of the livelihood sources. The mukhtar also noted that if need are English and Arabic translators in the settlement, which the mukhtar associated with tourism-related activities in the region. Although the mukhtar of Sefercik neighborhood did not list tourism as a livelihood source in the settlement, the mukhtar also mentioned that English and Arabic translators available in the settlement if required. The presence of individuals with English and Arabic translation skills was mentioned in the settlements of Sefercik and Öteyüz. Although weak, a link can be established between this situation and the effects of tourism activities in the region as well as previous investments such as TP-OTC.

During the mukhtar focus group discussions conducted in Phase 2, it was found that the residents of the settlements have no employment related to tourism activities in the region.

Since the Zonguldak Municipality sees the livelihood sources in the region as primarily focused on tourism and industry, no impact on agriculture and livestock is anticipated. Apart from these, tourism has not been mentioned as a sector among the livelihood sources.

The Çaycuma District Governorship has stated that maritime tourism has decreased due to the fertilizer factory in the region.

Based on the interview with the representative of the Zonguldak Provincial Directorate of the Republic of Türkiye Ministry of Culture and Tourism on 24.08.2023, it was stated that the project could indirectly boost tourism by encouraging the development of dining, accommodation, and transportation facilities for employees, which could also create job opportunities.

In an interview with a representative of the Zonguldak Provincial Directorate of the Republic of Türkiye Ministry of Health on 25.08.2023, it was warned that there are sensitive swimming areas and natural water sources that are regularly inspected by the Ministry of Health.

5.12.2.10 Employment, unemployment, and labor influx

As of 2020, one of the most prominent issues in the interviews with the local people as the positive effects of the project is that the Project and the Filyos Valley Project, seen in connection, will contribute to the economic development of the region. 66 of the 77 households interviewed within the scope of the ESIA baseline analysis stated that the project will contribute to the regional economy (86%). It is in the second place that it will benefit local employment and decrease the internal emigration caused by unemployment. The fact that there are already local people working in the construction of the port increases the expectations regarding employment. In addition, with the Filyos Valley Project, it is thought that the values of the worthless lands in the region will increase, and the people of the region will be positively affected from this.

In the household interviews conducted in February 2025, the question "The number of individuals aged 15-64 in the household who are actively seeking work but unable to find it" was asked. Among the 371 people, this number is around 23. It is a significant concern that in a household of 4 people, 3 individuals are unemployed. In two households, one with 5 people and one with 4 people, 2 individuals in each household are unemployed. This indicates that households where more than half of the members are facing unemployment do exist. The requests for increasing employment opportunities align with this data. In the focus group discussion with women in Gökçeler Village, the relationship between the inability to carry out agricultural and livestock activities and the increasing unemployment rate was emphasized.

The data collected from the mukhtar interviews regarding employment[91], and unemployment conditions in the region are as follows (see Table 107). The data in the relevant table is not disaggregated by gender.

Table 107. **Employment, and unemployment data, Mukhtar Interviews, 2025**

Settlement	Number of unemployed job seekers	Labor force potential in the settlement (if needed)		
		Unskilled / Manual labor (or low skilled)	Semi-skilled labor (or medium skilled)	Skilled labor (or high skilled)
Gökçeler	10	No information	No information	No information
Sazköy	No information	Experienced individuals who have previously worked in construction jobs	No information	No information
Sefercik	10	Construction worker Experienced individuals who have previously worked in construction jobs	Cooks Security personnel Heavy vehicle operator Driver	Healthcare worker English translator Arabic translator Office workers using computer

91 The terms used in the following table are based on the OECD (Organisation for Economic Co-operation and Development) Employment Outlook 2024. https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/07/oecd-employment-outlook-2024_abc8ad82/ac8b3538-en.pdf).

Settlement	Number of unemployed job seekers	Labor force potential in the settlement (if needed)		
		Unskilled / Manual labor (or low skilled)	Semi-skilled labor (or medium skilled)	Skilled labor (or high skilled)
				Metal and welding master Wall master
Derecikören	25	Experienced individuals who have previously worked in construction jobs	No information	No information
Aşağıihsaniye	15	Tree cutter Experienced individuals who have previously worked in construction jobs	Cook Security personnel Search and rescue worker Heavy vehicle operator Driver	Engineer Local guide Healthcare worker Office worker using computers Metal and welding master Wall master
Öteyüz	500	Construction worker Tree cutter Experienced individuals who have previously worked in construction jobs	Cook Security personnel, Search and rescue staff Heavy vehicle operator Driver	Engineer English translator Metal and welding master Wall master Road maintenance master

In the household survey conducted in February 2025, the opinions of household heads on improving local livelihoods were compiled. As seen in previous sections (Agricultural activities, and Husbandry activities), suggestions regarding the improvement of existing livelihood sources (agriculture and livestock) were frequently encountered. However, a particularly striking point was that the most frequently mentioned issue was the need to increase employment opportunities. Statements such as "*The land has been expropriated, there's nothing left to do—we need new job opportunities*" were considered revealing of this concern. Statements such as *"A new factory could be established because there is no land left"* also align with this perspective. Similarly, expressions like "*All the land here is communal, so we cannot engage in proper agriculture. We expect the government to mediate and make these lands productive*" highlight the existing challenges.

One of the two female household heads (see also Gender) who attended the meeting, suggested establishing a cooperative to support women's enterprises, while the other proposed creating employment opportunities for women. Additionally, two households specifically requested employment opportunities for family members with disabilities (see also Health).

Suggestions regarding employment opportunities include opening new factories and encouraging existing investors to increase their investments. However, it is emphasized that these investments should not harm human health or disrupt the region's environmental and social structure.

In addition to the opening of factories and facilities, there is also a demand for projects and social support initiatives that would enhance employment opportunities.

The mukhtar of Aşağıihsaniye village evaluated the positive impact of the project as providing employment opportunities. Similarly, Çaycuma Municipality has expressed the opinion that the project will have a positive impact on the region in terms of industry and employment.

The relevant official of Çaytaş stated that there is a lack of skilled workers in the region, which may make local employment difficult. However, in the focus group meeting with women in Gökçeler Village, participants stated that the lack of local employment in previous recruitment periods had a negative impact on the region. According to them, if local employment is provided within the scope of the Project, it will have a positive effect on the region.

In line with the information obtained by representatives of Zonguldak Chamber of Commerce and Industry, and Western Black Sea Development Agency (BAKKA) key projects on the region include Filyos Valley Project, Çaycuma SERA-OIZ, Filyos Kilimli Project, and Filyos Logistics Center Project. All of these projects are strengthened by the consolidation of the investment network in the region. In this sense, they consider the railway as a valuable logistical asset (Zonguldak Chamber of Commerce and Industry, and Western Black Sea Development Agency (BAKKA), 24.08.2023, Face to face stakeholder interview).

Zonguldak Municipality expects that the project will increase local employment and stimulate the local economy (25.08.2023, Face to face stakeholder interview).

According to the interview with the representative of Zonguldak Provincial Directorate of Turkish Employment Agency (İŞKUR) on 24.08.2023, due to difficulties in finding qualified workers in the province and districts, contractors have turned to new subcontractors and widened their search for personnel.

5.12.3 Education, Health and Technical infrastructure

5.12.3.1 Education

Educational conditions across different geographical levels (NUTS), segmented by gender and age groups, have been established using the 2024 National Education Statistics provided by TurkStat. TurkStat has also offered a set of indicators to define educational levels, categorizing the educational attainment level for individuals aged 6 and above according to the International Standard Classification of Education (ISCED, 2011).

These statistics were compiled for individuals aged 6 to 65, as defined by TurkStat. However, this has caused a discrepancy in the total population figures in the population section since formal education starts uniformly at age 6 in Türkiye. Furthermore, differences between total population figures and educational statistics have created gaps in certain age groups for both males and females due to the absence of clustered population data.

Among the population in Türkiye, more females tend to have only primary school education, while males tend to have high school education[92]. When examining the average duration of education by province, this rate is 9.3 years in Türkiye, while it is 8.5 years across Zonguldak. In Zonguldak, the average duration of education is 9.5 years for men and 7.6 years for women[93]. There is a gender gap, with more women being illiterate compared to men. Despite having a similar number of males and females in the population, there is an unequal distribution of education levels, which highlights a gender-based difference[94].

[92] TurkStat, National Education Statistics Database, 2022-2023, **Table-4 Population by attained education level and sex**, 2022-2023, https://data.tuik.gov.tr/Bulten/Index?p=Ulusal-Egitim-Istatistikleri-2023-53444, Access date: March 2025.

[93] TurkStat, National Education Statistics Database, 2022-2023, **Table-9 Mean years of schooling by provinces,** 2022-2023, https://data.tuik.gov.tr/Bulten/Index?p=Ulusal-Egitim-Istatistikleri-2023-53444, Access date: March 2025.

[94] TurkStat, National Education Statistics Database, 2022-2023, **Table-1 Population by literacy and sex**, 2022-2023, https://data.tuik.gov.tr/Bulten/Index?p=Ulusal-Egitim-Istatistikleri-2023-53444, Access date: March 2025.

Öteyüz, located in the town center of Filyos, has the only high school with 98 students[95]. Table 108 provides details on educational services in these settlements, the number of students receiving transportation-assisted education, and the distance to the nearest school.

In accordance with the Ministry of National Education Regulation on Access to Education via Transportation[96] (Official Gazette Date: 11.09.2014, Official Gazette Number: 29116), the student transportation practice is defined as the implementation aimed at ensuring that those benefiting from education via transportation are transported daily to the transportation center's official school/institution and special education classes to continue their education and training. Within the scope of this practice, free lunch services are also provided to primary and secondary school students transported, excluding special education students/trainees.

This practice also includes students from official schools/institutions that have been closed due to insufficient student numbers. Schools in this region were closed due to insufficient student numbers caused by the low population, and a transportation-based education system has been implemented in the area.

Table 108. Educational Services in Settlements in the Social AoI[97]

Settlement	Primary school	Secondary school	High school	Access to Education by Transportation	Transport Location	Distance
Gökçeler	✖	✖	✖	10	Filyos centre	5 km
Sazköy	✖	✖	✖	15	Saltukova / Çaycuma	9.8 km / 23 km
Sefercik	✖	✖	✖	6	Filyos centre	2 km
Derecikören	✖	✖	✖	45	Filyos centre	6.2 km
Aşağıihsaniye	✖	✖	✖	25	Saltukova	6.5 km
Öteyüz	✖	✖	✓	-	-	-

In all stages of the social research, open-ended questions were applied to collect stakeholders' opinions about the project. Mukhtar of Sazköy village stated that providing training on agriculture, livestock (especially cattle), and aromatic plants to men would be beneficial for improving the economic activities in the settlement. Similarly, the mukhtar of Aşağıihsaniye village also stated that providing training for workers in the industry would be beneficial.

None of these questions revealed any concerns or expectations related to education, schools, or students. In this regard, no observable positive or negative impact of the project on the education situation has been identified. Similar findings were observed in the opinions gathered regarding the improvement of livelihoods. No participant provided any opinions related to education or students.

In the interviewed households, the following questions were asked to determine the level of participation in stakeholder engagement activities: "*Number of adults (aged 15 and above) who use a language other than Turkish*" and "*Number of illiterate adults (aged 15 and above)*" Among the population of 371, illiteracy was observed in 7 individuals.

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[95] Çaycuma Filyos Melek ve Ahmet Şanlı Anadolu Lisesi, https://filyosmasal.meb.k12.tr/, Access date: March 2025.
[96] Republic of Turkey Ministry of National Education. (2014). Regulation on Access to Education via Transportation (Official Gazette No. 29116). https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=20040&MevzuatTertip=5&MevzuatTur=7&utm_source.
[97] SIA Field Study, Mukhtar Interviews, 2020

According to the 2023 national education statistics, the proportion of the illiterate population (4,032 people) within the total population aged 6 and above (87,491 people) in Çaycuma District of Zonguldak Province is approximately 5%. This rate remains around 2% in the region[98].

Furthermore, there is no distinctly expressed ethnic identity associated with the languages spoken other than Turkish. However, due to Syrian migrant families, it is possible to encounter low levels of use of non-Turkish languages such as Arabic and Kurdish. According to the *Provincial Breakdown of Syrian Refugees in Türkiye - September 2024 data*, the number of Syrian refugees located in the Zonguldak region ranges between 1 and 2,500. However, there is no data available regarding their distribution at the district and neighborhood levels[99].

As an additional piece of information, during interviews with local people it was noted that languages such as Laz language, though not widespread, are still used among the elderly.

5.12.3.2 Health

Understanding the prevalent or endemic diseases in the region is of great importance for comprehending the long-term impacts of the project. According to a study conducted in 2019, common diseases observed in the Western and Eastern Black Sea regions, including Zonguldak, between 2009 and 2016 have been documented[100]. According to the research, circulatory system disorders rank first. Second place is cancer, and third place is respiratory system disorders. Western and Eastern Black Sea regions have the highest rate on circulatory system disorders among the distribution of the rate in Türkiye.

In the province of Zonguldak, the total number of hospital is 12, number of beds per 100,000 people is 393, and the number of physician per thousand people is 2.1[101].

There are no health centers located within the social AoI's settlements. Even though family doctors make regular visits, residents in these settlements typically prefer to utilize district health centers. The distances from the settlements to the nearest health center can be found in Table 109.

Table 109. Health Services in Settlements in the Social AoI[102]

Settlement	Health Center	Family Doctor	Nearest Health Center
Gökçeler	✖	Once in a week	5 km
Sazköy	✖	Once in every two weeks	10 km
Sefercik	✖	Once in a week	2 km
Derecikören	✖	Once in a week	5 km

The number of elderly individuals who are dependent on care, bedridden, and homebound is nearly 14. Another finding reflected in health-related outcomes is the presence of individuals

98 TurkStat, National Education Statistics Database, Literacy data for 6 years of age and over within subprovince level, Çaycuma, 2023.

99 UNHCR Türkiye: Provincial Breakdown Syrian Refugees in Turkiye - September 2024. https://data.unhcr.org/en/documents/download/111466

100 Akturan and Others. 2019. Death Rates and Causes in Türkiye According to TURKSTAT Data Between 2009 and 2016 https://dergipark.org.tr/tr/download/article-file/686966 Access date: March 2025

101 TurkStat, Health Statistics, 2022, Access date: March 2025.

102 SIA Field Study, Mukhtar Interviews, 2020

with disabilities. Representing 3.5% of the population, these individuals, like those in the elderly age group and those in need of care, may be disadvantaged in participation processes.

While gathering the opinions of the interviewed household heads on the project, no direct relationship was established between the project and its impacts on health. The views and suggestions that may be related to health impacts are listed below. Before presenting these statements, it should be noted that the mentioned dust, vibration, and excavation works are associated with previous investments that were active in the past. As stated by Çaycuma District Governorship the local population is disturbed by the environmental impacts of the fertilizer factory located in the region.

The views of the household heads regarding environmental impacts, collected through the household survey conducted in February 2025, are as follows:

- *"During the construction phase, no one should be harmed, and attention should be paid to community health. Complaints about subcontractors should be taken into account."*
- *"Environmental pollution, particularly dust, could be a negative impact, but if employment is provided from the village, it could be a positive aspect."*
- *"The country's interest is more important, but we are affected by the noise. When we come to the village, there is no silence. Previously, there were piling works, and construction continued even at midnight."*
- *"Negative, as it constantly creates vibrations."*
- *"It is believed that the village as a whole may be affected by issues such as dust, noise, and security."*

In meetings held with mukhtars, when their opinions about the project were gathered, the main concerns were related to issues such as dust, mud, and security during the construction phase.

It has been emphasized that there are negative effects, such as dust, due to loading on the trains without tarpaulins by the Çaycuma Municipality. It has been highlighted that measures should be taken regarding this issue, during the interview dated 06.02.2025.

Among the views expressed by the household heads regarding the improvement of livelihoods, deficiencies in healthcare services have also been emphasized. Although this issue sheds light on a different context, one participant's opinion is as follows: "*There is no doctor in the village, the center is Filyos, and we can walk to the health center in 40-45 minutes. We need to take the train to go to Zonguldak or Ereğli, but it's not possible. I would like support in these matters.*"

5.12.3.3 Technical infrastructure and transportation

Information about the infrastructure in the social AoI was gathered through interviews with Mukhtars in 2020. Electricity is available in all settlements except for occasional interruptions in Derecikören due to old lines. Heating in all settlements relies on wood and coal.

In Sefercik neighborhood, there is a sewerage network throughout the settlement, and similar networks are mostly present in other settlements, except for Aşağıihsaniye, which lacks such a network and uses septic tanks. Drinking water quality is reported as polluted in most settlements except Derecikören. Treatment systems are common in Filyos neighborhoods, while rural areas use spring water sources.

Road conditions are good with no transportation problems in all settlements. Telecommunications and internet infrastructure are generally available, though there may be some inadequacies in some areas Table 110.

Table 110. Infrastructure Status in Settlements in the Social AoI[103]

Settlement	Sewerage Network	Electricity infrastructure	Drinking Water Quality	Road Conditions	Telecommunications and Internet Infastructure
Gökçeler	Network is available for 90% of settlement, others use septic tanks	Available, no problem	Bad quality, spring water sources are used	Smooth, asphalt	Available, no problem
Sazköy	Network is available for 70% of settlement, others use septic tanks	Available, no problem	Bad quality, spring water sources are used	Smooth, asphalt	Available, no problem
Sefercik	Network is available, no problem	Available, no problem	Bad quality, treatment system is used	Smooth, asphalt	Available, but not sufficient
Derecikören	Network is available for 80% of settlement, others use septic tanks	Available, interruptions have been reported due to the old lines	Good quality	Smooth, asphalt	Available, no problem
Aşağıihsaniye	Network is not available, septic tanks are used	Available, no problem	Bad quality, spring water sources are used	Smooth, asphalt	Available, but not sufficient
Öteyüz	Network is available, no problem	Available, no problem	Bad quality, treatment system is used	Smooth, asphalt	Available, no problem

During the interviews conducted with household heads in February 2025, it was observed that opinions and suggestions regarding the project were largely focused on technical infrastructure-related issues. Particular emphasis was placed on the condition of roads / access roads, damages caused by flooding, and internet infrastructure. The quotes from the interviews are as follows:

- *"We do not want to face any obstacles in our access to Filyos. The design should ensure our access to Filyos."*
- *"Additionally, there are mosque associations and sports clubs, but most companies do not provide support."*
- *"Previously, we could access the sea from the left side of the port, but now we cannot."*
- *"During the construction phase, structures should not be damaged, and secondary roads should not encroach on lands."*
- *"Due to the works carried out in the port area, our houses were flooded. Since everything was elevated, our homes were left underwater. I did not receive any support from the government regarding this. If the same happens again, I will be negatively affected."*
- *"We have a fuel shortage, which has also been a major burden for us, and we lack proper infrastructure."*
- *"As far as I know, fiber cables extend up to the village entrance, but within the village, we are using ADSL[104], and the internet speed is low. It would be better if the speed were increased by replacing the cables."*

103 SIA Field Study, Mukhtar Interviews, 2020

104 ADSL stands for Asymmetric Digital Subscriber Line. It is a type of digital broadband technology used to deliver high-speed internet access over traditional telephone lines

- *"I think it is entirely positive. Currently, we already have road and sea transportation, and rehabilitating the railway in this way would make logistics more efficient."*
- *"We are used to the train, as long as our living space is not damaged, there is no problem."*

In meetings held with mukhtars, when their opinions about the project were gathered, the main concerns were related to the possibility of blocking access roads to Filyos during the operational phase.

Important warnings regarding road usage were raised by Çaytaş Ateş Tuğla Sanayi ve Ticaret A.Ş. In this meeting on February 4, 2025, it was mentioned that at-grade crossings could increase the risk of accidents, and therefore, precautions should be taken. According to the facility's opinion, it was emphasized that having underpasses and overpasses for the crossings is one of the most fundamental measures.

In the women's focus group meeting held in the Gökçeler settlement on 04.02.2025, it was stated that the most significant problems for women in the region are floods, insufficient transportation and social activities.

On February 6, 2025, Çaycuma Agricultural Credit Cooperative No. 2958 stated that the project would positively affect the companies using the highway, that the use of the railway would reduce transportation costs, and that it would create a positive impact.

Among the views expressed by the household heads regarding the improvement of livelihoods, deficiencies in technical infrastructures and services have also been emphasized. Although this issue sheds light on a different context, opinions of the participants are as follows:

- *"The village roads are in poor condition; I would like the roads to be repaired."*
- *"There are no markets or similar places here"*
- *"The maintenance and repair of the Sefercik station would improve the livelihoods here"*
- *"Improvement of transportation (road networks)"*

As can be seen from here, importance is given to the improvement of transportation infrastructure. The demands related to healthcare services in the Health section is also linked to the transportation infrastructure.

5.12.4 Vulnerable Groups

As per ESS10, Disadvantaged or Vulnerable Individuals or Groups (DVIG) encompass those who encounter obstacles or difficulties in fully engaging with society or are more susceptible to risks and vulnerabilities. These challenges may stem from factors like gender, economic situation, social origins, age, disability, language, or other conditions. Addressing their needs may necessitate tailored assistance, support, or safeguarding measures to safeguard their rights, welfare, and access to equal opportunities. The comprehensive methodology used in the identification of DVIG can be summarized as follows:

- Considering all parties involved or affected,
- Reviewing all risks in the context of e&s specifically for vulnerable groups,
- Conducting stakeholder consultations conducted before the project
- Identifying gaps, if any, between national and international standards,
- Including parties that could positively benefit from the project in the category ofvulnerable 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. Besides, disadvantaged groups will be more sensitive in line with Project's environmental impacts, community health and safety issues, impacts on traffic. Consequently, these groups can be summarized as the following. The overall assesment for DVIGs are presented in Table 111, too.

- Females, especially who are the sole heads of household,
- Elderlies,
- People with handicapped including home bound, bedridden individual, and
- Illiterates.
- Non-Turkish speaking

It should be noted that landowners whose share of land acquired for the project, in relation to their total land holdings, is above 10% are severely affected and may be at a disadvantage. However, this assessment could not be carried out due to deficiencies related to the total land holdings of the shareholders. Further information is provided by the RP.

5.12.4.1 Females who are heads of households

Women who are the sole heads of household are considered part of the vulnerable groups. An analysis of employment rates by marital status shows that widowed women have the lowest rate. This results in a disadvantage for women who are sole household heads in terms of labor force participation (2022). According to Presidency of the Republic of Türkiye Strategy and Budget Office data[105], the women's labor force participation rate in January 2025 remained below the values of the previous year. Similar results gathered by Household Labour Force Survey. The labour force participation rate for those aged 15 years and over was 53.3% in 2023. This rate was 35.8% for females and 71.2% for males[106].

Besides, women who are separated from their spouses (divorced) have been found to have been victims of the highest rates of physical, sexual, and emotional violence. Therefore, women who are sole household heads will be in a vulnerable situation due to their higher likelihood of experiencing violence (2014)[107].

Another finding that supports this situation is the gender of the individuals who participated in the household interviews. In the field study, the proportion of women representing households is less than 10%. This situation is related to the overall representation of women in local governance in Türkiye. In rural areas, the proportion of women serving as mukhtar is 0.6%, while that of men is 99.4%[108].

Women who are heads of households on their own may have low participation in informative activities including information meetings, consultation meetings, and negotiation meeting may be low, as they are alone in handling responsibilities such as providing for the household and caring for the children. Due to social pressure and the influence of gender roles, their participation may be low, too.

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[105] Presidency of the Republic of Türkiye Strategy and Budget Office. Total and Female Labor Force Participation Rate, January 2017 – January 2025.https://www.sbb.gov.tr/istihdam/. Access Date: March 2025

[106] TurkStat Press Release dated 06.03.2025. Women in Statistics, 2024. https://data.tuik.gov.tr/Bulten/Index?p=Women-in-Statistics-2024-54076. Access Date: March 2025

[107] Turkish Statistical Institute, Gender Statistics, 2022, Vital and Gender Statistics Group, Publication Number 4681, Release Date March 2023., https://www.tuik.gov.tr/media/announcements/toplumsal_cinsiyet_istatistikleri.pdf, Access Date: March 2025.

[108] Turkish Statistical Institute, Gender Statistics, 2022, Vital and Gender Statistics Group, Publication Number 4681, Release Date March 2023., https://www.tuik.gov.tr/media/announcements/toplumsal_cinsiyet_istatistikleri.pdf, Access Date: March 2025.

Even at a low level, they may be sensitive to issues related to labor influx, Sexual Exploitation and Abuse (SEA) / Sexual Harassment (SH), and Gender-Based Violence (GBV) issues.

In this regard, additional measures should be implemented to ensure that women, particularly those who are the sole heads of household, women who are landowners of private lands, and all other women, have equal opportunities in stakeholder participation processes. For detailed information, please refer to Project specific Stakeholder Engagement Plan (SEP).

5.12.4.2 Elderly

In Türkiye, the population of children is higher than the elderly population. However, for Zonguldak, the elderly population ratio is greater than children. Therefore, the elderly dependency ratio is higher than the child dependency, for Zonguldak (refer to Age distribution).

According to the results of the household survey dated February 2025, approximately 23% of the total population (371) consists of elderly individuals, while around 8% of the population is under the age of 14. The high proportion of the population aged 65 and above has necessitated the consideration of elderly individuals among PAPs as a vulnerable group.

Their participation in informative activities including information meetings, consultation meetings, and negotiation meetings may be low due to age-related deterioration in individual health conditions such as chronic diseases. This conditions will be critical both on E&S and CHS issues, and resettlement activities.

In stakeholder participation processes, additional measures should be implemented to ensure that the elderly population aged 65 and above have equal opportunities to those in the working-age group of 15-64 years. For detailed information, please refer to Project specific Stakeholder Engagement Plan (SEP). Other than this, no negative impact of the project on the elderly has been mentioned.

5.12.4.3 People with handicaps

There are no health centers located within the social AoI's settlements. Therefore, health problems are critical for local people, especially for elderlies, and chronic disease owner.

The number of elderly individuals who are dependent on care, bedridden, and homebound is nearly 14. Individuals in this group may be disadvantaged in participating in stakeholder engagement processes. Another finding reflected in health-related outcomes is the presence of individuals with disabilities. Representing 3.5% of the population, these individuals, like those in the elderly age group and those in need of care, may be disadvantaged in participation processes.

The participation of the people with handicaps (Physical Disability, Visual Impairment, Hearing Impairment) including home bound, bedridden individuals, to informative activities including information meetings, consultation meetings, and negotiation meetings may be low due to physical handicaps, and /or impossibilities. This conditions will be critical both on E&S and CHS issues, and resettlement activities.

Vulnerable groups associated with this aspect include individuals with disabilities, and the who face heightened risks in pedestrian traffic at railway crossings. Addressing the safety concerns of these vulnerable groups is crucial for ensuring a secure, informative actions and inclusive environment at railway crossings and stations.

5.12.4.4 Illiterates

When evaluating the general education status of the settlements, illiteracy is not common among the population. Even though, there are 7 illiterate individuals within Derecikören, and Sazköy.

Illiterate individual may have difficulty reading and understanding announcements, informational brochures, and other materials presented in written or visual form, whether in print or on the official website. Therefore, they can not access information related to E&S risks of the Project. Therefore, informative documents should be prepared for illitertates.

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. For the table where all the DVIGs are visualized together, please refer to Table 111.

Table 111. Identified DVIGs in line with Project

Identified DVIG	Reasons for being disadvantaged in line with ESS10 requirements
Females, especially women who are the head of household	Low participation in meetings where the project's relevant E&S, CHS risks are announced.
	They may be unable to benefit from the employment opportunities that the project will offer.
	Even at a low level, they may be sensitive to issues related to labor influx, SEA/SH, and GBV issues.
	Low participation in the land acquisition and livelihood restoration process. Low participation in consultation meetings. Low participation negotiation meetings.
Elderly	Low participation in meetings where the project's relevant E&S, CHS risks are announced. They may be more affected by impacts such as noise and dust.
	Low participation in the land acquisition and livelihood restoration process. Low participation in consultation meetings. Low participation negotiation meetings.
People with handicaps (Physical Disability, Visual Impairment, Hearing Impairment) including home bound, bedridden individual	Low participation in meetings where the project's relevant E&S, CHS risks are announced. They may be more affected by impacts such as noise and dust.
	Low participation in the land acquisition and livelihood restoration process. Low participation in consultation meetings. Low participation negotiation meetings. Difficulty in reading and understanding the documents presented during the land acquisition process. Difficulty in understanding the land entry and exit protocols.
Illiterates	Difficulty in reading and understanding the draft and final documents of the project
	As well as being unable to read and comprehend written information notes and warning signs.
	Difficulty in reading and understanding the documents presented during the land acquisition process. Difficulty in understanding the land entry and exit protocols.

5.13 Impact Assessment

5.13.1 Land Preparation and Construction Phase

5.13.1.1 Demography

During the project's land preparation and construction phases, approximately 200 people will be involved, with 150 working for the contractor and the remaining personnel working for the design and supervision consultant team.

The construction sites that will be used during the construction phase of the project are not determined while ESIA is being prepared. Therefore, construction sites could not be included in the evaluations about the construction phase.

Due to the temporary construction sites, changes on the population are expected to be restricted in time and will be restored when construction activities are completed. The construction phase of the project is expected to be completed approximately mid-2028.

The impacts of the Project on the baseline conditions examined under the Demography heading can be defined as follows:

- No labor influx of a scale that would affect the population size of the region is anticipated. Accordingly, no project-related impacts are expected on the administrative structure of settlements or on permanent population movements.
- Any administrative changes in the status of settlements (e.g., neighborhood, village, or town) would result from external administrative decisions and would not be attributable to the Project.
- The Project's workforce capacity (approximately 200 workers) is not sufficient to trigger population relocation or to affect the population composition of nearby settlements.
- Changes in demographic indicators (such as population density, growth rate, or household size) are expected to follow typical demographic trends, with no meaningful correlation to Project activities.
- The urban–rural population distribution in the region has remained stable over time, and no Project-related impacts are expected that would alter this existing structure.
- Although land acquisition for the Project may result in limited economic displacement affecting agricultural and livestock-related incomes, these impacts are not expected to influence rural–urban population distribution.
- The Project is not expected to result in direct impacts on gender roles or gender relations within the local communities.
- Despite the absence of significant labor influx, measures will be implemented to prevent and address risks related to gender-based violence, sexual harassment, and exploitation, particularly with respect to local women.
- The Project workforce will primarily consist of individuals aged 15–64, corresponding to the working-age population. This workforce size will not be sufficient to alter the proportion of elderly population or dependency ratios, nor to eliminate age-related disadvantages.
- As is generally the case across Türkiye, the working-age population in the region has the highest participation in employment. Consequently, this group is expected to have the greatest level of interaction with the Project through local employment opportunities, with only a minor positive effect anticipated on youth unemployment levels.
- Local employment opportunities will be announced through appropriate channels, and cooperation with local employment agencies will be ensured in line with the Stakeholder Engagement Plan (SEP) and the requirements of ESS2 and ESS10.

- Given the region's existing industrialized character and the integration of industrial and rural areas, accommodation and service provision systems are already well established, and no Project-related pressure on these systems is expected.
- Seasonal and temporary population movements may occur during peak construction periods, leading to a short-term increase in mobility.
- Indirect labor influx may occur as individuals (and potentially their families) migrate to the region in anticipation of employment opportunities related to the Project or other emerging investments. This indirect influx is expected to remain limited and manageable.

5.13.1.2 Economy

During the project's land preparation and construction phases, approximately 200 people will be involved, with 150 working for the contractor and the remaining personnel working for the design and supervision consultant team.

The construction sites that will be used during the construction phase of the project are not determined while ESIA is being prepared. Therefore, construction sites could not be included in the evaluations about the construction phase.

The findings of the field studies conducted in 2020 and 2025 largely overlap. Therefore, this facilitates making predictions for the project's construction process in the area of Economy.

The impacts of the Project on the baseline conditions examined under the Economy heading can be defined as follows:

- The region's main economic activities have transformed with industrial investments made after the 1990s and 2000s, shaping their current form. Therefore, the Project is not expected to have an impact on the general characteristics of the existing economic structure.
- The main sources of livelihood in the region include pensions, salaried employment in permanent jobs, agriculture, and livestock farming. The Project is not expected to have an impact on changing these livelihood sources.
- The role of agriculture and livestock among livelihood sources has declined due to industrial investments in the region. Previous projects' land acquisition activities have led to the conversion of agricultural and livestock areas into industrial zones. This Project has the potential to expand this impact. At this point, resettlement and livelihood restoration measures will be implemented.
- These measures will apply to 18 privately owned parcels, one of these privately owned parcels is currently subject to an ongoing litigation process, among the 18 private parcels subject to land acquisition and a total of 102 shareholders were identified as having ownership rights on these 18 parcels. 14 were determined to be either the actual users of the relevant private lands or first-degree relatives of the actual users within the PAH. The physical and economic resettlement impacts of the Project due to land acquisition will be limited to these PAPs, and are not expected to impact the overall economic landscape of the region.
- The impact of land acquisition on livelihoods may cause a decline in agricultural and livestock incomes. Therefore, the loss of agricultural and livestock income per household will be addressed within the framework of livelihood restoration.
- After the implementation of mitigation measures, the average household income, monthly expenditure items, and monthly expenditure amounts will be maintained.
- At this point, an improvement in the income levels of poverty line, cost of living, and starvation line is expected.
- These expectations will apply to the aforementioned PAPs, and no impact on the income level increase or decrease is expected at the regional level due to the Project.

- The reduction in the size of agricultural and garden lands due to the Project's land acquisition requirements will affect the income generated from these lands. During the expropriation and the parallel land acquisition methods applied, full replacement costs for the lands will be paid, preventing the livelihood loss impact resulting from land loss.
- No physical or economic resettlement impacts are expected on any private residential, commercial, or associated structures due to the Project.
- The Project's land acquisition requirements do not affect common areas such as grazing lands. Therefore, no physical or economic resettlement impacts are expected on the local population engaged in livestock farming using common natural resources due to land acquisition.
- The common use purposes structures such as roads, floodplains, Filyos river, and health protection (zone) will be impacted due to the Project's land requirement. It should be noted that these lands belong to TCDD Legal Entity, and Treasury. Therefore, these areas are under the responsibility of the mentioned institutions, and there is no loss in line with public use.
- The situation regarding agriculture and livestock also applies to tourism activities and fishing. Though this project does not have a direct impact on tourism and fishing.
- When the opinions of local people, local authorities, and other stakeholders on improving livelihoods were gathered, the common consensus was to increase job and employment opportunities.
- Settlements have workers of varying skill levels, ranging from unskilled laborers to engineers. Therefore, the project must have an effective local employment strategy combined with on-the-job training.
- The purchase of goods and services from local businesses will have a positive impact on economic growth and create employment opportunities over the construction period by creating new businesses and jobs that serve the needs of construction activities and the workforce.
- It is assumed that the increase in demand for goods and services will also lead to an increase in supply.
- Therefore, it is thought that personnel recruitment and procurement of goods and services will have a positive effect on the size and composition of the population in the affected settlements.
- To maximize this positive impact, the list of goods and services required during the execution of the project and construction activities must be announced locally, along with other local authorities, such as chambers of commerce, mayors or sub-governors.
- Providing the goods and services from the local market as much as possible by the contractors carrying out the construction activities will enable the development of industrial and small-scale workplaces in the region.
- The risk of gender-based violence is one of the most critical adverse social impacts caused by labour influx. Especially in rural settlements, where the presence of law enforcement is often low, the risk of sexual harassment for local women is likely higher, in particular for younger women and girls, but also boys. Increase in criminal activity such as theft, physical assaults, sexual harassment of women and girls (gender based violence), exploitative sexual relations, human trafficking, alcohol and drug abuse, and smuggling etc. may occur due to Project-related labour influx.

5.13.1.3 Education, Health, and technical infrastructure

Education

- The number of educational and healthcare institutions serving the settlements within the project's impact area is limited to two, and neither is within social AoI.
- No impact is expected on components related to education, such as literacy, in the region.

- In none of the discussions there was any risk or impact related to education mentioned.
- Among the opinions received on livelihood restoration, it has been suggested that the local population be included in programs such as agriculture and livestock. In this regard, the PAPs directly affected by the project's land acquisition should be included in these training programs. At this point, exchanging information with local institutions related to education, agriculture, and livestock will be crucial.

Health

- The number of educational and healthcare institutions serving the settlements within the project's impact area is limited to two, and neither is within the social AoI.
- The fact that the regional population consists of individuals in the older age group brings to the agenda the risks arising from the Project's physical impacts.
- The impact area includes disadvantaged individuals in terms of health, such as people with disabilities and bedridden individuals. These conditions should be taken into account during stakeholder engagement activities.

Technical infrastructure

- One of the most frequently raised issues regarding the region's technical infrastructure is flooding the port area. These floods put houses and associated structures at risk.
- The common use purposes structures such as roads, floodplains, Filyos river, and health protection (zone) will be impacted due to the Project’s land requirement. It should be noted that these lands belong to TCDD Legal Entity, and Treasury. Therefore, these areas are under the responsibility of the mentioned institutions, and there is no loss in line with public use.
- The land acquisition plan also shows a floodplain on Treasury land. Although the 325/2, and 331/1 parcels appear as Filyos river, and floodplain it has been reported that these areas are used by TPAO as green areas. A part of the area in 331/1 is a stockyard, while the area in 325/2 appears as a green space, its intended use is different from that of a green space.
- While some of the local population sees the investment in the railway as a solution and alternative to the region's transportation problems, others view it as an investment that further complicates access to the port and maritime areas.
- Therefore, access roads, at-grade crossings, and underpasses and overpasses will be the most critical issues during the implementation of the project.
- Particularly, individuals with age-related or physical access disadvantages living very close to settlements should be taken into consideration.
- As a result of the land preparation and construction activities of the project, some impacts are expected on the transportation infrastructure. The first one is about roads and routes. These changes may have negative impacts on economic activities and daily life. Especially obstacles may arise in accessing health and education services and workplaces.
- In particular, the main access road of Sazköy settlement intersects with the railway construction. It is recommended that these obstacles to be prevented by offering alternative routes for a short period of time. In Gökçeler, the widening of the existing village road passing by the houses may cause restrictions in transportation.
- In addition, road closures and route changes should be announced with local media and corporate announcements.
- The impacts of the construction phase on the roads can also be physical. It is known that the roads used by heavy tonnage construction vehicles on the daily routine are damaged faster. This change observed by the locals in the port construction which is currently ongoing may cause discomfort. For this reason, damage to the roads must be eliminated and possible damages must be compensated.

- Construction vehicles can also cause physical damage due to various accidents. Fences, walls, wells, trees, etc. may be damaged by construction activities. Especially in Gökçeler, it is seen that construction works will be very close to the houses. In such cases, compensation for damages should be stipulated in the contracts between GDII and contractors.
- Project activities will not have any impact on the public infrastructure in the region. Infrastructure systems such as sewerage, drinking water network, irrigation water network, energy transmission line of the settlements in the region are not located in the project area.
- The installation of a construction site with additional facilities can lead to temporary increased pressure due to the system overload, and possible interruptions in public services such as electricity and water supply for residential areas close to the construction site. Interruption in public services can have impacts on livelihoods or quality of life.

5.13.1.4 Vulnerable groups

Vulnerability can be defined as follows:

Females, especially who are the sole heads of household

- No direct impact of the Project is expected in terms of gender roles. However, due to the specific conditions of the region and Türkiye, women in older age groups and female heads of households are considered disadvantaged groups within the scope of this Project.
- Additional measures will be required to ensure the participation of women, including vulnerable females, in stakeholder engagement processes and information dissemination activities. These measures are mostly defined within the SEP and will be used in all areas where they can be integrated with the SEP as an impact mitigation measure.
- Women, particularly female heads of households, face disadvantages in participating in employment processes. Therefore, additional measures will be defined to increase women's participation in local employment-related information and/or training processes. These measures will be specifically highlighted within the SEP.
- Elderly individuals in the region, especially women in older age groups, are considered vulnerable groups.
- Additional measures will be required to ensure the participation of elderly individuals, as well as vulnerable females. These measures are mostly defined within the SEP and will be used in all areas where they can be integrated with the SEP as an impact mitigation measure.
- Settlements have workers of varying skill levels, ranging from unskilled laborers to engineers. Therefore, the project must manage stakeholder engagement processes effectively in local employment efforts. At this point, additional strategies will be needed to ensure the participation of women in local employment.
- The risk of gender-based violence is one of the most critical adverse social impacts caused by labour influx. Especially in rural settlements, where the presence of law enforcement is often low, the risk of sexual harassment for local women is likely higher, in particular for younger women and girls, but also boys. Increase in criminal activity such as theft, physical assaults, sexual harassment of women and girls (gender based violence), exploitative sexual relations, human trafficking, alcohol and drug abuse, and smuggling etc. may occur due to Project-related labour influx. However, although the Project-affected settlements show rural characteristics, the security forces are active in the settlements due to their proximity to the city centres.

Elderlies

- They may be more affected by impacts such as noise and dust.
- Their participation in informative activities including information meetings, consultation meetings, and negotiation meetings may be low due to age-related deterioration in individual health conditions such as chronic diseases.
- This conditions will be critical both on E&S and CHS issues, and resettlement activities.
- In stakeholder participation processes, additional measures should be implemented to ensure that the elderly population aged 65 and above have equal opportunities to those in the working-age group of 15-64 years. For detailed information, please refer to Project specific Stakeholder Engagement Plan (SEP). Other than this, no negative impact of the project on the elderly has been mentioned.

People with handicapped (Physical Disability, Visual Impairment, Hearing Impairment) including home bound, bedridden individual

- They may be more affected by impacts such as noise and dust.
- Their participation to informative activities including information meetings, consultation meetings, and negotiation meetings may be low due to physical handicaps, and /or impossibilities.
- This conditions will be critical both on E&S and CHS issues, and resettlement activities.

Illiterates

- Individuals who are illiterate will be disadvantaged in stakeholder engagement processes. Additional measures will be required to ensure the participation of illiterate individuals, especially during land acquisition and livelihood restoration activities.
- The disadvantage will be particularly higher for illiterate women in the older age group.
- These measures are mostly defined within the SEP and will be used in all areas where they can be integrated with the SEP as an impact mitigation measure.
- These measures will be critical during the land acquisition process and livelihood restoration activities.
- No other language besides Turkish has been identified among the local population. Due to the influence of past tourism and foreign investments in the region, English may be used as an alternative language option in the area.

5.13.2 Operation Phase

5.13.2.1 Demography

The project will be handed over to the General Directorate of Turkish State Railways (TCDD) after construction is completed, and the operational activities will be carried out by TCDD.

The number of TCDD personnel foreseen to be employed during the operation phase is not determined yet. The evaluations have been conducted based on the assumption that approximately 50 people will be working.

No direct impact of the project's operational phase on the demographic structure is expected.

- During the operational phase of the project, it is likely to have a positive impact on the regional demographic structure
- The impacts identified for each demographic component during the construction phase will be lower and even negligible during this period.
- Issues not considered within the scope of impacts for the construction phase will remain off the agenda during this period as well.
- Stakeholder engagement processes will continue to be important throughout this phase.

- Since the land acquisition process will have been completed, there will be no impact related to land use.
- The participation of vulnerable groups in the stakeholder engagement process will still be essential.
- The Labor and Working Conditions will largely be adapted for TCDD employees, too.

5.13.2.2 Economy

The project will be handed over to the General Directorate of Turkish State Railways (TCDD) after construction is completed, and the operational activities will be carried out by TCDD.

The number of TCDD personnel foreseen to be employed during the operation phase is not determined yet. The evaluations have been conducted based on the assumption that approximately 50 people will be working.

No direct impact of the project's operational phase on the economic structure is expected.

- Attracting both skilled and unskilled labor from the region, which could help stimulate economic activity.
- The impacts identified for economic structure during the construction phase will be lower and even negligible during this period.
- Issues not considered within the scope of impacts for the construction phase will remain off the agenda during this period as well.
- Stakeholder engagement processes will continue to be important throughout this phase in line with ESS10.
- Since the land acquisition process will have been completed, there will be no component related to ESS5.
- The participation of vulnerable groups in the stakeholder engagement process will still be essential, in line with ESS10.
- The Labor and Working Conditions will largely be adapted for TCDD employees, in line with ESS2, too.

5.13.2.3 Education, health and technical infrastructure

Influences on the infrastructure are expected to be mostly positive during the operation phase of the project. Inadequate issues have been identified in various areas such as roads, sewage, waste collection system in the project area. It is within the expectation of all stakeholders that the project will increase investment in the region and improve the quality of life.

The operation of the project is expected to ease the load on the highway by facilitating the connection between the industrial points in the region. This not only extends the life of the transportation infrastructure, but also contributes to public health and safety by reducing the number of trucks in road traffic.

5.13.2.4 Vulnerable Groups

- The risks related to participation processes during the construction phase for all DVIGs will also apply to the operational phase.
- However, since environmental and social risks will decrease and the RP process will be completed, the level of impact will decrease.
- The labor-related risks will be considered in the context of female workers.
- Discrimination and harassment issues including race, color, language, and beliefs will be also considered in line with fair-labor condition for all project workforce.
- SEA/SH and GBV issues will continue to apply to all women in the region, including passengers.

- The most significant risk during the operational phase for the elderly and individuals with disabilities will be physical accessibility issues.
- This issue will apply to all the elderly and individuals with disabilities in the social AoI, including passengers.

5.14 Impact Significance, Mitigation Measures and Residual Impacts

The significant participation of local communities in employment is seen as a positive aspect of the project, and it also helps reduce the likelihood of socio-cultural conflicts due to population growth.

Additionally, there are other mitigation measures planned during the project's construction phase to manage its social impacts on the population and demographic structure, including:

- To increase the local benefits of the project, an effort will be made to procure goods, services, and materials from local businesses to the extent possible.
- A grievance mechanism, as outlined in the Stakeholder Engagement Plan (SEP), will be established and operational throughout all phases of the construction period. Any disputes or concerns will be addressed and resolved through the Project's grievance mechanism.
- In order to promote culture and social habits in the region and to prevent possible conflicts between local people and employees, compulsory cultural sensitivity trainings will be given to workers, no employees will be started without these trainings and trainings will be repeated periodically during employment.
- A code of conduct will be established by the project management for all employees. This code will outline the rules of behavior that must be adhered to, not only while working within the construction site but also when interacting with local residents outside the construction site.
- To reduce the environmental and social impacts of the traffic movement, separate roads will be constructed as much as possible for the construction sites, and training will be provided to workers on the rules to be followed in cases where residential roads will be used.
- In line with the SEP, local administrators, relevant institutions / organizations and local people will be informed and consulted about impacts from the project activities and planned mitigation measures.

Gender based violence (GBV) and sexual harassment and abuse (SHA) issues require some additional measures:

- Gender sensitivity will be sought in the employment of Community Liasion Officer(s) (CLOs) who will work at site.
- The CLO(s) will be informed and trained if necessary about GBV/SHA issues.
- Mandatory and repeated training shall be provided for the workforce about refraining from unacceptable conduct toward local community members, specifically women; The Project will introduce sanctions (e.g., dismissal) for workers involved in criminal activities. The Code of Conduct will include prohibition of activities such as use of illegal substances, smuggling, engaging in violence exploitation and sexual harassment.
- Workers shall be informed about national laws that make sexual harassment and gender based violence a punishable offence which is prosecuted. The Project shall enforce laws on drug abuse and smuggling.
- Grievance Mechanism (GM) will be accessible for all kind of groups and ensure the confidentiality of personal information.
- Focus group meetings will be held in the settlements to inform women about GRM. The following information should be given at these meetings:
    - Women's rights

- Ways of self-protection in cases of violence and sexual abuse
- Emergency contact numbers
- Contact information of institutions and organizations they can apply to
- GRM and privacy policy
- The privacy policy of the GM will be repeated in all information materials.

Table 112 provides a summary of social impact assessments. This table summarizes the significance of impacts identified before and after the implementation of mitigation measures.

Table 112. Socioeconomic Impacts, Mitigation Measures and Residual Impacts

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				
Demography											
Temporary Labor influx	Land Preparation and Construction	Local people and local workforce, including vulnerable female as heads of households	Local	Short term reversible	Short-term	One-off/rare	Low	Medium	Moderate	- Implement Project Grievance Mechanism, - Inform local communities and local authorities about temporary labor influx and temporary labor demands in line with SEP - Plan accommodation for temporary workers - Plan temporary housing for temporary workers to strength technical infrastructure	Minor
	Operation	Local people and local workforce, including vulnerable female as heads of households	Local	Short term reversible	Short-term	One-off/rare	Low	Low	Minor	- Prioritize PAPs in project employment opportunities by including clauses in bidding contracts to reduce the need of recruitment of external workforce - Include all the provisions in LMP and the contractor's Labour Management Plan to prevent inappropriate employment conditions in line with ESMP, - Provide building good relations between the local community and workers in line with SEP -	Negligible
Economy											
Income loss agricultural, and husbandry activities	Land Preparation and Construction	Land owners, shareholders, and users, including vulnerable female as heads of households, elderlies, people with handicapped, and illiterates	Local	Medium term reversible	Medium-term	Intermittent	Medium	High	Major	- Implement Project Grievance Mechanism, - Implement mitigation measures defined in RP. Ensure implementation of Livelihood Restoration measures as defined in RP. Consider vulnerable groups identified in line with SEP and RP. - -	Moderate
Income loss agricultural, and husbandry activities	Operation	Land owners, shareholders, and users, including vulnerable female as heads of households, elderlies, people with handicapped, and illiterates	Local	Short term reversible	Short-term	One-off/rare	Low	Medium	Moderate		Minor
Education											
Training programs	Land Preparation and Construction	Landowners, shareholders, and users, including vulnerable female as heads of households, and people with handicapped	Local	Short term reversible	Short-term	One-off/rare	Low	Medium	Moderate	- Implement Project Grievance Mechanism, - Implement mitigation measures defined in RP. Ensure implementation of Livelihood Restoration measures as defined in RP. Consider vulnerable groups identified in line with SEP and RP.	Moderate
Training programs	Operation	Landowners, shareholders, and users, including vulnerable female as heads of households, and people with handicapped	Local	Short term reversible	Short-term	One-off/rare	Low	Low	Minor		Minor
Technical infrastructure											
Access problems	Land Preparation and Construction	Landowners, shareholders, and users, including elderlies, and	Local	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor	- Implement Project Grievance Mechanism, Ensure implementation of ESMP in line with access roads Ensure implementation CHS measures as described in ESMP.	Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Reversibility	Duration	Frequency	Overall Magnitude				
		people with handicapped								Ensure implementation of SEP	
Vulnerable groups											
The effectiveness of stakeholder engagement processes	Land Preparation and Construction	Vulnerable groups including women in older age groups, and female heads of households	Local	Medium term reversible	Medium -term	Continuous	Medium	High	Moderate	- Implement Project Grievance Mechanism, - Consider vulnerable groups identified in line with SEP and RP. - Provide building good relations between the local community and workers in line with SEP	Minor
The effectiveness of stakeholder engagement processes	Operation	Vulnerable groups including women in older age groups, and female heads of households	Local	Short term reversible	Short-term	Continuous	Medium	High	Moderate		Minor

5.15 Labor and Working Conditions

During the project's land preparation and construction phases, approximately 200 people will be involved, including 150 contractor staff and personnel from the design and supervision consultant team. The workforce will primarily consist of young, working-age, and recruitment will prioritize local residents where feasible, as highlighted in the Demography section. Seasonal and temporary labor influx is expected during peak construction periods, potentially including families seeking project-related work, as emphasized in the Economy section. The project will implement measures to ensure safe working conditions and protect local women from gender-based violence, harassment, and exploitation. Workers of varying skill levels, from unskilled laborers to engineers, will benefit from local employment strategies combined with on-the-job training. Job announcements will be shared with the local population, in coordination with local employment agencies, to ensure inclusive access to opportunities. Procurement of goods and services from local businesses is expected to support economic growth and create employment opportunities in the affected settlements. Interactions between incoming laborers and the local population, including female employees and local women, will be carefully managed to minimize social risks and ensure inclusive engagement. Additionally, cumulative effects from previous industrial and commercial investments, together with increased workforce and service demand, are expected to contribute positively to the local economy. The risks of the project during the land preparation and construction phase are discussed in detail in the LMP.

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 provides guidance for the implementation of these measures and ensures strict adherence to regulations, while a responsible staff will oversee compliance. Subcontractors will explicitly state the prohibition of child labor.

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.

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).

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 DGII PIU for approval based on the Good International Industry Practice. Contractor will also prepare Labour Management Plan based on the LMP. The works will not commence until these plans are cleared by DGII 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.

The impact assessment for the relevant aspects has been provided in the previous section, while the mitigation measures have been primarily presented in the ESMP.

5.16 Occupational Health and Safety

Two main indicators of working life are occupational accidents and occupational diseases. In Türkiye, the incidence of occupational accidents has significantly decreased over the past 40 years; however, the rate still remains relatively high. According to the Occupational Health and Safety Profile Report (2016), the distribution of worker fatalities in 2014 by field of activity is as follows:

- Production, manufacturing, processing, storage: 105,538
- Excavation, construction, repair, demolition: 19,177
- Movement, sports, artistic activity: 6.672
- Service provided to the business and/or the public; intellectual activity: 4,592
- Agriculture, forestry, gardening, fish farming, working with live animals: 1,300
- No information: 8.477
- Other: 71,248

5.16.1 Impact Assessment

5.16.1.1 Land Preparation and Construction Phase

The risks of the project during the land preparation and construction phase are discussed in detail in the LMP. The construction of such projects includes the following activities:

- Earthworks
- Mapping geodesy and topographic works
- Construction of the superstructure of the railway layers
- Rail compression, rail welding, rail tensing, rail lubrication, rail grinding, rail system assembly works;
- Construction of the superstructure of the highway layers (lower floor, base layers, asphalt fields)
- Construction of the Station (all rough and fine construction works of stations)
- Electrification and Signaling Works

Occupational health and safety issues that may occur in these works may be caused by: Heavy equipment use, travel and fall hazards, exposure to physical, chemical and biological hazards, noise, dust, falling objects, smoke and oils, risks from using tools and machinery.

People under the age of 18 will not be employed by the Project, as construction activities will involve dangerous work.

Issues requiring occupational health and safety measures and training are:

- Exposure to chemicals
- Welding hazards (Aluminum Termite welding fume emissions, burns and radiation)
- Excavation work, earthwork hazards
- Vibration of heavy construction equipment
- Dust, Noise
- Traffic Accidents
- Lifting heavy materials
- Construction iron accidents
- Ergonomic hazards during construction
- Environmental hazards (insects, wasps etc.)
- Power cuts and arc failure burns
- Electric works

- Burn
- Working at heights (falls from scaffolding, ladders, structures)
- Confined space entry (oxygen deficiency, toxic gases, rescue difficulties)
- Hot works (cutting, grinding, fire hazards)

Based on experience with construction projects, overtime is considered as risk potential. This risk is discussed in the Employment and Training Plan.

5.16.1.2 Operation Phase

The Ministry of Transport and Infrastructure is authorized with the construction and operation of the railway. Terms and conditions applied to DGII personnel are specified in the Civil Servants Law No. 657. There is no gap between Turkish Law and ESS 2 requirements as Türkiye is a party of ILO Conventions.

It should be remembered that health and safety issues regarding railway operation are highly related to the measures taken for the Community Health and Safety and Emergency Preparedness and Response. The implementation of a safety management system, underpinned by a genuine safety culture within a railway undertaking is key to unlocking future safety improvements.

Adequacy of the safety in railways can be controlled via examining:

- Collisions of trains
- Derailments of trains
- Level-crossing accidents
- Accidents to persons
- Fires in rolling stock
- Other accidents

5.16.2 Impact Significance, Mitigation Measures and Residual Impacts

During both construction and operation phases, occupational health and safety risks are considered significant due to the scale and nature of activities. These impacts mainly relate to physical, chemical, ergonomic and operational hazards for workers, and indirect risks for local communities. The Project has adopted national legislation, international standards, and World Bank ESS2 requirements to ensure compliance. The significance of impacts varies from moderate to high at source but can be reduced to acceptable levels through proper planning, training, monitoring, and enforcement of OHS practices.

A summary of the key impacts, corresponding mitigation measures, and anticipated residual impacts is presented in the Table 113below.

Table 113.Occupational Health and Safety Mitigation Measures and Residual Impacts

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				
Exposure to Chemicals	Construction	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Safe storage and labeling of all chemicals, compliance with MSDS. ▪ Provide PPE (gloves, goggles, respirators) suitable for chemical exposure. ▪ Regular training on chemical handling and emergency response. ▪ Emergency showers and eye wash stations on site. ▪ Proper waste management and disposal of hazardous substances.	**Minor**
Welding Hazards (fumes, burns, radiation)	Construction	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Use of welding shields, protective clothing, and local exhaust ventilation. ▪ Specific training on welding safety. ▪ Continuous monitoring of welding fumes. ▪ Fire safety equipment (extinguishers) near welding sites.	**Minor**
Excavation and Earthwork Hazards (collapse, falls, landslide)	Construction	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Excavation permits and slope stability assessments. ▪ Benching/shoring/shielding techniques where required. ▪ Barriers and signage around open excavations. ▪ Emergency response plan for collapses/landslides.	**Minor**
Vibration from Heavy Machinery	Construction	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Limit exposure time for operators. ▪ Maintenance of equipment to reduce vibration. ▪ Provide anti-vibration gloves and seating. ▪ Medical monitoring for vibration-related health issues.	**Minor**
Dust and Noise Exposure	Construction & Operation	Project personnel, nearby communities	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Regular watering of construction sites, dust suppression systems. ▪ Use of mufflers and silencers on machinery. ▪ Provide earplugs/earmuffs for workers. ▪ Continuous noise monitoring.	**Minor**
Traffic Accidents (internal project transport & external roads)	Construction & Operation	Project personnel, nearby communities	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Traffic management plan (signage, barriers, speed limits). ▪ Driver safety training and licensing. ▪ Vehicle maintenance program. ▪ Coordination with local authorities for road safety.	**Minor**
Lifting and Handling Heavy Materials	Construction	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Use of cranes, hoists, and lifting aids. ▪ Manual handling training. ▪ Job rotation to reduce repetitive strain. ▪ Strict permit-to-work system for critical lifts.	**Minor**
Accidents with Construction Iron / Sharp Materials	Construction	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Use of protective gloves, helmets, and safety boots. ▪ Proper stacking and securing of rebar and steel. ▪ Safe cutting/welding practices.	**Minor**
Ergonomic Hazards (Repetitive Motion, Awkward Postures)	Construction & Operation	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Ergonomic work design, adjustable equipment. ▪ Worker training on posture and lifting techniques. ▪ Job rotation and rest breaks.	**Minor**
Environmental Hazards (Insects, Wasps, Pests)	Construction & Operation	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Pest control program. ▪ Use of repellents and protective clothing. ▪ First aid readiness for stings and bites.	**Minor**
Electrical Works and Power Cuts / Arc Burns	Construction & Operation	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Permit-to-work system for electrical activities. ▪ Lock-out/tag-out procedures. ▪ Arc-flash PPE and insulated tools. ▪ Regular inspection of power systems.	**Minor**
Fire, Burns, and Explosions (including Blasting)	Construction & Operation	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Fire detection and suppression systems. ▪ Blasting only under supervision of certified engineers. ▪ Firefighting training and emergency drills. ▪ Storage of fuels and explosives in compliance with regulations.	**Minor**
Fatigue and Overtime Risks	Construction	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Working hours aligned with labor law. ▪ Mandatory rest breaks. ▪ Monitoring of overtime by contractor management. ▪ Health checks for workers on extended shifts.	**Minor**
Slips, Trips, and Falls (Heights, Uneven Surfaces)	Construction & Operation	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Fall protection systems (harnesses, guardrails, nets). ▪ Housekeeping program to keep walkways clear. ▪ Safety signage in elevated areas. ▪ Training in working at heights.	**Minor**
Train Collisions, Derailments, Level Crossing Accidents	Operation	Project personnel, nearby communities	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Implementation of railway Safety Management System. ▪ Daily inspection of signaling and level crossings. ▪ Regular track and rolling stock maintenance. ▪ Emergency response planning and simulation drills.	**Minor**

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Reversibility	Duration	Frequency	Overall Magnitude				
Fire in Rolling Stock / Railway Facilities	Operation	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Fire detection and suppression systems in rolling stock and stations. ▪ Fire drills and evacuation training for personnel. ▪ Maintenance of electrical and mechanical systems.	**Minor**
Emergency Preparedness – Lack of Drills and Emergency Testing	Construction & Operation	Project personnel, nearby communities	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ Emergency response plans shall be tested regularly through periodic drills (fire, evacuation, chemical spill, traffic accident scenarios, etc.), and lessons learned shall be documented. ▪ Contractors shall organize at least annual emergency exercises involving both site workers and relevant external agencies (e.g., fire brigade, health services). ▪ Results of drills shall be evaluated and corrective actions shall be implemented immediately.	**Minor**
Training Deficiencies (OHS and Emergency Response)	Construction & Operation	Project personnel,	Restricted	Irreversible	Short term	One-off/Rare	High	Medium	**Major**	▪ All project personnel shall receive regular OHS trainings, including induction training before mobilization and refresher trainings at least annually. ▪ Specific trainings shall cover first aid, fire safety, working at height, electrical works, handling of hazardous materials, traffic safety, and ergonomics. ▪ Training records shall be maintained systematically, and workers shall not be allowed to work without documented participation in relevant OHS training. ▪ Toolbox talks shall be held daily/weekly to remind workers of task-specific hazards and safe practices.	**Minor**
OHS Documentation and Record Keeping Gaps	Construction & Operation	Project personnel	Restricted	Irreversible	Short term	One-off/Rare	Medium	Medium	**Moderate**	▪ An incident reporting and recording system shall be established; all accidents, near-misses, and occupational illnesses shall be documented, investigated, and reported. ▪ Root cause analysis shall be conducted for all significant incidents, and corrective measures shall be tracked to closure. ▪ Records of OHS inspections, risk assessments, permits-to-work, and monitoring results shall be archived and made available for audits. ▪ The Contractor shall development a site specific OHS risk assessment and management plan. The Contractor shall prepare and maintain OHS manuals, procedures, and work instructions, ensuring they are updated periodically and accessible to all workers.	**Minor**

5.17 Community Health and Safety

5.17.1 Methodology and Project Standards

5.17.1.1 Methodology

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 for Construction and Decommissioning (April 30, 2007),
- WBG EHS Guidelines for Railways (April 30, 2007),
- Turkish Statistical Institute (TÜİK) website and related statistics (www.tuik.gov.tr)
- TCDD General Directorate statistics,
- 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 ESS 4, 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
- 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.

5.17.1.2 Project Standards

Besides the applicable requirements of the national legislation relevant to the health and safety of the local communities, the main applicable international standard for the Project's potential community health and safety impacts is ESS4 – Community Health and Safety which recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts.

Other related legislation and standards applicable to community health and safety such as legislation on the management of water resources, air quality, noise, etc. are listed in Chapter 2 of this ESIA and detailed in relevant chapters.

5.17.2 Baseline Conditions

5.17.2.1 Existing Road Transport Network and Traffic Conditions

The nearest transportation route to the project area is D010 Highway. According to the 2023 Traffic Volume Maps prepared by the Ministry of Transport and Infrastructure, General Directorate of Highways (see Figure 87), traffic load of the D010 Highway is presented in Table 114.

Table 114. Information About Transportation Routes

Highway Name	Distance to Project Area (km)	Traffic Load
D010	6.5	Automobile: 9,333 Medium Commercial Vehicle: 1,024 Bus: 155 Truck: 625 Truck+Trailer, Tow Truck+Semi Trailer:359 Total: 11,496

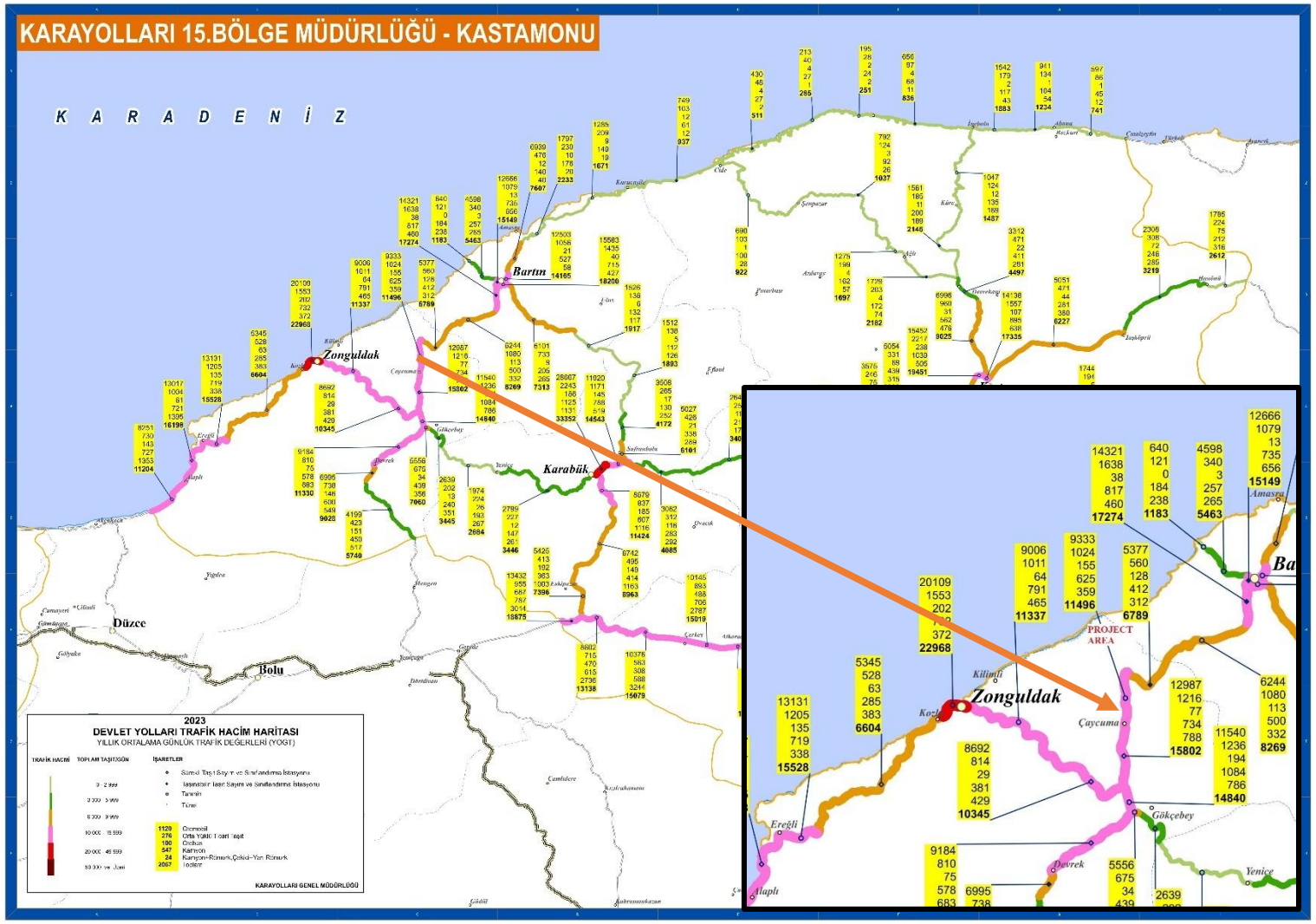
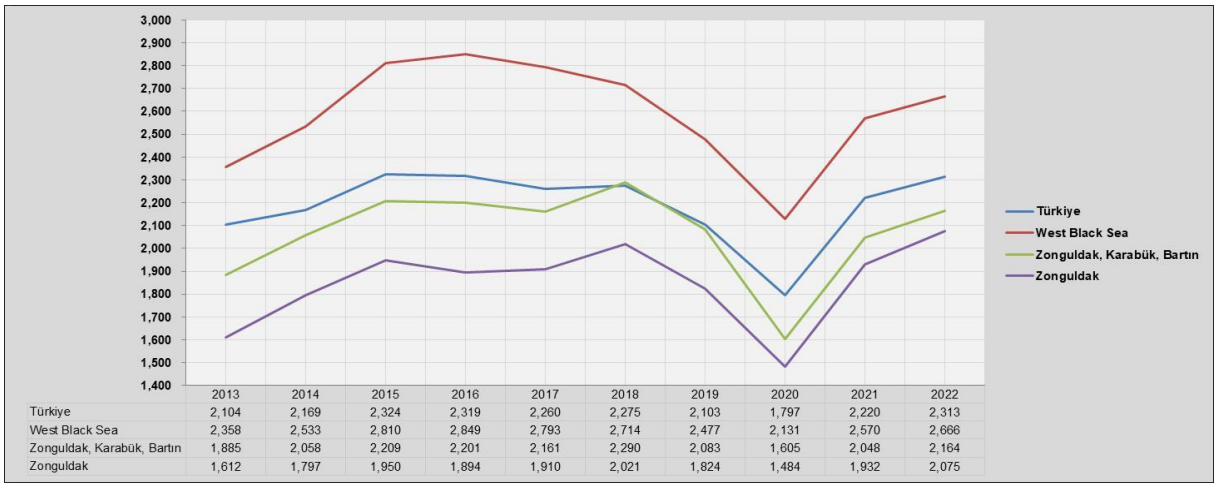


Figure 87. State Highways Traffic Volume Map (2023) for 15th Regional Directorate of KGM

Traffic Accident Statistics

In Zonguldak Province, it is observed that traffic accidents remain below the national and regional averages (see Figure 88). The notable decrease seen in the graph in the year 2020 is due to the lockdown measures implemented during the Covid-19 pandemic.



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Türkiye	2,104	2,169	2,324	2,319	2,260	2,275	2,103	1,797	2,220	2,313
West Black Sea	2,358	2,533	2,810	2,849	2,793	2,714	2,477	2,131	2,570	2,666
Zonguldak, Karabük, Bartın	1,885	2,058	2,209	2,201	2,161	2,290	2,083	1,605	2,048	2,164
Zonguldak	1,612	1,797	1,950	1,894	1,910	2,021	1,824	1,484	1,932	2,075

Figure 88. Number of Traffic Accidents Per Million Population

In the interview held with Çaycuma Municipality on 24.08.2023, it was reported that there is no significant level of traffic accidents in the district and its surrounding areas. However, it was noted that there is a high incidence of fatal pedestrian accidents along the railway passing through the center of Çaycuma due to safety deficiencies. It is expected that the project will increase the operational volume of the railway. Therefore, additional measures related to public health and safety should be taken in the region, and work on engineering structures such as culverts and pedestrian overpasses should commence to address these issues.

5.17.2.2 Natural Disaster Risk

The project route passes through the nearby forest areas. Forest areas around the project route are under the jurisdiction of Zonguldak Province and Çaycuma district fire departments, Zonguldak Forest Regional Directorate and Çaycuma Forest Management Department.

Due to its geographical location, climate conditions, and forest management practices, forest fires are not observed in the region. However, similar reasons make the area susceptible to other natural disasters commonly seen in the Black Sea region. Among these natural disasters, there is a high risk of landslides and flash floods in the area (see Figure 89).

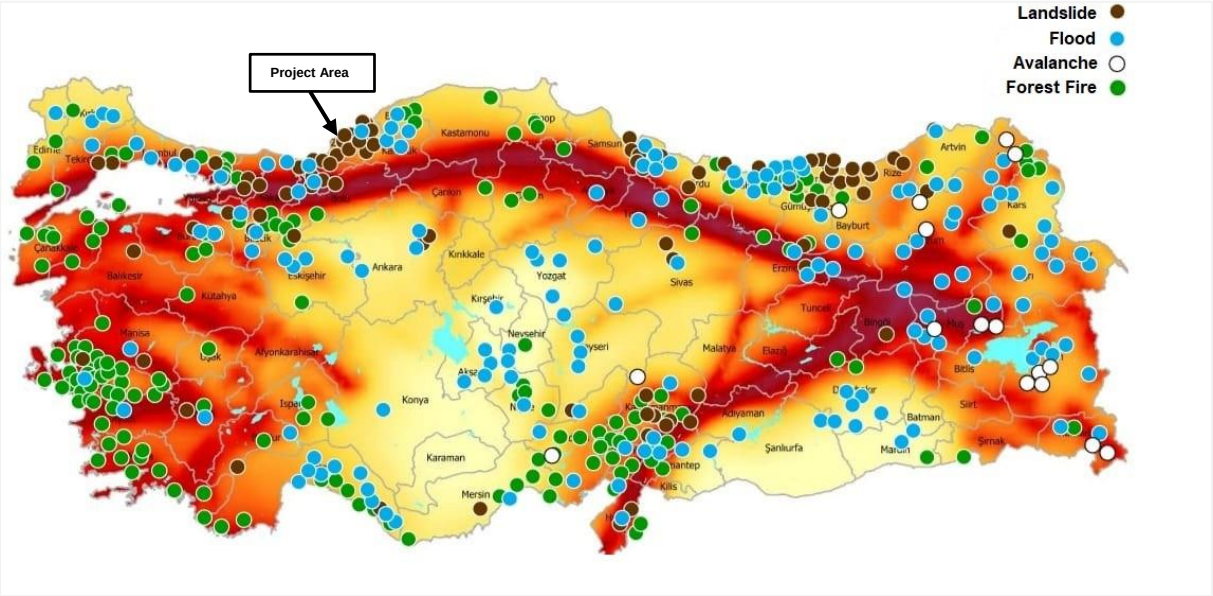


Figure 89. Natural Disaster Map for Türkiye[109]

5.17.3 Impact Assessment

5.17.3.1 Land Preparation and Construction Phase

As stated in the WBG EHS Guidelines for Railways, community health and safety impacts that may occur during railway construction, rehabilitation and maintenance phases are common with impacts that may occur in construction projects of major infrastructures and large industrial facilities. These impacts include, inter alia, dust, noise and vibration from construction machinery and equipment, and infectious diseases that may be caused by personnel temporarily employed during land preparation and construction. The impacts mentioned here are also specified in the WBG General EHS Guidelines for Construction and Decommissioning, listed below:

- General Site Hazards,
- Disease Prevention,
- Traffic Safety

These impacts are explained in more detail in ESS4: Community Health and Safety and are given below.

Hazardous Material Management and Safety

Major hazardous substances foreseen to be used in the land preparation and construction phases of the project are railway oils, powdered silica, fuels, solvents, paints and packaging containing residues of or contaminated by hazardous substances together with absorbents, cleaning cloths, protective clothing contaminated with hazardous substances.

Emergency Preparedness and Response

Potential emergencies that may occur during the land preparation and construction phases of the project include site-specific risks from natural hazards such as floods, earthquakes and

109 https://manisa.afad.gov.tr/afad-turkiyenin-afet-risk-haritasini-cikardi-merkezicerik Publication Date: February 2022

landslides. Emergency situations such as this should be handled appropriately and in a timely manner, taking into account the elements specified in the Emergency Preparedness and Response Plan.

In addition, earthquake risk, landslide risk and potential structural stability risks are evaluated in Chapter 5.1.

Community Exposure to Health Problems

In case of employing local workers during the land preparation and construction phases of the project, infectious and vector-borne diseases will pose a low risk, especially for communities living in settlements around the main camp site. Therefore, an additional burden on local health facilities is not expected. Yet, in the event of any communicable disease outbreaks, the related risks will be reassessed and the necessary mitigation measures will be redefined accordingly.

It is considered that most or all of the personnel will be provided from the local and regional workforce in order to provide the highest level of benefit to the local community during the land preparation and construction phases of the project. This may cause diseases to be observed in the Project area to spread to local communities through the local workforce.

However, this risk will exist during the temporary construction period, and the impact is considered significant if no action is taken. It is anticipated that this impact will not be significant, as measures such as general hygiene training, regular medical checks, and necessary vaccination activities, waste and wastewater management practices to be provided by DGII for free, as required.

The project will have a minimal impact on local health services, as workers will be provided with regular medical checks, health services and construction camp sites in accordance with international standards.

Traffic and Road Safety

The Project will involve a number of construction vehicles and equipment in the land preparation and construction phase. Even though the activities will be mainly conducted within Project's construction corridor, off-site traffic load is expected particularly from the transportation of construction materials from the quarries/borrow areas and local suppliers. Interchanges, underpass or overpass structures will need to be constructed to avoid any permanent traffic interruption and to prevent risks on the community health and safety. In this respect, the following situations/activities, which may result in increased traffic accident risk for the temporary construction period, will require well planned and strictly implemented traffic management practices:

- Heavy machinery conducting earthworks and construction activities along the Project's construction corridor in the vicinity of settlements.
- Personnel transport vehicles transporting workers from construction camp sites to related Project construction sites.
- Material transport vehicles transporting required materials from the quarries, borrow areas and other industrial areas (e.g. supply of concrete, steel).
- Vehicles transporting the waste generated at construction sites (i.e. excavated materials, recyclable waste, etc.) to the related reuse/disposal sites

Pedestrians and bicyclists are at greatest risk of serious injury from collisions with moving vehicles. In addition, children are regarded as the most vulnerable group in terms of pedestrian safety together with elder people, cyclists and motorcyclists. Accordingly, children, older people, cyclists, motorcyclists and all pedestrians, who live in the settlements located close to the Project's construction corridor, camp, quarry and borrow areas, access roads, underpasses and overpasses that will be constructed, would be the most vulnerable persons to Project's risks associated with construction traffic. Avoiding the passage of construction

traffic through the settlements, training of the truck drivers and operators of construction machinery/equipment would be required to prevent/minimize construction traffic-related risks and impacts on local communities and users of the existing roads.

Since the construction activities are predicted to increase the traffic in the project area, a Traffic Management Plan has been prepared and will be implemented. This plan responds to concerns about the safety of life and property of residents and their children and concerns about the safety of animals.

Security Personnel

Relations of the Project security personnel and the local communities present risks in terms of social conduct and conflict since the security personnel have a certain degree of authority, which may be misinterpreted in case related personnel are not trained in terms of use of force and communications with the public. Therefore, it is necessary to ensure that the security personnel to be employed are screened that they have not been involved in past abuse and are trained in terms of applicable law, code of conduct, gender sensitivity and cultural sensitivities of the region in accordance with the ESS4. The risk is considered to be temporary to land preparation and construction phase.

When security personnel is used, the Borrower will be guided by the principles of proportionality and GIIP, and by applicable law (in accordance with the Law No. 5188 on Private Security Services, Regulation on the Implementation of the Law on Private Security Services, ESS2 and relevant ILO conventions), in relation to hiring, rules of conduct, training, equipping, and monitoring of such security workers.

5.17.3.2 Operation Phase

As stated in the WBG EHS Guidelines for Railways, the public health and safety impacts that can be seen during the operating phase of railways are as follows:

- General railway operational security,
- Transport of dangerous goods,
- Level crossing security,
- Pedestrian safety.

During the operational phase, the most important danger that may result in serious injury or death in railway operations is seen as the train colliding on the railway, colliding with vehicles on the road or derailing. One of the risks arising from the railway operation is the transportation of dangerous substances. The leakage of these substances during the transportation of dangerous goods poses a risk around the railway line. In addition, level crossings are areas at high risk on railways. This risk can be eliminated if the road traffic can be stopped temporarily during the train passage. Among other things, issues such as intrusion in railway facilities, power lines and equipment can also pose risks.

Traffic and Pedestrian Safety

As the project enters its operation phase, traffic density on the railway is expected to increase over time. Therefore, there are key points on the existing railway that need to be considered from a pedestrian safety perspective.

It is recommended to collaborate with local authorities and relevant government agencies for the planning and implementation of infrastructure elements (such as culverts, pedestrian overpasses, etc.) along this railway to enhance pedestrian safety.

Emergency Preparedness and Response

Among the emergencies that may occur during the operation phase are the ones that may occur at the stations or emergencies that may occur on the railway route and result in

accidents. Therefore, specific measures and management procedures for such events need to be developed within the operational phase Emergency Preparedness and Response Plan.

Emergency Preparedness

Preparedness involves actions designed to save lives and minimize damage. It is planning and training prior to a rail disaster for appropriate response when an emergency occurs.

Emergency Response

Emergency response begins as soon as a rail emergency is identified or reported. When it is notified of a rail emergency, they will immediately make notifications per TCDD protocols.

Moreover, it should be remembered that emergency response for railway accidents may require a comprehensive approach in which many institutions should take part.

It is known that railway accidents mainly include[110]:

- Collisions of trains
- Derailments of trains
- Level-crossing accidents
- Accidents to persons
- Fires in rolling stock
- Other accidents

These accidents can affect people, nonetheless, it is known that major fatalities are in question for unauthorized persons (see Figure 90).

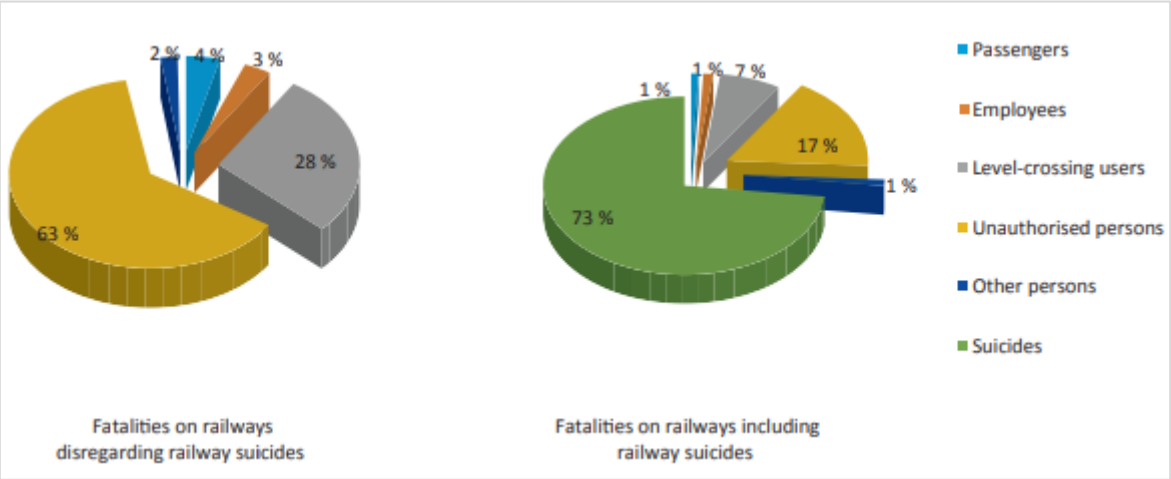


Figure 90. Relative share of fatalities per victim category among railway and all fatalities (2011-2015)

Source: European Railway Agency, 2017, *Railway Safety Performance in The European Union*

The above figure shows that, majority of the fatalities occur due to having unauthorized people on railway and poor level crossing management. Therefore, monitoring the project route possesses a great importance.

Furthermore, a series of steps needs to be followed if a railway emergency is faced:

[110]European Railway Agency, 2014, Railway Safety Performance in The European Union

- The first responder on scene makes a preliminary assessment and notifies relevant authorities (Fire Department, police etc.) with all information available.
- The first arriving Fire Officer becomes the Incident Commander and will command and direct all emergency response actions until relieved by the senior official having legal or assigned responsibility
- The Incident Commander assesses the need for additional resources.
- In conjunction with the Incident Commander, law enforcement will set up security and establishes access and traffic control.
- The TCDD Branch Director shall appoint supervisors to emergency response divisions/groups.
- The Incident Commander will instruct emergency response personnel to not move property and debris associated with the wreckage unless there is imminent danger of items being destroyed, or unless they inhibit access to passenger rescue.
- The health service officers are responsible for the identification, movement and/or removal of the dead.
- In the event a body has been moved prior to the health service officers' approval, personnel moving the body shall make careful note of the location and condition of the body.
- Ministry of Interior Disaster and Emergency Management (AFAD), Police Department, Fire brigade, TCDD, and other officials shall contact the Mayor. The TCDD will be in constant communication with the Command Post.

5.17.4 Impact Significance, Mitigation Measures and Residual Impacts

In the WBG General EHS Guidelines for Construction and Decommissioning, the above-mentioned effects and strategies for reducing these impacts can be listed as follows:

- General Site Hazards;
    - Restricting access to the site with institutional and administrative controls, in areas with high-risk structures, through fences, signs and explanations to local communities, taking into account the conditions in the site.
    - In areas where it is not possible to prevent entrance to the site, measures such as closing small gaps, keeping dangerous goods in locked warehouses and eliminating dangerous conditions,
- Disease Prevention (Community Exposure to Health Problems);
    - Prevention of disease risk by means of providing health awareness training, promoting individual protection, conducting vaccination programs to reduce the risk of infection in local communities, and providing other health services,
    - Providing treatment in the field or local health facilities, providing access to medical services for all employees,
    - To develop cooperation with local institutions in order to ensure the access of workers, their families and the society to health services,
- Traffic and Road Safety;
    - Providing periodic maintenance and safety of the vehicles used,
    - To prevent pedestrians from coming into contact with construction vehicles,
    - Cooperation with local institutions to ensure traffic signs, visibility and general safety of roads,
    - To provide coordination with emergency response teams in order to provide appropriate first aid in case of accident,

- Reducing the transportation distance by meeting the materials used with local production as much as possible,
- To prevent construction traffic from passing through settlements as much as possible,
- Preparation and implementation of Stakeholder Engagement Plan.

On the other hand, if the construction contractor decides to operate its own quarries and borrow sites, or if the use of explosives in blasting operations becomes necessary (though this is not anticipated), the following measures must be taken into consideration. First and foremost, it will be necessary to conduct an environmental impact assessment. Blasting operations must be carried out by certified experts in strict compliance with relevant laws and regulations to ensure community health and safety. Explosives must be securely transported and handled by trained personnel using specialized vehicles, with dynamite and detonators transported separately. Pre-ignition safety protocols must include resistance testing, securing electrical cables, issuing warning sirens, and restricting access to the blasting area. Blasting should not occur during adverse weather conditions to mitigate static electricity risks, and a delayed ignition system must be employed to minimize vibrations. Post-blasting inspections should identify and address residual risks, such as unstable blocks and unexploded areas, with comprehensive safety measures implemented. Workers must be provided with appropriate protective equipment, and compliance with occupational health and safety standards must be ensured. All explosive materials must be handled, transported, and disposed of in accordance with legislative requirements, with thorough documentation and oversight by the relevant authorities.

An Emergency Preparedness and Response Plan has been developed for the land preparation and construction phases of the Project to address potential emergencies that may occur during the activities carried out by the contractor and relevant subcontractors, including floods, storms, sabotage, accidents, occupational incidents, spills and leaks, machinery failures, gas leaks and explosions, and structural collapses. The plan covers first aid, evacuation procedures, and emergency contact information. In addition, during the operational phase of the project, TCDD will continue to operate the emergency procedures it is currently carrying out. The Emergency Preparedness and Response Plan prepared and to be executed will include the following elements:

- Administration (policy, purpose, distribution, definitions, etc.)
- Organization of emergency areas (command centers, medical stations, etc.)
- Roles and responsibilities
- Communication systems
- Emergency response procedures
- Emergency resources
- Training and updating
- Checklists (role and action list and equipment checklist)
- Business continuity and contingency

The Emergency Preparedness and Response Plan covers both on-site and off-site measures. Besides, the notification and communication systems to be established for workers, the Project Owner will also develop measures/systems for collaboration with the local communities and other external parties including local governmental agencies, media, etc. where necessary.

The following actions are also covered as part of the Emergency Preparedness and Response Plan to be implemented:

- Local communities will be notified 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.

- Cooperation will be provided with related authorities both for prevention of emergencies and during emergency situations, where necessary

As a result of the effective implementation of the main elements mentioned above and the mitigation measures mentioned below, the risks to the community health and safety of the project will be minimized.

As stated in the WBG EHS Guidelines for Railways, the recommended risk management activities for risks identified for railways during operation phase are as follows:

- General Railway Operation Safety;
    - Implementing railway operational safety procedures, such as a Positive Train Control (PTC) system, aimed at reducing the likelihood of train collisions,
    - If the PTC system is not considered practical, automatic rail trusses are found, in places where manual trusses are available, when the train passes from the main line to the side road in the absence of signaling, and when it returns to its normal position on the main line, reporting and transmitting this information to all employees and train officers on the train,
    - To regularly inspect and maintain railway lines and facilities in order to operate in accordance with national and international railway line safety and standards,
    - Implementing a general safety management program equivalent to internationally recognized railway safety programs,
- Transport of Dangerous Goods;
    - A suitable system must be established for the proper separation, acceptance and transportation of dangerous substances. As these materials can be provided by third parties, the separation and acceptance process must comply with international standards applicable to packaging, marking and labeling of containers, as well as certificates and notices from the shipper.
    - The use of cistern wagons and other wagons meeting the national and international standards (e.g. thermal protection and puncture strength) suitable for the cargo carried and the preventive maintenance program should be implemented.
    - Spill / Leak Prevention and Control Plan and Emergency Preparedness and Response Plan should be prepared based on the analysis of hazards, including the nature, consequence and probability of accidents. Based on the result of the hazard analysis, measures and control methods, including the following, should be applied.
        - Managing and timing dangerous goods transport to minimize risk to society (for example, restricting the transport of dangerous goods on some roads),
        - Limiting train speed in developed areas of the city,
        - Establishment of protective barriers and other technical measures in sensitive areas (e.g., water resources and settlements),
        - Transfer of emergency preparedness and response information to potentially affected communities (e.g., emergency notification systems and evacuation procedures)
        - To provide security awareness training, to prevent unauthorized access and to reduce risks during storage and transportation in order to

implement the Hazardous Material Safety Plan and ensure personnel safety.

- Level Crossing Safety
    - 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 risk of road traffic.)
    - Regular inspection / maintenance to ensure automatic doors installation and proper operation in all level crossings,
- Pedestrian Safety;
    - Putting 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,
    - Providing regular information on road safety/ traffic and awareness raising activities to local communities especially schools, neighboring villagers including women before construction,
    - 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.

The mitigation measures and the assessments regarding community health and safety are presented in detail in Table 115. Additionally, throughout the lifecycle of the project, complaints, opinions, feedbacks and suggestions from the community will be recorded via GM, which should be publicized, and guarantees should be given that complaints received will be resolved to the maximum extent possible.

Table 115. Community Health and Safety Mitigation Measures and Residual Impacts

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				
Risk on traffic and pedestrian safety due to construction traffic	Land Preparation and Construction	Local communities, Users of existing roads	Restricted	Short-term reversible or irreversible (depending on the consequence of impact, such as accident-related injuries or deaths)	Short-term	Intermittent	High	High	**Major**	▪ Implement the Traffic Management Plan, ▪ Implement the Stakeholder Engagement Plan, ▪ 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 restrictions at construction areas and access routes, by specifying restricted zones, (i.e. dangerous routes), fencing, barriers, etc., ▪ 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 areas that do 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.	**Minor**
		Communities Along the Routes Vehicles Along the Routes	Wide	Short-term reversible or irreversible (depending on the consequence of impact, such as accident-related injuries or deaths)	Short term	Intermittent	Medium	High	**Moderate**		**Minor**
Emergency Preparedness and Response	Land preparation and construction	Local Communities Project employees	Local	Short-term reversible or irreversible (depending on the consequence of impact, such as accident-related injuries or deaths)	Short-term	One-off	Negligible to High (depending on the type of incident, number of people affected)	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, ▪ Where necessary, communicate the details of the nature of the emergency, protection options, etc. through trained community liaison officer(s), ▪ The Project Company will cooperate with related authorities both for the prevention of emergencies and during emergency situations, where necessary, ▪ Communication with the media will be handled by qualified and trained personnel and/or through appropriate tools, such as press releases, when necessary.	**Minor**
	Operation	Local Communities Users of Railway and Connection	Restricted	Short-term reversible or irreversible (depending on the consequence of impact, such as accident-related injuries or deaths)	Medium-term	One-off/rare	High	High	**Major**	▪ Implementing a site-specific Emergency Preparedness and Response Plan, ▪ Controlling the project route for unauthorized people, ▪ Cooperation with related authorities (for emergency prevention and during emergencies), ▪ Emergency response begins as soon as a rail emergency is identified or reported. When it is notified of a rail emergency, they will immediately make notifications per TCDD protocols. If a railway emergency occurs: ▪ The first responder on scene makes a preliminary assessment and notifies relevant authorities (Fire Department, police etc.) with all information available. ▪ The first arriving Fire Officer becomes the Incident Commander and will command and direct all emergency response actions until relieved by the senior official having legal or assigned responsibility.	**Minor**

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Reversibility	Duration	Frequency	Overall Magnitude				
										▪ The Incident Commander assesses the need for additional resources. ▪ Together with the Incident Commander, law enforcement will set up security and establish access and traffic control. ▪ The TCDD Branch Director shall appoint supervisors to emergency response Divisions/Groups. ▪ The Incident Commander will instruct emergency response personnel not to move property and debris associated with the wreckage unless there is imminent danger of items being destroyed, or unless they inhibit access to passenger rescue. ▪ The health service officers are responsible for the identification, movement and/or removal of the dead bodies. ▪ In the event a body has been moved prior to the health service officers' approval, personnel moving the body shall make careful note of the location and condition of the body. ▪ The Ministry of Interior Disaster and Emergency Management (AFAD), Police Department, Fire brigade, TCDD, and other officials shall contact the Mayor. The TCDD will be in constant communication with the Command Post.	
Security Personnel	Land preparation and construction	Local Communities	Local	Short-term reversible	Short-term	Intermittent	Low	Medium	**Minor**	▪ Ensure that the security personnel to be employed are screened that they have not been involved in past abuses. Train the security personnel in terms of applicable law, code of conduct, gender-based harassment and violence, cultural sensitivities of the region, stakeholder engagement procedure in accordance with the ESS4. ▪ 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. ▪ In accordance with the ESS4, Security Personnel will be trained adequately (or determine that they are properly trained) in the use of force (and where applicable, firearms) and appropriate conduct toward workers and affected communities; and (iii) require them to act within the applicable law and any requirements. ▪ Provide training 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 training. The training will ensure force is used only for preventive and defensive purposes and in proportion to the threat. ▪ Employment of armed security necessitates additional training provisions. ▪ 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. ▪ Ensure all measures are included in contractual agreements. ▪ When security personnel is used, the Borrower will be guided by the principles of proportionality and Good International Industry Practice, and by applicable law (in accordance with the Law No. 5188 on Private Security Services, Regulation on the Implementation of the Law on Private Security Services, ESS2 and relevant ILO conventions), in relation to hiring, rules of conduct, training, equipping, and monitoring of such security workers.	**Negligible**
Community exposure to health problems	Land preparation and construction	Local Communities Project employees	Wide	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident-related injuries or deaths)	Short-term	Intermittent	Medium	Medium	**Moderate**	▪ Ensure compliance with Workers' accommodation: processes and standards for accommodation; including clean and safe areas that ensure the minimum space requirements, air-conditioning and ventilation that is appropriate for the existing climatic conditions to avoid spread of disease among the Project workforce, ▪ Provide training on healthcare and general hygiene cleanliness to all personnel, ▪ Conduct periodic medical checks for personnel, provide vaccination and/or develop other mitigating measures when required, ▪ Develop and implement appropriate waste and wastewater management plans, ▪ Implement health related awareness raising activities covering local communities. ▪ Implement dust suppression measures such as regular water spraying on roads, material stockpiles and excavation areas to minimize dust dispersion affecting nearby communities. ▪ Ensure proper covering and management of transported materials (e.g. trucks with tarpaulins) to avoid dust emissions and material spillover on local roads. ▪ Establish noise and vibration control measures (e.g. using low-noise equipment, maintaining machinery, installing temporary barriers where necessary) to reduce exposure of nearby communities.	**Minor**

Impact Description	Project Phase	Receptor	Impact Magnitude					Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Reversibility	Duration	Frequency	Overall Magnitude				
										▪ Plan and schedule construction activities to minimize night-time works and avoid unnecessary disturbance to sensitive receptors such as residences, schools, and hospitals. ▪ Implement traffic management plan to ensure safe circulation, reduce congestion, and minimize accident risks for local communities.	
General railway operation safety	Operation	Local Communities	Restricted	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident-related injuries or deaths)	Medium-term	Intermittent	High	High	**Major**	▪ Implementing railway operational safety procedures, such as a Positive Train Control (PTC) system, aimed at reducing the likelihood of train collisions, ▪ If the PTC system is not considered practical, automatic rail trusses are found, in places where manual trusses are available, when the train passes from the main line to the side road in the absence of signaling, and when it returns to its normal position on the main line, reporting and transmitting this information to all employees and train officers on the train, ▪ To regularly inspect and maintain railway lines and facilities in order to operate in accordance with national and international railway line safety and standards, ▪ Implementing a general safety management program equivalent to internationally recognized railway safety programs.	**Minor**
Level crossings safety	Operation	Local Communities	Restricted	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident-related injuries or deaths)	Medium-term	Intermittent	High	High	**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 risk of road traffic), ▪ Regular inspection / maintenance to ensure automatic doors installation and proper operation in all level crossings.	**Minor**
Pedestrian safety	Operation	Local Communities	Restricted	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident-related injuries or deaths)	Medium-term	Intermittent	High	High	**Major**	▪ Putting clear and visible 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 training about not entering the area without permission, especially for local youth, ▪ Providing regular information on road safety/ traffic and awareness raising activities to local communities especially schools, neighboring villagers including women before construction, ▪ 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**

6 CUMULATIVE IMPACT ASSESSMENT

The previous chapters of this ESIA have provided assessments of the Project's potential impacts. As a major infrastructure initiative located in a region where other infrastructure projects are operational, under construction, or in the planning stages, this Chapter places particular emphasis on evaluating the potential cumulative environmental and social impacts of the Project. These impacts have been assessed in relation to Valued Environmental and Social Components (VESCs), considering both existing and future developments.

6.1 Methodology and Project Standards

The Cumulative Environmental and Social Impact Assessment study to be conducted for the Project will follow 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 Effects 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 Effects Assessment Practitioners Guide prepared by the Cumulative Effects Assessment Working Group (Hegmann, G. C. Cockling, R. Creasey, S. Dupuis, Kennedy, L. Kingsley, W. Rodd, H. Spaling and D. Stalker; February and AXYS Environmental Consulting Ltd. for the Canadian Environmental Assessment Agency (1999).
- 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 environmental and social impacts from existing developments, combined with the potential incremental impacts resulting from proposed and/or anticipated future developments, may result in significant cumulative impacts that would not be expected in the case of a stand-alone development (IFC, August 2013) (Figure 91).

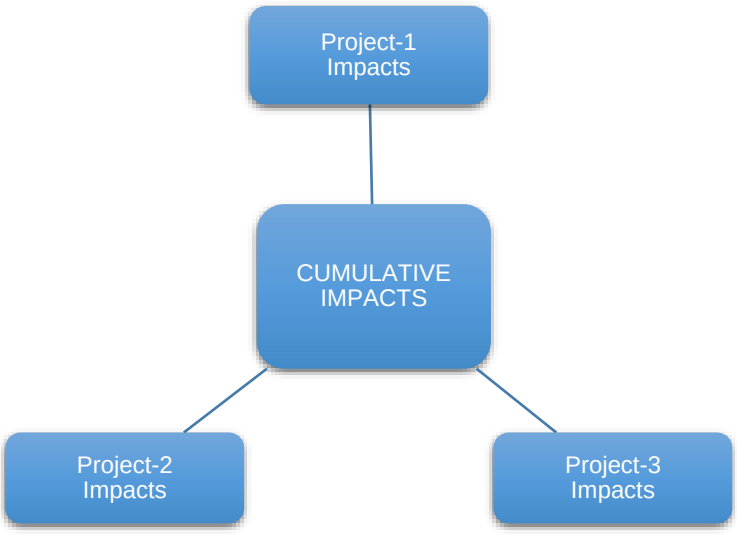


Figure 91. Illustration of Cumulative Impacts

The need for Cumulative Impact Assessment (CIA) emerges in circumstances where a series of developments, which may or may not be of the same type, is occurring, or being planned within an area where they would impact the same VESCs, which are defined as the environmental and social attributes that are considered to be important in assessing risks. The CIA process to be implemented in case of such circumstances is defined by IFC (August 2013) as:

(i) analyzing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social drivers on the chosen 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 Filyos Project ESIA studies, is illustrated below.

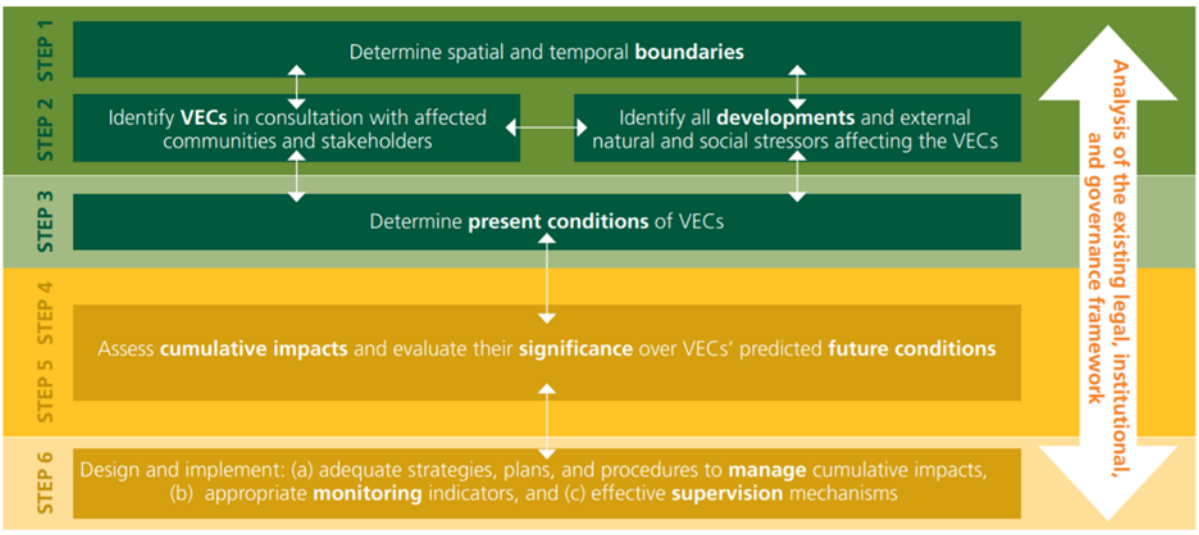


Figure 92. Six-Step CIA Approach

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

6.2 Cumulative Impact Assessment

This chapter has been developed considering the studies and assessments carried out during Phase-1 and Phase-2.

6.2.1 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 environmental and social 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 AoI. Details of the Step 1 assessments are provided in the following sections.

6.2.1.1 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 Valued Environmental and Social Components (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 Filyos 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 Filyos 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 Filyos Project, valued environmental and social components to be considered in the CIA have been selected as presented in Table 116.

Table 116. Selected VESCs for the Project within the CIA Study

Environmental/ Social Subject	VESCs	Specified VESCs
Biodiversity and Natural Resources	Critical Habitat	B1.2 : Sand beaches above the driftline
	Natural Habitats	C1.2: Permanent mesotrophic lakes, ponds and poolsC2.2: Constantly flowing streams and rivers C2.5: Temporary running waters D5.1: Sedge beds with free water on the surface G1.A: Meso- and eutrophic mixed deciduous forests

Environmental/ Social Subject	VESCs	Specified VESCs
	Flora and Fauna Species with High Conservation Priority	Endemic and / or Red List category CR, EN, VU, NT Flora Endemic and / or Red List category CR, EN, VU, NT Fauna
Land Use	Agricultural Areas	Arable lands
Air emissions and Noise	Air quality and noise levels in settlements along the Project Route	Baseline measurement points: • Gökçeler • Sefercik • Sazköy • Derecikören
Cultural Heritage	Registered Protected Areas	Sazköy 3rd Degree Archaeological Sites Öteyüz Mahallesi 1st and 3rd Degree Archaeological Sites Ancient City of Tios and Tios Necropolis Area
Socio economic environment	Agriculture and livestock	This Project has the potential to expand previous negative impact.
	Land acquisition	The impact of land acquisition on livelihoods may cause as a decline in agricultural and livestock incomes.
	Livelihood restoration	The reduction in the size of agricultural and garden lands will affect the income generated from these lands.

6.2.1.2 Spatial and Temporal Boundaries

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 Filyos Port, Filyos Industrial Zone and Sakarya Gas Field Development Project Area were evaluated (see Figure 93).

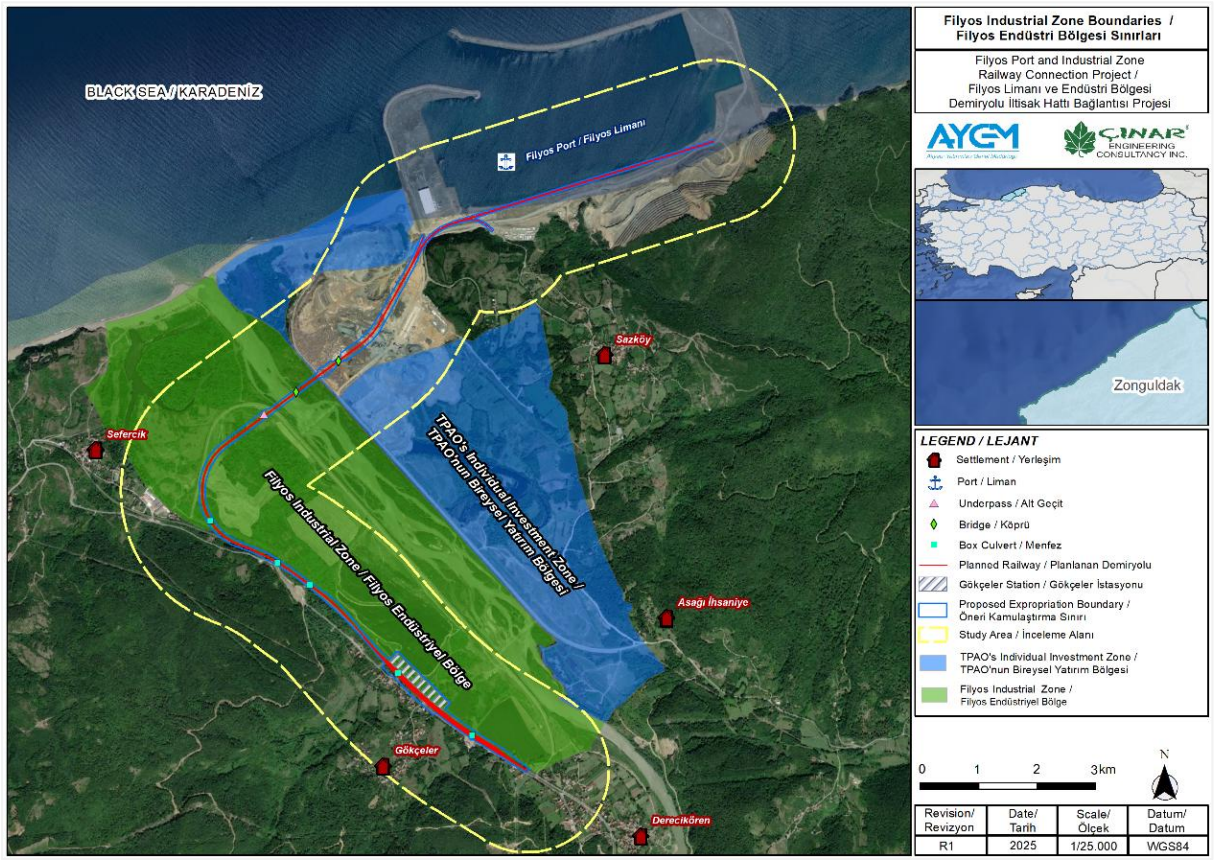


Figure 93. Other Projects in Filyos Sub-Project Area

6.2.2 Step 2: Scoping Phase II- Other Activities and 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).

The majority of 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 use of Filyos Port will contribute to further land developments around the project area. Increased access 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.

In addition, the activities in the scope of Filyos Industrial Zone will be accelerated by the completion of the railway and port projects. This will have an impact on agricultural lands. As mentioned before, agricultural activities in Sazköy and Aşağıihsaniye are generally performed for household consumption. Commercial agriculture is not common. In addition, there is no comprehensive irrigation system / union on agricultural production in the area.

In order to prevent floods that may occur in the region especially on the Filyos Creek, rehabilitation works carried out in 2022-2024. Flood events along the project route are minimized.

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.

6.2.3 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.

6.2.4 Step 4: Assess Cumulative Impacts on VESCs

Assessment of potential cumulative impacts of the Filyos Sub-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 each VESC has been assessed considering the possible impacts of the past, present or planned activities for Filyos Sub-project and other projects in the CIA study area.

In this regard, potential impacts on each VESC have been classified as negligible, low, medium or high depending on the criteria described in Table 117.

Table 117. Criteria for Magnitude of Cumulative Impact Potential

Magnitude of Cumulative Impact Potential	Criteria
Negligible	The VEC is affected only by the Project
Low	The VEC is affected by this Project and 1 other project
Medium	The VEC is affected by this Project and 2 other projects
High	The VEC is affected by this Project and 3 or more projects

The cumulative impacts of VESCs are evaluated in Table 118. It should be noted that the nationally protected areas are not included in the evaluation, as they are not in the boundaries of the CIA study area.

Table 118. Cumulative Impacts on VESCs

Environmental and Social Factor	VESCs	Specified VESCs	Filyos Sub-Project	Filyos Port	Filyos Industrial Zone	Sakarya Gas Field Development Project	CUMULATIVE IMPACT
Biodiversity and Natural Resources	Critical Habitat	B1.2 : Sand beaches above the driftline	**Negligible**	**High**	**High**	**High**	**High**
	Natural Habitats	C1.2: Permanent mesotrophic lakes, ponds and pools C2.2: Constantly flowing streams and rivers C2.5: Temporary running waters G1.1: Riparian forests on the river bank D5.1: Sedge beds with free water on the surface G1.A: Meso- and eutrophic mixed deciduous forests	**Low**	**High**	**High**	**High**	**High**
	Flora and Fauna Species with High Conservation Priority	Endemic and / or Red List category CR, EN, VU, NT Flora Endemic and / or Red List category CR, EN, VU, NT Fauna	**Low**	**High**	**High**	**High**	**High**
Land Use	Agricultural Areas	Arable lands	**Low**	**Low**	**High**	**High**	**High**
Air emissions and noise	Air quality and noise levels in settlements along the Project Route	Gökçeler	**High**	**Low**	**High**	**Low**	**Medium**
		Sefercik	**Medium**	**Low**	**High**	**Low**	**Medium**
		Sazköy	**Low**	**Medium**	**Low**	**High**	**Medium**
		Derecikören	**Medium**	**Low**	**High**	**Low**	**Medium**
Cultural Heritage	Registered Protected Areas	Sazköy 3rd Degree Archaeological Sites	**Low**	**Medium**	**Negligible**	**Medium**	**Medium**
		Öteyüz Neighborhood 1st and 3rd Degree Archaeological Sites	**Low**	**Negligible**	**Low**	**Negligible**	**Low**
		Ancient City of Tios and Tios Necropolis Area	**Low**	**Negligible**	**Low**	**Negligible**	**Low**
Socio economic environment	Agriculture and livestock	This Project has the potential to expand previous negative impact.	**Medium**	**Medium**	**Medium**	**Medium**	**High**
	Land acquisition	The impact of land acquisition on livelihoods may apparent as a decline in agricultural and livestock incomes.	**Medium**	**Medium**	**Medium**	**Medium**	**High**
	Livelihood restoration	The reduction in the size of agricultural and garden lands will affect the income generated from these lands.	**Medium**	**Medium**	**Medium**	**Medium**	**High**

6.2.5 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.[111]

Table 119. Criteria for the Determination of Significance of Cumulative Impacts

Significance	Impact
Severe	Impacts that the decision-maker must take into account 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 as follows;

VESCs	Significance	Description
Biodiversity and Natural Resources	Minor	Nearly half of the Biodiversity AoI defined for the Project, which is about 1,000 hectares, is composed of natural habitats. Possible effects on natural habitats, although they originate from many projects, correspond to a limited part of the total area.
Land Use	Moderate	A significant portion of the agricultural land has already been expropriated due to previous projects; however, agricultural activities in the region are primarily carried out for household consumption.
Air emissions and noise	Moderate	Within the scope of existing and planned projects, the activities associated with these projects may have direct effects, such as decreased air quality and increased noise, as well as indirect effects resulting from traffic congestion.
Cultural Heritage	Minor	Access to the cultural assets is not restricted as part of the projects.
Socio-economic environment	Moderate	Implementation of livelihood restoration measures will reduce the impact level on income related to agricultural and husbandry activities.

It is important to highlight that cumulative impacts typically result from the actions of multiple stakeholders, and the responsibility for managing these potential impacts is shared and varied.

Project level mitigation measures are defined in Chapter 5 of this ESIA Report. Where project specific mitigation measures are not sufficient and prevention of an unacceptable cumulative impact 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:

[111] UK Highways Directorate 205/08: Design Booklet for Bridges and Roads; http://www.standardsforhighways. co.uk /ha/standards/dmrb/

- 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 in the responsibility of DGII. DGII 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 Filyos Port, Filyos Industrial Zone and Sakarya Gas Field Development Project (in this case, Ministry of Industry and Technology, Management of Industrial Zone and TP-OTC) will be informed by DGII periodically and WB will be informed about the interactions between these authorities.

7 PROJECT ALTERNATIVES

7.1 Route Selection and Optimization

A proceeding from the Conference on Railway Engineering (Melbourne 30th April – 3rd May 2006) titled “Route Selection Criteria for a New Railway” emphasizes that the railway alignment should have the maximum of straight track, minimum gradients and the largest circular curve radii possible, giving due consideration to the traffic, individual vehicle characteristics and operational requirements, providing for the most economical operation and the least amount of maintenance. The publication further indicates that alignment design is an iterative process rather than a straightforward application of basic criteria and must involve an intuitive understanding of the trains (Beale, 2006).

The proceeding also underlines that future modifications to the alignment are extremely difficult, so it is essential that all aspects have been considered before construction is commenced. The difficulty and cost of construction can be affected by the topography and geology along the route. The presence of existing man-made structures may affect the alignment of the route and the construction techniques employed. Specific factors that may affect constructability are:

- Extensive construction through rock, water crossings or any other crossing that requires bridging, narrow rights-of-way and steep slopes;
- The presence of overhead power cables and pylons, buried services such as gas, water, sewerage, power and telecommunications;
- The ability to stage works in a practical, safe, functional and economic way (Beale, 2006).

The conference proceeding further points out that the infrastructure design is closely linked to operational requirements, for example speeds through turnouts at junctions, the provision of emergency crossovers and reversible signaling on double track railways and the provision of passing loops on single track railways. In addition to the ability of the route to cater for the predicted demand, operations criteria should ensure future flexibility to accommodate further upgrading or provide for a change in the service pattern (Beale, 2006).

Furthermore, the traction system will be a significant input to route selection. Route selection will impact on power and braking requirements for the trains and consequently fuel consumption. Journey times, which is also an essential criterion in route planning will be affected by the following:

- Length of route;
- Line speed (affected by gradients, curvature, signaling, connections to existing network and conflict with other rail traffic);
- Number of stations stops (Beale, 2006).

In conclusion, the route selection criteria for a new railway should be developed to achieve the following objectives:

- Safety, reliability and comfort;
- Best practice engineering standards, principles and criteria;
- Compatibility and integration with existing land use and planned development;
- Promote sustainable development;
- Maximum ridership/revenue potential;
- Maximum connectivity and accessibility;
- Minimum journey time;
- Minimum capital, operating and maintenance costs;
- Minimum maintenance requirements;
- Minimum environmental impact;

- Minimum impacts on social, cultural and economic resources (Beale, 2006).

Within the scope of the Project, the following criteria have been taken into consideration in determining the project route:

- Geological formation and soil structure,
- Impacts on biodiversity
- Location of the settlements,
- Land use types,
- Land acquisition requirements,
- Location of the water structures (dam, pond),
- Cut and fill balance,
- Locations of the existing and planned highways,
- Wind erosion,
- Agricultural and irrigation fields,
- Maintenance and operational difficulties,
- Environmental and social impacts,
- Construction costs,
- Location of Filyos Port,
- Area that Filyos Industrial Zone is planned,
- Adjacent archaeological sites,
- The opinions and requirements of TPAO, which operates the individual investment area and Filyos Port,
- Location of existing railway.

The proposed route was determined by considering all of the aforementioned criteria, along with other technical limitations and requirements related to the nature of the railway structures. In line with the Appraisal Environmental and Social Review Summary (2020) and the Environmental and Social Commitment Plan (2020), the railway route design for Phase 1 has been revised (see Figure 1 and Figure 2), with particular attention given to areas of high biological and ecological value, identified cultural heritage sites, and the physical and economic displacement of affected communities. The environmental and social impacts are outlined in Chapter 5 of this ESIA.

In the cultural heritage impact assessment studies conducted during Phase-1 of the Filyos Port and Industrial Zone Railway Connection Project, it was realized that two (2) registered archaeological sites were located within the railway project expropriation border and impact corridor (These sites are Sazköy 3rd Degree Archaeological Site, and Öteyüz 1st and 3rd Degree Archaeological Sites). Since the railway route has been revised in Phase-2, these areas are excluded and outside of the project expropriation boundary. The railway route was revised to avoid overlapping with the archaeological sites outlined in ESCP, and the new route was designed in a manner that would not have an impact on Sazköy 3rd Degree Archaeological Site and Öteyüz 1st and 3rd Degree Archaeological Sites.

Based on the Critical Habitat Assessment that was conducted in Phase 1, the Critical Habitat supporting these species were identified and the location of the identified critical habitat and locations of Centaurea kilaea and Pancratium maritimum populations are shown in Figure 80. As seen from the figure, due to the change of railway route, the habitat of these species are not within the AoI and Phase 2 Biodiversity AoI. Therefore, there will be no Project-related impacts on this habitat and species populations it supports.

7.2 Optimization of Engineering Structures

Necessary bridges and box culverts were placed by the project designer along the railway route considering project standards, hydraulic conditions, ground condition, etc.

7.3 Technology Selection

In general, considering the infrastructure and maintenance costs of the vehicles utilizing this infrastructure, conventional railway lines for speeds up to 160 km/h and high-speed railway lines for speeds up to 250 km/h are regarded as the most economical systems. Within the scope of the Project, a design speed of 50 kilometers per hour has been selected, taking into account both its suitability for freight transportation and the topographical conditions of the region.

The signaling system to be installed as part of the project will be designed to operate safely and effectively on this line.

In terms of the traction system, Filyos railways will be electrified. As indicated in the International Energy Agency's Report on "The Future of Rail: Opportunities for Energy and the Environment" (2019), electric trains are significantly more efficient than diesel-electric, especially in situations where rapid acceleration and frequent starting and stopping are necessary. Electric trains are less energy intensive than diesel trains because electric motors have much higher thermodynamic efficiencies than internal combustion engines. Electric motors are also much better placed to enable regenerative breaking, minimizing inertial losses (especially relevant in the case of frequent stops). As a result, countries with large shares of trains running on electricity tend to have lower energy demand per train-kilometer for similar sized trains. The carbon intensity of diesel traction does not vary significantly across regions. On the other hand, the carbon intensity of electricity depends on the fuel used to generate power. Electric trains can effectively reduce emissions, compared with diesel-powered trains, but only if the power generation mix is not largely dependent on primary fuels with high carbon content, such as coal. Electric trains are significantly less carbon intensive than diesel trains if they draw power from primary energy sources with low-carbon content (International Energy Agency (IEA), 2019).

7.4 Construction Camp Sites

The camp sites previously utilized in nearby construction areas by other entities are planned to be used during the construction phase. Nevertheless, the footprints of the camp sites are yet to be identified. The information related with relevant baseline and impacts about the camp sites will be available after the contracting company is assigned. Additional studies for baseline data collection and environmental and social impact assessment for camp sites will be performed by DGII and the Contractor in line with World Bank Environmental and Social Framework requirements.

The environmental and social impacts, along with the respective mitigation measures, will be analyzed and determined in a supplementary site-specific ESMP prepared by the assigned contractor.

7.5 Quarries and Material Borrow Sites

When quarries and borrow sites are identified, additional environmental and social assessments will be conducted by the DGII (and Design and Supervision Consultant) prior to the construction phase, using the impact assessment approach given in this ESIA report, and in a manner acceptable to the World Bank. Contractor will be required to design, open and manage quarry sites in line with WB ESSs, WBG EHS Guidelines and Good International Industrial practices (GIIP) in addition to national requirements.

The environmental and social impacts of the areas will be assessed according to the Management of the Change Process detailed in the ESMP. The environmental and social

impacts, along with the respective mitigation measures, will be analyzed and determined in a supplementary site-specific ESMP prepared by the assigned contractor.

7.6 Access Roads

Access roads to be used during the land preparation and construction phases of the project have not yet been determined. As outlined in the World Bank's Concept Appraisal Environmental and Social Review Summary (2020) for the Rail Logistics Improvement Project (Improving Rail Connectivity Project) in Türkiye, the utilities of existing construction sites in the region, including the Filyos Industrial Zone, Individual Investment Zone, and Filyos Port, are planned to be used to the extent possible.

If new access roads are deemed necessary based on the results of additional studies to be conducted during the final design stage by the assigned contractor, the environmental and social impacts of these roads will be identified and assessed through the Management of Change Process, as detailed in the ESMP. This will be in accordance with the World Bank Environmental and Social Framework requirements. The environmental and social impacts, along with the respective mitigation measures, will be analyzed and determined in a supplementary site-specific ESMP prepared by the assigned contractor.

7.7 No Project Alternative

In the "no Project" scenario, it is assumed that trucks will transport freight from the port using the existing Zonguldak-Çaycuma highway. Factors such as distance, travel times on highways, fuel consumption, truck fleet requirements, driver costs, and truck operation and maintenance expenses were evaluated. Considering these costs, the implementation of the project is expected to yield the following benefits:

- Operating income for TCDD Taşımacılık A.Ş., which will serve as the operating institution for railway transportation.
- A comparison of annual operation and maintenance expenses, highlighting savings from rail-based freight transport versus truck-based transport.
- The monetary value of time saved by employees working in railway transportation compared to those involved in truck transportation.

In order to increase the share of freight transportation by rail, it is imperative to promptly address bottlenecks on main railway lines, upgrade single-track railways to double-track systems based on traffic density, and complete investments in signaling and electrification infrastructure. These measures will not only enhance the speed and capacity of rail freight transportation but also facilitate the development of efficient logistics centers, industrial zones, and connection lines to organized industrial zones along the railway corridors. Given these requirements, the construction of the railway is both necessary and unavoidable. This project not only supports regional economic development but also plays a critical role in the expansion and strengthening of national logistics networks. The route design prioritizes the preservation of the natural environment and the creation of infrastructure that harmonizes with the region. Additionally, by integrating with existing railway networks, the project aims to optimize transportation capacities in the area.

Taking environmental and social mitigation measures, the management practices proposed in this report, the environmental and social management plan set aims at the correct and sustainable management of the project during the construction and operation phases. Therefore, considering the potential negative effects, minimizing potential adverse effects, establishing relevant operational and management measures, and the numerous beneficial effects of the project, it was determined that the no-project scenario is not feasible.

8 STAKEHOLDER ENGAGEMENT

The Stakeholder Engagement Plan (SEP) document has been prepared for the management of communication and interaction processes that need to be established during the crediting period among institutions, organizations, and other stakeholders that may be directly and/or indirectly affected by the Project, which is conducted by the Project Owner in collaboration with ÇINAR. Additionally, SEP aims to contribute to minimizing the adverse social impacts of the Project and enhancing its positive effects through the inclusive engagement with stakeholders.

Project specific SEP will be submitted as a separate document including GM.

A summary of the activities carried out in relation to the ESIA has also been provided within ESIA.

Details of the interviews conducted using the sampling and research techniques mentioned in the relevant are provided in Appendix-11. Please see also Appendix-10 to examine the Project's stakeholders. Photographs taken during the interviews are given via Appendix-12, too.

8.1 Stakeholder Consultation Meeting for Information Disclosure

As part of the Project, a broadly attended stakeholder engagement/consultation meeting was held on 15 January 2026 in Filyos town, Zonguldak Province. Prior to the meeting, stakeholder institutions and Mukhtars were officially invited through formal invitation letters. A few days before the meeting, all stakeholder institutions and Mukhtars were also contacted by phone and re-invited to the meeting.

Public announcements regarding the meeting were posted at various locations, including the Derecikören Village Mukhtar's Office, Gökçeler Village Mukhtar's Office, Gökçeler railway station, Gökçeler bus stop, and meeting hall in Filyos town.

The Project information leaflet prepared for the Project was distributed during the meeting. A presentation was delivered with the participation of the Consultant and social specialists from AYGM. During the presentation, technical information about the Project, its environmental and social impacts and the mitigation measures to be implemented, the prepared ESIA documents, and the operation of the grievance mechanism were summarized. Following the presentation, a question-and-answer session was conducted.

The meeting lasted for more than one hour and was attended by 52 (11 females and 41 males) participants. During the meeting, all participants were requested to sign the attendance sheet; however, some participants did not sign the document due to their status as public officials.

Information about the meetings is provided in Table 120.

Table 120. Information about the Stakeholder Participation Meeting

Province	District	Town	Meeting Place	Address	Date	Time	Number of Participants
Zonguldak	Çaycuma	Filyos	Filyos Municipality Multi-Purpose Hall	Hisarönü Mahallesi Namık Kemal 2 Sokak No:4 Çaycuma / ZONGULDAK	15.01.2026	14:00/ 15:15	52 (11 females and 41 males)

At the beginning of the meeting, the concerns raised by an elderly female participant regarding the construction-related impacts shaped the main agenda of the meeting. In addition, the Project duration, alignment, and employment capacity were frequently discussed. Questions related to land acquisition also constituted a significant part of the meeting. The local community also stated that the impacts of other projects in the area are still ongoing.

In summary, the Project is generally accepted by the local community, provided that due attention is paid to its environmental impacts, that it contributes to local employment, and that social investment opportunities are created in the region.

The project introduction and all environmental and social documents prepared as part of the project will be available on AYGM's website.

Detailed information about stakeholder participation meetings, the issues raised during these meetings, and stakeholders' opinions and suggestions are provided in the SEP[112] document.

[112] Stakeholder Engagement Plan (SEP), available at: https://aygm.uab.gov.tr/dunya-bankasi-turkiye-de-demiryolu-lojistigini-gelistirme-projesi

8.2 Grievance Mechanism

The Grievance Mechanism (GM) is an important tool of SEP and serves the purpose of addressing environmental and social impact-related complaints, opinions, suggestions, feedback, and questions by covering internal and external stakeholders under separate headings.

Project specific SEP will be submitted as a separate document including GM.

The contact information for the project, which is an important step in GM, is also provided here. Details are again included in the SEP document.

Various official channels are available for stakeholders to voice their complaints;

DGII

- Phone Line: 03122031000/3059
  E-Mail: İbrahim Görkem Gökmen: igorkem.gokmen@uab.gov.tr Hazal Babur: hazal.babur@uab.gov.tr
- Grievance Registration Form: PAPs have the opportunity to complete grievance registration forms available at the construction site and other accessible public locations such as village coffehouse.

Republic of Türkiye Ministry of Transport and Infrastructure

UAB ALO123 Request Management System[113]

  - Request page[114]
  - Whatsapp line[115]
  - Video call[116]
-

In addition to the GM, the WGM will also be implemented. DGII PIU / Contractors have the goal of establishing procedures and responsibilities for handling and overseeing employee grievances, including those from subcontractors. They are committed to achieving the following objectives:

- Creating a mechanism for all employees, including subcontractor personnel, to voice their concerns and complaints about working conditions.
- Preventing the recurrence of grievances related to the same issues.
- Providing open and transparent relationships with workers to address concerns at an early stage of any conflicts.

[113] https://www.123.gov.tr/

[114] https://www.123.gov.tr/talep-olustur

[115] https://api.whatsapp.com/send/?phone=905011230123&text&type=phone_number&app_absent=0

[116] https://www.123.gov.tr/goruntulu-gorusme

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