AYGM
Altyapı Yatırımları Genel Müdürlüğü

ÇINAR®
ENGINEERING
CONSULTANCY INC.

FILYOS PORT/INDUSTRIAL ZONE CONNECTIONS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Prepared According to the World Bank Environmental and Social Standards

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ABBREVIATIONS AND ACRONYMS

RAP	Land Acquisition and Resettlement Action Plan
GDII	General Directorate of Infrastructure Investments
DCoM	Decision of Council of Ministers
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESS	Environmental and Social Standards
ESCP	Environmental and Social Commitment Plan
ESMP	Environmental and Social Management Plan
ETP	Employment and Training Plan
Km	Kilometer
KP	Kilometer Point
SEP	Stakeholder Engagement Plan
MoEU	Ministry of Environment and Urbanization

LIST OF ANNEXES

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EXECUTIVE SUMMARY

The proposed Railway and Logistic Improvement Project (RLIP) aimed at constructing new railway lines to contribute overall economy and industrial development in the Filyos region. The railway line under the proposed project, which is planned to be built as part of the overall regional economic development program , consists of four main components. These components will be Gökçeler – Sanayi Line, Dock Connection, Ferry Line, Port Link. Gökçeler – Sanayi Line will be the longest line to be constructed within the scope of the project. Dock, Ferry and Port Line will provide connection to Filyos Port, where construction activities are continuing. Two alternatives are evaluated for the Port Connection and the alternative land preparation and construction activities to be selected will be decided by GDII before it starts. In this report, both alternatives were evaluated from the environmental and social point of view.

- Gökçeler – Industry Line: 6.40 km
- Dock Connection: 1.10 km
- Ferry Link: 1.80 km
- Port Connection (Alternative Conection-1): 2.60 km
- Port Connection (Alternative Connection-2): 2.70 km
- Total: 11.90 km (Alternative-1 as Port Connection is Considered)

There are several national laws related to environment and social risk management and World Bank ESSs are considered in preparing this ESIA. Turkish Environmental Law, No. 2872, published in the Official Gazette No. 18132, dated August 11, sets the main requirements need to protect the environment in line with sustainable environment and sustainable development goals. The Environmental Law provides a legal framework for the development of environmental regulations in accordance with national and international standards. Within the scope of this framework Environmental Impact Assessment studies are carried out in Turkey within the scope of the Environmental Impact Assessment Regulation, which was published in the Official Gazette dated 25.11.2014 No. 29186. The project was evaluated according to the EIA Regulation by Ministry of Environment and Urbanization, General Directorate of Environmental Impact Assessment, Permit and Inspection and it was assessed that the project is exempt from EIA Regulation process.

The World Bank's Environmental and Social Framework has been applied to all investment project financing since October 2018. The World Bank has determined the Environmental and Social Standards (ESS) for managing environmental and social risks of the projects as:

- ESS1 Assessment and Management of Environmental and Social Risks and Impacts
- ESS2 Labor and Working Condition
- ESS3 Resource Efficiency and Pollution Prevention and Management
- ESS4: Community Health and Safety
- ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities
- ESS8: Cultural Heritage
- ESS9: Financial Intermediaries
- ESS10: Stakeholder Engagement and Information Disclosure

In January and February 2020, CINAR conducted a site reconnaissance along the entire Project route and study area with participation of the environmental and social experts.

In the Environmental and Social Impact Assessment (ESIA) studies, project alternatives were examined and the most appropriate and environmentally friendly alternative was selected. The alternatives for the project area and the route are limited, alternatives such as no-project alternative and optimization of the engineering structures were evaluated. The most important criteria in the selection of the possible route and structures alternative was to "avoid" all environmental and social impacts.

During the identification of the route alternative for the Project geological formation and soil structure, location of the human settlements, land use types, location of the water structures (dam, pond), cut and fill balance, wind erosion, agricultural and irrigation fields, maintenance and operational difficulties, environmental impacts, construction costs, location of Filyos port, area that Filyos industrial zone is planned, and location of existing railway were considered.

The proposed route was determined considering all above mentioned criteria together with other technical limitations and requirements regarding the nature of the railway structures. Therefore, no feasible route alternative could be determined during the feasibility studies and the environmental and social impacts related with the only route alternative (the proposed route) are assessed in this ESIA.

The route selection criteria for the project was done to achieve the following goals:

- 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
- Minimum impact to human settlements, economic activities, including people's livelihood

As one of the outcomes of the ESIA studies, Environmental and Social Management Plan (ESMP) is based on performance improvement and mitigation measures and actions that address identified environmental and social issues, impacts and opportunities. The main objective of the ESMP is to document the important environmental problems, the steps to be followed to adequately address them, as well as the identification of the persons / unit and program responsible for implementation and monitoring and the associated costs.

GDII will establish and manage an information system in compliance with World Bank policies and will request this from the possible contractors. In addition, GDII and the contractor firm will gather public opinions through an effective and active grievance mechanism and stakeholder engagement.

Filyos Town, Derecikören Village, Gökçeler Village and Sazköy Village of Zonguldak Province were visited during the site reconnaissance. The Project will have a construction area of approximately 52.86 hectares. According to the land asset data of the Ministry of Agriculture and Forestry, there are fallow-free dry agricultural areas, residential areas, forest areas and river floodplains on the railway route and the construction site.

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

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

The overall magnitude of the impacts were evaluated by considering:

- Geographical extent (wide, local or restricted)
- Magnitude (high, medium or low; e.g. how much area, how many trees, level of emission or noise, etc.)
- 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)

The potential impacts of the Project on the existing land use characteristics, soils and geology will occur mainly during the land preparation and construction phases, due to the earthworks and construction activities that will be conducted. The operation phase of the Project will not cause any direct impacts on soils. Yet, the operation phase mitigation measures will be in place to minimize the risk of erosion and contamination.

Potential noise sources during the construction phase of the Project can be listed as the construction activities to be carried out on railway routes, road and material supply activities from quarries. During the operation phase of the project, the noise that will result from the movement of the freight trains will be the main source of noise. The noise modeling studies were carried out for both the construction and operation periods. During the land preparation and construction phases of the Project, the significance of the impact resulting from 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 increase in noise levels is assessed to be major and after the proposed mitigation measures, the residual impact significance is expected to be moderate.

Possible impacts on air quality within the scope of the project are especially the dust emissions during the construction of the railway lines and road that would result from the excavation and cut and fill works, material storage, unloading and transportation processes to be carried out during the construction works of the project. In order to minimize the impacts on ambient air quality during the land preparation and construction phases of the project; measures such as watering 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. Air pollutants distribution modeling has been performed considering possible dust emissions from the land preparation and construction phase. Since the electrical system will be used on the railway during the operational phase of the project, greenhouse gas emissions and possible impacts on air quality are considered negligible. In order to minimize the dust and 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. In addition, GHG emissions will be quantified annually during the construction phase in accordance with the internationally recognized methodologies. During the land preparation and 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.

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. The measures to prevent, minimize, or control wastewater effluents generated in the rail car maintenance areas have been provided as part of this Report.

During the land preparation and construction phases as well as the operation phase, the significance of the impact on surface water flow/hydrological regime of the rivers to be crossed is moderate and after the proposed mitigation measures, the residual impact significance will be minor. In order to monitor the water quality from the resources in the study area and groundwater wells, measurements will be performed at least 2 times a year (in rainy and dry periods).

Use of resources for the Project will be an issue mainly during the construction phase where an extensive need will be imposed for the supply of construction materials (aggregate, basalt, granite, gabbro, lime stone, etc.). Thereby, material borrow pits and quarries will be used to supply the Project's construction material requirements throughout the construction activities.

During the construction phase, the amount of approximately 0.16 tons of solid waste to be generated by the Project activities per day corresponds to approximately 0.036% of the daily total solid waste reception capacities (about 450 tons) of solid waste disposal facilities located in Zonguldak (ZONÇEB). Also, employment from the local population will be prioritized within the scope of the Project and therefore the majority of the staff will be composed of residents of the towns and neighborhoods on the Project route. The actual increase in the amount of the municipal waste generation that will occur due to the Project will be even lower since the personnel employed from the local settlements contribute to the waste generation in the provinces where they already live. In addition, waste management trainings will be given to reduce the total amount of domestic waste production to be sent to the landfill site, and separate collection of packaging waste at the construction site will be encouraged. Therefore, the load that could be added to the existing waste disposal infrastructure capacity by the Project would be negligible. The impact will be temporary and will significantly decrease upon completion of 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 staff and visitors will result in waste generation. No intensive waste generation is expected during the operation phase. During the operation phase, solid waste will be generated due to the daily activities of the personnel to be employed at the stations. Likewise, there is solid waste generation from the visitors at the stations. In the later stages of financial modeling, the amount of waste expected to occur at each station will be calculated as soon as the number of operational staff and visitors is determined. 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.

The above-mentioned waste management hierarchy is the basis of waste management that will be implemented during the land preparation, construction and operation phases of the Project. On this basis, the priority will be to maximize conservation of resources, to avoid waste generation or to minimize waste generation at the source where it is not possible to avoid waste generation.

Nearly half of the Biodiversity Study Area 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 the grey dunes are the water-dependent C1.2: Permanent mesotrophic lakes, ponds and pools, C2.2: Permanent non-tidal, fast, turbulent watercourses, and G1.1: Riparian and gallery woodland, with dominant *Alnus, Betula, Populus* or *Salix*.

Mitigation measures defined in the ESIA for the potential impacts on biodiversity receptors will be further developed based on data to be obtained from additional field work especially for fauna groups, and implemented within the scope of the Biodiversity Management Plan (BMP) through developing species and habitat specific measures following the no net loss principle.

As a result of the study in which the impact of the project to the cultural heritage was investigated. The registered “Sazköy 3rd Degree Archeological Site” is located on the planned Railway Dock Connection (0 + 150- 0 + 390 KP) and the planned Railway Ferry Link (between 0 + 500- 0 + 940 KP). As a result of the studies, it has been identified that the cultural asset, which is thought to be a necropolis area, will be adversely affected by the construction activities. For this reason, it is recommended that the Filyos Railway Dock and Ferry Link route should be revised in a way that it does not damage the registered area. If such a revision is not possible, it may be necessary to plan test pit and salvage excavations in the areas where the railway route cuts the site, and to implement them before the construction period. 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.

Another registered site that may be affected by the project activities is the Öteyüz Mahallesi 1st and 3rd Degree Archeological Site. The area lies between the 2 + 130 - 2 + 012 kilometer points of railway connection line and within the impact corridor. For this reason, all kinds of excavation, skimming, logging, cleavage etc. activities to be carried out within the project construction boundaries must be carried out under the supervision of an archaeologist. While planning the side activities of the project such as opening service roads related to the project, determining the locations of the quarries, creating an excavation storage area, the protection limits of the registered archaeological site should be taken into consideration and any intervention in the area should be avoided. Starting from the design phase of the project for any project, revision and similar applications to be carried out in Öteyüz Mahallesi 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.

Another registered archaeological site located near the project route is Ancient City of Tios and Tios Necropolis Area. Both areas are located very close to the expropriation limit. For this reason, the plans and projects of all kinds of construction activities planned to be carried out near the sites should be submitted to the Karabük Cultural Heritage Conservation

Regional Board under the Law No. 2863, and the opinion of the official institution should be consulted. The decisions to be taken by the protection board must be followed at all stages of the project. In addition to the decision of the Board, it is highly recommended that all construction works to be carried out in these areas and its surroundings to be implemented under the supervision of an archaeologist.

Both positive and negative socio-economic impacts were identified in the ESIA study. Potential positive impacts were identified on employment opportunities and procurement of goods and services, infrastructure and social services. Negative impacts such as loss of lands and pastures, restriction of access to pastures and agricultural lands, damage on crops, fruit trees and lands, damage on irrigation systems and water resources, physical displacement and loss of house / building and other assets and businesses has been also identified. Mitigation measures were determined for each impact subject to minimize and/or mitigate the possible impacts.

Other social impacts are expected to have some impacts on livelihood of population , community relations, and vulnerable groups. No significant adverse impact on social relations has been identified. However, employment opportunities play an important role in contributing to local economy and social standards . Special mitigation measures are determined for impacts on vulnerable groups. The above social impacts and risks have been identified during the impact assessments and mitigation measures are proposed in the RAP and the SEP .

The ESIA also review 'other facilities' that are already operating or planned within the railway line footprint to assess whether these to be considered as 'associated facilities' as per the Banks' ESF requirements. The review of publicly available information of these facilities reveal that they are not directly or indirectly linked and such facilities could function independently with own access roads and resources. Nevertheless, the project team will carry out additional due diligence after final detailed designs are completed for the railway lines to determine whether such facilities have any bearing on social an environment implications to the project and if required additional ES review and mitigation measures will be included during the project implementation.

Once the draft versions of the Project documents (ESIA, ESMP, RAP and SEP) were finalized, they were 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.

As the COVID-19 pandemic has coincided with the preparation studies of these documents, the GDII has adopted additional measures during the disclosure of the Project documents as part of the stakeholder consultation process. As a national lockdown is currently in place, the electronic copies of the documents and additional tools such as presentations and informative videos on the environmental and social impacts of the project, including land-based impacts, have been disseminated via the GDII's official website, other social media channels and direct messaging on individual basis for the PAPs.

The feedbacks on the disclosed documents have been collected through official correspondences, online feedback forms, e-mails and a hotline established for this purpose. As the public disclosure is limited to these channels due to the outbreak, additional consultations have been conducted with the Mukhtars to ensure all PAPs have been informed about the Project documents and received the informing messages from the GDII. The availability and efficiency of the adopted ways of disclosure have been consulted with the settlement heads and additional measures were implemented accordingly. For the PAPs who could not find access to the online channels, an informative summary text of the disclosed

documents has been prepared and shared with them. The Mukhtars have also been asked to convey the questions and concerns of the PAPs who are not able to access to the communication channels, if any.

The GDII have also communicated with the institutional stakeholders during the disclosure process in accordance with the SEP. Opinions have been requested from the institutions and organizations with an official correspondence about the disclosed documents of the Project. All national and local institutional stakeholders have been sent an official letter by the GDII.

The questions and concerns received from the stakeholders during the disclosure process are presented in detail in the SEP and RAP documents. Although the raised issues are addressed in the relevant documents, the GDII will provide feedbacks to the PAPs in response to their questions and concerns.

1. INTRODUCTION

Filyos Valley Project, planned to be constructed in Çaycuma District of Zonguldak Province, is an integrated project planned with Filyos Freezone, Filyos Industrial Zone, Filyos Port, flood protection structures, industrial infrastructure and transportation connections.

It is foreseen that Filyos Port, which is planned to be built within the scope of Filyos Valley Project, will become one of the most important ports of the Black Sea and our country, with a capacity of 25 million tons / year. In order to carry out transportation and distribution of goods arriving at Filyos Port in the safest and least expensive manner, the Filyos Port/Industrial Zone Connections Project (Project) is planned by the Ministry of Transport and Infrastructure (UAB) General Directorate of Infrastructure Investments (GDII).

As in the whole world, railway systems have been attached importance in Turkey, especially after the proclamation of the Republic. The reason for this is that railway systems are safer, faster and less expensive than roads.

In the feasibility studies carried out within the scope of the Project, priorities for travel and load demands were determined. After the determination of these requests, financial and economic analysis was made and different financial analyzes were evaluated. As a result of all these evaluations, approximately 12.00 km long rail system and 4.50 km long highway, which are thought to be beneficial to work with the railway in transportation, have been designed.

Locations and railway kilometer points of stations located on the Project route are given below.

Table 1-1: Locations and Railway Kilometers of Stations in Project Route

No.	Station KP point	Station Name
1	0+371	Gökçeler
2	5+853	Sanayi

GDII considers using international finance for implementation of construction works of this Project. A contract was signed between GDII and Cınar Engineering and Consulting Inc. (CINAR) in December 2019, for the preparation of below listed documents of the Project according to the World Bank standards.

- ESIA Report
- Environmental and Social Management Plan (ESMP)
- Stakeholder Engagement Plan (SEP)
- Resettlement Action Plan (RAP)
- Environmental and Social Commitment Plan (ESCP)

In January 2020, CINAR conducted a site reconnaissance along entire Project route with participation of environmental and social experts. CINAR was accompanied by GDII personnel during the site visit.

Locations of the key project components (railway line, highway route, station, bridge, load ramp, administrative building, warehouse areas, construction sites) and selected settlements located within the railway's and highway's land acquisition (land consolidation/expropriation) corridor were visited during the site reconnaissance.

It was observed during the reconnaissance site visit that no land preparation and construction work has been started. The routes generally passes near or inside of settlements

and mainly cultivated and arable agricultural lands. Derecikören, Gökçeler, Sefercik and Sazköy Neighborhoods, which are thought to be most affected by the activities to be carried out within the scope of the project, were also visited within the scope of site reconnaissance.

1.1. Project Background

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 is the largest and most important valley located in the province of Zonguldak and lies along the Filyos Creek, whose width reaches up to 300-400 m forming Çaycuma plain in Çaycuma Disctrict center and Filyos plain in Saltukova/Kokaksu-Hisarönü district.

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 river bed remediation channel and the Ministry of Finance, General Directorate of National Estate is appointed for the urgent expropriation of the immovable properties. (Figure 1-1).

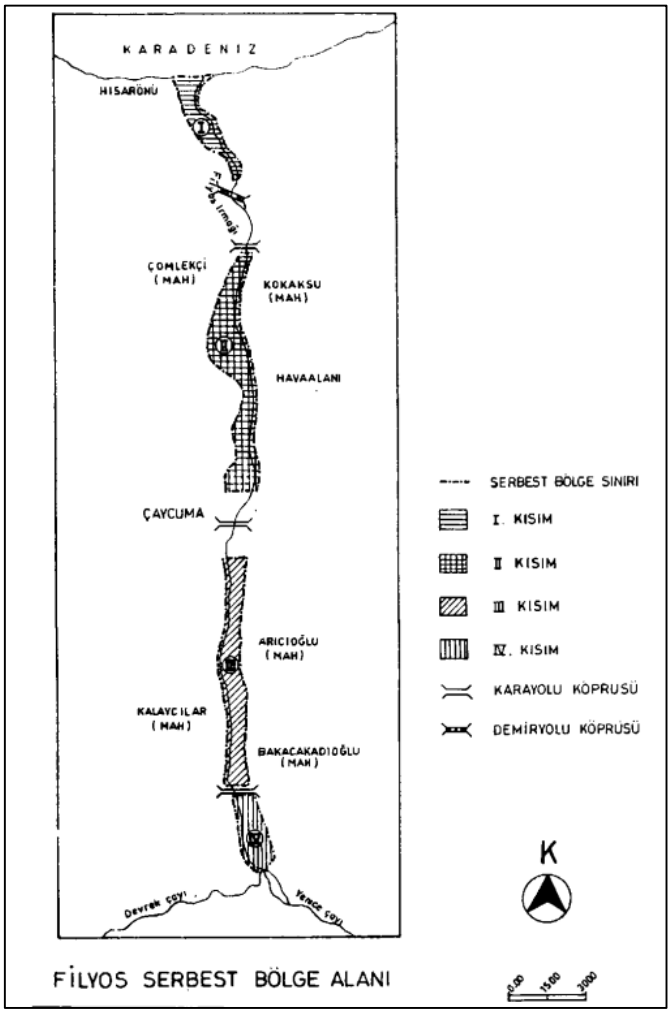

Figure 1-1: Borders of Filyos Freezone and Its Sections Declared by Decision of the Council of Ministers (No:94/5377)

Subsequently, Freezone Boundaries, announced with the Decision of the Council of Ministers 94/5377, is altered by cancellation of 3th and 4th sections, with the Decision of Council of Ministers dated 30.09.1996 and No. 96/8692. (Figure 1-1)

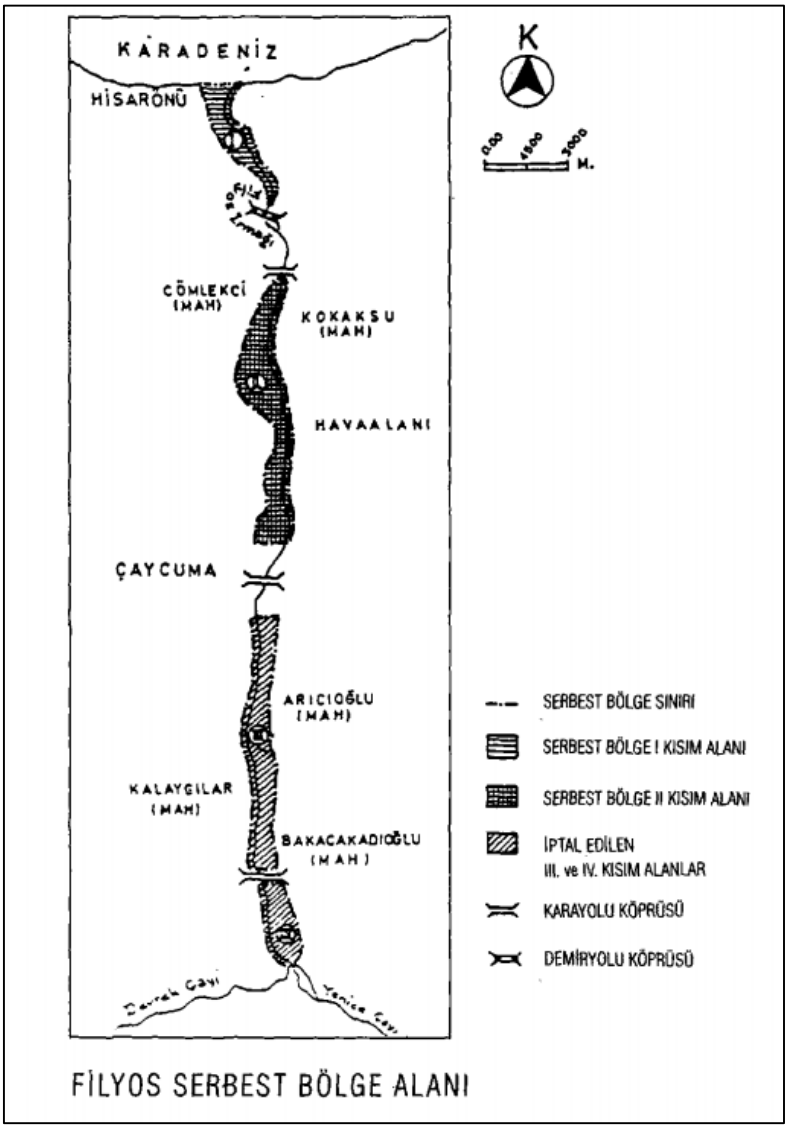

Figure 1-2: Revised Filyos Freezone Boundaries and Sections with Decision of the Council of Ministers No. 96/8692

Boundaries were revised with the Decision of the CoM No. 2008/14807 and 2009/14730 and finalized with the Decision of CoM (2010/975) published in the Official Gazette dated 01.06.2015 No. 29373 .

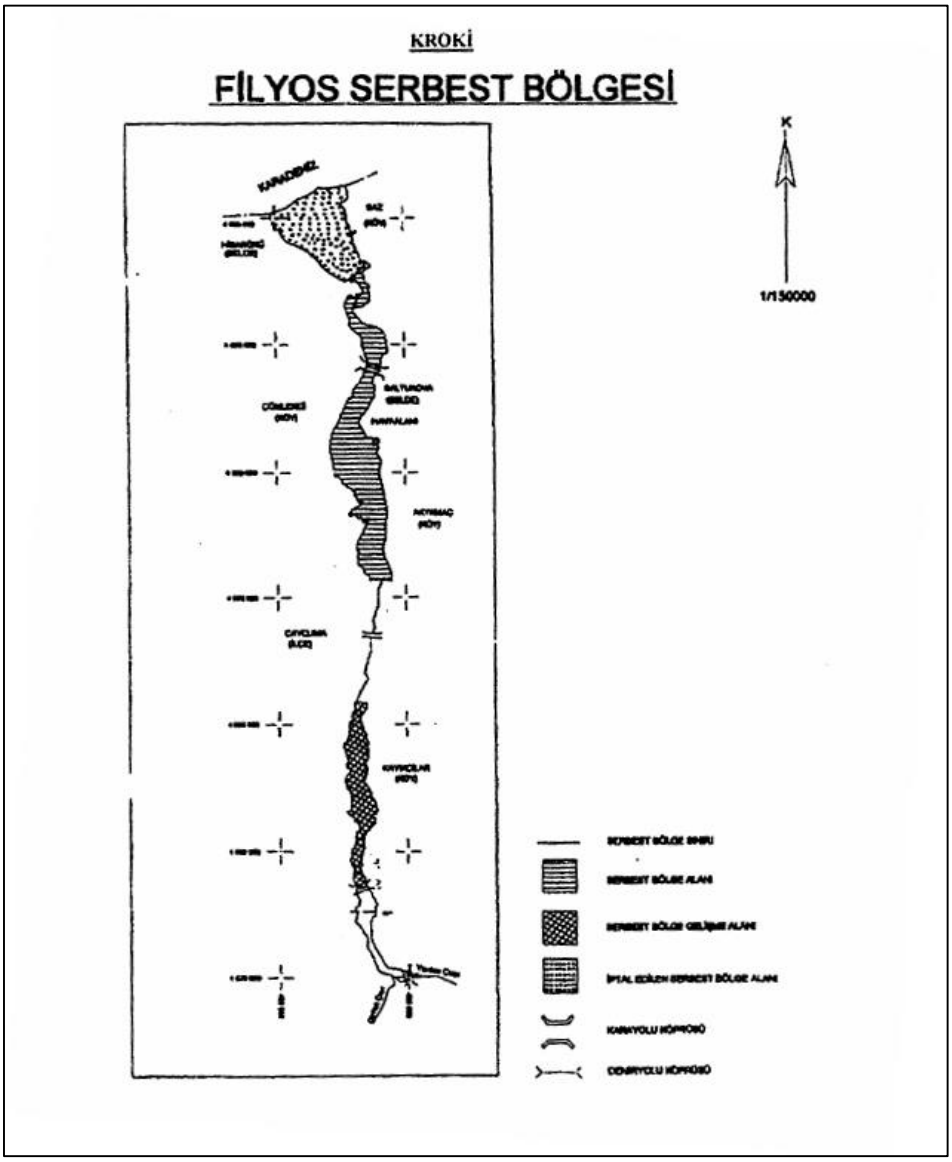

Figure 1-3: Finalized Filyos Freezone Boundaries and Sections with Decision of the Council of Ministers No. 2010/975

The Decision of the Coordination Board of Industrial Zones dated 29.06.2012 and 2012/1 was decided to declare the area, which is located north of the Borders of Filyos Freezone, as part I, as the Filyos Industrial Zone, and by the Decision of the Council of Ministers dated 16.07.2012 and 2012/3574, this area was declared as filyos industrial zone.

In this context, the area containing port industrial zone, freezone, rail and road links is referred as "Filyos Valley". Filyos Valley Region has an important location both by its coast to the Black Sea and its appeal to Ankara and Central Anatolian hinterland. All sea, railroad, road and airline transportation facilities are all available in the area.

Figure 1-4:Filyos Port, Filyos Industrial Zone and Filyos Freezone

The facilities, intended to be built within the scope of the Filyos Valley Project, are given below;

- Port and Front Filling Site
- Port Warehouse Area
- Shipyard
- Thermal Power plant Cement and Soil Industry
- Iron-Steel Facility
- Freezone
- Industrial Zone
- Organized Industrial Zone
- LPG Storage Facilities
- Petrochemical Plant
- Petroleum and petroleum Products Storage Facility
- Wood and Forest Products
- Refractory Brick Industry
- Coal-Ore Storage Area and Storage Facilities
- Ash Handling Area
- Classification Yard

Filyos Port Project, which is integrated with the industrial zone, is expected to create an important momentum in the improvement and development of Western Black Sea provinces. Port infrastructure construction is ongoing.

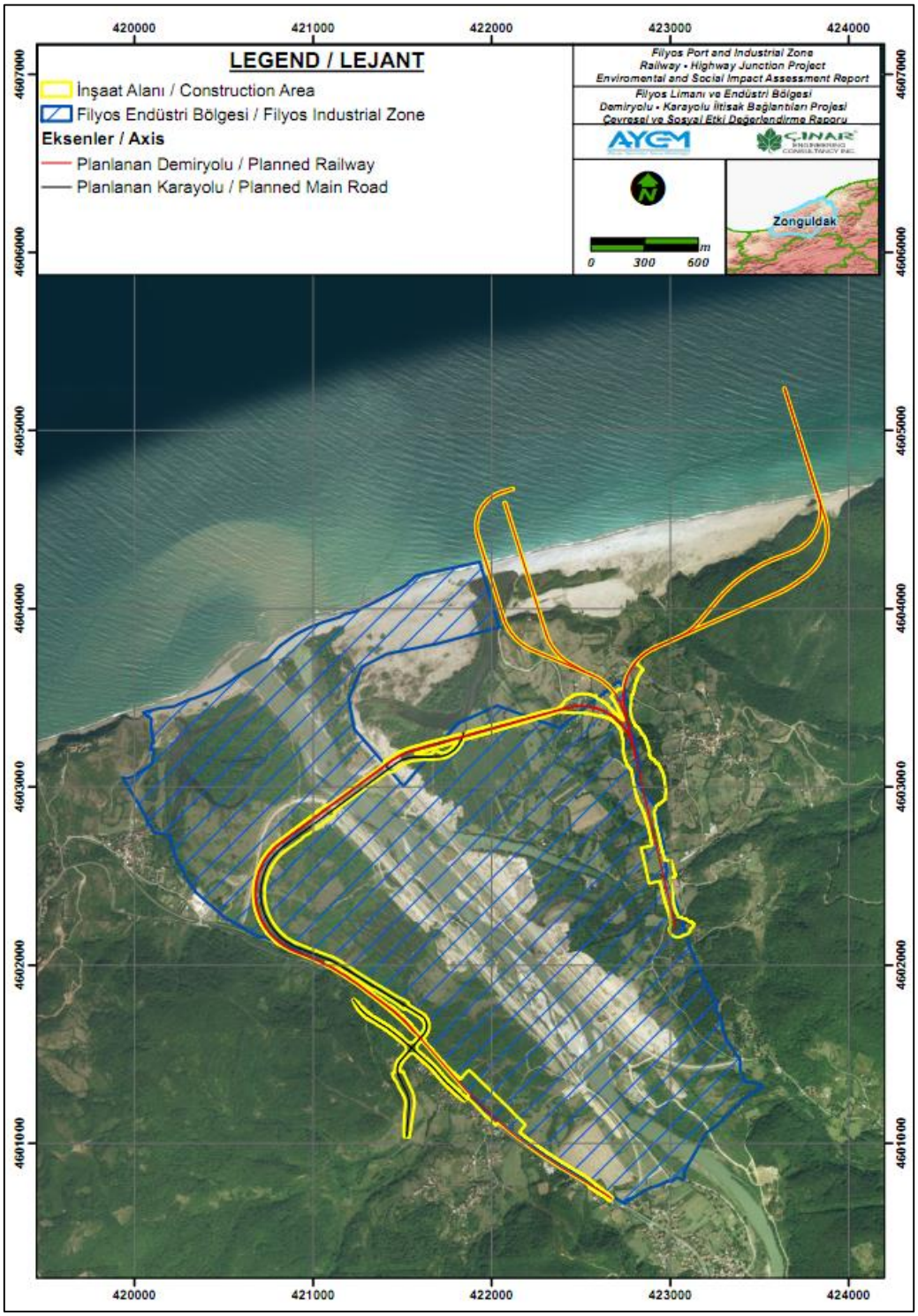

Figure 1-5: Filyos Industrial Zone and Project Routes

Filyos Industrial Area has an area approximately 597 hectares. Approximately 260 hectares of this area is unsuitable for construction which consists of impoundment, forest area, wetland and sand area, also, roughly 70 hectares of the area includes treatment plant, administrative building, service building, parking areas, roads etc. Remaining area of 267 hectares will consist of 8-10 industrial parcels each with 5-30 hectares in size.

Filyos Industrial Zone is one of the most important projects of Turkey 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, Filyos Port/Industrial Zone Connections Project (Project) is being planned in order to ensure both properly carry out planned industrial activities and distribute the goods arriving to the Filyos Port in the safest and least costly manner.

“Filyos Port/Industrial Zone Connections (Including highway connection) Survey-Project, Feasibility and Engineering Services Work" is contracted out by the Ministry of Transport and Infrastructure, General Directorate of Infrastructure Investments, to "Altınok Consultancy and Engineerig Inc. in 21.02.2018. In the context of this project, Feasibility Report and Geological-Geotechnical Survey Report were prepared.

1.2. Project Location

The project route remains within the borders of the Filyos Town, which is located in the Province of Zonguldak and Çaycuma district. 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 south of this village. Farming lands, forest and pasture lands and river flood plains are located on the project route.

1.3. Project Owner

GDII is the owner of the project. GDII is a public institution affiliated with the Ministry of Transport and Infrastructure with a special budget for finance.

GDII’s duties and powers include to prepare and approve the plans and projects of railways, logistic villages, centers or bases, ports, shelters, coastal structures, airports, or have them prepared, and to build these transportation infrastructures and/or have them built, then transfer the completed ones to the relevant organizations.

The project will be handed over to the General Directorate of State Railways Management of the Republic of Turkey (TCDD) after the construction is completed and the operational activities will be performed by TCDD.

1.4. Limitations and Uncertainties

The 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 the Chapter 3 of the ESIA, is provided by GDII. During the preparation of ESIA report, "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 than as stated in ESIA report and the approval of GDII.
- 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.
- On the locations and capacities of excavation waste storage areas, no determination has been made. Consequently, material storage is not included in the evaluations (e.g. Land Use, Air Quality).

- 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 contractor might consider during construction. Since no information is available regarding the location of the blasting, amount and type of the explosives and timeframe of the blasting, relevant assessment could no be performed in the scope of ESIA studies.
- Field studies for ecological assessments within the scope of the project is conducted in January. In the areas subjected to the study, determinations on habitat suitability is completed. However, due to seasonal restrictions, detailed species identification could not be carried out.
- In the field of project, expropriation works were extendly carried out by the General Directorate of National Estate of the Ministry of Finance, in 1998 in the area referred as Filyos Industrial Zone, and then this area was handed over to the Ministry of Industry. Most of the lands within the project area belongs to the Ministry of Finance, and there is no data available for asset detection for a significant part of the area. These treasury lands are mostly abandoned and not used while only a few of them are formally rented and used by farmers for agricultural activity and by residents of houses. Although the formal asset inventory will be prepared while preparing expropriation plan by GDII in the second half of 2020, a site survey was carried out in the lands which are currently in use by GDII on January 2020 to determine the existing assets and provide data to the Resettlement Action Plan (RAP).

A contract will be signed with a Design and Supervision Consultant by GDII, and the Design and Supervison Consultant will review the final design of the project, including the engineering structures, and will perform the biodiversity field studies, preparation of expropriation plans, environmental and social assessments that cannot be carried out within the scope of the ESIA since the layout and design of other project components (access roads, borrow pits, quarries etc.) have not been determined.

In addition, all environmental and social impacts will be assessed according to the Management of the Change Process detailed in the ESMP. The ESMP and Sub-Management Plans will also be revised according to the results of additional studies.

2. INSTITUTIONAL AND LEGAL FRAMEWORK

In this Chapter, institutional and legal framework related to project is presented.

2.1. Institutional Framework

Administrative framework in Turkey refers to central and local administrations. Turkey is divided into provinces by taking economical and geographical conditions into consideration so that public services can be provided in every district. Every province is managed by smaller local administrations (municipalities, villages/neighborhoods). Representatives of the administrative structure of these units are mayors in municipalities and headmen of villages/neighborhoods.

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

Institutional framework in Turkey in relation with the project is summarized with Figure 2-1.

GDII will assign a constraction contractor for the project. Contractor will be responsible for the coordination for the the involvement of the agencies listed below where needed. A project specific Environmental and Social Management Plan and Stakeholder Engagement Plan will be preprared by the Contractor. These documents will include the requirements for the interaction between GDII and these institutions and agencies.

The project will be handed over to the General Directorate of State Railways Management of the Republic of Turkey (TCDD) after the construction is completed. ESMP and relevant sub-management plans will be revised according to ESMS of TCDD before commencing the operation phase.

2.1.1. Central Administrations

Basis of central administrations is constructed with Ministries in Turkey. Ministries provide services through provincial and district organizations, to local areas.

Ministry of Transport and Infrastructure is the main central administration in scope of the Filyos Port/Industrial Zone Connections Project. National institution responsible for implementation of the project is The General Directorate of Infrastructure Investments under the Ministry.

Environmental impacts, permits, management and inspection of the project is under the scope of authority of Ministry of Transport and Infrastructure along with Ministry of Environment and Urbanization, Ministry of Agriculture and Forestry, Ministry of Energy And Natural Resources, Ministry of Labor, Social Services and Family and Ministry of Health.

Ministry of Environment and Urbanization 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. MoEu fulfills those activities with its organization structure composed of General Directorates. Those principally in relation with this project are given as follows:

- 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 Cadastre
- General Directorate of National Estate

Ministry of Transport and Infrastructure

- General Directorate of Infrastructure and Investments

Ministry of Agriculture and Forestry

- General Directorate of Nature Protection 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 Mining and Petroleum Affairs
- General Directorate of Mineral Research and Exploration

Ministry of Labor, Social Services and Family

- 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 and Urbanization, Zonguldak Provincial Directorate of Agriculture and Forestry, Zonguldak Provincial Directorate of Culture and Tourism, DSİ Kastamonu 23rd Regional Directorate, Zonguldak Forestry Regional Directorate, KGM Kastamonu 15th Regional Directorate and Zonguldak Provincial Special Administration.

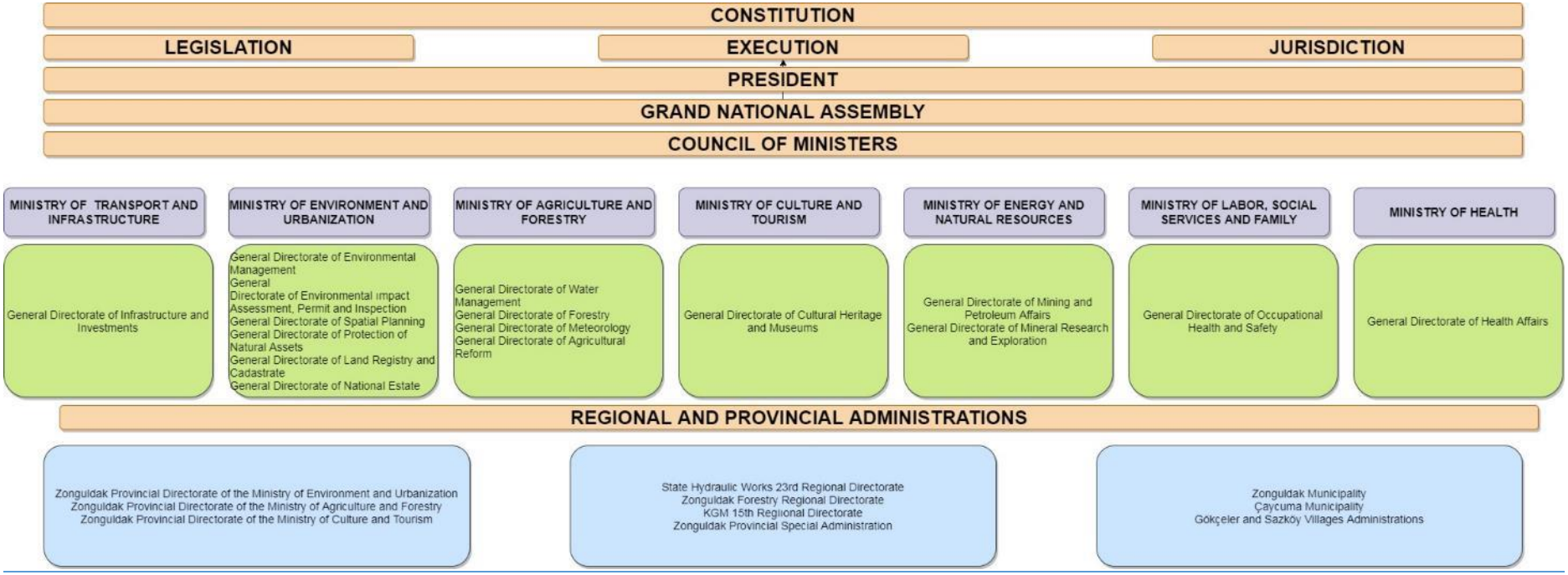

Figure 2-1: Legal Framework Related to the Project

2.1.3. Local Administrations

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

2.2. National Legislation

National legislation in relation with environmental management therefore constructing the legal basis for Filyos Port/Industrial Zone Connections Project are explained in the following sections.

2.2.1. Environmental and Social Legislation

Turkish Environmental Law, No. 2872, published in the Official Gazette No. 18132, dated August 11, 1983 explains basic principles that are necessary to protect the environment in line with sustainable environment and sustainable development goals. The Environmental Law provides a legal framework for the development of environmental regulations in accordance with national and international standards. Following its first publication date of 1983, various amendments have been made.

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

- Agricultural Reform Law on Land Rearrangement in Irrıgated Areas (Law No: 3083)
- Expropriation Law (Law No: 2942)
- Forestry Law (Law No: 6831)
- Groundwater Law (Law No: 167)
- Labor Law (Law No: 4857)
- Occupational Health and Safety Law (Law No: 6331)
- Law on Conservation of Cultural and Natural Assets (Law No: 2863)
- Law on Soil Conservation and Land Use (Law No: 5403)
- Mining Law (Law No: 3213)
- Municipality Law (Law No: 5393)
- National Parks Law (Law No: 2873)
- Pasture Law (Law No: 4342)
- Public Health Law (Law No: 1593)
- Settlement Law (Law No: 5543)
- Highway Traffic Law (Law No: 2918)
- Electricity Market Law (Law No: 6446)
- Energy Efficiency Law (Law No: 5627)

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

Environmental Permits and Licences

- Regulation on Environmental Impact Assessment
- Regulation on Environmental permits and Licenses
- Regulation on Environmental Audit
- Regulation Concerning Environmental Management Services

Land Use and Soils

- Regulation on Protection, Use and Planning of Agricultural Lands
- Implementation Regulation of 17/3rd and 18th Articles of the Forestry Law
- Implementation Regulation of Land Consolidation and On-Farm Development Services
- Regulation Concerning the rehabilitation of the Lands Disturbed by Mining Activities
- Regulation on Pastures
- Regulation on the Control of Soil Pollution and Lands Polluted by Point Sources

Water

- Regulation on Surface Water Quality
- Regulation on Water Pollution Control
- Regulation Concerned Water Intended for Human Consumption
- Regulation on Urban Wastewater Treatment
- Regulation Concerning Protection of Groundwater against Pollution and Deterioration
- Regulation on Control of Pollution Caused by Hazardous Substances in and around the Water Bodies.
- Communique on Sampling of Surface Water, Ground Water and Sediment and Biological Sampling
- Regulation on Protection of Drinking-Potable Water Basins

Waste

- Regulation on Control of Packaging Wastes
- Regulation on Waste Management
- Regulation on the Control of Excavation Soil, Construction and Demolition Wastes
- Regulation on the Control of Medical Wastes
- Regulation on the Control of Waste Oils
- Regulation on the Control of Waste Vegetable Oils
- Regulation on the Control of waste Batteries and Accumulators
- Regulation on the Control of End-of-Life Tires
- Regulation on Mining Wastes
- Regulation on the Landfill of Wastes
- Regulation on the Control of Waste Electrical and Electronic Equipment
- Regulation on the Control of End-of-Life Vehicles
- Regulation on Zero Waste
- Regulation on the Control of Collecting Wastes from the Vessels
- Regulation on Recovery of Some Non-Hazardous Wastes

Air

- Regulation on the Control of Industrial Air Pollution
- Regulation on the Assessment and management of Air Quality
- Regulation on the Control of Exhaust Gas Emissions

Chemicals

- Regulation on Classification, Labelling and Package of Materials and Mixtures
- Regulation Regarding Transport of Hazardous Materials on Railways
- Regulation Regarding Transport of Hazardous Materials on Highways

Health, Safety and Labor

- Communique on Hazard Classes List related to Occupational Health and Safety
- Regulation Concerning the Protection of workers from Risks Associated with Noise
- Regulation Concerning the Protection of workers from Risks Associated with Vibration
- Regulation on Health and Safety Conditions in the Use of Work Equipment
- Regulation on Occupational Health and Safety
- Regulation on Occupational Health and Safety on Construction Works
- Regulation on Health and Safety Regarding Temporary and Time Limited Works
- Regulation on Health and Safety Precautions Regarding Working with Chemicals
- Regulation on Health and Safety Signs
- Regulation on Dust Management
- Regulation on Safety Information Forms Regarding Hazardous Materials and Mixtures
- Regulation on Health and Safety Risk Assessment
- Regulation on Personal Protection Equipment
- Regulation on Vocational Training of the Employees Working in Dangerous and Highly Dangerous Workplaces
- Regulation on the Control of Polychlorinated Biphenyl Terphenyls

Noise

- Regulation on Assessment and Management of Environmental Noise
- Regulation on Environmental Noise Emission Caused by Equipment Used Outdoors

Social

- Regulation on Implementation of Resettlement Law
- Regulation on the Implementation of Law Concerning Private Security Services
- Law on Right to Information

Others

- Regulation on Traffic in Highway
- Regulation on Railway Security
- Regulation on Critical Duties Concerning Railway Security
- Regulation on Earthquake Technique in Construction of Coastal and Harbor Structures, Railway and Airport

2.2.1.1. Environmental Impact Assessment

Environmental Impact Assessment (EIA) is a process by which the positive and negative impacts of a given project on the environment can be determined. This process is not a decision-making process in itself; is a process that progresses in parallel with the decision-making process, and act 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 is the investor's handbook. When an EIA report of an investment with feasibility or design is drawn up, all the details of the project and a clear road map for the investor arise. For the investor, it is the healthiest way to act with an EIA consultant together with the creation of the investment idea.

Environmental Impact Assessment (EIA) studies have gained legal status with Article 10 of the Environmental Law No. 2872, which was published in the Official Gazette dated 11/8/1983 and numbered 18132 in Turkey. On 7 February 1993, the EIA Regulation was put into force and it has been changed seven times in total to date, taking into account the harmonization studies with the European Union (EU) Legislation and the EU EIA Directive. At this time, the Environmental Impact Assessment Regulation, which was published in the Official Gazette dated 25/11/2014 and numbered 29186, is in force.

With the introduction of the online EIA Process Management System / e-ced, the institutions and organizations authorized by the Ministry of Environment and Urbanization can make EIA applications through this system.

The EIA process consists of three phases;

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

Environmental Impact Assessment (EIA) studies will commence following environmental Baseline studies. Under baseline studies;

- Determination of the facilities and settlements on the project area
- Determination of existing environmental conditions
- Determination of the methods and means for the determination of environmental effects, determination of possible environmental (direct and indirect) effects,
- Determination of standards related to environmental effects 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,
- Detection and investigation of the nearest protected areas and sensitive ecosystems to the project area. In the case of presence, National Parks, Nature Parks, Wetlands Wildlife Protection Areas. Natural Heritage, Nature Conservation Areas, Reserve Areas. Biogenetic Reserves, Natural Sites and Monuments, Biosphere Archaeological, Historical, Cultural Mass, Special Environmental Protection Areas Special Protected Areas, Tourism Documents etc. in the activity area, further study should be done in this regard.

EIA studies in Turkey are maintained differently for the projects located in the Annex I and Annex II lists of EIA Regulation.

The Environmental Impact Assessment (EIA) Report needs to be prepared within the scope of the activities listed in the Annex-I list and the Project Introduction File (PIF) is prepared for the activities listed in the Annex-II list. EIA Process in Turkey are summarized in Figure 2-2.

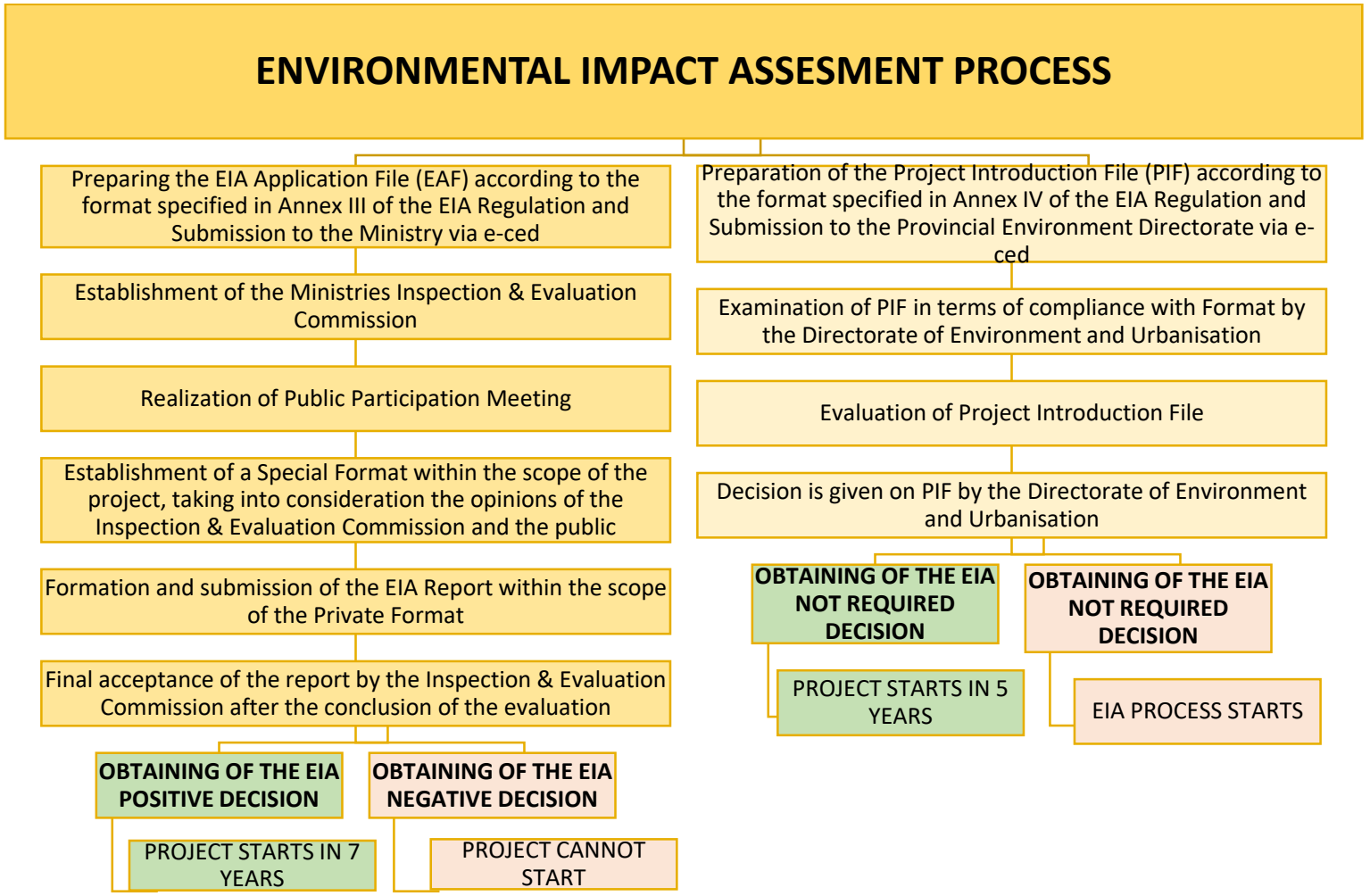

Figure 2-2: EIA Process in Turkey

2.2.1.2. Biodiversity

National laws and regulations regarding protection of the habitats and species are listed below.

- Law on National Parks
- Law on Protection of Cultural and Natural Assets
- Decree-Law Establishing the Special Environmental Protection Agency
- Terrestrial Hunting Law
- Law on Fisheries
- Law on Animal Protection
- Regulation on the Protection of Wetlands
- Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora
- Regulation on Fisheries
- Regulation on Protection of Wildlife and Wildlife Development Areas
- Regulation Regarding Collection and Protection of Plant Genetic Resources
- Regulation on Collection, Protection and Usage of Plant Genetic Resources

In addition to abovementioned regulations; plans, programs and strategies regarding factors that affect biodiversity in a direct or indirect way are studied. Those plans, programs or strategies are given below.

Table 2-1: National Environmental Plans, Programs and Strategies

Regulation/Plan	Effective Date	Purpose/Scope
National Plan on on-site Protection of Plant Genetic Diversity	1998	Plan and activities for on-site protection of plant genetic diversity in its natural habitat and agricultural ecosystems
National Environmental Action Plan	1999	Determination of priority actions concerning the environment, pollution sources and their effects on human and environmental health
National Forestry Program	2004	Policies and strategies concerning forestry activities within the framework of sustainable development
Turkish National Action Plan against Desertification	2005	Identification of factors causing desertification and to prevent/reduce the effects of drought and preparation of measures
National Strategy and Action Plan on Biodiversity	2007	Conservation of biodiversity in Turkey with a holistic approach and attaining the objectives of sustainable usage
National Biological Diversity Strategy and Action Plan	2011	Determination of activities and targets related to wetlands
National Rural Development Strategy	2015	Increasing the capacity of Turkey's rural development policies and practices

2.2.1.3. Cultural Heritage

The Law on Protection of Cultural and Natural Assets (No. 2863), covering matters related to movable and immovable cultural and natural assets that need to be protected, was published in the Official Gazette No. 18113 dated July 23, 1983 and. With the aforementioned Law, the issues related to the protection and conservation of movable and immovable natural assets that need to be protected have been identified and defined as follows (Article 6):

- Immovables built until the end of 19th century
- Immovables that were constructed after this date and which are required to be protected by the Ministry of Culture and Tourism in terms of 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

Aforementioned Law states that if found, movable and immovable assets must be reported to nearest museum directorate, village headman or other local authority. (Article 4)

It is also stated that the in case immovable and movable cultural assets belonging to public institutions and real and legal persons subject to the provisions of private law are known to exist or will be protected in the future, the movable and immovable culture and nature assets are state property. (Article 5)

Movables identified with the above articles and reported to the Ministry of Culture and Tourism should be located in museums by the Ministry of Culture and Tourism by sorting and registering according to scientific principles they are duly taken to 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 principle decision No. 658 of the High Council for the Protection of Cultural and Natural Assets of the Ministry of Culture dated November 5, 1999, is one of them. The decision stated that the archaeological sites should be classified and protected, and the three main classes, which are basically determined, 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 consolidation and expropriation of the lands corresponding to the railway and highway route planned within the scope of the Filyos Port and Industrial Zone Railway-Highway Junction Project will be done in accordance with the applicable laws and regulations.

National Legislation Related to Expropriation

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

Expropriation Law

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

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

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

National Legislation Regarding Resettlement

Resettlement Law

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

Resettlement Law deals with the families applying to related governmental agencies in the project region and requesting government assisted resettlement. Resettlement assistance of the government is provided for entitled families while expropriation compensation payments are paid to all individuals possessing immovable properties in the project area. According to the Article 3 of the Law, three types of resettlement can be applied as for that the choices and requests of affected families. Article 3 of the Law reads this point as follows;

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

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

Physical resettlement: This type of resettlement is implemented through providing construction credit support to a family within the amount of loan determined by the Ministry

(MOEU) for the aim of re-building (moving) of villages because of unsuitability of a village centers or consolidating of villages because of dispersed settlement or villages which are fragmented as a result of disasters; after selling land (house plot) from village development areas to people in need".

2.2.1.5. Labor Law and Regulations

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

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

2.2.2. Requirements for Environmental Licenses, Permits and Approvals

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

Filyos port is adjacent to a registered tumulus which is a 3rd degree culturally protected area. The railway route is expected to pass through this area if the Ministry of Culture and Tourism allows. According to the information received so far, there are no naturally protected area according to the national legislation.

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

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

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

Land Use

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

Construction Site

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

Water and Wastewater Management

- Water usage
- Environmental permit for wastewater discharge
- Environmental permit for package wastewater treatment plants

Wastes

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

2.3. Environmental and Social Impact Assessment under National Legislation

The Environmental and Social Impact Assessment process in Turkey is carried out within the scope of the Environmental Impact Assessment Regulation, which was published in the Official Gazette dated 25.11.2014 No. 29186.

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.

According to EIA Regulation, railway projects are classified according to the route length. They are given as follows:

- Projects located in Annex-1 and to be subjected to Environmental Impact Assessment
  - Railway routes longer than 100 km (Article 6-a)
- Projects located in Annex-2 List and to be subjected to Selection and Screening.
  - Railway projects that are not located in the Annex-1 List (except from connection/junction lines)
  - Railway route alteration, in case continuous length of sections leaving the route is 30 km or more
  - Increasing the number of lines while preserving the existing railway route

If Filyos Port /Industrial Zone Connections Project is evaluated according to the EIA Regulation, its railway length of 12 km falls below the threshold stated in the Annex-2 list. Opinion of the Ministry of Environment and Urbanization, General Directorate of Environmental Impact Assessment, Permit and Inspection was requested by GDII and project was evaluated to be exempt from EIA Regulation process.

2.4. International Agreements, Conventions and Protocols

International conventions on the environment and other relevant conventions that Turkey is a party of, are given below.

Environment

- Vienna Convention for the Protection of the Ozone Layer and Montreal Protocol on Substances Depleting Ozone Layer (O.G. 8-9.9.1990, No: 20629)
- United Nations Framework Convention on Climate Change (UNFCCC) (O.G. 21.10.2003, No: 25266)
- Kyoto Protocol(O.G. 17.02.2009, No: 27144)
- United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (O.G. 14.02.1998 No:23258)
- The 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)
- The Convention on the Protection of the Black Sea Against Pollution and related Conventions (Treaty of Bucharest) (O.G. 06.03.1994, No:21869)
- 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)
- The 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

Biodiversity

- Convention for the Conservation of European Wildlife and Natural Habitats (Bern Convention) (O.G. 20.2.1984, No: 18318)
- International Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar) (O.G. 17.5.1994, No: 21937)
- Convention on Biodiversity (O.G. 27.12.1996, No: 22860)
- Cartagena Protocol on Biosafety (O.G. 24.06.2003, No: 25148)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (O.G. 20.06.1996, No: 22672)
- International Convention for the Protection of Birds, Paris 1959 (O.G. 17.12.1966, No: 12480)

Cultural Heritage

- 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)

2.5. World Bank Environmental and Social Standards

Activities supported by the Bank through Investment Project Financing are required to meet accompanying Environmental and Social Standards.

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), so as to accomplish environmental and social results consistent with the Environmental and Social Standards (ESSs).

ESS1, paragraph 28 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 (EHGS)
- Community safety
- Climate change and other transboundary or global risks and impacts
- Materials threat to the protection, conservation, maintenance and restoration of natural habitats and biodiversity
- Ecosystem services and the use of living natural resources (fisheries, forests etc.)

2. Social Risks and Impacts covering the following issues
- Threats to human security
- Risks that project impacts fall disproportionately on individuals or groups who, because of their particular circumstances, may be disadvantaged or vulnerable

- Any prejudice or discrimination toward individuals or groups in providing access to development resources and project benefits, particularly in the case of those who may be disadvantaged or vulnerable;
- Negative economic and social impacts relating to the involuntary taking of land or restrictions on land use;
- Risks or impacts associated with land
- Impacts on the health, safety and well-being of workers and project-affected communities;
- Risks to cultural heritage

ESS1 is one of the main considerations during assessing the environmental and social risks, as this ESIA study is constructed for identifying the environmental and social risks and determining relevant mitigation measures. Chapter 5 is constructed for impact assessment and identifying the mitigation measures.

ESS2: Labor and Working Conditions

Environmental and Social Standard 2 perceives the importance of employment creation and income generation for the aim of comprehensive financial development and poverty reduction. Borrowers should create healthy working conditions by treating the workers fairly.

Number of personnel planned to be employed during the construction and operation phase of the project is identified in Chapter 3.4 and detailed impact assessment was given in Chapter 5. In addition an Employment and Training Plan was prepared as an annex of ESMP.

ESS3: Resource Efficiency and Pollution Prevention and Management

This standard points out to the requirements to highlight resource efficiency and pollution prevention and management with a holistic approach to project implementation. The aim is to minimize pollution arises from the project with sustainable use of resources.

Number of personnel planned to be employed during the construction and operation phase of the project is identified in Chapter 3.4 and detailed impact assessment was given in Chapter 5. In addition an Employment and Training Plan was prepared as an annex of ESMP.

Main material need will be occued during the construction phase. Aggregate Material will be needed and potential borrow areas and quarries near project area have been idendtified in Chapter 4.5.1. Moreover, noise, air emssions, waste and wastewater production, will be in question during both construction and operation phases. Detailed impact assessment was given in Chapter 5. In addition an Aggreagate Management Plan, Pollution Prevention Plan and Waste Management Plan was prepared as an annex of ESMP.

ESS4: Community Health and Safety

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

During construction risks due to increased traffic, explosive use and blasting, security personnel community exposure to health problems will be in question therefore Emergency Preparedness and Response needs to be assessed. In addition, during operation, Emergency Preparedness and Response is also a necessity for traffic and pedestrian safety and railway accidents. This risk have been assessed in Chapter 5.11 and an Emergency Preparedness and Response was prepared as an annex of ESMP.

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

This standard emphasizes that involuntary resettlement should be avoided. If it in unavoidable, necessary measures to mitigate adverse impacts on displaced people should be taken.

Land acquisitions is in question for the project as it is described in detail within the Resettlement Action Plan (RAP). Mitigation measures for Land Acquisition, Restrictions on Land Use and Involuntary Resettlement were also identified in RAP.

ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

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

This standard also points out to sustainable management of primary production and harvesting of living natural resources and 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.

ESS6 identify two different types of protected areas: Legally Protected Areas and Internationally Recognized Areas. Protected areas are idenfied within Chapter 4.6. Moreover, impact assessment and mitigationmeasures regarding Biodiversity Conservation and Sustainable Management of Living Natural Resources are given in Chapter 5.7. Moreover, Biodiversity ManagementPlan was prepared as an annex of ESMP.

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

This standard is not relevant to the Project.

ESS8: Cultural Heritage

This standard points out that cultural heritage provides continuity between tangible and intangible forms between past, present and future. In the implementation of project, necessary measures should be taken in order to protect cultural heritage.

During the assesments on cultural heritage which was provided in Chapter 4.7, Sazköy 3rd Degree Archeological Site, Öteyüz Mahallesi 1st and 3rd Degree Archeological Site, Tios Ancient City and Tios Necropolis were identified as cultural assets affected by the Project. Detailed impact assessment and mitigation measures are identified in Chapter 5.8 and Culutural Heritage Management Plan which was included in annex of ESMP.

ESS9: Financial Intermediaries (FIs)

Financial Intermediaries are set out in order 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.

ESS10: Stakeholder Engagement and Information Disclosure

Importance of open and transparent engagement between Borrower and stakeholders are emphasized as it is a necessary element of good international practice. Effective stakeholder engagement contributes to the projects in terms of improvement of environmental and social sustainability, enhancement of project acceptance and successful project design.

A detailed Stakeholder Management Plan was prepared. Stakeholders of the project, public participation processes and necessary actions to be implemented are given in Stakeholder Engagement Plan and in Chapter 7.

2.6. Other Guidelines

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

The 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 General EHS Guidelines including the subjects of "environment", "occupational health and safety", "community health and safety" and "construction and decommissioning", the World Bank Group has published sector specific guidelines for a variety of industries. Relevant aspects of the 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 sector-specific guidelines regarding the railways are described below.

- **Environmental, Health, and Safety Guidelines for Railways**

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

Other IFC guideline documents to be used where necessary in the environmental and social assessments are as follows.

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

2.7. Project Environmental and Social Categorization

The World Bank will classify 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 Bank 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 environment and social risks of the project are both rated as “Substantial”. Two categories of risks are recognized: (i) those that relate to the impacts of project activities; and (ii) contextual.

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), and (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 economic displacement for individuals and businesses, (ix) loss of housing / structure and other assets and physical resettlement, (x) loss of pastures and prevention of passages, (xi) potential impacts on culturally and naturally protected areas.

3. PROJECT DESCRIPTION

3.1.Project Route

3.1.1. Settlements along the Route

Project route is located in the boundaries of Filyos Town of Çaycuma District, Zonguldak Province. The route starts at Northwest of Derecikören Village, proceeds along the Northeast of Gökçeler Village, crosses the Filyos Creek and ends in the south of Sazköy. (Figure 3-1)

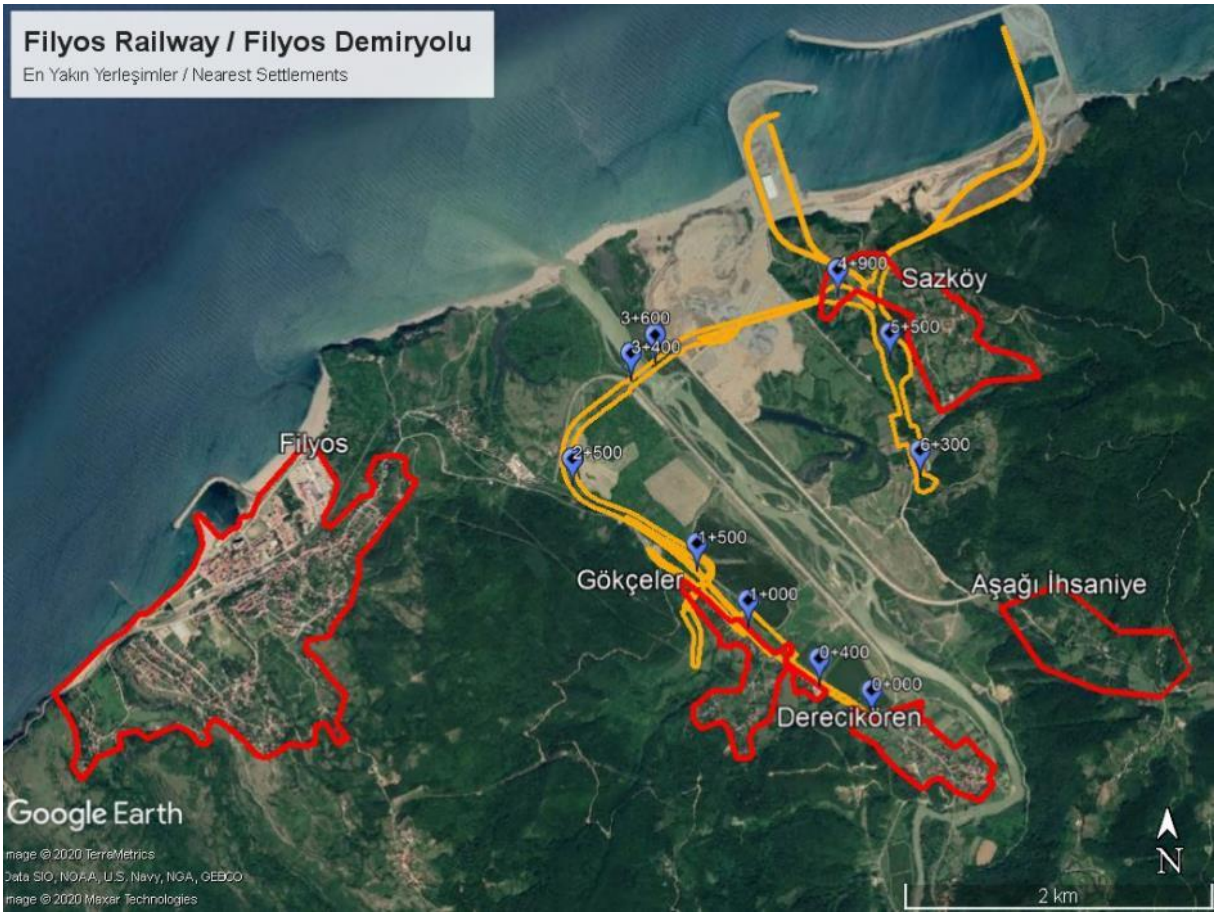

Figure 3-1: Project Route and Surrounding Settlements

3.1.2. Land Use Characteristics and Land Ownership

The project are will have a construction area of approximately 52.86 hectares. 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

Legally protected areas constitute an integral part of biodiversity conservation efforts, as well as ecosystem services provided by ecological functions they convey. In Turkey, 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:

- assignment to a category is a not a commentary on management effectiveness,
- the categories systems is international; national names for protected areas may vary,
- All categories are important; and gradation of human intervention is implied
- Accordingly, legally protected areas in Turkey, 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)

Table 3-1: 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
Bartin Creek 1st Degree Natural Protected Area	Ia	15.58
Goldagi Nature Park	V	16.83
Balamba Nature Park	V	23.14
Milli Egemenlik Nature Park	V	24.30

Detailed assessment concerning legally protected areas are given in Chapter 4.6.2.1.

3.1.4. Internationally Recognized Areas

In Turkey, 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 Turkey'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 Turkey 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 Kiyilari (Coasts) is one of the KBAs identified by the inventory, which covers an areas of about 17,413 hectares within Amasra, Bartin Merkez and Caycuma 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.

Detailed assessment concerning legally protected areas are given in Chapter 4.6.2.1.

3.2. Project Components

3.2.1. Project Lines

The railway, which is planned to be built as part of the project, consists of four main components. These components will be Gökçeler – Sanayi Line, Dock Connection, Ferry Line, Port Link. Gökçeler – Industry Line will be the longest line to be constructed within the scope of the project. Dock, Ferry and Port Line will provide connection to Filyos Port, where construction activities are continuing. Two alternatives are evaluated for the Port Connection and the alternative land preparation and construction activities to be selected will be decided by GDII before it starts. In this report, both alternatives were evaluated from the environmental and social point of view.

- Gökçeler – Industry Line: 6.40 km
- Dock Connection: 1.10 km
- Ferry Link: 1.80 km
- Port Connection (Alternative Conection-1): 2.60 km
- Port Connection (Alternative Connection-2): 2.70 km
- **Total: 11.90 km (Alternative-1 as Port Connection is Considered)**

In the context of this project, highway connections and crossings are also planned. The highway connection will be planned as a connection to Zonguldak ring road and will start in the west of Gökçeler – Industry Line. The highway connection that will cross the Gökçeler – Industry Line at KP-1+400 and will be approximately 3.5 km long. In addition, widening works will be carried out in the existing Zonguldak-Çaycuma road that crosses the highway connection at KP-1+400. Existing road with 10 m width will have approximately 40 m width with 2-lanes, after the widening works. The road widening work will have a length of about 0.85 km. In total, the highway construction activities will approximately have a length of 4.35 km.

Project route is located in the boundaries of Filyos Town of Çaycuma District, Zonguldak Province. The route starts at Northwest of Derecikören Village, proceeds along the Northeast of Gökçeler Village, crosses the Filyos Creek and ends in the south of the Sazköy Village.

Within the scope of this project, there exist highway connection and highway crossings, in this context, Highway Bridge is planned for highway connection and railway crossing in the north of Gökçeler Village. The Filyos Creek will be crossed via the bridge by railway and highway that are parallel to each other.

After the bridge passage on the Filyos Creek, highway will continue to south moving downwards with reduced filling and the railway will continue on the bridge. Railway route moves in the west of Sazköy Village and ends at Industry Station.

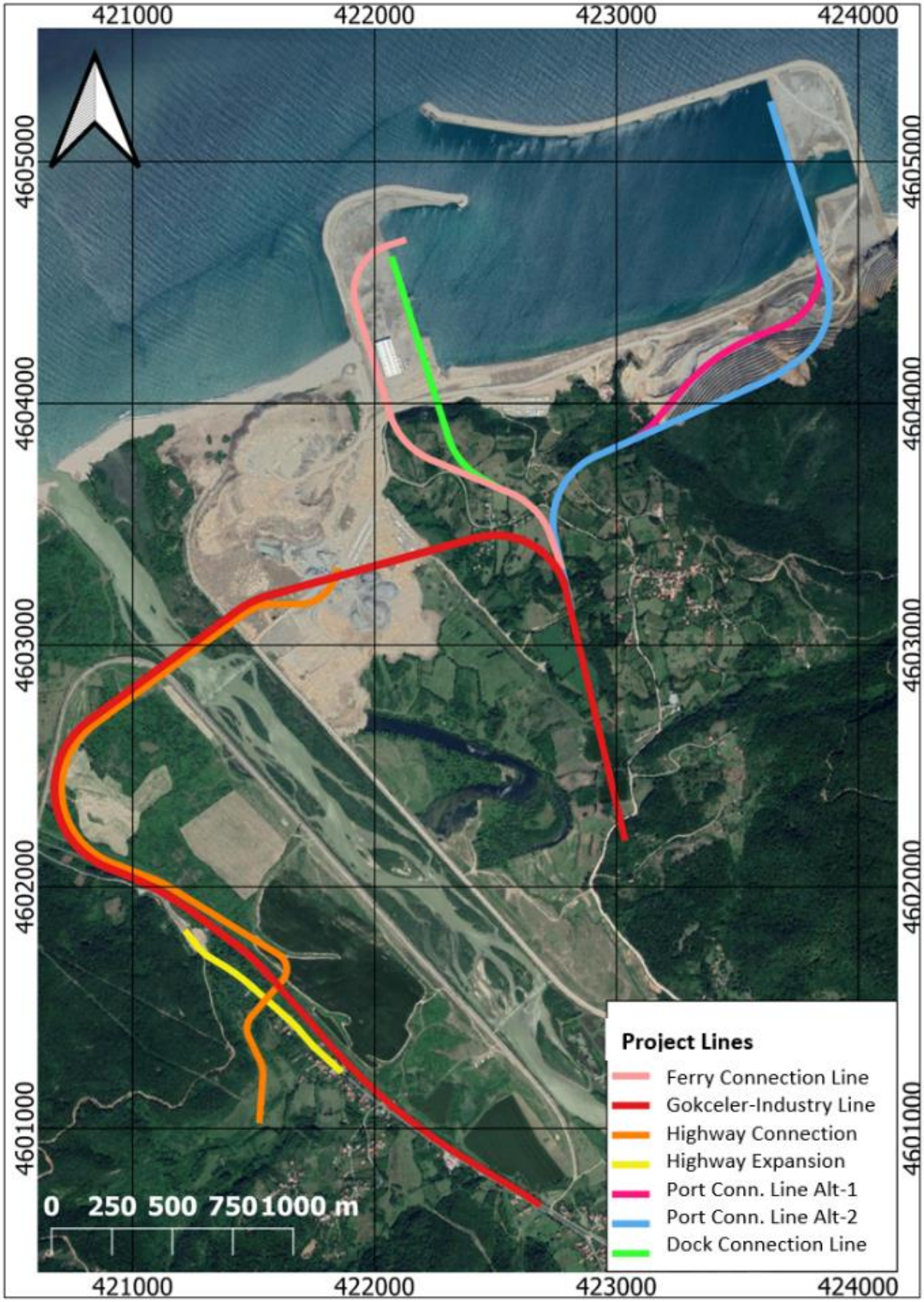

Figure 3-2: Project Components

The Project is designed so as to pass Filyos Creek with only one bridge including the highway connection. Railway and Highway bridge is the most important engineering structure for the project. As per performed pilot drillings on the footing of the bridge, it was observed that socketing to rock base is not possible. Therefore, foundation system is assigned as deep foundation with the consideration of bearing capacity and settlement criteria. The piles will be drilled as friction piles after the improvement of the capacity. In case of high ground water level conditions, with proper construction methods, dry piling excavation will be performed.

3.2.2. Engineering Structures

Engineering structures planned on the project route and their properties, are given in the table below.

Table 3-2: List of Engineering Structures

Engineering Structure	Start KP	End KP	Length (m)
Gökçeler Station	0+318	1+278	1278
Highway Bridge Crossing	0+595	0+625	40
Filyos Highway Bridge	3+360	3+747	387.5
Filyos Railway Bridge	2+571	2+958	387.5
Railway Bridge Crossing	4+192	4+232	40
Industry Station	5+305	6+306	983

3.2.3. Quarries and Materal 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 (Section 1.5). However, quarries and borrow quarries that sweat in and around the project area were evaluated within the scope of the ESIA studies and presented in Section 4.5.

If the contractor uses the material to be obtained from licensed quarries, it will be ensured that the areas and quarries have “EIA Positive” or “EIA Not Required” Decisions.

When quarries and borrow sites are identified, additional environmental and social assessments will be conducted by the GDII or the 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 & vibration assessments related to the quarries will be performed and activities for reinstatement will be planned. Contractors will be required to design, open and manage quarry sites in line with WB Environmental Health and Safety Guidelines (EHSGs) and Good International Industrial practices (GIIP).

The environmental and social impacts of the areas will be assessed according to the Management of the Change Process detailed in the ESMP. The ESMP and Sub-Management Plans will also be revised according to the results of additional studies.

3.2.4. Excavated Materials Storage Sites

Within the scope of the project, appropriate storage areas for the excavation material storage will be determined and necessary expropriation procedures will be carried out within this scope. The construction contractor will provide storage sites with sufficient capacity to store all excavated material. While evaluating the excavation storage areas, the land use,

proximity to groundwater and surface water resources and air quality assessment studies will also be carried out.

The environmental and social impacts of the areas will be assessed according to the Management of the Change Process detailed in the ESMP. The ESMP and Sub-Management Plans will also be revised according to the results resulting from additional studies.

3.2.5. Construction Camp Sites

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.

If accommodations are provided for workers, Contractors will ensure that they 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.

3.2.6. Access Roads

Intersection roads and temporary roads will be constructed in order to avoid interruption of the traffic and to minimize the risk of community health and safety. Access roads to be used in the land preparation and construction stages of the project have not been determined yet.

If new access roads are deemed necessary during construction activities, the environmental and social impacts of the construction of the new access roads will be evaluated according to the Management of the Change Process detailed in the ESMP.

The ESMP and Sub-Management Plans will also be revised according to the results from additional studies.

3.2.7. Associated Facilities

The associated facilities for the Project are substations for electrification of the railways, along with the catenary, signalling and telecommunication systems.

3.2.7.1. Substations

Number and power of substations were determined according to geometric structure of the route, the characteristics of the trains and the number of trains per day. 20 years projection of operation period was considered for the number of trains per day for the route between Gökçeler and Industry Stations.

There will be transformers in every substation with the power of 2x10 MVA. TEİAŞ requires that each transformer in the substations be powered from different phases in its new applications. For this reason, neutral zones have been created in front of the substations, which will always be active when the two transformers are active, as well as between the two substations.

Since the trains pass through the neutral-zones with their own inertia, in the determination of the neutral-zones located between the substations; large slope and sharp curves were avoided as much as possible.

After determining the locations of substations, neutral-zone and other postal locations were also determined. In the monorail diagrams prepared for all routes and substations, substations were shown with neutral zones and other equipment. Then, dimensions of the area needed for the substations were determined with the layout plans were prepared with placement of the equipment to be used in the substations.It is envisaged to place the necessary panels and other equipment in a building for substation and equipment for remote control and control.

The existing Zonguldak - Karabük railway line is a minor line, and the existing line is operated as a monorail and used for diesel management. Therefore, the catenary system is planned to take traction energy from the Zonguldak - Karabük line when it becomes electric line in the future.

It is planned to establish a remote control center between Gökçeler - Industry line and the direct transit station for the remote control and control of the equipment in the shifts and transformer centers. During the operation phase, all shifting and transformer centers will be monitored 24 hours a day from this center.

It is necessary to design two substations along the route or the energy should be taken from the place that is deemed appropriate by the institution. Transformers will be installed according to the investment program of TEİAŞ or outside the scope of the project to feed the catenary line as 154 kV open area.

3.2.7.2. Catenary System

In the design of catenary system, criteria such as the type of pantograph, sizes of catenary wires and other conductors (return and feeder conductor) were determined. In addition to these criteria, span of poles for curved and aligned lines were determined with the consideration of stretching of wires and ambient conditions such as wind speed and temperature and also geometry of the line. Also, pole layouts (staking) were prepared including the entire route accordingly.

In those layouts, uninsulated overlaps, insulated overlaps, neutral regions, mid-point anchors and switching point catenary system are shown. Section and neutral regions are placed on the route according to the monorail diagram prepared earlier. The station roads are electrically separated from the main roads by sectioning insulators. The electrical sectioning on the main road was carried out with insulated overlaps. Thus, adaptation between the pole layout and monorail diagram of the line is achieved.

Since the catenary systems and the loads of the poles are also determined in the pole layout plans, depending on this, 6 main types have been determined and dimensioned. It is envisaged to use steel poles in concrete, bridges and viaducts in normal open lines and

stations. It was especially considered that there will be no poles in the stations used by passengers and loading-unloading platforms.

3.2.7.3. Signaling System

Gökçeler-Industry Railway Project is a double track and approximately 6.5 km. On this route, the railway is designed at a speed of 120 km / h, and therefore, along with freight trains, passenger and other express trains will be operated on this line.

Since abovementioned line will be operated as combined traffic line, signaling system was designed accordingly. Therefore, signals and automatic train stop (ATS) systems on the route was planned for trains that will travel at low speed.

The signaling system along the route of 6.5 km line from Gökçeler station to the Industry Station is designed to be two-way traffic line. On both sides of the stations, Commanded Block Signals are placed at the braking distance to the entrance signals. Dispatcher or station operator can control these signals.

Automatic train protection system (ATP) that is capable of controlling the train movement at all times, which is used in other countries will be used as a security and cabin signaling system considering signals may not be seen in the entire route by drivers of high-speed trains.

In order to make switching points safer, switch motors are used. Electric locks or detector-controlled switches are not preferred. In addition, switch heaters that can be controlled from signalization control centers are to be installed considering harsh winters. Switch heaters will be electrified from catenary system via transformer. It will not be electrified by the uninterrupted power supply.

Vital systems and the power supplies in the signalization system will be placed inside the building in stations, and in steel cabinets between stations.

Energy to the signaling and telecommunication systems will be provided from the catenary and low-voltage network. Uninterruptible power supplies (UPS) consisting of battery groups will also be available to provide energy to the systems for a certain period of time against power cuts.

Wayside signals will be electrified from uninterruptible power supplies (UPS) in the stations in appropriate sections.

Interlocking circuits will have SSI (Solid State Interlocking) and modular structure. Rail circuits will be insulated DC or AC at the stations and twin rail insulated AC rail circuit between the stations. A control center (CTC) will be established for monitoring, receiving information and evaluation of trains and signaling system in the route along the stations in the Karabük-Zonguldak line as the Gökçeler station is a direct transit station, and the Industry Station will be provide service to the Port that is to be constructed in the future.

Monitoring and traffic management is carried out by means of the large-sized synoptic panel and monitor in the existing centers of the operating organization, TCDD. Projection system has been preferred for these centers in order to adapt with the systems of TCDD.

Also, a control and monitoring computer will be installed in each station to allow local control and maneuvering of the stations and for the monitoring of the station.

3.2.7.4. Remote Control (Telecommand) System

A Remote Control Center (RCC) will be constructed at the direct passage station for the monitoring, control and control of the equipment in the posts and transformer centers on the route between Gökçeler-Sanayi.

There will also be Remote Units (RTUs) related to the system, along the line, outside the center, on the shifts where equipment are located and in substations. Information will be sent to the center through these units, and the commands to be sent from the center will also be possible through these units, such as power off and energizing.

In the existing systems of TCDD, the monitoring and control of the equipment is carried out on a large-sized synoptic panel and monitor. TCDD prefers projection systems instead of synoptic panels in its new systems. Therefore, a projection system has been envisaged for the center between Gökçeler-Industry in order to adapt with the systems of TCDD.

By the knowledge of the monorail diagram of the route and transformer centers, the layout of the transformer centers, pole layout plans, pole loads and foundation dimensions, it was possible to determine all the materials and equipment quantities in the systems, and quantification and discovery lists were prepared according to these determinations.

3.2.7.5. Telecommunication System

Along the route, fiber optic cable and copper high frequency cable will be laid inside the concrete channel. All voice communications, information and control transmission for CTC and SCADA, computer communication during operation phase will also be made through these cables.

With normal automatic telephone communication, within the scope of the signaling system; dispatcher and maintenance telephones, and communication line telephones for electrification. Dispatchers will be at stations and on the road, and maintenance phones will be at the control center.

Communication line telephones will be available at railway stations, substations, post and maintenance centers.

Electrification personnel will also be able to use dispatcher telephones along the road within the scope of the signaling system.

For these services, 2000 subscribed-stations have been envisaged. This station is planned to be installed in the building where CTC and Remote Control Centers are located.

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:

- Completion of topographic measurements, preparation of implementation projects and preparation and execution of expropriation plans
- Lose soil stripping and storage
- Highway connection and earthworks
- Construction of hydraulic structures (culverts, underpasses and overpasses, drainage pipes and ditches)
- Construction works of Filyos Creek Bridge
- Traffic signs, road markings, guardrail
- Construction of station area
- Installation of security systems such as lighting, emergency communication facilities, wire fences

For the existing facilities, that may be affected by the railway route construction activities (railway, station, etc.), necessary measures will be taken by GDII.

3.3.1.1. Earthworks

For the general information about excavation and filling operations to be carried out within the scope of the project, the Geological-Geotechnical Survey Report[1] prepared within the scope of the project was used. In the scope of the project, cut and fill operations will be performed in Gökçeler-Industry Line (including Stations) and highway connection. Between the KP-0 + 000 - KP-4 + 192 section of the Gökçeler-Industry railway route and between the KP-0 + 000-KP-3 + 360 section where the Highway Connection works will be carried out, the cutting process due to the low slope and high groundwater level it will be applied only for the removal of topsoil and loosened soil, and then the filling process will be carried out.

After the bridge crossing, in the Gökçeler-Industry Line between KP-4+232 - KP-4+760 and the highway connection between KP-3+747 - KP-4+300 only the removal of topsoil and soft soil will be subjected to cutting process. Filling process will be performed later.

Between KP-4+760 - KP-6+305 of Gökçeler-Industry railway line construction activities will be carried out by cutting due to the very high slope. Especially, between KP-4+760 - KP-5+060, it is necessary to perform a very intensive cutting operation, and the cutting operation will be done up to a depth of 20 meters.

Table 3-3: Earthworks within the scope of the project

Line	Construction Work	Start	End	Depth of Excavation (m)	Height of Backfill (m)	Area (m)	Excavated Material qty (m^3)	Backfill qty (m^3)
Gökçeler-Industry Railway Line (Including Stations)	Filling will be done after topsoil and soft soil removal	KP-0+000	KP-1+700	1	2	75,000	75,000	150,000
		KP-1+700	KP-2+400	1	3.4	15,000	15,000	51,000
		KP-2+400	KP-3+360	1	6.5	37,000	37,000	240,500
		KP-3+760	KP-4+192	1	7.1	19,000	19,000	134,900
	Bridge crossing construction	KP-4+192	KP-4+232	-	-	-		
	Cutting operation	KP-4+232	KP-4+760	1	6.2	17,000	17,000	105,400
		KP-4+760	KP-5+060	20	-	25,000	500,000	0
		KP-5+060	KP-6+305	3.5	-	160,000	560,000	0
Highway	Filling will be done after topsoil and soft soil removal	KP-0+000	KP-3+360	1	-	120,000	120,000	0
	Bridge crossing construction	KP-3+360	KP-3+747	-	-	-		
	Filling will be done after topsoil and soft soil removal	KP-3+747	KP-4+300	1	-	19,000	19,000	0
Total							**1.362.000**	**681.800**

[1] Altınok Mühendislik, 2019, Filyos Port and Filyos Industry Region Railway Junction Line Connections(Including Highway Connection)Surver-Project, Feasibility Work, Geological-Geotechical Survey Report, Ankara

Line	Construction Work	Start	End	Depth of Excavation (m)	Height of Backfill (m)	Area (m)	Excavated Material qty (m^3)	Backfill qty (m^3)
Dock Connection	This area the boundaries of the existing port area construction. Within the scope of port construction, the rail connection will be completed after the excavation and filling works are completed in the area. Since the excavation and earthworks here will be carried out within the scope of port construction, they could not be evaluated within the scope of earthworks.							
Ferry Link								
Port Connection								

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

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 Turkey because it is cheaper and safer. Detonation rate reaches 4400 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 the 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 3-4: Types and number of vehicles planned to be used in the construction phase of the project

Equipment	Number
Backhoe loader	6
Dumptruck	10
Pickup	6
Concrete Mixer	4

Equipment	Number
Mobile (Concrete) Pump	4
Trailer	6
Fuel Tanker	2
Water Tanker	2

3.3.2. Operation and Maintenance Activities

Filyos port and Industrial Zone Railway-Highway Connections Project will be handed over to General Directorate of State Railways (TCDD) after completion of its construction.

It is envisaged that passenger transportation will be carried out with electric train sets consisting of 4 wagons with a capacity of 261 passengers. The line is designed so that electric vehicles can be operated. Technical specifications of the passenger train is given below:

Table 3-5: Technical specifications of passenger train

Technical Specification	Value
Buffer to buffer length	80100 mm
Carriage Width	2825 mm
Carriage Height	4050 mm
Max Operation Speed	140 km/h
Outer Doors	Automatic Sliding Door
Engine Power	750 hp/row
Vehicle Weight	58.9 ton
Vehicle Length	26.85 m
Passenger Capacity (row with 3 person)	196

Within the scope of the project, passenger transportation is planned between Gökçeler Station and Industry Station. While making calculations related to passenger transportation, annual holidays such as public holidays and weekends are taken into consideration and total operation of annually 305 days were calculated. In this case, the number of daily and annual passengers and the number of daily trips between Gökçeler Station and Industry Station are as follows between the years 2023 and 2052.

Table 3-6: Passenger Transportation Information in 2023-2052

Years	Gökçeler Station - Industry Station Daily Passenger Number (Capita)	Gökçeler Station - Industry Station Annual Passenger Number (Capita)	Gökçeler Station - Industry Station Daily Train Voyage Number
2023	2,215	675,575	7
2052	5,570	1,698,823	17

In the calculations related to freight transportation, 1 year is taken as and 365 days, considering that the port operation and freight transportation will work continuously throughout the year. The information regarding freight transportation between Gökçeler Station and Port is given below.

Table 3-7: Information on Freight Transportation between 2023-2052

Year	Gökçeler Station - Industry Station Daily Load (ton)	Gökçeler Station - Port Annual Load (ton)	Gökçeler Station - Port Daily Freight Train Number
2023	5,685	2,075,000	7
2052	14,098	5,145,887	17

In the calculations related to freight transportation, 1 year is accepted as 365 days, considering that the port operation and freight transportation will work continuously throughout the year. The information regarding freight transportation between Gökçeler Station and Port is given below.

Table 3-8: Information on Freight Transport between 2023-2052

Year	Gökçeler Station - Industry Station Daily Load (ton)	Gökçeler Station - Port Annual Load (ton)	Gökçeler Station - Port Daily Freight Train Number
2023	5,685	2,075,000	7
2052	14,098	5,145,887	17

Railways consist of complex mechanical and electrical systems and there are hundreds of thousands of portable parts. In order for the railway service to be safe and secure, the equipment must be kept in good working order and regular maintenance is essential. If the railway is allowed to fail and become insecure due to lack of maintenance, a viable operation cannot be maintained.

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[2]. 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 it will be ensured that the line is clean.

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.

[2] http: //www.railway-technical.com/trains/train-maintenance/

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 local 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 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 systems etc.

3.4. Project Workforce

During the project land preparation and construction period, heavy construction machine operators, railway superstructure-line workers, railway infrastructure & highway infrastructure - superstructure and engineering structures works, station buildings construction workers, electromechanical works workers, engineers, technicians etc. About 150 people, including the group and other employees, will work.

3.5. Implementation Program

The construction of the railway and highway is planned to start in the second half of 2021 and will take approximately 3 years. Construction is planned to be completed by 2024.

3.6. Project Costs and Income

Within the scope of the construction costs of the project, railway line and road connection construction, traction systems, railway overpass, station construction and railway and road bridge, freight ramp, administrative building and construction, application project and engineering services have been taken into consideration and the total land preparation and construction cost has been calculated as approximately 123.700.000€.

Rail and road maintenance costs of the project were counted and it was calculated as approximately 282,680,000 € during 30 years of operation, Road operating expenses have been calculated as approximately 49,133,521 €, Thus, the total cost of the operation is estimated to be approximately 331,814,000 €.

The income of the operation is composed of the wage from passenger and freight transport. Since the project highway line will be a free state road, it is not included in the income calculations.

The main purpose of the project is the transportation of cargoes originating from the Port of Filyos, which has led to a lower passenger transport income than the freight transport income. Due to the proximity of the two stations in the service and the operating times arranged in line with the passenger demand, it was thought that the passengers would mostly prefer the highway. In this context, 30-year passenger and cargo revenues have been calculated as approximately 2,002,700,000 €.

3.7. Other Projects with Footprints Geographically Overlapping with the Project Area

As described in Chapter 1.1 of this report, the geographic coverage of the Filyos Port and Industrial Zone partially overlap with the proposed Project area. The construction of the Filyos Port started back in 2014 and will be completed by end 2020. There is an access road which will be used for the Filyos Port and Industrial Zone, thus, these facilities will be operationalized and functioning irrespectively of the RLIP. Since the project area is located within the footprint of the Filyos Port and Industrial Zone, this ESIA has undertaken environmental and social due diligence to identify whether any potential environmental and social risks to the project activities might be caused by the construction and operation of these facilities. The due diligence is based on the publicly available information on the norms and procedures applied for the envnironemntal and social management of the facilities. The details of the due diligene are presented below.

3.7.1. Filyos Port

The geographical footprint of Filyos Port overlaps with Ferry Connection Line, Port Connection Line and Dock Connection Line that will be constructed in the scope of Project (See *Figure 3-2*). The Filyos Port will serve Ankara, Kırıkkale, Kastamonu, Çankırı, Bolu, Eskişehir, Kayseri, Zonguldak, Bartın and Karabük Provinces. According to the Feasibility Study and zoning plan developed for the Filyos Port and Industrial Zone, the capacity of the Port will allow for handling of 1 million containers and 25 million tons of bulk cargo. The Industrial Zone will also be an important investment area where logistics services will be provided for the investment activities such as manufacturing of electrical equipment, machinery, motor vehicles, trailers (trailers) and semi-trailers (semi-trailers), setting and operation of shipyard, port management and ship repair.

Table 3-9 provides details for the total handling capacity of the ports in the TR81 region covering Zonguldak province and its vicinity.

Table 3-9: Handling in the Project Area and Surrounding Ports, 2012

Port	Total Handling (Tonnes)
Bartın Port	1,317,819
Erdemir Port	8,846,949
Eren Holding Port	4,730,414

Port	Total Handling (Tonnes)
Zonguldak TTK Port	1,786,515
TR81 Total	**16,903,640**
İstanbul	43,533,612
Kocaeli	61,458,478
Turkey	816,996,109

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

The construction of the Filyos Port includes 2,450 meters of main breakwater, 1,370 meters secondary breakwater, 3,000 meters berth with a depth of 14-19 meters, approximately 22 million cubic meters dredging, backfilling and fortification.

Figure 3-3: View from Filyos Port Construction

Source: GDII Official Website

Figure 3-4: View from Filyos Port Construction Site

The EIA regulation specifies construction of ports in Annex 1 as requiring the EIA, however, the Filyos Port construction has been exempted from the EIA study since Filyos Port Development Plan was approved before the effective date of EIA regulation. However, the Filyos Port construction was planned to be supported by EU funding, thus, a detailed EIA study was conducted in 2009 as per the provisions of EU EIA Directive Annex 1. The EIA Study identified potential impacts, both positive and negative, of the construction and operation of the Filyos Port, which related to increased employment, increased local economy, increased population, increased land price, loss of agricultural lands, emissions, wastewater discharges, solid waste disposal and loss of sensitive habitats, and suggested mitigation measures. Two Public Consultation Meetings were organized in 2009 and 2010 within the scope of the EIA studies.

Since the Filyos Port project is exempted from the EIA regulation, there is no national legal requirement to perform environmental or social monitoring of ongoing construction activities. However, the construction and operation of the Port have to be performed in compliance with the requirements of national environmental legislation in force (as listed in Chapter 2.2 of this ESIA). Since 2014, when the construction of the Port started, there have been no known/recorded environmental social incompliances revealed during the construction period. The construction of the Filyos Port is planned to be completed by the end of 2020.

The area needed for the backcourt of Filyos Port was expropriated. The 1/25.000 and 1/1.000 Scale Environmental Development Plans were approved by the Ministry of Environment and Urbanization. No significant concerns were indicated by local people during the consultaitons performed during the site studies in the scope of this ESIA.

Based on the analysis of the available information regarding the management of potential environmental and social impacts associated with the construction and operation of the Port, no major environmental and social risks to the proposed Project activities are expected to be caused by the Filyos Port since the spatial extent of the overlap is limited, the construction and operation of the Port are subject to national environmental legislation and also governed by the recommendations of the EIA Study. Main monitoring parameters within the project area, such as noise level, vibration, air quality and soil quality, will be monitored throughout the project implementation, and mitigation measures will be updated accordingly, if needed.

3.7.2. Filyos Industrial Zone

The planned Filyos Industrial Zone is located between the Zongulak and Bartin provinces in the delta where the Filyos River flows into the Black Sea. The geographical footprint of Filyos Industrial Zone overlaps with Gökçeler - Industry Line and Highway connection. The decision for the construction of the Filyos Industrial Zone was taken back in 2014, with existing highway envisaged as an access road, however, the construction itself has not started yet. For the Industrial Zone to be ready for investments, it is necessary to complete the mapping, and thenthe preparation of the geological-geotechnical survey report, the development plan and the parceling plan, the preparation of the infrastructure projects and the construction of the infrastructure. The Ministry of Industry and Technology manages these preparatory works as per the relevant legislation. The current map of the Filyos Industrial Zone has been approved by the General Directorate of Industrial Zones.

Irmak-Karabük-Zonguldak Railway Line, which crosses the border of Filyos Industrial Zone, connects the region to Ankara and Central Anatolia. The studies for the Adapazarı-Karasu-Ereğli-Bartın Railway Line, which will connect all the ports in the Western Black Sea and the Filyos Industrial Zone with East Marmara, are ongoing.

The expropriation of the lands situated in the Filyos Industrial Zone was completed in 2010. The feasibility studies of the Filyos Industrial Zone have been completed by Ministry of Industry and Technology. The start of the construction of the Industrila Zone has not been determined yet.

According to the feasibility studies conducted for the Filyos Industrial Zone, there are areas that have to be protected and cannot be used as industrial areas such as 4 km long and 300 m bed width (119 hectares), 106 hectares of wetlands, 20 hectares of sandy areas. Therefore, in the Filyos Industrial Zone with a size of 597 hectares, approximately 220 hectares of industrial area consisting of 8-10 parcels of 5-30 hectares will be created at best. The other environmental and social aspects considered while selecting the location of the Filyos Industrial Zone, included the location of agricultural lands and forest areas, the need to ensure flood control in the vicinity of Filyos Creek, existing zoning plans, quality of surface and groundwater and the presence of cultural heritage sites. For the Filyos Industrial Zone planning and operation, the following permits and agreements have been sought and obtained by the Ministry of Industry and Technology:

- Zonguldak Provincial Directorate of Agriculture has granted permission for the area to be declared as the Industrial Zone under the Land Protection and Land Use Law No. 5403.

- In the opinion letter of the Ministry of Environment and Forestry, General Directorate of Nature Conservation and National Parks, dated 25.04.2011 and numbered 36154; it is stated that there is no objection in declaring the requested site as an Industrial Zone.
- (Former) Ministry of Environment and Forestry General Directorate of State Hydraulic Works, Department of Survey and Plan stated there are upstream development project of Filyos River (5 flood protection plan and 7 flood trap planned on the Filyos River membrane) in the area where the facilities have not been put into practice yet but planned to be declared as Industrial Zone. It has been stated that part of the construction of flood protection for Zonguldak-Çaycuma Filyos River Flood Protection 2nd Part Construction Work has been completed and the area proposed as Industrial Zone will be protected from flood after the completion of the work. It has been stated that the area proposed as the Indsutrial Zone has been considered as appropriate, provided that the Zonguldak-Çaycuma Filyos River Flood Protection Part 2 Project is taken into consideration.
- In the letter of opinion No. 33406 dated 15.04.2011 of the Ministry of Environment and Forestry, General Directorate of Environmental Management; Since the drinking and utility water needs of the settlements around the Filyos River are supplied from caisson wells fed by the Filyos River, the current quality of Filyos Stream and groundwater should be maintained and therefore the industrial and domestic wastewater to be formed as a result of the studies to be carried out in the area and the Filyos River and that the existing quality of groundwater should not be adversely affected, and the facilities to operate in this field and the central wastewater treatment plant of the Industrial Zone should be put into operation simultaneously,
- In the letter of opinion of Special Environmental Protection Agency of the Ministry of Environment and Forestry dated 24.03.2011 and numbered 2711; the proposed area is not within the authority and responsibility area of the agency, since it is outside the borders of the Special Environmental Protection Area,
- Ministry of Environment and Forestry, General Directorate of Environmental Impact Assessment and Planning stated in their opinion letter that it is determined that the sectors envisaged to be established in the Industrial Zone are the sectors that may cause pressure and intense pollution on the receiving environment, and the environmental monitoring be performed before the establishment of industrial facilities. It is stated that it is thought to be appropriate to use the bookmark techniques and technologies, and consequently, it is considered that it will be appropriate to declare the region as an Industrial Zone,
- It has been stated by the Ministry of Culture and Tourism, the General Directorate of Cultural Heritage and Museums that the conservation development plan to be approved by the conservation board for the 1st degree archaeological site within the borders of the Industrial Zone, and a conservation plan for the 3rd degree archaeological site should be prepared.

Based on the analysis of available information and permits issued by relevant government agencies, no major environmental and social risk are expected to be caused to the project activities by the construction and operation of the Filyos Industrial Zone as its environmental and social management will be in accordcane with the requiremetns of the national environmental legislation, and also in line with requirements set forth in the permits and opinion letters above. The land expropriation works have been completed as stated in Chapter 1.1. The main parameters, such as noise, vibration, air quality and soil quality, will be monitored within the project area throughout the project implementation, and mitigation measures will be updated accordingly, if needed.

4. BASELINE CONDITIONS

4.1. Land Use, Soils and Geology

4.1.1. 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 south of this village.

The project construction area will cover approximately 52.86 hectares. According to the land asset data of the Ministry of Agriculture and Forestry, there are fallow-free dry agricultural areas, residential areas, forest areas and river floodplains on the railway route and the construction site. (Figure 4-1).

As it can be seen from Figure 4-1, large portion of the construction area passes through fallow-free dry farming lands. Besides, there are residential and forest areas on the project route and construction area. (Table 4-1).

Railway and highway 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 approximately 6700 m^2. However, this area has been damaged due to the existing port construction.

Table 4-1: Land Use Types in the Project Study Area

Land Use Type	Total Area (ha)	Percentage
Dry Farming (fallow-free)	43.46	82.22%
Residential Area	3.30	6.25%
Forest	3.20	6.06%
River Flood Plain	2.22	4.19%
Coastal Dunes	0.67	1.28%
Total	**52.86**	**100.00%**

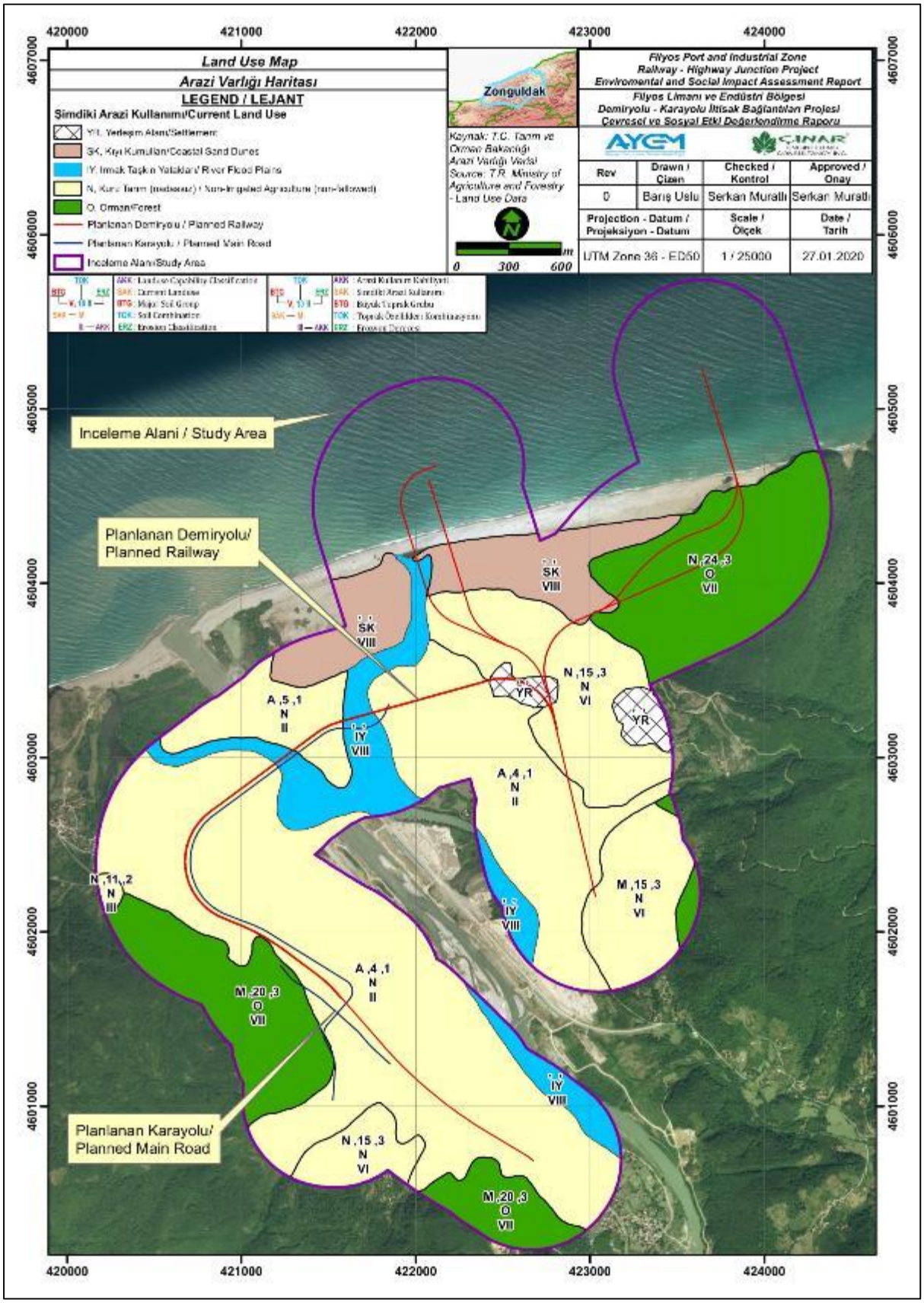

Figure 4-1: Land Asset Map of the Project Area

Land use capability classes that are defined by the Ministry of Agriculture and Forestry are presented below.

Table 4-2: 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.

Project construction area is examined and it is seen that 61.31.percent of the area consists of agricultural lands where soil is suitable for cultivation. All of these areas are fallow-free dry agricultural lands with Class-II LUC (Agricultural lands suitable for long-term soil cultivation for many types of crops).

Approximately 27 percent of the area consists of agricultural land where the soil is not suitable for cultivation. These areas are fallow-free dry agricultural lands (20.91%) and forests (6.06%). The river floodplains and coastal dunes that cover 4.20 percent of the area comply with the class of lands that are not suitable for agriculture. Residential areas are not classified since these lands are not capable to be used as agricultural lands.

Table 4-3: Land Use Capability Classes According to Land Use Types

Land Use Type	LUC Class	Area (ha)	Percentage
Dry farming (fallow-free)	II	32.41	61.31%
	VI	11.05	20.91%
Forests	VII	3.20	6.06%
River Flood Plains	VIII	2.22	4.20%
Coastal Dunes	VIII	0.67	1.27%
Residential Area	-	3.30	6.25%
Total		**52.86**	**100.00%**

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 4-4.

Table 4-4: Suitable Land Uses According to the Land Use Capability Classes

LUC	Wildlife	Forestry	Pasture			Agriculture		
			Limited	Moderate	Intensive	Limited	Moderate	Intensive
Class I								
Class II								
Class III								
Class IV								
Class V								
Class VI								
Class VII								
Class VIII								

The areas defined as Class VI, VII and VIII within the project area are not suitable for agricultural use. In the light of this information, 32.41 hectares of fallow-free dry farming land which constitute 61.31% of the area is suitable for agriculture.

4.1.2. Soils

4.1.2.1. Major Soil Groups

According the land asset data of the Ministry of Agriculture and Forestry, the main soil types on the project route were determined. Accordingly, 56% of the project area is Alluvial Soils, 26% Non-Calcareous Brown Forest Soils and 18% Brown Forest Soils. (Table 4-5).In Chapter 4.1.1, the areas defined as river floodplain, residential area and coastal dunes are not included in major soil group assessment.

Table 4-5: Distribution of Major Soil Groups in the Project Area

Major Soil Groups	Total Area(ha)	Percentage
Alluvial Soils	452.96	56%
Non-Calcareous Brown Forest Soils	211.71	26%
Brown Forest Soils	142.56	18%

Major Soil Groups Map of the project area is given in Figure 4-2.

Detailed characteristics of the major soil groups in the study area 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.

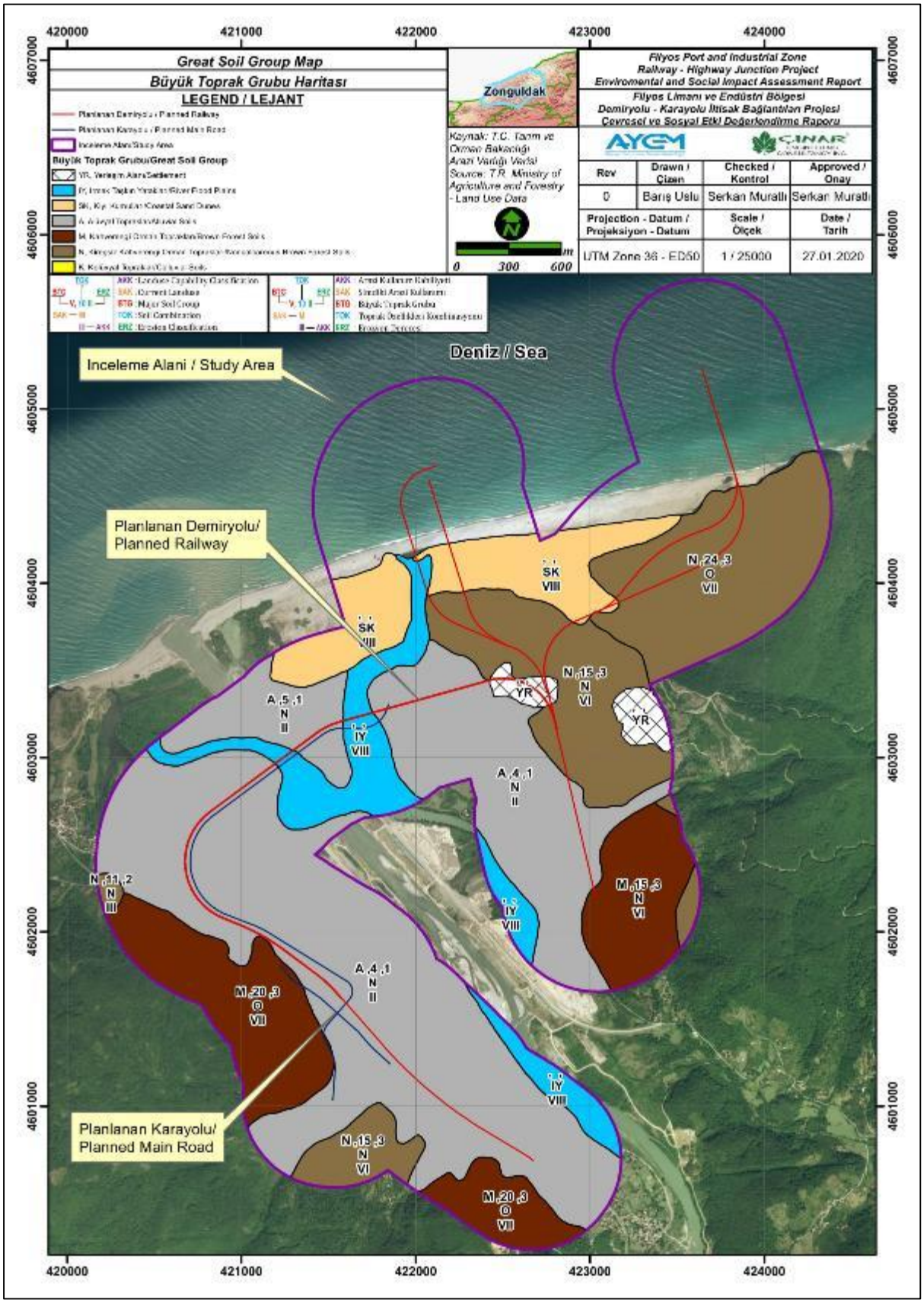

Figure 4-2: Major Soil Groups Map of Project Area

4.1.2.2. 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 Turkey 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 on the construction area by erosion degrees is presented in Table 4-6. Accordingly, 56% of the area is 1st degree, 43% 3rd degree, and 0.31% 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 4-6: Erosion Degree Classification of the Construction Area

Erosion Degree	Total Area (ha)	Percentage (%)
Degree 1	452.96	56.11%
Degree 2	2.50	0.31%
Degree 3	351.77	43.58%
Total	**807.23**	**100%**

The erosion map of the project study area is presented in Figure 4-3.

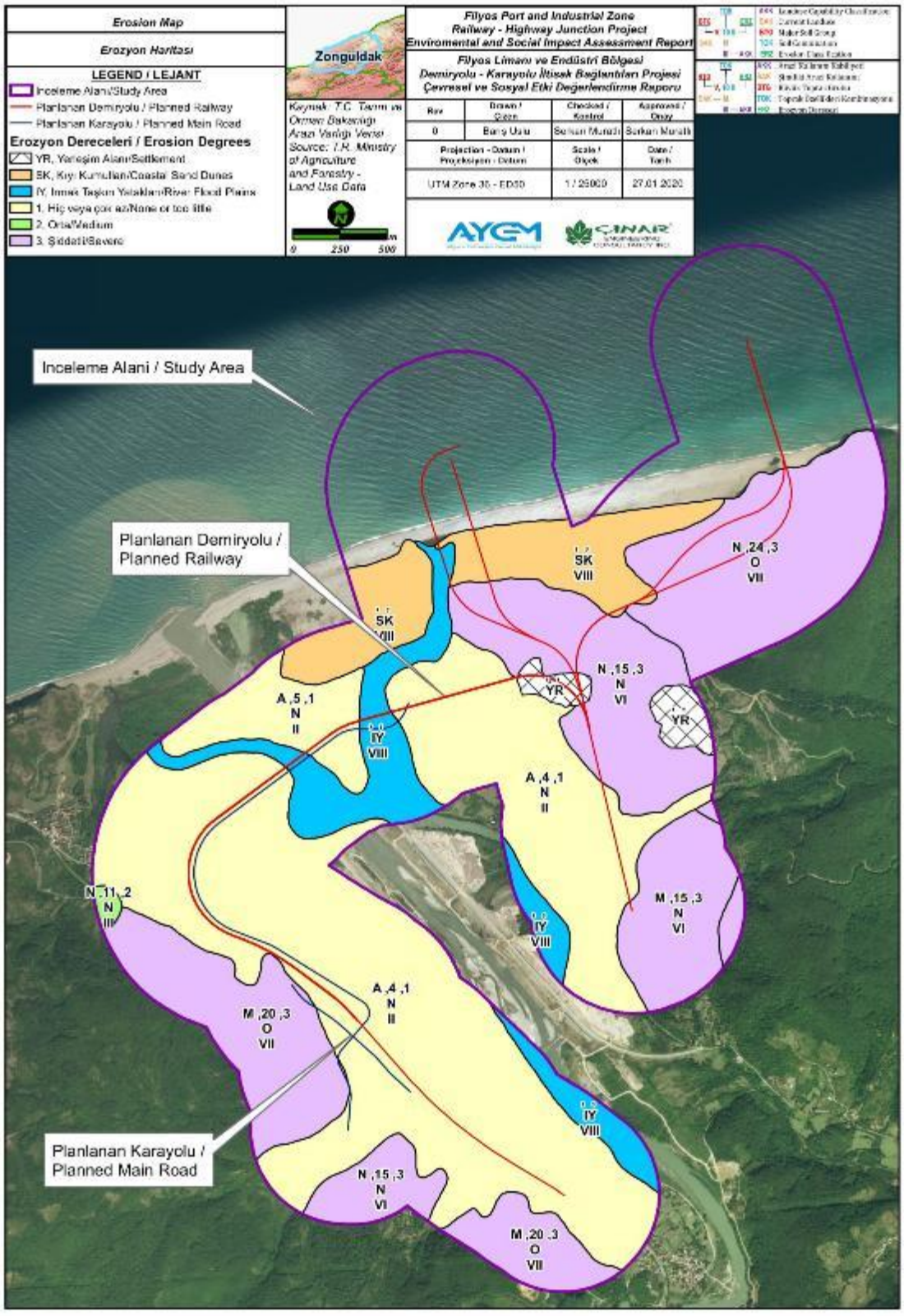

Figure 4-3: Erosion Map of the Project Area

4.1.2.3. Baseline Soil Quality

In order to determine the baseline soil quality around the project area, samples were taken from 2 points. Those points are shown on the Figure 4-4 and their information is given in Table 4-7. 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. Analysis results of soil samples and related limit values are given in Table 4-8.

Table 4-7: Information on Soil Sampling Points

No	Sampling Location	Coordinates
T-1	Industry	422986 E, 4602353 N
T-2	Gökçeler	421991 E, 4601094 N

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

Soil samples taken are reference samples. 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. Analysis results are given below.

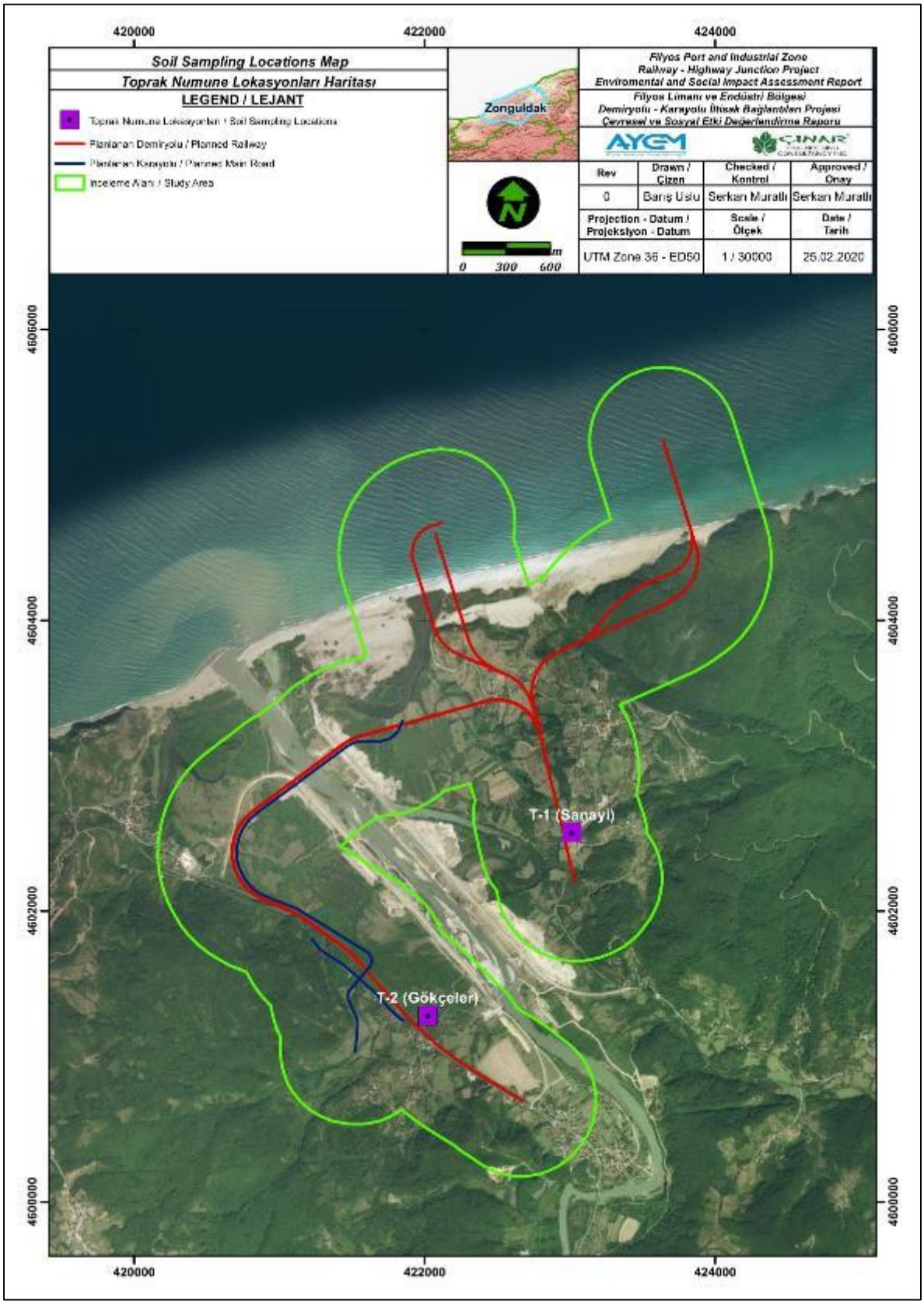

Figure 4-4: Soil Sampling Locations

Table 4-8: Analysis Results of Soil Samples

Parameter	Unit	T1	T2	Soil Quality Standards Set by the Canadian Council of Environment Ministers for the Protection of the Environment and Human Health*			
				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	6 - 8	6 - 8	6 - 8	6 - 8
Antimony (Sb)	mg/kg	< 0.050	< 0.05	20	20	40	40
Arsenic (As)	mg/kg	4.97	3.344	12	12	12	12
Copper (Cu)	mg/kg	33.2	15.274	63	63	91	91
Barium (Ba)	mg/kg	107	< 2	750	500	2.000	2.000
Beryllium (Be)	mg/kg	0.549	0.274	4	4	8	8
Boron (B)	mg/kg	< 2.00	< 2	2	-	-	-
Mercury (Hg)	mg/kg	0.297	< 0.1	6.6	6.6	24	50
Zinc (Zn)	mg/kg	72.8	< 0.5	250	250	410	410
Silver (Ag)	mg/kg	< 0.100	< 0.1	20	20	40	40
Cadmium (Cd)	mg/kg	0.226	< 0.05	1,4	10	22	22
Tin (Sn)	mg/kg	0.119	< 0.05	5	50	300	300
Cobalt (Co)	mg/kg	10.6	6.580	40	50	300	300
Lead (Pb)	mg/kg	14.1	1.54	70	140	260	600
Molybdenum (Mo)	mg/kg	0.253	< 0.05	5	10	40	40
Nickel (Ni)	mg/kg	15.4	22.322	45	45	89	89
Selenium (Se)	mg/kg	0.804	0.457	1	1	2,9	2,9
Thallium (Tl)	mg/kg	0.152	< 0.05	1	1	1	1
Titanium (Ti)	mg/kg	273	70.076	-	-	-	-
Uranium (U)	mg/kg	0.359	0.183	23	23	33	300
Vanadium (V)	mg/kg	60.2	24.343	130	130	130	130
Chromium(Cr)	mg/kg	14.4	19.567	64	64	87	87
Oil and Grease	%	< 0.02	< 0.02	-	-	-	-
BTEX	mg/kg	< 0.1	< 0.1	-	-	-	-

Parameter	Unit	T1	T2	Soil Quality Standards Set by the Canadian Council of Environment Ministers for the Protection of the Environment and Human Health*			
				Agricultural Use (mg/kg)	Use for Residential / Parking Areas (mg/kg)	Use for Commercial Purposes (mg/kg)	Use for Industrial Purposes (mg/kg)
TVOCs	mg/kg	< 0.01	< 0.01	-	-	-	-
TPH	mg/kg	131	120.3	-	-	-	-

4.1.3. Geology

In this chapter; the evaluations regarding the general and structural geology and tectonism of the area planned for the railway route are explained. All information are obtained from the project prepared in 2018, "Filyos Port and Filyos Industrial Zone Railway Junction Line (Including highway connection) Geological and Geotechnical Investigations Report" and Geological Map of Turkey Series, Zonguldak-E28 Sheet prepared by the MTA of 1 / 100,000 scale.

4.1.3.1. General Geology

In the east of the Istanbul Zone, where the study area is located, in the north of Kastamonu-Arac 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.

In the region; with the increase of tectonic activity before Malm, Ereğli, Yılanlı, Alacaağazı, Karadon, Çakraz and Çakrazboz formations have ascended and formed a wear area. Malm-Early Apsian tectonics is a period of relaxation, and positive areas have been the shelf-platform of İnaltı deposition, which has become the slope-deep sea in Apsian-Albian. During the Malm-Early Albian period, the basin turned into a basin that is suitable for the sedimentation of Ulus formation. It is the period in which the tectonic activity increases in the pre-santonian (possible Turonian) region. Due to the compression, İnaltı formation, which ascends in the basin, is turned northward and transfer material to Yemişliçay formation. It is the period in which tectonic activity increases between Campanian and Maastrichtian. In this period, both volcanic activity increased and underwater surface out cropping of Çakraz, İnaltı, Kilimli and Ulus formations took place in compressed horizontal movements. Maastrichtian is the period of stability in terms of tectonics. In this period, pelagic-semi-pelagic limestones of Akveren formation were deposited transiently with volcanites (Akbaş et al., 2002) (Figure 4-5).

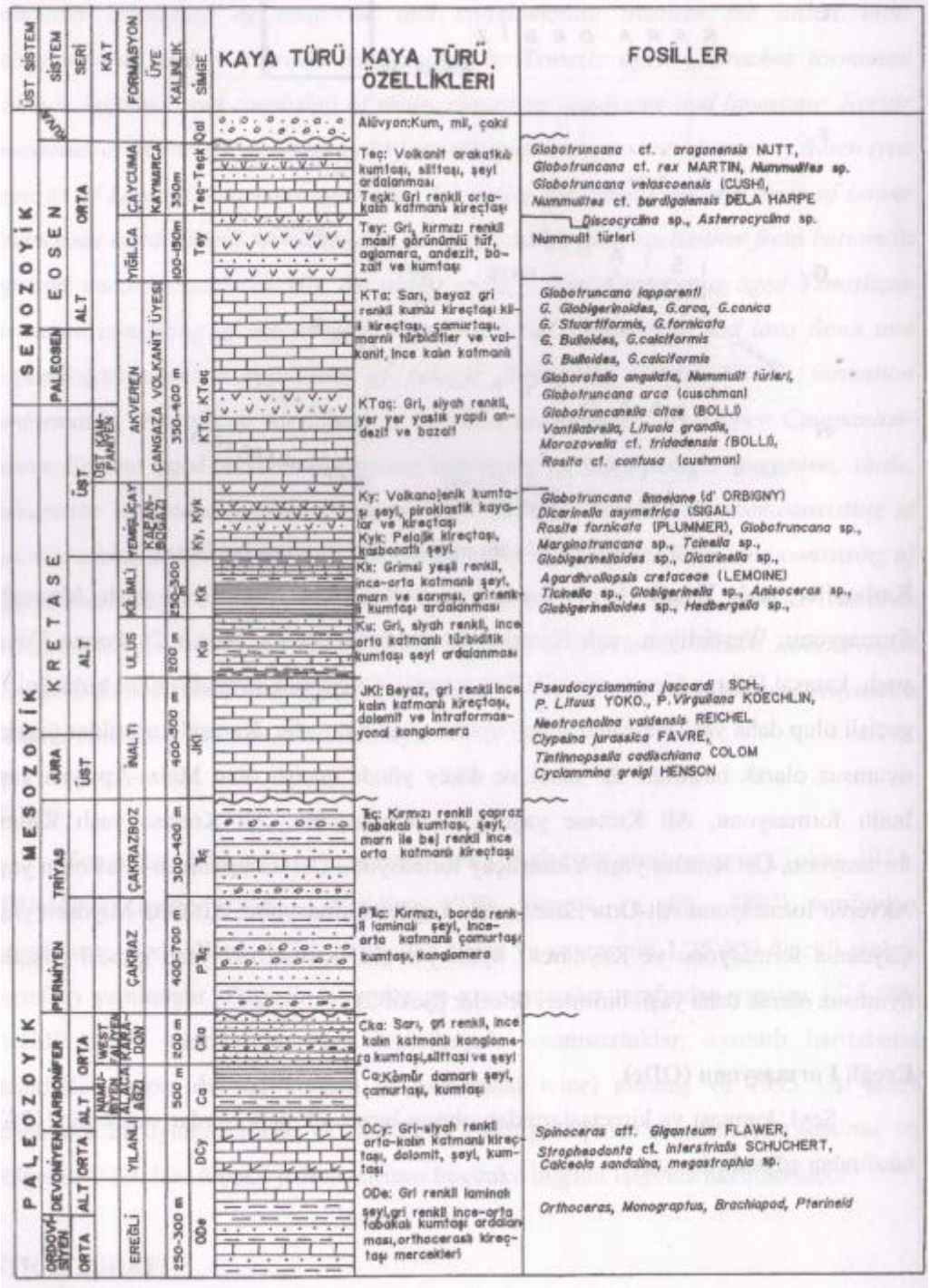

Figure 4-5: Generalized Stratigraphic Column Cross-Section of the Rocks on and around the Project Route

Source: Akbaş,B. et al., 2002

Units outcropped near the railway route are from oldest to youngest: 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.

4.1.3.2. Structural Geology

Turkey, 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), is 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.

Turkey'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 Tuyuz, 1999).

Map of Turkey's tectonic units are presented in Figure 4-6.

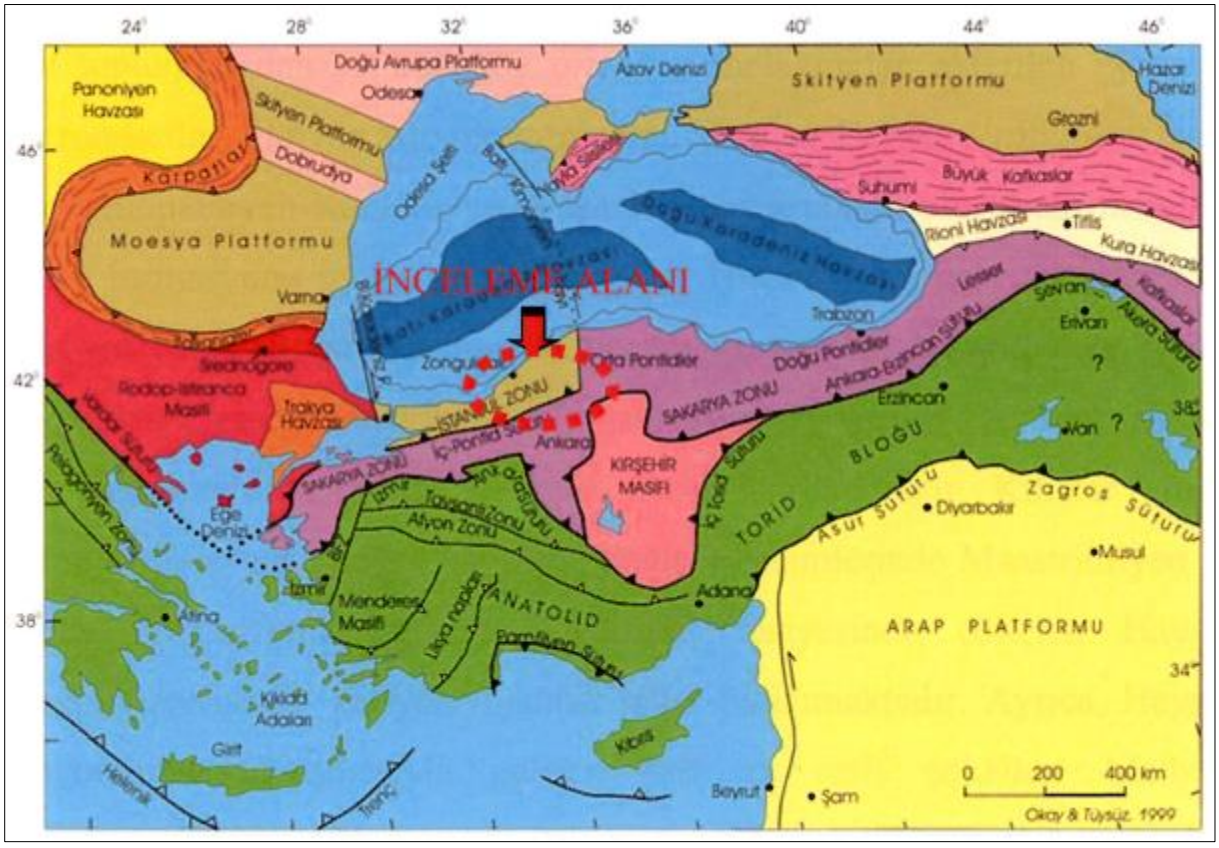

Figure 4-6: Turkey's Tectonic Units

Source: Okay and Tüysüz, 1999., GDII 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 Turkey, today 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 Turkey's neotectonic structures and fault zones are presented in Figure 4-7.

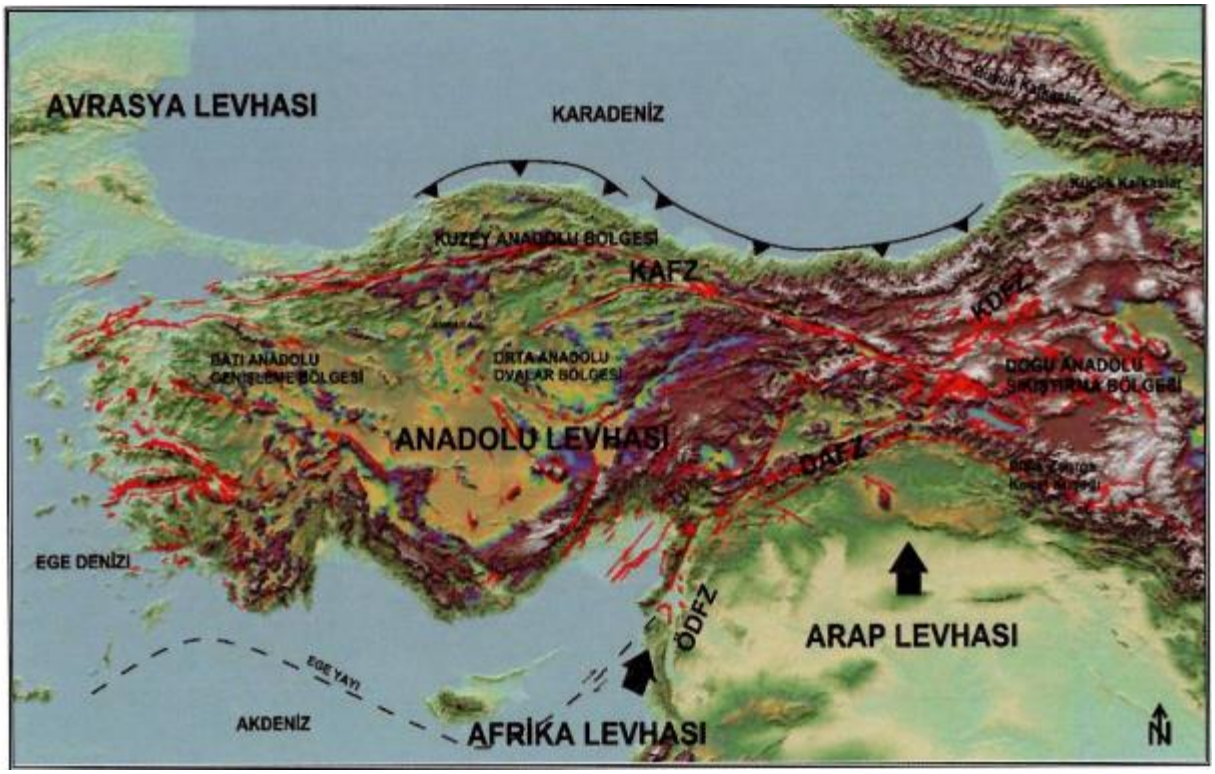

Figure 4-7: Map of Turkey's Neotectonic Structures and Fault Zones

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 and its surrounding provinces, was influenced by the orogenic movements 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.

4.1.4. Geology of the Railway Route

Filyos Port and Filyos Industrial Zone, Railway Connection Line Connection (Including Required Highway Connection) Survey-Project, Geological-Geotechnical Survey Report" has been prepared.The geological units and their lithological properties, geotechnical evaluations and natural disasters observed as a result of the surface geology studies carried out within the scope of the said report are summarized as below.

4.1.4.1. Stratigraphy

The railroad routes and the units passing along the highway connection are from oldest to youngest; Mesozoic Period Cretaceous aged Yemişliçay Formation (Ky) and Quaternary aged Alluvium (Qal) deposits. The generalized stratigraphic column section of the railway and highway routes and its surroundings is given in Figure 4-8 and the geology map of the project study area is given in Figure 4-9.

These geological units are described below from oldest to youngest with their lithological features.

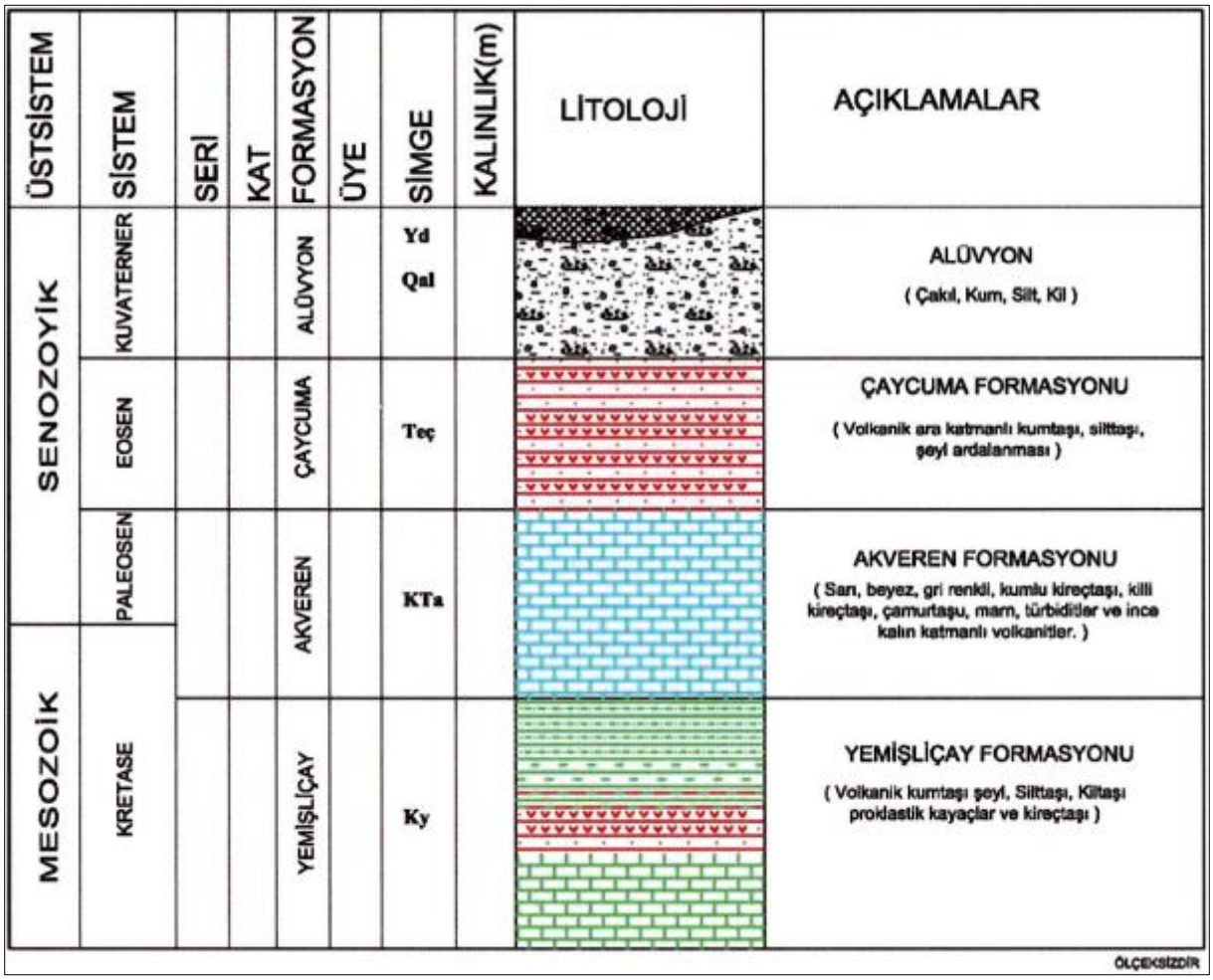

Figure 4-8: Generalized Stratigraphic Column Section of the Rock Routes of the Project Routes and Its Surroundings

Source: GDII and Altınok,2018

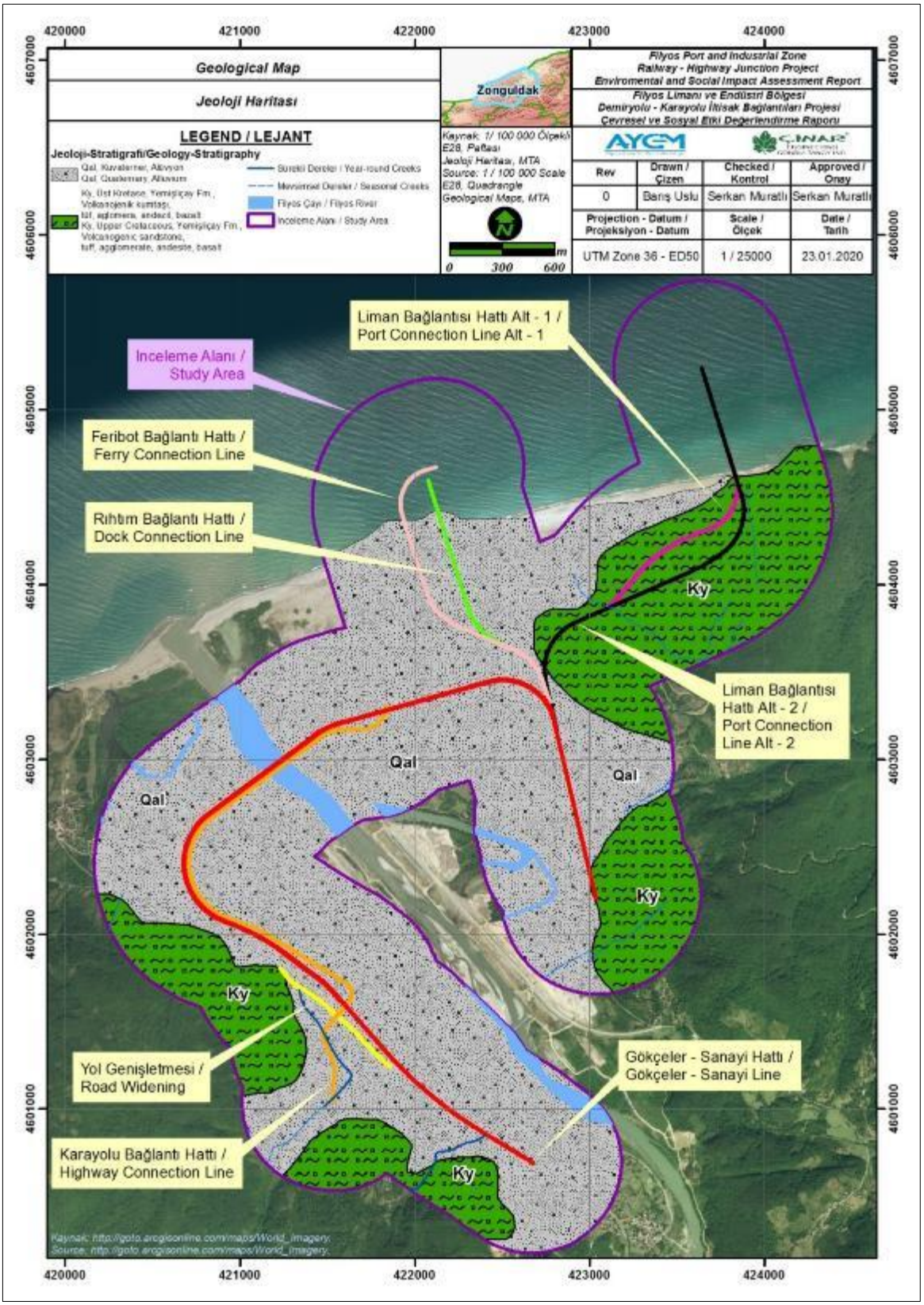

Figure 4-9: Geology Map of the Study Area

Source: Akbaş, et.al., 2002

Mesozoic

Cretaceous

Yemişliçay Formation (Ky)

This formation consists of volcanic sandstone, siltstone, claystone, shale and pyroclastic rocks, and pelagic-semi-pelagic limestones and is named after the Yemişliçay village in the Sinop region (Ketin and Gümüş, 1963). The formation is generally brown, thin to medium layered volcanogenic sandstone, grayish green colored, thin to medium layered shale, sandstone, siltstone alternation, tuff, tuffite; beige and red-pink colored, thin-medium layered pelagic-semi-pelagic clayey limestones in the middle sections; on the upper parts, it is represented by brown and dark gray agglomerates.

Quaternary

Alluvion (Qal)

It is gravel, sand, clay, silt and mud deposits in the flat beds developed on the old pits. It mostly consists of units that are not attached or attached very little.

4.1.4.2. Geotechnical Characteristics

Within the scope of the project, in order to determine groundwater level and geological-geotechnical properties of the grounds of important engineering structures, foundation borehole studies in 48 points at total 1298.8 m, seismic refraction measurements in 34 points, microtremor measurement at 14 points and electrical resistivity tomography measurements in 5 profiles were carried out in geophysical studies.

In drilling works; the aim was to determine the vertical and lateral continuities of geological units, to determine groundwater levels, to perform on-site experiments, to determine the physical properties of the ground and rocks, and to take samples that have been disturbed / undisturbed. Physical and mechanical laboratory experiments were carried out on soil and rock samples.

It was observed that the alluvium thickness was high during the field observations carried out on the project routes. In this section, the expected alluvial accumulation consists of sand, gravel and gravel blocks from the materials collected by the flood waters. It was determined with the geological profile that clay-silt thicknesses are shallow and lenticular, sand-silt sand, clay silt units are common.

In line with the information obtained from the surface geology of the project routes and the drilling works, the ground lithologies of the project engineering structures are presented below on the basis of routes and formation.

Gökçeler-Industry Line Railway Route Geology

Yemişliçay Formation (Ky)

This Cretaceous formation in the area out cropped between KP: 4 + 810 and KP: 5 + 040 and KP: 5 + 185 and KP: 5 + 690 from the beginning of the route.

SD-35 borehole was drilled between KP: 4 + 810 and KP: 5 + 040 of this route, and different levels of clay and siltstone were found from the surface to the depth of drilling.

These lithological units are generally filled with topsoil; brown, moist low to medium plasticity, solid to very solid, gravel clay; grayish-brown-pied colored less silty, tight-very tight claystone-siltstone containing clay; and grayish colored, locally silty, hard, weathered-moderately weathered, abundant fractured-cracked, locally sandstone interbanded, weakly resistant siltstone.

In addition, drilling wells numbered SD-38 and SD-39 were drilled between KP: 5 + 185 and KP: 5 + 690 of the Gökçeler-Industry line route, and siltstone-claystone units belonging to this formation were encountered on the surface.

There are different levels of clay and claystone-siltstone from the surface to the drilling depth throughout the drilling. These lithological units are generally yellowish brown, nonplastic, very hard, hard consistency, less sandy clay; yellowish brown, locally siliceous, hard, weathered-moderately disintegrated, abundantly fractured-cracked, occasionally interlocking claystone-siltstone containing manganese veins.

Alluvial Sediments (Qal)

Quaternary aged alluvial deposits, are observed from the beginning of Gökçeler-Industry railway line at the regions KP: 0+000 - KP: 3+700; KP: 3+700 - KP: 4+810; KP: 5+040 - KP: 5+185 and KP: 5+690 - KP: 6+305.Among these route intervals, between KP: 3 + 700 and KP: 4 + 810, there are artificial fillings (Yd) on the alluvium deposits, which are the materials used in the construction of the port.

Between KP: 0+000 and KP: 2+220, SD-1, SD-2, SD-3, SD-4, SK-5, SD-6, SD-7 ve SK-8 drilling wells, between KP: 2+640 and KP: 3+400 SK-18, SD-19, SK-20, SD-21, SD-22, SK-23 and SD-24 drilling wells are located and alluvial sediments are found throughout these lines.

These units consist of from the surface along the drilling depth; light brown, moist, low-medium plasticity, low gravel, medium-thick viscosity silty clay-silt; moist, plasticity-free, loose-medium tight-tight, clayey silty gravel sand; and grayish colored, moist, high plasticity, low gravelly, occasionally sand interbanded, medium solid-solid-very solid, clay-silt.

In addition, since the route through which alluvium units pass KP: 3 + 400 and KP: 3 + 700, Filyos Creek passes; Drilling work could not be done on this route, and Electric Resistivity Tomography (ERT) study, one of the geophysical studies, was carried out.

Between KP: 3+700 and KP: 4+150 of the line, SD-26 and SD-28 wells, between KP: 4+150 and KP: 4+810, SD-31, SD-32, SD-33 and SD-34 drilling wells are located. Alluvial deposits were found in these wells along with artificial filling, which are the materials used in the construction of the port from the surface. These alluvial deposits are generally composed of grayish-brown-mottled, less silty, tight-very tight sandy gravel; gray dark colored, clay intermediate band, medium tight-tight sand; and silty, less sandy, medium plasticity, organic content in places, solid-very solid-hard-tempered silty clay-silt, clay-silt and solid-consistency hard sandy silt.

Between KP: 2+220 and KM: 2+640 of this route there is SD-17 drilling well, between ; KP: 5+040 - KP: 5+185 SD-36 and SD-37 drilling wells, between KP: 5+690 - KP: 6+305, SD-40, SD-41, SD-42 and SD-43 drilling wells are located. During the drillings in these sections, alluvial deposits (Qal) are found at the top and siltstone units of Yemişliçay formation (Ky) are found at the bottom.

Road Widening Route Geology

Alluvial Sediments (Qal)

Quaternary aged alluvial sediments are located between KP: 0 + 000 and KP: 0 + 805, the 'existing road widening route' planned as a connection to the existing highway. Along this route, SK-5, SD-6, SD-7, SK-8, SK-12 and SK-13 foundation boreholes are located and throughout the drilling depths, light brown, moist, low to medium plasticity, low gravel, medium to thick consistency silt clay-silt; moist, plasticity-free, loose-medium tight-tight,

clay silt gravel sand and gravel; and grayish colored, moist, high plasticity, less gravels, partly sand interbanded, medium-solid-very solid-clayey silts were found.

Highway Connection Line Geology

Yemişliçay* Formation *(Ky)

Yemişliçay Formation (Ky) has never been encountered on the surface along the highway connection route. However in the 16,50-21,50 m depth of the SK-10 foundation borehole between the KP: 0+000 and KP: 0+475, there is siltstone belonging to Yemişliçay formation with grayish brown, locally siliceous, hard, undifferentiated-moderately weathered, abundant fractured cracks, locally sandstone interbanded, weakly resistant.

Alluvial Sediments *(Qal)*

Quaternary aged alluvial deposits are found along the highway route (KM: 0 + 000 to KM: 3 + 468).

Between KM: 0+000 and KM: 0+475 of these route, SK-9 and SK-10 foundation boreholes are located. Among those, Quaternary aged alluvium sediments and siltstone belonging to Cretaceous Yemişliçay Formation were found in SK-10 along its depth. Besides, SK-11 (KP: 0+475 - KP: 0+780), SK-14, SK-15 and SK-16 (KP: 0+780 - KP: 1+580); SK-17 (KP: 1+580- KP: 1+850) foundation boreholes are located in continuation of this route. Throughout their depths, grayish and brown, moist, low-medium-high plasticity, low gravel, medium-solid consistency, silty clay-clay-gravel clay; grayish mottled, silty sandy, sandy gravel; and grayish brown, plasticity-free, moist, medium-hard consistency, medium firm-firm-very firm, gravel clayey silty sand are observed.

SK-18, SD-19, SK-20, SD-21, SD-22, SK-23 and SK-25 foundation boreholes are located in continuation of this route (KP: 1+850 - KP: 2+600). Throughout their depths, light brown, moist, low-medium plasticity, low gravel, medium-thick consistency silty clay-silt; moist, plasticity-free, loose-medium tight-tight, clayey silty gravel sand; and grayish colored, moist, high plasticity, less gravels, partly sand interbanded, medium-solid-very solid-clayey silt was found.

Apart from this, because the Filyos Creek passes between KM: 2 + 600 and KM: 2 + 900 of the highway connection route; drilling work could not be performed on this route, and Electric Resistivity Tomography (ERT) study, one of the geophysical studies, was carried out.

SK-27, SK-29, SK-30 and SD-31 foundation boreholes are located in KP: 2+900 - KP: 3+468 in this route. In these boreholes, alluvial deposits were found with the artificial filling, which is the materials used in the construction of the port from the surface. Those are generally composed of grayish-brown-mottled, less silty, tight-very tight sandy gravel; gray dark colored, non-plasticized clay intermediate band, medium tight-tight silty sand; and silty, low-sandy low-medium-high plasticity, with organic content in places, solid-very solid-hard consistency silty clay-silt, clay-silt and ortho solid-solid consistency, hard sandy silt.

Port Connection Line Alternative-1 and Alternative-2 Railway Geology

Yemişliçay Formation (Ky)

While the Quaternary aged alluvial sediments found along the First KP: 0 + 400 along the Port Connection Line Alternative-1 and Alternative-2 Railway Routes, the remaining parts of the routes on the land are on the Cretaceous Yemişliçay formation (clay, claystone-siltstone).

Since the construction works continue in the port construction area, only the soil profile of the section of KP: 0 + 000 and KP: 0 + 820 has been determined on the route of the port, SD-37, SD-44 and SD-45 foundation boreholes were opened.

In these foundation boreholes, throughout the depth, brown, moist, low to medium plasticity, gravel, claystone interbanded medium to very solid consistency, silty clay; grayish-brown-mottled, less silty, clay-bound, firm-very tight, clayey gravels containing silt and siltstone blocks; and yellowish grayish brown, locally siliceous, hard, weathered-moderately weathered, occasionally altered, abundant fractured cracked, weakly resistant claystone-siltstone alternation were found.

Ferry and Dock Connection Line Geology

Quaternary aged alluvium units are found along the ferry and dock connection routes, under which the Cretaceous Yemişliçay formation is located. Since the construction works continue in the port construction area, soil profile of KP: 0+000 and KP: 0+820 of this line is determined. SD-37, SD-46, SD-47 and SD-48 boreholes are located here.

Throughout the depth of these boreholes, brown, moist, low to medium plasticity, gravel, claystone interbedded, medium to very solid consistency, silty clay; grayish-brown-mottled, less silty, clay-bound, firm-very tight, clayey gravels containing silta and siltstone blocks were found and under; weakly resilient claystone-siltstone alternation of grayish-brown, partly siliceous, hard, weathered-moderately weathered, locally altered, abundantly fractured, of the Cretaceous aged Yemişliçay formation were found.

Assessment of Units in terms of Engineering Geology

As a result of the drilling and surface geology studies carried out along the project routes, 2 different geological units were encountered. These are from old to young;

- Cretaceous aged Yemişliçay formation (Ky)
- Quaternary aged alluviums composed of clay and silt

In the cuts and fills to be constructed along the project routes, the sections where the cuts and fills are high were evaluated as critical and the geotechnical evaluations and slope stability analysis results in these sections are presented in Table 4-9 - Table 4-12.

Table 4-9: Information on Cut&Fill Construction in Critical Regions of Gökçeler-Industry Railway Line

No	Start	End	Fill Length (m)	Maximum Cut/Fill Height					Geological Unit
	KP	KP		KP	Left	Axis	Right	Maximum Value (m)	
Fill-1	0+400	1+700	1+300	-	-	-	-	2,0	Qal
Fill -2a	1+700	2+400	700	2+300	-	3,79	3,03	3,4	Qal
Fill -2b	2+400	3+360	960	3+320	6,45	6,43	5,95	6,5	Qal
Fill -3	3+760	4+192	432	4+020	7,08	6,95	6,65	7,1	Qal
Fill -4	4+232	4+760	528	4+380	6,17	6,18	5,86	6,2	Qal
Cut-1	4+760	5+060	300	4+920	20,10	15,49	13,62	20,0	Ky
Cut-2	5+060	6+305	1245	5+480	57,43	32,25	19,17	57,0	Ky

Source: GDII and Altınok, 2018

Table 4-10: Slope Stability Analysis Results for Gökçeler-Industry Railway Line Cut&Fills

Cut/Fill Profile Name (Route)	No	Conditions	Slope	Cut/Fill Foundation	Calculated Safety	Min Safety Required	Results
D-2a Fill Profile (KP: 1+700-2+400) Max. Fill KP: 2+300	1	Static(No-drainage)	2y/1d	Granulated Fill	2,30	1,50	The cuts to be formed with this slope are sufficiently secure in case of unreinaged earthquake
	2	Static (Drainage)			2,00	1,50	
	3	Eathquake(No-drainage)			1,50	1,10	
D-2b Fill Profile (KP: 2+400-3+360) Max. Fill KP: 3+320	1	Static(No-drainage)	2y/1d	Granulated Fill	1,80	1,50	The cuts to be formed with this slope are not sufficiently secure
	2	Static (Drainage)			1,80	1,50	
	3	Eathquake(No-drainage)			0,60	1,10	
D-3 Fill Profile (KP: 3+760-4+192) Max Fill KP: 4+020	1	Static(No-drainage)	2y/1d	Granulated Fill	1,80	1,50	The cuts to be formed with this slope are not sufficiently secure
	2	Static(drainage)			1,80	1,50	
	3	Eathquake(No-drainage)			0,80	1,10	
Y-1 Cut Profile (KP: 4+760-5+060) Max Cut KP: 4+920	1	Static(No-drainage)	2y/1d	Gravel Clay, Clayey Graveli Siltstone	2,20	1,50	The cuts to be formed with this slope are sufficiently secure
	2	Static(drainage)			1,50	1,50	
	3	Eathquake(No-drainage)			1,20	1,10	
Y-2 Cut Profile (KP: 5+060-6+305)Max Cut KP: 5+480	1	Static(No-	2y/1d	Silty Clay Gravel Clay, Siltstone	1,70	1,50	The cuts to be formed with this slope are sufficiently secure
	2	Static(drainage)			1,80	1,50	
	3	Eathquake(No-drainage)			1,20	1,10	

Source: GDII and Altınok,2018

Table 4-11: Potential of Settlement and Swelling Potential Analysis Results of Cut and Fills on Gökçeler-Industry Railway Line

Cut/Fill Profile Name (Route)	No	Cut/Fill Foundation	Settlement (cm) / Swelling Potential
D-1 Fill Profile (KP: 0+400-1+700), Max Fill KP: (-)	1	Clay, Silty Sand	It is necessary to fill in the place by digging approximately 1.5 m from the ground level in case of possible bearing power and settlement problems.
D-2a Fill Profile (KP: 1+700-2+400) Max Fill KP: 2+300	1	Sand	It has been neglected that the sudden settlements that will occur in the unit will take place during the fill construction.
	2	Silt-1, Silt-2	10,50 cm
D-2b Fill Profile (KP: 2+400-3+360) Max Fill KP: 3+320	1	Sand	It has been neglected that the sudden settlements that will occur in the unit will take place during the fill construction.
	2	Silt	46,64 cm
D-3 Fill Profile (KP: 3+760-4+192) Max Fill KP: 4+020	1	Sand	It has been neglected that the sudden settlements that will occur in the unit will take place during the fill construction.
	2	Silt	48,90 cm
D-4 Fill Profile (KP: 4+232-4+760) Max Fill KP: 4+380	1	Sand	It has been neglected that the sudden settlements that will occur in the unit will take place during the fill construction.
	2	Silt	82,00 cm
Y-1 Cut Profile (KP: 4+760-5+060) Max Cut KP: 4+920	1	Cut foundation is siltstone.	Since the cut foundation is siltstone, settlement and swelling potential is not expected
Y-2 Cut Profile (KP: 5+060-6+305) Max Cut KP: 5+480	1	Cut foundation is siltstone.	

Source: GDII and Altınok,2018

Table 4-12: Liquefaction Analysis Result for Cuts&Fills along Gökçeler-Industry Railway Line

Cut/Fill Profile Name (Route)	Cut/Fill Foundation	Liquefaction Potential Status
D-1 Fill Profile (KP: 0+400-1+700), Max Fill KP: (-)	Clay, Silty Sand	Since the first 4.0 m of the foundation is at the level of clay and the silty sand below it, SPT N1,60 ≥ 20, this ground has been identified as a non-liquefaction ground and no liquefaction analysis has been performed.
D-2a Fill Profile (KP: 1+700-2+400)	Sand; Silt-1, Silt-2	Liquefaction potential
D-2b Fill Profile (KP: 2+400-3+360)	Sand; Silt	Liquefaction potential
D-3 Fill Profile (KP: 3+760-4+192)	Sand; Silt	Liquefaction potential
D-4 Fill Profile (KP: 4+232-4+760) Max Fill KP: 4+380	Sand; Silt	Due to the fact that the foundation is a high plasticity silt ground and the clay ratios are high in the hydrometer analysis, this ground has been identified as a non-liquefaction ground and no liquefaction analysis has been performed.
Y-1 Cut Profile (KP: 4+760-5+060)	Siltstone	Since the cut foundation is siltstone, liquefaction potential is not expected.
Y-2 Cut Profile (KP: 5+060-6+305)	Siltstone	

Source: GDII and Altınok,2018

In addition, in the sections where Gökçeler-Industry railway line where cut&fills are constructed, except for D-1 foundation, no bearing problem is expected in critical regions.

4.1.4.3. Seismicity

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

The study area that is marked on the "Turkey Earthquake Hazard Map" which was published in the Official Gazette No. 30364 dated 18.03.2018 and came in force on 01.01.2019 and renewed is given in Figure 4-10. The routes planned in the scope of the project and its surroundings were examined on the interactive earthquake hazard map published by AFAD, and the largest ground acceleration (PGA 475) for the 475 Year Repetition Period was found to be 0.220 g.

Figure 4-10: Earthquake Hazard Map of Project Routes

Source: AFAD, 2018, Turkey Earthquake Hazard Map

In the structures to be constructed within the scope of the project, provisions of "Regulations for the Structures to be Built in Disaster Areas" published in the Official Gazette No. 26582 dated 14.07.2007 and "Turkey Building Code" of Disaster and Emergency Management Administration published in the Official Gazette No30364. dated 18.03.2018 that came into force in 01.01.2019 will be strictly followed

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, Town of Filyos and surroundings has potential of being affected by earthquakes occur on west part of North Anatolia Fault which is located 85~100 km south.

According to Boğaziçi University, Kandilli Observatory and Earthquake Research Institute, Regional Earthquake-Tsunami Monitoring Center, 5 major earthquakes, magnitude 5.0 and above, occurred along the railway route since 1900. (http://www.koeri.boun.edu.tr/sismo/2/deprem-bilgileri/buyuk-depremler/).

These earthquakes show that the region is seismically active. These earthquakes are:

1. Gerede-Çerkeş (Bolu) Eq. on 01.02.1944, magnitude of 7.2, casualty of 3959 dead and 20865 displaced.
2. Abant (Bolu) Eq. on 26.05.1957, magnitude of 7.1, casualty of 52 dead and 5200 displaced.
3. Mudurnu (Adapazarı) Eq. on 22.07.1967, magnitude of 6.8, casualty of 89 dead and 7116 displaced.
4. Bartın (Zonguldak) Eq. on 03.09.1968, magnitude of 6.5, casualty of 29 dead and 2478 displaced.

5. Gölcük (Kocaeli) Eq. on 17.08.1999, magnitude of 7.8, casualty of 17480 dead and 73342 displaced.
6. Düzce Eq. on 12.11.1999, magnitude of 7.5, casualty of 763 dead and 35519 displaced.

Information for active seismic fault of the project route and surroundings are collected from "Turkey Active Fault Map", Zonguldak (NK 36-10) section, scaled '1/250,000, published by "General Directorate Of Mineral Research And Exploration and data of active fault line in "Earth-science map viewer and editor" online webpage which belongs the same institution. Map of active fault line for project route and surroundings is given in Figure 4-11.

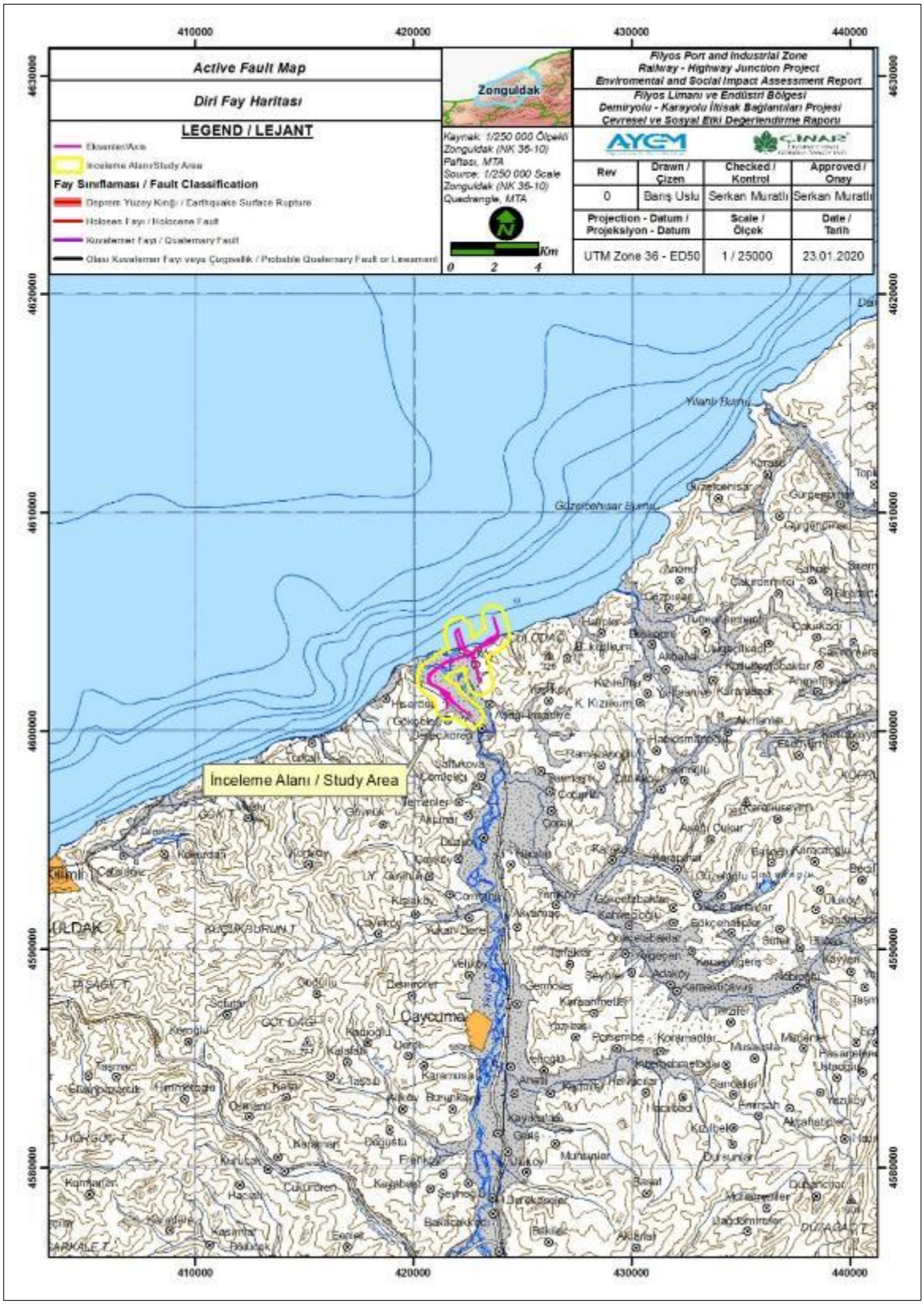

Figure 4-11: Active Fault Line for Project Route and Surroundings

Source: Emre et al., 2011; Emre and Duman, 2012

North Anatolian Fault (KAF)

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). KAF 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 KAF ((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, KAF has created 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.

KAF is located in the 85.5 km south of the Gökçeler-Industry Railway Line, in the NEE-SSW direction with average direction of N70^{0}E.

Düzce Fault

The Düzce Fault, which morphologically restricts the Düzce basin in the KAF zone from the south, is 70 km long between Akyazı and Kaynasli. The Düzce fault, consisting of three complementary parts that complement each other, is an active fault with right direction. It is observed in the foundation rocks before the Quaternary in the Akyazı section. In the Düzce basin part, it forms a tectonic contact between the Quaternary aged alluviums and the foundation rocks. Drainage features observed in today's morphology; Fault steepness, shifted streams and ridges are data indicating the activity of this fault. The activity of the fault occurred with earthquakes dated 17.08.1999 and 12.11.1999. The 30 km east part of the 130 km long surface fracture developed in the earthquake of 171.08.1999 is located on the Düzce fault. This earthquake occurred in the part of Düzce Fault until Lake Efteni. In the earthquake dated 12.11.1999, Düzce Fault was broken between the Efteni Lake in the eastern part and the Pirahmetler in the northwest of Bolu. The length of the fault that was broken in this earthquake is 45 km (http: //www.duzce.gov.tr/geological-yapi).

Düzce Fault is located 103.5 km southwest of the Gökçeler-Industry Line in the SEE-NWW and E-W 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 58.2 Southeast of the Gökçeler-Industry Railway Line.

Devrek Fault and Yığılca Fault

As one of the faults of KAF zone, the NE-SW oriented Devrek Fault is located to the east of Çilimli Fault and consists of two faults parallel to each other. These faults constitute surface faulting in Quaternary-Pleistocene with unknown Holocene activity. One of the faults is with an unknown Holocene activity (Gökçeler industrial railway route KP: approximately 42.2 km southwest of 0 + 000), while its length is 9799.8 m; the other is a strike-slip fault (unknown Holocene activity) (approximately 41.2 km southwest of Gökçeler - Industrial 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 unknown reverse fault and its length is 10246.4 m. This fault is located approximately 68.2 km southwest of Gökçeler - Industry Line.

4.1.4.4. Landslides

According to site studies are made under the geotechnical study report studies prepared for the project routes, MTA Turkey Landslide Inventory Map online at the same institution Zonguldak Sheet for "Geology Map Viewer and Drawing Editor"; there are no active or passive landslide areas on and around the planned routes. However, there are "cryptographic, slip and flow type shallow landslide" areas in the hills , approximately 2.8 km southeast of the Gökçeler-Industry Line. The landslide map of the project route and its surroundings is given in Figure 4-12.

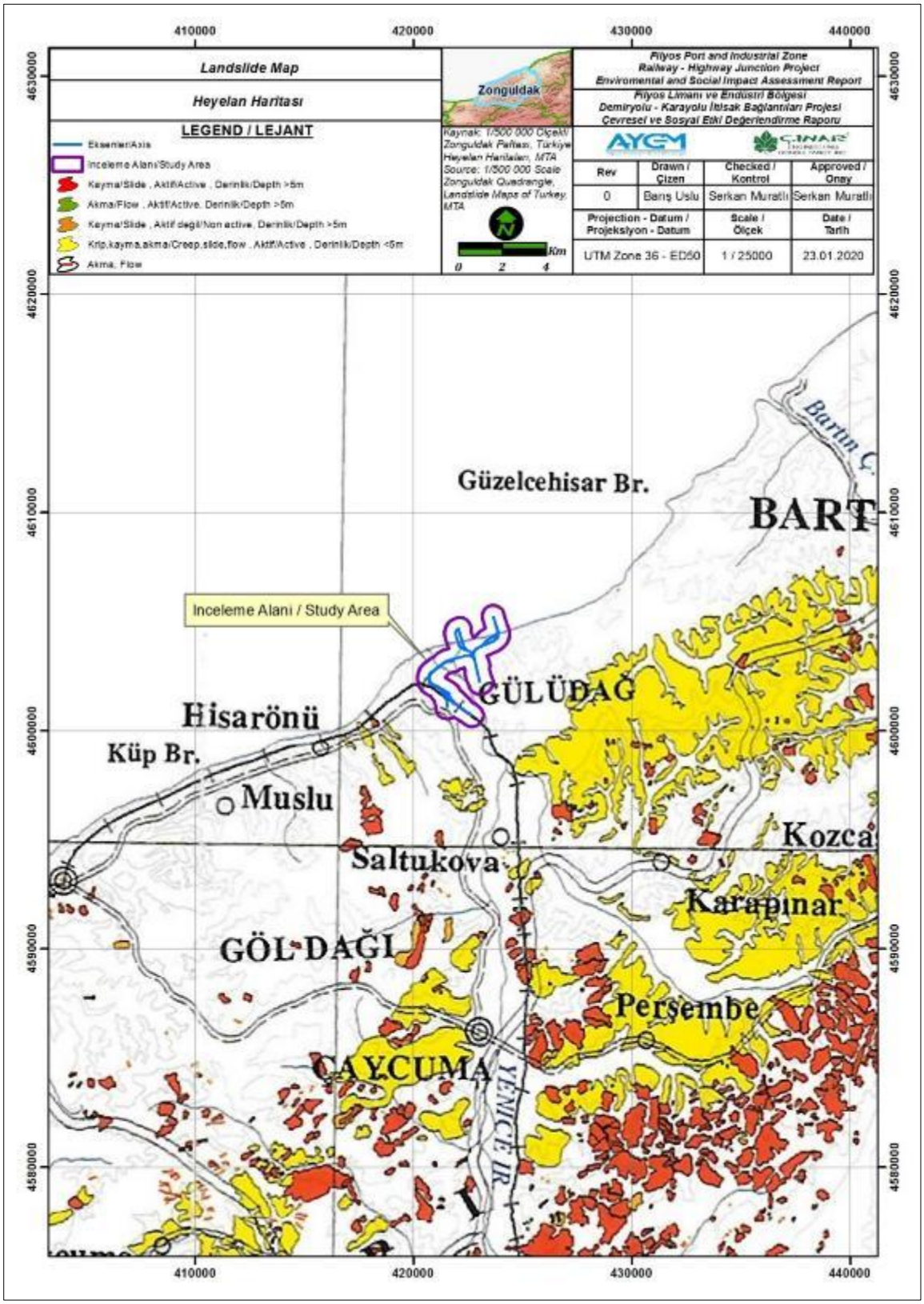

Figure 4-12: Landslide Map of the Project Area and Surroundings

Source: Duman, T.Y. et. al., 2011

4.1.4.5. Geosites

Turkey Geological Heritage Protection Association (JEMIRKO), having the importance of geology in Turkey, 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" study by JEMİRKO was examined and it was determined that the project routes do not intersect any geological heritage sites. Therefore; The directions and distances of the geological heritage sites around the project routes to the relevant kilometer points of the Gökçeler-Industry railway route are presented in Table 4-13.

Table 4-13: List of Geosites in the Region where Project Routes are Located

Name of the Geosite	Location	Description	Geosit Category	Gökçeler-Industry Railway Route KP:	Direction and the Distance to the Gökçeler- Sanayi Railway Line (Km)
Column lavas in the Upper Cretaceous volcanic series in Güzelcehisar town	Bartın	Column lavas in the Upper Cretaceous aged volcanic series are extremely well developed. In this environment, radial column lavas or basalt roses are also common. It is not protected.	IV	5+200	Northeast 12,0
Karadere Stream	Karabük	Graptolite levels are defined as the transition from Arenig floor to Blanvirn floor. It is not protected..	I	0+000	Southeast 90,8
KAF Creep,	Karabük	A place where non-seismic crust movement can be monitored. There are right-sided strike-slip motion on the NAF. An average of 1 cm of movement was observed per year. Not under protection.	VII	0+000	Southeast 88,6
Silicified trees	Çankırı	Tree branches and trunks preserved during the activity of Kızılcahamam Volcanics	III	0+000	Southeast 103,4

Name of the Geosite	Location	Description	Geosit Category	Gökçeler-Industry Railway Route KP:	Direction and the Distance to the Gökçeler- Sanayi Railway Line (Km)
		belonging to the Upper Miocene. It is not protected.			
Translated garden and water arc caused by the earthquake of November 12, 1999 in Eften Lake, Forest National Park.	Düzce	During the Dağdibi (Düzce) Earthquake of 12 November 1999, with a magnitude of Mw = 7.1, many artificial and natural linear structures were interrupted by the earthquake fault and shifted in the right lateral direction. Two of them are the garden wall of the observation house of Eften Lake Forest National Park and the water channel of the pool in this garden. These structures were shifted in 2.8 m right lateral direction. National Park is the area.	VII	0+000	Southeast 122,9

Source: https: //www.jemirko.org.tr

4.2. Noise

In order to determine the baseline noise levels in the project area, background noise measurements were performed for 48 hours.

Background noise measurements were carried out at 5 points (noise sensitive receptors) selected along the routes of railway connection lines and highway that have the potential to be adversely affected by construction and operation activities.

The background noise measurement points are listed in Table 4-14 below.

Table 4-14: Background Noise Measurement Locations

No	Measurement Location	Coordinates	Number of Nearby Dwellings
G-1	Sefercik	420491 E, 4602090 N	3
G-2	Gökçeler	421818 E, 4601044 N	18
G-3	Sazköy-1	422449 E, 4603361 N	5
G-4	Sazköy-2	422445 E, 4603400 N	8
G-5	Derecikören	422560 E, 4600522 N	7

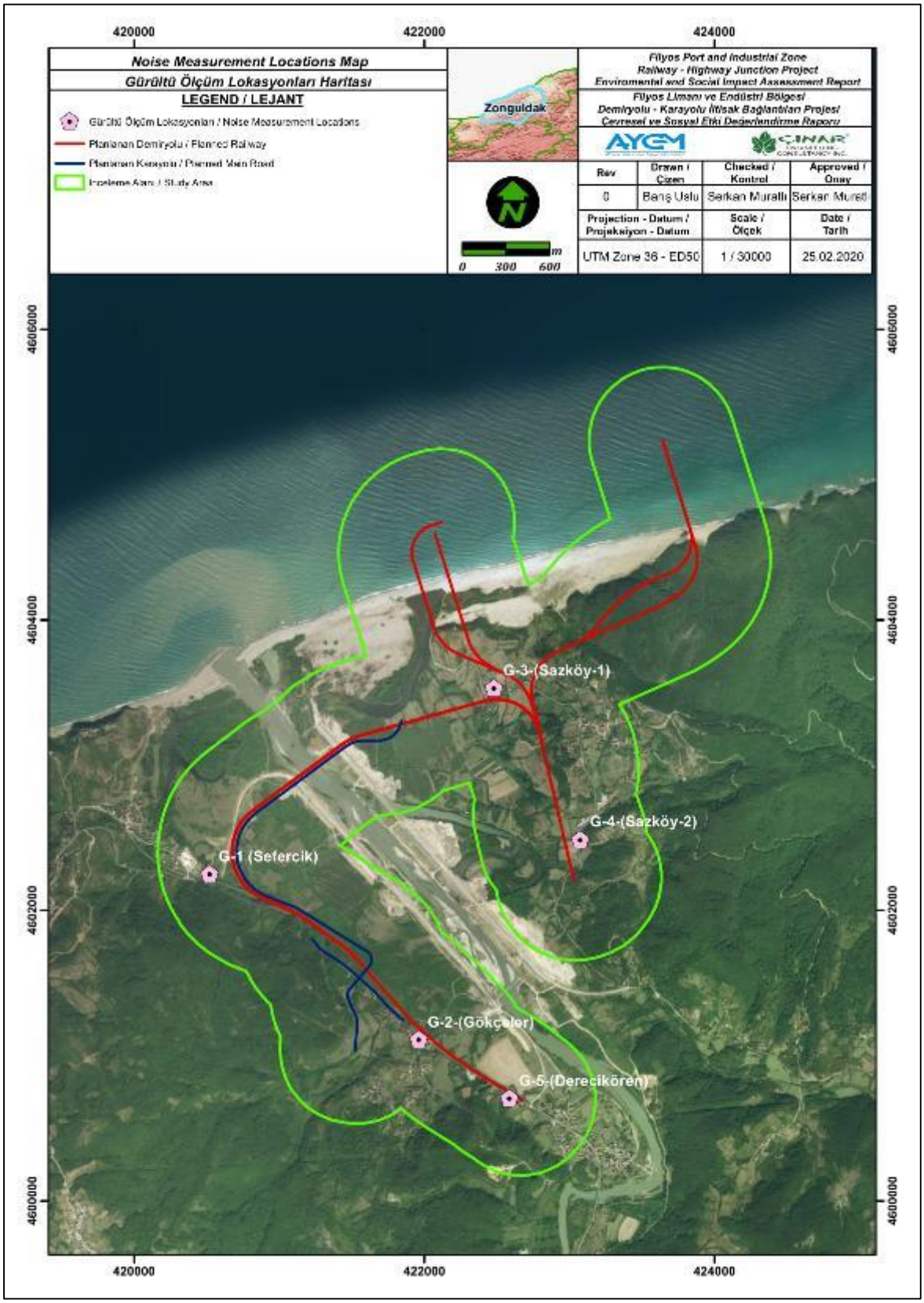

Figure 4-13: Background Noise Measurement Locations

The results of background noise measurements were evaluated within the scope of Regulation on Assessment and Management of Environmental Noise (RAMEN) as Day (07:00-19:00), Evening (19:00-23:00), Night (23:00-07:00) averages and IFC Environmental, Health and Safety (EHS) Guidelines for Environmental Noise Management as Daytime (07:00-22:00) and Nighttime (22:00-07:00) averages.

Table 4-15: Background Noise Measurement Results

Sampling Point	Day (07:00-19:00) (dBA)	Evening (19:00-23:00) (dBA)	Night (23:00-07:00) (dBA)	Day (07:00-22:00) (dBA)	Night (22:00-07:00) (dBA)
G-1 (Gökçeler)	63.2	52.9	53.8	63.1	53.9
G-2 (Sefercik)	62.9	59.2	48.2	62.8	51.7
G-3 (Sazköy-1)	55.8	58.0	50.2	57.6	56.2
G-4 (Sazköy-2)	50.5	47.5	38.3	49.8	39.6
G-5 (Derecikören)	68.8	61.5	65.1	67.4	63.3

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 (SPL) for a long enough time (one year) to precisely define environmental noise exposure.

As seen in Table 4-15, the point with the highest noise level is the G-5 (Derecikören) point. This point is adjacent to the existing Zonguldak-Çaycuma road and the existing railway. This high noise level is thought to be the caused by the existing road and railway.

4.3. Air Quality and Greenhouse Gas (GHG) Emissions

4.3.1. 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[3].

[3] 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.

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)[4].

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 4-16.

Table 4-16: 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 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 4-17: National air quality index values

Index	AQI	SO_2 [µg/m³]	NO_2 [µg/m³]	CO [µg/m³]	O_3 [µg/m³]	PM_{10} [µg/m³]
		1 Hour average	1 Hour average	8 Hours average	8 Hours average	24 Hours average
Good	0 - 50	0-100	0-100	0-5.500	0-120	0-50
Medium	51 - 100	101-250	101-200	5,501-10,000	121-160	51-100
Unhealthy for Vulnerable Groups	101 - 150	251-500	201-500	10,001-16,000	161-180	101-260

http: //dx.doi.org/10.1016/j.envint.2007.01.010

[4] 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
Unhealthy	151 – 200	501-850	501-1.000	16,001-24,000	181-240	261-400
Very Unhealthy	201 – 300	851-1100	1.001-2.000	24,001-32,000	241-700	401-520
Hazardous	301 – 500	>1101	>2001	>32,001	>701	>521

Source: Environmental Status Report, Zonguldak 2018

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 10 air quality measurement stations in Zonguldak, 1 in the Central District, 2 in Ereğli District, 4 in Kilimli District, 1 in Çaycuma District and 2 in Kozlu District.

Within the scope of the project, Eren Energy Tepeköy Station data, which is the closest station to the area and east of the project area, was evaluated in order to have an idea about the baseline air quality of the project area. At this Station, PM_{10}, SO_2, NO_2 and O_3 measurements are performed. RCIAP 2019-2023 Limit values and air quality index classification of these measurement results are as follows:

Table 4-18: Ambient Air Quality According to Eren Energy Tepeköy Station

Parameter	PM10 (µg/m³)	SO2 (µg/m³)	NO2 (µg/m³)	O3 (µg/m³)
Eren Energy Tepeköy Station	19.99	2.44	14.44	43.05
RCIAP Limit Value (2019-2023)	40	20	40	-
Air Quality Index	Good	Good	Good	Good

As seen above, PM_{10}, SO_2, NO_2, and O_3 values did not exceed RCIAP limit values in 2018 and have “Good” air quality according to the air quality index assessment.

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

The measurement points have chosen adjacent to the emission sources based on nearest settlements and topographic conditions. The measured parameters include $PM_{2.5}$, PM_{10} and NO_2 and SO_2. $PM_{2.5}$ and PM_{10} parameters were measured for 7 days. NO_2 and SO_2 were measured for 1 month. The map showing the sampling points is given in Figure 4-14 and $PM_{2.5}$ and PM_{10} results in Table 4-19. Ppassive diffusion measurements (NO_2 and SO_2) are currently continuing and the results will be evaluated when the measurements are completed.

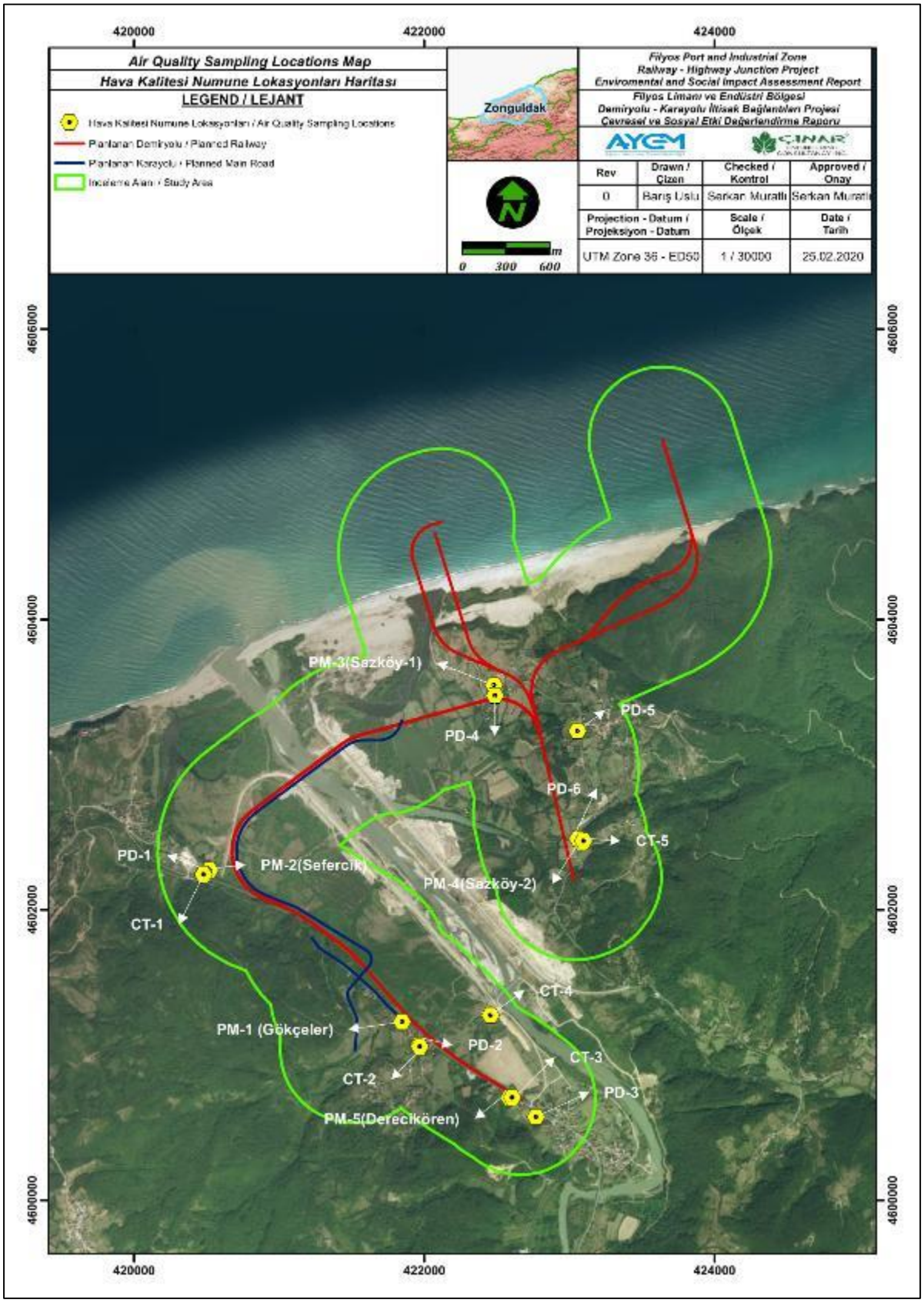

Figure 4-14: Air Quality Sampling Points

Table 4-19: PM_{10} & $PM_{2.5}$ Sampling Results

Measurement Point	Coordinates	PM_{10} Measurement Result (µg/m³)	PM_{10} RCIAP Limit Value(2019-2023) (µg/m³)	PM_{10} WHO Limit Value (µg/m³)	$PM_{2.5}$ Measurement Result (µg/m³)	$PM_{2.5}$ WHO Limit Value (µg/m³)
H-1 (Gökçeler)	421818 E, 4601044 N	25.80	40	50	6.44	25
H-2 (Sefercik)	420491 E, 4602090 N	26.75	40	50	6.75	25
H-3 (Sazköy-1)	422449 E, 4603361 N	27.23	40	50	6.88	25
H-4 (Sazköy-2)	422445 E, 4603400 N	27.55	40	50	6.88	25
H-5 (Derecikören)	422560 E, 4600522 N	27.33	40	50	6.85	25

As seen in Table 4-19, in the baseline situation, according to PM_{10} and $PM_{2.5}$ measurement results, the current air quality is in compliance with both RCIAP and WHO standards.

NO_2 and SO_2 passive diffusion measurements studies are currently ongoing and the results will be inserted into the Final ESIA report when the measurement results are obtained.

4.3.2. Greenhouse Gases

As of 2016, the resulting greenhouse gas emissions in Turkey, including industry, energy, industrial processes and product use, agriculture is calculated as 526.3 million tons $CO_{2eq.}$ (TURKSTAT, 2019) Since 1990, the total greenhouse gas emissions generated in Turkey are given below.

Table 4-20: Greenhouse gas emissions between 1990-2017 (CO_2 equivalent)

Year	CO_2	CH_4	N_2O	F-gases	Total
1990	151.5	42.4	24.7	0.6	219.2
1991	158.0	43.3	24.4	0.9	226.6
1992	163.9	43.2	25.0	0.7	232.8
1993	171.0	43.0	25.8	0.4	240.1
1994	167.4	42.7	23.3	0.7	234.1
1995	180.9	42.5	23.6	0.6	247.6
1996	199.5	42.9	24.3	0.6	267.2
1997	212.0	42.1	23.9	0.6	278.6
1998	212.0	42.3	25.3	0.6	280.3
1999	207.8	43.7	25.7	0.6	277.8
2000	229.8	43.6	24.8	0.7	298.9
2001	213.5	42.8	23.3	0.8	280.4

Year	CO_2	CH_4	N_2O	F-gases	Total
2002	221.0	40.9	23.2	1.0	286.1
2003	236.5	42.9	25.0	1.2	305.6
2004	244.5	43.5	25.5	1.5	315.0
2005	264.2	45.2	26.1	1.7	337.2
2006	281.6	46.6	28.0	1.9	358.2
2007	312.7	49.0	27.4	2.3	391.4
2008	309.3	49.9	25.9	2.4	387.6
2009	315.4	49.6	28.2	2.4	395.5
2010	314.4	51.3	29.4	3.5	398.7
2011	339.5	53.7	30.5	3.9	427.6
2012	353.7	57.1	31.6	4.6	446.9
2013	345.2	55.5	33.5	4.8	439.0
2014	361.7	57.3	33.9	5.1	458.0
2015	381.3	51.3	34.7	4.8	472.2
2016	401.2	53.9	37.1	6.3	498.5
2017	425.3	54.2	38.5	8.2	526.3

According to the results of the greenhouse gas emission inventory, total greenhouse gas emission in 2017 was calculated as 526.3 million tons (Mt) as CO_2 equivalent. While the largest share of CO_2 emissions in 2017 emissions was energy-related emissions with 72.2%, industrial processes and product use with 12.6%, agricultural activities with 11.9% and waste with 3.3%, respectively.

Table 4-21: Distribution of Greenhouse Gases by Sectors (million tons)

Year	Change Since 1990 (%)	Energy	Industrial processes and use of products	Agricultural activities	Waste	Total
1990	-	139.6	22.8	45.7	11.1	219.2
1991	3.4	144.0	24.7	46.5	11.3	226.6
1992	6.2	150.3	24.3	46.6	11.5	232.8
1993	9.6	156.8	24.5	47.0	11.8	240.1
1994	6.8	153.3	24.2	44.6	12.0	234.1

Year	Change Since 1990 (%)	Energy	Industrial processes and use of products	Agricultural activities	Waste	Total
1995	12.9	166.3	25.2	43.7	12.4	247.6
1996	21.9	184.0	26.2	44.4	12.7	267.2
1997	27.1	196.2	27.0	42.2	13.2	278.6
1998	27.9	195.9	27.4	43.6	13.5	280.3
1999	26.7	193.8	25.8	44.2	13.9	277.8
2000	36.4	216.1	26.2	42.3	14.3	298.9
2001	27.9	199.2	25.9	39.8	15.5	280.4
2002	30.5	205.8	26.9	37.4	15.9	286.1
2003	39.4	220.3	28.2	40.9	16.2	305.6
2004	43.7	226.1	30.8	41.4	16.6	315.0
2005	53.8	244.0	33.6	42.3	17.3	337.2
2006	63.4	260.0	36.7	43.5	18.0	358.2
2007	78.6	290.8	39.2	43.2	18.3	391.4
2008	76.8	287.3	40.9	41.0	18.3	387.6
2009	80.4	292.5	42.5	41.7	18.8	395.5
2010	81.9	287.0	48.1	44.0	19.5	398.7
2011	95.1	308.7	52.7	46.4	19.8	427.6
2012	103.9	320.5	55.0	52.1	19.4	446.9
2013	100.3	307.5	58.1	55.2	18.2	439.0
2014	108.9	325.8	58.5	55.5	18.2	458.0
2015	115.4	340.9	57.0	55.4	18.8	472.2
2016	127.4	359.7	62.2	58.2	18.4	498.5
2017	140.1	379.9	66.5	62.5	17.4	526.3

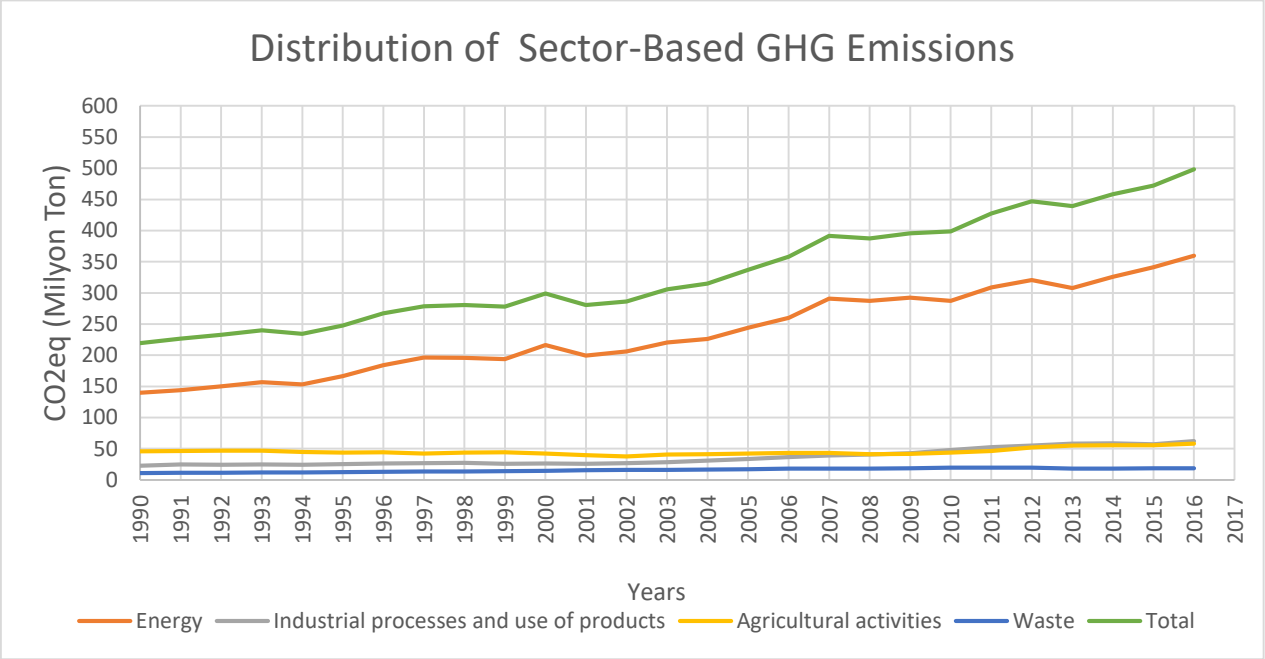

Figure 4-15: Distribution of Sector Based GHG Emissions in 1990-2017

The transport sector is responsible for more than half of global oil demand and around one-quarter of global CO_2 emissions from fuel combustion. Therefore changes in transportation are fundamental to achieving energy transitions globally. Yet while rail is among the most energy efficient modes of transport for freight and passengers, it is often neglected 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).

About 7% of global freight transport activity (measured in tons-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 Turkey are presented in Figure 4-16.

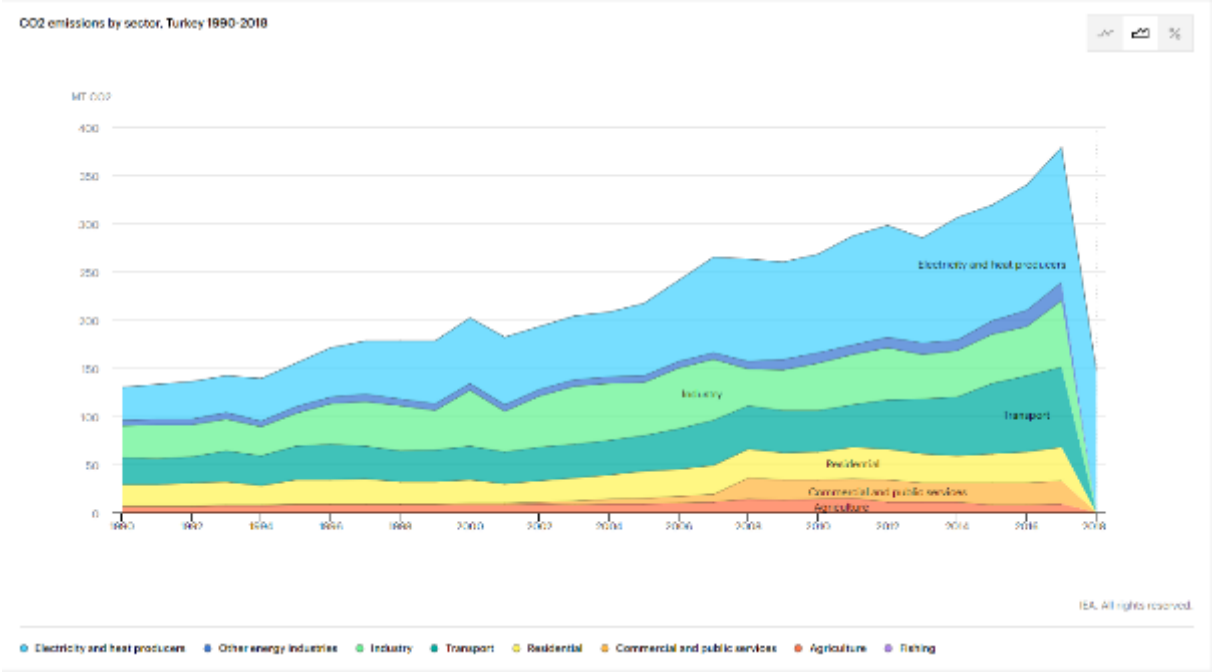

Figure 4-16: Sector-based CO2 emissions in Turkey (1990 – 2018) (International Energy Agency, 2020)

CO_2 emissions from the transport sector in Turkey, as shown in Figure 4-16 represents a significant amount of CO_2 emissions. The distribution of CO_2 emission within the transport sector is presented in Figure 4-17. In Turkey, road transport has the highest CO_2 emissions in the transport sector (91.5%). Railways are the type of transportation with the lowest CO_2 emissions in the sector with a ratio of 0.6% (Ministry of Transport and Infrastructure - General Directorate of Railway Regulation, 2018).

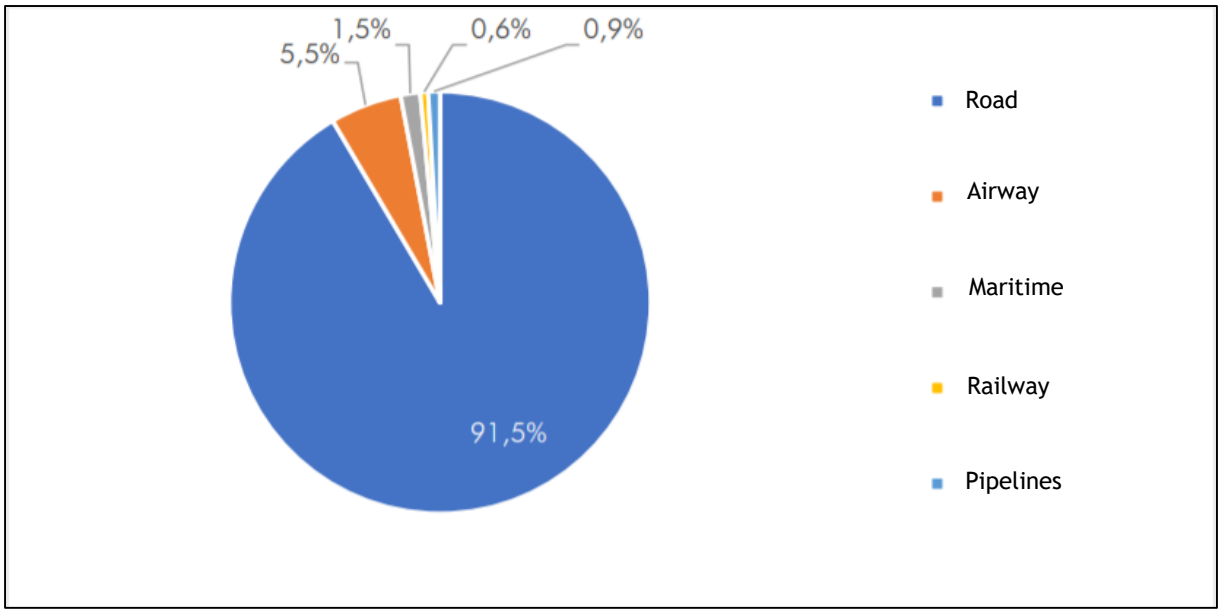

Figure 4-17: Distribution of CO_2 Emissions in Transport Sector in Turkey

Source: (Ulaştırma ve Altyapı Bakanlığı – Demiryolu Düzenleme Genel Müdürlüğü, 2018)

4.4. Water Resources and Wastewater Management

In this chapter, information about the 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 (DSI) (DSI, 2019),
- "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 (GDII) and Altınok Müş. Müh AŞ. In 2008 (GDII and Altınok, 2018)
- The Ministry of Agriculture and Forestry is the online 'Geodata Application' database (http://www.geodata.gov.tr)

4.4.1. Surface Water Resources

The Project is located on the Western Black Sea Basin. (Figure 4-18*)*

Compared to other basins, there are short streams in this basin; the drainage area of the basin consists of areas where flood waters reach Black Sea and drainage areas collecting the precipitation. These areas are bordered by Çangal Mountainı, Zindan Mountain, Küre Mountains, Ilgaz Mountains, Benli Mountain, Bolu Mountains, Kara Mountain, Işık Mountain and Elmacık Mountain in the east and Black Sea shores in the north. Western Black Sea basin is neighbor with Kızılırmak and Sakarya basins. Project routes are contained within the Filyos Creek subbasin of Western Black Sea Basin. (Figure 4-19).

Figure 4-18: Basins in Turkey

Source: DSİ, 2019

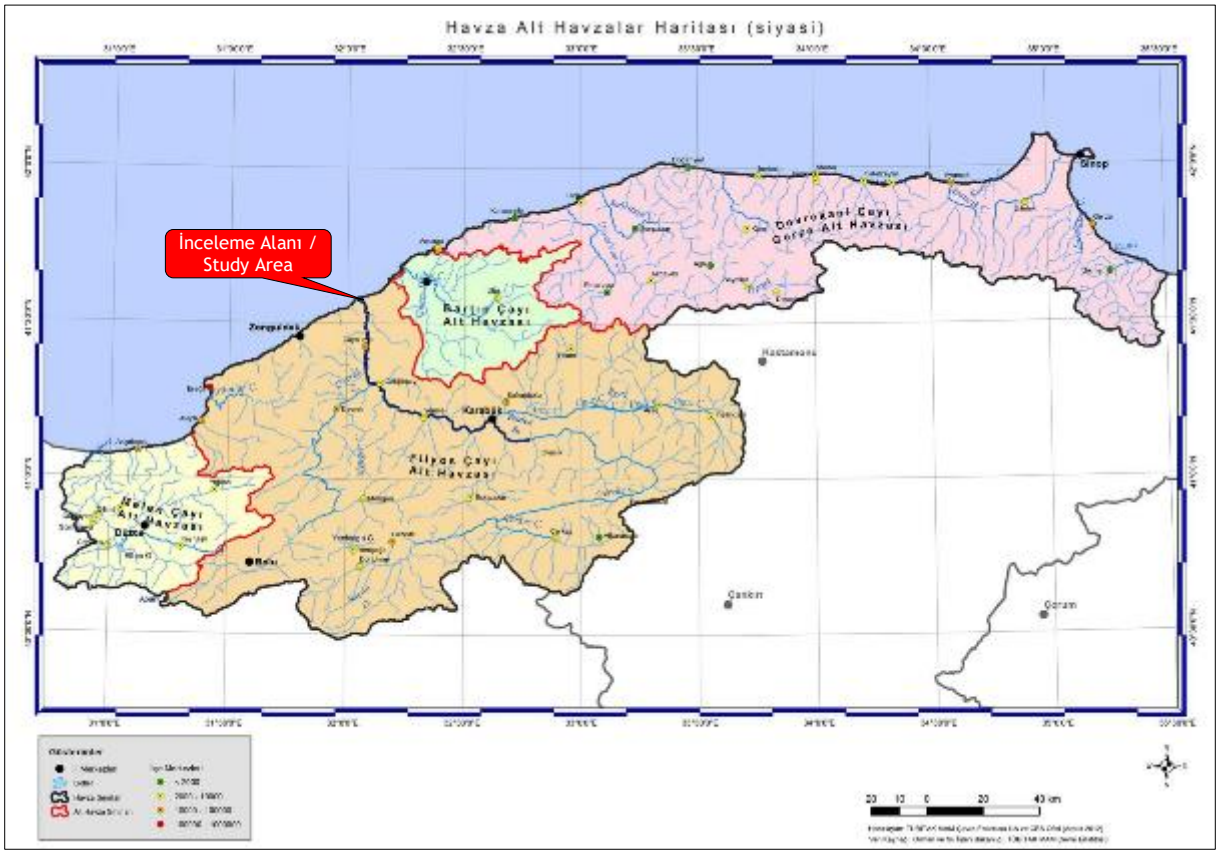

Figure 4-19: Subbasins of Western Black Sea Basin where Project Route is located

Source: OSİB and MAM, 2013

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 subbasin has 13.3 km^2 catchment area and the Filyos Creek has 104.6 m^3/s yearly average flowrate. Filyos Creek 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)*.

Information on surface water resources in the area of the project route are presented in the Figure 4-20.

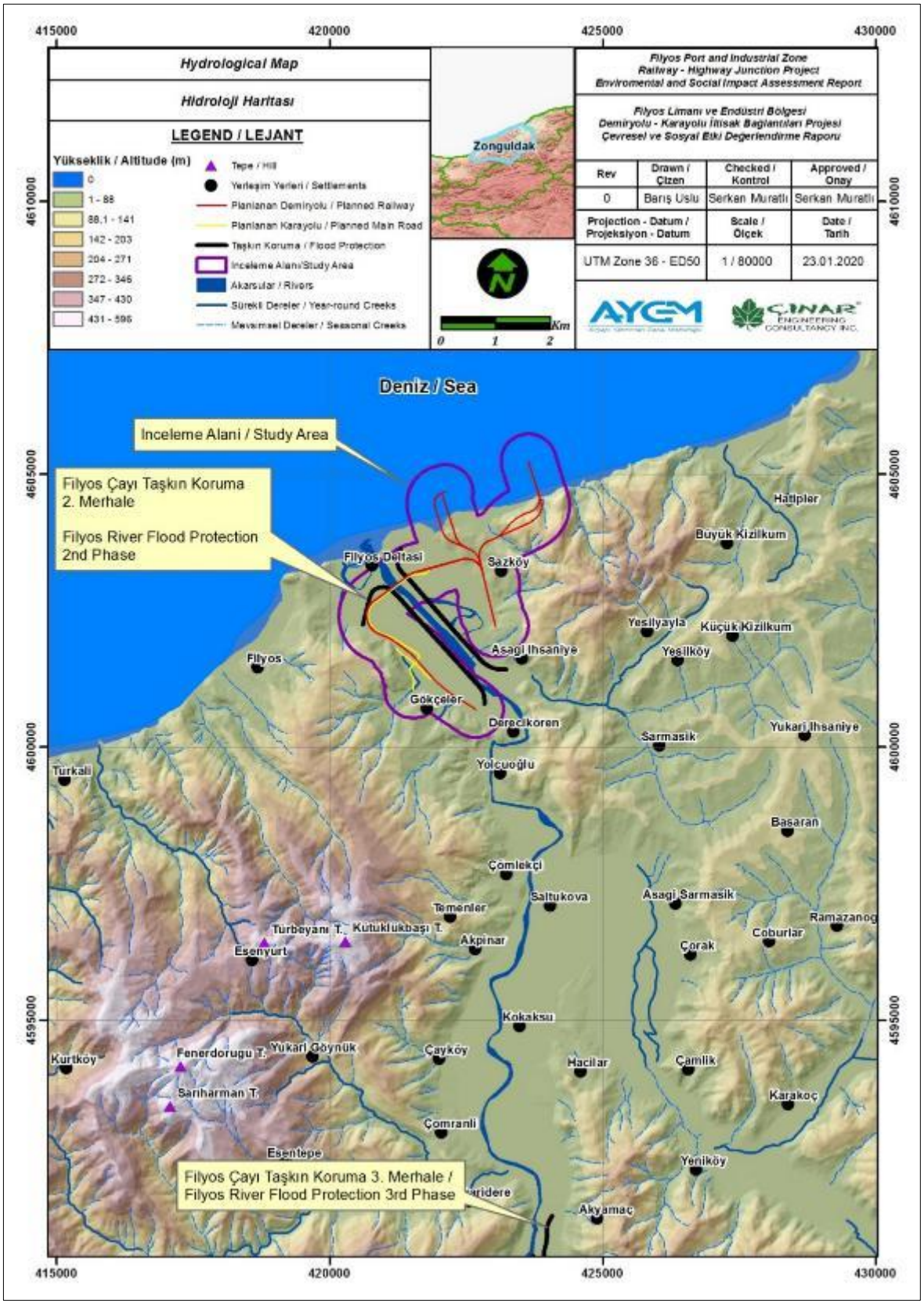

Figure 4-20: Hydrology Map of Project Routes

Rivers and Streams

There are 27 streams with continuous flow in the Western Black Sea Basin. Those are Devrekâni Stream (71.09 km), Filyos Creek (62.78 km), Büyükmelen Creek (56,89 km), Araç Creek (56,32 km), Karasu (48,17 km) and Bartın Creek (25.49 km). In addition there are many streams and creeks with seasonal flow in the basin.

Gökçeler-Industry railway and highway crossing in the scope of project crosses the Filyos Creek that is formed by the Yenice Creek and Devrek Creek, that reaches to the Black Sea in the downstream. The main crek that feeds Filyos Creek is Yenice Creek with average flowrate of 127.17 m^3/s.

Filyos Creek crosses the Gökçeler-Industry railway route between KP: 3+412 and KP: 3+555, and Highway Connection between KP: 2+650 and KP: 2+800. There also streams with seasonal flow in those routes.

Information about the streams within the project routes are presented in Table 4-22.

Table 4-22: Streams Located within the Project Area

Name	Type	Project Route	Project Route KP	Direction and average distance to the project route (km)
Filyos Creek	Continuous flow	Highway connection line	2+650 -2+800 *(*)*	-
		Gökçeler-Industry Railway Line	3+412 - 3+555 *(*)*	-
			5+600	West-Southwest 0.750
			6+000	West 0.305
			6+345	West 0.254
Unknown	Seasonal FLow	Gökçeler-Industry Railway Line *(*)*	0+399.99, 1+001.81, 1+767.53, 2+008.93, 4+601.92, 5+895.00	-
Unknown r	Seasonal Flow	Highway Connection *(*)*	2+504.182	-
Unknown	Seasonal FLow	Existing Road Widening Line *(*)*	0+685.80	-

Source: (*) GDII and Altınok, 2018

Lakes

In the Filyos subbasin, Abant Lake, Yedigöller (Sazlı Lake, İnce Lake, Nazlı Lake, Küçük Lake, Derin Lake, Büyük Lake and Serin Lake) and Yeniçağ Lake are located. In the Efteni Lake is located in the Melen Creek subbasin located in the west of Filyos Creek subbasin and Sarıkum Lake is located in the Devrenkani Creek-Gerze subbasin located in the east of Filyos subbasin.

There are no lakes on the project routes. However, there are several lakes that are very distant to the project area. (Table 4-23)

Table 4-23: Lakes near the Project Area

Lake	Province	Lake Area	Gökçeler-Industry Railway Line, KP:	Direction and the Distance to the Gökçeler- Industry Line (km)	Protection Status
Abant Lake	Bolu	119.81 ha	0+000	Southwest 123.5	Natural Park
Yeniçağ Lake	Bolu	273.64 ha	0+000	South- Southwest 84.3	Wetland with National Importance
Yedigöller-Sazlı Lake	Bolu	5950 m^2 (*)	0+000	Southwest 73.6	National Park
Yedigöller-İnce Lake	Bolu	1036 m^2 (*)	0+000	Southwest 73.6	National Park
Yedigöller-Nazlı Lake	Bolu	15780 m^2 (*)	0+000	Southwest 73.6	National Park
Yedigöller-Küçük Lake	Bolu	2170 m^2 (*)	0+000	Southwest 73.4	National Park
Yedigöller-Derin Lake	Bolu	15063 m^2 (*)	0+000	Southwest 73.0	National Park
Yedigöller-Büyük Lake	Bolu	24895 m^2 (*)	0+000	Southwest 72.9	National Park
Yedigöller-Serin Lake	Bolu	1758 m^2 (*)	0+000	Southwest 72.7	National Park
Efteni Lake	Düzce	522.72 ha	2+500	Southwest 122.8	Geosite

Source: (*) http: //www.bolu.gov.tr/yedigoller-milli-parki; OSİB, 2012; OSİB and MAM, 2013

Dams, Ponds and Flood Protection Structures

There are 33 dams, 37 ponds, 7 flood traps and 2 flood protection structures built on rivers and streams in the Western Black Sea Basin. These water structures are generally used for drinking and irrigation purposes, flood control and energy production. Among those, Filyos Creek flood protection structure-stage 2 passes through approximately from KP: 3+224 in the WNW-SE direction and from KP: 4+388 in the NE-SW direction.

Pond, dam and flood protection structures located around the project routes are presented in Table 4-24. When this table is analyzed, the nearest is Filyos Creek flood protection structure 3rd Stage (9.3 km away from Gökçeler - Industry railway route to SSW direction KP:0+000) and Dereköy Pond (KP:2+500 of Gökçeler - Industry railway route and is about 13.2 km away in the direction of SW).

Table 4-24: List of Project Routes and Dams, Ponds and Flood Protection Structures

Name	Province	Purpose	Status	Volume in Normal Water Level (hm^3)	Active Capacity (hm^3)	Area (km^2)	Gökçeler-Industry Railway Line, KP:	Direction and the Distance to the Gökçeler-Industry Railway Line (km)
Filyos Creek flood protection 2nd stage	Zonguldak	Flood Protection	Operation	-	-		3+224 - 4+388	-
Filyos Creek flood protection 3rd stage	Zonguldak	Flood Protection	Operation	-	-	-	0+000	South-Southeast 9.3
Çobanoğlu Pond	Zonguldak	Irrigation	Operation	3.38	-	-	0+000	Southeast 15.4
Merkez Düzçam Pond	Karabük	Irrigation	Project	-	-	0.04	0+000	Southeast 63.3
Dereköy Pond	Zonguldak	Drinking water	Operation	1.60	-	-	2+500	Southeast 13.2
Gümel Pond	Zonguldak	Drinking water	Project	-	-	0.29	0+000	Southeast 63.9
Arıt Dam	Bartın	Irrigation-Flood Protection	Project	35.90	2.89	2.40	0+000	East-Northeast 40.0
Kirazlıköprü Dam	Bartın	Irrigation-Flood Protection, Energy	Construction	66.10	58.10	10.90	0+000	East-Southeast 33.8
Kozcağız Dam	Bartın	Drinking, Irrigation, Flood Protection	Project	60.30	6.90	3.28	0+000	Southeast 24.8
Aktaş Dam	Karabük	Flood Protection, Energy	Project	127.00	60.00	5.32	0+000	Southeast 73.2
Çay Dam	Zonguldak	Flood Protection, Energy	Project	173.35	39.90	7.77	0+000	South-Southeast 50.7
Kozlu Dam	Zonguldak	Drinking Water	Operation	24.91	24.00	-	2+500	Southeast 26.0
Kızılcapınar Dam	Zonguldak	Drinking Water , Irrigation, Energy	Operation	47.40	31.00	2.45	0+000	Southeast 49.6

Name	Province	Purpose	Status	Volume in Normal Water Level (hm^3)	Active Capacity (hm^3)	Area (km^2)	Gökçeler-Industry Railway Line, KP:	Direction and the Distance to the Gökçeler-Industry Railway Line (km)
Gülüç Dam	Zonguldak	Drinking Water	Operation	4.36	3.98	1.27	0+000	Southeast 54.5
Yaraşlı Dam	Zonguldak	Drinking Water	Project	15.30	14.60	1.12	0+000	Southeast 59.9

Source: OSİB, 2012; http: //www.geodata.gov.tr

Irrigation Area Projects

There is no irrigation area projects on the project routes.

However, according to "Bartın, Karabük, Zonguldak Provinces GIS data" prepared by Abolished Ministry of Forestry and Water Affairs in 2012 and online GeoData Application of the Ministry of Agriculture and Forestry, there are several irrigation areas.

Information on irrigation areas are given in Table 4-25. The closest irrigation area to Gökçeler - Industry Line is the Çaycuma Irrigation Area located 710 m south. The irrigation module of this site is 0.402 l/s/ha; net irrigation area 7,400 ha; the gross irrigation area is 8,222 ha and irrigation water source is planned to be provided by 7 ponds.

Table 4-25: List of Irrigation Areas around the Project Route

Name	Province	Source of Irrigation Water	Status	Irrigation Module (l/s/ha)	Gross Irrigation Area (ha)	Net Irrigation Area (ha)	Gökçeler-Industry Railway Route, KP:	Direction and the Distance to the Gökçeler-Industry Railway Line (km)
Çaycuma Irrigation	Zonguldak	7 ponds	Project	0,402	8222	7400	0+000	South-Southeast 0.710
Kozcağız Dam Irrigation	Bartın	Kozcağız Dam	Project	0,310	3478	3130	0+000	East Southeast 17.1
Kirazlıköprü Dam Irrigation	Bartın	Kirazlıköprü Dam	Project	0,510	1788	2113	0+000	Northeast-East 26.0
Arıt Dam Irrigation	Bartın	Arıt Dam	Project	0,330	3000	2607	0+000	Northeast-East 28.7
Kızılcapınar Dam Irrigation	Zonguldak	Kızılcapınar Dam	Constuction	0,390	928	928	0+000	Southwest 50.8

Source: OSİB, 2012; http: //www.geodata.gov.tr

4.4.2. Groundwater Resources

According to "Impact of the Climate Change on the Water Resources in Western Black Sea Basin Project" prepared in 2016 by the Ministry of Forestry and Water Affairs, General Directorate of Water Management (SYGM), the total groundwater reserve is 92.95 km^3. In addition; the total dynamic reserve is 9.66 km^3; the total static reserve is 83.30 km3 and the total possible reserve is 55.30 km^3.

According to the 'Geological-Geotechnical Survey Report' prepared within the scope of the project in 2019; Cretaceous aged Yemişliçay formation, one of the geological units where the project routes pass, is generally brown, thin-medium layered volcanogenic sandstone, grayish green colored, thin-medium layered shale and sandstone alternation, tuff, tuffite; beige and red-pink colored, thin-medium bedded pelagic-semi-pelagic clayey limestones in the middle sections; On the upper parts, it is represented by brown and dark gray agglomerates. The sandstone-shale units of this formation are capable of holding moderate water in fracture cracks.

In addition, according to the report mentioned; Quaternary aged alluvial deposits, another geological unit where the Gökçeler – Industry railway route passes, are surrounded by valleys and river beds, plains, etc. Although there is gravel, sand and clay storage in the plains, it has the potential of carrying and storing water.

Within the scope of the mentioned geological-geotechnical report study, 42 of the 48 main drilling wells drilled along the project routes were found to have groundwater, and the relevant numerical data are presented in Table 4-26. As can be seen in the table, groundwater was found along the project routes at depths between 1.40 m and 8.80 m.

Table 4-26: Information on Groundwater Levels Measured in Foundation Drillings

No	Drilling No.	Highway Connection Route	Gökçeler-Industry Railway Route	Drilling Depth (m)	Coordinates		Elevation (m)	Groundwater Level (m)
		KP:	KP:		X (m)	Y (m)		
1	SD-1		0+050	37.95	422584	4602389	6.90	5.00
2	SD-2		0+300	42.45	422373	4602526	6.51	1.50
3	SD-3		0+750	28.95	421975	4602760	6.32	5.40
4	SD-4		0+915	24.45	421848	4602855	5.80	4.80
5	SK-5	0+000	1+000	24.45	421783	4602880	5.84	4.90
6	SD-6	0+105	1+110	24.45	421727	4603006	5.79	4.50
7	SD-7	0+245	1+245	24.45	421639	4603108	5.12	2.60
8	SK-8	0+355	1+355	24.45	421535	4603157	5.10	4.55
9	SK-9	0+100	-	24.45	421440	4602990	7.50	4.45
10	SK-10	0+300	-	21.50	421445.08	4602983.9	7.00	4.40
11	SK-11	0+440	-	37.50	421474	4603223	3.65	3.10

No	Drilling No.	Highway Connection Route	Gökçeler-Industry Railway Route	Drilling Depth (m)	Coordinates		Elevation (m)	Groundwater Level (m)
		KP:	KP:		X (m)	Y (m)		
12	SK-12	0+480	-	24.45	421425	4603228	3.98	3.10
13	SK-13	0+727	-	24.00	421238	4603389	4.50	3.40
14	SK-14	1+000	1+744	24.45	421241	4603541	6.00	2.95
15	SK-15	1+200	1+940	27.45	421138	4603627	3.60	3.50
16	SK-16	1+400	2+140	24.45	420983	4603743	4.00	2.94
17	SD-17	1+707	2+456	24.00	420697	4603840	3.00	2.40
18	SK-18	1+950	2+720	24.45	420636	4604083	2.30	7.40
19	SD-19	2+025	2+800	24.45	420634	4604164	2.40	2.80
20	SK-20	2+152	2+940	24.45	420714	4604275	2.50	2.05
21	SD-21	2+208	3+003	24.45	420744	4604329	3.30	2.80
22	SD-22	2+406	3+200	24.45	420906	4604464	2.00	2.80
23	SK-23	2+466	3+257	24.45	420965	4604462	3.50	2.95
24	SD-24	2+593	3+383	49.95	421045	4604553	5.62	5.93
25	SK-25	2+595	3+390	49.95	421066	4604539	5.30	5.98
26	SD-26	2+948	3+740	49.95	421335	4604771	6.80	5.10
27	SK-27	2+951	3+744	52.95	421355	4604750	6.92	5.15
28	SD-28	-	4+000	24.45	421572	4604878	1.94	2.40
29	SK-29	3+200	-	24.45	421584	4604825	2.60	3.50
30	SK-30	3+300	-	24.45	421689	4604827	2.50	3.60
31	SD-31	3+425	4+185	19.95	421753	4604934	2.56	1.64
32	SD-32		4+232	19.95	421831	4604968	2.60	1.40
33	SD-33		4+462	24.45	422014	4605022	2.68	8.50
34	SD-34		4+603	28.95	422156	4605049	2.70	6.50
35	SD-35		4+880	18.00	422433	4605117	20.50	-
36	SD-36		5+100	12.00	422584	4605063	13.98	8.80

No	Drilling No.	Highway Connection Route	Gökçeler-Industry Railway Route	Drilling Depth (m)	Coordinates		Elevation (m)	Groundwater Level (m)
		KP:	KP:		X (m)	Y (m)		
37	SD-37		5+150	12.45	422678	4605041	15.00	6.65
38	SD-38		5+365	34.50	422767	4604831	36.40	-
39	SD-39		5+574	23.00	422824	4604599	24.00	-
40	SD-40		5+744	10.95	422835	4604445	8.00	3.80
41	SD-41		5+900	16.95	422871	4604293	9.36	3.50
42	SD-42		6+050	15.95	422892	4604173	10.18	3.50
43	SD-43		6+290	12.00	422960	4603914	13.15	2.52
44	SD-44	Port Connection KP: 2+668 redline	0+400	32.00	422679	4605184	32.60	8.10
45	SD-45	Port Connection KP: 2+668 redline	0+580	34.00	422761	4605371	32.29	-
46	SD-46	Port Connection KP: 1+848 blueline	0+257	29.00	422600	4605211	28.37	8.70
47	SD-47	Port Connection KP: 1+848 blueline	0+400	43.50	422483	4605293	42.60	-
48	SD-48	Port Connection KP: 1+848 blueline	0+627	24.00	422272	4605253	23.00	-

Source: GDII and Altınok, 2018

4.4.3. Flood Events near Project Area

According to Geological-Geotechnical Survey Report of Filyos (Zonguldak) Industrial Zone Construction Plan prepared by Ministry of Science, Industry and Technology and Geoteknik Müh.Jeot.Son.Ltd.Şti in 2016, Filyos Creek has 104.6 m^3/s yearly average flowrate. Filyos Creek has the maximum flowrate of 230 m^3/s in April and minimum flowrate of 28 m^3/s in August, discharging 2.91 km^3 surface water to the Black Sea. Also; these surface waters also

carry 4.18x106 tons of suspended and 0.9x106 tons of bottom swab materials to the Black Sea. In addition, during the flood periods of the measurements made in the last two decades, the average flow of the water body of Filyos Creek can reach 3.18 to 19.94 times; It is also stated that this creek is fed by the flood side streams dominated by mud flooding.

According to Filyos Port and Filyos Industrial Zone, Railway Connection Line Survey-Project, Feasibility and Engineering Services Work Geological-Geotechnical Survey Report" prepared by Ministry of Transport and Infrastructure, General Directorate of Infrastructure Investments (GDII) and Altınok;

Flood renewal period in Filyos-Yenice-Soğanlı Stream basins is 25 years. In addition, in all routes within the scope of the project, large streams will be crossed by bridges, and culverts will be placed on the areas where dry creeks with small seasonal flows and streams with continuous flows are located in order to provide their water discharge.

According to the 'Western Black Sea Basin Flood Management Plan' report prepared by SYGM, Ministry of Agriculture and Forestry in 2019, in 1964 (Filyos Town), 1983, 1991 and 1998 (Çaycuma District Center), Filyos Creek has overflowed 4 times in total, causing 4 people to die and flooding of the settlements. In order to prevent these floods, flood improvement works were carried out between 2014-2015, namely Filyos Creek 1st, 2nd and 3rd stages.

In order to evaluate the project routes and the extreme meteorological events around it, the data of the Zonguldak Meteorology observation station, which are being observed by the General Directorate of Meteorology (MGM), and the records of extreme meteorological events in 1975-2019 in Zonguldak (MGM, 2020) were examined.

According to these records, in the region where Filyos Creek meets the Black Sea and Çaycuma district, in 1975-2019 there were no flood or heavy rainfall events have been observed. However, it has been determined that extreme meteorological events occur during the observation periods in the region where the project routes are located and in the surrounding settlements, and information about the events is presented in Table 4-27.

Table 4-27: Extreme Meteorological Events in the Region where Project Routes are Located (between 1975-2019)

Province	Location	Project route KP:	Direction and Distance to Project Routes (km)	Extreme Event	Damage caused by the Event
Zonguldak	Zonguldak	2+600	Southwest 25.5	Heavy rainfall anf flood (20 times)	In addition to damaging people, animals, transportation and settlements, road transportation is disrupted.
				Rainfall and flood (8 times)	People, animals, transportation and settlements and agricultural products have been damaged.
	Karabük	0+000	Southeast 60.5	Rainfall and flood (twice)	Residential areas and agricultural products were damaged.
	Eskipazar	0+000	Southeast 77.5	Rainfall and flood (once)	Residential areas are damaged.
	Devrek	0+000	Southeast 30.7	Rainfall and flood (once)	Residential areas are damaged.

Source: MGM, 2020

4.4.4. Surface Water Quality

Definition of water pollution was made as anthropogenic or natural caused, direct or indirect introduction of substances, energy, organisms or genetic material that has a probability to cause adverse effects to human health, or harm to living resources or to the environment (ERA, 2019). On the other hand, Turkish Water Pollution Control Regulation identifies water pollution as discharge of material or energy wastes which may cause negative deterioration in biological resources, human health, fishing, water quality and other uses of water directly or indirectly observed as a negative change in the chemical, physical, bacteriological, radioactive and ecological characteristics of the water resource.

Sources of water pollution are examined under two categories:

i) Point sources
ii) Diffused sources

The quality of surface water resources was performed according to the principles of the Surface Water Quality Regulation (YSKY), published in the Official Gazette dated 30.11.2012 and numbered 28483. The purpose of this regulation is to determine and classify the biological, chemical, physico-chemical and hydromorphological qualities of surface waters, coastal and transitional waters, to monitor and maintain the balance of using water in accordance with sustainable development objectives.

YSKY evaluates surface waters in four different classes in terms of general chemical and physico-chemical parameters. This classification is performed by comparing the analysis

result with the relevant limit value for each parameter analyzed in the sample after sampling. The water quality classes defined in Table-2 in YSKY Annex-5 are given below.

Table 4-28: Classification of Surface Waters in Terms of General Chemical and Physico-Chemical Parameters According to the Surface Water Quality Regulation

Water Quality	Water Quality Class	Color Code
Very Good	Class I	Blue
Good	Class II	Green
Moderate	Class III	Yellow
Poor	Class IV	Red

Samples were taken from 3 locations near in the study area in order to determine the quality of surface water resources. These locations have been selected from areas with water crossings near the railway lines routes. Measurements and analysis on samples taken from selected points were carried out in accordance with the standards specified in the Regulation on the Monitoring of Surface Water and Groundwater, which was published in the Official Gazette dated 11.02.2014 and numbered 28910. The coordinates of the surface water resources sampling points are listed in Table 4-29 below and shown in Figure 4-21.

Table 4-29: Surface Water Sampling Locations

Sampling Location	Coordinates
S-1	423682 E, 4602501 N
S-2	421245 E, 4602713 N
S-3	421115 E, 4601820 N
S-4	421602 E, 4601122 N

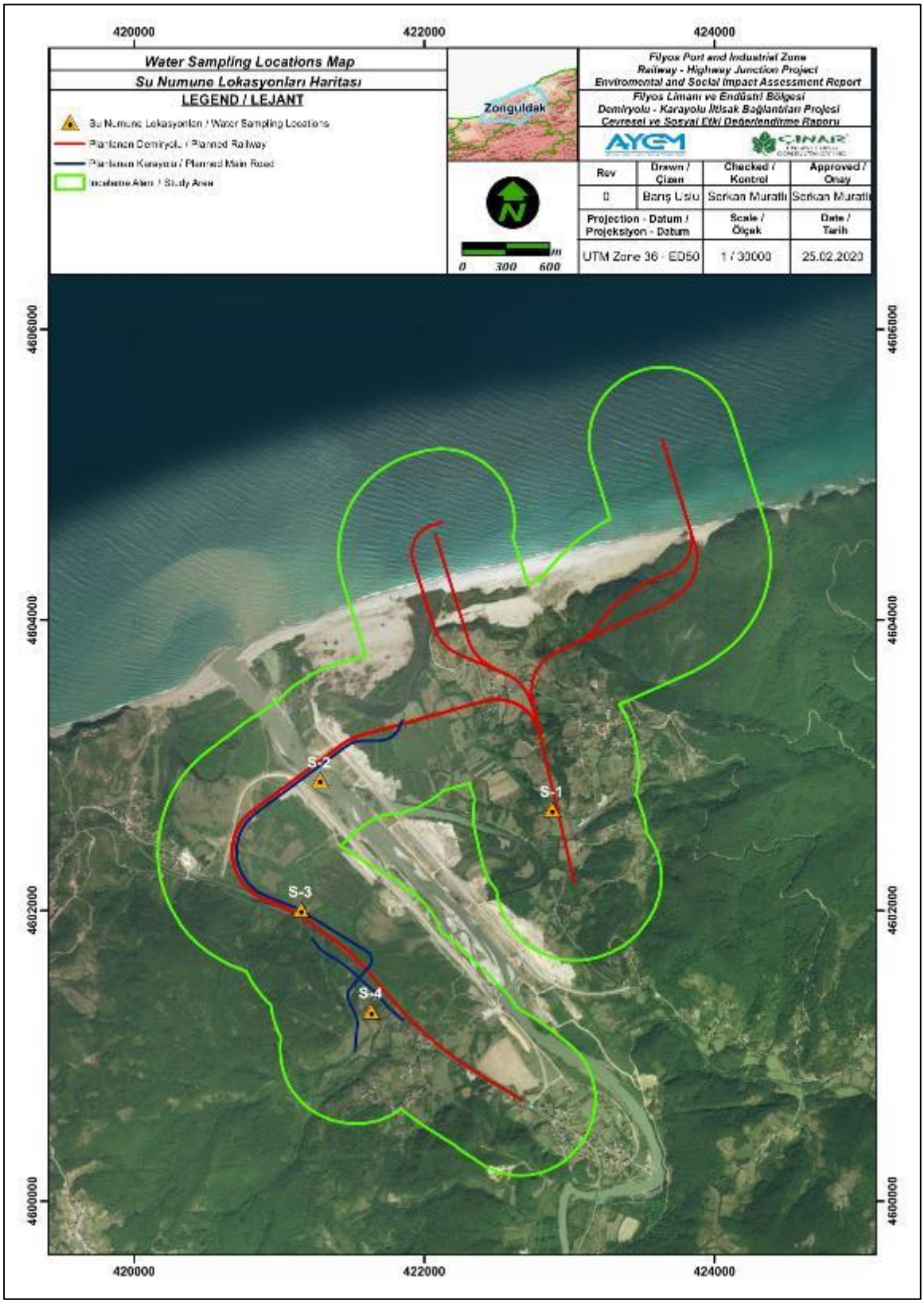

Figure 4-21: Surface Water Sampling Locations

The analysis results of surface water samples are given in table below.

Table 4-30: The Analysis Results of Surface Water Samples

Parameter	Unit	YSKY Annex-V Table 2				1. Point	2. Point	3. Point	4. Point	Uncertainty	Method
		Very Good (I.Class)	*Good (II. Class)*	*Moderate (II. Class)*	*Poor (IV. Class)*						
pH	-	-	-	-	-	7.82	7.82	-	8.01	± 0.07	SM 4500 H^+B
Conductivity	µS/cm	<400	1000	3000	>3000	515	515	-	511	% ± 3.13	TS 9748 EN 27888
Dissolved Oxygen	mg/L	>8	6	3	<3	10.32	10.32	-	10.58	% ± 1.23	ASTM D 888
Color (436 nm)	m^{-1}	nm: ≤ 1.5	nm: 3	nm: 4.3	nm: > 4.3	< 0.1	< 0.1	-	< 0.1	% ± 20.9	TS EN ISO 7887 B
Color (525 nm)	m^{-1}	nm: ≤ 1.2	nm: 2.4	nm: 3.7	nm: > 3.7	< 0.1	< 0.1	-	< 0.1	% ± 4.06	TS EN ISO 7887 B
Color (620 nm)	m^{-1}	nm: ≤ 0.8	nm: 1.7	nm: 2.5	nm: > 2.5	< 0.1	< 0.1	-	< 0.1	% ± 9.71	TS EN ISO 7887 B
BOD	mg/L	<4	8	20	>20	< 3	< 3	-	< 3	% ± 31	SM 5210 B
COD	mg/L	<25	50	70	>70	< 10	< 10	-	< 10	% ± 24.97	SM 5220 B
Ammonium Nitrogen	mg/L	<0.2	1	2	>2	< 0.016	< 0.016	-	0.094	% ± 25.3	SM 4500 NH_3 F
Total Kjeldahl Nitrogen (Tk-N)	mg/L	<0.5	1.5	5	>5	0.457	0.457	-	1.007	% ± 26.0	SM 4500 Norg B

Parameter	Unit	YSKY Annex-V Table 2				1. Point	2. Point	3. Point	4. Point	Uncertainty	Method
		Very Good (I.Class)	*Good (II. Class)*	*Moderate (II. Class)*	*Poor (IV. Class)*						
Total Nitrogen (N)	mg/L	<3.5	11.5	25	>25	0.72	0.72	-	1.447	-	SM 4500 Norg B. SM 4110 B
Sulphide (S^{2-})	mg/L	≤0.002	0.005	0.01	>0.01	< 0.002	< 0.002	-	< 0.002	% ± 13	SM 4500 S^{2-} D
Fluoride (F^{-})	mg/L	≤ 1	1.5	2	> 2	< 0.1	< 0.1	-	< 0.1	% ± 17.3	SM 4110 B
Nitrate Nitrogen	mg/L	<3	10	20	>20	0.263	0.263	-	0.44	% ± 26.6	SM 4110 B
Phosphate Phosphorus	mg/L	<0.05	0.16	0.65	>0.65	<0.05	<0.05	-	<0.05	% ± 14.4	SM 4110 B
Total Phosphorus (P)	mg/L	<0.08	0.2	0.8	>0.8	0.066	0.066		0.057	% ± 37.3	ISO 15587 TS EN ISO 17294-1.2
Manganese (Mn)	mg/L	≤ 0.1	0.5	3	> 3	0.004	0.004	-	0.011	% ± 36.8	ISO 15587 TS EN ISO 17294-1.2
Selenium (Se)	mg/L	≤ 0.01	0.0015	0.02	>0.02	< 0.0005	< 0.0005	-	< 0.0005	% ± 37.0	ISO 15587 TS EN ISO 17294-1.2
Oil and Grease	mg/L	< 0.2	0.3	0.5	> 0.5	< 10	< 10	-	< 10	% ± 27.9	SM 5520 D

Analysis results given in the table above are analysed, 1st monitoring point is evaluated as Good (Class II) in terms of Conductivity and Very Good (Class I) in terms of all other parameters analysed.

In the 2nd monitoring point, is evaluated as Good (Class II) in terms of Conductivity, KOI, Ammonium Nitrogen, Total Nitrogen and Manganese, Moderate (Class III) in terms of BOI and Total Kjeldahl Nitrogen. BOI as evaluated as Moderate in this point can be related with the residential area around the sample point. TKN parameter evaluated as Moderate in this point can be related with the use of nitrogenous fertilizers in agriculture. The water quality status of the point in terms of General Chemical and Physicochemical Parameters was determined as Moderate.

The third sampling point determined was visited and the sample could not be taken as the stream was dry.

The fourth sampling point evaluated according to the YSKY Annex-V Table-2 , and evaluated as Good (Class II) in terms of Conductivity and Total Kjeldahl Nitrogen and Very Good (Class I) in terms of all other parameters analysed. The water quality status of the point in terms of General Chemical and Physicochemical Parameters was determined as Good.

4.5. Resource and Waste Management

4.5.1. Material Requirements

The economy of the province of Zonguldak whose geographical structure consists of 50% mountains, 35% plateaus and 15% 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. [5] Zonguldak Province Mining Map is given below.

[5] Prof.Dr. Hamza ÇEŞTEPE Prof.Dr. Hasan VERGİL Doç.Dr. Gökhan DÖKMEN Yrd.Doç.Dr. Deniz ŞÜKRÜOĞLU Yrd.Doç.Dr. Mehmet Fatih BAYRAMOĞLU, 2016, THE PLACE AND IMPORTANCE OF THE MINING SECTOR IN ZONGULAK: ANALYSIS WITH ECONOMETRIC AND STATISTICAL METHODS, Ziraat Gurup Matbaacılık, Zonguldak

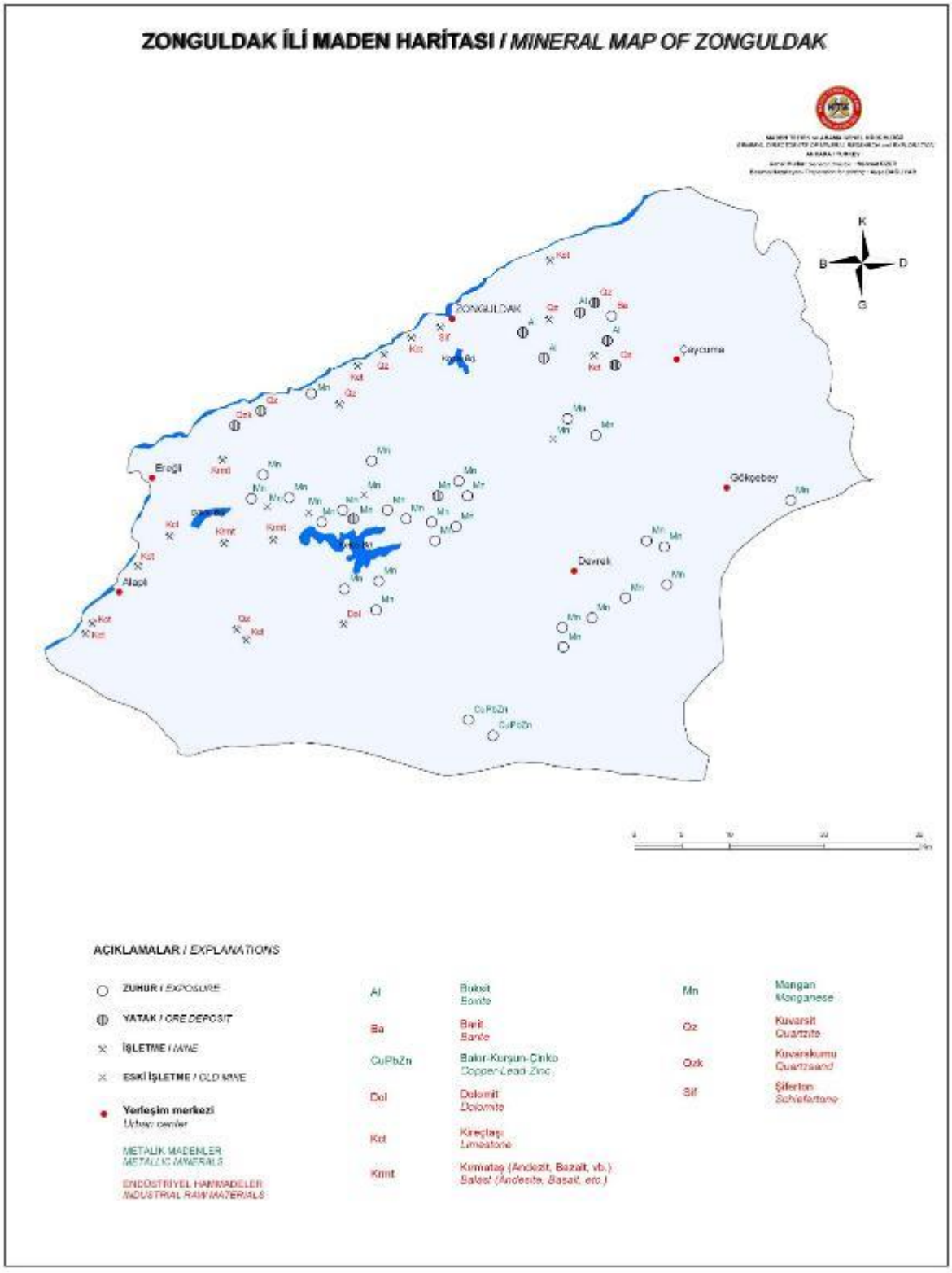

Figure 4-22: Zonguldak Province Mining Map

The material need of the project during the construction phase is planned to be met from existing concrete facilities and quarries. The borrow areas and quarries around the project

area have been identified and the map showing the locations of the identified sites is given in Figure 4-23.

Table 4-31: Potential 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

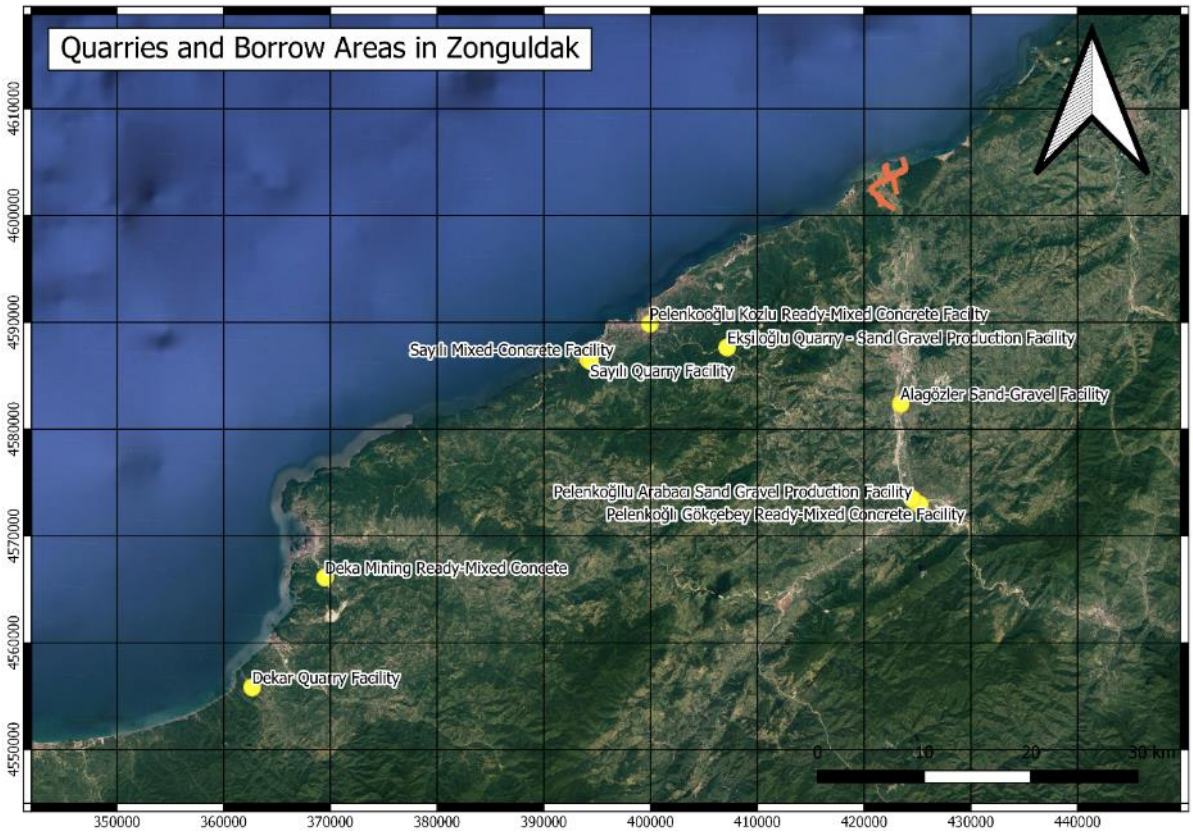

Figure 4-23: Potential Borrow Areas and Quarries around the Project Area

4.5.2. Provincial Waste Generation Rates and Waste Management Infrastructure in the Region

Zonguldak Province and Turkey's average daily waste generation values are given below. As shown, the average per capita municipal solid waste generation value for Turkey in 2018 1.16 kg / day while the Zonguldak to 1.04 kg / day.

Table 4-32: Waste Statistics of Zonguldak Province

Location	Domestic (Non-Recyclable)*	Recyclable*	Total
Zonguldak	0.728	0.312	1.04
Turkey	0.812	0.348	1.16

* Recyclable and non-recyclable wastes have been calculated based on the Environmental Indicators published by the Ministry of Environment and Urbanization, which states that 30% of generated municipal waste (by weight) consists of packaging waste (Ministry of Environment and Urbanization, 2015).

Source: Turkstat Municipality Waste Statistics, https://biruni.tuik.gov.tr/medas/?kn=119&locale=tr

For the disposal of solid wastes generated within the borders of the province of Zonguldak, the solid waste storage facility in the Central District Sofular Village Tombalaklar District of the Zonguldak Special Administration and Municipalities Environmental Infrastructure Basic Services Association (ZONCEB), which is the establishment of Municipalities and Special Provincial Administration, is used. Domestic solid wastes are collected by being separated in a certain rate at the source. Solid wastes are transferred to landfills by compressed semi-trailers by Kilimli (Karadon), Çaycuma, Devrek, Ereğli and Zonguldak Municipalities.

As of November 2008, solid wastes have been stored in this solid waste storage facility, and for this purpose, approximately 3 hectares (first lot) of 15 hectares of land have been filled as a storage area and closed.

Then, considering the generated solid waste amounts and topographic structure of the land, second lot, which was built strengthening the existing bank and to extend the life of the storage area, started to accept waste as of September 2019. The second lot of the solid waste storage facility has a total of 600,000 tons of solid waste storage capacity and can accept 450 tons of waste per day.

4.6. Biodiversity

4.6.1. Biodiversity Study Area

The Project route starts from the northwest of Derecikoren village, passes over Filyos Creek following through northeast of Gokceler village and West of Sazkoy, and ends in the south of Sazköy. The Project is expected to have an approximate construction area of 52.86 hectares. There is an existing highway connection and highway passes within the scope of the Project, where it is planned to construct a junction to the north of Gokceler village and a highway bridge for the railway passage. After it would pass over Filyos Creek via another bridge, the highway would depart from the railway to the south, and extend along underneath the railway.

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, not only the Project Area of Influence (AoI), but the larger ESIA study area, which consists of a 500-m corridor extending on each side of the proposed route was considered as the Biodiversity Study Area.

Biodiversity field studies conducted in January 2020 also covered the entire Biodiversity Study Area, in addition to which reference areas outside the Project footprint, and habitats with similar ecological features and carrying capacities were also considered.

Detailed flora and fauna sampling surveys were conducted at 10 sampling stations within the Biodiversity Study Area. These sampling points were selected considering habitat characteristics, as well as habitat preferences of 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 the field surveys. Ornithological surveys were conducted at three vantage points, representing different habitats, and also along 2 transect lines. A map showing sampling/vantage points is presented in Figure 4-24.

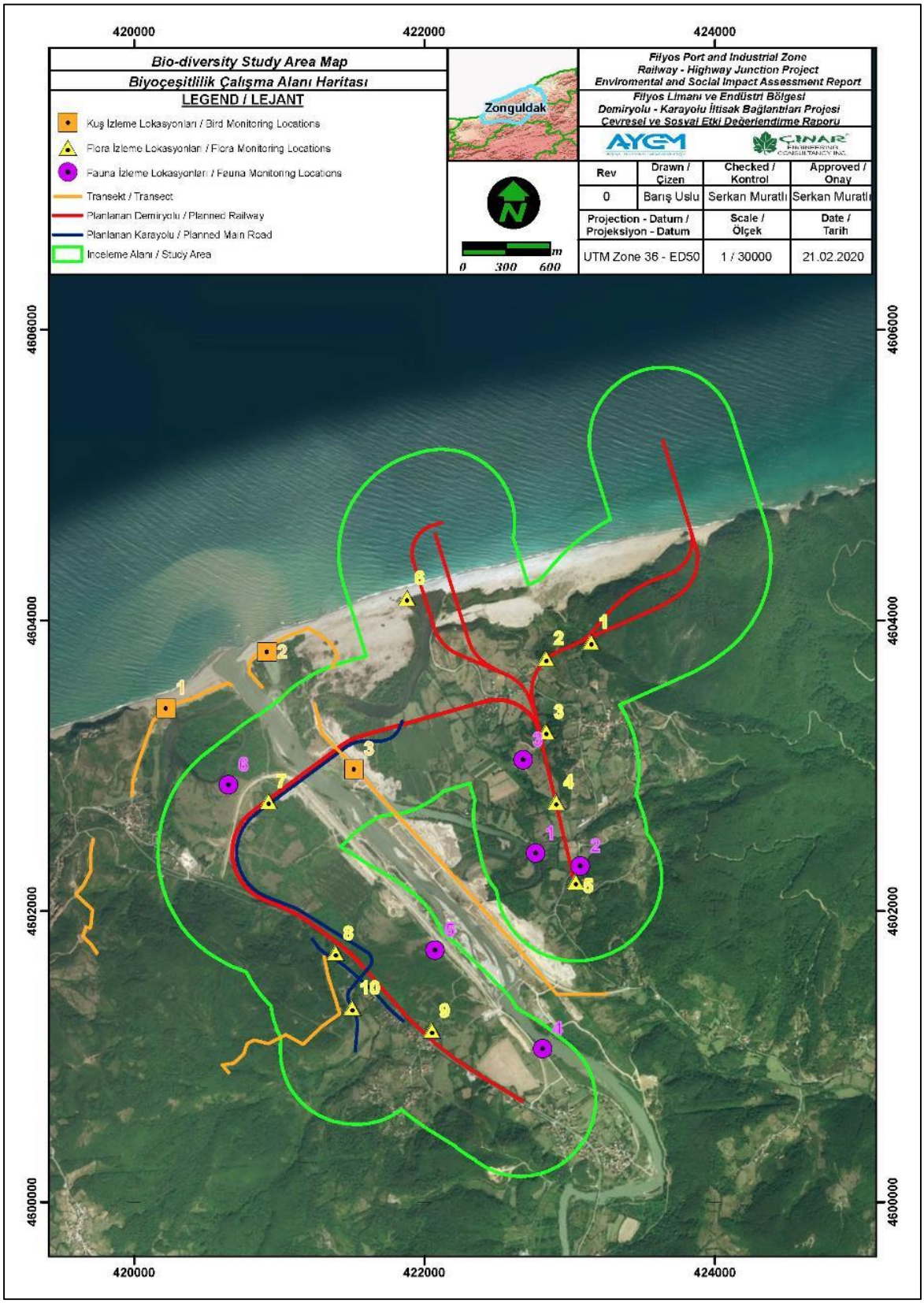

Figure 4-24: Biodiversity Study Area and Sampling/Vantage Points

4.6.2. Protected Areas

The World Bank ESS6 identify two different types of protected areas; Legally Protected Areas and Internationally Recognized Areas. Legally Protected Areas as defined by ESS6 are those that meet the IUCN definition for a protected area, while Internationally Recognized Areas are those that are exclusively defined as UNESCO World Heritage Sites, UNESCO Man and Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Ramsar Convention. 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 that have been designated a status under the Turkish protected area system, as well as areas designated as Key Biodiversity Areas (KBAs), Important Bird and Biodiversity Areas (IBAs) and Important Plant Areas (IPAs) were screened for the purpose of this ESIA.

4.6.2.1. 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 Turkey, 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:

- assignment to a category is a not a commentary on management effectiveness,
- the categories systems is 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 Turkey, 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 4-33, and a map showing the locations of the protected areas with respect to the Project route is presented in Figure 4-25. 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 4-33: 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
Bartin Creek 1st Degree Natural Protected Area	Ia	15.58
Goldagi Nature Park	V	16.83
Balamba Nature Park	V	23.14
Milli Egemenlik Nature Park	V	24.30

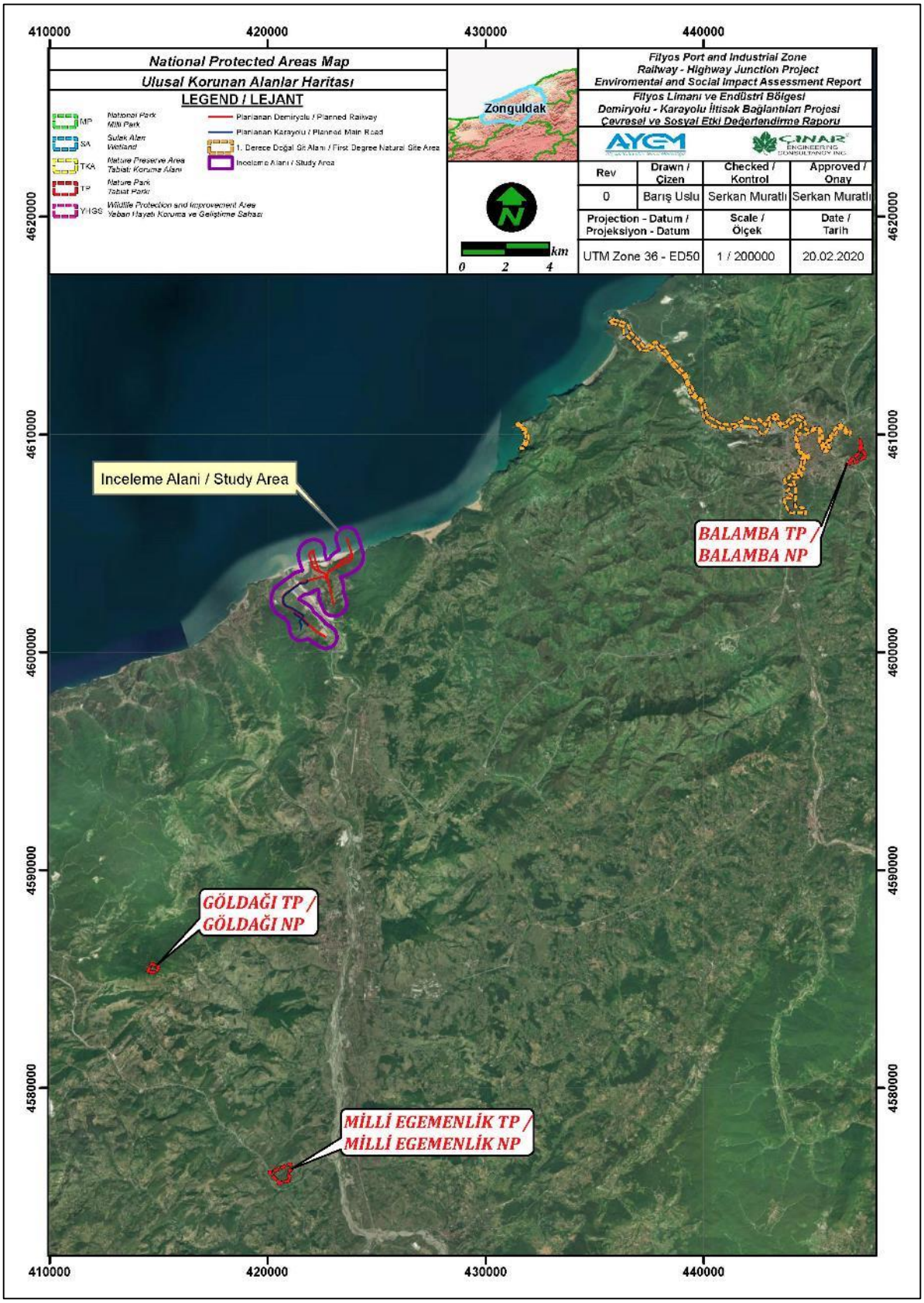

Figure 4-25: Legally Protected Areas

4.6.2.2. Internationally Recognized Areas

ESS6 defines Internationally Recognized Areas as "areas of recognized importance to biodiversity conservation but are not always legally protected". These area UNESCO Natural Heritage Sites, UNESCO Man and Biosphere Reserves, main Key Biodiversity Areas, and wetlands within the scope of Ramsar Convention on Wetlands of International Importance. 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 Turkey, 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 Turkey'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 Turkey 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 Kiyilari (Coasts) is one of the KBAs identified by the inventory, which covers an areas of about 17,413 hectares within Amasra, Bartin Merkez and Caycuma 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. Species that meet the KBA criteria are presented in table below:

Table 4-34: Amasra Coasts KBA-listed Species

Species	IUCN Red List Category
Seseli resinosum	VU
Gavia arctica	LC
Phalacrocorax aristotelis desmarestii	LC
Lutra lutra	NT

The Project route and its AoI is 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 Study Area. 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.

There is no information available on *Lutra lutra* population at the Biodiversity Study Area, or the larger region. 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 (DSI), Filyos Creek banks have lost their natural characteristic and have been transformed into stony/rocky areas. Photographs taken at one such location in

Demirikoren are provided in Figure 4-26. The Project field ecologists concluded that these areas are not suitable for *Lutra lutra* breeding or nesting.

Figure 4-26: Filyos Creek Demirikören Site

Field surveys were conducted in winter, which was not the best time to directly observe otter individuals. However, based on both literature data and experts' field expertise, the existing population in the area still feeds along the Creek. It is required that a pre-construction survey during the appropriate season is undertaken to confirm the presence of the otter population and habitat preferences in the area. Additional field surveys will be conducted prior to the finalization of the detailed design, results of which will be incorporated into tender documents. Mitigation measures proposed within the scope of this ESIA Report would then be updated based on the results of the pre-construction surveys.

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 (see Figure 4-25), 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 Study Area but in the KBA are considered as Category Ia: Strict nature reserves.

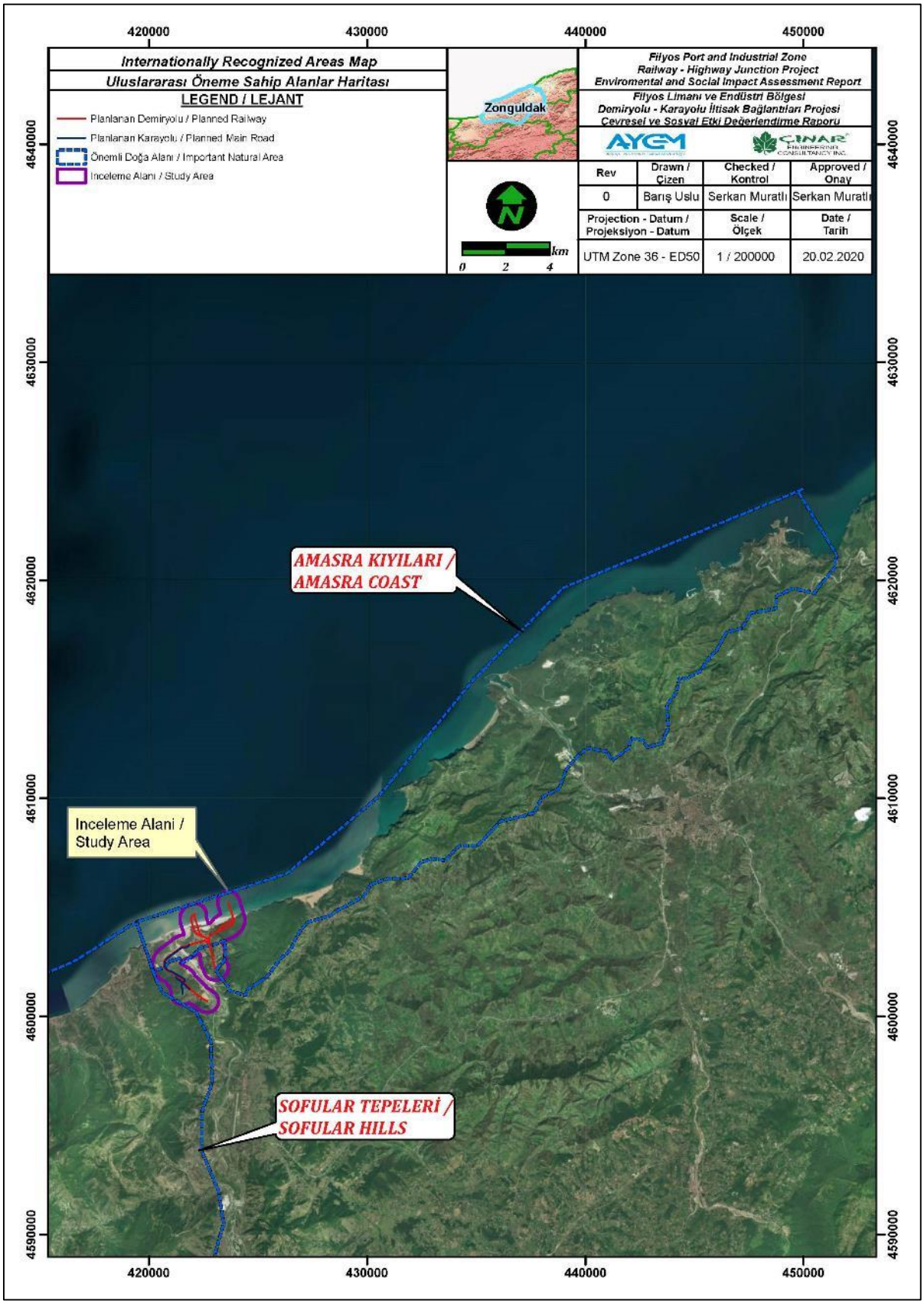

Figure 4-27: Amasra Coasts Key Biodiersity Area

4.6.3. Biodiversity Baseline Studies

The Biodiversity Study Area for the Filyos Port and Industrial Zone Railway-Highway Connections Project ESIA studies, is defined in Chapter 4, and a map showing the area is presented in Figure 4-24 . Biodiversity baseline studies were conducted to cover this area, while additional vantage points outside the area were also used as appropriate.

Baseline studies 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 following 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.
- Due to climatic conditions of the area and considering that winter was not an appropriate time to observe majority of species, to identify species' compositions information from previous studies were used and expert judgement was consulted.

4.6.3.1. 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 Turkey and the Caucasus. The main objective of the EUNIS habitat classification is to create a European reference set of habitat types including a description of all types and hierarchical classification.

Habitats within the Biodiversity Study Area were evaluated in accordance with the EUNIS classification, which is useful in terms of not only relating the national classifications to international level, but in terms of corresponding EUNIS habitats to habitats listed in Annex I of Habitats Directive for "designation of special areas of conservation" and the European Red List of Habitats (Janssen, 2016) for the critical habitat assessment.

Natural habitat types of the Biodiversity Study Area, characteristic plant species of these habitats, related EUNIS codes, corresponding Habitat Directive Annex I habitats and Natura 2000 codes, as well as the European Red List categories are presented in Table 4-35. In addition to habitats explained in the table there are also modified and artificial habitats that can be listed as; 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, J4.3: Rail networks and J4.5: Hard-surfaced areas of ports.

Photographs of the Natural and modified EUNIS habitat types of the Biodiversity Study Area are presented in Figure 4-28 and a map showing the habitats is provided in Figure 4-29.

Table 4-35: Habitats of the Biodiversity Study Area

EUNIS Habitat Type	Habitats Directive Annex I	Habitat Characteristics
B1.4: Coastal stable dune grassland (grey dunes)	2130: Fixed coastal dunes with herbaceous vegetation (grey dunes)	• Grows only along marine coasts • Filyos coasts is one the best representatives of the habitat in Turkey. • 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 that have been 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.
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.*
E3.4: Moist or wet eutrophic and mesotrophic grassland	6450: Northboreal alluvial pasture	• Found in forest and agricultural land opening. • Used as grazeland, this habitat is mostly composed of hay. • Dominant species are; *Medicago sativa, Trifolium campestre, Lolium perenne, Cynodon dactylon, Sanguisorba minor, Eryngium campestre, Chondrilla juncea.*

EUNIS Habitat Type	Habitats Directive Annex I	Habitat Characteristics
F5.3: Pseudomaquis	-	• Pseudomaquis habitat in Turkey is mostly found in Marmara and Western Black Sea regions. • Dominant species of the habitat are; *Phillyrea latifolia, Mespilus germanica, Arbutus unedo, Erica arborea, Arbutus andrachne, Laurus nobilis, Quercus petraea.* • Subflora of this healthy habitat is also quite rich composed of herbaceous species like; *Seseli campestre, Oenanthe pimpinelloides, Astragalus glycyphyllos subsp. glycyphyllos, Doronicum orientale.*
G1.1: Riparian and gallery woodland, with dominant *Alnus, Betula, Populus* or *Salix*	91E0: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*	• Observed along Filyos Creek. • Dominant species are; *Alnus glutinosa, Salix alba, Ulmus minor ve Platanus orientalis.* • Subflora is composed of shrubs like *Rubus sanctus* and *Prunus spinosa*, herbaceous species with high water demand like *Phragmites australis, Carex pendula, Pulicaria dysenterica, Plantago lanceolate.*
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 is no anthropogenic impacts. However, along the route it is degraded. • Deciduous tree species of the habitat are; *Carpinus 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.*

EUNIS Habitat Type	Habitats Directive Annex I	Habitat Characteristics
G1.D: Hazelnut tree orchards	-	• Represents hazelnut trees within the Biodiversity Study Area.
I1.2: Mixed crops of market gardens and horticulture	-	• Limited along the Project route. • Local people mostly grow vegetables in these areas..

B1.4: Coastal stable dune grassland (grey dunes)

D5.1: Reedbeds normally without free-standing water

E3.4: Moist or wet eutrophic and mesotrophic grassland

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 4-28: Habitats of the Biodiversity Study Area

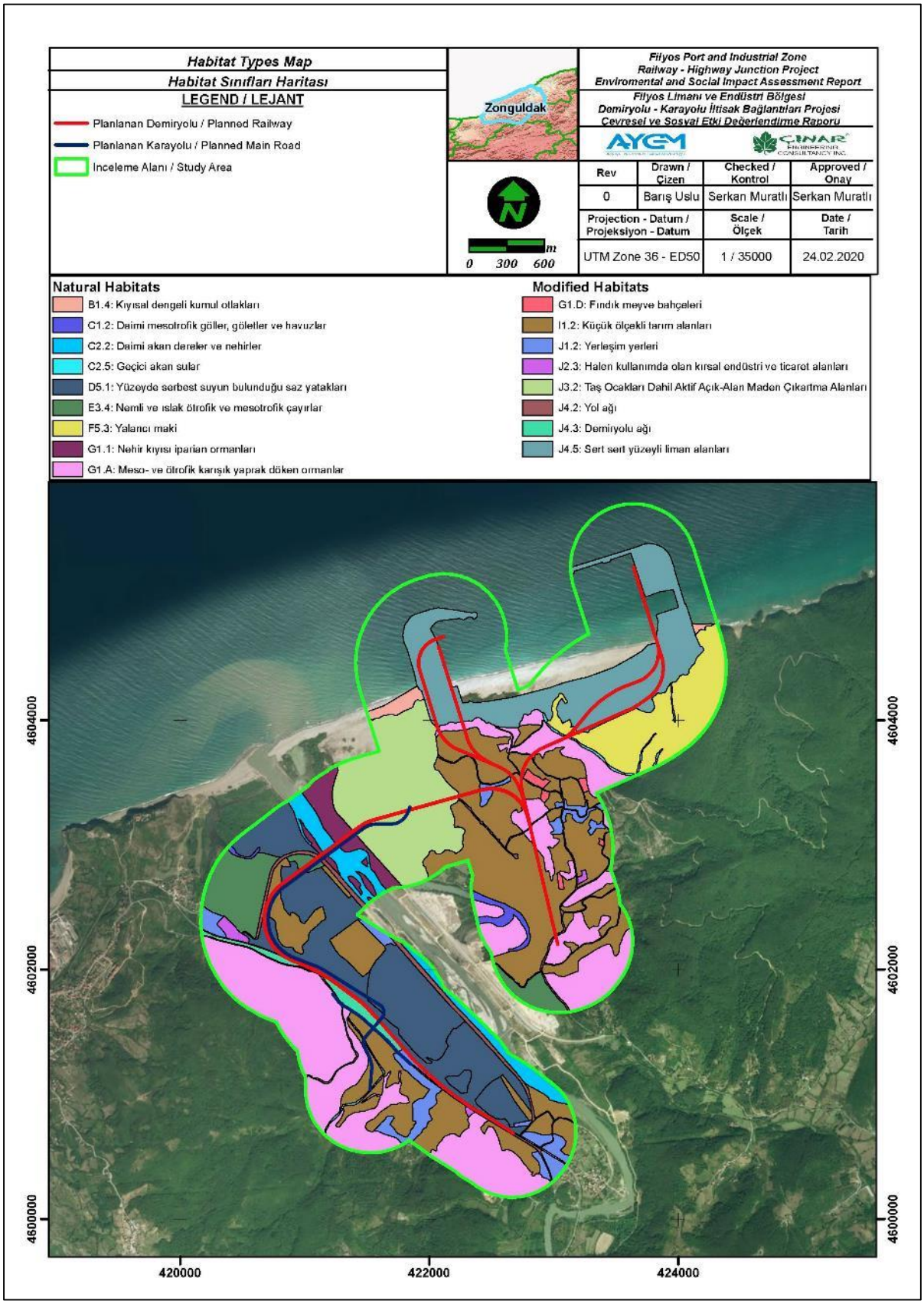

Figure 4-29: Habitat Map

4.6.3.2. Flora

To identify the flora composition of the Biodiversity Study Area, first sampling points representing different habitat types in the area were determined during the scoping phase of the ESIA process. For assessment of Project-related impacts, field surveys were conducted on each side of the 1.000-meter corridor. 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 Turkey, 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 Study Area, which belong to 65 plant families (see Table 4-36). 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 is also a rare *Pancratium maritimum*, and *Cyclamen coum* var. *coum* is 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 Turkey. 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. Populations of neither of the two species within the Biodiversity Study Area are located on the Project footprint or the AoI. Critical habitat assessment for these species is presented in Chapter 4.6.4, and potential impacts of the Project on flora species is further discussed in Chapter 5.7.2.

Centaurea kilaea

Pancratium maritimum

Cyclamen coum

Figure 4-30: Endemic and Rare Flora Species

Table 4-36: Flora Species Identified at the Biodiversity Study Area

FAMILY	NO	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
PTERIDOPHYTA																							
EQUISETACEAE	1	*Equisetum telmateia* Ehrh.	At kuyruğu	Widespread										x	x	x				x			
HYPOLEPIDACEAE	2	*Pteridium aquilinum* (L.) Kuhn	Eğrelti	Widespread								x	x								x		
ASPLENIACEAE	3	*Asplenium trichomanes* L.	Baldırıkara	Widespread								x							x	x			
	4	*Phyllitis scolopendrium* (L.) Newm.	Eğrelti	Widespread								x								x			
ATHYRIACEAE	5	*Athyrium filix-foemina*(L.) Roth	Eğrelti	Widespread								x				x				x			
ASPIDIACEAE	6	*Polystichum aculeatum* (L.) Roth	Eğrelti	Widespread								x				x				x			
	7	*Dryopteris filix-mas* (L.) Schott	Eğrelti	Widespread								x		x						x			
SPERMATOPHYTA																							
GYMNOSPERMAE																							
DICOTYLEDONES																							
RANUNCULACEAE	8	*Ranunculus arvensis* L.	Dugun cicegi	Mediterranean								x	x						x				
	9	*Ranunculus ficaria* L. subsp. *ficariiformis* Rouy & Fouc	Düğün çiçeği	Widespread								x	x							x			
	10	*Ranunculus repens* L.	Düğün çiçeği	Widespread								x				x			x				
	11	*Helleborus orientalis* Lam.	Çöpleme	Widespread								x	x							x			
	12	*Clematis vitalba* L.	Akasma	Widespread								x		x						x			
PAPAVERACEAE	13	*Papaver rhoeas* L.	Gelincik	Widespread								x	x							x			
	14	*Corydalis solida* (L.) Swartz subsp. *solida*	Kazgagası	Widespread								x		x					x				
	15	*Glaucium flavum* Crantz	Gündürmelalesi	Widespread													x		x				
BRASSICACEAE	16	*Descurainia sophia* (L.)	-	Widespread											x	x				x			
	17	*Brasica oleracea* L. Subsp. acephala (DC.) Metag.	Karalahana	Cultivated										x						x			
	18	*Cardamine bulbifera* (L.) Crantz	-	Euro-Siberian								x								x			
	19	*Eruca sativa* Miller	-	Widespread											x					x			
	20	*Thlaspi perfolatum* L.	Kulakçıklı akça çiçeği	Widespread											x				x				
	21	*Capsella bursa-pastoris* (L.) Medik.	Cobancantasi	Widespread											x					x			
	22	*Sisymbrium officinale* (L.) Scop.	Çalgıcı otu	Widespread											x					x			
VIOLACEAE	23	*Viola odorata* L.	Menekşe	Widespread									x	x						x			

FAMILY	NO	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
POLYGALACEAE	24	*Polygala supina* Schreb.	-	Widespread									x	x					x				
CARYOPHYLLACEAE	25	*Minuartia hamata* (Hausskn.) Mattf.	-	Widespread								x	x	x					x				
	26	*Holosteum umbellatum* L. var. *Umbellatum*	-	Widespread								x	x	x						x			
	27	*Velezia rigida* L.	-	Euro-Siberian								x		x						x			
	28	*Silene vulgaris (Moenc) Garcke var. vulgaris*	Gıvışkan otu	Widespread								x	x	x						x			
	29	*Silene dichotoma* Ehrh	-	Euro-Siberian								x		x					x				
	30	*Silene italica*(L.) Pers.	-	Widespread									x	x						x			
	31	*Silene alba* (Miller) Krause subsp. *alba*	-	Widespread								x	x						x				
	32	*Stellaria holostea* L.	-	Euro-Siberian										x						x			
	33	*Stellaria media* (L.) Vill. Subsp. *media*	-	Widespread										x						x			
POLYGONACEAE	34	*Polygonum lapathifolium* L.	Söğüt otu	Widespread												x			x				
	35	*Polygonum maritimum* L.	Sicimlik	Widespread													x		x				
	36	*Rumex scutatus L.*	-	Widespread									x							x			
CHENOPODIACEAE	37	*Salsola ruthenica* Iljin		Widespread													x		x				
TILIACEAE	38	*Tilia argentea* Desf. ex DC.	Ihlamur	Euro-Siberian								x								x			
GERANIACEAE	39	*Erodium cicutarium* (L.) L. Herit subsp. *cicutarium*	Turna gagası	Widespread								x		x					x				
	40	*Geranium molle* L. subsp. *molle*	-	Widespread									x	x						x			
	41	*Geranium purpureum* Vill.	-	Widespread										x						x			
ACERACEAE	42	*Acer campestre* L. Subsp. *campestre*	Akçaağaç	Widespread								x								x			
STAPHYLEACEAE	43	*Staphylea pinnata* L.	Patlak	Widespread								x	x							x			
CELASTRACEAE	44	*Euonymus latifolius* (L.) Miller_subsp. *latifolius*	-	Euro-Siberian								x							x				
RHAMNACEAE	45	*Paliurus spina-christi* Miller	Karaçalı	Widespread									x							x			
AQUIFOLIACEAE	46	*Ilex colchica* Poj.	Işılgan	Euro-Siberian								x							x				
FABACEAE	47	*Astragalus glycyphyllos* L. subsp. *glycyphyllos*	Geven	Euro-Siberian									x	x						x			
	48	*Genista tinctoria* L.	Boyacı katırtırnağı	Euro-Siberian								x	x							x			
	49	*Chamaecytisus hirsutus* (L.) Link	-	Widespread								x	x	x						x			
	50	*Psoralea bituminosa* L.	Katran yoncası	Mediterranean									x							x			
	51	*Coronilla varia* L. subsp. *varia*	-	Widespread									x							x			

FAMILY	NO	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
	52	*Melilotus alba* Desr.	Yonca	Widespread									x							x			
	53	*Dorycnium graecum* (L.) Ser.	-	Euro-Siberian									x							x			
	54	*Vicia cracca* L. subsp. *stenophylla* Vel.	Fiğ	Widespread								x								x			
	55	*Trifolium stellatum* L. var. *stellatum*	Ucgul	Widespread								x								x			
	56	*Trifolium campestre* Schreb.	Ucgul	Widespread								x								x			
	57	*Trifolium arvense* L. subsp. *arvense*	Üçgül	Widespread								x		x						x			
	58	*Lathyrus laxiflorus* (Desf.) O.Kuntze subsp. *laxiflorus*	-	Widespread								x	x	x						x			
	59	*Lathyrus aphaca* L. var. *biflorus* Post.	-	Widespread										x						x			
	60	*Medicago sativa* L.	Yonca	Widespread								x								x			
	61	*Medicago marina* L.	Sahil yoncası	Widespread													x			x			
ROSACEAE	62	*Pyrus elaeagnifolia* Pallas subsp. *elaeagnifolia*	Ahlat	Widespread								x		x						x			
	63	*Prunus x domestica* L.	Erik	Cultivated											x						x		
	64	*Agrimonia eupatoria* L.	Kasık otu	Widespread								x			x					x			
	65	*Crataegus pentagyna* Waldst	Alıç	Euro-Siberian									x							x			
	66	*Fragaria vesca* L.	Yaban çileği	Widespread								x								x			
	67	*Mespilus germanica* L.	Muşmula	Euro-Siberian								x								x			
	68	*Potentilla recta* L.	Beşparmak otu	Widespread								x	x							x			
	68	*Potentilla reptans* L.	Beş parmak otu	Widespread												x				x			
	69	*Rubus hirtus* Waldst ex. Kit.	Böğürtlen	Euro-Siberian												x				x			
	70	*Rubus sanctus* Schreber	Böğürtlen	Widespread									x			x				x			
	71	*Geum urbanum* L.	Su karanfili	Euro-Siberian								x				x				x			
	72	*Pyracantha coccinea* Roemer	Ateş dikeni	Widespread								x	x							x			
	73	*Sanguisorba minor Scop. Subsp. muricata (Spach)Brig*	Çayırdüğmesi	Widespread								x		x					x				
	74	*Rosa canina* L.	Kusburnu	Widespread								x							x				
ONAGRACEAE	75	*Epilobium parviflorum* Schreber	Yakı otu	Widespread												x							
APIACEAE	76	*Torilis leptophylla* (L.) Reichb.	-	Widespread								x							x				
	77	*Eryngium campestre* L. var. *campestre*	Şekerdikeni	Widespread								x							x				

FAMILY	NO	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
	78	*Eryngium maritimum* L.	Kumboğadikeni	Widespread													x			x			
	79	*Oenanthe pimpinelloides* L.	Kazayağı	Widespread								x							x				
	80	*Seseli campestre* Besser	-	Widespread								x	x						x				
	81	*Pastinaca sativa* L. Subsp. *urens* (Req. Ex Godron) Celak	-	Widespread								x		x						x			
	82	*Daucus carota* L.	Yabani havuc	Widespread								x				x				x			
ARALIACEAE	83	*Hedera helix* L.	Duvar sarmaşığı	Widespread									x	x						x			
CORNACEAE	84	*Cornus sanguinea* L. Subsp. *australis* (C.A.Meyer) Jav.	Dişi kızılcık	Euro-Siberian								x	x			x					x		
	85	*Cornus mas* L.	Kızılcık	Euro-Siberian								x				x				x			
CARIFOLIACEAE	86	*Sambucus ebulus* L.	Mürver	Euro-Siberian								x				x				x			
	87	*Lonicera etrusca* Santi.	Hanımeli	Widespread								x								x			
CRASSULACEAE	88	*Sedum album L*	Damkoruğu	Widespread									x							x			
	89	*Sedum pallidum* Bieb. Var. *pallidum*	Damkoruğu	Widespread									x							x			
DIPSACACEAE	90	*Scabiosa columbaria* L. Subsp. *columbaria* var. *columbaria*	-	Widespread								x								x			
ASTERACEAE	91	*Senecio vernalis* Waldst. et Kit	-	Widespread								x								x			
	92	*Doronicum orientale* Hoffm.	-	Widespread										x							x		
	93	*Inula ensifolia* L.	-	Euro-Siberian									x							x			
	94	*Inula viscosa* (L.) Aiton	Zimbit	Mediterranean									x							x			
	95	*Bellis sylvestris* Cyr..	Koyungözü	Mediterranean										x						x			
	96	*Carlina intermedia* Schur.	-	Widespread									x							x			
	97	*Centaurea iberica* Trev. Ex Sprengel	Peygamber cicegi	Widespread								x								x			
	98	***Centaurea kilaea* Boiss.**	**Kilyos düğmesi**	**Euro-Siberian**	**x**		**EN**										**x**				**x**		
	99	*Anthemis cretica* L. Subsp. *pontica* (Wild.) Grierson	Papatya	Widespread									x							x			
	100	*Anthemis tinctoria* L	Papatya	Widespread								x		x						x			
	101	*Artemisia vulgaris* L.	Kabayavşan	Widespread																x			
	102	*Eupatorium cannabinum* L.	-	Euro-Siberian								x		x		x				x			
	103	*Pallenis spinosa* (L.) Cass	-	Mediterranean									x							x			
	104	*Carduus nutans* L. sensu lato	Kenger	Widespread								x								x			

FAMILY	NO	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
	105	*Cirsium hypoleucum* DC.	Devedikeni	Euro-Siberian								x								x			
	106	*Cirsium ligulare* Boiss.		Widespread								x								x			
	107	*Otanthus maritimus* (L.) Hoffmans. & Link		Mediterranean													x			x			
	108	*Pulicaria dysenterica* (L.) Bernh.	-	Widespread									x		x	x		x		x			
	109	*Senecio vulgaris* L.	-	Widespread											x					x			
	110	*Tanacetum parthenium* (L) Schultz.	Solucan otu	Widespread								x								x			
	111	*Tussilago farfara* L.	Öksürük otu	Euro-Siberian								x			x					x			
	112	*Hieracium vagum* Jordan.	-	Euro-Siberian								x								x			
	113	*Lapsana communis* L.	-	Widespread								x		x					x				
	114	*Chondrilla juncea* L . var. *juncea*	-	Widespread								x							x				
	115	*Aster subulatus* (Michx.) Hort.eEx Michx.	-	Widespread									x							x			
	116	*Sonchus asper* (L.) Hill subsp. *glaucescens* (Jordon) Ball	-	Widespread										x						x			
	117	*Crepis sancta* (L.) Babcock	-	Widespread								x							x				
ERICACEAE	118	*Arbutus unedo* L.	Kocayemiş	Widespread									x								x		
	119	*Arbutus andrachne* L.	Sandal ağacı	Widespread									x							x			
	120	*Erica arborea* L.	Çalı fundası	Widespread								x	x									x	
PRIMULACEAE	121	*Androsace maxima* L.	-	Widespread								x								x			
	122	***Cyclamen coum* Miller var. *coum***	**Sıklamen**	**Widespread**						**EK 2**		**x**								**x**			
	123	*Primula vulgaris* Huds. subsp. *vulgaris*	Çuhaçiçeği	Euro-Siberian								x		x						x			
OLEACEAE	124	*Jasminum fruticans* L.	Yasemin	Euro-Siberian								x	x	x						x			
	125	*Phillyrea latifolia* L.	Ak kesme	Mediterranean									x	x								x	
	126	*Ligustrum vulgare* L.	Kurtbağrı	Euro-Siberian								x		x					x				
	127	*Fraxinus angustifolia* Vahl. subsp. *oxycarpa* (Bieb. Ex Willd.) Franco & Rocha	Dişbudak	Euro-Siberian								x								x			
ASCLEPIADACEAE	128	*Periploca graeca* L. var. *graeca*	-	Mediterranean								x				x				x			
CONVULACEAE	129	*Ipomea purpurea* (L.) Roth	-	Widespread											x					x			
BORAGINACEAE	130	*Echium italicum L.*	-	Mediterranean								x		x						x			
	131	*Buglossoides arvensis* (L.) Johnston	-	Mediterranean								x		x						x			

FAMILY	NO	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
	132	*Trachystemon orientalis* (L.) G. Don	Ispıt	Euro-Siberian								x									x		
	133	*Lithospermum officinale* L.	-	Euro-Siberian										x						x			
SCROPHULARIACEAE	134	*Verbascum blattaria* L.	Sığırkuyruğu	Widespread								x		x						x			
	135	*Parentucellia latifolia* (L.) Caruel *subsp. latifolia*	-	Mediterranean								x		x						x			
CONVOLVULACEAE	136	*Convolvulus arvensis L.*	-	Widespread								x		x						x			
VERBANACEAE	137	*Vitex agnus-castus* L.	Hayıt	Mediterranean																x			
LAMIACEAE	138	*Lamium amplexicaule* L.	Ballibaba	Widespread								x		x						x			
	139	*Lamium purpureum* L. var. *purpureum*	-	Widespread								x		x						x			
	140	*Calamintha nepeta* (L.) Savi subsp. *glandulosa* (Req.) P.W. Ball	-	Widespread								x	x							x			
	141	*Calamintha sylvatica* Bromf. Subsp. *sylvatica*	-	Euro-Siberian								x	x							x			
	142	*Stachys maritima* Gouan	Kumkarabaşı	Mediterranean													x			x			
	143	*Origanum vulgare* L. Subsp. *viride* (Boiss.) Hayek	Kekik	Widespread									x							x			
	144	*Prunella vulgaris* L.	-	Euro-Siberian								x		x						x			
	145	*Melissa officinalis* L. Subsp. *altissima* (Sm.) Arcangeli	Oğul otu	Mediterranean								x				x				x			
	146	*Teucrium chamaedrys* L. subsp. *chamaedrys*	Acıyavşan	Euro-Siberian								x	x	x						x			
	147	*Teucrium polium L.*	-	Widespread								x		x						x			
	148	*Salvia forskahlei* L.	Adaçayı	Euro-Siberian								x	x	x							x		
SANTALACEAE	149	*Osyris alba* L.	-	Mediterranean									x							x			
THYMELAEACEAE	150	*Daphne pontica* L.	-	Euro-Siberian								x								x			
LAURACEAE	151	*Laurus nobilis* L.	Defne	Mediterranean								x	x	x								x	
PLANTAGINACEAE	152	*Plantago major* L. Subsp. *major*	Sinir otu	Widespread										x	x					x			
	153	*Plantago lanceolata* L.	Sinir otu	Widespread											x					x			
URTICACEAE	154	*Urtica dioica* L.	Isırgan	Euro-Siberian								x		x						x			
CANNABACEAE	155	*Humulus lupulus* L.	Şerbetçi otu	Euro-Siberian								x								x			
MORACEAE	156	*Morus alba* L.	Dut	Cultivated											x					x			
	157	*Ficus carica* L. subsp. *carica*	İncir	Widespread											x					x			
ULMACEAE	158	*Ulmus minor* Miller subsp. *minor*	Karaağaç	Widespread												x				x			
PLATANACEAE	159	*Platanus orientalis* L.	Çınar	Widespread												x				x			

FAMILY	NO	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
FAGACEAE	160	*Castanea sativa* Miller	Kestane	Euro-Siberian								x								x			
	161	*Quercus hartwissiana Steven*	Istranca meşesi	Euro-Siberian									x	x							x		
	162	*Quercus petraea* (Mattuschka) Liebl. Subsp. *iberica* (Steven ex Bieb.) Krassiln.	Sapsız meşe	Widespread								x	x	x							x		
CORYLLACEAE	163	*Carpinus betulus* L.	Gürgen	Euro-Siberian								x		x								x	
	164	*Ostrya carpinifolia* Scop.	Kayacık	Mediterranean																	x		
	165	*Coryllus avellana* L. Var. *avellana*	Fındık	Euro-Siberian								x		x						x			
BETULACEAE	166	*Alnus glutinosa* (L.) Gaertner subsp. *glutinosa*	Kızılağaç	Euro-Siberian												x					x		
SALICACEAE	167	*Salix alba* L.	Aksöğüt	Euro-Siberian												x				x			
	168	*Salix cinerea* L.	Boz Söğüt	Euro-Siberian												x				x			
LORANTHACEAE	169	*Viscum album* L. subsp. *album*	Ökse otu	Widespread								x		x						x			
EUPHORBIACEAE	170	*Euphorbia rigida* Bieb.	Sütleğen	Mediterranean								x								x			
	171	*Euphorbia amygdaloides* L. var. *amygdaloides*	Sütleğen	Euro-Siberian								x								x			
	172	*Euphorbia paralias* L.	Kumsütleğeni	Mediterranean													x			x			
	173	*Mercurialis annua* L.	-	Widespread												x				x			
RUBIACEAE	174	*Galium fissurense* Ehrend.& Schönb. -Tem.	Yogurt otu	Iran-Turan								x								x			
	175	*Rubia peregrina* L.	-	Mediterranean								x								x			
MONOCOTYLEDONES																				x			
ARACEAE	176	*Arum italicum* Miller	Domuzlahanası	Widespread								x								x			
LILIACEAE	177	*Allium scorodoprasum* L. subsp. *rotundum* (L.) Stearn	Yabani sarımsak	Mediterranean								x			x					x			
	178	*Ruscus aculeatus* L. Var. *aculeatus*	Tavşan memesi	Widespread								x	x	x						x			
	179	*Ruscus hypoglossum* L.	Atdili	Euro-Siberian								x								x			
	180	*Asparagus aphyllus* L. Subsp. *orientalis* (Baker) P.H. Davis	Kuşkonmaz	Mediterranean								x	x	x						x			
	181	*Smilax excelsa* L.	Silcan	Euro-Siberian								x	x							x			
	182	*Scilla bifolia* L.	-	Mediterranean										x						x			
AMARYLLIDACEAE	**183**	***Pancratium maritimum* L.**	**Kumzambağı**	**Mediterranean**			**EN**									**x**					**x**		
ORCHIDACEAE	184	*Spiranthes spiralis* (L.) Chevall	Orkide	Mediterranean										x					x				
DIOSCOREACEAE	185	*Tamus communis* L. Subsp. *communis*	-	Widespread								x								x			

FAMILY	NO	TAXON	TURKISH NAME	PHYTOGEOG.REGION	ENDEMİZM		RED LIST	BERN	CITES			HABITAT							RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	1	2	3	4	5
TYPHACEAE	186	*Typha domingensis* Pers.	Hasır otu	Widespread														x		x			
JUNCACEAE	187	*Juncus littoralis* C.A. Meyer	Kofa	Mediterranean													x	x			x		
CYPERACEAE	188	*Carex distachya* Desf. Var. *distachya*	-	Mediterranean								x					x	x		x			
	189	*Carex distans* L.	-	Euro-Siberian												x	x	x		x			
	190	*Cyperus longus* L.		Widespread																x			
POACEAE	191	*Poa bulbosa* L.	-	Widespread								x						x		x			
	192	*Lolium perenne* L.	Cim otu	Widespread								x								x			
	193	*Brachypodium sylvaticum* (Hudson) P. Beauv.	-	Euro-Siberian								x		x					x				
	194	*Bromus japonicus* Thunb. subsp. *japonicus*	-	Widespread								x								x			
	195	*Cynodon dactylon* (L.) Pers. var. *dactylon*	Ayrık otu	Widespread											x					x			
	196	*Leymus racemosus* (Lam.) Tzvelev		Widespread													x			x			
	197	*Phragmites australis* (Cav.) Trin. ex Steudel	Kamış	Euro-Siberian												x		x				x	
	198	*Dactylis glomerata* L. subsp. *hispanica* (Roth) Nyman	Parmak otu	Mediterranean								x		x						x			
	199	*Briza media* L.	-	Widespread										x						x			
	200	*Phleum phleoides* (L.) Karsten	-	Euro-Siberian								x		x						x			
	201	*Hordeum murinum* L.	Yabani arpa	Widespread								x		x						x			
	202	*Piptatherum coerulescens* (Desf.) P. Beauv.	-	Widespread								x		x						x			
	203	*Bothriochloa ischaemum* (L.) Keng	-	Widespread								x		x						x			

ENDEMIZM	HABITAT CLASSIFICATION		RELATIVE ABUNDANCE
R: Regional endemic	1: Meso- and eutrophic *Quercus* woodland(G1.A)		**1:** Very rare
W: Widespread endemic	2: Pseudomaquis (F5.3)		**2:** Rare
	3: Moist or wet eutrophic and mesotrophic grassland (E3.4)		**3:** Moderately abundant
	4. Küçük ölçekli bahçeler (I1.2)		**4:** Abundant
	5. Riparian and gallery woodland, with dominant *Alnus, Betula, Populus* or *Salix* (G1.1)		**5:** Very abundant
	6. Coastal stable dune grassland (grey dunes) (B1.4)		
	7. Reedbeds normally without free-standing water (D5.1)		

4.6.3.1. Fauna

Fauna studies were also conducted in January 2020, as two separate studies targeting birds and other vertebrates. Sampling point that cover the entire Biodiversity Study Area, and vantage points in a larger area to represent different habitats were selected considering the seasonal constraints for observation.

A large list of fauna was prepared through an extensive literature review prior to field surveys, and a target list of species considering habitat characteristics and the known threats species are facing. Since data obtained through direct observations are limited, assessments within the scope of the ESIA focuses on bird species that had previously been identified in the area, and vertebrates that are also known to inhabit the area, as well as those that are of high conservation concern (CR, EN, VU, NT) but cannot be observed in January. It is possible to extend the list following additional pre-construction surveys during appropriate seasons. In line with ESS6, other species that might be further identified should also be assessed within the scope of the Environmental and Social Management Plan (ESMP).

The list of fauna species identified at the Biodiversity Study Area through previous records, direct observations and habitat suitability is provided in Table 4-37 Potential critical habitat triggering species are further assessed in Chapter 4.6.4, and impact assessment on fauna species can be found in Chapter 5.7.2.

Table 4-37: Fauna Species of the Biodiversity Study Area

Biodiversity Feature	IUCN Red List	Endemizm	Direct Observation
Mammals			
Canis aureus	LC	-	-
Vulpes vulpes	LC	-	-
Capreolus capreolus	LC	-	-
Myodes glareolus	LC	-	-
Erinaceus concolor	LC	-	X
Felis silvestris	LC	-	-
Glis glis	LC	-	-
Muscardinus avellanarius	LC	-	-
Miniopterus schreibersii	NT	-	-
Apodemus flavicollis	LC	-	-
Apodemus mystacinus	LC	-	-
Apodemus sylvaticus	LC	-	-
Apodemus uralensis	LC	-	-
Apodemus witherbyi	LC	-	-
Lutra lutra	NT	-	-
Meles meles	LC	-	-
Rhinolophus ferrumequinum	LC	-	-
Rhinolophus hipposideros	LC	-	-
Sciurus anomalus	LC	-	X
Sus scrofa	LC	-	-
Talpa levantis	LC	-	-
Eptesicus serotinus	LC	-	-
Myotis bechsteinii	NT	-	-
Myotis emarginatus	LC	-	-
Pipistrellus pipistrellus	LC	-	-
Birds			
Tachybaptus ruficollis	LC	-	X
Podiceps cristatus	LC	-	X
Phalacrocorax carbo	LC	-	X
Phalacrocorax aristotelis	LC	-	X
Microcarbo pygmeus	LC	-	X
Pelecanus crispus	VU	-	-
Egretta garzetta	LC	-	X
Ardea alba	LC	-	X
Ardea cinerea	LC	-	X
Cygnus olor	LC	-	X
Cygnus cygnus	LC	-	-

Biodiversity Feature	IUCN Red List	Endemizm	Direct Observation
Anser albifrons	LC	-	-
Branta ruficollis	EN	-	-
Tadorna tadorna	LC	-	-
Anas penelope	LC	-	X
Anas strepera	LC	-	-
Anas crecca	LC	-	-
Anas platyrhynchos	LC	-	X
Anas acuta	LC	-	X
Anas clypeata	LC	-	-
Netta rufina	LC	-	X
Aythya ferina	LC	-	-
Aythya fuligula	LC	-	-
Aythya marila	LC	-	-
Clangula hyemalis	VU	-	-
Melanitta nigra	LC	-	-
Melanitta fusca	EN	-	-
Bucephala clangula	LC	-	-
Mergellus albellus	LC	-	-
Mergus serrator	LC	-	-
Oxyura leucocephala	EN	-	-
Haliaeetus albicilla	LC	-	-
Circus aeruginosus	LC	-	X
Circus cyaneus	LC	-	X
Accipiter nisus	LC	-	X
Buteo buteo	LC	-	X
Buteo lagopus	LC	-	-
Falco tinnunculus	LC	-	X
Falco columbarius	LC	-	-
Falco peregrinus	LC	-	-
Gallinula chloropus	LC	-	-
Fulica atra	LC	-	-
Calidris alba	LC	-	-
Calidris alpina	LC	-	-
Lymnocryptes minimus	LC	-	-
Gallinago gallinago	LC	-	-
Scolopax rusticola	LC	-	-
Ichthyaetus ichthyaetus	LC	-	-
Ichthyaetus melanocephalus	LC	-	X
Hydrocoloeus minutus	LC	-	X
Chroicocephalus ridibundus	LC	-	X
Chroicocephalus genei	LC	-	X
Larus canus	LC	-	X
Larus michahellis	LC	-	X
Columba livia	LC	-	X
Columba oenas	LC	-	-
Streptopelia decaocto	LC	-	X
Asio otus	LC	-	-
Alcedo atthis	LC	-	X
Dendrocopos major	LC	-	-
Dendrocopos syriacus	LC	-	X
Alauda arvensis	LC	-	-
Anthus pratensis	LC	-	-
Motacilla cinerea	LC	-	-
Troglodytes troglodytes	LC	-	-
Prunella modularis	LC	-	-
Erithacus rubecula	LC	-	X
Saxicola rubicola	LC	-	X
Turdus merula	LC	-	X
Turdus pilaris	LC	-	-
Turdus philomelos	LC	-	X
Turdus iliacus	LC	-	-
Sylvia melanocephala	LC	-	X
Phylloscopus collybita	LC	-	-
Regulus regulus	LC	-	X

Biodiversity Feature	IUCN Red List	Endemizm	Direct Observation
Regulus ignicapilla	LC	-	-
Poecile palustris	LC	-	X
Cyanistes caeruleus	LC	-	X
Parus major	LC	-	X
Certhia familiaris	LC	-	-
Certhia brachydactyla	LC	-	-
Remiz pendulinus	LC	-	-
Garrulus glandarius	LC	-	X
Pica pica	LC	-	X
Coloeus monedula	LC	-	X
Corvus frugilegus	LC	-	X
Corvus cornix	LC	-	X
Corvus corax	LC	-	-
Passer domesticus	LC	-	X
Passer hispaniolensis	LC	-	-
Passer montanus	LC	-	X
Fringilla coelebs	LC	-	X
Fringilla montifringilla	LC	-	X
Chloris chloris	LC	-	X
Carduelis carduelis	LC	-	X
Spinus spinus	LC	-	X
Emberiza citrinella	LC	-	-
Emberiza pusilla	LC	-	-
Emberiza schoeniclus	LC	-	X
Passer hispaniolensis	LC	-	X
Passer montanus	LC	-	X
Fringilla coelebs	LC	-	X
Fringilla montifringilla	LC	-	X
Reptiles			
Emys orbicularis	NT	-	-
Trachemys scripta	LC	-	-
Testudo graeca	VU	-	-
Anguis fragilis	NE	-	-
Coronella austriaca	LC	-	-
Dolichophis caspius	LC	-	-
Natrix megalocephala	VU	-	-
Natrix natrix	LC	-	-
Natrix tessellata	LC	-	-
Zamenis longissimus	LC	-	-
Darevskia rudis	LC	-	-
Lacerta viridis	LC	-	-
Ophisops elegans	NE	-	-
Podarcis muralis	LC	-	-
Podarcis siculus	LC	-	-
Amphibians			
Bufo bufo	LC	-	-
Bufotes variabilis	DD	-	-
Hyla orientalis	NE	-	-
Pelophylax bedriagae	LC	-	-
Pelophylax ridibundus	LC	-	-
Rana dalmatina	LC	-	-
Lissotriton vulgaris	LC	-	-
Ommatotriton ophryticus	NT	-	-

4.6.4. 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.

Turkey 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 Turkey being exotics (Arslan et al. 2015), although a comprehensive list of alien plants is still lacking. Turkey 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 Turkey 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 Turkey are still limited, and considering general risks associated with railways in terms of introduction and spread of IAS, necessary measures will be taken as per ESS6. International guidelines and best practices will be followed to avoid intentional or accidental introduction of alien or non-native species, and if introduced necessary strategies and procedures will be developed to eradicate IAS.

4.6.5. Critical Habitat Assesment

4.6.5.1. 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 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;
- The project does not lead to measurable adverse impacts on those biodiversity features for, which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;
- The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time, 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 client's adaptive 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.

4.6.5.2. 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 assessments do not always cover Turkish habitats and species, experts' judgment was often consulted to interpret data. Since international, even European biodiversity assessment do not always cover Turkish habitats and species, experts' judgment was often consulted to draw conclusions on the current statuses of biodiversity components. Local expert judgment was also referred to due to the fact that there are no officially established or widely accepted national evaluations on threat and conservation statuses of habitats and species in Turkey.

Criterion 1: Critical (CR) and/or Endangered (EN) Species

Species threatened with global extinction and listed as Critically Endangered (CR) and Endangered (EN) on the IIUCN Red List are considered as part of Criterion 1. Critically Endangered species face an extremely high risk of extinction, while Endangered species face a very high risk of extinction in the wild.

Quantitative data on potential critical habitat triggering species' populations were assessed based on the Guidance Note (GN) 6 (2019) thresholds, which not only consider global conservation priorities but also nationally or regionally significant concentrations of species. Accordingly;

(a) areas that support globally-important concentrations of an IUCN Red-listed EN or CR species (≥0.5% of the global population AND (≥5% reproductive units of a CR or EN species);

(b) areas that support globally important concentrations of an IUCN Red-listed Vulnerable species, the loss of which would result in the change of the IUCN Red List status to EN and meet these thresholds;

(c) as appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species, trigger designation of critical habitat.

In determining CR and EN species at the Biodiversity Study Area, the IUCN Red List of Threatened Species, European Red Lists, and the only IUCN correspondence in Turkey; 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 Turkey, have also been assessed.

Criterion 2: Endemic and/or Restricted-Range Species

The updated version of the GN 6 (2019) defines the term endemic as restricted-range, which refers to a limited extend of occurrence (EOO) as such:

- For terrestrial vertebrates and plants, a restricted-range species is defined as those species which have an EOO less than 50,000 km^2.
- Form marine systems, restricted-range species are provisionally being considered those with an EOO of less than 100,000 km^2.
- For coastal, riverine and other aquatic species in habitats that do not exceed 200 km width at any point, restricted-range is defined as having a global range less than or equal to 500 km linear geographic span.

An area can be designated as critical habitat, if it holds ≥10 percent of the global population size and ≥10 reproductive units of an endemic and/or restricted-range species. Terrestrial species identified at the Biodiversity Study Area were assessed with respect to their EOOs and population sizes, based on the IUCN Red List, IUCN European assessments, and expert judgment.

Criterion 3: Migratory or Congregatory Species

Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem). Congregatory species are those, whose individuals gather in large groups on a cycyle 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. The timing of site surveys were not suitable for identification of migratory species and define their habitat use and preferences. Assessments for Criterion 3 can be made following detailed pre-construction migration surveys, which will be completed prior to the finalization of the detailed design

Criterion 4: Highly Threatened or Unique Ecosystems

To identify highly threatened or unique ecosystems, IFC 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.

European Red List assessments for terrestrial habitats were used in the assessments, where legally protected and internationally recognized areas were also considered. Amasra Coasts KBA, except for the two 1st Degree Nature Protection Areas withing its boundaries, does not meet the critical habitat criteria. However, the western tip of the KBA, where the Biodiversity Study Area falls into, "Coastal stable dune grassland (grey dunes)", and other EN habitats of the European Red List have been assessed as per Criterion 4.

Criterion 5: Key Evolutionary Processes

Evolutionary processes are defined as structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation and combinations of these variables can influence evolutionary processes that give rise to regional configurations of species and ecological properties. The significance of structural attributes in a landscape that may influence evolutionary processes are required to be determined on a case-by-case basis, and determination of habitat that triggers this criterion will rely on scientific knowledge.

Examples to spatial features associated with evolutionary processes can be listed as; landscapes with high spatial heterogeneity, ecotones, edaphic interfaces, connectivity between habitats, and sites of demonstrated importance to climate change adaptation either for species or ecosystems.

The Biodiversity Study Area is not associated with key evolutionary processes. Neither it hosts flora and/or fauna species that have distinct evolutionary histories with populations that show proven phylogenetic divergence from other species' other known populations.

4.6.5.3. 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 4-38.

Table 4-38: Potential Critical Habitat Triggering Taxa as per Criterion 1 and 2

Biodiversity Feature	IUCN Red List Category	Endemic / Restricted-Range
Plants		
Centaurea kilaea	EN	Endemic
Pancratium maritimum	EN	-
Reptiles		
Testudo graeca	VU	-
Natrix megalocephala	VU	-
Birds		
Oxyura leucocephala	EN	-
Branta ruficollis	VU	-
Melanitta fusca	VU	-
Pelecanus crispus	VU	-
Clangula hyemalis	VU	-

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 Turkey. Population identified within the Biodiversity Study Area consists of about 5,000 individuals and is quite healthy. It represents about 5-10% of the entire Turkish population. Therefore, the Biodiversity Study Area, which supports more than 0.5% of the species' global population, is a critical habitat for the species.

Pancratium maritimum is the only *Pancratium* species that naturally grows in Turkey. It is a perennial Mediterranean plant, which is found in along the coasts of the Mediterranean, the Atlantic Ocean, the Black Sea and the Caspian Sea. In Turkey, 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 has a population of about 5,000 individuals at the Biodiversity Study Area, which represents about 1-2% of its known population in Turkey. Considering its wide range, Pancratium maritimum does not meet Critical Habitat Assessment Criterion 1 threshold values.

Critical Habitat Assessment was conducted to cover the entire Biodiversity Study Area. Potential impacts on *Centaurea kilaea* and *Pancratium maritimum*, and the dune habitat holding these populations will be avoided within the scope of Filyos Port and Industrial Zone Railway-Highway Connections Project. A Critical Habitat Map showing the locations of *Centaurea kilaea* and *Pancratium maritimum* populations is presented in Figure 4-31.

Endangered *Oxyura leucaocephala* (White-headed duck) and Vulnerable *Branta ruficollis* (Red-breasted goose) were included in the species list from literature records, but are both accidental records for the area. The white-headed duck is a migratory duck species, known to breed in Armenia, Georgia, Russia, Spain and Turkey. Its population is decreasing in its range and its preferred wetland, coastal and marine habitats are under the threats of hunting, fishing and depletion of aquatic resources. Although it was previously recorded in Black Sea, there is a single record from around the Filyos Port. The red-breasted goose is another migratory species that has wintering grounds in western Turkey. Among these area Goksu Delta, Gediz Delta, Saros Gulf, Terkos Basin, Buyukcekmece Lake, Sakarya Basin and Tuz Lake. According to expert judgement, neither of these species use the area for breeding, wintering or feeding purposes. As the Biodiversity Study Area does not sustain regular or cyclical population of neither *Oxyura leucaocephala*, nor *Branta ruficollis* during winter, these two species do not meet thresholds for Criterion 1.

Populations of the other Vulnerable species listed in Table 4-38; *Melanitta fusca* (Velvet scooter), *Pelecanus crispus* (Dalmatian pelican), *Clangula hyemalis* (Long-tailed duck), *Testudo graeca* (Tortoise) and *Natrix megalocephala* (Large-headed water snake), do not have populations within the Biodiversity Study Area are not large enough that if lost would not cause their IUCN Red List categories to change. None of these species trigger critical habitat under Criterion 1.

If additional data become available as a result of pre-construction surveys to be conducted in an appropriate season (Spring-Summer), or if new species in the area are identified, Critical Habitat Assessment will be updated, and required actions will be taken within the scope the Project's Environmental and Social Management Plan (ESMP).

Although they do not trigger critical habitat, in line with ESS6 impacts on these species of high conservation concern are required to be assessed implementing the mitigation hierarchy, necessary measures should be developed and implemented within the scope of the Biodiversity Management Plan (BMP) with no-net-loss principle. Impact assessment on high conservation concern species is provided in Chapter 5.7.2.

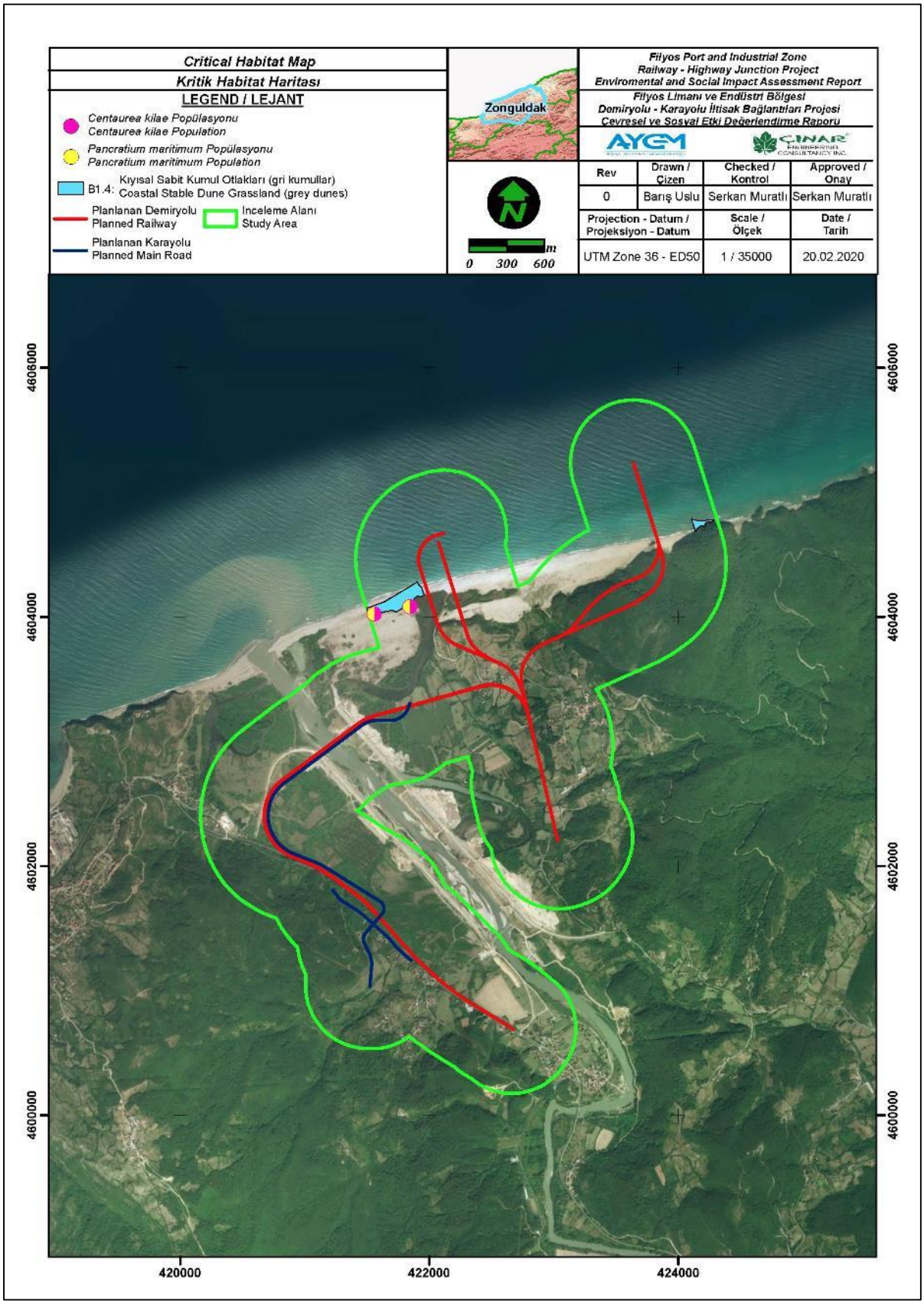

Figure 4-31: Critical Habitat Map

Criteria 3: Migratory or Congregatory Species

The most significant limitation to the biodiversity studies conducted within the scope of the Project's ESIA process is the fact that the month of January 2020 was not an appropriate time of the year for flora and fauna species to be identified. Some of the species identified through ornithological literature review and field surveys are known to be breeders in the aera, while some are those that are seasonal visitors. However, in lack of adequate field data, it is not possible to understand habitat use patterns of these species and assess migratory birds against Criterion 3 thresholds.

Pre-construction surveys to be conducted in the Biodiversity Study Area during migration and breeding seasons of the birds should provide information on habitat use, breeding status and flight routes of target species. These data can also be used to update Critical Habitat Assessments, and in line with provisions of ESS6, actions for migratory birds must be taken within the scope of the BMP.

Criterion 4: Highly Threatened or Unique Ecosystems

Coastal and terrestrial habitats identified in the Biodiversity Study Area 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 Turkey, 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 4-39 .

Table 4-39: Potential Critical Habitats as per Criterion 4

Habitat Description	European Red List		National Assessment	
	Category	Criterion	Category	Criterion
B1.4: Coastal stable dune grassland (grey dunes)	EN	B1, B2	EN	B1
C1.2: Permanent mesotrophic lakes, ponds and pools	NT	CD1	LC	-
C2.2: Permanent non-tidal, fast, turbulent watercourses	VU	A1	NT	A1
E3.4: Moist or wet eutrophic and mesotrophic grassland	EN	A1	LC	-
F5.3: Pseudomaquis	NT	CD1	NT	CD1
G1.1: Riparian and gallery woodland, with dominant *Alnus, Betula, Populus* or *Salix*	NT	CD1	LC	-

"Coastal stable dune grassland (grey dunes)" 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. It has not been possible to identify how much of the global extent of the habitat is represented in the area. However, considering its relatively narrow range and threats it has been facing, the grey dune habitat in the Biodiversity Study Area have been designated as critical habitat.

There will be no Project-related impacts on the grey dunes, and the *Centeaurea kilaea* population, which also triggers critical habitat. In line with ESS6 provisions, and following the mitigation hierarchy, potential impacts on critical habitat have been avoided within the scope of the Project.

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. Potential impacts of the Project on these habitats are further discussed in Chapter 5.7.2.

4.6.6. 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 recognize the importance of maintaining benefits that people, including businesses, derive from ecosystems. ESS6 defines ecosystem services as "…the benefits people and businesses obtain from ecosystems". Project development, must therefore be balanced and the potential for utilising 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, fibre 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 that are detailed in Chapter 4.8, have also been used.

Guidelines developed by the WRIprovide 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 4-40.

Table 4-40: 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. The most significant impact on livestock is the loss or restriction of access to grazeland for Sazkoy village, and potential impacts on livelihoods.
		Poultry	
		Grazeland	
	Apiculture	Stationary beehives	75% of honey is sold at the local markets.
	Wild foods	Mushroom, arbucus, 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 4-40, 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 4-32, 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, 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 in provided in Chapter 4.8. It has been identified that access to a large section of the only grazeland (M3) used by beneficiaries in Sazköy will be restricted with the implementation of the Project. For this particular village, which has lost most of their agricultural land with the expropriation process they had been subject to for other projects in the area, livestock is an important source of income. Due to the location of the settlement, there is no access to other grazeland, which makes this a priority ecosystem service for Sazköy beneficiaries.

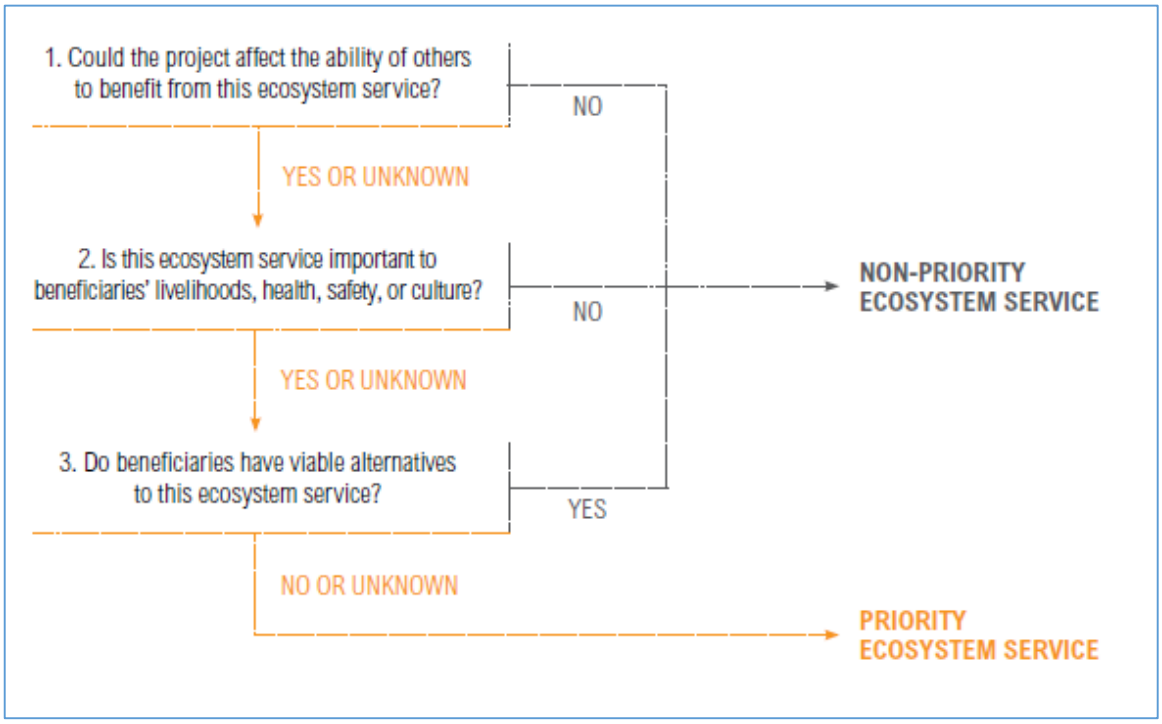

Figure 4-32: Decision Tree to Prioritize Ecosystem Services

Table 4-41: 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
Grazeland	Yes	Yes	No (Sazkoy)	Priority service
Stationary beehives	No	-	-	Non-priority service
Mushroom, arbucus, wild strawberry	Yes	No	-	Non-priority service
Hazelnut and bay leaves	Yes	Unknown	Unknown	Potential priority service
Firewood	Yes	No	-	Non-priority service

Significance of forest products in terms of livelihoods will be identified through detailed assessments that will be made within the scope of the Resettlement Action Plan (RAP). Loss of households who benefit from non-priority ecosystem services, and those who use treasury land, village legal entity, or public land like grazeland and forests, will also be assessed in the RAP, which will provide detailed mitigation and compensation measures.

4.7. Cultural Heritage

4.7.1. Archaeological and Historical Background

4.7.1.1. 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[6] 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)[7].

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[8]. The city also minted coins for Tios until the 3rd century AD[9]. 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 the region[10]. Filyos, which did not have a politically brilliant history in the Black Sea coast until the 4th century BC, has become an important city starting this period[11].

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[12].

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[13].

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 taken 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. (Figure 4-33, Table 4-42).

The city, which was an important transportation network and trade center during the Roman period, remained within the borders of Eastern Rome 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, has gained prominence with its economic

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[6] 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.

[7] Engin, Şenay Doruk, Tios ve Çevresinde Kültler, Tekirdağ Üniversitesi Sosyal Bilimler Enstitüsü, Edirne, 2019:5; Anderson 2009: 266.

[8] 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).

[9] Gür, Durmuş, Zonguldak İli, Filyos Beldesi, Tios Akropolü Kilise A Yapısı, Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara, 2015: 10; Bean, 1976: 4593

[10] Çapar 1991: 319-326; Emir 2011: 666-667.

[11] Gür, Durmuş, Kuzeybatı Karadeniz'de Bizans Dönemi Eserleri, Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara, 2019: 274; Boutkowski, 1864: 12.

[12] 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.

[13] Atasoy 2015a: 18; Baran-Dirlik-Kendirci 2015: 125; B. Öztürk 2008: 64-67; 2011: 487; 2012b: 161-164.

independence over time and has had great military and commercial importance. Other settlements in the region dated to this period are: Ahmetler, Türbetepe Huyuk, Derecikören, Çomranlı, Sazköy (Figure 4-33, Table 4-42).

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 (Figure 4-33, Table 4-42).

Table 4-42: Archaeological Sites Near the Project Route

NO	Name of the Archaeological / Immovable Cultural Heritage	Province	District	Nearest Distance to Project Expropriation Limit (km)	Approximate km Point of the Railway (Mileage Point)	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	0+000 (Branch Line)													
2	Maltepe 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Aşağısarmaşık	4.22	0+000 (Branch Line)													
3	Türbetepe Huyuk	Zonguldak	Çaycuma/Hacılar	6.81	0+000 (Branch Line)													
4	Putunburnu Huyuk	Zonguldak	Çaycuma/Hacılar	7.44	0+000 (Branch Line)													
5	Derecikören 1st Degree Archaeological Site	Zonguldak	Çaycuma/Derecikören	0.52	0+000 (Branch Line)													
6	Çomranlı 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Çomranlı	8.14	0+000 (Branch Line)													
7	Çomranlı 1st and 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Çomranlı	8.14	0+000 (Branch Line)													
8	Öteyüz Mahallesi 1st and 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Filyos/Öteyüz	0.09	2+000 (Branch Line)													
9	Filyos/Tios Ancient City Necropolis Area	Zonguldak	Çaycuma/Filyos/Öteyüz	0.16	2+550 (Branch Line)													
10	Ateş Tuğla Fabrikası 1st and 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Filyos/Hisarönü	1.43	2+650 (Branch Line)													
11	Filyos/Tios Ancient City	Zonguldak	Çaycuma/Filyos/Hisarönü	1.03	2+700 (Branch Line)													
12	Sazköy 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Sazköy	0.00	Jetty (0+150-0+390) and Ferry Line (between 0+500- 0+940 km)													
13	Sazköy 3rd Degree Archaeological Site 120th Block 16th Plot	Zonguldak	Çaycuma/Sazköy	0.17	0+490 (Port Line)													

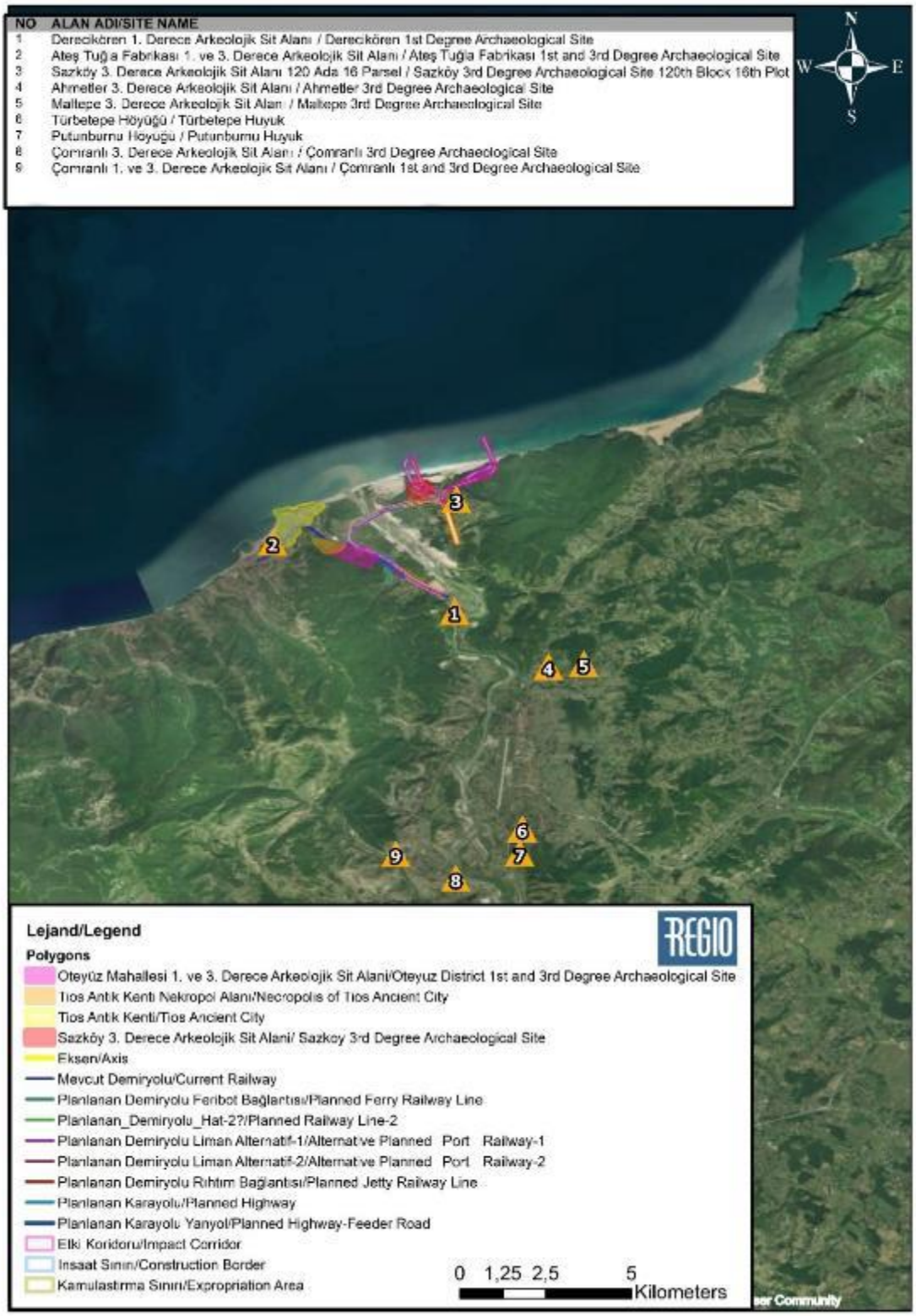

Figure 4-33: Archaeological / Historical Sites Located on the Project Route and Its Vicinity

4.7.1.2. Background for Intangible Cultural Heritage

Kipchak Turkmens, Lazi 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.

4.7.2. Overall Assessment

4.7.2.1. Overall Assessment of Tangible Cultural Heritage

In the deskwork's carried out, it was understood that there were 2 registered archaeological sites in the railway project expropriation limit and impact corridor. These areas are Sazköy 3rd Degree Archaeological Site Area within the expropriation boundary and Öteyüz 1st and 3rd Degree Archaeological Site located within the impact corridor (Figure 4-34, Table 4-43).

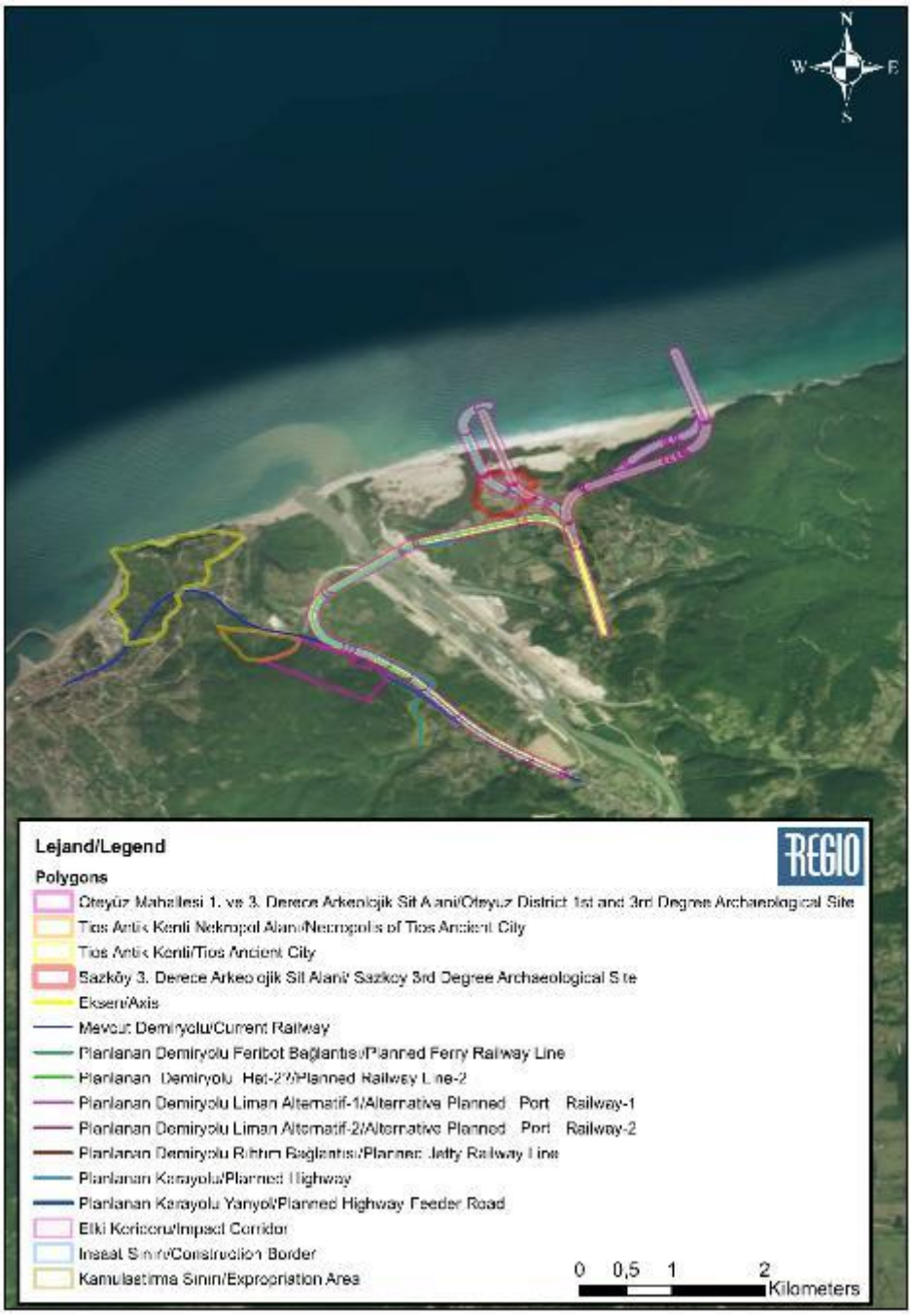

Figure 4-34: Archaeological Sites on the Project Route and Impact Corridor

One of these registered archaeological sites, Sazköy Archaeological Site is located on the Dock (0 + 150- 0 + 390) and Ferry Line (0 + 500- 0 + 940 km) of the Filyos Railway Project. (Figure 4-35). Most of the surface of the area thought to be a necropolis is covered with vegetation and grass. (Figure 4-36). 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[14] (Figure 4-37)

[14] Coordinates of the Sarcophagus Cover: 41576117 North, 32077205 East

Figure 4-35: Sazköy 3rd Degree Archaeological Site and Project Route

Figure 4-36: Sazköy Necropolis

Figure 4-37: 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 4-38). The area is outside the expropriation limit; however, it remains within the influence corridor. 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 4-38: 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 4-41). Both areas are outside the expropriation limit and the impact corridor. Tios Ancient City is north of the railway branch line (2 + 700) and 1 km from the impact corridor. The Tios Necropolis Area is located northwest of the branch line (2 + 550) and 0.13 km from the impact corridor. 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.

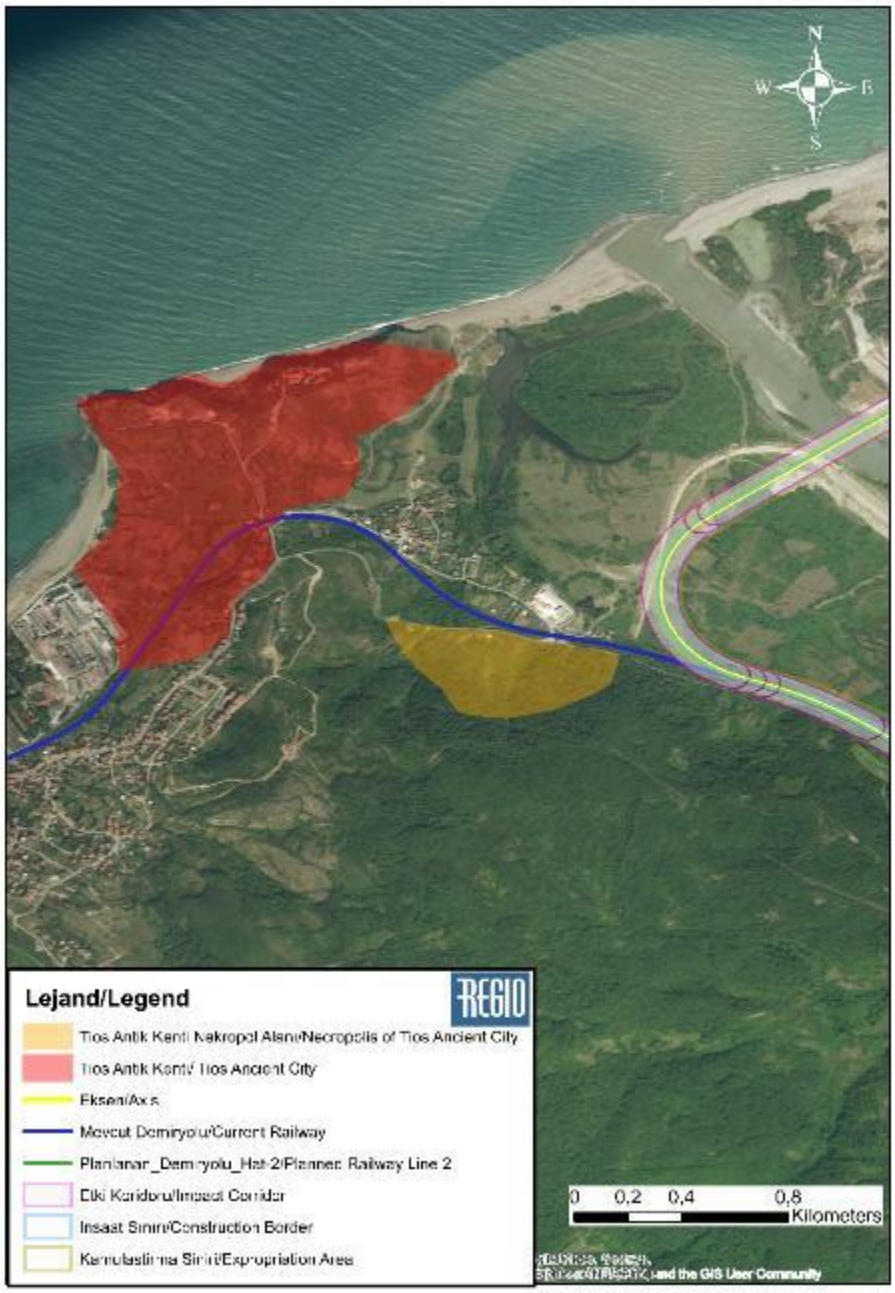

Figure 4-39: Project Route with Tios Ancient City and Tios Necropolis

In the field studies carried out within the scope of the project, no other tangible cultural heritage assets were found within the project impact corridor. 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 4-43: List of Tangible Cultural Assets on the Railway Route and Its Vicinity

No	Name of the Area	Province	District/ Neighborhood	Distance to Expropriation Limit	Registration Decision
1	Sazköy 3rd Degree Archaeological Site	Zonguldak	Çaycuma/Sazköy	0 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	9 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	1030 m.	The decision of Ankara Cultural Heritage Conservation Regional Board dated 14.01.1977 and numbered 288
4	Necropolis Area of the Ancient City of Tios	Zonguldak	Çaycuma/Filyos	160 m.	It will be added to the final version of the report.

4.7.2.2. 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 explain 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 4-44).

The information of the rural settlements included in this study are as follows;

Table 4-44: 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 km
Zonguldak	Çaycuma	Sazköy	0 km
Zonguldak	Çaycuma	Derecikören	0 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. (Figure 4-40). There is no cooperative or charity association in other settlements.

Figure 4-40: 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 the bonesetters and healers that used to exist in every village, exist 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 have 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 idle (Figure 4-41). 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 4-41: Traditional House Architecture

Products of traditional culinary culture such as kesme pilav (a kind of dough dish), köy mancarından[15] 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 buffalo breeding, buffalo 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 railway project, can create added value in the protection of cultural heritage and economic development of the people of the region.

4.8. Socio-Economic Environment

The main purpose of SIA studies is to determine the current social and economic conditions of the settlements within the Project Area. This is also a central part of the planning and implementation process as it provides a basic benchmark in which project performance and the positive (beneficial) and negative impacts on people and communities can be measured through regular monitoring and evaluation throughout the life of the Project.

4.8.1. Population and Demography

The project area is within the borders of Çaycuma district of Zonguldak province. Demographic profile and statistical indicators of this province and district will be evaluated in this section.

4.8.2. Provincial and District Populations and Population Pyramids

There are 8 districts including the Centre, 25 municipalities, 176 neighbourhoods and 380 villages in Zonguldak province in administrative terms. The city population is 599,698 according to 2018 Address Based Population Census Results (ADNKS). Villages and towns constitute 39% of the total population while 61% is urban population. The population density in the province is 181 people/km^2 in 2018. Population growth rate is 4.7‰.

In Turkey, along with accelerating industrialization and development movement of the 1950s developing economy and social transformation, inevitably brought the phenomenon of internal migration. The province of Zonguldak, which was positively affected by this transformation until the 1980s and was among the provinces receiving immigration, started to be among the provinces that emigrated after this year.

In Table 4-45, which shows the distribution of the village / city population of Zonguldak province since 2009, it is seen that the village population has been decreasing continuously and the city population has been increasing regularly. The population, which was 619,812 in 2009, decreased to 599,698 in 2018, indicating the presence of internal migration in parallel with the decrease in the village population throughout the province.

[15] Savoy Cabbage

Table 4-45: Village/City Distribution of Zonguldak Province Population by Years

	Year	Village Population	City Population	Total
Zonguldak	2009	339,496	280,316	619,812
	2010	332,382	287,321	619,703
	2011	326,374	286,032	612,406
	2012	319,222	287,305	606,527
	2013	245,796	355,771	601,567
	2014	238,886	359,910	598,796
	2015	232,200	363,707	595,907
	2016	229,896	367,628	597,524
	2017	225,821	371,071	596,892
	2018	234,029	365,669	599,698

Source: TUIK, ADNKS 2018

The population chart of Zonguldak province reveals the increasing and decreasing tendencies of the population more clearly (Figure 4-42). The population, which had increased slightly before 2009, recorded a significant decrease after 2009 and especially after 2010. It is seen that the biggest decrease in the population was between 2010 and 2013. The population increased slightly from 2017 to 2018.

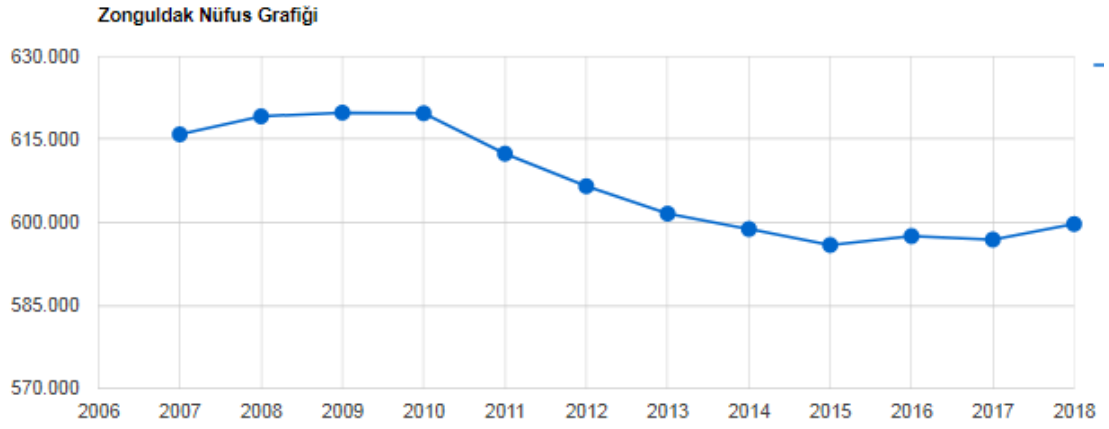

Figure 4-42: Population Chart of Zonguldak Province

In the population pyramid in Figure 4-43 showing the age group and gender distribution in the province of Zonguldak, it is seen that the male and female population in the 35-39 age group has a significantly higher rate. The second place is in the 40-44 age group and this distribution shows that the population in the active working age range is high across the province. While 34.5% of the population is in the young population category, 51% is in the middle age category. The elderly population is 14.37% and not at a very high rate. 50.42% of the population is women and 49.58% is men in the province.

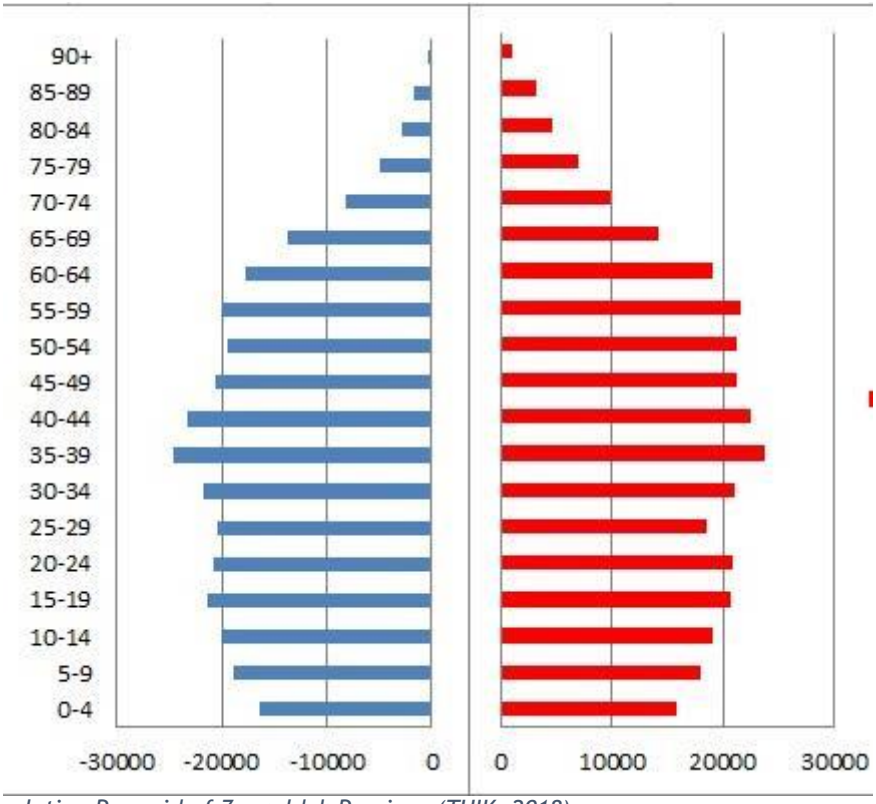

Figure 4-43: Population Pyramid of Zonguldak Province (TUIK, 2018)

The project is located within the borders of Çaycuma district of Zonguldak province. The population of Çaycuma district is 91,569 according to 2018 TUIK data. This population consists of 49.17% males (blue bars in above figure) and 50.83% females (red bars in above figure). The population of the district in 2018 constitutes 15.27% of the total population of Zonguldak province.

Table 4-46: Distribution of Çaycuma District Population by Years and Gender

	Year	Male Population	Female Population	Total
Çaycuma	2009	46,715	49,900	96,615
	2010	45,873	49,213	95,086
	2011	45,945	48,820	94,765
	2012	45,593	48,445	94,038
	2013	44,995	47,695	92,690
	2014	44,906	47,299	92,205

	Year	Male Population	Female Population	Total
	2015	44,396	46,794	91,190
	2016	44,456	46,643	91,099
	2017	44,361	46,499	90,860
	2018	45,020	46,549	91,569

Source: TUIK, ADNKS

It is observed that the district population of Çaycuma has a tendency to decrease regularly from 2008 to 2017 (Figure 4-44). There was only an increase from 2017 to 2018. The district population, which was 96,615 in 2009, became 91,569 by 2018. While 27,190 of the 2018 population live in the district centre, the total population in towns and villages is 64,379. There are 83 villages and 32 towns in Çaycuma district.

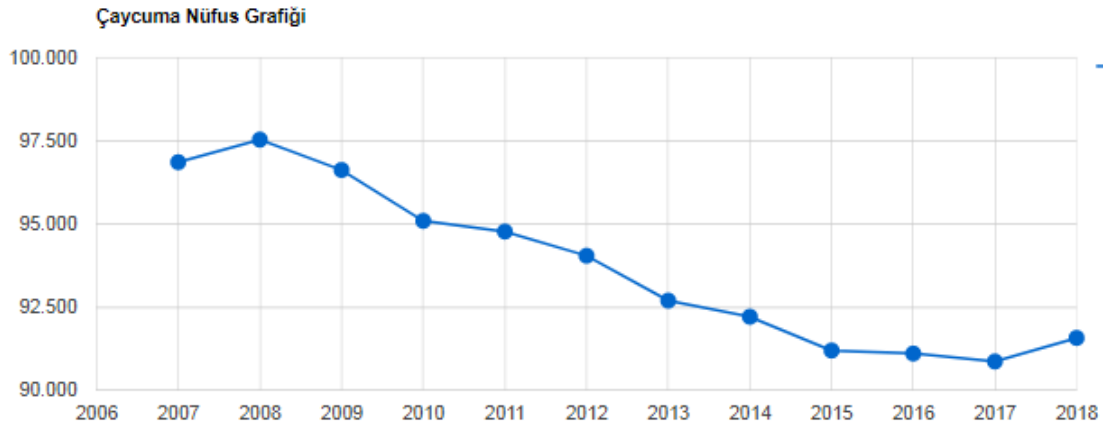

Figure 4-44: Population Pyramid of Çaycuma District

When Çaycuma population movements are analyzed, the most noticeable development is 98% growth of the district center population in the period of 1965-70. The reason for this unusual increase is the SEKA Paper Factory, which was put into operation in 1969. The industry started the rapid population and urbanization process in the district center. Despite these developments in the town center, considering general data of Zonguldak and Turkey, population growth rate in the villages is not high.

Table 4-47: Population Distribution by Towns and Years in Çaycuma District

	2014	2015	2016	2017	2018
Çaycuma District	26,424	26,536	27,062	27,457	27,190
Filyos Town	5,061	4,966	5,004	4,952	4,945
Karapınar Town	2,553	2,488	2,438	2,368	2,564
Nebioğlu Town	2,162	2,106	2,099	2,080	2,429

	2014	2015	2016	2017	2018
Perşembe Town	2,592	2,570	2,614	2,557	2,703
Saltukova Town	4,046	4,168	4,180	4,930	4,291

Source: TUIK, ADNKS

Considering the population distribution in the towns of Çaycuma district, it is seen that Filyos town where the Project is located has the highest population after the district centre. The population of the Filyos town was 5,061 in 2014, while it was 4,945 in 2018, a noticeable decrease.

4.8.3. Migration Movements and Net Migration Rates

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 was heavily immigrated between 1950 and 1985, employment capacity decreased and faced unemployment problem in the 1990s as a result of negative developments such as making loss of Turkey Hard Coal Authority and imposing significant costs to the Treasury, failure to modernize production technology, and reduced productivity. This situation led to the reversal of the migration movement, in other words, migration 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 are not in a capacity to enable the development of the industrial sector. All these negativities brought along an internal migration from Zonguldak to the outside of the early 1990s.[16] Migration has started out of the district, especially to Istanbul, Ankara, Bursa and Tekirdağ provinces.

The total population of the city, which was 619,703 in 2010, decreased to 612,406 in 2011 and 606,527 in 2012. These figures show that Zonguldak emits an average of 6-7 thousand people every year. When the immigration phenomenon in Zonguldak is examined in terms of periods, it was ranked 14th among the provinces receiving a net immigration with 1.0 ‰ in 1980, and became one of the provinces that gave net immigration after 1990. In 1990, it ranked 38th with 3.0 ‰ among the provinces with net migration, and in 2000 it rose to the 5th place among the provinces with net immigration with -7.3 ‰. Zonguldak, have risen to the top spots in Turkey between 1990 and 2000 among provinces with internal migration.

Table 4-48: Internal Migration Statistics in Zonguldak as of Five-Year Periods After 1980

Years	Total Population	Immigration	Outmigration	Net Migration	Net Migration Rate
1975-1980	804,265	45,225	36,546	8,679	10.8
1980-1985	918,089	29,219	47,770	-18,551	-20.0
1985-1990	983,254	38,943	68,311	-29,368	-29.4

[16] Socio-Economic Reasons of Migration in Zonguldak Province and Suggested Measures, Bülent Ecevit University Publications, No: 1

Years	Total Population	Immigration	Outmigration	Net Migration	Net Migration Rate
1995-2000	574,182	27,839	71,848	-44,009	-73.8

Source: TUIK, Migration Statistics

The internal migration statistics in Zonguldak as of 5-year periods after 1980 (Table 4-48) show that the latest positive difference between the immigration and outmigration occurred in 1975-1980 period. As can be seen from this table, after this period, Zonguldak has never been among the provinces receiving immigration; on the contrary, it has been in the top rank among the provinces that constantly emigrate. Between 1990 and 1995, there were important changes in the civil borders and therefore in the population of Zonguldak. Bartın has gained Provincial status in 1991 and so Karabük in 1995. After these developments, the total population declined to 574,182 as the two districts leaving Zonguldak in the 1995-2000 period.

Table 4-49: Internal Migration Statistics of Zonguldak Province Between 2009-2018

Years	Total Population	Immigration	Outmigration	Net Migration	Net Migration Rate
2009-2010	619,703	15,712	23,267	-7,555	-12.1
2010-2011	612,406	15,822	23,658	-7,836	-12.7
2011-2012	606,527	14,279	22,687	-8,408	-13.8
2012-2013	601,567	17,006	25,571	-8,565	-14.1
2013-2014	598,796	18,115	24,783	-6,668	-11.1
2014-2015	595,907	18,244	25,340	-7,096	-11.8
2015-2016	597,524	19,991	21,993	-1,942	-3.2
2016-2017	596,892	19,421	22,541	-3,120	-5.2
2017-2018	599,698	24,363	24,105	258	0.4

Source: TUIK, Migration Statistics

Table 4-49 shows the migration, net migration and net migration rates of Zonguldak province between years of 2009-2018. It is seen that internal migration continues in Zonguldak in the period between 2009 and 2018. The net migration rate, which was -12.1 in 2009, was -14.1 by 2013. However, after 2013, net migration rate has decreased. The net migration rate, which was -14.1 in 2013, decreased to 0.4 in the period of 2017-2018. It can be said that the internal migration trend has decreased in the region in recent years. In fact, the population increased slightly in the 2017-2018 period.

The contraction in employment with the crisis in the mining sector and the failure to realize alternative investments in the city are the leading factors that cause migration in Zonguldak. Turkey Hard Coal Authority has played a role in affecting and shaping the socio-economic structure of the city during the urbanization process in the mining basin and the years following the completion of urbanization. The institution, whose most important task in the

basin is to bring hard coal to the economy, was an institution that provided the services that the Municipal and private administration services should offer during periods when the necessary infrastructure and organizations were not established and could not operate adequately, and continued this mission for many years.[17]

In addition to the reasons for the internal migration phenomenon in the province and district, it was learned during the interviews conducted in rural settlements in Filyos town, that the internal migration occurred especially after 1998 and this was mostly due to expropriations made for Filyos Valley Project. Within the scope of Filyos Industrial Zone and Filyos Valley Project, the region was declared as "Free Zone" in April 1994 with the decision of the Council of Ministers in order to attract export-oriented investments to the region. In this context, expropriation was realized by paying 120-125 million TRY in the largest free zone of Turkey declared until today.[18] Local people and Mukhtars stated that many people migrated from the countryside to the cities after this period due to the loss of their land and their houses, some of this people migrated to the town and district centre and some to other major provinces.

4.8.4. Population and Demographic Structure of Settlements in the Study Area

While Zonguldak and Amasra hard coal quarries constituted an important employment area in the region until the end of 1990s, there was a contraction in employment due to the changes in mining policy at the end of 1990s and as a result, migrations from the region. In addition, as mentioned above, it was learned during field study that one of the reasons of rural migration was the expropriations made for Filyos Valley Project. Consequently, immigration out of the district has occurred due to the loss of houses and lands due to expropriation and the insufficient business areas.

According to the results of TUIK General Population Census of 2000, while Sazköy has a population of 280 people, this number has decreased to 190 in 2011. While the population in the village of Aşağıihsaniye was 221 people in 2000, it decreased to 183 in 2011 and 163 to 2018. The populations of Öteyüz and Sefercik districts of the town of Filyos also tend to decrease regularly over the years. The total population in the settlements in the study area is 3,075 people as of 2018 (Table 4-50).

Table 4-50: Population of the Settlements in the Study Area by Years

Settlement	2011	2012	2013	2014	2015	2016	2017	2018
Filyos - Öteyüz Quarter	2,229	2,225	2,209	2,197	2,127	2,165	2,142	2,126
Filyos - Sefercik Quarter	208	192	178	175	175	175	170	171
Sazköy	190	180	169	158	161	155	139	148
Derecikören	338	325	308	300	307	297	285	301
Gökçeler	208	207	193	186	195	173	169	166
Aşağıihsaniye	183	177	175	179	178	165	130	163

[17] DPT (2009), 9th Development Plan Mining Specialization Commission Report, Ankara.

[18] Atış, E. & Çelikoğlu, Ş. (2019). "Filyos Valley Project with Its Socio-Economic and Environmental Aspects", International Social Sciences Studies Journal, 5(29): 49-68

Settlement	2011	2012	2013	2014	2015	2016	2017	2018
Total								3,075

Source: TUIK, ADNKS

As mentioned in the above paragraphs, there were many migrant households after expropriation for the Filyos Valley Free Zone in 1998. While it was stated that 30-35 households migrated in Sazköy due to expropriation, it was learned that these people mostly migrated to Çaycuma, Filyos, Saltukova and Zonguldak. However, it has been stated that the population has increased slightly in recent times and some young people who have heard of the employment opportunities of Filyos Valley Project have returned to the village. This situation coincides with the increase in population data in the last year. While it was learned that more than 100 households migrated from the village after expropriation in 1998 in Aşağıihsaniye village, it was stated that 20 households in Derecikören and 10 households in Gökçeler migrated due to expropriation.

Table 4-51 shows seasonal population changes according to the information received from Mukhtars during the interviews[19]. Accordingly, it is observed that the population increased in all affected settlements in the summer months. The highest population growth in the summer was expressed in the village of Derecikören, the village's permanent population of 120 households rises to over 180 in the summer. The development of gardening culture in the region, the population living in provincial and district centres coming to rural settlements in summer and dealing with gardening, the seasonal forest workers coming to the village and the retired population returning to the village in the summer are the factors that increase this population.

Table 4-51: Seasonal Population Changes in Settlements at the Study Area

Settlement	Population (summer)	Number of households (summer)	Population (winter)	Number of households (winter)	Population difference in summer and winter seasons
Filyos – Öteyüz Quarter	3,500	800+	2,300	750	1,200
Filyos – Sefercik Quarter	200	50	177	45	23
Sazköy	200+	60	170	45	30+
Derecikören	500+	180+	376	120	124+
Gökçeler	185	90	169	85	16
Aşağıihsaniye	250	95	165	75	85

Source: SIA Field Study, Mukhtar Interviews, 2020

It is seen that the elderly population in some of the settlements in the study area, and the active population in others is predominant. For example, in the Sefercik neighborhood, the elderly population is very low, while in the Derecikören neighborhood, 53% of the population is the elderly population. Child population appears to be quite low in all settlements. The lowest child population is in Gökçeler and Aşağıihsaniye villages. Since Öteyüz Neighborhood

[19] The information gathered from the Mukhtars' interviews is based on estimates; it is only indicative but not precise census.

of Filyos is the largest populated neighborhood of the town, no information about the distribution of the population by age groups has been obtained by Mukhtar.

Table 4-52: Distribution of Population by Age Groups in Settlements in the Study Area

Settlement	Total Population	Elderly (65 years and over)	Active Population (16-65)	Child (0-16)
Filyos – Öteyüz Quarter	2,126	-	-	-
Filyos – Sefercik Quarter	177	25-30	120	25
Sazköy	170	50	85	35
Derecikören	376	200	110	50-60
Gökçeler	169	80-85	70-80	10
Aşağıihsaniye	165	60-70	80-85	10-15

Source: SIA Field Study, Mukhtar Interviews, 2020

According to the results of the survey conducted with households in the settlements, the average household size is 3.14 and is lower than the district average (3.42). The lowest average household size was observed in Gökçeler village (1.85), while the highest average household size was in Sazköy (1.57).

Table 4-53: Average Household Size of the Households in the Sample

Settlement	Average Household Size	Number of Households	Median
Filyos – Öteyüz Quarter	3.33	39	3.00
Filyos – Sefercik Quarter	2.87	8	3.50
Sazköy	3.57	7	2.00
Derecikören	3.4	10	3.00
Gökçeler	1.85	7	3.00
Aşağıihsaniye	2.83	6	3.00
General average	**3.14**	**77**	**3.00**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

4.8.5. Land Use and Ownership of Lands and Other Assets

In order to get official statistics on land use in the settlements in the study area, an official letter was sent to the Çaycuma District Directorate of Agriculture and the data was received. The data received from the District Agriculture Directorate are shown in Table 4-54. Accordingly, there are 46 farmers registered in the Farmer Registration System (FRS) in the settlements in the study area. While the total agricultural land of the settlements is 4,770 decares, 32% of this is the land registered in the FRS system. It is noteworthy that most of

the agricultural lands are composed of orchards. In total, among 1.541 decares of agricultural land; 1,147 decares is fruit garden, 308 decares is forage crops land, 61 decares is cereal products land and 25 decares is vegetable garden (See Figure 4-45-Figure 4-47). According to the data obtained from household interviews, vegetable gardens are much in number but small in size.

It is seen that the number of farmers registered in FRS is highest in Aşağıihsaniye settlement. There are no agricultural land and farmers registered in FRS in the Sefercik district, which also coincides with the information obtained during the Mukhtar interviews. It is observed that the total agricultural land in Sazköy is 850 decares and the agricultural land registered in FRS is 204 decares. Average agricultural land per farmer registered in FRS is highest in Aşağıihsaniye (average 53 decares).

Table 4-54: Land Use Statistics in Settlements at the Study Area

Settlement	Number of farmers registered in the FRS	FRS Registered Agricultural Land (decare)	FRS registered agricultural land / farmer (decare)	Total Agricultural Land of Settlements (decare)	Ratio of FRS Registered Agricultural Land to Total Agricultural Land (%)	Orchard Land (decare)	Vegetable Garden Land (decare)	Grain Products Land (decare)	Forage Crops Land (decare)	Pasture lands (decare)	Irrigated Land (decare)	Dry Land (decare)
Filyos-Öteyüz	1	1	1	20	%5	-	-	1	-	-	-	20
Filyos- Sefercik	-	-	-	250	-	-	-	-	-	-	-	250
Gökçeler	4	40	10	460	%9	22	8	10	-	-	-	460
Sazköy	13	204	15.6	850	%24	99	14	11	80	-	-	850
Derecikören	4	30	7,5	240	%13	11	3	13	3	-	-	240
Aşağıihsaniye	24	1,266	52.8	2,950	%43	1,015	-	26	225	-	-	2,950
Total	**46**	**1,541**	**86.9**	**4,770**	**%32**	**1,147**	**25**	**61**	**308**	**-**	**-**	**4,770**

Source: Çaycuma District Directorate of Agriculture, 2020

Figure 4-45: View of Gökçeler Village Roadside Vegetable Gardens-1

Figure 4-46: View of Gökçeler Village Roadside Vegetable Garden-2

Figure 4-47: View from Orchards in Sazköy

4.8.6. Pasture Land Use

Settlement-level Information on the grazing lands was gathered from Mukhtar interviews conducted during field survey. According to the data obtained, most of the grazing lands in the region affected by the Project remained in the area declared as Free Zone within the scope of Filyos Valley Project and was expropriated in 1998. The expropriated treasury lands are still used for grazing as there are no alternative pasture areas in the villages of Sazköy and Derecikören located on the right side of the Project area and located in a geographically limited area. Pasture areas of Aşağıihsaniye village have also been expropriated, but it has been learned that the households use their own gardens, agricultural lands or forest areas for grazing and mostly feed their animals in their barns.

Sefercik neighborhood has alternative pasturelands besides expropriated areas. As learned during field study, households use both expropriated treasury lands and pasturelands, but mostly the pasturelands. Gökçeler neighborhood has sufficient pasturelands for grazing not using the expropriated area.

Table 4-55: Pasture Land Use of Settlements in the Study Area

Settlement	Size (decare)	Sufficiency	Explanation
Filyos – Öteyüz Quarter	-	-	Since the neighbourhood is in the centre of the town, there is only a few households dealing with animal husbandry. Although there is no pastureland, few households engaged in livestock use empty lands for grazing.
Filyos – Sefercik Quarter	1000+	Sufficient	Apart from the pasturelands the village, expropriated treasury lands in the area declared as Free Zone are also used for grazing. However, mostly pasturelands are used.
Sazköy	500+	Insufficient	Most of the pasturelands of the settlement were expropriated in 1998. However, expropriated treasury lands in the area declared as Free Zone are still used as grazing land. Forest areas are also used, but very limited.

Settlement	Size (decare)	Sufficiency	Explanation
Derecikören	500+	Insufficient	All pasturelands of the settlement were expropriated in 1998. However, treasury lands in the area declared as Free Zone are still used as grazing land.
Gökçeler	200+	Sufficient	The pasturelands are available, sufficient.
Aşağıihsaniye	-	-	All pasturelands of the settlement were expropriated in 1998. Households use their own gardens, agricultural lands or forest areas for grazing. Animals are generally fed in the barns.

Source: SIA Field Study, Mukhtar Interviews, 2020

The grazing areas used by the settlements are presented in Figure 4-48. Sazköy settlement uses M3 pasture area, Derecikören M5 pasture area, Gökçeler M6 pasture area and Sefercik quarter uses M2, less frequently M1 area. It is seen that lands that are not qualified as pasture are used for grazing due to geographical limitations of region.

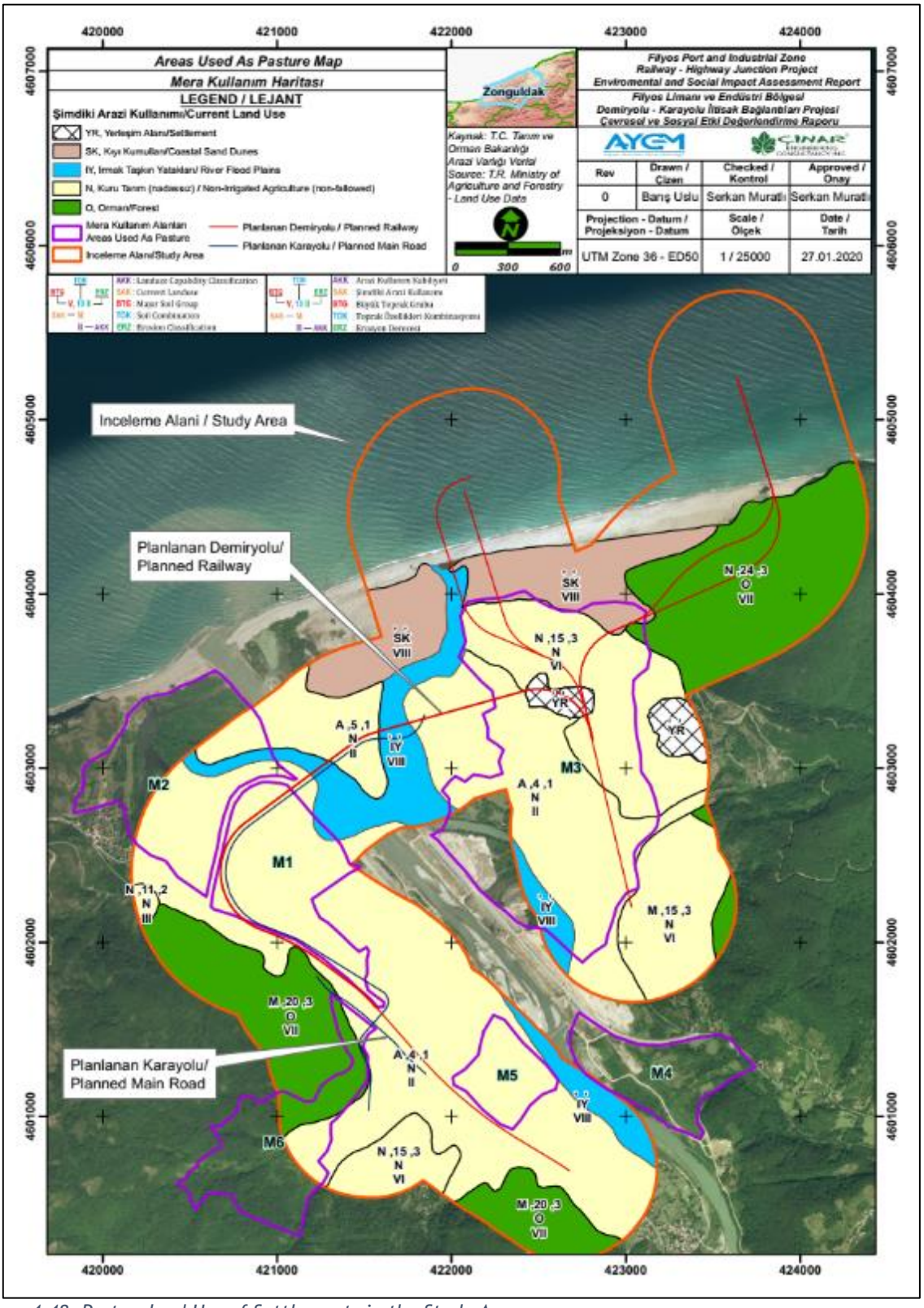

Figure 4-48: Pastureland Use of Settlements in the Study Area

4.8.7. Land Use of Households

While 59.7% of the households in the sample use or own a land, 40.3% do not. 47% of the households that have title deeds (shares or full) stated that this land is a vegetable garden, 18% is an arable land and 13% is an orchard. 9% of these households have both a vegetable garden and an arable land, the other 9% have both an orchard and vegetable garden, and 2% have both arable land and orchard.

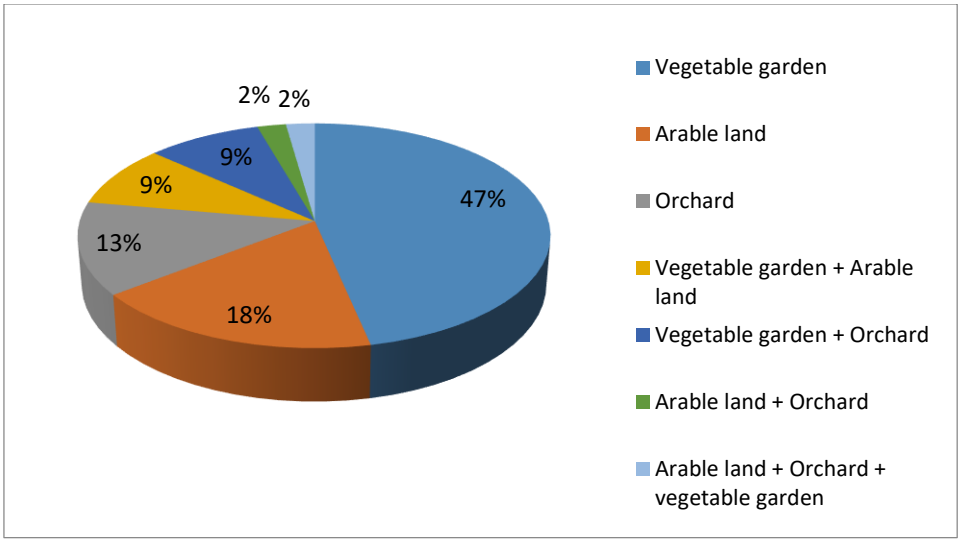

Figure 4-49: Land Ownership of Households in the Sample

Data on land sizes owned by households in the study area were obtained from the household survey results (Table 4-56). While 63% of the households in the sample have a total of 0-5 decares of land, 27% of the households have between 6-10 decares. Total land ownership of more than 10 decares is quite low (9%).

Table 4-56: Average Land Size Owned by the Households in the Sample (Total)

Total Land Size (decare)	Number of Households	Percentage (%)
0-5	28	63.6
6-10	12	27.3
11-20	1	2.3
21-30	2	4.5
31-50	1	2.3
51+	-	-
Total	**44**[20]	**84.2**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

While 50% of the households that own an arable land indicate that the land is between 0-5 decares, 31% stated that it is between 6-10 decares. The number of households that own arable land over 10 decares is quite low. This situation shows that the land ownership had

[20] 1 household did not respond to the question of land size owned because it uses only treasury land.

significantly decreased due to the expropriation of the agricultural areas in the region. 36% of the households interviewed have their own vegetable garden next to their home. All of these gardens are between 0-5 decares and mostly in the range of 50-1000 m^2. The households that own orchards have stated that the size of these lands, where there are trees such as nuts and walnuts, varies between 0-10 decares.

Table 4-57: Land Sizes Owned by Households in the Sample (Distribution by Land Types)

Land Size (decare)	Arable Land	Percentage (%)	Vegetable garden	Percentage (%)	Orchard	Percentage (%)
0-5	8	50.0	28	100,0	5	45.5
6-10	5	31.3	-	-	5	45.5
11-20	1	6.3	-	-	1	9.1
21-30	1	6.3	-	-	-	-
31-50	1	6.3	-	-	-	-
51+	-	-	-	-	-	-
General average	**16**	**100.0**	**28**	100,0	**11**	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

4.8.8. Other Land Uses

6.5% of the households in the sample stated that they use other land resources that are not their private property. The number of households included in the sample stating that they are using other lands (treasury, leased land, etc.) is 5 and the average land size is 84.2 decares. (Table 4-58). 4 of these households also have their own privately owned land, only 1 household stated that they do not have title deeds and only carry out agricultural activities in the treasury land.

Table 4-58: Average Land Sizes Used by Households in the Sample

Land Types	Number of households	Average Land Size (decare)
Treasury Land	3	102.3
Rented (with contract)	1	30.0
Rented (without contract)	-	-
Owned by others and used without payment (neighbors, friends etc.)	1	-
General average	**5**	**84.2**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

4.8.9. Land Use Characteristics

69% of the households in the sample deal with family farming. 15% stated that the land they owned was vacant and not used. 8% of the households use their lands for grazing. Other uses

of household land include renting to someone else, culvation of other shareholders and cultivation of non-shareholder relatives. (Table 4-59).

Table 4-59: Land Use of the Households in the Sample

Land Use	N	(%)
Self-cultivated (by household members)	36	69.2
Renting to someone	1	1.9
Cultivation for other shareholders	2	3.8
Grazing animals	4	7.7
Cultivation of non-shareholder relatives	1	1.9
Not used	8	15.3
Total	**52**[21]	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

4.8.10. Ownership of Immovable Assets (Houses, Barns)

While 64% of the households have the legal title of the house in which they live, 18% are shareholders of the houses. 12% of households live in a house owned by their relatives without paying rent. The ratio of tenant households is very low (5%).

Table 4-60: Ownership of Houses by Households in Sample

Ownership of House	N	(%)
Owned by household with title deed	49	63.6
Owned by household with shared title deed (shareholders)	14	18.2
Owned by relatives, used without paying rent	9	11.7
Tenants	4	5.2
Lodging	1	1.3
Total	**77**	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

The households were asked whether they own a real estate other than the house they live in, such as a store. While 19.5% of the households have a house other than where they live, 5% have a shop. It has been observed that the other houses owned outside the residence are usually in Filyos center. 56% of the households answered the question that the other property owned was used for investment purposes. 39% use their other property permanently.

[21] Since there is more than one answer option, the total number of answers exceeds the number of households that own the land.

Table 4-61: Ownership of Other Immovable (House / Store) in the Sample

Ownership of another immovable	N	(%)
Yes, house	15	19.5
Yes, store / workplace	4	5.2
No	58	75.3
Total	**77**	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

84% of those engaged in animal husbandry stated that they have a barn next to their households. The approximate sizes of the barns owned range from 5 m^2 to 250 m^2.

4.8.11. Ownership of Vehicles

51% of the households in the sample have at least one vehicle. 77% of the households that have a vehicle own a car. It is seen that 14% owned trucks and 7% owned tractors.

Table 4-62: Vehicle Ownership of the Households in the Sample

Ownership of Vehicles	N	(%)
Automobile	33	76.7
Truck	6	14.0
Minibus	1	2.3
Tractor	3	7.0
Total	**43**[22]	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

4.8.12. Local Economy, Livelihoods and Employment

In the province of Zonguldak, where agricultural lands are generally limited, the fertile plains along the length of Filyos Stream are important for vegetative reproduction. Corn, vegetable and fruit production is common in this section. Livestock, especially traditional buffalo breeding are also among the agricultural activities in the region. It has been observed that one of the most important income source was mining until recently. However, due to the economic policies in the country, the decrease in employment in the mines also affected Çaycuma district. The number of workers working at the mine decreased rapidly after 1980 and especially the rural areas have turned into a retirement region. During the field study, it was observed that the elderly population in rural settlements mostly retired from mining.

[22] Since there is more than one answer option, the total number of answers exceeds the number of households that own the vehicle.

Retired and middle-aged population is high in rural settlements and district center due to reasons such as lack of employment opportunities and poor living conditions. This situation generally results in the people who retired from private sector (mining) live on retirement income and not engaging in additional income sources such as agriculture / animal husbandry. Agricultural activities, which have been carried out intensely in the region in past, have decreased considerably due to the reasons such as loss of land after expropriation, geographical area limitation and decrease of agricultural income due to general economic reasons. However, there is a widespread gardening culture in the region and households produce vegetables and fruits for their own household consumption in these gardens. The number of households that sell agricultural products on market and carry out agricultural activities for income generation is very low. Similarly, animal husbandry has decreased compared to the past, one of the most important reasons is that pasture areas remained within the expropriated area and alternative areas could not be found due to geographical limitations. It has been observed that animal husbandry is mostly made as fattening livestock and that livestock sales are stated as a source of income in some of the households.

The widespread presence of forest areas in the region has directed local people to activities that can be an additional source of income, such as the supply of firewood from the forest, forestry works, collecting and selling plants / mushrooms. During the interviews conducted in the field studies, it was learned that especially in rural settlements close to forest areas, collecting goods and woodcutting was performed commonly. In some of the settlements, forest areas are also used for grazing. Plants such as bay leaf, linden and mushroom, chestnut are collected from the forest; and are sold to market in case of excess. The laurel leaf is collected by a method called “bay exile” and marketed abroad especially in Sazköy and Aşağıihsaniye villages.

4.8.13. Main Income Sources of Settlements

Mukhtar interviews provided more in-depth information on the main income sources of the settlements in the study area. Table 4-63 shows the main income sources of settlements. Although agricultural activities are mentioned among the income sources in the villages of Gökçeler and Derecikören, it has been learned during the interviews with muhtars that there is no commercial agriculture, and it is considered as an activity that supports household economy. Agricultural activity is carried out for the market only in the villages of Aşağıihsaniye and Sazköy and considered among the important sources of income.

Table 4-63: Main Income Sources in the Settlement in Project Area

Settlement	Primary	Secondary	Tertiary	Fourth
Filyos-Öteyuz	Retirement Income	Salaried employee (private sector)	Trade	Beekeeping-Animal Husbandry
Filyos-Sefercik	Retirement Income	Salaried employee (private sector)	Animal Husbandry	Salaried employee (public sector)
Sazköy	Animal Husbandry	Salaried employee (private sector)	Agriculture	Retirement Income
Aşağıihsaniye	Retirement Income	Agriculture	Animal Husbandry	Forestry
Derecikören	Retirement Income	Animal Husbandry	Salaried employee (private sector)	Agriculture
Gökçeler	Retirement Income	Salaried employee (private sector)	Animal Husbandry	Agriculture

Source: SIA Field Study, Mukhtar Interviews, 2020

4.8.14. Income Sources of Households

It is seen that the main income sources of the households in the sample are mostly retirement income and salaried employee income (Table 4-64). Tradesman / artisan / trade income and paid civil servant income are also among the main sources of income. However, the ratio of agricultural income and livestock income as the main income sources is quite low. This supports the knowledge that agriculture and animal husbandry are not performed as the main income source in the region and are mostly made for household consumption. A very limited part of this production is made for the market. 61% of the households stated that their main income is retirement income. The main income of 21% is wage income (Table 4-64).

Table 4-64: Main Income Sources of Households in Sample

Main Income Sources	N	(%)
Agricultural Income (Orcharding, etc.)	1	1.3
Husbandry Income (Livestock sales)	2	2.6
Husbandry Income (Selling livestock products to market)	-	-
Employee salary (private sector)	16	20.8
Seasonal Job Income	-	-
Retirement Income	47	61.0
Tradesman / Artisan / Trade Income	6	7.8
Employee salary (public sector)	4	5.2
Widow / Disabled / Elderly Salary Income	-	-
Rental Income	-	-
Other	1	1.3
Total	**77**	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

57% of the households have a secondary income source. It is seen that husbandry income is generally stated as a subsidiary income source of households (

Table 4-65). However, agricultural income is not again specified as a subsidiary income source. This finding supports that agricultural activities are mostly made for household consumption. It is observed that the income obtained from livestock sales and livestock products are among the primary subsidiary income sources (36%). While retirement income comes in second place (16%), rental income is stated in third place (11%). Seasonal job income, tradesman / trade income, state aid income are among other subsidiary income sources.

Table 4-65: Subsidiary Income Sources of Households in Sample

Source: SIA Field Study, Socio-Economic Household Survey, 2020

Income Sources	N	(%)
Agricultural Income (Orcharding etc.)	1	2.3
Husbandry Income (Livestock sales)	8	18.2
Husbandry Income (Selling livestock products to market)	8	18.2
Employee salary (private sector)	2	4.5
Seasonal Job Income	2	4.5
Retirement Income	7	15.9
Tradesman / Artisan / Trade Income	3	6.8
Employee salary (public sector)	1	2.3
Widow / Disabled / Elderly Salary Income	3	6.8
Rental Income	5	11.4
District Governing Aid	1	2.3
Other	3	6.8
Total	**44**	**100.0**

14% of households have a secondary subsidiary income source. Among the secondary income sources, rental income is in the first place (27%), agricultural income (18%) and husbandry income (selling livestock products to market) share the second place (18%).

Table 4-66: Secondary Subsidiary Income Source of Households in Sample

Income Sources	N	(%)
Agricultural Income (Orcharding etc.)	2	18.2
Husbandry Income (Selling livestock products to market)	2	18.2
Husbandry Income (Selling livestock products to market)	2	18.2
Employee salary (private sector)	1	9.1
Seasonal Job Income	1	9.1
Retirement Income	1	9.1
Tradesman / Artisan / Trade Income	-	-
Employee salary (public sector)	-	-
Widow / Disabled / Elderly Salary Income	-	-

Income Sources	N	(%)
Rental Income	3	27.3
District Governing Aid	-	-
Other	1	9.1
Total	**11**	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

4.8.15. Economic Status and Poverty Levels of Households

The poverty rate in Turkey declined significantly from 27.3 percent to 9.9 percent between 2004 and 2016. Growth in earnings and employment were the main drivers of poverty reduction during this period. However, economic growth slowed down in the second half of 2018. Unemployment continued to climb between May 2018-May 2019, from 10.6 percent to 14 percent, leaving 4.5 million people unemployed compared to 3.4 million a year ago. The agriculture and construction sectors that traditionally employ a larger share of low skilled and poor were severely hit by the economic slowdown. Likewise, the youth unemployment rate increased sharply to 25.5 percent from 19.4 percent a year ago. Despite a slight decrease in price levels, inflation remained high, averaging 18.6 percent in the first seven months of 2019, and adversely influenced low-income households. Moreover, real wages dropped last year for all income groups. In response, the government increased the minimum wage by 26 percent in January 2019 and announced employment support programs to protect low-income households. These trends have put upward pressure on the incidence of poverty, which is projected to be stagnant at around 9 percent between 2018-2021 while the number of the poor is expected to increase by 200-300 thousand people[23].

According to results of the minimum subsistence index prepared by Confederation of Turkey Public Workers Unions in January 2020, four-person family subsistence rate (poverty line) was calculated as 6.929,97 TRY. The results showed that the poverty line of a four-person family increased by 0.47% compared to the previous month. The poverty line of the single person (employee) was calculated as 3.435,81 TL which increased by 0.49% compared to previous month[24].

According to baseline survey results, total annual income of the households earned from main and subsidiary income sources derives between 6,000 TRY and 350,000 TRY. The average annual income of the households is 31,883 TRY. For a better understanding of poverty levels among households in the region, household sizes and annual income variables were compared. According to this analysis, it is seen that the average annual incomes by household sizes are under the poverty line. 59 out of total 71 households who answered the annual income question, are analyzed as below poverty line. This is an expected result considering the negative trend in the country's economy, high inflation and low incomes segment. The number of people living below the poverty line in Turkey increased by 1.24 million in 2018, from 15.8 million in 2017 to 16.8 million in 2018. Besides, 18 million people are at risk of poverty according to latest TUİK data of 2018 which means total of almost 34.5 million people (corresponds to approximately 42.5% of total country population) are either below poverty line or at risk of poverty.

[23] Poverty and Equity Brief Turkey, World Bank, October 2019

[24] Minimum Subsistence Index Prepared by Kamu-Sen Research and Development Center, January 2020

Table 4-67: Poverty Levels of Households

Household Size	Number of households	Minimum Annual Income (TRY)	Maximum Annual Income (TRY)	Average Annual Income (TRY)	Number of Households below Poverty Line
1	3	6,000	21,600	13,800[25]	2
2	28	18,000	84,000	36,604[26]	20
3	22	24,000	72,000	42,547[27]	18
4	11	21,000	72,400	47,844[28]	9
5	6	27,600	350,000	103,933	5
6	6	24,000	60,400	47,360[29]	5
7	1	-	-	-	-[30]
TOTAL	77	-	-	-	59[31]

Source: SIA Field Study, Socio-Economic Household Survey, 2020

The reasons of high number of households below the poverty line are the fact that the job opportunities are limited in the region, the population of middle-aged and older people is high and that the main income of these people generally depends on retirement income. These households generally do not engage in commercial agriculture and animal husbandry. Some of households with high average age produces vegetables for household consumption in gardens which provides additional support to the household to deal with increasing food costs. In addition, there are households that are engaged in animal husbandry and earn income from animal products due to the limited job opportunities in settlements that retain their rural characteristics more like Sazköy and Aşağıihsaniye.

While 39% of the households in the sample see themselves as people struggling to meet their expenses, 50% of them can get along more or less and 10% of them have income more than enough to meet their basic needs and they can easily get along (Table 4-68). In addition, 74% of households responded to "How do you see your economic situation compared to a year ago?" as "worse", and 20% answered as "the same". To the question of "How do you evaluate the future 5 years later economically?" 57% of the respondents answered “it will be worse” and 21% answered “it will be better”. It is observed that the majority of PAPs think that their economic situation is getting worse compared to previous years and that they do not have much belief that the situation will be better in the future.

Table 4-68: Economic Status Perception of Households in Sample

Source: SIA Field Study, Socio-Economic Household Survey, 2020

[25] One of the single-person households did not respond to annual income question. Therefore, average income was calculated for total of 2 households.
[26] Since 4 households did not respond to annual income question, average income was calculated for 24 households.
[27] Since 3 households did not respond to annual income question, average income was calculated for 19 households.
[28] Since 2 households did not respond to annual income question, average income was calculated for 9 households.
[29] One of the households did not respond to annual income question. Therefore, average income was calculated for total of 5 households.
[30] The household of 7 members did not respond to annual income question.
[31] The total number does not include the households who did not respond the question.

Economic Sufficiency	N	(%)
Getting along easily	8	10.4
Getting along more or less	39	50.6
Having difficulties	22	28.6
Having so much difficulties	8	10.4
Total	**77**	**100.0**

4.8.16. Agricultural Production

In the other settlements, except for the villages of Sazköy and Aşağıihsaniye, it was examined in the previous section that agricultural activities are generally carried out for household consumption and commercial agriculture is not common. Approximately 100 households in Öteyüz Quarter, approximately 40 households in Sazköy, 65 households in Gökçeler, 120 households in Derecikören and 45 households in Sefercik are engaged in agricultural activities only for household consumption. This numbers represent total number of households engaged in agriculture at the project-affected settlements, so not all these households will be affected by the Project. Only a small number of households are identified to be adversely affected by loss of agricultural lands due to Project.

Table 4-69 shows the main products grown in settlements in the study area. Although most of these products are intended for household consumption, especially beans and corn are sometimes sold in markets.

Table 4-69: Main Agricultural Products Grown in Settlements in the Study Area

Settlement	Primary	Secondary	Tertiary	Fourth
Filyos-Öteyuz	Beans	Tomatoes	Corn	Black cabbage
Filyos-Sefercik	Beans	Corn	Tomatoes	Spinach
Sazköy	Corn	Clover	Vetch	Sainfoin
Aşağıihsaniye	Beans	Corn	Biber	Tomatoes
Derecikören	Corn	Beans	Clover	Oat
Gökçeler	Corn	Beans	Tomatoes	Pepper

Source: SIA Field Study, Mukhtar Interviews, 2020

Household surveys also support the data received from Mukhtars, the agricultural products that households mostly grow are vegetables such as tomatoes, peppers, corn, beans, and eggplants (Table 4-70). It is understood that this production is mainly for household consumption. As a matter of fact, most of the households stated that they do not have any income-generating products and that they produce for their own household consumption. Only a few households stated that hazelnuts and corn were sold to market, while other a few stated that products such as vetch and alfalfa were used as animal feed.

Table 4-70: Agricultural Products Mostly Grown by Households in Sample

Agricultural products	Number of responses showing that the household grows the product	(%)	Agricultural products	Number of responses showing that the household grows the product	(%)
Wheat	2	1.4	Leek	4	2,7
Barley	1	0.7	Pepper	19	12,9
Sugar beet	1	0.7	Parsley	2	1,4
Beans	15	10.2	Lettuce	11	7,5
Black cabbage	14	9.5	Radish	1	0,7
Tomatoes	24	16.3	Cucumber	6	4,0
Corn	17	11.6	Spinach	2	1,4
Clover	3	2.0	Onion	3	2,0
Vetch	4	2.7	Cauliflower	1	0,7
Sainfoin	2	1.4	Potatoes	1	0,7
Eggplant	14	9.5			
Total				**147**	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

4.8.17. Livestock Production

According to the data received from Çaycuma District Directorate of Agriculture, there are 1,099 bovine animals and 265 small cattle in the settlements in the study area (Table 4-71). It is seen that bovine breeding is more common in the region and cattle breeding is performed only in Sazköy, Aşağıihsaniye and Gökçeler. Bovine breeding is also carried out in the Öteyüz and Sefercik neighborhoods of the Filyos town. It is seen that the local beekeepers are mostly in Aşağıihsaniye, the total number of beehives in the region is 357. However, according to the information provided by Mukhtars, it is known that the number of unregistered beekeeping is higher.

Table 4-71: Livestock Activities in Settlements at the Study Area

Settlement	Number of bovine animal	Number of small cattle	Number of mobile beekeepers	Number of mobile beehives	Number of local beekeepers	Number of local beehives
Sazköy	287	200	-	-	0	0
Aşağıihsaniye	222	46	-	-	3	197
Derecikören	349	0	1	40	1	30
Gökçeler	73	19	-	-	0	0
Öteyüz/Filyos	60	0	-	-	1	60
Sefercik/Filyos	108	0	-	-	1	70
Total	1.099	265	1	40	6	357

Source: Çaycuma District Directorate of Agriculture, 2020

According to the information received from Mukhtars, total of 249 households are engaged in livestock production in the settlements in the study area. The total number of bovine animal in the settlements is 1,224 while the number of small cattle is 456. There are 36 households in total engaged in beekeeping. Number of bovine animal and small cattle received from Mukhtar interviews (Table 4-72) is different from the numbers in Table 4-71 because Table 4-72represents the numbers estimated by Mukhtars while Table 4-71 is based on official data received from Çaycuma District Directorate of Agriculture.

Table 4-72: Number of Households engaged in Husbandry and Number of Livestock in the Settlements in the Study Area

Settlement	Number of Households Engaged in Husbandry (including poultry farming)	Number of Bovine Animal	Number of Small Cattle	Number of Households Engaged in Beekeeping
Filyos-Öteyuz	17	60	-	15
Filyos-Sefercik	29	74	-	5
Sazköy	41	150	271	3
Aşağıihsaniye	30	280	160	7
Derecikören	120	600+	-	-
Gökçeler	29	60	25	6
Total	**266**	**1224**	**456**	**36**

Source: SIA Field Study, Mukhtar Interviews, 2020

42% of the households in the sample are engaged in animal husbandry. While 29% of the households have bovine animals, 8% of them have small cattle, bovine breeding is observed as more common than cattle breeding. 18% of the households are engaged in poultry farming and 5% are engaged in beekeeping (Table 4-73).

Table 4-73: Livestock Ownership by Type in Households in the Sample

Livestock Type	Ownership	N	(%)
Bovine Animal	Yes	22	28.6
	No	55	71.4
Total		**77**	**100.0**
Small Cattle	Yes	6	7.8
	No	71	92.2
Total		**77**	**100.0**
Poultry	Yes	14	**18.2**
	No	63	**81.8**
Total		**77**	**100.0**
Beehives	Yes	4	5.2
	No	73	94.8
Total		**77**	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

There are 111 bovine animals in total and 22 small cattle per household among the households in the sample engaged in animal husbandry. 6 of the 77 households in the sample are engaged in cattle breeding. Therefore, there are total of 19 small cattle and 3 cattle per household among those engaged in cattle breeding. The number of households engaged in poultry farming is 14 and the number of poultry is 188 in total, with an average of 13 animals per household. On the other hand, total of 52 beehives were identified and there are 13 beehives per household.

Table 4-74: Average Number of Livestock Ownership in Households in the Sample

Livestock Ownership	Number
Bovine Animal	111
Number of Households	22
Average number of bovine/household	5.04
Small Cattle	19
Number of Households	6
Average number of cattle/household	3.2
Poultry	188
Number of Households	14

Livestock Ownership	Number
Average number of poultry/household	13.4
Beehives	52
Number of Households	4
Average number of beehives/household	13

Source: SIA Field Study, Socio-Economic Household Survey, 2020

It is seen that the production is mostly made for household consumption in other livestock products (milk, cheese, eggs, butter, eggs) except honey (Table 4-75). While 47% of the households stated that they consume the milk produced at home, 31% stated that they sold it in the public market and 21% to the merchant / factory. Cheese production is 31% for the market while butter production is 40% for the market. Egg production is mostly made for household consumption (71%). Honey production is 75% for the market, 25% for household consumption and it is observed that most of the honey production is for income.

Table 4-75: Purposes of Livestock Production among Households in the Sample

Livestock product	Purpose	N	(%)
Milk	Household consumption	9	47.4
	Sold at public market	6	31.6
	Sold to merchants/factories	4	21.1
	Total	19	100.0
Cheese	Household consumption	9	69.2
	Sold at public market	1	7.7
	Sold to merchants/factories	3	23.1
	Total	13	100.0
Butter	Household consumption	6	60.0
	Sold at public market	1	10.0
	Sold to merchants/factories	3	30.0
	Total	10	100.0
Egg	Household consumption	10	71.4
	Sold at public market	1	7.1
	Sold to merchants/factories	3	21.4
	Total	14	100.0

Livestock product	Purpose	N	(%)
Honey	Household consumption	1	25.0
	Sold at public market	3	75.0
	Sold to merchants/factories	-	-
	Total	4	100.0

Source: SIA Field Study, Socio-Economic Household Survey, 2020

4.8.18. Forestry

Besides agricultural activities and animal husbandry, livelihood activities related to forestry are also carried out in some of the settlements which are close to forest areas. While forest areas are not used in Derecikören village, Sefercik and Öteyüz districts, forestry activities are carried out in Sazköy, Aşağıihsaniye and Gökçeler villages. Income generating or income supporting activities related to forestry includes activities such as forestry works, obtaining firewood, collecting and selling products and grazing animals.

Forestry works are carried out in Sazköy, which is very close to the forest areas, and generally, people coming from the outside during the summer months are worked in forestry by the tender of the Forestry Operation Directorate.

Apart from forestry works, firewood is also collected from the forest areas by many people. Among the income generating commercial activities in Sazköy, bay leaf collection and sale is quite common. With a traditional activity called “bay exile”, bay leaves are collected from the trees in forest areas and sold to traders.

In the village of Aşağıihsaniye, which is also close to the forest areas, forestry work is carried out by approximately 12-13 households. Firewood collection and animal grazing is also common in forest areas as the village has no pasture land. Products such as bay leaf, mushroom, chestnut, linden are collected and sold to traders or markets in the village, where product harvesting from the forest is also common.

Forestry is not very common in Gökçeler village, but forest area is used for collecting firewood. It has also been learned that products such as mushrooms and chestnuts are collected and sold in markets in case of excess.

While 75% of the households in the sample stated that their village is close to the forest, 49% out of total do not use the forest areas (

Table 4-76). While 30% of the households use the forest to collect firewood, 13% of the households collect mushrooms / herbs / spices etc. for their household consumption. There are only 3 households collecting products from the forest and selling to the market, but this small number may be a result of the representation of settlements that do not use the forest lands in the sample.

Table 4-76: Forest Land Use in the Households in the Sample

Forest Land Use	N	(%)
Collecting firewood	23	29.9
Collecting mushrooms / herbs / spices etc. for the household consumption	10	13.0
Collecting mushrooms / herbs / spices etc. for market selling	3	3.9
Working as forestry worker	1	1.3
Grazing animals	2	2.6
Not used	38	49.3
Total	**77**	**100.0**

Source: SIA Field Study, Socio-Economic Household Survey, 2020

4.8.19. Industry and Local Businesses

Industrial activities in Çaycuma district started towards the end of 1940s. Filyos Fire Brick Factory, whose foundation was laid in 1945 as a state institution in the town of Filyos and started trial production in 1949, has made this town the most important settlement unit of the district for a long time. "Brick Blends", produced with manpower in the 1940-1950s in Çaycuma district center, have turned into small scale Brick and Tile Factories in the following years. By the 1960s; there are sawmills, water mills, small oil factories, a yoghurt factory in the region. Yurtbay Brick and Çaycuma Dairy factories have grown up to date.[32]

In Çaycuma, in the early 1960s, there was only a small Turning Workshop and a few small auto body shops and repairers for the small industry. The movement of the small industry and the opening of new turning shops were realized with the start of SEKA constructions. The opening of engine renewal workshops is much later.

In those years, Bartın-Ankara road was passing through Istasyon district and repairers were located on this road. With the increasing number of repairers, the construction of the Small Industrial Site started in the 1980s on the land between the new Ankara road and Filyos Stream. A new industrial site with the name of Yesil Caycuma is added to this small industrial site which has 212 offices. Nowadays, Çaycuma Small Industrial Site is an important center for all kinds of manufacturing and repairs.

SEKA Paper and Pulp Factory, whose foundation was laid in 1965 and put into service in 1969, played an important role in the development and population increase of Çaycuma. As a result, Çaycuma left Filyos behind in terms of population in 1970, the population of the center exceeded 10,000 in 1985, and now its population has exceeded 90,000 with the effect of the development in industry, commerce and service sectors and the transformation of nearby villages into neighborhoods. Industry has an important place among the economic activities in the district. According to 2014 data, 42.4% of the active population is employed in the industrial sector.

[32] Çaycuma Municipality, 2014-2019 Strategic Plan, p. 26

The most important industrial establishment of Çaycuma is the SEKA Çaycuma Paper Factory, which was established as the third largest paper factory of Turkey. It was one of the first basic industrial facilities of the planned period with the establishment of the SPO (State Planning Organization) in 1963 after the 1960 conflict. It has been made to produce high strength corrugated cardboard, wrapping-pouched paper and cellulose by making use of pine, beech and fir forests of the Western Black Sea Region. The SEKA Paper Factory, which plays a major role in the industrial development of Çaycuma and transforms the district center into a typical industrial city, has also caused major transformations in the social life of the city.

Industrial facilities established in parallel with the industrialization movement in the country and employing approximately 6,000 people also lead to the development of service branches that will meet the needs of the increasing population. Large factories established in the Organized Industrial Zone in the 1990s with the effect of declaring the region as a priority region in development further increase sectoral diversity. Besides GURSAN which is in the Turkey's top 500 companies, there are around 50 factories involved in OIZ producing cleaning paper, textiles, furniture, etc. Çaycuma, which was a small agriculture-service settlement in the past, has become an industry-service city depending on the developments in industry and services.

Recently, organic farming has been carried out on the lands leased from the Treasury by the former landowners in the productive areas expropriated by the Filyos Stream for the Free Zone.

The local economy, which was limited to the mining and paper sector due to the policies pursued until the 1980s, entered the process of opening out with the economic policies implemented in the 1980s. This process has been extremely painful for the region, Ereğli Coal Company (After 1983, Turkey Hard Coal Authority) as the region's most important employment source rapidly liquidated and employment volume of about 60,000 has been reduced up to 10 thousand.

One of the important thresholds for the development of the local economy is the establishment of the Association of Tradesmen and Craftsmen and the Credit Guarantee Cooperative in 1967. The Motor Carriers Transport Cooperative, which has more than 150 partners to carry the raw materials and finished goods of the paper factory, was established in 1970. Çaycuma Chamber of Commerce Industry (ÇTSO) was established in 1984. ÇTSO has been the owner, follower and practitioner of the region's important economic projects for a while, mainly Çaycuma Organized Industrial Zone (ÇAYORSAN), airport, university etc.

4.8.20. Organized Industrial Zone (OIZ) and Small Industrial Sites (SIS) Status in Affected District Centers

Çaycuma Organized Industrial Zone, with a total area of 125 hectares, is located in the middle of the provinces of Zonguldak, Bartın and Karabük. It is very close to transportation routes. Ereğli and Karabük Iron and Steel Factories are 80 kilometers away from the planned Filyos Industrial Zone and Filyos Port. It consists of 64 industrial parcels. In Çaycuma Organized Industrial Zone, there is no problem in terms of infrastructure and full service is provided to all investors. Establishment on a flat land, provision of water, electricity, natural gas, wastewater line, drainage and telephone and support services within the boundary of the region make the region a preferred reason for new investments[33].

[33] Çaycuma Municipality, 2014-2019 Strategic Plan, p. 29

In ÇAYORSAN, the sector density is at the facilities belonging to the apparel, furniture, packaging, food and machinery sectors, respectively. Other sectors include cleaning paper, glass, building materials and steel doors. There are 37 companies producing in total and 2,624 people are employed[34].

Filyos Port and Filyos Valley Project

Filyos Valley Project is an integrated project planned with Filyos Free Zone, Filyos Industrial Zone, Filyos Port, flood protection structures, industrial infrastructure and strong transportation connections. The Filyos Free Zone and the Filyos Industrial Zone, which are included in the scope of the project, will be active, primarily through the realization of other major projects in the region, the rehabilitation of the Filyos River and the Filyos Port Project. Currently, it is known that approximately 390 hectares of the expropriated area of 632 hectares in Filyos are in a position to open up to industry. In addition to developing the Zonguldak, Bartın and Karabük provinces with the Filyos Valley Project, it is aimed to bring an area of 32 square kilometers to the industry with the improvement of the Filyos River[35].

Within the scope of the Filyos Valley Project, a kilometer wide belt was declared as Free zone and an Industrial zone between the Black Sea delta in the north and Gökçebey in the south and Turkey's largest port is planned in the delta part of this belt. With the decision numbered 94/5377 published in the Official Gazette, dated 05.04.1994, the Ministry of Public Works and Settlement for the determination of the location and borders of the Filyos Free Zone in the location where the Filyos River is located and for the construction of a breeding channel in the river bed, and the Ministry of National Real Estate General Directorate for the urgent expropriation of the immovable properties has been assigned.

The area declared as Industrial Area is approximately 607 hectares. Considering 124 hectares of gravel and forest area, approximately 113 hectares of wetland and reed area, the estimated size that can be planned as an industrial area is 370 hectares. Expropriation on behalf of the Industrial zone has been completed in 1998. The northern border of the declared Industrial Zone is the Black Sea, the southern border is the free zone, the western border is the railway line and the eastern border is settlements and forest areas. There are Sazköy settlement approximately 250 meters east, Derecikören Village 300 meters south, Gökçeler village 200 meters southwest, Sefercik neighborhood 100 meters west, and Hisarönü (Filyos) Town 4 km west.

Filyos Port, which is one of the most important parts of the Filyos Valley Project and capable of providing regional development, will be constructed with a capacity of 25 million tons / year, 5 million tons / year in the first phase and 20 million tons / year in the second phase. Domestic and international (especially Black Sea countries) connections and export / import of Filyos Investment Basin will be provided through Filyos Port. In this regard, Filyos Port completes the investments that will come to the region and it is envisaged to be implemented in parallel with the free zone and the industrial zone.

It is expected that the Filyos region will become a seaport with the realization of the Filyos Port and there will be significant changes in the socio-economic structure of region. With the realization of the Filyos Free zone and the Industrial zone, Filyos and its surrounding settlements will have sub-center reinforcements. Together with the realization of Free zone and Industrial zone investments and Zonguldak Airport's becoming more active; the semi-

[34] Provincial Planning and Coordination Directorate (2015)

[35] Çetinkaya, M. "Filyos Valley Project", p.2

rural texture and image of the region is expected to turn into urban texture and structure. The free zone and industrial zone to be established in Filyos Valley, Zonguldak Airport and strong transportation connections in the region along with Filyos Port will trigger the arrival of many private sector investments in the region, and the project will have an effect that crosses the boundaries of Çaycuma; it is thought that it will reduce the unemployment and migration rate in the planned region[36].

As the TR81 Level 2 Region (Zonguldak, Karabük, Bartın) is a region with high unemployment and migration, the Filyos Valley Project can be of great importance in terms of minimizing these problems and entering the economic development process and regional development. This project is considered as a mega project due to the port, OIZ, free zone, industrial zone, HEPP, dam for irrigation purposes, and the number of lands intended for agriculture and industry, and it is envisaged that more than 40.000 unemployed people in the region can be employed directly or indirectly in the Project.

4.8.21. Infrastructure Services

Information on the infrastructure possibilities of the settlements in the study area was received from Mukhtars interviewed during the field study. Electricity infrastructure is available in all the settlements examined; interruptions have been reported only in Derecikören village due to the old lines. Wood and coal are used in all settlements for heating.

In the Sefercik neighborhood, the sewerage network is available throughout the settlement, and it has been learned that the network is mostly available in other settlements except the Aşağıihsaniye settlement. There is no sewerage network in Aşağıihsaniye and households use septic tanks.

Drinking water quality has been reported as polluted in all settlements except Derecikören. While the treatment system is generally used in the neighborhoods of Filyos, spring water sources are used in rural settlements. Road conditions are good in all settlements, there is no transportation problem. Telecommunications and internet infrastructure are available in all settlements, while some may be inadequate.

Table 4-77: Infrastructure Status in Settlements in the Study Area

Settlement	Sewerage Network	Electricity infrastructure	Drinking Water Quality	Road Conditions	Telecommunications and Internet Infastructure
Filyos-Öteyuz	Network is available, no problem	Available, no problem	Bad quality, treatment system is used	Smooth, asphalt	Available, no problem
Filyos-Sefercik	Network is available, no problem	Available, no problem	Bad quality, treatment system is used	Smooth, asphalt	Available, but not sufficient
Sazköy	Network is available for 70% of	Available, no problem	Bad quality, spring water	Smooth, asphalt	Available, no problem

[36] Çetinkaya, M. "Filyos Valley Project", p.31

Settlement	Sewerage Network	Electricity infrastructure	Drinking Water Quality	Road Conditions	Telecommunications and Internet Infastructure
	settlement, others use septic tanks		sources are used		
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
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
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

Source: SIA Field Study, Mukhtar Interviews, 2020

4.8.22. Education Services

The educational services are not available in the settlements other than Öteyüz Quarter. In these settlements where primary and secondary schools are not available, education with transportation support is provided by Ministry of Education. There is a high school only in Öteyüz District, because of its location in the town center of Filyos, and it has approximately 150-200 students. Information on educational services in the settlements, number of students benefiting from transport education and distance to the nearest school are given in Table 4-78.

Table 4-78: Educational Services in Settlements in the Study Area

Settlement	Primary school	Secondary school	High school	Education with transportation support provided by Government	Transport Location	Distance
Filyos-Öteyuz	×	×	✓	-	-	-
Filyos-Sefercik	×	×	×	6	Filyos centre	2 km
Sazköy	×	×	×	15	Saltukova / Çaycuma	9.8 km / 23 km
Aşağıihsaniye	×	×	×	25	Saltukova	6.5 km

Settlement	Primary school	Secondary school	High school	Education with transportation support provided by Government	Transport Location	Distance
Derecikören	×	×	×	45	Filyos centre	6.2 km
Gökçeler	×	×	×	10	Filyos centre	5 km

Source: SIA Field Study, Mukhtar Interviews, 2020

4.8.23. Health Services

None of the settlements within the study area has a health center. Although family doctors visit at regular intervals, people in settlements generally prefer to use health centers in the districts. Distances of the settlements to the nearest health center are given in Table 4-79 .

Table 4-79: Health Services in Settlements in the Study Area

Settlement	Health Center	Family Doctor	Nearest Health Center
Filyos-Öteyuz	✓	Available all time	-
Filyos-Sefercik	×	Once in a week	2 km
Sazköy	×	Once in every two weeks	10 km
Aşağıihsaniye	×	Once in every two weeks	6.5 km
Derecikören	×	Once in a week	5 km
Gökçeler	×	Once in a week	5 km

Source: SIA Field Study, Mukhtar Interviews, 2020

4.8.24. Social Relations and Community Tension

There was no response/react observed in related with the Project during the field studies. Due to the prevalence of mining sector in the region, socio-cultural life was marked by alternating mining work and the fact that men were severed from agriculture, women labor came to the fore in agricultural activities. Until recently, the way to survive and guarantee its future for the local people was to enter a state business, especially mining, to be “insured”. One of the most important effects that mining has brought to Çaycuma from the past to the present has been to prevent and delay the development of settlement urbanization by blocking the industrialization. Today, mostly retired people live in the Filyos town and rural settlements, the young population leaves the region due to the lack of job opportunities and the reduction of agriculture-animal husbandry. The Filyos Valley Project creates expecations for employment by the people of the region, so many local people supports the implementation of the project. Loss of agricultural lands and pastures due to expropriations made in the past caused a significant decline in agriculture and animal

husbandry as a source of livelihood. For this reason, the local people are waiting for the Filyos Valley Project to create employment opportunities and investments that will enable the young population to stay in the region. During the interviews with Mukhtars, it was learned that there are currently employed local people in the construction of the port and as the employment opportunities are opened, the young population starts to return to the region.

4.8.25. Vulnerable Groups

Vulnerable groups that may be affected by the Project and which may be disadvantageous compared to other people / groups are defined in the following categories;

- Very poor households receiving in-kind / cash support from the Social Assistance and Support Foundation
- Physically or mentally disabled persons
- Households that do not own land but use other land in the village (with or without paying rent)
- Households using public lands such as treasury land, village legal entity, pasture, forest
- Elderly people over 65 years old who need care
- People whose land was affected by other infrastructure or investment projects (highway, railway, oil or gas pipelines etc.) in the region and whose lands will be affected again within the scope of this Project

The presence of these vulnerable groups was questioned during interviews with Mukhtars at the settlements (Table 4-80). Accordingly, it was learned that there is no household in the category defined as “landless”, which does not own land and uses other private lands. Households that use public lands are especially common in the village of Aşağıihsaniye. However, it was learned that not all of these people are locals, but also from outside who reside in nearby urban settlements and rents the public lands from Directorate General of National Estate to perform agricultural activity as a subsidiary income.

The approximate number of households whose land was previously expropriated by other projects and will be expropriated within the scope of this project again is received by Mukhtars in Sazköy and Aşağıihsaniye. The number of households in this situation could not be taken clearly in other settlements. However, most of the lands of local people have already been expropriated due to the expropriation of the area previously declared as Industrial Zone, Therefore, the ownership of the land has decreased and the number of households whose land will be expropriated to the second one is not expected to be higher accordingly. Land acquisition and resettlement impacts of the Project will be covered in more detail in RAP document.

Table 4-80: Vulnerable Groups in Settlements in the Study Area

Settlement	The households receiving the assistance of the Social Assistance and Support Foundation	Physicall y / Mentally Disabled (person)	Households that do not own land but use other land in the village (with or without paying rent)	Households using public lands	Elderly people over 65 years old who need care (person)	The household whose lands were expropriated by other projects, and will be subject to expropriation again under this Project
Filyos-Öteyuz	15	10	-	-	-	INA[37]
Filyos-Sefercik	2	2	-	-	-	INA
Sazköy	3	7	-	4	-	3
Aşağıihsaniye	4	1	-	13	1	2
Derecikören	3	5	-	3	-	INA
Gökçeler	2	3	-	3	-	INA

Source: SIA Field Study, Mukhtar Interviews, 2020

Vulnerable households / persons affected by the project will be defined in more detail with the studies to be carried out for Resettlement Action Plan (RAP) that will be developed and implemented within the scope of the Project.

4.9. Labor and Working Conditions

Ministry of Transport and Infrastructure in Turkey has the following principles and duties according to the Presidential Decree No. 1 on the Presidential Organization[38]:

- National policy, in coordination with relevant institutions and organizations, in the fields of development, establishment and operation of Canal Istanbul and similar waterway projects that combine the transportation, maritime, communication and postal works and services between the Black Sea and the Marmara Sea and enable the navigation of the ships. Carrying out studies to determine the strategies and targets and implementing the targets,
- To plan, establish, install, operate and develop infrastructure, networks, systems and services related to transport and maritime business and services in accordance with commercial, economic and social needs, technical developments,
- To ensure that transportation, maritime, communication and postal works and services are offered in a free, fair and sustainable competitive environment in an economic, serial, convenient, safe, high quality environment with minimum environmental impact and in a manner that takes care of the public interest,
- To carry out the necessary studies for the determination of universal service policies in accordance with the social, cultural, economic and technological conditions of the

[37] Information not available (The exact number could not be obtained during Mukhtar interviews as they did not clearly know whose lands would be expropriated second time. This situation will be examined in detail in the RAP.)

[38] ULAŞTIRMA VE ALTYAPI BAKANLIĞI (2019) 2018 Yılı Faaliyet Raporu, https://www.uab.gov.tr/uploads/pages/butce-raporlari/2018-idare-faaliyet-raporu.pdf

country within the provisions of the relevant laws, to determine the principles that will ensure the universal service, and to follow its implementation,

- To determine the procedures and principles regarding the scope and execution of e-Government services by providing necessary cooperation and coordination with the relevant public institutions and organizations, to make action plans for these services, to carry out coordination and monitoring activities, to make the necessary arrangements and to coordinate the related activities in this context within the framework of information society policies, goals and strategies;,
- To carry out international relations required by transportation, maritime, communication, postal works and services, to make agreements and to ensure legislative harmonization in these fields if required by international legislation,
- To perform other duties assigned by laws or Presidential decrees.

The Ministry fulfills these functions through a number of service units. These units are:

- General Directorate of Highway Regulation
- General Directorate of Railway Regulation
- General Directorate of Sea and Inland Water Regulation
- General Directorate of Dangerous Goods and Combined Transport Regulation
- General Directorate of Maritime Trade
- General Directorate of Shipyards and Coastal Structures
- General Directorate of Communication
- General Directorate of Infrastructure Investments
- General Directorate of European Union and Foreign Relations
- Audit Services Department
- Strategy Development Department
- Transportation, Maritime and Communication Research Center Department
- Revolving Fund Management Department
- Personnel and Education Department
- IT Department
- Support Services Department
- Press and Public Relations Consultancy
- Private secretariat
- Internal Audit Department

The organizational structure of the central and provincial organization of the Ministry, which is headquartered in Ankara, is as shown in Figure 4-50.

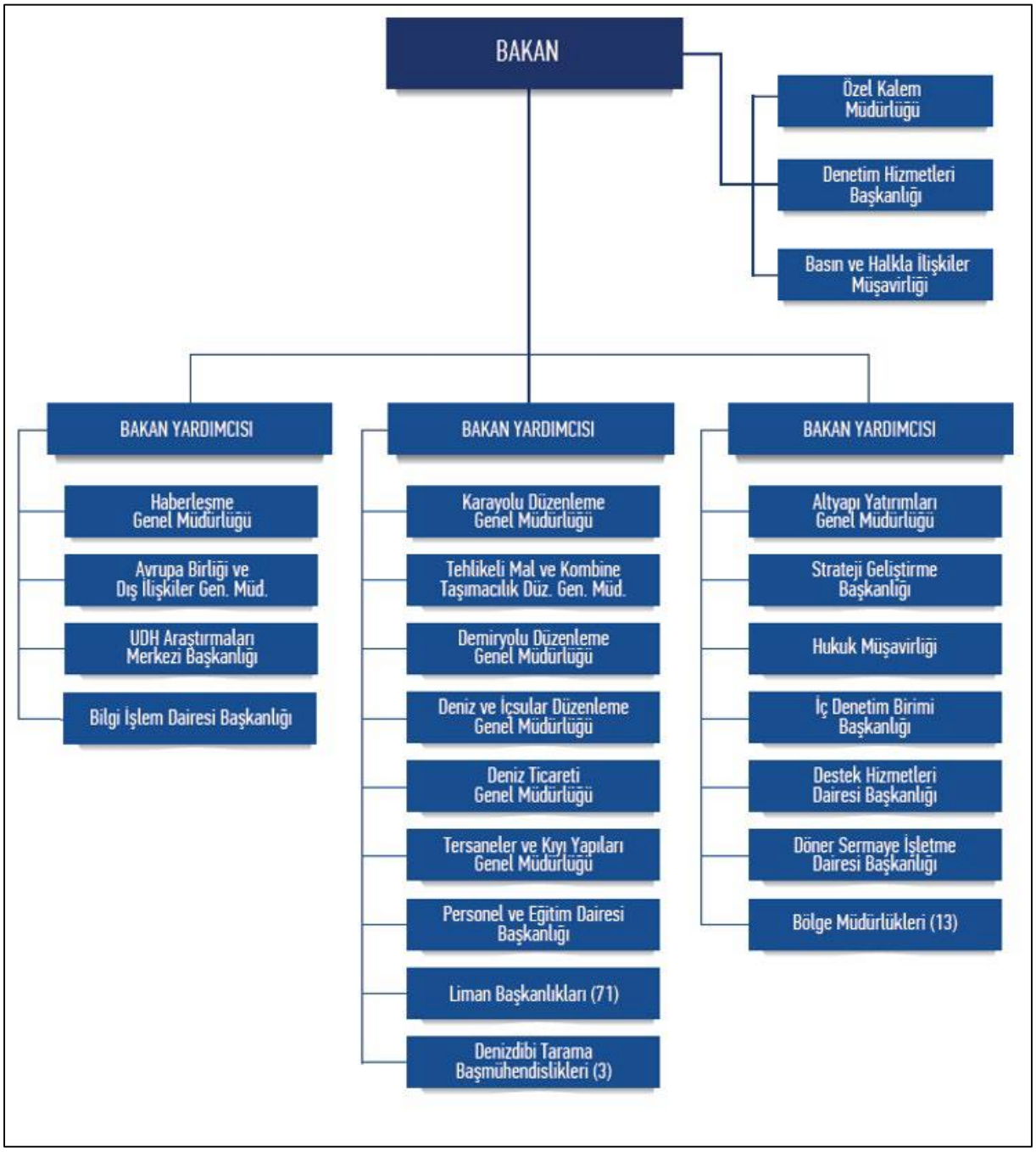

Figure 4-50: Organization Chart of the Ministry of Transport and Infrastructure

Activities within the scope of this project are carried out by the General Directorate of Infrastructure Investments.

As of the beginning of 2019, 4,020 people are employed in the central and provincial organizations of the Ministry. Employment location and gender distribution of employees are presented in the table below.

Table 4-81: Employment type and gender distribution of the Ministry Personnel

	Central		Provincial		Total	
	Female	Male	Female	Male	Female	Male
Civil servant	421	991	297	1257	718	2248
Worker	90	209	161	594	251	803
Total	511	1,200	458	1,851	969	3,051
Total	1,711		2,309		4,020	

Source: Ministry of Transport and Infrastructure, 2018 Annual Report, 2019

The distribution of civil servants by service class is concentrated in the field of General Administrative Services and Technical Services (Figure 4-51).

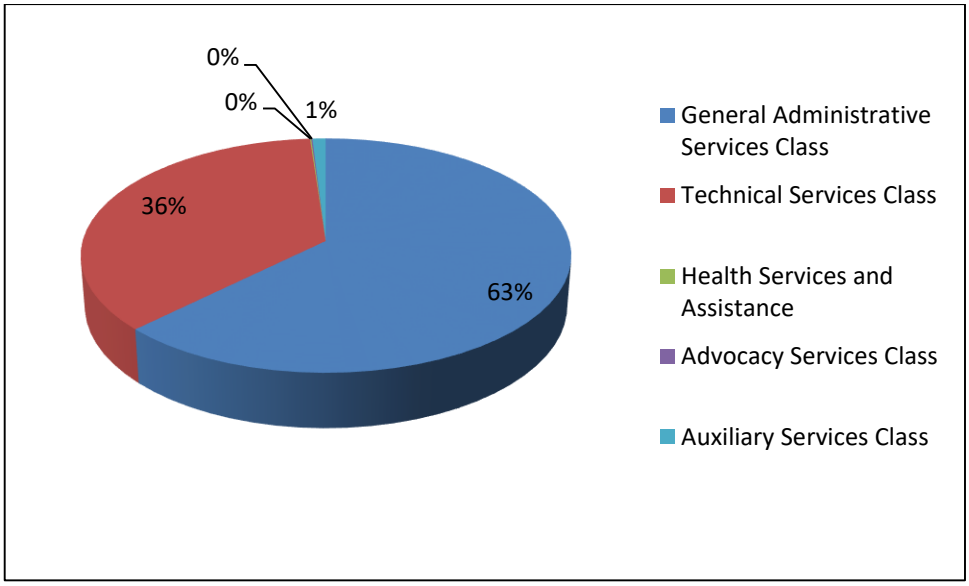

Figure 4-51: Distribution of Civil Servants by Service Class

In 2018, the personnel expenses allocated by the Ministry are 180,194,318 TL, and the Social Security payment is 36,491,922 TL. Employment pay rules are based on the Civil Servants Law No. 657 and Social Insurance and General Health Insurance Law No. 5510.

The amount allocated for personnel payments under the Budget Law specifically for GDII was 22,690,200 TL in 2018. The amount of Social Security payments was recorded as 4,440,661 TL.

Terms and conditions applied to GDII personnel are specified in the Civil Servants Law No. 657. The law will especially apply to GDII employees (direct employees) who are assigned to work on the project. Working hours for direct employees with GDII staff are 40 per week. Overtime work is limited to 270 hours a year. Each overtime pay is paid one and a half times the normal hourly rate.

The draft Labor Management Plan (LMP) will set terms and conditions for contracted workers. These terms and conditions will be, in a minimum, compliant with the national Labor Law and WB standards.

The exact number of project employees to be assigned in relation to the project is not yet known. The number of workers will be employed during the construction phase are estimated based on experience from similar projects carried out in Turkey and worldwide. Expected labor employment of Çukurova Region and Iskenderun Bay Railway Connections and Filyos Port/Industrial Zone Connections projects are the same and estimated to be around 260-340 people. . The peak of the number of workers in a construction site is expected to be at most 180 people. According to the LMP, the construction teams that will carry out the basic construction works are as follows:

Table 4-82: Teams to perform basic jobs and estimated workers

Activity	Number of team	Number of workers in a team
Earthworks team (cutting and filling and loading and compact)	2	It is estimated that about 30 to 40 workers will be employed in each team.
Superstructure and electromechanical team	3	It is estimated that 50-60 workers will be employed in each team and 10-20 employees in one-road superstructure.
Construction (station) team	3	It is estimated that about 30 to 40 workers will be employed in each team.
Maintenance and repair team	3	Approximately 5 people will be employed in each team to protect and repair areas as soon as possible after the previous team's work is completed.

Source: Employment and Training Plan(Draft), 2019

Approximately 30% of the workers will be unskilled workers. The remaining staff consists of managers, engineers, foremen, technicians and technical experts. While expecting for the majority of unskilled workers from the local community, other workers from other parts of Turkey.

Direct employees of the project are GDII personnel. Contracted employees will be people who will be employed in the services that are being taken and especially during the construction phase. These employees are expected to include Community Workers. An employment approach that prioritizes the local workforce will be adopted, as presented in the LMP:

- For earthworks: It is estimated that most or all workers will come from local and regional workforce.
- For superstructure and electromechanical work: Most or all workers are expected to be from local and regional workforce.
- For construction (station) works: Most or all workers are expected to be from local and regional workforce.
- In the Draft LMP, it is stated that the estimated local employment will be 60%.

4.9.1. Child Labor

The minimum working age in Turkey is 15. Regulations on civil servants and workers' labor laws do not allow child labor. People under 18 will be prohibited to work in construction as defined in Project’s LMP document.

4.9.1. Unregistered/Uninsured Employment

Regulations on civil servants and workers' labor laws do not allow precarious informal employment.

4.9.2. Discrimination

The goals of the Ministry of Transport and Infrastructure are to implement policies aimed at increasing the participation of groups requiring special policies, especially women and the disabled, in the workforce and employment.

Some improvements provided to public employees in Turkey in recent years for will be beneficial in preventing discrimination:

- Establishment of a Public Personnel Advisory Board, which allows consultation on general issues concerning public personnel,
- To increase the compulsory employment rate of disabled people in public institutions,
- Banning the night duty for pregnant personnel, increasing the free maternity leave period and ensuring that male personnel also benefit from this right,
- The introduction of paid companionship permits for civil servants to accompany their relatives in need of treatment may be an example of this positive trend (State Personnel Presidency)[39].

4.9.3. Right of Association

Steps have been taken in recent years about the association of civil servants in Turkey. Developments in favor of civil servants are as follows:

- Expanding the association and joining union members rights of civil servants, removing the year requirement to become a union founder, and pave the way for candidate civil servants to become union founders,
- Forgiveness of disciplinary offenses of civil servants and other public officials,
- Replacing the collective bargaining system without binding with collective bargaining system (State Personnel Presidency)[40].

4.10. Community Health and Safety

Baseline conditions regarding community health and safety, infrastructure services around the project area and management approach are explained in this section.

4.10.1. Existing Road Transport Network and Traffic Conditions

Change in the Length of highways in Turkey are given in Figure 4-52. As can be seen here, when the highway lengths between 1984-2018 are examined, an increase in the length of the State Roads, Provincial Roads and Highways is observed. In addition, divided road construction has increased between these years. A 4.5 km long highway is planned to be constructed within the scope of Filyos Port and Industrial Zone Connections Project. The project area is located within the jurisdiction of the Kastamonu 15th Regional Directorate of KGM.

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[39] Yıldız, Günay (2019) DEVLET MEMURLARI KANUNU: TÜRK KAMU PERSONEL REJİMİ İÇİN BİTMEYEN TARTIŞMA, Ufuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi Yıl:8 Sayı:15, https://www.ufuk.edu.tr/uploads/page/enstituler/sosyal-bilimler/ensdergi/say-15/18.-devlet-memurlar-kanunu-trk-kamu-personel-rejimi-in-bitmeyen-tartma.pdf

[40] Yıldız, Günay (2019) DEVLET MEMURLARI KANUNU: TÜRK KAMU PERSONEL REJİMİ İÇİN BİTMEYEN TARTIŞMA, Ufuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi Yıl:8 Sayı:15, https://www.ufuk.edu.tr/uploads/page/enstituler/sosyal-bilimler/ensdergi/say-15/18.-devlet-memurlar-kanunu-trk-kamu-personel-rejimi-in-bitmeyen-tartma.pdf

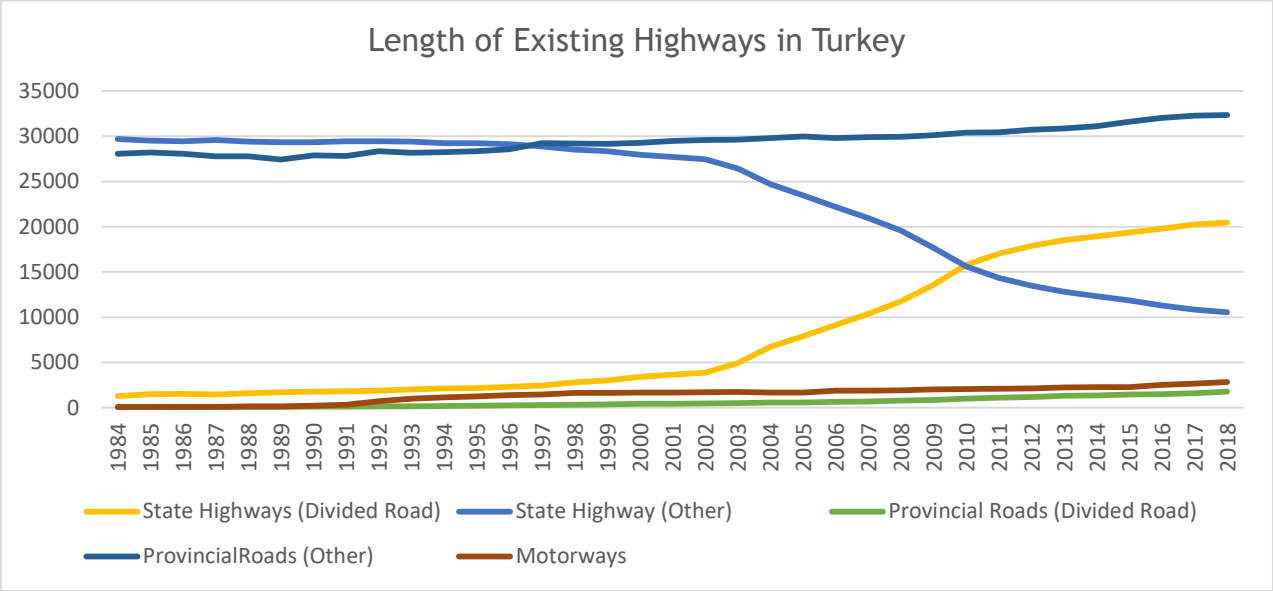

Figure 4-52: Change of Length of Existing Highways in Turkey

Source: TURKSTAT

4.10.2. Traffic Accident Statistics

Changes in the number of traffic accidents in Turkey for 2002 -2018 are shown in Figure 4-53.

While there is an increasing trend in the number of traffic accidents until 2012, there has been a decrease in 2013 and 2014. While an increase was observed again in 2015, 6.39% decrease was observed from this year until 2018.

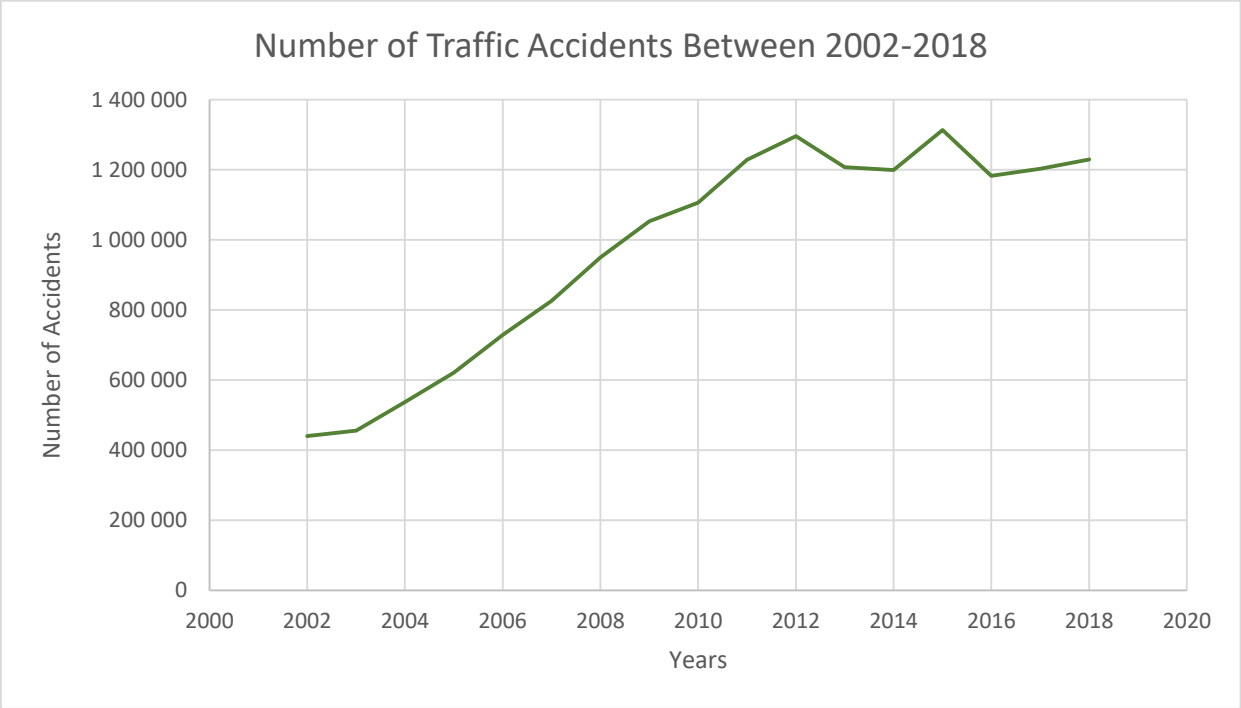

Figure 4-53: Change in the Number of Traffic Accidents

Source: TURKSTAT

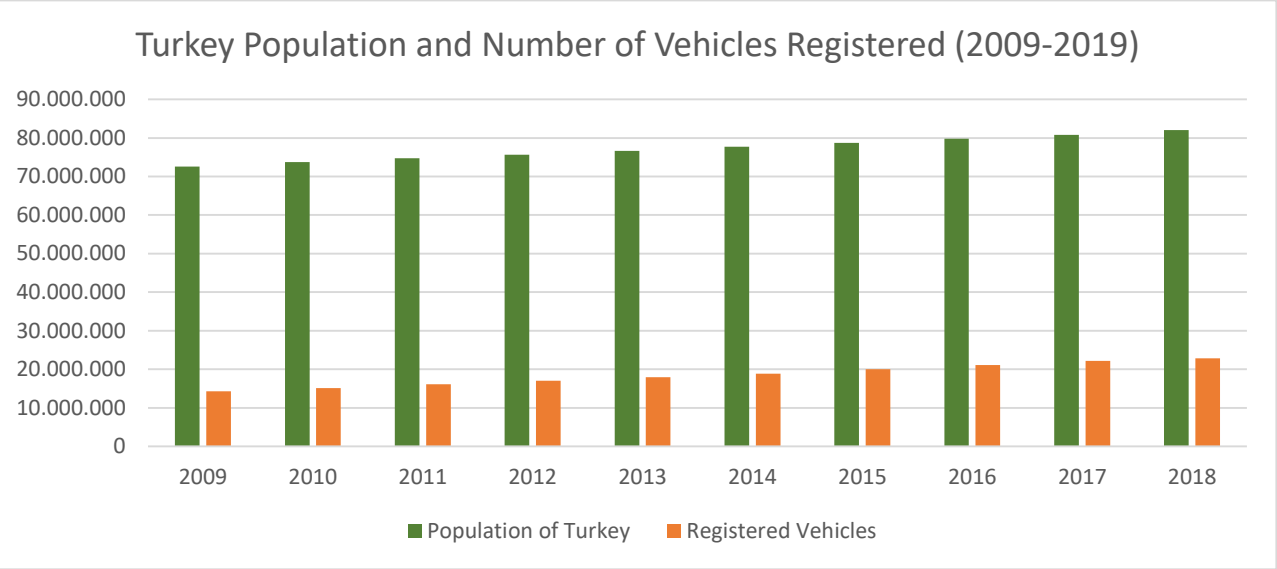

Figure 4-54: Turkey Population and Number of Vehicles Registered (2009-2019

Source: TURKSTAT

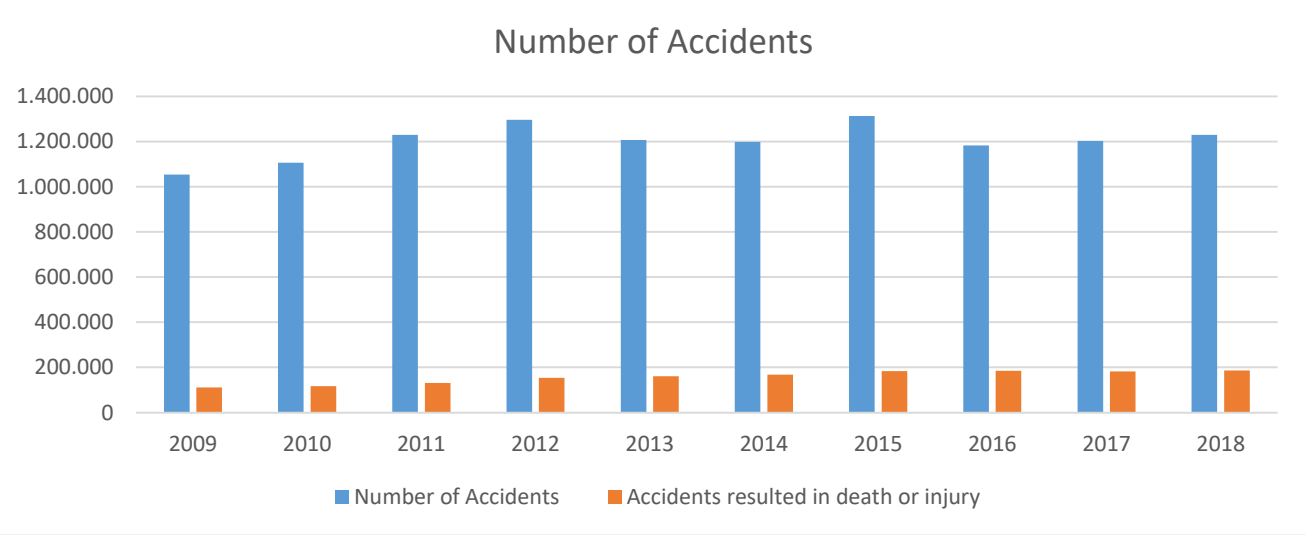

Figure 4-55: Number of Accidents in Turkey

Source: TURKSTAT

Figure 4-54 shows the change in Turkish population and number of vehicles registered between 2009-2018. Between those years, population of Turkey has increased by 13.01% while number of vehicles are increasing by 59.72%. In Figure 4-55 number of traffic accidents and number of accidents resulted in deaths or injury can be seen. When the rates of deaths or injuries resulting from traffic accidents are analyzed, it is observed that there is a slower increase compared to the number of registered vehicles and the population. This slower increase can be attributed to increased number of divided roads and highways built in accordance with national strategies.

Monthly traffic accident data for 2019 in Zonguldak province has been published monthly in Traffic Statistics Department Traffic Statistics Bulletins. Figure 4-56 shows monthly traffic accident statistics in Zonguldak for 2019. The total number of accidents in the province in 2019 was determined to be 2190.

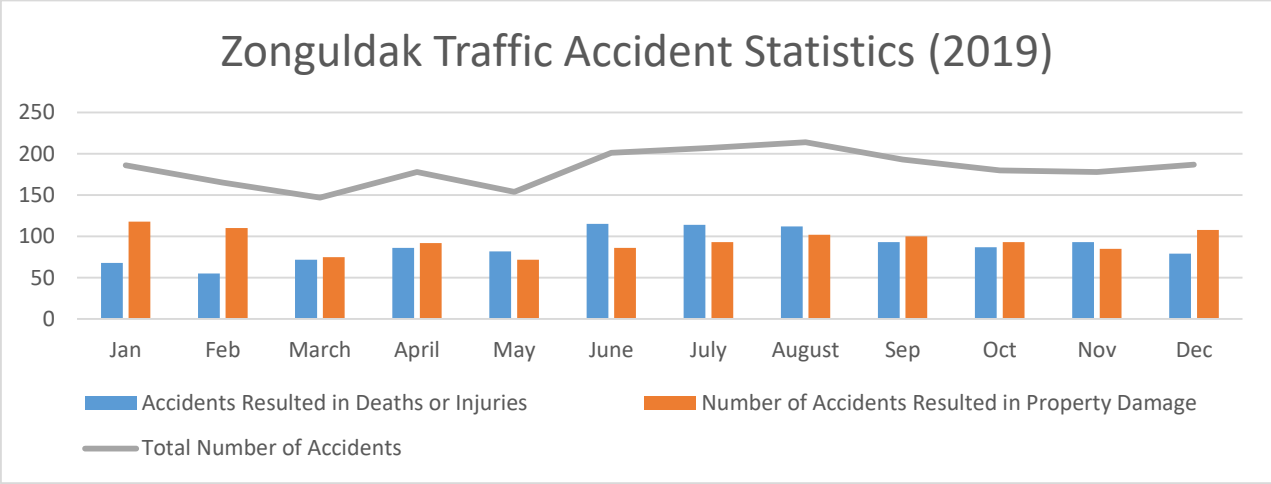

Figure 4-56: Change in the Number of Traffic Accidents in Zonguldak Province (2019)

Source: General Directorate of Security, Department of Traffic Services (trafik.gov.tr)

According to TURKSTAT data, the causes of traffic accidents that caused death or injury in 2018 are as follows:

- 89.6% due to drivers,
- 8.7% due to pedestrians,
- 0.8% due to road conditions,
- 0.5% due to vehicles, and
- 0.4% due to passengers.

The number of vehicles registered to traffic in Turkey increased 2.91% in 2018 compared to the previous year.

4.10.3. Forest Fires in the Regional and Local Fire Response Capacity

The project route passes through the nearby forest areas. The distribution of forest fires in Turkey are given in Figure 4-57. When evaluating for the Black Sea region, it is seen that fire incidents centered upon especially in the western regions.

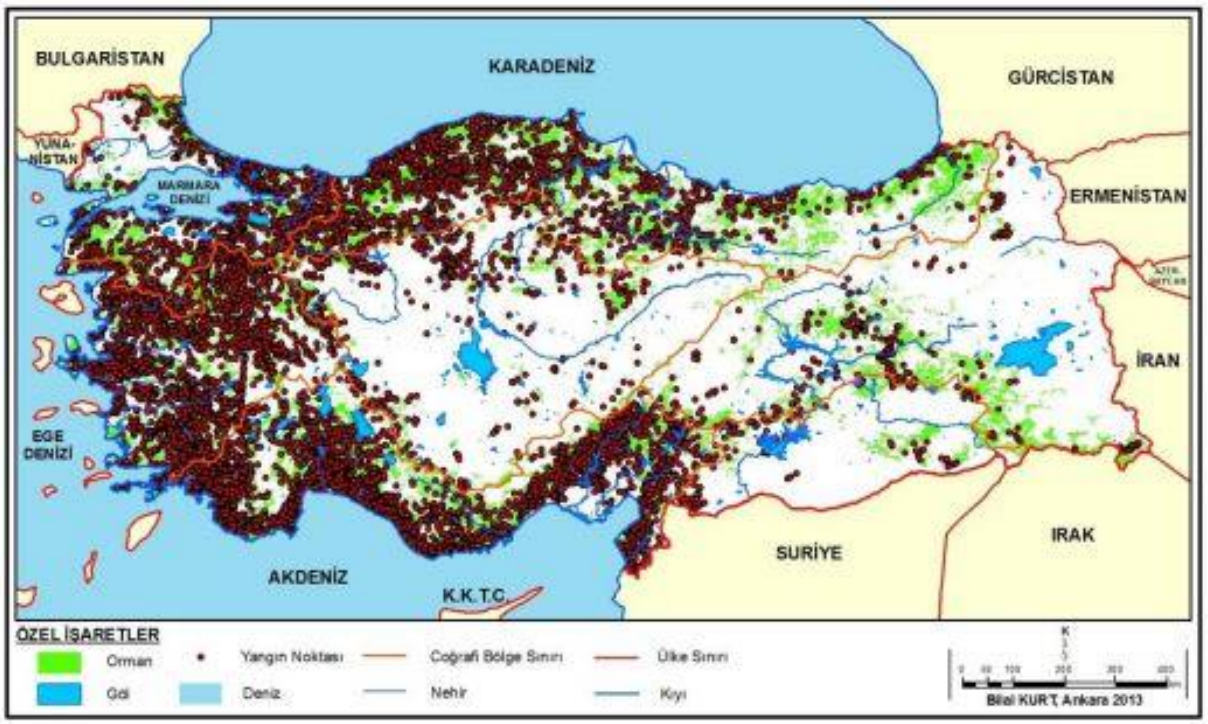

Figure 4-57: Distribution of Forest Fires in Turkey between the Years 2005 – 2010

Source: Kurt B (2014). Distribution of forest fire in Turkey. Geography of Ankara University Institute of Social Sciences (Geography of Turkey) Department, M.Sc., ANKARA

The number of forest fires and forests that are damaged between 2013-2018 in Zonguldak province are given in Figure 4-58. In 2015, both the number of forest fires and the area destroyed by fire increased compared to other years. In 2014 and 2018, number of forest fire incidents are lower compared to other years.

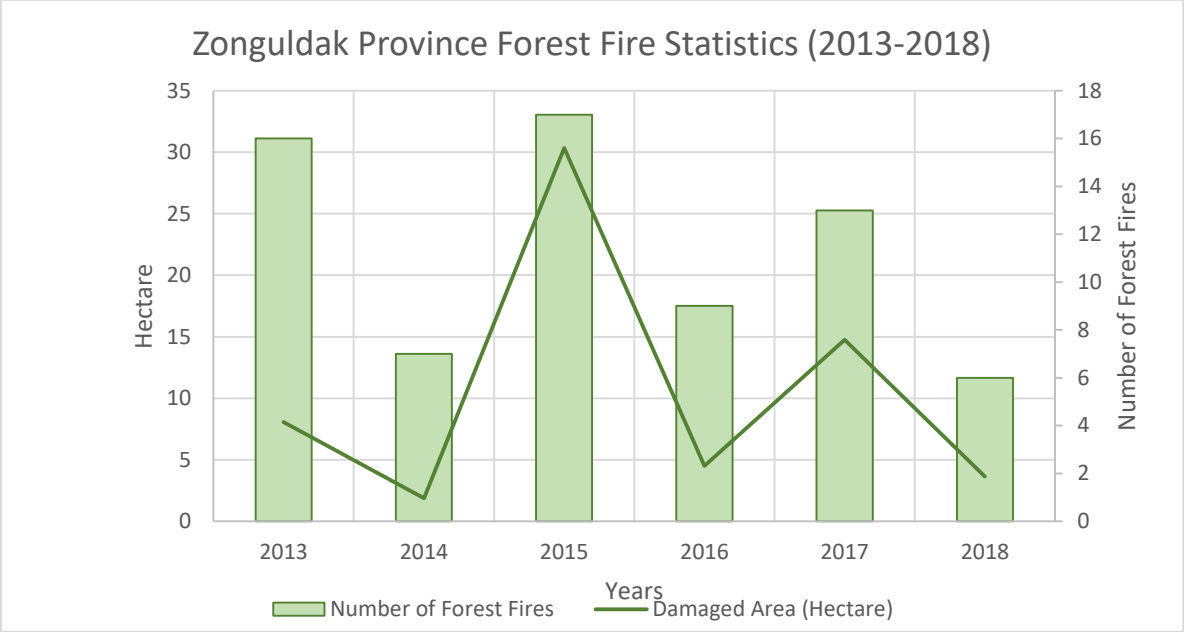

Figure 4-58: Zonguldak Province Forest Fire Statistics

Source: TURKSTAT

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.

5. ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS & MITIGATION MEASURES

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.

5.1. Methodology of Environmental and Social Impact Assessment

5.1.1. ESIA Process and Evaluation Approach

As of October 1, 2018, all investment projects financed by the World Bank are subject to the Bank's Environmental and Social Framework (ESF). The ESF ensures that the World Bank 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 are addressed comprehensively and systematically. The ESF has made significant progress, including extended roles for grievance mechanisms, on transparency, non-discrimination, public participation and accountability. The Environmental and Social Framework aligns the World Bank's environmental and social principles with that of other development agencies.

- The Environmental and Social Framework consists of the following directives:
- 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
- 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 Environmental and Social Framework, the Project is classified as “Substantial” in terms of environmental and social risk. Therefore, a detailed environmental and social impact assessment and environmental and social management plans given below should be prepared according to requirements of World Bank’s ESF and relevant laws ad requirements in force in Turkey.

- Environmental and Social Management Plan (ESMP)
- Community Health and Safety Management Plan
- Emergency Preparedness and Response Management Plan.
- Traffic Management Plan
- Biodiversity Management Plan
- Cultural Heritage Management Plan
- Stakeholder Engagement Plan
- Resettlement Action Plan (RAP)

5.1.2. ESIA Methodology

The methodology to be used for characterization of environmental and social impacts 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 UK; Highways Agency 205/08: Volume 11, Section 2 Environmental Impact Assessment and Handbook for Scoping Projects: Environmental Impact Assessment), Scottish Natural Heritage’s (SNH) Handbook on

Environmental Impact Assessment (2013) and other available guidance documents on impact assessment (Canter, 1993, Standards Association of Australia, 1999, etc.).

In accordance with good ESIA practice, 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 effect is determined by a comprehensive analysis of criteria which may encompass the following:

- Geographical extent (wide, local or restricted)
- Magnitude (high, medium or low; e.g. how much area, how many trees, level of emission or noise, etc.)
- 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)

Criteria for magnitude factors are provided in Table 5-1.

Table 5-1: 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
	Irreversible after 30 years of operation period or irreversible	Irreversible after 30 years of operation period or reversible	Irreversible after 2 years of construction period or reversible
Duration	Long-term	Medium-term	Short-term
	After 30 years of operation	Within 30 years of operation	Within 2 years of construction
Frequency	Continuous/Recurrent	Intermittent	One-off/rare

General criteria to be taken into consideration when determining sensitivity of the receptor and the overall magnitude are provided in Table 5-2, 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 5-2: 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 characteristics, features or elements	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	No or very low importance and rarity	No or very minor loss or detrimental alteration to one or more characteristics, features or elements	No or very minor benefit to or positive addition of one or more characteristics, features or elements

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 5-3.

Table 5-3: Significance Assessment Matrix

		Receptor Sensitivity			
Overall Magnitude		High	Medium	Low	Negligible
	High				
	Medium				
	Low				
	Negligible				
Major Importance		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 Importance		Impacts are not likely to be key decision-making factors. The cumulative impacts of such factors may influence decision-making, if they lead to an increase in the overall adverse effect on a particular receptor. If possible, impact significance are to be reduced to lower levels by taking mitigation measures; otherwise acceptance of associated risks is required for proceeding with the Project.			
Minor Importance		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.			

5.1.3. Area of Influence (AoI) and ESIA Working 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.

In consideration of the above definition of the AoI, it is required to conduct ESIA studies in areas that shall at least cover the AoI. Thus, the overall ESIA study area will be wide enough to cover the AoI for each environmental and social impact subject. For the Project, a study

corridor will be defined; for other separate Project facilities (quarries, borrow sites, etc.) specific study areas around those facilities will be considered. The overall ESIA study area will consist of at least 500 m of sub-study areas that will cover the direct physical impacts of railway and road and will be expanded as needed to cover effects that exceed this limit. Sub-study areas will be specific to every environmental and social issue considered in the ESIA study. Due to some environmental issues / components, potential impacts will be limited to the construction site of the Project. In such cases, land acquisition (land consolidation / expropriation) corridor will be considered.

5.1.4. Structure of ESIA Report

The general outlines of the ESIA Report covering the important environmental and social issues related to the Project for the Filyos Port/Industrial Zone Railway - Road Connections Project are presented below:

Chapter 1.	Introduction
Chapter 2.	Institutional and Legal Framework
Chapter 3.	Project Description
Chapter 4.	Baseline Conditions
Chapter 5.	Environmental and Social Risks and Impacts & Impact Mitigation Measures
Chapter 6.	Project Alternatives
Chapter 7.	Stakeholder Engagement
Chapter 8.	References

Figure 5-1: General Outline of the ESIA Report

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.

5.2. Land Use, Soils and Geology

5.2.1. Methodology and Project Standards

The importance of the land use and the impact of the project on soil and geology within the scope of the Project was evaluated in the context of the World Bank Environmental and Social Standards. In this context, taking into account the baseline characteristics evaluated in Section 4.1, the necessary measures have been defined in order to avoid, reduce and balance the significant effects by conducting studies in line with the mitigation hierarchy accepted for the ESIA studies.

The project construction area will cover approximately 52.86 hectares. According to the land asset data of the Ministry of Agriculture and Forestry, there are fallow-free dry agricultural areas, residential areas, forest areas and river floodplains on the railway route and the construction site. Accordingly, those activities to be carried out within the scope of the project will be governed by following laws and regulations:

- Agricultural Reform Law on Land Rearrangement in Irrıgated Areas (Law No: 3083)
- Law on Soil Conservation and Land Use (Law No: 5403)
- Regulation on Protection of Agricultural Lands and Land Consolidation
- Governing Regulation on Soil Conservation and Land Use
- Expropriation Law (Law No: 2942)
- Regulation on the Control of Soil Pollution and Lands Polluted by Point Sources

In the scope of the ESIA, the impacts on land use, soil and geology have been evaluated 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 Cadastre
- Geographical Information System (GIS)
- Public Database:
    - General Directorate of Mineral Research and Exploration (MTA)
    - General Directorate of Mineral Technical Exploration (MTA, Geological Sciences Portal),
    - Disaster and Emergency Management Presidency (Earthquake Research Department Database)
    - Disaster and Emergency Management Presidency (Natural Disasters Database).

Within the scope of the ESIA studies, the significance of the impacts was assessed based on the sensitivity of the receptors and the overall magnitude of the impact. The magnitude of the impact is determined using quantitative or, where this is not possible, qualitative methods based mainly on professional judgement.

In the determination of receptor sensitivity, public interest, legal conditions, admissibility, sustainability, etc. factors were evaluated. The overall magnitude of the impacts is based on a general assessment of the components below.

- Geographical extent (wide, local or restricted)
- Magnitude (high, medium or low);
- 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)

The impact assessment methodology formed within the scope of ESIA study is explained in detail in Chapter 5.1, impacts on Land Use, Soil and Geology are discussed under the section of Impact Significance, Mitigation Measures.

5.2.2. 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
- Construction of Access Roads
- Utility works
- Top soil stripping
- Cut and Fill Works
- Excavation works for highway connection
- Filyos Creek Construction Works
- Construction of Engineering Structures
- Highway Bridge Crossing
- Traffic signs, marking of track and guardrail
- Service areas, parking areas
- Construction of stations 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 and highway route components will begin with the stripping of the top soil, 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 Chapter 5.9. As mentioned in the Chapter 1, 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.

5.2.2.1. 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, pastures, 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

As stated in Chapter 3.1.2, most of the Project Area is expropriated under the "Filyos Valley" Project. Detailed information about the areas to be expropriated and expropriation works are presented in Chapter 4.8.

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 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 GDII or other related authorities.

Soil

In the scope of the Project, cut and fill works will be carried out in Gökçeler-Industry Railway Line (including Stations) and highway connection. The analysis was made based on the fact that the railway and highway routes were planned in parallel, and the most critical of two lines was selected in the analysis. The parameters selected for fill and cut in geotechnical evaluation were determined considering the “Earthquake Technical Regulation regarding Coastal and Harbor Structures, Railways and Airport Construction” published by the Ministry of Transport and Infrastructure in 2008 and “Turkey Building earthquake Regulation”-TBDY-2018.

Between KP-0 + 000 - KP-4 + 192 of the Gökçeler-Industry Railway Line and the KP-0 + 000-KP-3 + 360 section where the Highway Connection construction will be carried out, the cut process will be applied only for the removal of topsoil and soft soil due to low slope and high groundwater level and the fill process will be applied subsequently.

After the bridge crossing, the cut process in the Gökçeler-Industry Railway Line between KP-4 + 232-KP-4 + 760 and the highway connection between KP-3 + 747-KP-4 + 300 will be applied only for the removal of topsoil and soft soil and the fill process will be applied subsequently.

In the section between KP-4 + 760- KP-6 + 305 of Gökçeler-Industry Railway Line, construction activities will be carried out by cut due to the high slope. Especially, between KP-4 + 760-KP-5 + 060, it is necessary to perform a very serious cut operation, up to a depth of 20 meters.

In addition, during the excavation activities, the thickness of the topsoil to be removed is considered to 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 below.

Table 5-4: Amount of Excavation Material to be Generated within the Scope of the Project

Line	Start	End	Topsoil (m^3)	Subsoil (m^3)	Total Excavation Material Amount (m^3)
Gökçeler-Industry Railway Line (Including Stations)	KP-0+000	KP-1+700	22,500	52.500	75.000
	KP-1+700	KP-2+400	4,500	10.500	15.000
	KP-2+400	KP-3+760	11,100	25.900	37.000
	KP-3+760	KP-4+232	-	19.000	19.000
	KP-4+232	KP-4+760	-	17.000	17.000
	KP-4+760	KP-5+060	7,500	492.500	500.000
	KP-5+060	KP-6+305	48,000	512.000	560.000
Highway Connection	KP-0+000	KP-3+360	36,000	84.000	120.000
	KP-3+747	KP-4+300	5,700	13.300	19.000
TOTAL			**135.300**	**1.226.700**	**1,362,000**

The area where the dock, ferry and port connection lines will be built remains within the boundaries of the existing port construction area. In the scope port construction, the railway connection will be completed after the cut and fill works are finalized. Since the excavation and earthworks here will be carried out within the scope of port construction, they have not been evaluated within the scope of earthworks.

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 was 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 was 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 was came into force after being published in the Official Gazette No. 27605 dated 08.06.2010 will also be fallowed.

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 was 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 in order to prevent erosion risk, before the land preparation and construction activities, erosion controls such as drainage channels, settling structures, etc. will be applied.

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,

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 the event that soil contamination takes place will also vary depending on the level and extent of contamination. However, in order 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 along the Motorway route will be further managed through implementation of the related management plans (Waste Management Plan, Pollution Prevention Plan, etc.).

Geology

Geological and Geotechnical Risks

Geological-geotechnical risks were determined in the geological-geotechnical survey report prepared by Altınok Inc. KP: 0 + 000-4 + 760 of Gökçeler-Industry Line Railway and the entire

highway connection of KP: 0 + 000-3 + 468 will pass over the filled ground. There areas where are deep cut and fill will be applied. The sections where cut and fill are deep are evaluated as geologically-geotechnically critical sections and examined in detail.

In these sections, the topsoil and weak soil bearing capacity can be a problem. While no geotechnical problems are expected in the cuts to be manufactured from engineering structures, seating and liquefaction and slope stability problems are expected in the filling passages in critical sections.

Also; in the pilot drillings performed on the railway abutments, the rock units where abutments are placed were not found, and the appropriate foundation type will be selected by taking into account the bearing strength and settlement criteria.

Landslide Risk

As stated in Chapter 4.1.4.4, there is no active or passive landslide risk around the planned project route according to land surveys conducted within the scope of geological-geotechnical survey report and Turkey Landslide Inventory Map of MTA, Zonguldak Section. However, caution should be taken against landslides that may develop locally, especially in the cut process performed in clastic rocks of Yemişliçay formation during the construction phase.

Seismicity Related Risks

As stated in Chapter 4.1.4.3. Zonguldak and its surrounding area, located in the western Black Sea region where major coal reserves of Turkey are located, was affected by the earthquakes occurred in the North Anatolian Fault Line due to the regions's geological and geological structure and tectonic features. Filyos and surroundings have the potential to be affected by the earthquakes that can occur in the North Anatolian Fault Zone that is located 85-100 km south of the city.

Project route that is marked on the "Turkey Earthquake Hazard Map" which was published in the Official Gazette No. 30364 dated 18.03.2018 and came in force on 01.01.2019 and renewed is given in Figure 4-6. The routes planned in the scope of the project and its surroundings were examined on the interactive earthquake hazard map published by AFAD, and the largest ground acceleration (PGA 475) for the 475 Year Repetition Period was found to be 0.220 g.

Geosite Loss and Damage

As stated in Chapter 4.1.4.5., the study area is not located in any geosites area. The nearest geosites area defined is the "Lava Columns belong to Upper Cretaceous Volcanics located in Güzelcehisar" and it is located 12 km northeast of the KP: 5+200 of the Gökçeler-Industry railway line and the project activities will not pose a risk for the area.

5.2.2.2. Operation Phase

Soil

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

- Erosion control structures will be monitored and maintained regularly to ensure that they are functioning properly
- Embankment and cutting slopes will also be checked regularly to identify and respond to any risks that may be associated with erosion, landslide, etc.

- Paving of the highway connection line will also be done by applying appropriate erosion and sediment control measures.
- In case of road accidents that may result in spills and leakages, Emergency Preparedness and Response Plan will be implemented to manage any potential contamination effectively.
- More environmentally friendly products will be used to prevent the possibility of any soil pollution in removing icing of road connection line.

Geology

Geological and geotechnical risks (i.e. geotechnical risks such as stability and settlement problems, landslide and seismicity related risks) described above for land preparation and construction phase will persist during operation phase. There will be no impact on geosites during this phase as well.

5.2.3. Impact Significance, Mitigation Measures

Assessment of impacts on land use, soils and geology was done based on the methodology presented in Chapter 5.1. 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 and typical descriptor of defined in Chapter 5.1 Specific sensitivity/value criteria considered in assessing the impacts on land use and soils is provided below.

Table 5-5: 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 V-VII 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	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.

Subject	High	Medium	Low	Negligible
	ecologically critical habitat status			

Mitigation Measures to Address Geological-Geotechnical Impacts

Gökçeler – Industry railway line KP: 0+000-4+760 and complete highway connection KP: 0+000-3+468 will be placed on backfilled ground. There are deep cut&fill locations in route of project. These cut&fill locations are considered as critical section in terms of geotechnical and very well examined. Slope stability analyzes for backfill areas are made with the help of surface geological studies, boring works and laboratory tests.

In these locations, after topsoil and soft soil will be excavated, it will be backfilled with granulated crushed stone. Followingly, backfill will be compacted/preloaded properly in order to prevent settlement and bearing capacity problems. Additionally, for clay with silt and silty-clay soil locations, first 20m depth of ground will be improved by jet-grout and geopier applications against low SPT value and liquefaction possibilities. In the critical slope stability locations, numerical analyze method will be used in geotechnical report which will be prepared with certain parameters and material specifications during operation phase of the project.

There is no rock foundation below the railway bridge abutments as per performed borings, therefore, deep friction pile foundation will be applied for footing.

Mitigation Measures to Address Seismic Impact – Earthquake Impact

The route of project is marked on renewed "Seismic Risk Map of Turkey" 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). Accordingly, biggest gravitational acceleration value is determined as 0,220 g as per earthquake return period of 475 years and this creates serious risk.

All structures like foundation, culverts etc. within the project will be designed and constructed as per high earthquake resistance parameters.

Mitigation Measures to Address Landslide Risks

As stated in Chapter 4.1.4.4, there is no active or passive landslide risk around the planned project route according to land surveys conducted within the scope of geological-geotechnical survey report,Turkey Landslide Inventory Map of MTA, Zonguldak Section and information gathered from" Earth Sciences Map Viewer and Drawing Editor" of MTA.

However, especially in the construction phase, measures such as jetcrete, wire mesh, bolt etc should be taken in the cut process performed in clastic rocks of Yemişliçay formation and caution should be taken against landslides that may develop on a local scale.

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 our experts 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 5-6 below.

Table 5-6: Land Use, Soils and Geology Impacts, Proposed Mitigation Measures and Residual Impacts

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Impacts on arable lands	Land preparation and construction	Arable lands Local communities	Restricted	High	Irreversible	Long-term	One-off	High	High	Major	Resettlement Action Plan (RAP) 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 established to ensure any complaints/comments regarding the Project will be received and responded in a timely manner, providing solutions and taking corrective measures as appropriate. Contractor will ensure that necessary corrective measures are taken 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.	Moderate
				Medium	Irreversible	Long-term	One-off	Medium	Medium	Moderate		Minor
				Low	Irreversible	Long-term	One-off	Medium	Low	Minor		Negligible
Topsoil stripping	Land preparation and construction	Arable lands	Restricted	High	Irreversible	Long-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. Topsoil that is stripped will be temporarily stored in the areas to be determined within the scope of the project, with a slope of not more than 5% according to provisions of Regulation on the Control of Excavation Soil, Construction and Demolition Wastes published in 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, the filling of the filling areas 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.	Moderate
		Non arable lands	Restricted	Medium	Irreversible	Long-term	One-off	Low	Low	Minor		Minor
		Lands with no topsoil	Restricted	Medium	Irreversible	Long-term	One-off	Negligible	Negligible	Negligible		Negligible
Soil Erosion	Land preparation and construction	Lands with Erosion Degree 3	Local	Medium	Irreversible or long-term reversible	Long-term	Intermittent	Medium	Medium	Moderate	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.	Minor
		Lands with Erosion Degree 2	Local	Medium	Irreversible or long-term reversible	Long-term	Intermittent	Low	Low	Minor		Negligible
		Lands with Erosion Degree 1	Local	Medium	Irreversible or long-term reversible	Long-term	Intermittent	Negligible	Negligible	Negligible		Negligible
Soil Contamination	Land preparation and construction	Lands with Class II LUC Project Personnel Local Communities	Local	Medium	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.	Negligible

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
		Lands having Class V-VII LUC and Residential Areas Project Personnel Local Communities	Local	Low	Short-term reversible	Short-Term	One-off	Negligible	Negligible	Negligible		Negligible
Soil Erosion	Operation	Lands with Erosion Degree 3	Local	Medium	Irreversible or long-term reversible	Long-term	Intermittent	Medium	Medium	Moderate	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. Road pavement of the highway connection will also be conducted implementing appropriate erosion and sediment control measures	Minor
		Lands with Erosion Degree 2	Local	Medium	Irreversible or long-term reversible	Long-term	Intermittent	Low	Low	Minor		Negligible
		Lands with Erosion Degree 1	Local	Medium	Irreversible or long-term reversible	Long-term	Intermittent	Negligible	Negligible	Negligible		Negligible
Soil Contamination	Operation	Lands having Class II LUC Project Personnel Local Communities	Local	Medium	Short-term reversible	Short-Term	One-off	Low	Low	Minor	In case of road accidents that may result in spills and leakages, Emergency Preparedness and Response Plan will be implemented to manage any potential contamination effectively. For de-icing of the structures of highway connections, more environmentally-friendly products will be used to prevent any potential contamination to soils.	Negligible
		Lands having Class V-VII LUC and Residential Areas Project Personnel Local Communities	Local	Low	Short-term reversible	Short-Term	One-off	Negligible	Negligible	Negligible		Negligible
Geological and geotechnical Risks (bearing capacity, liquidization, slope stability)	Land preparation and construction, Operation	Project Routes, Railway and Highway Users	Restricted	High	Short-term reversible	Short-term	One-off	High	High	Major	There are deep cut&fill locations in route of project. These cut&fill locations are considered as critical section in terms of geotechnical and very well examined. In these locations, after loose and botanical topsoil will be excavated, it will be backfilled with granulated crushed stone. Followingly, backfill will be compacted/preloaded properly in order to prevent settlement and bearing capacity problems In these critical regions, for clay with silt and silty-clay soil locations, first 20m depth of ground will be improved by jet-grout and geopier applications against low SPT value and liquefaction possibilities. In the critical slope stability locations, numerical analyze method will be used in geotechnical report which will be prepared with certain parameters and material specifications during operation phase of the project There is no rock foundation below the railway bridge abutments as per performed borings, therefore, deep friction pile foundation will be applied for footing. By carrying out periodic control and maintenance activities along the routes, additional durability and structural measures will be developed and implemented in cuts and fills when necessary. (cracks,	Minor

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											breaks, slips, deformations etc. of engineering structures that could happen especially after natural disasters)	
Seismicity	Land preparation and construction, Operation	Project Routes, Railway and Highway Users Project Personnel	Wide	High	Irreversible	Long-term	Intermittent	High	High	Moderate	- All structures like foundation, culverts etc. within the project will be designed and constructed as per high earthquake resistance parameters. In the structures to be constructed within the scope of the project, provisions of "Regulations for the Structures to be Built in Disaster Areas" published in the Official Gazette No. 26582 dated 14.07.2007 and "Turkey Building Code" of Disaster and Emergency Management Administration published in the Official Gazette No30364. dated 18.03.2018 that came into force in 01.01.2019 will be strictly folowed - By carrying out periodic control and maintenance activities along the routes, additional durability and structural measures will be developed and implemented in cuts and fills when necessary. (cracks, breaks, slips, deformations etc. of engineering structures that could happen especially after natural disasters)	Minor
Landslide Risk	Land preparation and construction, Operation	Project Routes, Railway and Highway Users Project Personnel	Limited	Local	Short-term reversible	Short-term	One-off	Local	Negligible	Negligible	- there is no active or passive landslide risk around the planned project route according to land surveys conducted within the scope of geological-geotechnical survey report,Turkey Landslide Inventory Map of MTA, Zonguldak Section and information gathered from" Earth Sciences Map Viewer and Drawing Editor" of MTA. However, especially in the construction phase, measures such as jetcrete, wire mesh, bolt etc should be taken in the cut process performed in clastic rocks of Yemişliçay formation and caution should be taken against landslides that may develop on a local scale..	Negligible
Geosit Loss and Damage	Land preparation and construction, Operation	Geositesı	Wide	No-Impact	-	-	-	No-impact	Negligible	Negligible	- The nearest geosites area defined is the "Lava Columns belong to Upper Cretaceous Volcanics located in Güzelcehisar" and it is located 12 km northeast of the Gökçeler-Industry railway line and the project activities will not pose a risk for the area.	Negligible

5.3. Noise and Vibration

In order to evaluate the noise impacts that will occur within the scope of the construction and operation activities of the project, background noise measurements were performed in selected locations along the railway and highway route, and noise modeling studies were carried out for the construction and operation phases. Information on background noise measurements is presented in Chapter 4.

In the assessment of noise impact during the construction and operation phases of the project, potential impact sources include construction activities to be carried out along the railway and highway corridor, and noise during operation phase.

5.3.1. Methodology and Project Standards

5.3.1.1. Methodology

In the noise assessment, internationally accepted methods and standards are used.

Sound PLAN 7.3 program was used to determine the total noise level that will occur during the land preparation, construction and operation period of the planned project.

During the land preparation and construction phase of the project, the possible effects of the construction machinery and equipment mentioned in Section 3.3.1.4 were taken into consideration while evaluating the possible effects on noise. In the operational phase, in order to evaluate the worst case scenario, evaluations were made by considering the number of trips and vehicles envisaged to be used 2052.

It is anticipated that works in land preparation and construction phase will take place only in day time. In addition, the railway and highway connection are expected to operate for 24 hours during the operational phase of the project.

Considering 17 trips a day in 2052, 12 trips between 07:00-22:00 and 5 trips between 22: 00-07: 00 according to the average time of a trip. Likewise, it is thought that the transportation to be carried out in the highway connection will proceed in line with the railway connection.

- Turkey-Regulation on Assessment and Management of Environmental Noise
- World Bank Group Environment, Health and Safety (EHS) Guidelines, General EHS Guidelines: Noise
- World Bank Group Environment, Health and Safety (EHS) Guidelines: Railways (April, 30 2007)

SoundPLAN 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, 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 receiving points, noise levels arising from the machinery and equipment that will operate during the construction period and noise levels arising from the railway and road connection to the operation period were calculated.

UTM WGS 84 coordinate system was used in the studies. Information about the data used for the model is given in the table below.

Table 5-7: 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 (°C)		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

It is expected that, excavation works and the use of machinery, tools and equipment in the construction phase and rail and road use in the operation phase will create 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 and road 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 and highway will be operated throughout the day.

5.3.1.2. Project Standards

Limit values defined in the national Regulation on Assessment and Management of Environmental Noise and World Bank Group General EHS Guidelines have been taken into account to determine the project standards.

National Legislation

Assessment of environmental noise is regulated by the Regulation on Assessment and Management of Environmental Noise (RAMEN). Limit values for industrial areas, residential areas and areas having both are determined within three different time periods. Within the scope of this project, the limit values specified in Annex-7 Table-2 (Environmental Noise Limit Values for Light Rail Systems) and Table-5 (Environmental Noise Limit Values for Construction Site) will be taken into consideration.

Environmental Noise Limit values for the construction sites determined in the RAMEN published in the Official Gazette No. 27601 dated 04.06.2010, are given in the table below. The following values will be used for environmental noise assessment that will occur during the project construction phase.

Table 5-8: Noise Limit Values Determined by RAMEN

Type of Activity (construction, demolition and repair)	L_{day} (dBA) (07.00 - 19.00)
Buildings	70
Roads	75
Other Sources	70

In addition, in case of working in the evening (19: 00-23: 00) and night (23: 00-07: 00) timeframe during the construction phase, RAMEN Article 23, 65 dBA in the evening (19: 00-23: 00), the limit values of 65 dBA in the evening and 60 dBA in the night should be complied with.

During the project operation phase; Limit values of 65 dBA during the day, 60 dBA in the evening and 55dBA at night should be complied with for rail systems given in article 19 of RAMEN.

International Standards

World Bank Group 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 given in the Guideline are given in the table below. As it can be seen, World Bank Group standards are more stringent values. Therefore project standards were developed according to World Bank Group guidelines.

Table 5-9: Noise Limit Values Determined by World Bank Group General EHS Guidelines

Receptor	One Hour Leq-dBA	
	Daytime 07:00-22:00	Nighttime 22:00-07:00
Residential Area	55	45
Industrial/Commercial Areas	70	70

5.3.2. Impact Assessment

5.3.2.1. 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 07:00 and 19:00 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 5-10.

Table 5-10: Number of Machinery and Equipment to be used in Construction Phase

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

The machines and equipment listed in Table 5-10 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 can not 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 7.3 are provided below.

Water Truck

The sound power level of the Water Truck selected from the SoundPLAN 7.3 program library is 90.8 dBA and its distribution according to the 1/1 octave frequency band is given below.

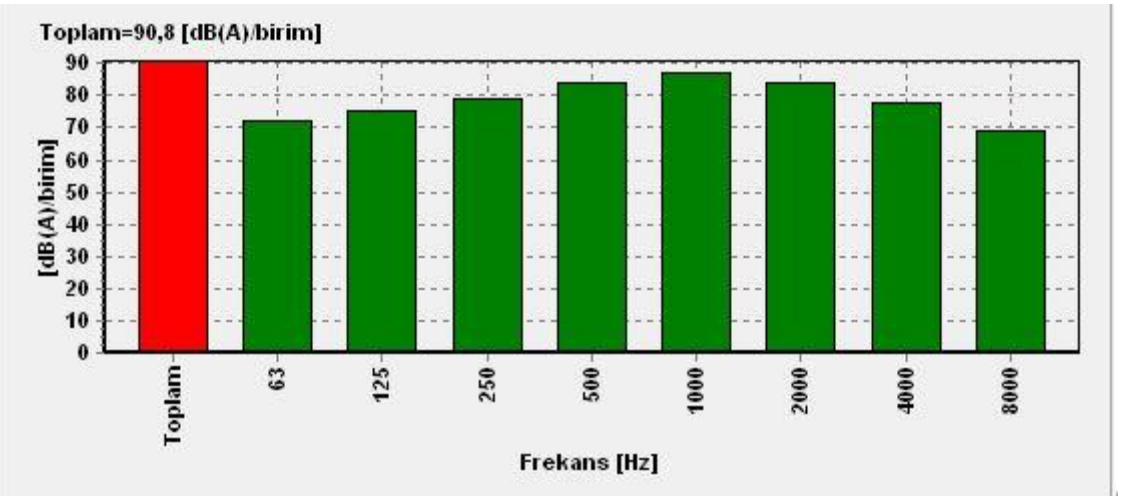

Figure 5-2: Water Truck Noise Level Frequency Analysis

Concrete Mixer

The sound power level of the Concrete Mixer selected from the SoundPLAN 7.3 program library is 108.0 dBA and its distribution according to the 1/1 octave frequency band is given below.

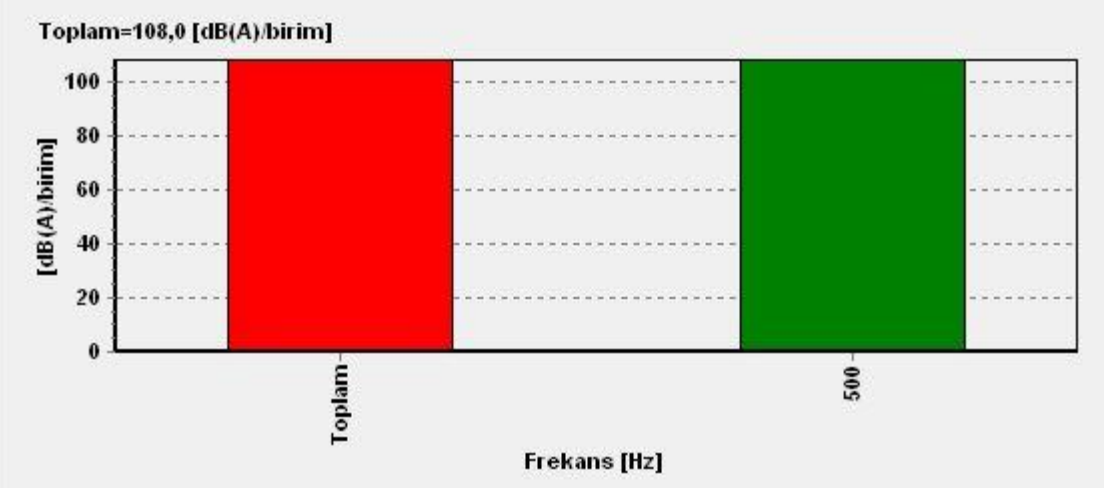

Figure 5-3: Concrete Mixer Noise Level Frequency Analysis

Concrete Pump

The sound power level of the Concrete Pump selected from the SoundPLAN 7.3 program library is 109.0 dBA and its distribution according to the 1/1 octave frequency band is given below.

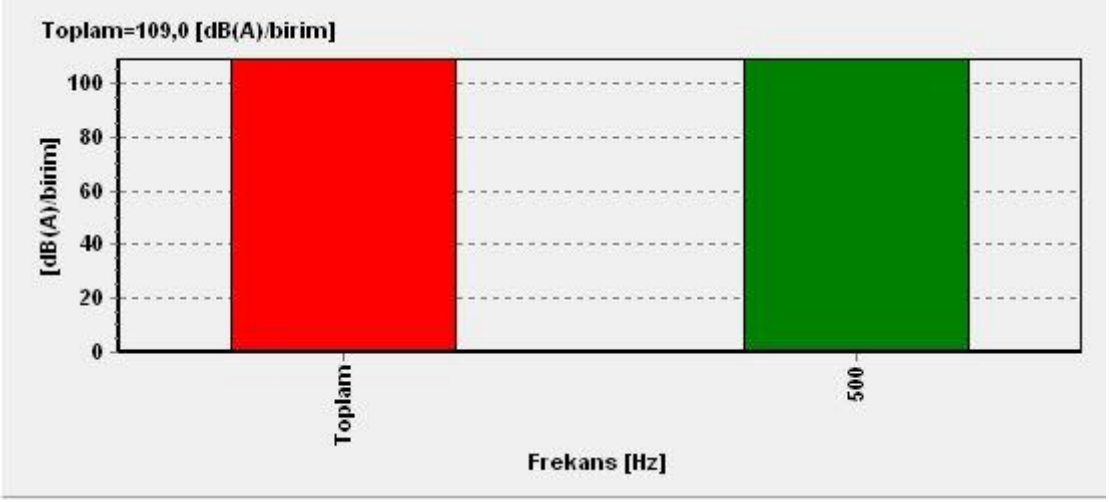

Figure 5-4: Concrete pump Noise Level Frequency Analysis

Truck

The sound power level of the Truck selected from the SoundPLAN 7.3 program library is 94.0 dBA and its distribution according to the 1/1 octave frequency band is given below.

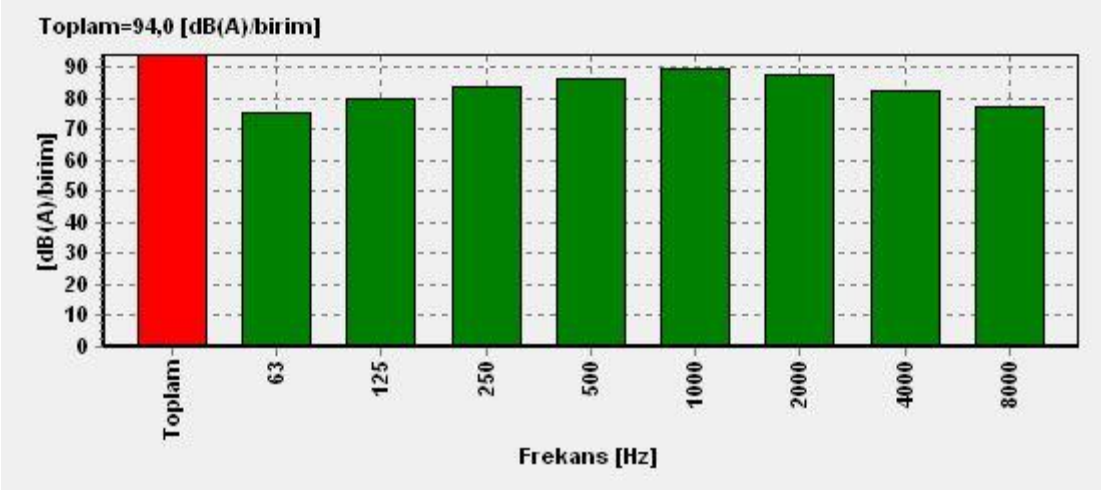

Figure 5-5: Truck Noise Level Frequency Analysis

Pickup Truck

The sound power level of the Pickup Truck selected from the SoundPLAN 7.3 program library is 100.1 dBA and its distribution according to the 1/1 octave frequency band is given below.

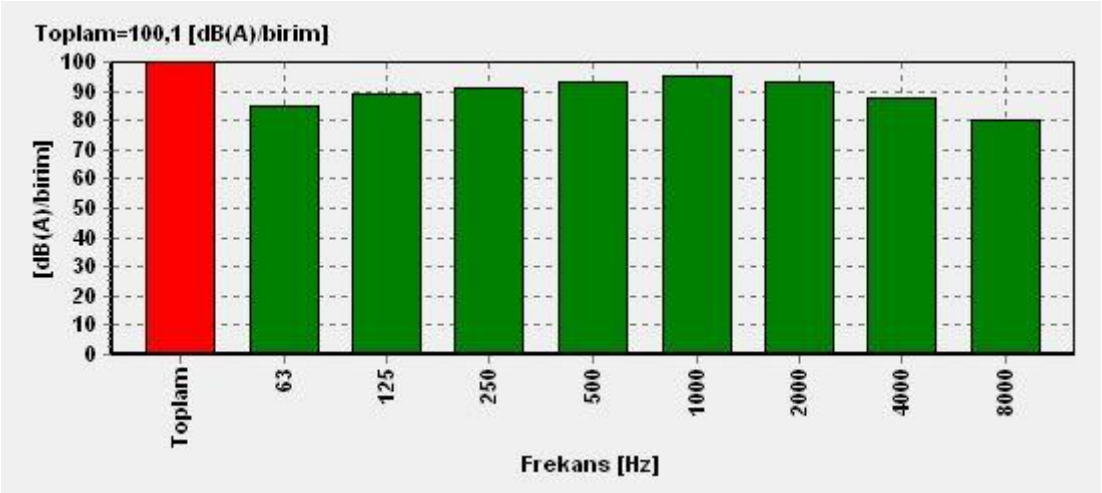

Figure 5-6: Pickup Truck Noise Level Frequency Analysis

Backhoe Loader

The sound power level of the Backhoe Loader selected from the SoundPLAN 7.3 program library is 105.0 dBA and its distribution according to the 1/1 octave frequency band is given below.

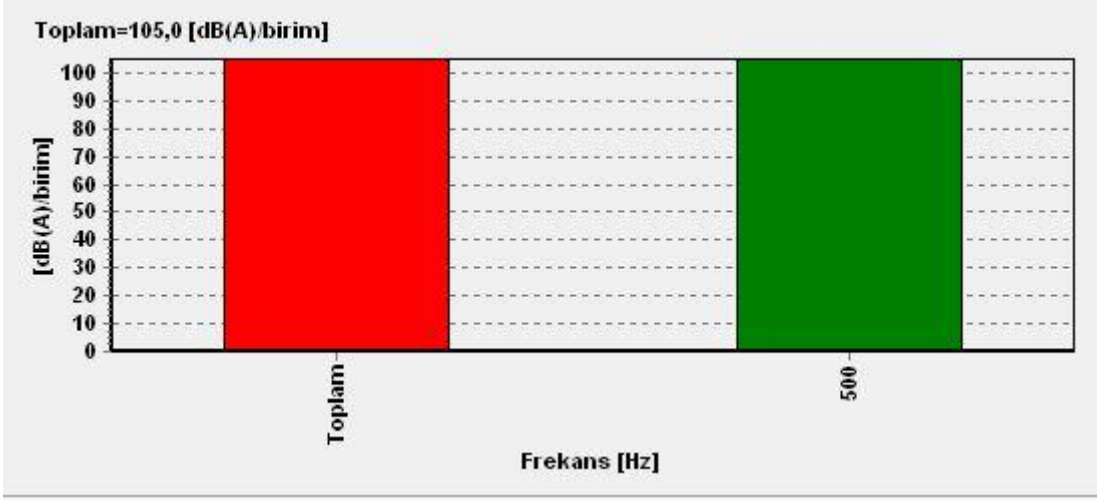

Figure 5-7: Backhoe Loader Noise Level Frequency Analysis

Water Tanker-Fuel Tanker

The sound power level of the Water and Fuel Truck selected from the SoundPLAN 7.3 program library is 95.8 dBA and its distribution according to the 1/1 octave frequency band is given below.

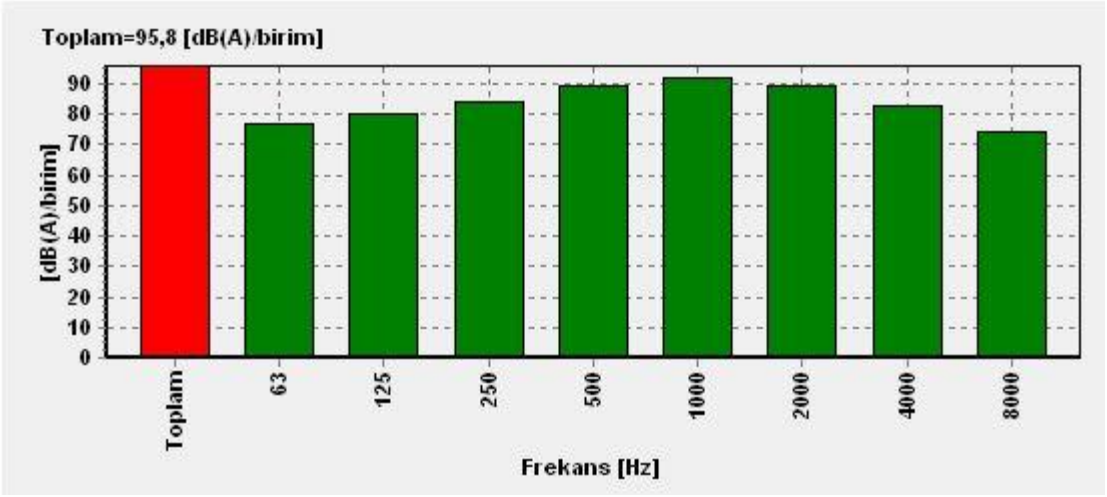

Figure 5-8: Water Tanker-Fuel Tanker Noise Level Frequency Analysis

Trailer

The sound power level of the Trailer selected from the SoundPLAN 7.3 program library is 123.8 dBA and its distribution according to the 1/1 octave frequency band is given below.

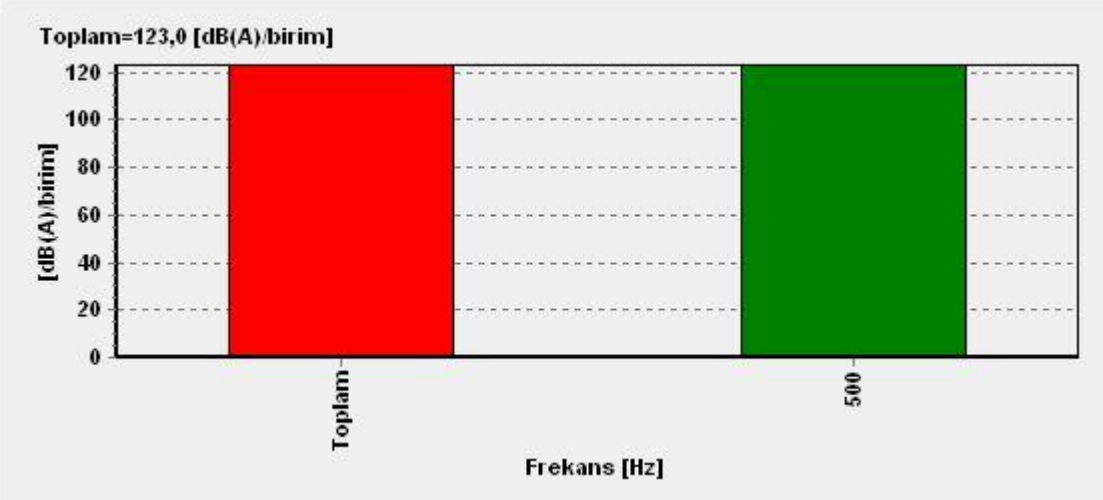

Figure 5-9: Trailer Noise Level Frequency Analysis

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, 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 and road connection to the operation period were calculated.

The noise emissions that will occur in these areas are modeled separately. The noise maps created as a result of the calculations made in this context are presented below. In addition, the noise values calculated for the receptors and their coordinates are presented in Table 5-11.

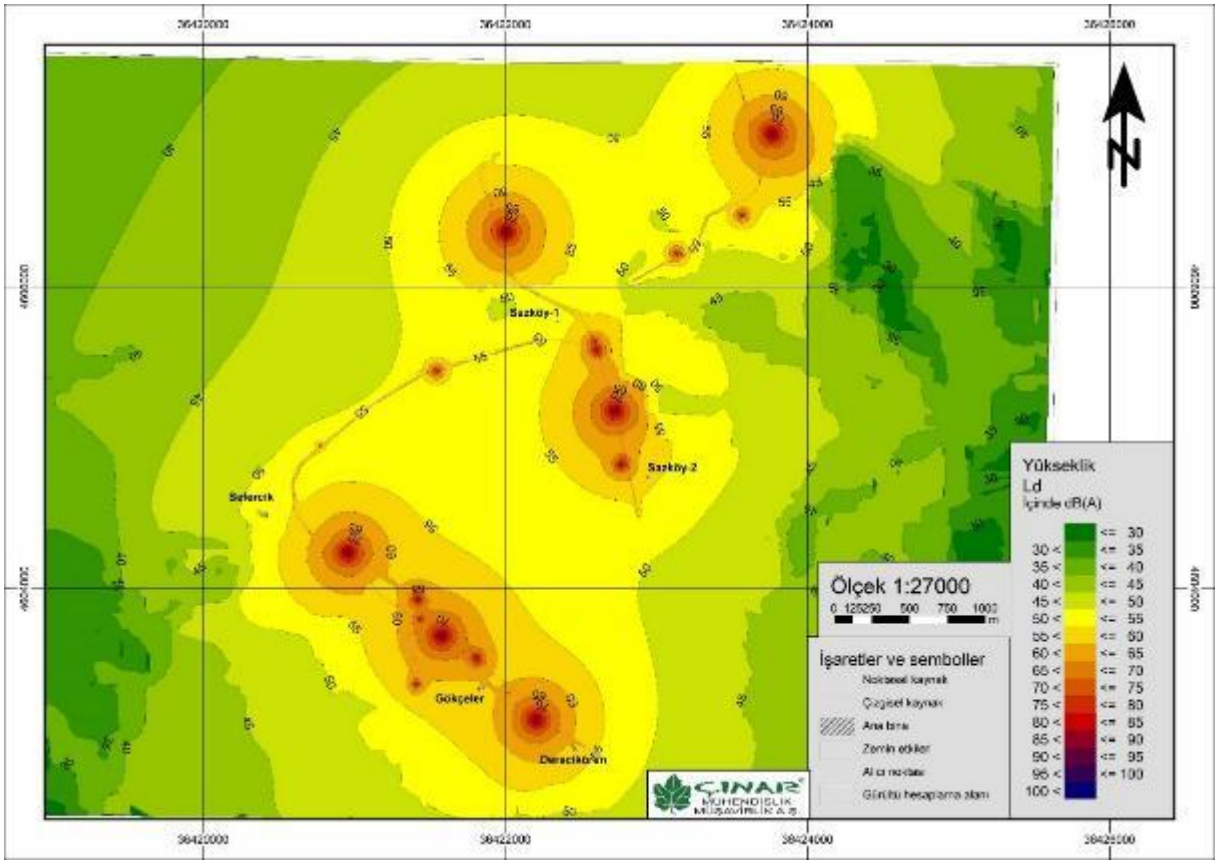

Figure 5-10: Grid Noise Map (Land Preparation and Construction Phase)

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 decreasing with the effect of ground and distance is closest to 60 dBA as can be seen from Table 5-11.

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.

Table 5-11: Noise Emission Values Calculated in the Receptors during the Construction Phase

Receptor	X (m)	Y (m)	Z (m)	Ld dB(A)
Derecikören	422560.00	4600522.00	11.96	52.2
Gökçeler	421932.00	4600926.00	8.68	57.5
Sazköy-1	422452.00	4603346.00	28.71	52.6
Sazköy-2	423047.00	4602304.00	29.11	56.9
Sefercik	420491.00	4602066.00	10.42	51.9

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 nosie and vibration will be done.

5.3.2.2. Operation Phase

Noise

As the noise source, trains and vehicles 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 modeling studies, it has been assumed that trains and vehicles will work along all lines and connection roads 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 and vehicles to operate on all lines at the same time.

The sound power level of the Freight Train selected from the SoundPLAN 7.3 program library is 103.6 dBA and its distribution according to the 1/1 octave frequency band is given below.

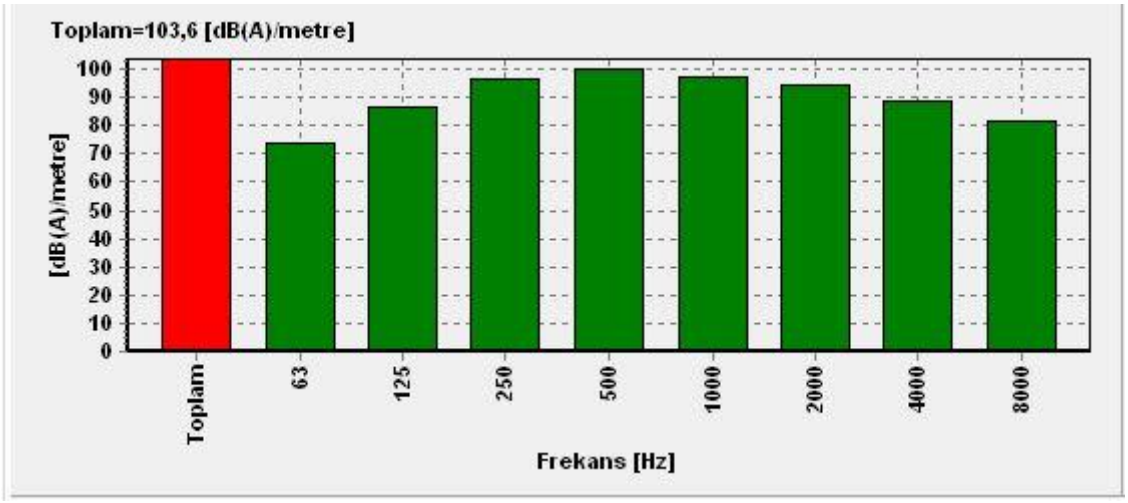

Figure 5-11: Freight Train Noise Level Frequency Analysis

Calculation of Total Noise Level during Operation

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

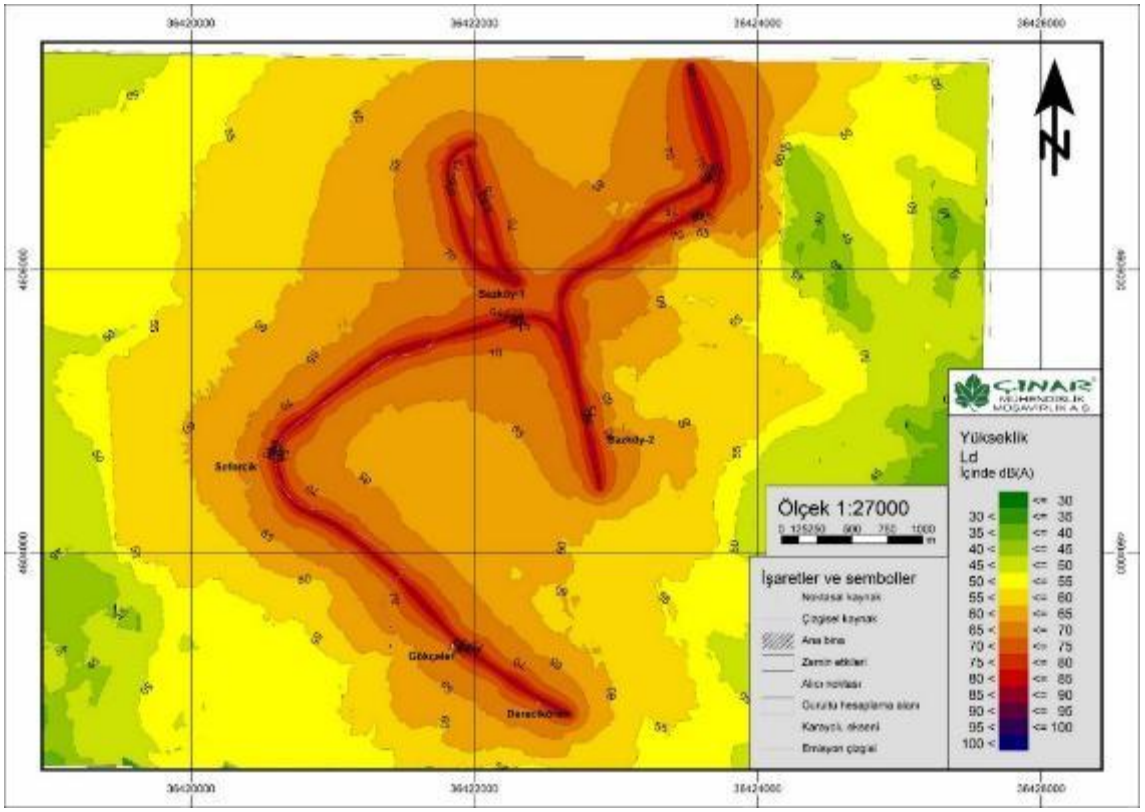

Figure 5-12: Grid Noise Map (Operation Phase-Day)

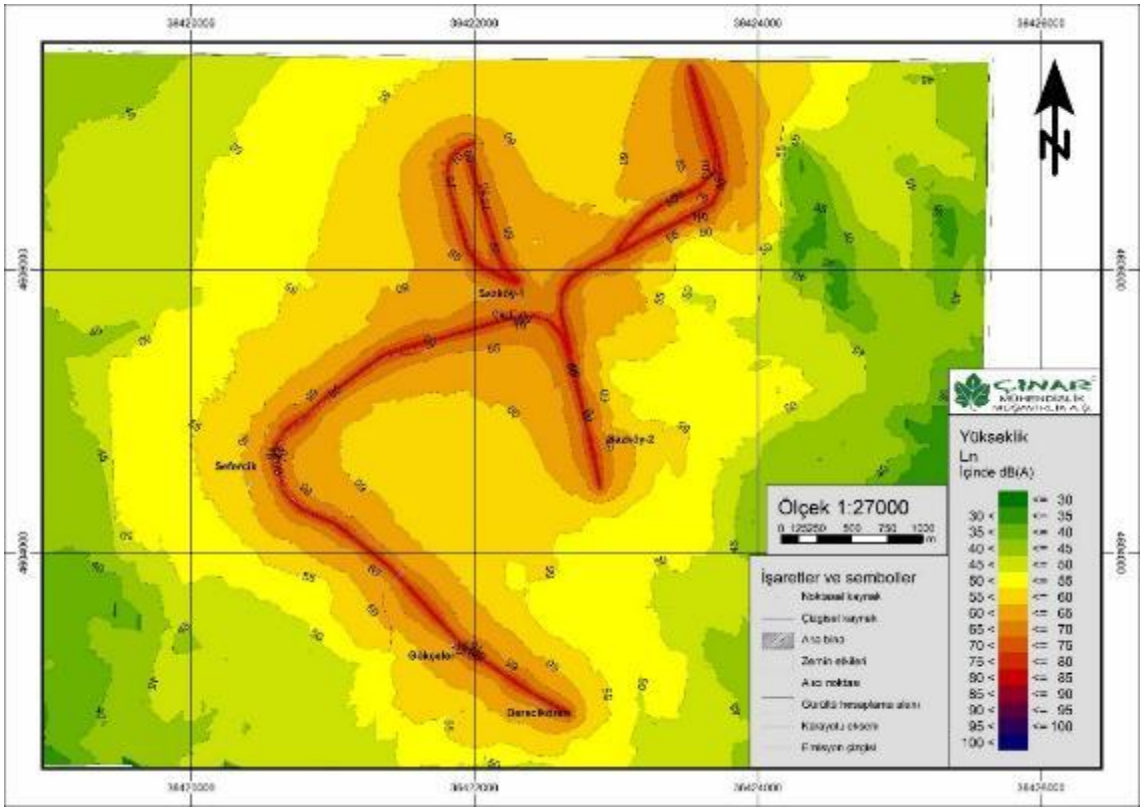

Figure 5-13: Grid Noise Map (Operation Phase-Night)

In the modeling of noise emissions, the closest settlements have been identified as receptors and the noise levels calculated at these points are given below.

Table 5-12: Noise Emission Values Calculated in the Receptors during the Operation Phase

Receptor	X (m)	Y (m)	Z (m)	L_{day}	L_{night}
Derecikören	422560.00	4600522.00	11.96	78.6	71.8
Gökçeler	421932.00	4600926.00	8.68	73.5	67.4
Sazköy-1	422452.00	4603346.00	28.71	69.7	64.0
Sazköy-2	423047.00	4602304.00	29.11	73.1	67.1
Sefercik	420491.00	4602066.00	10.42	65.5	59.9

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[41].

Many of these excitation frequencies are approximated in Figure 5-14.

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

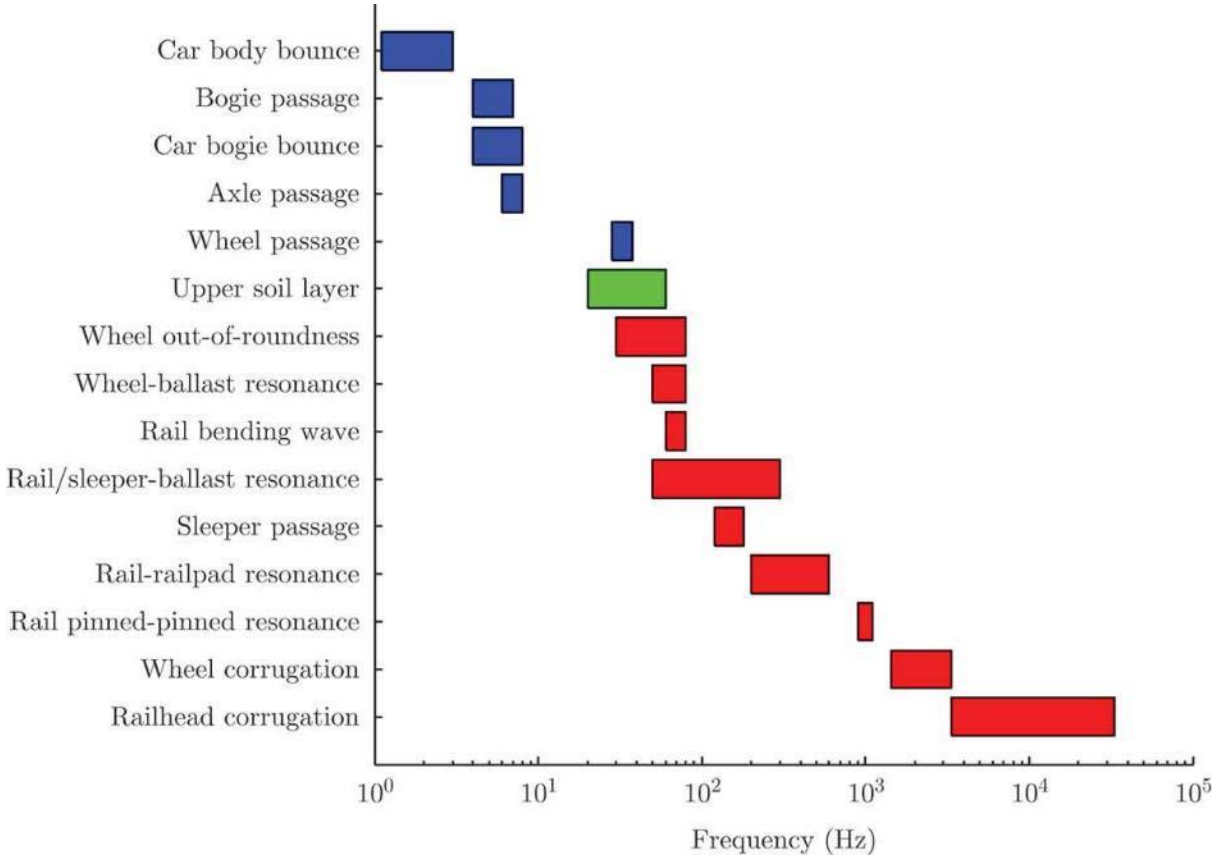

Figure 5-14: Main contribution of dynamic vehicle/track and soil interactions

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

Ground-borne vibration can be a serious concern for nearby neighbors 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 feelable 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 5-15. 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[42].

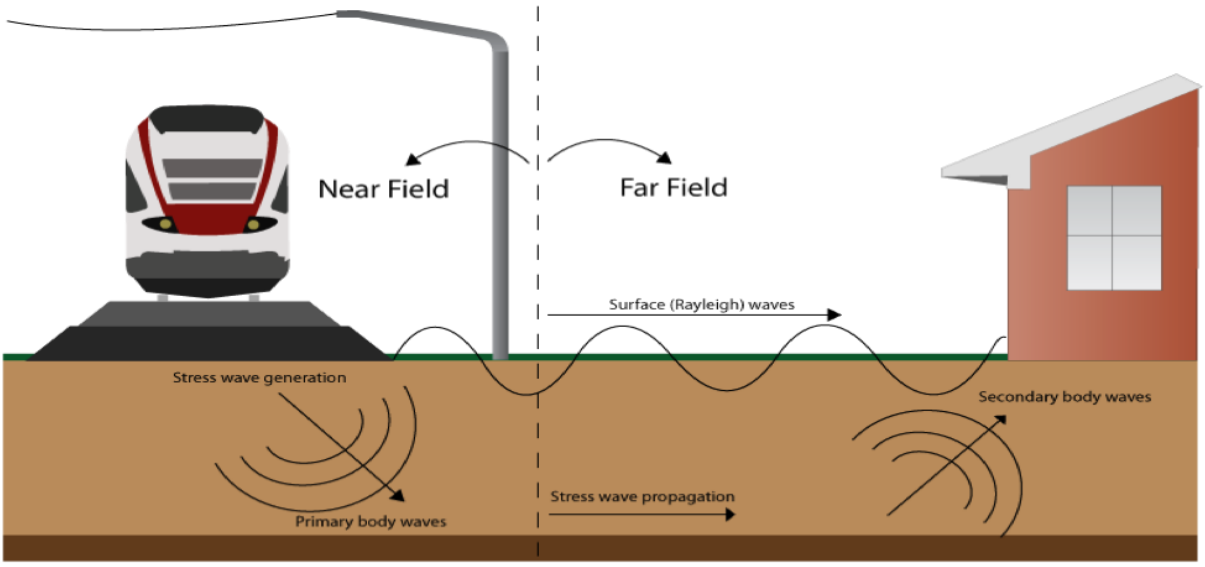

Figure 5-15: Ground borne vibration

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

5.3.3. Impact Significance, Mitigation Measures and Residual Impacts

Noise impact levels of construction and operation activities related to the project were assessed according to noise modeling results and baseline measurements. Apart from the mitigation measures developed within the scope of the ESIA Report, there are also design measures taken during the planning and design phase of the Project. Some of them are as follows:

- Optimization / design of the railroad route to avoid residential areas as much as possible,
- Reducing the emissions of wagons (Also in the wheel sound: reduction of rail roughness)
- Reducing the emissions of railway line (Also in the wheel sound: reduction of rail roughness) [43]
- 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

42 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

43Matthias Hintzsche, Federal Office for Environment, Dessau, Almanya Michael Jäcker-Cüppers, Federal Office for Environment, Dessau, Germany Rainer Kühne, München, Germany Heinz-Dieter Marohn, Berlin, Germany Dr. Lars Schade, Federal Office for Environment, Dessau, Germany, Adjustment and Implementation of EU Directives on Environmental Noise Assessment and Management, European Union Twinning Project, Noise Reduction Measures Handbook, April 2008

- Design and construction of noise barrier structures (e.g. panels)

The applicability of the above mentioned mitigation measures will be further considered during the final design studies by performing post-mitigation noise modelling studies and re-assessment of the operation phase noise impacts on the identified receptors.

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; which have 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 considered in relation to the assessments made on the noise impacts of the project:

- 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 construction period noise monitoring will be conducted in order to identify the effectiveness of measures taken and identify any residual impact. Corrective actions will be taken for any residual impacts with moderate or high significance. Noise monitoring will be conducted quarterly during the construction phase and also upon complaint.
- Noise monitoring will be conducted once in a three month in the first year of the operation, after one year, monitoring will be done in every two years. Noise monitoring will also be conducted upon complaint.

It should also be taken into account that the modeling work and impact assessment of the operating period are carried out within the framework of the activities foreseen for 2052. For this reason, these impacts are expected to occur in 2052. Defined mitigation measures will be implemented repeatedly. In this context, following years where the project will be implemented (not in the initial years of operation), noise barriers will be considered as an alternative impact mitigation measure and its application will depend on the monitoring that will be conducted to observe actual impacts.

In order 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.

The magnitude of noise impacts was assessed due to the deviation from the baseline noise levels and applicable standards (regulatory limits and international guidelines). As summarized in Table 5-13, 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 5-13: 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

With taking the experienced change with regard to decibel levels into consideration, the magnitude criteria to be integrated into the magnitude determination is presented below

Table 5-14: 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

In this case, the impact size of all receptors during the construction and operation phase of the project is as follows:

Table 5-15: Impact Magnitudes in the Construction and Operation Phases

Receptor	Baseline (dBA)		Modeling Results in Construction Phase (dBA)	Change/Impact Magnitude	Modeling Results in Operation Phase (dBA)		Impact Magnitude
	Day	Night			Day	Night	
G-1 (Gökçeler)	63.1	53.9	57.5	Negligible	**73.5**	**71.8**	High
G-2 (Sefercik)	62.8	51.7	51.9	Negligible	65.5	**67.4**	High
G-3 (Sazköy-1)	57.6	56.2	52.6	Negligible	**69.7**	**64.0**	High
G-4 (Sazköy-2)	49.8	39.6	56.9	Medium	**73.1**	**67.1**	High
G-5 (Derecikören)	67.4	63.3	52.2	Negligible	**78.6**	59.9	High

Table 5-16: Noise Impacts, Impact Mitigation Measures and Residual Impacts

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Increase in noise levels	Land Preparation and Construction	G-1 (Gökçeler)	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor	Develop and implement a Pollution Prevention Plan. Implement Project Grievance Mechanism. If any comment related with noise is received through the Grievance Mechanism, evaluate the complaint and where necessary plan and implement corrective actions. Carrying out construction activities only during the day Prefer machinery, equipment and vehicles with lower sound power levels and sound reduced models. Using newer models. Conduct maintenance of construction vehicles regularly by means of a regular vehicle maintenance and repair program which is also recommended by the manufacturer. Define and obey speed limitations for construction vehicles. Carry out relevant trainings and provide instructions to drivers of construction vehicles on the driving speed limits. Avoid driving of construction vehicles through settlements where possible. Use of designated site access roads. Evaluate construction of access roads where required to avoid traffic through residential areas. Prohibition of construction vehicles entering the construction site and prohibition of keeping them running while waiting on the construction site. Carry out noise monitoring by means of noise measurements in accordance with IFC standards Provide site personnel with necessary environmental training that aims at reducing noise caused by Project activities. When necessary, in order 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 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. In order to keep the noise level to a minimum, the provisions of the Environmental Noise Assessment and Management Regulation entered into force with the Official Gazette dated 04.06.2010 and No. 27601 will be complied with. Notification of communities/settlements about the noise levels that maybe created during construction phase due to heavy machinery use	Negligible
		G-2 (Sefercik)	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
		G-3 (Sazköy-1)	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
		G-4 (Sazköy-2)	Local	Medium	Short Term Reversible	Short-term	Continuous	Medium	Medium	Minor		Negligible
		G-5 (Derecikören)	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
	Operation	G-1 (Gökçeler)	Local	High	Irreversible	Long-term	Intermittent	High	Medium	Major	Reducing the emissions of wagons (Also in the wheel sound: reduction of rail roughness) Reducing the emissions of railway line (Also in the wheel sound: reduction of rail roughness) 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) The above mentioned measures should be taken into consideration during the final design studies that will be performed by both GDII and Design & Supervision Consultant by performing post-mitigation noise modelling studies and re-assessment of the operation phase noise impacts on the identified receptors 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; Noise monitoring will be conducted once in a three month in the first year of the operation, after one year, monitoring will be done in every two years. Noise monitoring will also be conducted upon complaint.	Moderate
		G-2 (Sefercik)	Local	Negligible	Irreversible	Long-term	Intermittent	Low	Medium	Major		Moderate
		G-3 (Sazköy-1)	Local	High	Irreversible	Long-term	Intermittent	High	Medium	Major		Moderate
		G-4 (Sazköy-2)	Local	High	Irreversible	Long-term	Intermittent	High	Medium	Major		Moderate
		G-5 (Derecikören)	Local	High	Irreversible	Long-term	Intermittent	High	Medium	Major		Moderate
Vibration	Land Preparation	Nearest Settlements	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Low	Minor	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 nosie and vibration will be done.	Minor

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
	and Construction											
	Operation	Nearest Settlements	Local	Negligible	Irreversible	Long-term	Continuous	Low	Low	Minor	Optimizing the average speed of trains by 50 km/h Having an appropriate grievance mechanisim for vibration related complaints Quarterly vibration monitoring studies.	Minor

5.4. Air Quality and Greenhouse Gas Emissions

5.4.1. Methodology and Project Standards

5.4.1.1. Methodology

Air Quality

The criteria described in Chapter 5 ("ESIA Methodology") have been used for the assessment of impacts related with air quality. According to this methodology generic criteria for determining the sensitivity of a receptor are set and the sensitivity of receptors was classified depending on the importance/rarity of the receptor of concern. In this context, baseline air quality measurements were performed at the receptors defined in the Chapter 4.3. Since all of these areas are residential area, their sensitivity is determined as Medium.

In accordance with the methodology described in Chapter 5, in order to determine the overall impact magnitude there are 5 magnitude factors to be identified. One of them is the impact magnitude which is scaled as low, medium and high. Criteria used to define the magnitude of impacts on air quality are presented in Table 5-17.

As can be seen in this table, the magnitude of impacts is based on the percentage of exceedance of air quality standards (Project standards). The exceedance of Project Standards will be estimated by taking into account the baseline air quality measurements and air dispersion modelling results. When the magnitude of impact does not exceed the regulatory limits, then the impact magnitude will be defined as negligible.

Table 5-17: Criteria for Magnitude of Impacts on Air Quality

Exceedance of Project Standards (%)	Impact Magnitude
0-25	Low
25-50	Medium
50-100	High

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 (CO2)
- Methane (CH4)
- Nitrous oxide (N2O)
- Sulfur hexafluoride (SF6)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)

Project's contribution to climate change was assessed with the calculation of amount of GHG emissions anticipated. In this context, during the operational phase of the planned highway connection, an assessment was made on the types and numbers of vehicles envisaged in 2052. In this context, greenhouse gas emissions are calculated using the relevant approach and data (emission coefficients) within the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

5.4.1.2. Project Standards

National Legislation and Air Quality Standards

Improvements in air management policy in Turkey, Turkey's European Union (EU) has gained significant momentum with the adoption of the Integrated Environmental Strategy. Accordingly, Turkey's legislation, the EU Air Quality Framework Directive (and related directives), the Large Combustion Plants Directive and the other on climate change has been full complied. The laws in force in Turkey in relation to air quality and emissions from incinerators is Regulation on the Control of Industrial Air Pollution published in the Official Gazette No. 27277 dated 03.07.2009 (Amended: OG-20/12 / 2014-29211)

As a result of the amendment of the Regulation on the Control of Industrial Air Pollution published in the Official Gazette numbered 29211 on 20.12.2014, the Regulation on the Control of Air Pollution from Industrial Plants and the Regulation on Large Combustion Plants were abolished.

The purposes of the Regulation on the Control of Industrial Air Pollution are to control emissions in the form of smoke, dust, gas, steam and aerosols emitted into the atmosphere as a result of the activity of industries and power plants; to protect people and their environment from the hazards arising from contamination in the breathable environment; to eliminate the adverse effects that cause significant damage to the environment and relations with neighbouring countries that arise in the environment due to air pollution and to prevent these effects. Therefore, the regulation defines a limit value for gas contaminants and particulate matter.

Limit values to be followed in 2019-2023 and after 2024 are given below according to this regulation:

Table 5-18: Air Quality Limit Values of 2019-2023 and after 2024

Parameter	Time	Unit	2019-2023	2024 and after
SO_2	Hourly (cannot exceed more than 24 times annually)	$\mu g/m^3$	350	350
	Short term limit		60	60
NO_2	Hourly (cannot exceed more than 18 times annually)	$\mu g/m^3$	250	200*
	Annual		40*	40
PM_{10}	24 hour (cannot exceed more than 35 times annually)	$\mu g/m^3$	50	50
	Annual		40	40
Settling Dust	Short term limit	mg/m^2day	390	390
	Long term limit		210	210
CO	Max daily 8 hours average	mg/m^3	10	10
VOC	Hour	$\mu g/m^3$	280	280
	Short term limit	$\mu g/m^3$	70	70
Pb	Annual	$\mu g/m^3$	0.5	0.5

International Requirements

WBG standards and requirements are applicable to the Project. In this regard, the WBG General EHS Guidelines-Environmental - Air Emissions and Ambient Air Quality indicates that for projects with significant sources of air emissions and potential for significant impacts to ambient air quality, these impacts should be prevented of minimized by ensuring that standards in relevant national legislation or in their absence the World Health Organization (WHO) Ambient Air Quality Guidelines are not exceeded. Thus, following compliance requirement with relevant national legislation, the WBG EHS Guideline refers to the WHO Ambient Air Quality Guidelines. Ambient air quality guideline values recommended by WBG are presented in Table 5-19.

Table 5-19: WBG – WHO – Ambient Air Quality Guideline Values

Parameter	Duration	Guideline Value (µg/m^3)
SO_2	10 minute	500
	24 hour	20
NO_2	Hourly	200
	Annual	40
Particulate Matter (PM_{10})	24 hour	50
	Annual	20
Particulate Matter ($PM_{2,5}$)	24 hour	25
	Annual	10
O_3	8 hour daily maximum	100

Source: IFC Environmental, Health and Safety Guidelines, General EHS Guidelines - Environmental – Air Emissions and Ambient Air Quality

5.4.2. Impact Assessment

5.4.2.1. 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 vehicles that will use the highway connection during the operation phase.

There will be some dust formation that will result from excavation, fill, material storage, unloading and transportation processes to be carried out during the construction works of the project. The possibility of dust formation during the 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 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 5-20: 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 construction works to be carried out within the scope of the project are planned to be completed in about 2 years, working 10 hours a day, 305 years (taking holidays into account). 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 1.362.000 m^3 cut and 681.800 m^3 fill works are planned in road construction. In the calculations, the material density was taken as 1.6 ton / m^3. 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 cut and fill operations to be carried out within the scope of the project is shown below.

Table 5-21: Emission to be Generated During Cut and Fill Operations

Line	Start	End	Excavated Material Amount (ton)	Hourly Excavate Material Amount (ton/hour)	Removal Emissions (kg/hour)	Loading Emissions (kg/hour)	Fill Amount (ton)	Hourly Fill Amount (ton/ hour)	Unloading Emissions (kg/ hour)	Total Emission (kg/ hour)
Gökçeler-Industry Railway Line	KP-0+000	KP-1+700	120,000	3.344	0.492	0.197	240,000	78,689	0.393	1.082
	KP-1+700	KP-2+400	24,000	7.869	0.098	0.039	81,600	26,754	0.134	0.271
	KP-2+400	KP-3+360	59,200	1.410	0.243	0.097	384,800	126,164	0.631	0.970
	KP-3+760	KP-4+192	30,400	9.967	0.125	0.050	215,840	70,767	0.354	0.528

Line	Start	End	Excavated Material Amount (ton)	Hourly Excavate Material Amount (ton/hour)	Removal Emissions (kg/hour)	Loading Emissions (kg/hour)	Fill Amount (ton)	Hourly Fill Amount (ton/ hour)	Unloading Emissions (kg/ hour)	Total Emission (kg/ hour)
	KP-4+232	KP-4+760	27,200	8.918	0.111	0.045	168,640	55,292	0.276	0.433
	KP-4+760	KP-5+060	400,000	131.148	1.639	0.656				2.295
	KP-5+060	KP-6+305	640,000	209.836	2.623	1.049				3.672
Highway	KP-0+000	KP-3+360	192,000	62.951	0.787	0.315				1.102
	KP-3+747	KP-4+300	30,400	9.967	0.125	0.050				0.174
Total										**10.528**

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 storage during excavation in the construction phase, will be done simultaneously (the worst case scenario) and dust emissions were calculated accordingly as 10.528 kg/hour. Therefore, as stated in the Annex-2 of the Regulation on the Control of Industrial Air Pollution (Amended R.G. 20.12.2014-29211), "Calculation Air Pollution Contribution"

Is required by using an internationally accepted distribution model in the facility's impact area if the pollutant mass flow specified in the Table 2.1 of the regulation are exceeded, for new facilities to be established.

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 2015 data was chosen to use 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 in 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 SKHKKY Annex-2; in a square-shaped area of 1 km2 (1 km x 1 km) with lengths of 1 km x 1 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 study area and in this system the sides of the created square area was 1000 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 study area 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 effects of emissions to the atmosphere on air quality were determined.

Maximum GLC values, STV and LTV and UVS limit values obtained as a result of modeling studies are given in Table 5-22 and Table 5-23.

Table 5-22: PM10 Sampling Results of Land Preparation and Construction Phase of the Project

Pollutant	Period	Model Results		RCIAP Limit Values (µg/m³)	WBG Guideline Limit Value (µg/m³)
		Max GLC Values (µg/m³)	Limit Value Exceedence Number		
Particulate Matter (PM 10)	24 Hours	36.74	-	50	50
	Annual	19.89	-	40	20

Table 5-23: Settled Dust Values of Land Preparation and Construction Phase

Emission	Average period	Max GLC Value	RCIAP Limit Value Exceedence number	RCIAP Limit Values for STV and LTV (mg/m²day)
				2019-2023
Dust	Monthly (g/m²)	0.00	-	390
	Annual (µg/m³)	46.21	-	210

During the baseline studies, measurements of PM10 and settled dust are as follows:

Table 5-24: PM10 and Settled Dust Values of Land Preparation and Construction Phase in Receptor Points

Receptor	PM_{10} Annual (µg/m³)	Settled Dust Annual (µg/m³)
Sazkoy-1	2.18595	1.72743
Sazkoy-2	4.85045	4.28643
Sefercik	0.88084	0.2969
Gokceler	5.47888	4.17164
Derecikoren	2.74286	2.62036

As of 2019, the limit value of PM10 24-hour limit is 50 µg / m^3 (it cannot be exceeded more than 35 times in a year) and the annual limit value is 40 µg / m^3 in RCIAP Annex-2 Table 2.2. For the settled dust, 24-hour and monthly limit values are given as 390 mg / m^2 and 210 mg / m^2. Accordingly, the 24 hour and annual maximum PM10 values obtained with the modeling study and the maximum settled dust of 24 hour and monthly values comply with the limit values. The results table showing 24-hour and annual PM10 and 24-hour and monthly settled dust GLC values obtained as a result of modeling studies and iso-concentration map are formed with GLC values are presented.

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

Air Quality Model Distribution Maps are presented in Annex-9.

Also, as explained above, assuming that a fairly large area was prepared at the same time, modeling study was carried out by reflecting the worst-case scenario. Therefore, it is expected that emission will occur below the modeling results when land preparation studies are conducted.

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.

5.4.2.2. Operation Phase

Air Emissions

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.

On the other hand, the main pollutants expected to emerge due to the vehicles using the road connection during the operational phase of the project are NO2, PM10, CO and VOC. In order to determine the amount of emission that will occur during the operational phase of the project, an assessment has been made on the types and numbers of vehicles as expected in 2052.

Table 5-25: Traffic Projections for 2052

Automobile	Medium Commercial Vehicle	Bus	Truck	Trailer Truck	Total
8,083	2,671	357	219	133	11,463

* In the assessment it was assumed that all types of vehicles use diesel fuel in order to consider worst-case scenario

In calculation of emissions, EMEP/EEA air pollutant emission inventory guideline (2016) was used. For this purpose, approach presented in 1.A.3.b.i iv-Exhaust emissions from road transport was adopted. Coefficients given in the tier 1 method are presented below.

Table 5-26: Emission Coefficients (g/kg fuel)

Vehicle Type	Fuel	CO	VOC	NOx	PM	N_2O	NH_3	Pb	SO_2
Automobile	Gasoline	84.7	10.05	8.73	0.03	0.206	1.106	0.000033	0.08
	Diesel	3.33	0.7	12.96	1.1	0.087	0.065	0.000052	0.016
	LPG	84.7	13.64	15.2	0	0.089	0.08	0	0
Medium Commercial Vehicle	Diesel	7.4	1.54	14.91	1.52	0.056	0.038	0.000052	0.016
Heavy Commercial Vehicles (including intercity buses)	Diesel	7.58	1.92	33.37	0.94	0.051	0.013	0.000052	0.016

* In the assessment it was assumed that all types of vehicles use diesel fuel in order to consider worst-case scenario

Typical fuel consumption rates for different vehicle types and fuel types are presented below.

Table 5-27: Typical Fuel Consumption Values

Vehicle Type	Fuel	Fuel Consumption (g/km)
Automobile	Gasoline	70
	Diesel	60
	LPG	57.5
Medium Commercial Vehicle	Diesel	80
Heavy Commercial Vehicles (including intercity buses)	Diesel	240

Source: EMEP/EEA Air Pollutant Emission Inventory Guidelines (2016)

The number of daily vehicles that will use the highway connection is 8.803 as of 2052. Fuel consumption type information of these vehicles were taken from tuik.gov.tr in order to make the assessment and automobile fuel use data was used. Accordingly, the distribution of automobiles that will use Highway Connection in 2052 by fuel type is as follows:

Table 5-28: Automobiles according to Fuel Types

Fuel Type	Turkey Percentage	2052-Daily Vehicle Number
Gasoline	25%	2.201
Diesel	37%	3.257
LPG	38%	3.345

* Reference: TURKSTAT

Emissions for different vehicle types that use both gasoline and diesel fuel are calculated by the emission coefficients given and typical consumption values and are given in Table 5-29.

Table 5-29: Emissions in Operation Phase

Vehicle Type	Emission(g/sec)								
	Fuel	CO	VOC	NO_X	PM	N_2O	NH3	Pb	SO_2
Automobile	Gasoline	166.403	19.744	17.151	0.059	0.405	2.173	0.000	0.157
	Diesel	8.299	1.745	32.300	2.741	0.217	0.162	0.000	0.040
	LPG	207.766	33.458	37.285	0.000	0.218	0.196	0.000	0.000
Medium Commercial Vehicle	Diesel	21.962	4.570	44.250	4.511	0.166	0.113	0.000	0.047
Heavy Commercial Vehicles (including intercity buses)	Diesel	17.914	4.538	78.864	2.222	0.121	0.031	0.000	0.038

Air dispersion modeling was carried out with AERMOD software for SO2, NO2, PM10, CO, VOC and Pb to evaluate possible impacts during the operation phase of the project. The results of the modeling study were compared with the air quality limit values defined in RCIAP and WBG standards:

Table 5-30: Operation Phase Model Results - SO_2

Receptor	Model Results (µg/m³)			RCIAP Limit Values (µg/m³)		WBG Guideline Values (µg/m³)	
	Hourly	24 hours	Annual	Hourly	Annual	10 minutes	24 hours
Derecikoren	0.00514	0.00077	0.00011	350	60	500	20
Gokceler	0.05483	0.01602	0.00438	350	60	500	20
Sazkoy-1	0.05016	0.01732	0.00456	350	60	500	20
Sazkoy-2	0.00728	0.00285	0.00069	350	60	500	20
Sazkoy-3	0.01634	0.00403	0.00051	350	60	500	20
Sefercik	0.00963	0.003	0.00053	350	60	500	20

Table 5-31: Operation Phase Model Results - NO_2

Receptor	Model Results (µg/m³)		RCIAP Limit Values (µg/m³)		WBG Guideline Values (µg/m³)	
	Hourly	Annual	Hourly	Annual	Hourly	Annual
Derecikoren	5.49	0.52369	200	40	200	40
Gokceler	38.06	3.44195	200	40	200	40
Sazkoy-1	3.91	0.08678	200	40	200	40
Sazkoy-2	14.86	0.38322	200	40	200	40
Sazkoy-3	7.31	0.40161	200	40	200	40
Sefercik	5.49607	3.3048	200	40	200	40

Table 5-32: Operation Phase Model Results – PM10

Receptor	Model Results (µg/m³)	RCIAP Limit Values (µg/m³)	WBG Guideline Values (µg/m³)
	Annual	Annual	Annual
Derecikoren	0.02237	40	20
Gokceler	0.14706	40	20
Sazkoy-1	0.00371	40	20
Sazkoy-2	0.01635	40	20
Sazkoy-3	0.01716	40	20
Sefercik	0.14113	40	20

Table 5-33: Operation Phase Model Results – CO

Receptor	Model Results (µg/m³)	RCIAP Limit Values (µg/m³)	WBG Guideline Values (µg/m³)
	8 Hours	8 Hours	8 Hours
Derecikoren	0.0085	10	-
Gokceler	0.0481	10	-
Sazkoy-1	0.0026	10	-
Sazkoy-2	0.0129	10	-
Sazkoy-3	0.0117	10	-
Sefercik	0.0518	10	-

Table 5-34: Operation Phase Model Results – VOC

Receptor	Model Results (µg/m³)		RCIAP Limit Values (µg/m³)	
	Hourly	Annual	Hourly	Annual
Derecikoren	1.6751	0.1578	280	70
Gokceler	11.8268	1.0370	280	70
Sazkoy-1	1.5006	0.0261	280	70
Sazkoy-2	5.9726	0.1153	280	70
Sazkoy-3	3.4796	0.1210	280	70
Sefercik	15.5902	0.9952	280	70

Table 5-35: Operation Phase Model Results – Pb

Receptor	Model Results (µg/m³)	RCIAP Limit Values (µg/m³)
	Annual	Annual
Derecikoren	0	0.5
Gokceler	0.00001	0.5
Sazkoy-1	0	0.5
Sazkoy-2	0	0.5
Sazkoy-3	0	0.5
Sefercik	0.00001	0.5

As seen above, in the operational phase of the Project, in terms of air quality, there is compliance with both RCIAP and WBG limit values.

Air Quality Model Distribution Maps are presented in Annex-9.

Greenhouse Gas Emissions

During the operation phase, possible impacts on greenhouse gas were evaluated by considering the vehicles to be used in road connection. An evaluation was made on the type and number of vehicles estimated in 2052. In this context, greenhouse gas emissions are calculated using the relevant approach and data (emission coefficients) within the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table 5-36: Greenhouse Gas Emissions

Vehicle Type	Fuel	Number of Vehicles	Fuel Consumption (kg)	Emission Factor (g/kg)	Total Emission (kg)
Automobile	Gasoline	2201	0.315	3180	2.204
	Diesel	3257	0.27	3140	2.761
	LPG	3345	0.25875	3030	2.623
Medium Commercial Vehicle	Diesel	2671	0.36	3140	3.019
Heavy Commercial Vehicles (including intercity buses)	Diesel	709	1.08	3140	2.404
TOTAL					**13.012**

Greenhouse assessment of transportation projects is an essential element. To this end, greenhouse gas emissions during operation were calculated using the 2006 IPCC National Greenhouse Gas Inventory Guidelines, Volume 2: Energy, Part 3: Mobile Combustion. Net calorie values and emission coefficients are taken from this document.

The amount of greenhouse gas emissions of the operational phase will generally depend on the number of vehicles, fuel consumption and distance traveled. Fuel consumption and fuel type are heavily dependent on vehicle technologies, which will be governed by government strategies. Therefore, reducing the effects of greenhouse gas emissions for the operational

phase should be evaluated in the context of comprehensive and large-scale plans and programs in cooperation with the state.

In addition, the assessment made in this chapter did not take into account the contribution of new technology vehicles (such as electric vehicles) that use alternative fuels, which will contribute to reducing greenhouse gas emissions.

5.4.3. Impact Significance, Mitigation Measures and Residual Impacts

5.4.3.1. Air Quality

Assessment of the effects depends on the sensitivity of the recipients and the overall effect size. As detailed in Section 5.1 ("ESIA Methodology"), the overall impact size is based on a number of factors such as geographic extent, duration, reversibility, frequency, and impact size. The magnitudes of the impacts in terms of air quality are based on the percentage exceeding the project standards. If the concentrations of the pollutants exceed the project standards 0-25%, 25-50% and more than 50% in a given receptor, the effect size is defined as low, medium and high, respectively. Pollutant concentration in each location was determined by the model results together with the baseline measurement results. As it can be seen, the impact size is defined as "low" in both construction and operation phases.

The maximum SO_2, NO_2, PM_{10}, CO, VOC and Pb levels calculated during the Operation Period are as follows:

As can be seen, according to the modeling results carried out only according to the vehicle projections in 2052, the 24-hour Limit Value of 200 µg / m^3 for NO_2 parameter was exceeded by 2 percent, and 204 µg / m^3 concentration was observed, and all other results are compatible with the project standards.

Table 5-37: Maximum Emissions of Operation Phase

Parameter	**Model Results (µg/m³)**		
	Hourly	**24 Hours**	**Annual**
SO2	0.27033	0.11343	0.03842
Parameter	**Model Results (µg/m³)**		
	Hourly	**Annual**	
NO2	**204.13**	29.01	
Parameter	**Model Results (µg/m³)**		
	24 Hours	**Annual**	
PM10	2.097	1.2393	
Parameter	**Model Results (µg/m³)**		
	24 hours	**Annual**	
CO	0.323	0.0576	
Parameter	**Model Results (µg/m³)**		

	Hourly	Annual
VOC	0.061	0,.087
Parameter	**Model Results (µg/m³)**	
	Hourly	
Pb	0.00006	

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.

In order to minimize the dust and effects 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.

In addition, in order to minimize the dusting that may occur in the land, the air quality standards related to dusting due to stored materials in the open area, specified in the "Emission Limits for Authorized Facilities" (Annex-1) will be complied with.

5.4.3.2. Greenhouse Gas Emissions

GHG emissions for the construction and operation phase of the project were estimated in above sections of this chapter. The estimations on construction phase included sources such as fuel combustion, blasting and changes in land use type. It was observed from the calculations that clearing of vegetation and changing the land use type is the major GHG emission source during construction. The highest contribution within the land use change emissions was from the removal of organic soils. For the operation phase GHG estimations were carried out for the number of vehicles for 2052 and it was observed that heavy vehicle load was the main contributor to GHG during operation.

Alternatives that are technically and financially feasible and cost effective, to reduce 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. In addition, GHG emissions will be quantified annually during construction phase in accordance with internationally recognized methodologies. In addition, the following measures will be applied:

- Construction activities will be carried out in line with good industrial practices.
- Alternative fuel and energy resources are not applicable for the construction machinery to be used in the scope of the Project. On the other hand The Project Company 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 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.
- Trainings will be provided to site personnel regarding 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 alternatives analysis will be conducted.

Table 5-38: Air Quality Impacts, Mitigation Measures and Residual Impacts

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Decrease in Air Quality	Land preparation and construction	Gökçeler	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor	In order to minimize the dust and effects that may occur soil stripping, cut and fill 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. In the operation phase, following measures will be taken in accordance with RCIAP; having the locations where stacked materials, the connection area where materials are discharged and conveyors and other carriers covered, unloading operations without tossing, covering vehicles with tarpaulin during material transportation and keeping the upper part of the material at 10% humidity During the whole activity, the project site will be regularly moistened with water truck In accordance with the "Exhaust Gas Emission Control and Gasoline and Diesel Quality Regulation" published in the Official Gazette No. 28837 dated 30.11.2013; vehicles with traffic inspections, exhaust gas emission measurements will be used, and vehicles that need maintenance will be taken into maintenance after routine checks and other vehicles will be used until their maintenance is completed. 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. Adopt procedures to limit the drop height of falling materials. Apply dust suppression methods such as watering with water trucks; applying non-toxic antidust 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 with nylon canvas or with materials with grain size larger than 10 mm during transportation. Prefer local licensed quarries and material borrow sites for the reduction of transportation distance of materials. Where necessary, place wind shields or barriers around material storage sites to prevent spreading of dust emissions where necessary. Upgrade where necessary and ensure maintenance of access roads (both to construction camp sites, construction sites, quarries/material borrow sites and material storage areas). Avoid driving of construction vehicles through settlements where possible. Implement Project Grievance Mechanism. If any comment related with dust and air quality is received through the Grievance Mechanism, evaluate the complaint and where necessary plan and implement corrective actions.	Negligible
		Sefercik	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
		Sazköy-1	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
		Sazköy-2	Local	Medium	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
		Derecikören	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
	Operation	Gökçeler	Local	High	Irreversible	Long-term	Continuous	High	Medium	Minor	Implement Project Grievance Mechanism. If any comment related with dust and air quality is received through the Grievance Mechanism, evaluate the complaint and where necessary plan and implement corrective actions.	Negligible
		Sefercik	Local	Negligible	Irreversible	Long-term	Continuous	Low	Medium	Minor		Negligible
		Sazköy-1	Local	High	Irreversible	Long-term	Continuous	High	Medium	Minor		Negligible
		Sazköy-2	Local	High	Irreversible	Long-term	Continuous	High	Medium	Minor		Negligible
		Derecikören	Local	High	Irreversible	Long-term	Continuous	High	Medium	Minor		Negligible

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Greenhouse Gas Contribution	Construction & Operation	Highway Connection	Local	High	Irreversible	Long-term	Continuous	High	Medium	Negligible	Construction activities will be carried out in accordance with good industry practices. Alternative fuel and energy resources are not applicable for the construction machinery to be used in the scope of the Project. On the other hand The Project Company 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 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. Trainings will be provided to site personnel regarding energy efficiency and best practices.	Negligible

5.5. Water Resources and Wastewater Management

5.5.1. Methodology and Project Standards

5.5.1.1. Methodology

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

- National Catchment Protection Action Plan of Batı Karadeniz Catchment (2013)
- TUIK Database
- Database of the Turkish State Hydraulic Works (DSI),
- 1/25,000 scale topographical maps of the Project route,
- Long-term Extreme Meteorological Events Reports obtained from 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 5.1 of the ESIA Report, taking the both the receptor sensitivity and the magnitude of the impact into consideration.

5.5.1.2. Project Standards

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

- Guidelines for Drinking Water Quality – World Health Organisation (WHO), 2011.
- Regulation on Waters Intended for Human Consumption (RWIHC), Chemical Parameters and Indicator Parameters – Turkish Ministry of Health, 2005;
- Turkish Water Pollution Control Regulation (WPCR); (Official Gazette Date: 31.12.2004, No: 25687),Standards for Discharge of Domestic Wastewater into Receiving Water Bodies (Population 84-2000);
- IFC's General Environmental, Health and Safety (EHS) Guidelines, Indicative Values for Treated Sanitary Sewage Discharges;
- Surface Water Quality Regulation (SWQR), Inland Surface Waters Quality Criteria – Turkish Ministry of Forestry and Water Works, 2012.

5.5.2. Impact Assessment

5.5.2.1. Land Preparation and Construction Phase

Water Use

In the land preparation and construction phase of the Project, there will be no water use other than drinking and utility purposed water use of 150 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;

150 people x 240 L/day-capita[(44)]= 36 m^3/day

([44]) (TURKSTAT) 2018 According to Turkey Municipality Water Statistics; Drinking and utility water requirement per person has been determined as 131L/capita-day for Zonguldak Province

In addition, it is estimated to use approximately 5 m^3 of water per day in order to prevent dusting.

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

Wastewater Generation

t is planned to employ 150 people during the land preparation and construction phase, and the amount of domestic wastewater to be generated is calculated as 27.9 m^3 / day on the assumption that a person's daily water use requirement is 186 lt / person-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 disposal will be provided within the scope of the protocol to be made with the municipality that has a wastewater infrastructure system.

On the other hand, it is planned to use an average of 5 m3 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.

Impacts on Surface Water Flow

Crossing of surface waters by the project route is given in the Chapter 4.4.1. These crossings are with the Filyos Creek and influent streams of Filyos Creek with seasonal flow. In case those surface waters are not crossed with properly designed engineering structures and techniques, deformation is possible around them. Other than this impact, the stability of cut&fills along the route may be adversely affected due to uncontrolled flowing surface waters and rising groundwater level. Especially potential flood events in case of excessive precipitation in the region 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 includes 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

Filyos Creek passes through the area and covers a wide area and covers a wide area. Within the scope of the Filyos Basin Flood Protection Project (dam and flood traps for flood protection purposes), construction works of the 2nd part of the Filyos Creek Flood Protection are ongoing. The area outside the Filyos Creek is partly farmed, partly empty bushes, poplar, wooded and reed areas are available.

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 Iller Bank in 2010. In the report approved by İller Bank General Directorate, Department of Underground Investigations in 2010, the evaluations for the study area whose limits are specified in Figure 5-16 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 5-16, 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 study area and it is stated that there will be no flood hazard for the region with the Filyos River Flood Prevention Project.

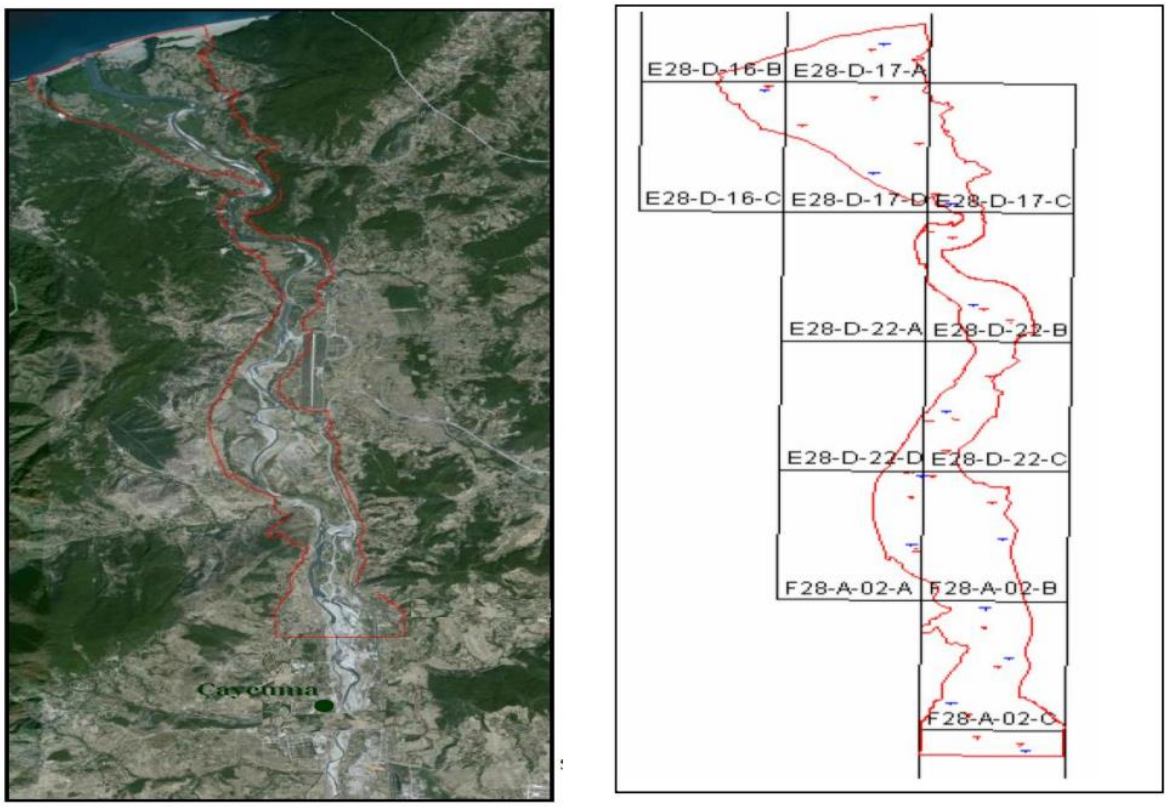

Figure 5-16: Report Approved by Iller Bank General Directorate, Department of Underground Studies and 1/5,000 Scale Layout Index

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 fo 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.

Impacts on Ground Water

If hazardous material spills / leaks of fuel, oil, petroleum, cement, etc. are not controlled immediately, it may reach groundwater and cause contamination especially in areas where the groundwater level is high and dominated by alluvial soil. Interaction with groundwater may occur during the construction of the bridge abutments. Groundwater will not be utilized during the project land preparation and construction phase.

5.5.2.2. Operation Phase

Water Use

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

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

100 people x 240 L/day-capita= 2,40 m^3/day

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

Wastewater Generation

During the operation phase of the project, the total number of employees working at the station and passengers visiting the stations will be approximately 100 people. In this context amount of wastewater generation is calculated as;

100 people x 186 L/day-capita= 1,86 m^3/day

After collecting wastewater in septic tanks to be built at the stations, it will be transmitted to the nearest wastewater treatment plant with the sewage trucks of the relevant municipality.

Impacts on Surface and Ground Waters

During 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 prohibitied to store any type of chemical and hazardous material near 50 meters of any creek or river. Personnel will be trained regarding waste disposal to the rivers and creeks and periodic checks will be maintained to monitor waste disposal to streams.

No surface and groundwater source will 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.

5.5.3. 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". Information on the engineering structures planned for crossing the surface waters are given in Table 5-39.

Table 5-39: List of Engineering Structures Planned on the Project Route

Route Name	Route KP	Engineering Structure Location	Type of Engineering Structure	Length/size of Engineering Structure (m)
Gökçeler-Industry Railway Line	2+571.04 – 2+958.54	Filyos Creek	New railway bridge	387.5
	0+399.99, 1+001.81, 1+767.53, 2+008.93, 4+601.92	Stream with seasonal flow	Box culvert	2.00 x 2.00
	5+895.00		Box culvert	2.50 x 2.50
Highway Connection Line	3+360.41 – 3+747.91	Filyos Creek	New highway bridge	387.5
	2+504.182	Stream with seasonal flow	Box culvert	2.00 x 2.00
Existing Highway Extension Line	0+685.80	Streams with seasonal flow	Culvert	10.0 x 5.0

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. 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.

Mitigation Measures on Groundwater

When determining the locations of temporary fuel or oil storage areas, location of water resources will be taken into account. Accidental spill of hazardous materials such as fuel, oil, oil, cement etc. will be taken under control immediately. Interaction with groundwater may occur during the construction of the bridge abutment foundations, but there will be no significant impact on the quality and quantity of groundwater as the area to be covered by the foundation of this bridge abutments will be limited.

Table 5-40: 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
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Wastewater Generation	Land preparation and construction, Operation	Construction Area, Stations	Limited	Low	Short-term reversible	Short-term	Intermittent	Low	Low	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 wastewater infrastructure system. 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
Impacts on Surface Water Flow and Flood Risk	Land preparation and construction, Operation	Surface Water Resources, Project elements, Project Personnel, Railway and Highway Users	Wide	High	Irreversible or Long-term Reversible	Long-term	Intermittent	High	High	Major	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. 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. 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. Consequently flood events along the project route are prevented. In order to monitor the water quality of the surface waters within the project study area, periodically at least 2 times a year (rainy and dry periods), considering location of the pollution sources during land preparation and construction phase, water samples will be collected and assessment of the water quality of the samples will be performed.	Minor
Impacts on Groundwater	Land preparation and construction, Operation	Alluvial Groundwater Aquifer	Local	Medium	Medium-term reversible	Short-term	Intermittent	Medium	High	Moderate	When determining the locations of temporary fuel or oil storage areas, location of water resources will be taken into account. Accidental spill of hazardous materials such as fuel, oil, oil, cement etc. will be taken under control immediately.	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
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Impacts on Surface Water	Operation	River crossings	Local	Medium	Medium-term reversible	Long-term	Intermittent	Low	Low	Minor	It will be prohibitied 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 Periodic checks will be maintained to monitor waste disposal to streams.	Negligible

5.6. Resource and Waste Management

5.6.1. Methodology and Project Standards

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

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

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

5.6.1.1. Methodology

Both qualitative and quantitative approaches have been adopted in the Environmental and Social Impact Assessment to evaluate the project's material use and waste management. GDII provided technical information about excavation and filling amounts and the number of personnel that cause waste generation as a result of their daily activities.

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

- World Bank Environmental and Social Standards, ESS 1: *Assessment and Management of Environmental and Social Risks and Impacts:*
- World Bank Environmental and Social Standards, ESS 3: *Resource Efficiency and Pollution Prevention and Management*
- Environmental, Health, and Safety (EHS) Guidelines for Railways (April 30,2007),),
- IFC, Environmental Health and Safety (EHS) Guidelines for Construction Materials Extraction (April 30,2007),
- Mining resource maps of material borrow sites and quarries published in the internet site of General Directorate of Mineral Research and Exploration (MTA),
- Provincial Environmental Status Reports published by the Provincial Directorates of Environment and Urbanization (2018),
- National Waste Management and Action Plan published by the Ministry of Environment and Urbanization, General Directorate of Environmental Management (2016-2023),
- Waste statistics published by Turkstat (2018),

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

5.6.1.2. Project Standards

Regulation on Waste Management is the basis of national legislation relating to the management of waste in Turkey. In addition to this there is another regulation for specific sort of waste. These include waste streams from excavations, constructions, building demolitions, waste oils, packaging waste, waste batteries and accumulators, medical waste, waste electrical and electronic equipment, and waste tire. The full list of legal national waste regulations are given in the project is provided in Part 2 of the ESIA Report. Fundamental standards that identified in national regulation about waste management are given below briefly.

Table 5-41: Basic Standards / Terms Defined by National Waste Management Regulations

National Legislation	Standards/Terms
Regulation on Waste Management	Waste Management Plan developed and implemented for reduction at source, reuse and recycling of solid wastes "3-Year Waste Management Plan" developed, approved (by the authorities) and implemented for hazardous wastes Different types of wastes stored in separate containers (domestic, recyclable ones, hazardous wastes...) Hazardous wastes stored in designated temporary storage areas Closed containers used to store hazardous wastes should be in good condition, durable and closed tightly then they placed on water resistant surface such as concrete floor. Labels put on hazardous waste containers to identify type of the waste, amount of the waste and date of storage Registration of produced wastes are conserved in facility Waste declaration forms (for the waste generated in the previous year) filled and submitted to the Ministry of Environment and Urbanization in March of the coming year Agreements with municipalities or licensed companies for recycling, recycling, final disposal
Regulation on Packaging Waste Control	Packaging waste temporarily stored in a designated place separate from other wastes and chemicals Recyclable waste delivered to licensed recycling companies
Regulation on Waste Oil Control	Characteristics of waste oils analyzed according to the parameters specified in Regulation on Control of Waste Oils and categorization of waste oils done
Regulation on Control of Excavation Soil, Construction and Demolition Waste	Store top soil 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 main standard applicable to the Project's impacts on potential materials and wastes is ESS 3 - Resource Efficiency and Pollution Prevention standard and it necessitates below issues;

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

Likewise, it requires the establishment of a waste management hierarchy that takes into account the prevention, reduction, reuse, recovery, recycling, disposal of waste and finally waste disposal.

At the same time, the European Union Waste Framework Directive (2008/98 / EC) was decisive in defining the waste management approach. This directive sets out basic concepts and definitions such as waste management, waste definitions, recycling, and recycling. It explains when waste ends up as waste and becomes a secondary raw material (referred as end-of-waste criteria) and how to distinguish between waste and by-products. The Directive sets out some basic waste management principles.

5.6.2. Impact Assessment

5.6.2.1. Impact Assessment

Land Preparation and Construction Phase

During the land preparation and construction phases of the project, activities such as cleaning the vegetation and digging the ground, levelling the area, construction of the railway and highway will be carried out. Therefore; main waste type to be considered during the land preparation can be stated as excavation and construction waste (e.g. scrap metal, wood, concrete waste, etc.) and system equipment waste (boards, cables, electronic components).

In addition, solid wastes will be generated due to human activities at camp site and railway and highway construction sites as well. Solid waste types expected to be generated within the scope of the human activities are; domestic solid wastes, packaging waste of equipment (e.g. wood, cardboard, plastic, etc.), hazardous waste

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

Origins of the waste, waste types and final disposal measures are given in the waste stream diagrams below;

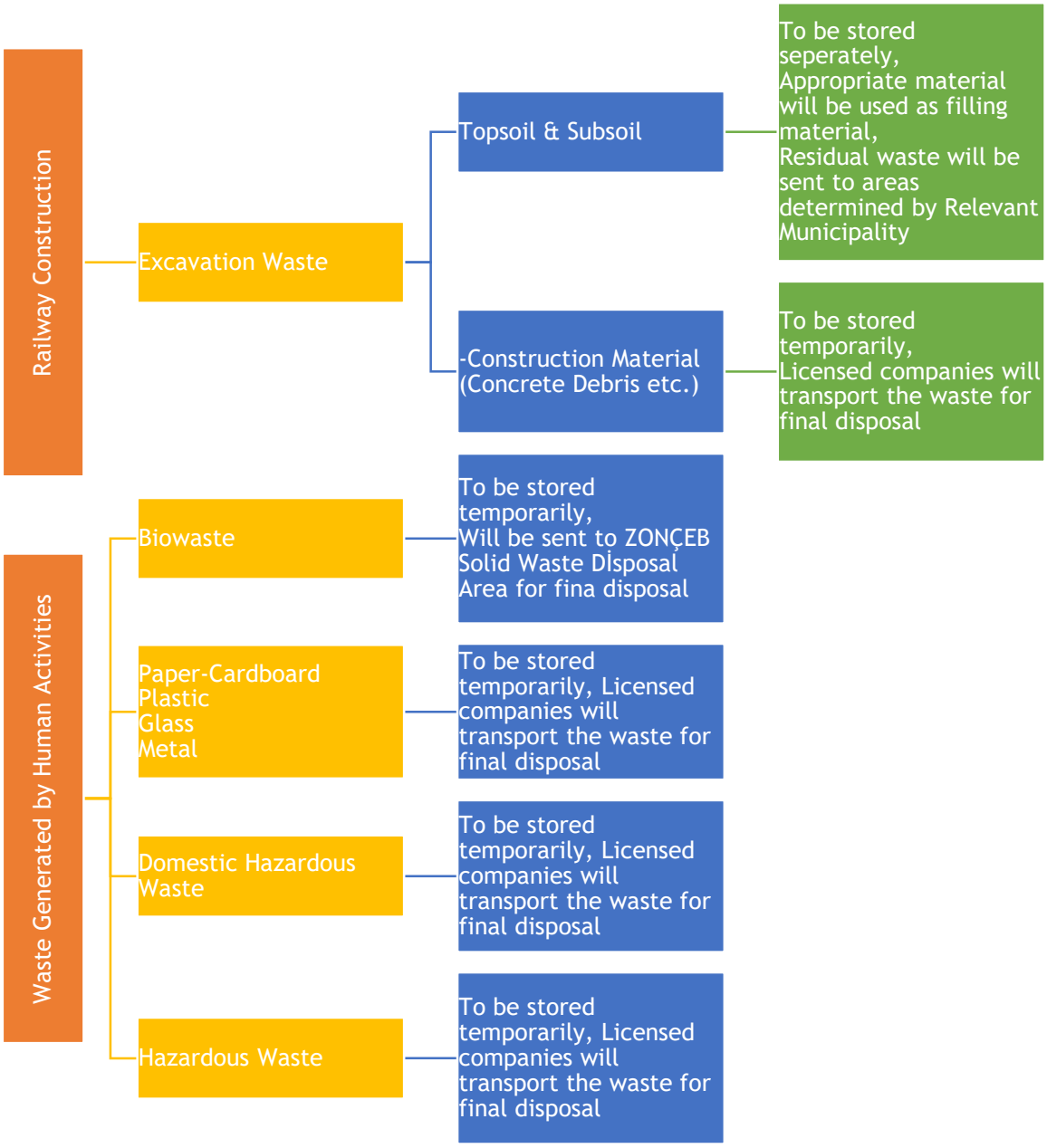

Figure 5-17: Waste Stream Diagram for Land Preparation and Construction Phase

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 5-42.

Table 5-42: General List of Wastes from Land Preparation and Construction Phase

Waste Code	Waste Code Definition
13	**Oil Wastes and Liquid Fuel Wastes (except food oils, 05 and 12)**
13 02	Waste Engine, Transmission and Lubricating Oils
15	**Waste Packaging and Absorbents (not reword), Wiping Cloths, Filter Materials and Protective Clothing**
15 01	Packaging (Including Separately Collected Packaging Wastes of the Municipality)
15 02	Absorbents, Filter Materials, Cleaning Cloths and Protective Clothing
16	**Wastes Not Reword in the List**
16 06	Batteries and Accumulators
17	**Construction and Demolition Waste (Including Excavation Excavated from Contaminated Areas)**
17 01	Concrete, Brick, Tile, Ceramic
17 02	Wood, Glass and Plastic
17 04	Metals (including alloys)
17 05	Soil (Including Excavated Materials from Contaminated Places), Stones and Dredging Muds
17 06	Insulation Materials and Construction Materials Containing Asbestos
17 09	Other Construction and Demolition Waste
20	**Municipal Wastes Including Separately Collected Fractions (Residential and Similar Commercial, Industrial and Institutional Wastes)**
20 01	Separately Collected Fractions (except 15 01)
20 03	Other Municipal Waste

Excavation and Construction Wastes

The amount of excavation expected to occur during the construction phase of the project is approximately 1,362,000 m^3. 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.

Within the scope of the project, appropriate storage areas will be determined for the excavation surplus material storage and necessary expropriation procedures will be carried out within this scope. The Contractor Company will provide storage sites with sufficient

capacity to store all excavated material. When sufficient storage areas are installed, 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.

Non-hazardous Solid Wastes

According to TUIK municipal waste statistics in 2018, the average daily municipal waste per capita was calculated as 1.04 kg (TUIK, 2018). The estimated amount of municipal waste that will occur during the land preparation and construction phase of the project is given below, according to the number of people working in the field. This amount includes separately collected fractions such as paper, cardboard, glass, metal, plastic and biodegradable waste:

150 person x 1.08 kg/person*day = 162.0 kg/day

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

Within the scope of the National Waste Management and Action Plan (2016-2023)[1], the components of municipal waste are categorized by region. 55% of the municipal waste generated according to the municipal waste characterization of the Black Sea region, where the Project Area is located, is in the bio-waste category. This municipal waste includes bio-waste, paper-cardboard, plastic, glass, metal, combustible, domestic hazardous waste and other wastes. Black Sea Region solid waste characterization is examined below.

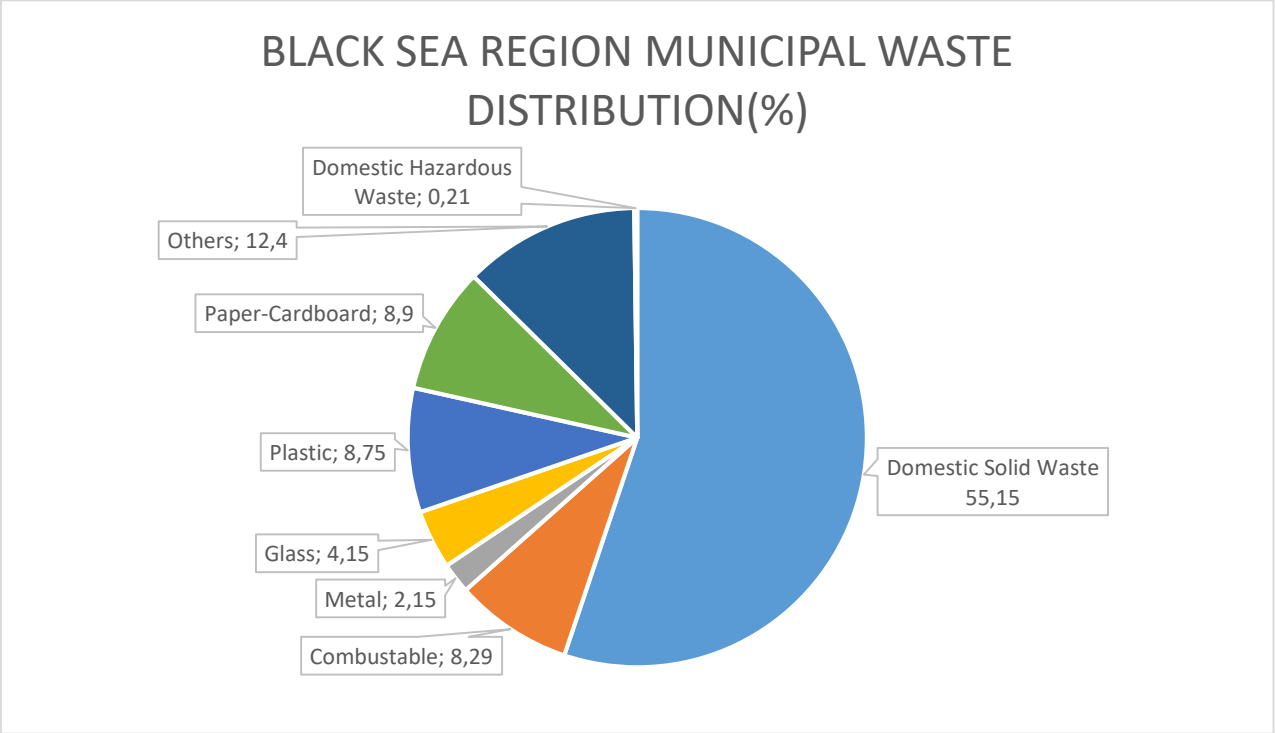

Figure 5-18: Percentage of Municipal Waste Distribution in the Black Sea Region (GDEM, 2017)

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

Table 5-43: Municipal Waste Components and Amounts that Will Occur During Land Preparation and Construction Phase

Waste Type	Amount (kg/day)
Domestic Solid Waste	89.34
Paper-Cardboard	14.42
Plastic	14.18
Glass	6.72
Metal	3.48
Combustible	13.43
Domestic Hazardous Waste	0.34
Others	20.09
Total	**162.00**

As stated in Chapter 4.5.2, the disposal of solid waste generated in Zonguldak Province is carried out in the solid waste storage facility affiliated to ZONCEB. The second lot of the solid waste storage facility started to accept waste as of September 2019. ZONCEB Waste Storage Facility is properly licensed and managed in an environmentally acceptable manner therefore it can be used for the project purposes.

The solid waste storage facility has a total of 600,000 tons of solid waste storage capacity and can accept 450 tons of waste per day. In this case, 0.1162 tons of solid amount to be produced per day corresponds to approximately 0.036% of the daily solid waste reception capacity of the solid waste storage facility.

In addition, 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.

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

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 take place.

Accumulators expected to occur in case of maintenance and repair operations at the construction site will be given to companies that collect such wastes and provide recycling in accordance with the Waste Management Regulation.

Waste tires expected to occur after maintenance and repair operations at the construction site will be delivered to the companies or authorized carriers that distribute and sell tires in accordance with the Regulation on Control of End-of-Life Tires.

Oil change of construction machinery will be carried out every two months, at least once. Oil change for maintenance of the machines will be done at licensed services. Thus, there will be no waste oil production during the land preparation and construction phases of the project.

In the infirmary, which is planned to be installed at the construction sites during the construction works, only first aid equipment will be available to carry out the first response. At this stage, medical waste generation is not expected, only a small amount of bandage wastes will be generated. These wastes will be collected in private containers in the infirmary and given to the licensed Medical Waste Disposal Facilities. During the construction phase of the project, the provisions of the “Medical Waste Control Regulation” published in the Official Gazette dated 25.01.2017 and numbered 29959 will be complied with.

Hazardous and Special Wastes

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

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

- Wastes and materials contaminated with lubricants, hydraulic fluids or fuels (personal protective equipment, rugs, clothes, etc.)
- Operation and maintenance of construction equipment and machinery that require the use, storage and transportation of different amounts of fuels, oils and lubricants,
- Solvents and paints to be used in construction activities,
- Vegetable oils, batteries, electrical / electronic equipment, cables, fluorescent lamps, medical supplies consumed by the Project staff.
- Spillage metal goods and materials in contact with fuels, dangerous substances / chemicals,
- Waste tires and accumulators from construction machinery.

It is necessary to manage hazardous and special wastes correctly in order to avoid the important impacts on receiving environments and also on human health. The project will fully comply with the national waste regulation and implement international waste management standards in accordance with the Waste Management Plan based on the waste hierarchy. Therefore, no significant impacts are expected due to waste generation during the land preparation and construction phase of the Project.

Operation Phase

During operation phase, waste due to maintanence and repair operations and human activities (personelle and passengers) is expected.

Origins of the waste, waste types and final disposal measures are given in the waste stream diagrams below;

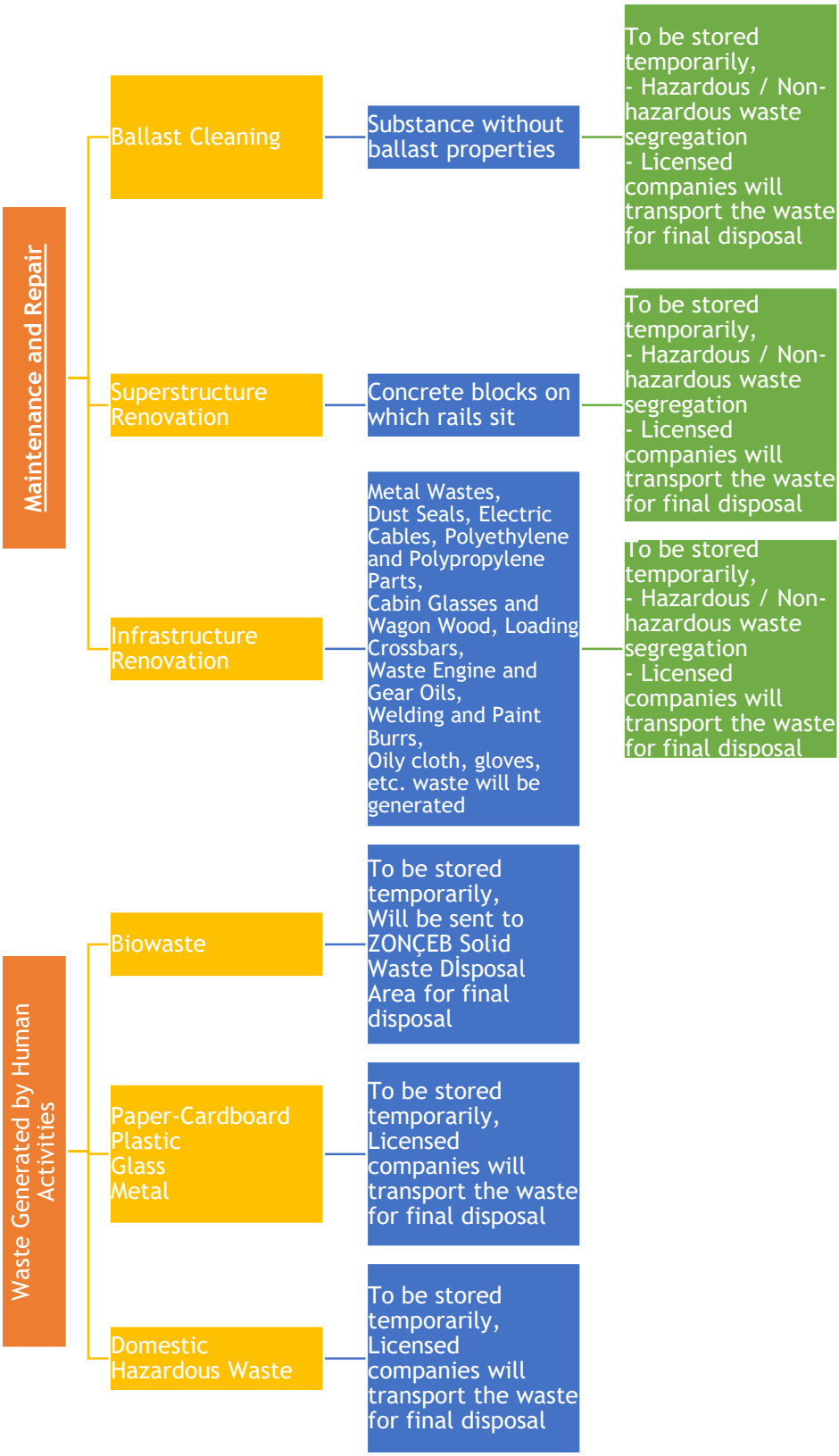

Figure 5-19: Waste Stream Diagram for Operation Phase

Non-hazardous Solid Wastes

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. In the feasibility studies carried out within the scope of the project, the number of people who will work at the stations and visit them daily has been determined as 100 people for one station. Within the scope of the project, two stations, Gökçeler and Industry, will be built. In this case, the number of people who will provide waste production during the operation phase is 200. In this case, during the operation phase, the amount of waste to be produced daily is as follows:

200 person x 1.08 kg/person*day = 216.0 kg/day

When the composition of the waste to be evaluated within the scope of the National Waste Management and Action Plan (2016-2023), the components of the waste are as follows:

Table 5-44: Municipal Waste Components and Amounts to Occur During Operation Phase

Waste Type	Amount (kg/day)
Domestic Solid Waste	119.12
Paper-Cardboard	19.22
Plastic	18.90
Glass	8.96
Metal	4.64
Combustible	17.91
Domestic Hazardous Waste	0.45
Others	26.78
Total	**216.00**

The amount of 0.216 tons of solid to be produced per day corresponds to approximately 0.048% of the daily solid waste reception capacity of the solid waste storage facility.

In addition, since there is no infirmary at the stations, the nearest health center will be used for medical interventions in case of an unexpected accident during the activities. Therefore, significant medical waste will not be generated during the operation phase. Due to first aid practices, a negligible amount of medical waste (band-aid, etc.) may be generated.

The garbage to be generated at the stations 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 ZONCEB solid waste storage facility by the relevant municipality garbage trucks. ZONCEB Waste Storage Facility 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

During the operation phase, the formation of wastes that will result from the maintenance and repair of the trains will occur. Maintenance-repair wastes are generally described below.

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

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

Infrastructure Renovation: Infrastructure renewal works to be carried out in extraordinary situations during the operation of the railway line, and its amount is unpredictable.

Accordingly, arising from maintenance and repair work;

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

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

Hazardous and Special Wastes

Limited quantities of hazardous and special wastes produced at this stage will include the following:

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

5.6.3. Impact Significance, Mitigation Measures and Residual Impacts

Waste management practices are based on the waste management principles defined by the European Union Waste Framework Directive (2008/98 / EC). These principles basically state that wastes should be managed without endangering human health and without harming the environment, and especially without risking water, air, soil, plants or animals, disturbing noise or odors, and adversely affecting rural areas or special interests.

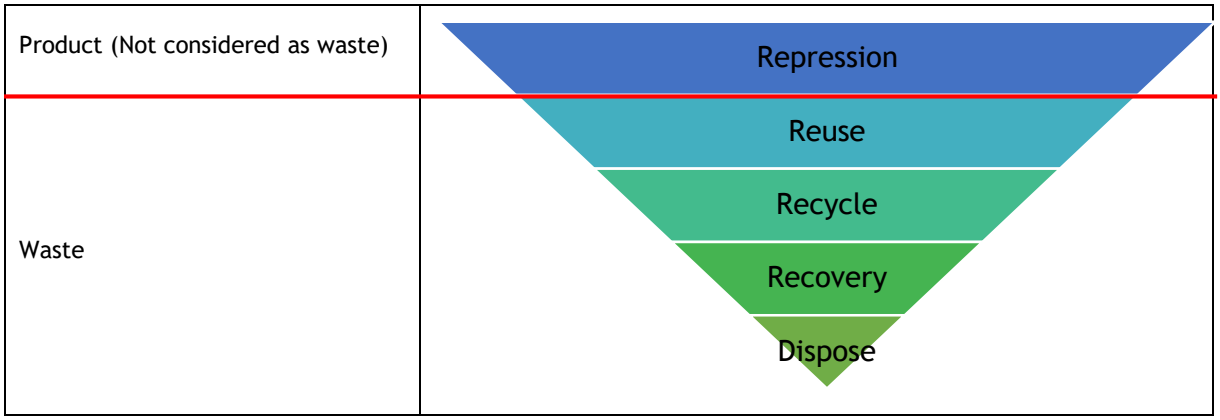

Figure 5-20: Waste Management Hierarchy [45]

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

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

Project waste management will be carried out in accordance with national and international standards / good practices listed in Section 5.6.1. A Waste Management Plan will be available in all land preparation, construction and operational phases of the project, and the implementation of the best practice in waste management will be regularly reviewed and renewed as necessary. Impacts associated with resource and waste management, impact materiality for identified impacts, proposed mitigation measures and residual impacts are given below.

45 https: //ec.europa.eu/environment/waste/framework/

Material Use

Aggregate Material will be needed during the construction phase of the Project. However; types and volumes of materials to be use was not specified during the feasibility study (Chapter 1.4).

In case of a need for new quarry/borrow site to be used during the construction activities, the environmental and social assessments should be performed by Conractor in line with the Management of Change Process described in ESMP. More specifically, the environmental subjects listed below should be assessed;

- Air Emissions
- Noise and Vibrations
- Water Use
- Waste Generation
- Land Conversion (Reinstatement)

During shoveling, ripping, drilling, blasting, transport, crushing, grinding, screening, and stockpiling) activities dust emissions are expected. To control dust emission;

- Land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles, and blasting should be planned with due consideration to meteorological factors (e.g. precipitation, temperature, wind direction, and speed) and location of sensitive receptors;
- A simple, linear layout for materials-handling operations to reduce the need for multiple transfer points should be designed and installed (e.g. processing plants should be preferably located within the quarry area);
- Dust emissions from drilling activities should be controlled at the source by dust extractors, collectors, and filters, and wet drilling and processing should be adopted, whenever possible;
- Dust emissions from processing equipment (e.g. crushers, grinders, screens) should be adequately controlled through dust collectors, wet processing, or water spraying. Dust control applications should consider the final use of extracted material (e.g. wet-processing stages are preferred when wet materials or high water contents would not negatively affect their final use);
- Procedures to limit the drop height of falling materials should be adopted;
- Use of mobile and fixed-belt transport and conveyors should be preferred to hauling the material by trucks through internal roads (enclosed rubber-belt conveyors for dusty materials are recommended in conjunction with cleaning devices);
- Internal roads should be adequately compacted and periodically graded and maintained;
- A speed limit for trucks should be considered;
- Water spraying and surface treatment (e.g. hygroscopic media, such as calcium chloride, and soil natural-chemical binding agents) of roadways and exposed stockpiles using a sprinkler system or a ”water-mist cannon” should be implemented;
- Exposed surfaces of stockpiled materials should be vegetated.

Moreover, to control, NO_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 activies 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, microdelayed, 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 overconfined 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 plantscreening equipment. Adequately designed foundations for these facilities should sufficiently limit vibrations.

Water will be needed during the operation of the quarries and borrow sites, on the other hand, water needs should be limited through recirculation and reuse, implementing closed-circuit systems from sedimentation ponds to the quarrying process. If water use is significant, especially in arid or semi-arid regions, a water-resource availability and impact assessment should be conducted. Moreover, any alteration to water regime via surface water and groundwater should be controlled.

Dewatering of the quarrying pit, diamond-wire cutting, and surface water runoff can generate a wastewater discharge high in suspended solids. To prevent or minimize the suspended sediments in discharge waters the following are recommended:

- Adoption of settlement ponds, sumps, and lagoons designed to allow adequate retention time. Lagoons should be sealed with impervious material, as needed, and adequate maintenance programs of the settlement lagoons should be implemented, including side-slope stability, pipe cleaning/maintenance, and removal of settled materials;
- Recycling of processing / wire cutting waters;
- Construction of a dedicated drainage network;
- Settlement enhancement by using flocculants or mechanical means, particularly where limited space prevents or limits the use of lagoons;
- Installation of sediment traps along water drainages, including fascines, silt fences, and vegetation traps.

Rock waste and removed topsoil–overburden are the main inert wastes produced by quarrying activities. Hazardous wastes may be generated from impurities and trace components included in the exploited (waste) rocks (e.g. asbestos or heavy metals or minerals that could result in acidic runoff). The recommended prevention and control methods to reduce wastes include the following:

- Operational design and planning should include procedures for the reduction of waste production (e.g. blending high-quality rock with poor rock);
- Topsoil, overburden, and low-quality materials should be properly removed, stockpiled near the site, and preserved for rehabilitation;
- Hazardous and non- hazardous waste management plans should be developed and adopted during the design and planning phase. Impacts associated with specific chemical and / or physical properties of extracted materials should be considered during the design phase, and impacts from waste rock impurities should be adequately controlled and mitigated by covering waste disposals with noncontaminated soil.

Excavation activities at construction materials extraction sites often involve major topographical and land-cover changes to allow extraction activities, often including clearing of preexisting vegetation. Therefore, proper reinstatement activities should be conducted after operation of the quarry ends. Measures to have an adequate reinstatement activity includes but not limited to:

- Selection of appropriate low-impact extraction (e.g. excavation, quarrying, and dredging) methods that should result in final site contours supportive of habitat restoration principles and final land use;
- Establishment of buffer zones from the edge of extraction areas, considering the characteristics of the natural habitats and the type of extraction activities;
- To reduce the consumption of land area and, consequently, the loss of soil, preference for extraction should be given to thicker deposits (these should be exploited as far as possible and as reasonable);
- Vegetation translocation and relocation techniques should be used as necessary. Vegetation cover, such as native local plants, topsoil, overburden, or spoils feasible for sustaining growth should be removed in separate operations and segregated for later use during site reinstatement, and materials to be used for site reinstatement should be stockpiled and protected from wind and water erosion, as well as from contamination;

- During extraction, ecological niches should be preserved and protected as far as possible;
- Smaller, short-lived extraction sites4 should be reclaimed immediately, and larger sites with a useful lifespan beyond 3–5 years should be subject to ongoing rehabilitation; 4 Such as 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 landuse plans. Land that is not restored for a specific community use should be seeded and revegetated with native species;
- Test pits, interim roads (internal and access), buildings, installations, and structures of no beneficial use should be removed, and the land should be appropriately rehabilitated. Hydrological systems should be restored to predevelopment runoff rate.

If the contractor will have the material obtained from licensed borrow pits and quarries, it will be ensured that the areas and quarries have “EIA Positive” or “EIA Not Requirred” Decisions. Contractor will prepare an Aggregate Management Plan and submit to GDII 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. Aggregate Management Plan will include, mitigation measures for environmental and social risks and environmental monitoring needs.

Table 5-45: Impacts on Resources and Waste Management, Mitigation Measures and Residual Impacts

Definition of Impact	Project Phase	Magnitude of Impact							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Possible impacts from storage of excavation surplus materials	Land preparation and Construction	Environmental resources (soil, surface water, groundwater), Ecological receptors, Community health and safety	Restricted	Medium	Irreversible	Long term	Continuous	High	Low	Minor	Use of excavation material as much as possible in filling works, Storage of excavated material that cannot be used for filling operations in temporary storage areas where necessary permissions have been obtained and in sufficient capacity. Proceeding according to the splitting and filling program to minimize excavation wastes during excavation operations.	Minor
Non-Hazardous Solid Waste Management	Land preparation and Construction	Environmental resources (soil, surface water, groundwater), Ecological receptors, Community health and safety Project staff health and safety	Wide	Medium	Short-term reversible	Short term	Continuous	Medium	Low	Minor	Creating and implementing a project-specific Waste Management Plan, To comply with the requirements of applicable waste management regulations for the management of all waste generated as a result of the project activities, Separation of wastes (hazardous / non-hazardous, recyclable / non-recyclable) and temporary storage in designated storage areas Ensuring that waste storage areas meet the standards set by the relevant legislation: - Determining sufficient and appropriate storage areas and ensuring that conditions such as container types, labels and classifications are appropriate in these areas, - Ensuring impermeability on the grounds of storage areas against possible contamination of soil and groundwater, - Sufficient ventilation of the area under conditions where volatile wastes need to be stored, - Establishing a suitable drainage system against leaks, - Restriction of physical access to waste storage areas (through gates, fences, etc.); ensuring that only authorized persons can enter the storage areas, - Placing warning signs and panels with the name and contact number of authorized personnel in storage areas, - In order to be prepared for emergencies such as spillage, fire, absorbent materials, fire extinguishing equipment, etc. near the area. be ready, - Quick identification of any possible spillages / leaks by periodically performing visual checks in hazardous waste areas, Ensuring that wastes are not spilled out of areas other than those reserved for this purpose and providing necessary training and all necessary waste management training and periodic repetition of these trainings, No waste should be disposed of or burned at the construction site, Marking waste explosives and used explosive containers as explosive waste. Storage of explosive wastes separately in storage areas reserved for this purpose, where only authorized personnel can work. Delivery of these wastes to licensed companies, Ensuring that the Contractors 'and subcontractors' Waste Management Plan and the measures specified in this ESIA are implemented.	Negligible
	Operation	Environmental resources (soil, surface water, groundwater), Ecological receptors, Community health and safety	Wide	Negligible	Short-term reversible	Long term	Continuous	Low	Low	Minor	Implementing a project-specific Waste Management Plan. Visual control of waste and garbage spilled along the railway route and periodic collection of these garbage, separation of these wastes according to their recyclability, storage of separated wastes in separate containers and disposal according to the Waste Management Regulation.	Negligible

Definition of Impact	Project Phase	Magnitude of Impact							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
		Health and safety of station staff									Using lead-free paints for maintenance work. Collecting the garbage that will occur at the stations from the collection areas to be placed in the station and forwarding them to the ZONCEB solid waste storage facility with the garbage trucks of the relevant Municipality.	
Additional load on the waste management facilities of the region	Land preparation and Construction Operation	Regional waste management infrastructure	Wide	Negligible	Irreversible	Long term	Continuous	Negligible	Low	Negligible	Construction and use of excavation material storage areas of appropriate number and capacity; storage of all excavation material in storage areas where temporary expropriation procedures are carried out and necessary permits are obtained, Ensuring that waste disposal agreements are made with municipalities and licensed recycling / disposal firms.	Negligible
Material Use	Land preparation and Construction	Borrow areas and quarries to be selected, Local People	Local	Negligible	Short-term reversible	Short Term	Continuous	Negligible	Low	Negligible	It will be ensured that the areas and quarries have “EIA Positive” or “EIA Not Requirred” Decisions. 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 Contactor will identify potential borrow areas and quarries with indication of capacities, while providing measures for site reinstatement.	Negligible

5.7. Biodiversity

5.7.1. Methodology and Project Standards

5.7.1.1. Methodology for Biodiversity Studies

ESIA biodiversity studies within the scope of Filyos Port and Industrial Zone Railway-Highway Connections Project have been conducted based on previously published scientific work, reports on habitats and species, field surveys conducted in January 2020 and expert judgement. Methodologies applied by field experts targeting different animal and plant groups considered priority habitats of the area, species of high conservation concern and also protected areas.

The fact that field surveys were undertaken in January 2020, limited the availability of on-site data especially in terms of identifying the fauna composition of the area. It is important that additional pre-construction surveys are conducted in Spring and/or Summer, so that data gaps can be closed, and habitat and species-specific mitigation measures and management strategies to be further developed within the scope of the BMP can reflect the current conditions As in the case of baseline fieldwork, additional field surveys will be undertaken by flora and fauna experts to cover the entire Project route, as well as temporary construction sites and permanent structures as planned. In line with the BMP, it is the responsibility of the GDII to appoint experts to conduct the field surveys and report the results and make necessary assessments in line with the provisions of ESS6. The exact timing of the surveys will depend on the seasonal weather conditions, but a general approach would be to study the area from April through June prior to the finalization of the detailed design and will then be incorporated into the BMP.

As with other environmental and social topics addressed in the ESIA Report, biodiversity studies were conducted in line with the Turkish legislation, international environmental and social standards and guidelines, the European Union (EU) legislation, as well as conventions and protocols relevant to the Project.

5.7.1.2. Project Standards

Chapter 2 of this ESIA Report explains the related Institutional Framework, Applicable Turkish Legislation including not only the Environmental and Social Legislation, but also the Labour Law and Regulations, the World Bank Environmental and Social Standards (ESSs), IFC Performance Standards (PSs), and Environmental Health and Safety Guidelines. In line with the institutional and legal framework set for the Project, standards, guidelines and GIIP documents pertaining to biodiversity studies are presented in this section.

National Legislation

The Environmental Law No. 2872 aims at protection of the natural environment in line with the sustainable development principles. Its framework was extended with Law 5491 entering into force on April 26, 2006 amending the Environmental Law, to cover fundamental principles of biodiversity conservation. Article 6 of the Law states the importance of protecting biodiversity, and introduces penal sanctions against damage to the environment, including the destruction of biological diversity, when detected through inspection and audits.

The regulations issued on the basis of the Environment Law specify rules on the prevention of pollution and on environmental impact assessment. The laws and regulations for conservation of habitats and species in Turkey as the following:

- Law on National Parks
- Forestry Law

- Law for the Protection of Cultural and Natural Assets
- Terrestrial Hunting Law
- Law on Fisheries
- Law for the Protection of Animals
- Pasture Law
- Regulation on Identification, Registration and Approval of Protected Areas
- Regulation on Conservation of Wetlands
- Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora
- Regulation on Fisheries
- Regulation on Protection of Wildlife and Wildlife Development Areas

There are also laws and regulations effective in terms of protecting other environmental components, as well as to minimize pollution and ensure sustainable development and management of natural resources. Legislation on air quality control and management, environmental management and permitting, health and safety, management of chemicals and other dangerous substances, noise control and management, soil quality control, water quality control and management, and waste management, also ensure management of issues that might have indirect impacts on biodiversity features.

Strategies, programs, and action plans to implement statutory biodiversity conservation principles, which have been set forth by the related law and regulations, can be found within the scope of the following official documents prepared at the national scale:

- National Environmental Action Plan (1998)
- National Plan for In-Situ Conservation of Plant Genetic Diversity (1998)
- National Agenda 21 Programme (2001)
- National Wetland Strategy (2003)
- Turkish National Forestry Programme (2004)
- National Science and Technology Policies 2003-2023 Strategy Document (2004)
- Turkish National Action Programme Against Desertification (2005)
- National Environmental Strategy (2006)
- National Rural Development Strategy (2006)
- National Biological Diversity Strategy and Action Plan (2007)

The National Biological Diversity Strategy and Action Plan, whose most recent update was completed in 2007, is a response to the obligation to prepare a national strategy for the purpose of guiding the implementation of the Convention on Biological Diversity (CBD). The aim of this Strategy is to identify and assess Turkey's biological diversity in brief, to determine a generally agreed strategy for conservation and to propose the actions required for achieving the goals of Biodiversity Conservation in Turkey. The Strategy defines the current legal responsibilities concerning biological diversity, underlines the importance of international cooperation intended for policy-making and the importance of the necessary research conditions to develop ecosystem management, and includes a definition and

assessment of Turkey's biological diversity and the strategies and priority action plans towards the goals.

National Guidelines on Protected Areas and Conservation of Biodiversity

There are three important sources in the Turkish biodiversity literature that provide guidance on determining a site's status as a whole, especially when it is not a conservation area officially designated and protected by law, but is significant to be considered as a protected area. In "122 Important Plant Areas of Turkey", Ozhatay et al. (2008) define important plant areas (IPAs) from different regions of Turkey, based on internationally recognised criteria and locally collected data. Each IPA is explained in terms of its general characteristics, detailed flora species' composition, threats it faces and related conservation efforts if there are any.

Important Bird Areas (IBA) of Turkey have also been studied since 1990, through successive projects, which today are conducted by WWF-Turkey. An inventory that defines 97 IBAs, also in accordance with international selection criteria that had previously been developed by BirdLife International (Magnin & Yarar, 1997), was published in 1997 and is updated on regular basis as conservation studies continue across the country.

Doga Dernegi, partner of BirdLife International in Turkey, has been working towards sustaining biodiversity since 2002 across the country, through a number of projects covering a wide array of ecosystems, habitats, species, and protected areas. Doga Dernegi initiated a comprehensive study on Key Biodiversity Areas (KBAs) in Turkey analyzing a total of 472 sites from different regions and published an inventory 2006, which defines each site in terms of its outstanding characteristics and provides a detailed list of species and their global and regional threat statuses (Eken et al., 2006).

Plant specimens collected during field surveys were identified using the "Flora of Turkey and East Aegean Islands" (Davis, 1965-1988), while Turkish names of the identified species were compiled using the "Turkish Plant Names" by Prof. Dr. Turhan Baytop (Baytop, 1994). Assessments on threat statuses of flora species were based on the Red Data Book of Turkish Plants (Ekim et al., 2000), which was prepared in accordance with the IUCN Red List criteria of 1994 and updated based on Red List criteria.

Unlike the Red Data Book of Turkish Plants (Ekim, et al. 2000) that provides a list for national threat statuses of flora species, on which a consensus have been reached among the scientific community in Turkey, there are no widely accepted threat lists established for fauna species. Since information on fauna species is limited in guidelines provided in this section, it is important to rely on expert judgment in terms of populations, distribution and general ecology of identified fauna species, and their assessments in line with ESS6.

The World Bank Environmental and Social Standards

The World Bank Environmental and Social Standards (ESSs), set out the requirements in terms of assessment and management of environmental and social risks and impacts of projects supported by the World Bank to achieve sustainable project implementation. The standards have been designed to avoid, minimize or manage environmental and social risks of projects through implementation of mitigation measures.

The main objective of ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources is conservation and protection of biodiversity and living natural resources in reaching sustainable development. It is important to maintain ecological functions of habitats and the biodiversity they support. Biodiversity often underpins ecosystem services as well. Therefore, impacts on biodiversity can adversely impact ecosystem services as well.

The World Bank addresses requirements related to ecosystem services in ESS1: Assessment and Management of Environmental and Social Risks and Impacts.

The main objectives set out in ESS6 are as the following:

- To protect and conserve biodiversity and habitats.
- To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity.
- To promote the sustainable management of living natural resources.
- To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.

ESS6 requires that the following are described in the assessment of biodiversity-related risks and impacts:

- Ecosystems affected
- Species affected
- Ecosystems services affected
- Protection status
- Site ownership and control
- Baseline threats
- Potential project-related risks and impacts

In planning and undertaking environmental and social assessment related to the biodiversity baseline, the Borrower is required to follow relevant GIIP utilizing desktop review, consultation with experts and field-based approaches, as appropriate.

Where identified, risks and impacts on biodiversity or habitats are required to be managed by the Borrower in accordance with the mitigation hierarchy and GIIP. Given ecological systems are highly complex, it is very hard and at times impossible to make reliable estimations on long-term impact associated with project activities. Therefore, in management of risks where there is high levels of uncertainty, it is important to adopt a precautionary approach and implement adaptive management strategies that can respond to monitoring results. In the precautionary principle, the main emphasis is on avoiding actions with potentially harmful (and particularly with irreversible) consequences until there is sufficient information available to properly assess and weigh the likely costs and benefits. Adaptive management involves adjusting actions and approached based on the results of ongoing monitoring.

The Borrower is required to ensure that competent biodiversity expertise is utilized to conduct the environmental and social assessment and the verification of the effectiveness and feasibility of mitigation measures. Where significant risks and adverse impacts on biodiversity have been identified, the Borrower will develop and implement a project-specific Biodiversity Management Plan (BMP) to address such risks and impacts.

The European Union (EU) Legislation

The European Union (EU) environmental legislation, in the most general sense, is set forth to ensure protection of air and water quality, conservation of resources and protection of biodiversity, waste management and control of activities which can have an adverse environmental impact, at both Member State level and internationally. Since the mid-1970s,

EU environmental policy has been guided by action programmes defining priority objectives to be achieved over a period of years. The latest of these programmes was adapted by the European Parliament and the Council of the European Union in November 2013 and extends until the year 2020. Even prior to the Biodiversity Strategy to 2020, the EU had been committed to the protection of nature at EU level, since the adoption of the Birds Directive in 1979. The Habitats Directive was adopted in 1992 to help maintain biodiversity, protecting over 1000 animals and plant species, and over 200 types of habitats. It also established the EU-wide Natura 2000 network of protected areas. The EU Biodiversity Strategy to 2020 aims to halt the loss of biodiversity and ecosystem services in the EU and help stop global biodiversity loss by 2020. The Strategy is structured around the commitments taken by the EU in 2010, at the International Convention on Biological Diversity, and it contains 6 operational targets:

- Protect species and habitats – Target 1
- Maintain and restore ecosystems – Target 2
- Achieve more sustainable agriculture and forestry – Target 3
- Make fishing more sustainable and seas healthier – Target 4
- Combat invasive alien species – Target 5
- Help stop the loss of global biodiversity – Target 6

Although not an EU Member State, Turkey has a set program for alignment with the EU Acquis, which comprises more than 200 major legal acts covering horizontal legislation, water and air quality, waste management, nature protection, industrial pollution control and risk management, chemicals and genetically modified organisms (GMOs), noise and forestry. A number of regulations have been adapted, yet there is a rather long way for Turkey to achieve in the field of biodiversity and nature protection. Action 7 under Target 2 of the EU Biodiversity Strategy to 2020 seeks to "assess the impact of EU funds on biodiversity and investigate the opportunity of a compensation or offsetting scheme to ensure that there is no net loss of biodiversity and ecosystem services".

The Birds Directive (2009/147/EC)

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (this is the codified version of Directive 79/409/EEC as amended) aims to protect about 500 wild bird species naturally occurring in the European Union. Under the pressure of habitat loss and fragmentation, intensive agriculture, forestry, fisheries, use of pesticides, and hunting, wild birds can only be protected through regulating human activities by cooperating across borders.

Habitat loss and degradation have been identified as the most serious threats to the conservation of wild birds. The Directive also places special emphasis on the protection of bird habitats for especially endangered and migratory species. Accordingly, Member States are required to designate Special Protection Areas (SPAs) for 194 particularly threatened species and all migratory bird species listed in Annex I of the Birds Directive.

SPAs are scientifically identified areas critical for the survival of the targeted species, such as wetlands. They are part of the Natura 2000 ecological network set up under the Habitats Directive 92/43/EEC. Wild birds across Europe are protected under the five annexes to the Birds Directive as explained in Table 5-46.

Table 5-46: Annexes to the Birds Directive

Annex	Description
I	194 species and sub-species are particularly threatened. Member States must designate Special Protection Areas (SPAs) for their survival and all migratory bird species.
II	82 bird species can be hunted. However, the hunting periods are limited and hunting is forbidden when birds are at their most vulnerable: during their return migration to nesting areas, reproduction and the raising of their chicks.
III	Overall, activities that directly threaten birds, such as their deliberate killing, capture or trade, or the destruction of their nests, are banned. With certain restrictions, Member States can allow some of these activities for 26 species listed here.
IV	The directive provides for the sustainable management of hunting but Member States must outlaw all forms of non-selective and large scale killing of birds, especially the methods listed in this annex.
V	The directive promotes research to underpin the protection, management and use of all species of birds covered by the Directive, which are listed in this annex.

The Habitats Directive (92/43/EEC)

The Habitats Directive 92/43/EEC was adapted in 1992 with the objective to ensure conservation of a wide range of rare, threatened or endemic animal and plant species. rare and characteristic habitat types are also targeted for conservation in their own right. The Habitats Directive (together with the Birds Directive) forms the cornerstone of Europe's nature conservation policy. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. All in all the directive protects over 1,000 animals and plant species and over 200 so called "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance.

Annexes I and III to the Directive contain the types of habitats and species whose conservation requires the designation of special areas of conservation. While annexes II, IV and V list over a thousand animal and plant species that are protected in various ways. Description of annexes to the Habitats Directive is provided in Table 5-47.

Table 5-47: Annexes to the Habitats Directive

Annex	Description
I	Natural habitat types of community interest whose conservation requires the designation of special areas of conservation
II	(about 900) Core areas of their habitat are designated as sites of Community importance (SCIs) and included in the Natura 2000 network. These sites must be managed in accordance with the ecological needs of the species.
III	Criteria for selecting sites eligible for identification of sites of community importance and designation as special areas of conservation.
IV	(about 400, incl. Annex II species) strict protection regime must be applied across their entire natural range within the EU, both within and outside Natura 2000 sites.
V	(over 90) Member States must ensure that their exploitation and taking in the wild is compatible with maintaining them in a favourable conservation status.

International Conventions and Protocols

Turkey is party to a number of conventions on different aspects of biological diversity, which are listed below:

- UN Convention on Biological Diversity (CBD) (1997) and the Cartagena Protocol on Biosafety (2004)
- UN Framework Convention on Climate Change (UNFCCC) (2004)
- Vienna Convention for the Protection of the Ozone Layer (1988) and the Montreal Protocol on Substances Depleting the Ozone Layer (1990)
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1994)
- UN Convention to Combat Desertification (CCD) (1998)
- Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (RAMSAR) (1994)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1996)
- Convention for the Protection of World Cultural and Natural Heritage (1983)
- International Convention for the Prevention of Marine Pollution from Ships (MARPOL)(1990)
- International Convention on Plant Genetic Resources for Food and Agriculture (2006)
- Convention on Long-Range Transboundary Air Pollution and the Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmissions of Air Pollutants in Europe (EMEP) (1983)
- Convention for the Conservation of European Wildlife and Natural Habitats (BERN) (1984)
- European Landscape Convention (2001)
- Convention for the Protection of the Black Sea Against Pollution (Bucharest) (1994) and its protocols including the Protocol for the Protection of Biological and Landscape Diversity in the Black Sea (2004)

Convention on Biological Diversity

Amongst the conventions listed above, the United Nations Convention on Biological Diversity is the one that sets the stage for the Project biodiversity studies, in terms of not only providing a globally recognizable definition of biological diversity but also defining clear strategies on conservation of biodiversity that are to be addressed within the scope of this ESIA Report. The Convention was opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio "Earth Summit"). It remained open for signature until 4 June 1993, by which time it had received 168 signatures. The Convention entered into force on 29 December 1993. Turkey ratified the Convention in 1996, and since then prepared four National Reports on Biological Diversity. In year 2010, the Conference of Parties (COP) of the Convention adapted a revised and updated Strategic Plan for Biodiversity, which also included the Aichi Biodiversity Targets for the period of 2011-2020. The targets provide a framework for action by all stakeholders to save biodiversity and enhance its benefits for people while preparations for the Post-2020 Biodiversity Framework are ongoing.

- Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society
- Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

- Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity
- Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services
- Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

Convention for the Conservation of European Wildlife and Natural Habitats

The Convention for the Conservation of European Wildlife and Natural Habitats (Bern Convention) aims at conserving and promoting biodiversity, developing national policies for the conservation of wild flora and fauna and their natural habitats, protection of the wild flora and fauna from the planned development and pollution, developing trainings for protection practices, promoting and coordinating the researches made regarding this subject. It has been signed by 26 member states of the European Council (as well as Turkey) with the aim of conserving the wildlife in Europe was put forward in 1982. Species to be protected according to the Bern Convention are listed in four appendices, which are presented in Table 5-48 with their explanations. Species that are not included within the appendices of the Convention are those that do not require any special protection. Species are not listed individually but instead are protected due to the habitat protection approach of the Bern Convention.

Table 5-48: Annexes to the Bern Convention

Appendix	Description
I	Strictly protected flora species
II	Strictly protected fauna species
III	Protected fauna species
IV	Prohibited means and methods of killing, capture and other forms of exploitation

Convention on International Trade in Endangered Species of Wild Flora and Fauna

Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) is an international agreement that has been ratified by governments of 164 states (including Turkey) and entered into force in 1975. Appendices to the Convention aim to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The principles of CITES are based on sustainability of the trade in order to safeguard ecological resources (live animals and plants, vast array of wildlife products derived from them, including food products, exotic leather goods, etc.). Turkey ratified the Convention in 1996. Categories and species included in CITES are listed in three different appendices based on their protection statuses. These appendices and their explanations are given in Table 5-49.

Table 5-49: Appendices to the CITES

Appendix	Description
I	Species that are threatened with extinction and CITES prohibits international trade in specimens of these species except when the purpose of the import is not commercial.
II	Species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled.
III	List of species included at the request of party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation.

IUCN Red List of Threatened Species

The International Union for Conservation of Nature (IUCN) Species Programme, together with the IUCN Species Survival Commission (SSC) has been providing assessments on conservation statuses of a whole range of taxa, including species, subspecies, varieties and even subpopulations of certain species around the globe, in order to draw attention to especially those that are threatened with extinction.

Using the IUCN Red List Categories and Criteria, the IUCN Red List of Threatened Species provides information on species' taxonomy, conservation status and distribution, which have been evaluated globally. The main purpose of the system that the IUCN puts forth is to "catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable)". The schematic diagram presenting the structure of the Red List categories is provided in Figure 5-21.

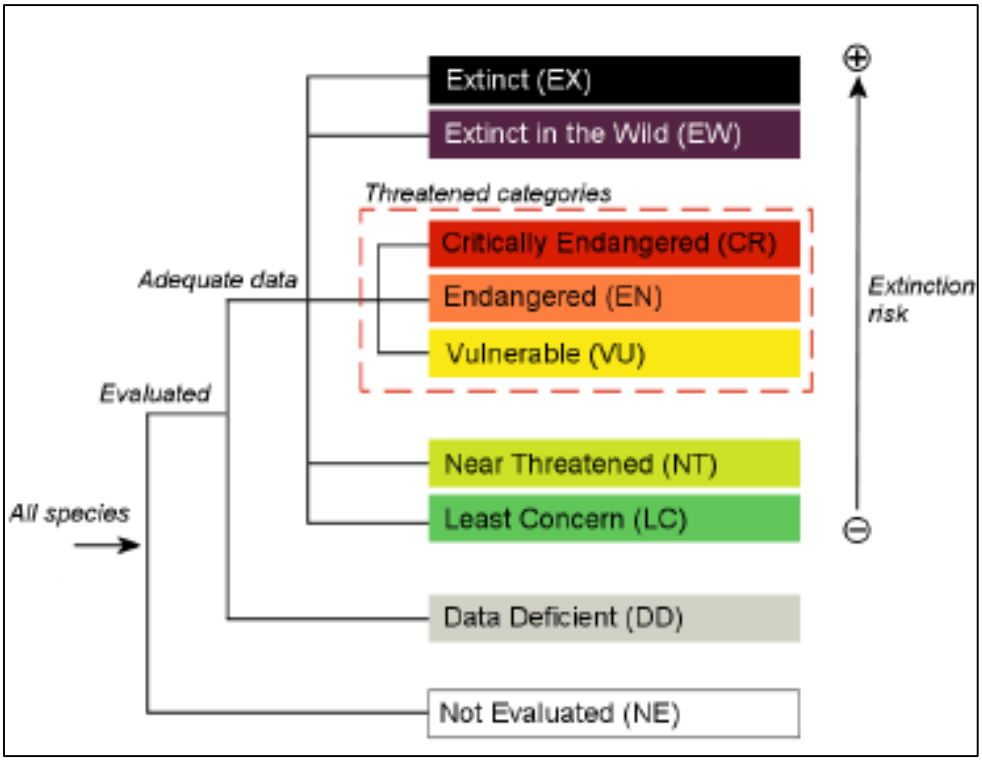

Figure 5-21: Structure of the IUCN Red List Categories

5.7.2. Impact Assessment

Habitat loss and fragmentation due to linear structures like railways and highways have been identified as the most significant impacts on biodiversity through studies conducted globally. Although railway emissions and land use required by the infrastructure is lower than that of other means of transport, it is required that railways are evaluated based on their own properties and their site-specific impacts on biodiversity are assessed thoroughly.

In this section of the ESIA Report, potential impacts of Filyos Port and Industrial Zone Railway-Highway Connections Project on biodiversity, the framework for the mitigation hierarchy implemented in line with ESS6 to reach no net loss, and lastly sensitivity criteria developed for biodiversity receptors that are subject to the site-specific impact assessment. Potential impacts of the Project that are addressed in impact assessment can ben listed under the following three main headings:

1. **Habitat Loss and Fragmentation – Barrier Effect**

   Loss of feeding, breeding, nesting areas, differentiation in animal behavior, changes in population genetics, formation of ecological traps and passages for invasive alien species

2. **Animal Mortality**

   Collision, electrocution, wire strikes and rail entrapment

3. **Environmental Impacts**

   Noise and vibration, air emissions, soil pollution, water pollution, soil erosion and changes in the hydraulic structure

5.7.2.1. Land Preparation and Construction Phase

The most significant impact of the Project on biodiversity during its land preparation and construction phase will be habitat loss and fragmentation, and the barrier effect the two impacts bring about. Populations of flora species will be directly impacted, while fauna species' habitat use capabilities will be reduced.

When distribution of a particular population is divided by a railway, part of the habitat is lost, and the rest might be destructed. The small isolated patches that are formed as a result of fragmentation may not have sufficient capacity to maintain viable populations. Activities to be realized during the land preparation and construction phase may present physical barriers limiting animals' movement between areas where they feed and have access to water, and their breeding sites.

Given that biodiversity field for the ESIA was undertaken in winter, on-site data do not provide adequate information to provide an understanding on the fauna composition of the area. Mitigation measures proposed at this stage are targeted at flora and fauna species that are known to be inhabiting the area from literature records and habitat suitability, and have been assessed based on expert judgement. Prior to the onset of land preparation and construction phase, it can be possible to do additional field work during appropriate seasons for species and habitats (Spring-Summer) to detail foreseen impacts and also develop site and species-specific measures.

IFC's 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 fauns 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 grey dune habitat and the *Centaurea kilaea* it holds. 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 a adaptable management approach.

Significance of land preparation and construction impacts on biodiversity and site-specific measures to be taken by the Project are detailed in Chapter 5.7.3.

5.7.2.2. 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 (IFC, 2007).

IFC (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, herbicides for the Project will be used following the manual on pesticides prepared by the World Health Organization (WHO) and the UN Food and Agriculture Organization (FAO). Accordingly, necessary trainings should be provided to the Project personnel both on use of herbicides, and also on biodiversity features in the area.

The barrier effect of the railways that start off during the land preparation and construction phase, continues through the operation and maintenance phases. Although limited when compared to impacts of highways, animal mortality due to collision, electrocution, wire strikes and rail embankment are the most obvious impacts of operation-phase impacts (Dorsey et al., 2015). Collision is a significant risk factor for mammals and birds, while smaller animals have been reported to die due to embankment (Budzic 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 effect. To prevent such measures to enhance the barrier effect, physical barriers and fences should not be placed randomly along the right-of-way. Instead, appropriate locations where collision risk is higher should be determined prior to construction. When fencing is used, it is also crucial to provide escapes.

Structures 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. In determining the need and location for new passages, socio-economic impacts should also be considered. Passages that will also enable human and cattle passage and provide access to grazelands should be identified through consultations within the scope of the Stakeholder Engagement Plan (SEP), and addressed through an integrated approach.

5.7.2.3. 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 5-22. 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 Filyos Port and Industrial Zone Railway-Highway Connections Project will be avoided at the first step of the mitigation hierarchy, there will not be an offset requirements for net gains in critical habitat.

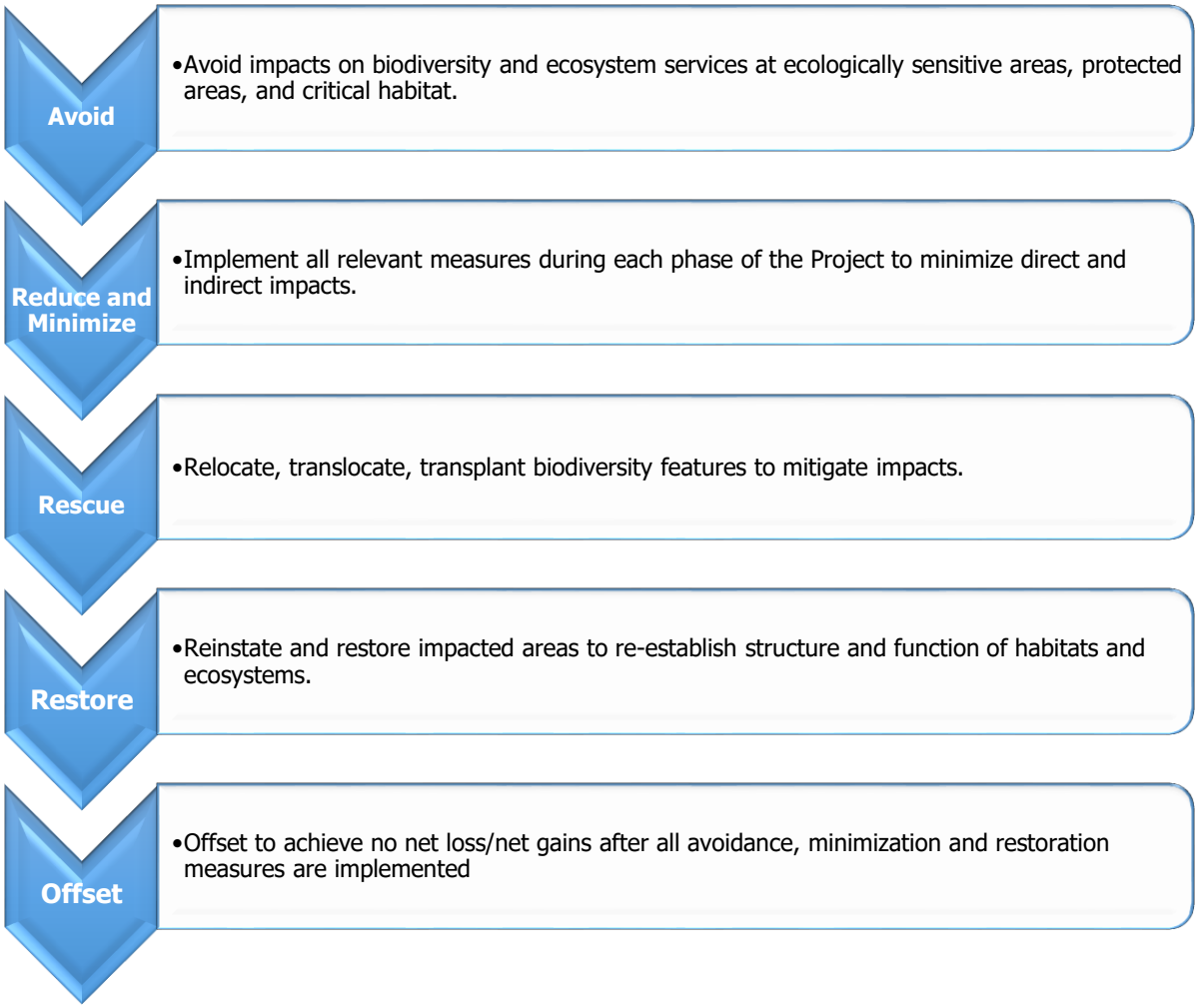

Figure 5-22: The Mitigation Hierarchy

5.7.2.4. 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 5-50.

Table 5-50: 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 5-51. 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 5-51: Biodiversity Receptor Sensitivity

Biodiversity Receptor	Sensitivity Level
Critical Habitat	
B1.4: Coastal stable dune grassland (grey dunes)	High
Natural Habitats	
C1.2: Permanent mesotrophic lakes, ponds and pools	Moderate
C2.2: Permanent non-tidal, fast, turbulent watercourses	
D5.1: Reedbeds normally without free-standing water	
E3.4: Moist or wet eutrophic and mesotrophic grassland	Low
F5.3: Pseudomaquis	
G1.1: Riparian and gallery woodland, with dominant *Alnus, Betula, Populus* or *Salix*	
G1.A: Meso- and eutrophic *Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus* and related woodland	
G1.D: Hazelnut tree orchards	
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	

5.7.3. Impact Significance, Mitigation Measures, and Residual Impacts

Biodiversity impact assessment for Filyos Port and Industrial Zone Railway-Highway Connections Project was undertaken according to the methodology presented in Chapter 5.1.2 Accordingly, magnitude of each impact was estimated as a factor of the

foreseen geographic extent, duration, and frequency of the impact. Sensitivity criteria and sensitivity/value of each associated biodiversity receptor were provided in Chapter 4.6.

The grey dune habitat and *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 grey dunes will not be impacted by the Project activities either.

Nearly half of the Biodiversity Study Area 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 the grey dunes are the water-dependent C1.2: Permanent mesotrophic lakes, ponds and pools, C2.2: Permanent non-tidal, fast, turbulent watercourses, and G1.1: Riparian and gallery woodland, with dominant *Alnus, Betula, Populus* or *Salix*.

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 Study Area, 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 Chapter 5.7.2.3 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 5-52. Mitigation measures defined in the ESIA will be further developed based on data to be obtained from additional field work especially for fauna groups, and implemented within the scope of the Biodiversity Management Plan (BMP) through developing species and habitat specific measures following the no net loss principle.

Table 5-52: Impacts on Biodiversity Receptors, Mitigation Measures and Significance of Residual Impacts

Impact Description	Project Phase	Receptor	Impact Magnitude						Receptor Sensitivity	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
Habitat loss / fragmentation	Land preparation and construction	Critical habitat: Grey dunes (B1.4)	-	-	-	-	-	-	High	No impact (Avoided)	Indirect impacts on the grey dune habitat and its *Centaurea kilaea* and *Panratium maritimum* populations, and also the mesotrophic lake habitat will be avoided in line with the related environmental management plans (waste management, pollution prevention). The Project personnel will be informed on the sensitivity of the habitats. If more data become available during additional surveys to be conducted prior to the finalization of the detailed design in Spring-Summer, the Critical Habitat Assessment will be updated and required actions will be taken within the scope of the ESMP.	-
		Natural habitats: Lakes (C1.2)	-	-	-	-	-	-	Moderate	No impact (Avoided)		-
		Natural habitats: Streams (C2.2), riparian woodland (G1.1)	Limited	Medium	Irreversible	Long-term	One-off	Medium	Moderate	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.	Low
		Natural habitats: Reedbed (D5.1), mesotrophic grassland (E3.4), pseudomaquis (F5.3), deciduous woodland (G1.A), hazelnut orchards (G1.D)	Limited	Low	Irreversible	Long-term	One-off	Medium	Low	Moderate	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, habitat 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, conservation priorities, and also nesting areas that will be identified through pre-construction surveys. Any direct impact on plant and animal species will be prevented.	Low
		Fauna species of high conservation concern	Limited	High	Irreversible	Long-term	One-off	Medium	Moderate	Moderate	Nesting areas for fauna species will be identified through pre-construction surveys, and experts will be consulted if nests are to be displaced. For *Lutra lutra*, presence of its population will be confirmed and habitat preferences will also be identified prior to the finalization of the detailed design. Surveys targeting bird species will be conducted during migration and breeding seasons to provide further information on habitat use, breeding status and flight routes of target species prior to the finalization of the detailed design. 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. Pre-construction surveys will be conducted on both sides of the route to determine which animal species will be impacted by fragmentation yielding a list of target species. Species-specific strategies will be developed and implemented within the scope of the Biodiversity Management Plan (BMP). In line with the characteristics of the target species, it will be decided in consultation with experts whether passages planned within the scope of the Project would be sufficient for wildlife. Where necessary, in order to ensure no net loss in populations of fauna species new structures will also be considered in areas that are identified to be significant for animal passages. Passages that will also enable human and cattle passage and provide access to grazelands will be identified through consultations within the scope of the Stakeholder Engagement Plan (SEP). 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,	Low

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				
											chemical repellents, lights and reflectors, etc.) will also be identified.	
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	Moderate	Low	Trainings will be organized for the Project personnel to inform them about the on-site speed limits and also importance of animal passages. Machinery and equipment that arrive in work areas will be checked for presence of invasive alien species. All machinery and equipment will be subject to regular maintenance and will not be used out of purpose. Use of machinery and equipment will be limited to designated work areas. Impacts related to noise and vibration will be controlled in line with the Project standards.	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	Moderate	Low	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 (Waste Management Plan, Water and Wastewater Management Plan, etc.).	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	Moderate	Low	Natural vegetation will be conserved to the best possible extent during land preparation, and native species will be used in restoration after completion of the construction phase. Vehicles and equipment entering the site will be checked for invasive alien species. If identified, necessary measures will be taken in line with the Project standards to eradicate the species. Instead of using herbicides, which would destroy the natural vegetation and enable introduction of invasive alien species, different vegetation management methods will be considered as appropriate spatially and temporally. During the land preparation and construction phase biodiversity monitoring studies, potential for presence of invasive alien species in the area will also be monitored.	Negligible
Habitat loss / fragmentation	Operation	Natural habitats	Limited	Medium	Irreversible	Long-term	One-off	Medium	Moderate	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 land preparation and construction Where necessary, habitat and species-specific measures will be developed and implemented with an adaptable management approach. To establish coherence between newly formed and natural habitats, conserve fauna species, prevent introduction of invasive alien species, and ensure secure transportation, integrated vegetation management strategies will be developed and implemented.	Low
Habitat loss / displacement	Operation	Flora and fauna species of high conservation concern	Limited	Medium	Irreversible	Long-term	One-off	Medium	Moderate	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 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.	Low

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				
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	Moderate	Moderate	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.).	Low
Invasive alien species	Operation	Natural habitats Flora and fauna species of high conservation concern	Local	Low	Reversible	Medium-term	Intermittent	Low	Moderate	Low	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

5.8. Cultural Heritage

5.8.1. Methodology and Project Standards

5.8.1.1. Methodology

Evaluating the present status of the tangible and intangible cultural heritage assets has been conducted in five different phases which are;

- Desktop Study
- Field Research
- Risk Assessment
- Impact Assessment
- Reporting

Desktop Studies

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 desk 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[46].

Field Surveys

The field survey on tangible and intagible cultural heritage have been conducted separately. The 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[47].

The railway routes, the newly planned station areas and the connection roads 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 100m 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 100m 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 50m right and 50m left of the construction axis). During field walking, 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 100m 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

[46] Decision No 1180, decision no 2237 and decision no 4456 of the Directorate of Karabük Regional Preservation Board of Cultural Assets.

[47] Senior Archaeologist H. Uğur DAĞ, Senior Archaeologist Kılıçhan SEVMEN, Senior Archaeologist Serkan AKDEMİR, Senior Archaeologist Seray AYAZ

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 (Annex-7). 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

Greater part of the works for identifying the archaeological and immovable cultural assets within the 100m 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 explain 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.

Risk Assessment

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 (Table 5-53)

Table 5-53: The Areas where Archaeological Potential Modelling was conducted and KP Intervals

The Areas where Archaeological Potential Modelling was conducted and KP Intervals				
Filyos Port/Industrial Zone Connections	Section -1	Branch Line	0+000	0+970
		Branch Line	0+970	2+000
		Branch Line	2+000	2+954
	Section -2	Branch Line	2+954	4+087
		Branch Line	4+087	4+642
		Branch Line	4+642	5+110
	Section -3	Branch Line	5+383	6+345
		Branch Line Ferry Line - Jetty Line - Port Alternative Line 1-2	5+110 0+000 0+000 0+000	5+383 0+610 0+193 0+390
		Ferry Line	0+610	1+020
		Ferry Line	1+020	1+848
		Jetty Line	0+480	1+087
		Jetty Line	0+193	0+480
	Section -4	Port Alternative Line 1-2	0+390	0+875
		Port Alternative - Line 2	0+875	1+462
		Port Alternative Line 2	1+462	2+126
		Port Alternative Line 1-2	2+126 2+126	2+668 2+763
		Port Alternative Line 1	1+022	1+874

With the modeling study and the modeling maps (Annex-8) 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 ESRI ArcGIS 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 modeling was 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 below.

Table 5-54: Predictive Parameters and Sub-Categories Taken into Consideration in Modelling

Predictive Parameters	Predictive Sub-category	Critical Value	Predictive Weight
Hydrology/ Proximity to Water	Stream Order 1	750 m	2
	Stream Order 2	1000 m	2
	Stream Order 3	1000 m	1
	Stream Order 4	1000 m	2
	Stream Order 5	1500 m	-1
	Stream Order 6	1750 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
	Industry/Built Area	Yes	-4

Predictive Parameters	Predictive Sub-category	Critical Value	Predictive Weight
	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

5.8.1.2. Project Standards

In Turkey, 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 ATATURK 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 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 Turkey, 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
- European Bank for Reconstruction and Development- EBRD, Environmental and Social Policy, PR08, Cultural Heritage; April 2019
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, ICOMOS 2011.

5.8.2. Impact Assessment

It is possible that some activities conducted within the project and impact area of the project may cause irreversible negative effects on tangible and intangible cultural heritage assets in the area. Some mitigation measures are proposed to minimise these effects. 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 sies. In line with the document, the archaeological and tangible cultural assets identified in the area are classified based on their level of importance. (Table 5-55)

Table 5-55: Example Guide for Assessing Value of Heritage Assets

Grading	Archaeology	Built Heritage or Historic Urban Landscape
Very High	Sites of acknowledged international importance inscribed as Word Heritage List property.	Sites or structures of acknowledged international importance inscribed as of universal importance as Word Heritage List property.
	Individual attributes that convey Outstanding Universal Value of the Word Heritage List property.	Individual attributes that convey Outstanding Universal Value of the Word Heritage List property.
	Assets that can contribute significantly to acknowledged international research objectives.	Other buildings or urban landscapes of recognised international importance.

Grading	Archaeology	Built Heritage or Historic Urban Landscape
High	Nationally-designated Archaeological Monuments protected by the State Party's laws	Nationally-designated structures with standing remains.
	Undesignated sites of the quality and importance to be designated.	Other buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade.
	Assets that can contribute significantly to acknowledged national research objectives.	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.	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.	"Locally Listed" buildings.
	Assets compromised by poor preservation and/or poor survival of Contextual associations.	Historic (unlisted) buildings of modest quality in their fabric or historical associations.
	Assets of limited value, but with potential to contribute to local research objectives.	Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings.
Negligible	Assets with little or no surviving archaeological interest.	Buildings or urban landscapes of no architectural or historical merit; buildings of an intrusive character.
Unknown Potential	The importance of the asset has not been ascertained.	Buildings with some hidden (i.e. inaccessible) potential for historic significance.

For assessing the severness of exposure to damage of these properties in the project are and its impact zone as the result of project activities a 5 grade classificaiton has been used. This grading depends on the size of the asset carrying a risk of damage as the result of project acivies (m^2) and the size of the area to be negatively affected by project activies (m^2) (Table 5-56).

Table 5-56: Change / Impact Assessment Chart

Impact of Construction Activities on the Archaeological and Tangible Cultural Assets (%)	SCALE & SEVERITY OF CHANGE/IMPACT
0-20	No Change
21-40	Negligible change
41-60	Minor change
61-80	Moderate change
81-100	Major change

The general impact assessment of the arcaheological 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" (Table 5-57).

Table 5-57: 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

These assessment made based on the criteria stated above are given in Table 5-58.

5.8.3. 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[48] 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 is later analysed to evaluate the effects of the project on intangible assets and the analysis has been reported.

The registered "Sazköy 3rd Degree Archeological Site" located in Section-2 is located on the planned Railway Dock Connection (0 + 150 - 0 + 390 KP) and the planned Railway Ferry Link (between 0 + 500 - 0 + 940 KP). As a result of the studies, it has been identified that the cultural asset, which we think is a necropolis area, will be adversely affected by the construction activities. For this reason, it is highly recommended that the Filyos Railway Dock and Ferry Link route should be revised in a way that it does not damage the registered area. If such a revision is not possible, it may be necessary to plan test pit and salvage excavations in the areas where the railway route cuts the site, and to implement them before the construction period. 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.

Another registered site that may be affected by the project activities is the Öteyüz Mahallesi 1st and 3rd Degree Archeological Site. The area lies between the 2 + 130 - 2 + 012 kilometer points of railway connection line and within the impact corridor. For this reason, all kinds of excavation, skimming, logging, cleavage etc. activities to be carried out within the project construction boundaries must be carried out under the supervision of an archaeologist. While planning the side activities of the project such as opening service roads related to the project, determining the locations of the quarries, creating an excavation storage area, the protection limits of the registered archaeological site should be taken into consideration and any intervention in the area should be avoided. Starting from the design phase of the project for any project, revision and similar applications to be carried out in Öteyüz Mahallesi 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.

[48] ESRI ArcGIS

Another registered archaeological site located near the project route is Ancient City of Tios and Tios Necropolis Area. Both areas are located very close to the expropriation limit. For this reason, the plans and projects of all kinds of construction activities planned to be carried out near the sites should be submitted to the Karabük Cultural Heritage Conservation Regional Board under the Law No. 2863, and the opinion of the official institution should be consulted. The decisions to be taken by the protection board must be followed at all stages of the project. In addition to the decision of the Board, it is highly recommended that all construction works to be carried out in these areas and its surroundings to be implemented under the supervision of an archaeologist.

The cultural sites that are located within the construction site, and that may be directly affected by the project activities are presented in Table 5-58 in detail together with possible negative impact of the construction activities on these areas.

As the result of the assessment, it was determined that rate of change resulting from construction activities in one of the areas is “Minor Change” while there will be no change in the other areas (Table 5-58).

Table 5-58: Impact Assessment Table

EVALUATION OF IMPACT ON CULTURAL ASSETS												
No	GIS Code	Name of the Area	Province	District	Registration Status	Distance to the Project Site (m)	Size of Cultural Heritage Area (m2)	Size of the Area in which the Construction Activity Affects the Cultural Heritage Area (m2)	Rate of Impact (%)	Scale and Severity of Change / Impact	General Impact	The Value of Cultural Heritage
1	CHA005	Sazköy 3rd Degree Archeological Site	Zonguldak	Çaycuma/Sazköy	Registered	0	164523,33	58123,86075	35,33	Minor Change	Medium Impact	High
2	CHA005	Öteyüz Mahallesi 1st and 3rd Degree Archeological Site	Zonguldak	Çaycuma/Filyos/Öteyüz	Registered	0	309809,36	2831,42254	0,91	No Change	Low Impact	High
3	CHA005	Tios Ancient City	Zonguldak	Çaycuma/Filyos/Hisarönü	Registered	1030	633695,63	0	0	No Change	No Impact	High
4	CHA005	Tios Necropolis	Zonguldak	Çaycuma/Filyos/Öteyüz	Registered	160	139465,21	0	0	No Change	No Impact	High

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[49] mentioned in the report. For this reason, an "Archaeological Potential Modeling Study" was also conducted for the project route (Table 5-53). Model Maps for Estimating Archaeological Potential related to this modeling study was prepared and presented in Annex-8. The probability of archaeological or immovable cultural heritage assets calculated according to the results of these assessments is given in Table 5-59 on the basis of mileage intervals. The areas identified as "Very High, High and Medium Risk" in the Table 5-59 constitute the sections of the project route that are "likely to encounter chance finds".

Table 5-59: Risk Levels of the Areas where Archaeological Potential Modelling was conducted

The Areas where Archaeological Potential Modelling was conducted and KP Intervals					
	Section Code	**Section Code**	**Line Name**	**Initial KP**	**Risk Level**
Filyos Port/Industrial Zone Connections	Section-1	Branch Line	0+000	0+970	High
		Branch Line	0+970	2+000	Very High
		Branch Line	2+000	2+954	Very High
	Section-2	Branch Line	2+954	4+087	Very High
		Branch Line	4+087	4+642	Low
		Branch Line	4+642	5+110	Very High
	Section-3	Branch Line	5+383	6+345	High
		Branch Line- Ferry Line - Jetty Line - Port Alternative Line 1-2	5+110 0+000 0+000 0+000	5+383 0+610 0+193 0+390	Very High
		Ferry Line	0+610	1+020	Very High
		Ferry Line	1+020	1+848	Low
		Jetty Line	0+480	1+087	Low
		Jetty Line	0+193	0+480	Very High
	Section-4	Port Alternative Line 2	0+390	0+875	Medium
		Port Alternative Line 2	0+875	1+462	Low
		Port Alternative Line 1-2	1+462	2+126	Low
		Port Alternative Line 1-2	2+126 2+126	2+668 2+763	Low
		Port Alternative Line 1-2	1+022	1+874	Low

[49] Chance Find

For the reasons stated above, the prepared "Cultural Heritage Management Plan " and the "Chance Find Procedure" should be updated by all contractors in accordance with their organizational structure in order 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 to be prepared should be shared with the other construction subcontractors of the project, and the subcontractors should prepare a more detailed "Cultural Heritage Management Plan and "Chance Find Procedures" and follow it throughout the project

5.9. Socio-Economic Environment and Social Impact Assessment

5.9.1. Methodology and Project Standards

5.9.1.1. Methodology

Qualitative and quantitative research methods were used together and primary and secondary data were evaluated together in the SIA study conducted to determine social impacts from the project. The scoping phase of the ESIA included defining the impact area of the Project and therefore the settlements expected to be affected by the project. During the scoping phase, the project components and their interactions with the settlements are examined;

- Affected by residential expropriation and / or resettlement (physical resettlement);
- Affected by land expropriations that may affect livelihoods such as agricultural land, garden (economic resettlement);
- The common areas affected such as pasture and forest areas,
- Settlements that are likely to be affected by the environmental impacts of the project (noise, vibration, dust, traffic, etc.) have been identified.

Within the scope of literature review and collection of secondary data, preliminary studies and feasibility studies on the population living in the area of impact and the Project, Statistical data on the demographic structure and socio-economic status of the settlements in and near the project route, Secondary sources such as research articles and regional development reports were examined.

By evaluating these collected data, a field study was conducted in order to get to know more about the population living in the Project area, their livelihoods, socio-economic profile, social structure, relations with the Project area, how they use the area and their perceptions about the Project. The fieldwork was carried out on 9-10 January 2020 with the participation of 2 interviewers and 2 social experts, and six settlements (1 town and 5 villages) identified during the scoping phase were visited (See Figure 5-23). In these settlements, settlement surveys with muhtars, households and household surveys, and focus group meetings with disadvantaged groups were held. In addition, in-depth interviews were made with relevant stakeholders such as local institutions / organizations, governorship / district governorship / municipalities, cooperatives / associations related to the project. In this context, a total of 3 institutions / organizations and 102 PEKs were consulted during the field study. The number of interviews and participants conducted in the field study are given in Table 5-60.

Table 5-60: Stakeholder Consultations in Field Work

	The number of interviews	Number of Participants
Interviews with local institutions / organizations	2	4
Meetings with local governments (Governorship, District Governorate, Municipality)	1	2
Mukhtar settlement surveys	6	6
Household surveys	77	77
Focus group meetings	2	13
Total	88	102

Source: SIA Field Study, 2020

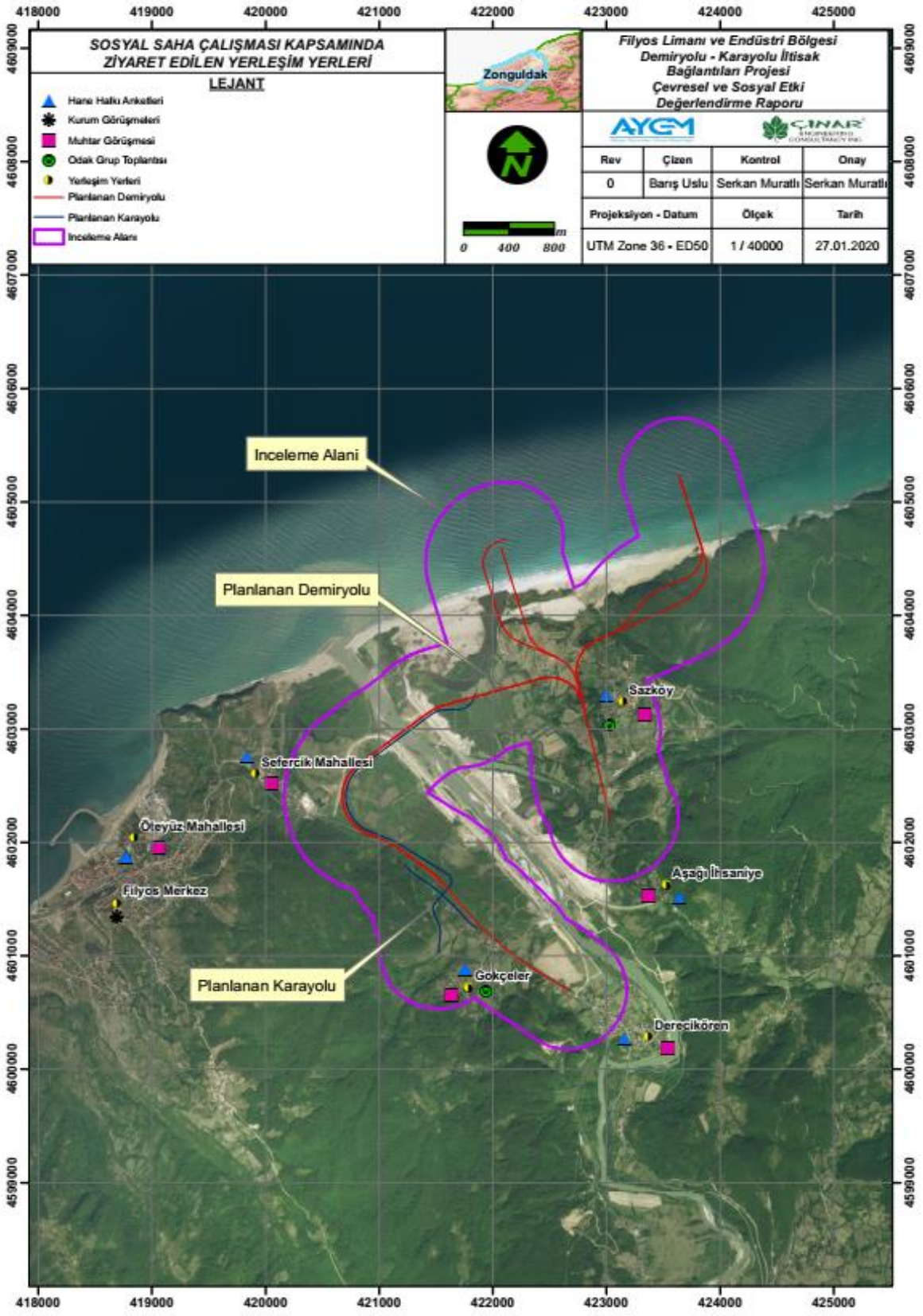

Figure 5-23: Settlements Visited within the Scope of Social Field Studies

Two questionnaire forms; namely mukhtar and household surveys; were used to collect data, on the subjects such as demographic profile, socio-economic structure of the population living in the project area, infrastructure services in the area they live in, their access to education and health services, information and views about the Project. As qualitative data collection tools, semi-structured interview guidelines were prepared to be used in focus group meetings and one-to-one in-depth interviews. Prior to the field study, surveyors were trained on data collection tools and the Project, thus aiming to ensure accurate data collection and effective stakeholder management. Survey applications in the field study by surveyors; Mukhtar surveys, focus group meetings and in-depth interviews were managed by expert sociologists working under the project.

In all six settlements that are expected to be affected by the project, village surveys were conducted with muhtars, household surveys with 77 households and focus group interviews in two settlements were conducted.

During the meetings with the headmen, general information about the settlements was tried to be obtained. Settlement survey in general; contains questions about demographic profile and social structure, migration movements, vulnerable groups, existing infrastructure, educational opportunities, health services, economic activities, forest use, expropriation and cadastre, land ownership, cultural heritage, and aims to learn the opinions of mukhtars about the project. The sample of the settlement survey is given in Annex-3.

With the household survey, it is aimed to gather information about the general socio-economic status of the households in the research area and their general views and expectations regarding the project. Household survey generally; includes questions about infrastructure and housing status, income generating activities, land availability, access to services such as education, health, problems in the region, and aims to learn the opinions about the project.

With focus group meetings, which is one of the qualitative research methods, interviews were made with groups that might be disadvantaged in the region and more detailed information was obtained regarding both social dynamics and project views and expectations. In these meetings, discussions were made on positive or negative effects of the project on social services and infrastructure in the region, the economy of settlements, employment and livelihoods, quality of life in the settlement and the subjects that are desired to be informed about the project. (Annex-5) The data obtained from the focus group meetings are evaluated in the baseline conditions and impact analysis sections.

In-depth interviews were held with stakeholders (local institutions and organizations, local administrations, etc.), who may be directly or indirectly affected by the project, to receive their opinions and suggestions, which are key to assessing social impacts. Semi-structured question instructions used in in-depth interviews are given in Annex-4. In this context, in-depth interviews were held with institutions such as Filyos Municipality, Çaycuma District Agricultural Directorate and Çaycuma Agricultural Credit Cooperative.

Using all the data collection methods mentioned above, many data from different sources were obtained about the socio-economic status of the region. Table 5-61 summarizes the data on socio-economic baseline and their resources.

Table 5-61: Baseline Data Collection Methodology and Resources

	Data Collected	Resources
Land Use	Land use, land types (individual, treasury, forest, pasture etc.)	District Agricultural Directorate, Mukhtar meetings, secondary data from State Statistical Institute
Demography	Population density, population growth, population pyramids by gender / age, migration movements, average household size, population distribution in settlements	Mukhtar meetings, State Statistical Institute, Strategic Plans
Health	Current health services in the settlements, number of hospital beds, access to public health services, mortality rates	State Institute of Statistics, Regional Development Reports, Strategic Plans, District health directorate, Mukhtar meetings
Education	Educational opportunities in residential areas, number of schools, primary school, secondary school and higher students enrolled in institutions, literacy rates and education levels, access to school	State Institute of Statistics, Regional Development Reports, Strategic Plans, Mukhtar meetings
Infrastructure	Access to water resources and sewerage, access to transportation (existing roads, railways), access to electricity (quality of service), mobile coverage (communication), residential facilities	Mukhtar meetings
Economy	Employment data, labor force participation, sector-based economic data allocation (agriculture, service, industry, etc.), livelihoods in project affected settlements, land ownership and use, local economy, agricultural production (cultivation method, crop type, productivity, agriculture income), irrigation water resources, livestock (animal type, grazing methods, products obtained), forestry activities (gathering from the forest, wood cutting, forestry work etc.), land values, pasture use etc.	State Institute of Statistics, Regional Development Reports, Strategic Plans, Mukhtar meetings, District Agriculture Directorate, Household surveys
Vulnerable Groups	Access to social services, the poor, the elderly, people with disabilities, women-owned households, people without land, people without formal deeds for the land, people without houses, ethnic minorities, communities dependent upon natural resources, refugees (if any)	Mukhtar interviews, Household surveys
Intangible Cultural Heritage	Cultural heritage, assets, structures in the project area	Mukhtar meetings, in-depth interviews

Sampling Strategy

The study area was determined based on the scope of expected socio-economic impacts. All settlements that have the land within 3 km of the railway and road lines, which are the components of the project, have been included in the study area. This scope is the area where direct effects (land acquisition, pasture area losses, environmental effects such as

noise, vibration, etc.) can be observed. There are 1 town center and 5 villages in the study area.

Populations of the settlements in the study area were taken through the TURKSTAT ABPRS system, and the approximate number of households in the neighborhoods was calculated using the average household size data of the provinces. There are approximately 894 households in Öteyüz Neighborhood, Sefercik Neighborhood, Sazköy, Aşağıihsaniye, Derecikören and Gökçeler villages remaining in the research area, and a total of 76 household samples with 90% reliability level and ± 0.09 error margin were calculated based on the calculation currently used in the statistical sampling literature.

Total sampling is distributed 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. Populations of the settlements, total number of households and distribution of the sample to the settlements are given in Table 5-62.

Table 5-62: Population of the Settlements, Number of Households and Distribution of Samples

Province	District	Settlement	Population	Total Approximate Number of Households**	Number of Surveys Performed
Zonguldak	Çaycuma	Filyos – Öteyüz Neighborhood	2,126	620	39
		Filyos – Sefercik Neighborhood	171	49	8
		Sazköy	148	43	7
		Derecikören	301	87	10
		Gökçeler	166	48	7
		Aşağıihsaniye	163	47	6
Total			**3,075**	**894**	**77**

Source: SIA Field Study, 2020

Data Analysis

After the control of the questionnaires applied in the household fieldwork was completed, data analysis was performed using SPSS 22.0 (Statistics Program for Social Sciences). All the qualitative and quantitative data obtained from household survey data, village headman surveys, focus group discussions with disadvantaged impact groups, and in-depth interviews with institutions, organizations and other relevant stakeholders were evaluated together and impact assessment was conducted.

Impact Assessment

By analyzing all primary and secondary data, qualitative and quantitative data collected, the possible positive and negative, permanent and temporary, short-term and long-term impacts and impact groups of the Project, how and at what level of impact would be

observed are determined. Suggestions have been developed for the identified impacts and impact groups that will increase the positive effects and ensure that they will benefit more people. Suggestions have been prepared to eliminate the negative impacts or to minimize the impacts and the number of people to be affected and to compensate for the negative effects.

SIA has adopted the impact assessment method used for the ESIA. The severity of the impacts has been determined based on the sensitivity of the receptor and the overall magnitude of the Project impact on that particular receptor. The magnitude of the impact is determined by using qualitative methods, predominantly on professional judgment, when quantitative or where this is not possible. The overall magnitude is based on the sum of the following components: Geographic coverage, reversibility, duration, frequency, and size (high, moderate, low).

A significance assessment matrix was used to assess the impact before and after the mitigation, and the impacts have been identified accordingly. General effects are classified as highly important, moderately important, low-level or negligible.

Limitations

The most important limitation of the studies is that land acquisition processes have not started officially and therefore land asset determination has not been officially carried out. However, in order to carry out the ESIA and RAP studies, the determination of land assets by GDII was carried out with a preliminary study and information was provided. This situation creates the possibility of changes in the current situation in the land during the determination of the official asset.

5.9.1.2. Project Standards

Since the project is supported by the World Bank, it is obliged to meet the Environmental and Social Standards of the World Bank. The ones related to social issues of these standards are briefly summarized below;

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

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

ESS2: Labor and Working Conditions

Environmental and Social Standard 2 perceives the importance of employment creation and income generation for the aim of comprehensive financial development and poverty reduction. Borrowers should create healthy working conditions by treating the workers fairly.

ESS4: Community Health and Safety

ESS 4 emphasizes issues of health, safety, and security risks and impacts on communities due to project activities. Borrower 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

The 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 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. can. 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 effects on displaced people.

ESS10: Stakeholder Engagement and Information Disclosure

Importance of open and transparent engagement between Borrower and stakeholders are emphasized as it is a necessary element of good international practice. Effective stakeholder engagement contributes to the projects in terms of improvement of environmental and social sustainability, enhancement of project acceptance and successful project design

5.9.2. Impact Assessment

This section will generally describe what the positive and negative impacts of the Project will be, how these impacts can lead to consequences, and what mitigation and remedial measures should be. The railway junction line project may have both positive and negative impacts.In addition to its positive effects such as improving the transportation infrastructure, providing employment opportunities and reviving the region economically, negative effects may also arise.

Possible negative effects are; temporary and permanent loss of agricultural lands, loss of agricultural crops and trees, physical resettlement and economic displacement, loss of livestock-related stables, shelters, shelters, loss of pasture and pasture, housing / construction losses, restrictions on access to land, construction work of the project effects that may arise on public health and safety and quality of life, such as noise, dust, vibration, etc. People who may be affected by these effects are the owner / tenant / user of land, house and other real estate and common users of areas such as pasture, grassland, forest. The degree of impact, will be differentiated according to their age, education and income level and the value of their property.

In addition to its positive effects such as improving the transportation infrastructure, providing employment opportunities and reviving the region economically, negative effects may also arise. Possible negative effects are; temporary and permanent loss of agricultural lands, loss of agricultural crops and trees, physical resettlement and economic displacement, loss of livestock-related stables, shelters, shelters, loss of pasture and pasture, housing / construction losses, restrictions on access to land, construction work of the project effects that may arise on public health and safety and quality of life, such as noise, dust, vibration, etc. People who may be affected by these effects are the owner / tenant / user of land, house and other real estate and common users of areas such as pasture, grassland, forest. The degree of impact, will be differentiated according to their age, education and income level and the value of their property.

Detailed assessments of the project's potential impacts due to noise, air emissions, water use and interaction with water resources, waste generation and visual changes are provided in the following sections of this ESIA:

- Chapter 4.2 and 5.3: Noise
- Chapter 4.3 and 5.4: Air Quality and Greenhouse Gas Emissions
- Chapter 4.4. and 5.5: Water Resources and Wastewater Management
- Chapter 4.5 and 5.6: Resource and Waste Management

5.9.2.1. Population and Population Changes

In this section, possible social effects on the demographic profile of the project affected settlements are evaluated. The assessment is divided into two parts: land preparation and construction phase and operation phase.

Land Preparation and Construction Phase

Basic land preparation and construction activities expected to have potential impacts on the demographic structure in the region are:

- Establishment of construction sites;
- Employment of personnel and provision of goods and services from local businesses, and
- Presence of construction workers (including subcontractors).

Impacts of Construction Sites

It is envisaged that the personnel to be employed during the construction phase of the project will be employed at the construction sites to be established. The location of the construction sites and the exact number of project employees to be assigned is not yet known. The number of workers will be employed during the construction phase, are estimated based on experience from similar projects from Turkey and worldwide. Expected labor employment of Çukurova Region and Iskenderun Bay Railway Connections and Filyos Port/Industrial Zone Connections projects are the same and estimated to be around 260-340 people. . The peak of the number of workers in a construction site is expected to be at most 180 people.

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. These overall impact size factors are moderate and the receptor sensitivity is low. The impact will be Low

Local Employment and Job Opportunities

A maximum of 180 people are expected to work during the land preparation and construction phase of the project. It is also likely that the purchase of goods and services from local businesses will have a positive impact on economic growth and create employment opportunities over the 3-year 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. This is likely to create factors that create attraction, which is necessary to preserve the attractiveness of local communities and to keep young people in villages / neighborhoods, and even to encourage former residents to return to their settlements. 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. As a matter of fact, during the interviews conducted in the region, it was observed that the local people especially expected the Filyos Valley Project to be implemented as soon as possible and create employment opportunities, the Railway Connection Line project was considered as part of this project and therefore, expectations were observed. It has been learned that the population migrating from the region due to unemployment and there were returns to the

region especially after the construction of the Filyos Port, where many people from the region were employed.

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.

These overall impact magnitude is moderate and the receptor sensitivity is moderate. The overall impact will be Moderate (Beneficial).

Labor Influx

It is expected that a certain workforce will be brought to the region from outside to work in the construction, in the construction and operation phases of the project. Although it is envisaged to give priority to the people living in the region who are seeking a job / unemployed in the employment of this workforce, it is considered that it is not possible to meet the entire workforce from the region and it is inevitable to bring in particular skilled workforce. The indirect labor flow, which means people coming to the project area with expectations such as finding a project and / or other job opportunities, is expected to occur due to the acceleration of urbanization and the opening of new investments. This indirect flow may also include families of people who come to the region to work and / or seek work. The project has potentially positive and negative impacts in terms of migration and temporary settlement of the workforce, demands on infrastructure and public services, housing and sustainable resource management and social dynamics. Workers from outside the region will be employed at construction sites. Construction site area provides workers with accommodation, cafeteria, laundry, health facility, recreation facility, etc. will provide opportunities to meet their needs.

Appropriately managed labor influx can provide potential benefits for the community. These benefits are typically related to economic opportunities through employment and/or training by the project, procurement of goods and services from the local suppliers in the region (such as hotel stays, apartment rentals, shopping from local vendors) and contribution to local economy. Improved communication, transport links, economic linkages, monetization of rural economies and new markets for local products and services will increase economic opportunities in the region. Local employment in different job branches and trainings to be provided for workers by the Project may contribute to the increasing of occupational specialization in the region, capacity enhancement (technical capacity, earning capacity, wealth accumulation, purchasing power and network building), individual, household, and community empowerment.

These overall impact factors are moderate and the receptor sensitivity is moderate. The overall impact will be Moderate (Beneficial).

One of the potential negative impacts is the disturbance from the coming of foreign workers depending on the socio-cultural structure of the people living in the region. The general discomfort created by workers may be increased pressure on the use of common infrastructure or services, or tensions due to lack of respect for local cultural norms. Other potential negative effects (risks) that can be caused by the labor flow; Increases in crime

movements, concentration of traffic and increase in accidents, additional load on transportation infrastructure.

The risk of gender based violence is one of the most critical adverse social impacts caused by labor 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 labor 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 centers.

In the focus group meeting with women in Sazköy, it was observed that there was no concern about compliance with the workers coming from outside, while women in Gökçeler village stated that they might be disturbed by the presence of foreign workers from outside the region. There were also concerns about the increase in crime movements such as theft. Women in the region expect employment from the region and its surroundings as much as possible.

These overall impact factors are moderate and the receptor sensitivity is moderate. The impact will be Moderately Important.

Operation Phase

Considering the fact that a certain level of employment can be provided in the region, although not very intense within the scope of the project, and the implementation of the Filyos Valley Project in the continuation of the project, an important economic growth potential can be achieved by attracting the migration of the skilled and unskilled active workforce in the region. Stakeholder consultations have also revealed that settlements with a currently declining population have positive economic expectations from the project, which may reverse the declining population rate. Therefore, it is likely to have a positive impact on the demographic structure at the regional level during the operational phase of the Project.

These overall impact factors are moderate and the receptor sensitivity is low. The overall impact will be Low (Beneficial).

Mitigation and Development Measures

The high share of local communities in employment provides a positive view for the project, while at the same time reducing the possibility of socio-cultural conflicts that may arise from population growth. ETP is committed to employing the local workforce within the scope of the project. As observed in the interviews in the region, local people have an expectation about local employment and it will be important to give priority to local workers as much as possible. Other mitigation measures to be implemented during the construction phase of the project to manage the social impacts on the population and demographic structure are as follows;

- To increase the local benefits of the project, goods, services and materials will be procured from local businesses to the extent possible. During the construction period, a Procurement Plan, which also defines local procurement procedures, will be prepared and added to the subcontractor agreement.

- As part of the Stakeholder Engagement Plan (SEP), a grievance mechanism will be in place at all stages of the construction phase; Any dispute will be resolved through the Project 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.
- Code of conduct will be determined for the employees by the project management, which will include the rules of conduct that will be followed not only within the construction site, but also in communicating with local people outside the construction site.
- During the project, a Traffic Management Plan will be prepared to determine mitigation measures 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) 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.
- GRM 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 GRM will be repeated in all information materials.

5.9.2.2. Impacted Land and Other Assets, Economic and Physical Displacement

In this section, potential social effects that may arise due to land acquisition and loss of immovable assets as a result of the Project are evaluated. The assessment is divided into two parts: land preparation and construction phase and operation phase.

Land Preparation and Construction Phase

Since the lands on the project route will be permanently expropriated by GDII, the project is expected to cause both economic and physical resettlement. The project is not currently intended to use urgent expropriation (Article 27). Expropriation decisions will be made in accordance with the expropriation law No. 2942. Amount of lands that need to be expropriated / required ownership arrangement due to project activities, is determined in the context of the information on amount of land, use status; Information such as the type of building / structures, usage status and number, map and expropriation operations

Indicator ownership information of the lands within the land acquisition corridor was compiled based on the information and documents provided by GDII and presented in Table 5-63. The distribution of the parcels affected by the land purchase process and the Project Affected Persons (PAP) [50] are also given in this table. This data can be changed during future design and / or optimization work of the Project. The total land loss due to expropriation is estimated to be 586.85 decares, 446.52 decares of this loss is in the parcels of the state treasury under current conditions (as of January 2020). An important part of the lands to be purchased (approximately 77% in terms of surface area and number of parcels) mainly consists of public lands. Individual lands that will be affected by expropriation correspond to 29% of the total in terms of number of parcels and 17% in terms of surface area. This is due to the fact that most of the lands in the region have been expropriated within the scope of Filyos Valley Project Industrial Zone. The fact that the new land acquisition is few and limited indicates that the project's land acquisition effects will not be major.

Table 5-63: Indicator Ownership Information and Land Acquisition Summary of Lands in the Expropriation Corridor

	Private	National treasury	Third Party Organizations (Municipality, TCDD)	Village Legal Entities	Pasture	Forest	Total (decares /number)
Area to be Expropriated (decare)	100.20	446.52	36.81	3.30	-	-	586.85
Parcel	139	322	6	4	-	-	471
Number of PAPs affected	715	6	-	-	-	-	721

Source: GDII, 2020

[50] Project affected people (PAP) describe all people affected by mandatory resettlement, including all members of a household (including women, boys, girls, boys, larger generations in the case of larger households); the owner and employees of a business; members of an ethnic minority group; tenants; landowners and partners; informal settlers (i.e. those who do not have formal deed); Those who have customary land rights; Unofficial business operators and their employees / assistants are included. The number of PAPs for land impact calculations refers to the household head / owner / user of the land as the representative of the family, so PAP is the project affected household.

Although the number of PAPs that could potentially be affected in Table 5-63 appears as 721, this number includes owners, shareholders and users directly in the lands. It was observed in desktop studies that many agricultural lands with a very small area sizes and not used in the region have hundreds of shareholders.. For example, a 497 m^2 sized-land has 149 shareholders in total. Another 302 m^2 sized-land has total of 151 shareholders. In the field studies, it was observed that a great majority of these shareholders had no connection with the lands, and even some people were not even aware of the existence of the land. This situation is due to the fact that the surface areas are quite small, and the number of idle parcels that were used in the past but are currently not used by the shareholders living in the cities. This is especially common in the Öteyüz and Sefercik neighborhoods of Filyos. This situation may pose a problem of outreach to all shareholders of the land during expropriation, besides it is observed that some of the listed shareholders were already passed away but their names still exist in the list. Shareholders may be required to apply to the Land Registry Office to delete the names of dead owners who have shares in the title deed and to transfer the immovable property to determine the actual shares of the shareholders.

When looking at Table 5-64, which shows the distribution of the lands in the corridor to be expropriated according to the settlements, it is seen that 31% of the total 471 parcels are in Gökçeler village and 27% in Sazköy. Most of the affected lands in Sazköy, Aşağıihsaniye and Sefercik settlements are in the status of public land. While private land is not affected in Derecikören, private lands constitute 99% of the lands to be expropriated in the Öteyüz neighborhood.

Table 5-64: Distribution of Lands in the Expropriation Corridor to Settlements

Settlement	Total Number of Parcels Affected	Private	National treasury	Third Party Organizations (Municipality, T.C.D.D)	Village Legal Entities
Sazköy	129	19	106	-	4
Aşağıihsaniye	14	2	12	-	-
Derecikören	18	-	17	1	-
Gökçeler	146	59	84	3	-
Sefercik	125	22	103	1	-
Öteyüz	39	37	1	1	-
Total	**471**	**139**	**322**	**6**	**4**

Source: GDII, 2020

Land expropriation will be completed prior to the construction phase. This process is likely to result in the following types of impacts during the land preparation and construction phases of the Project;

- Loss of housing / structure and other assets (Physical resettlement)
- Permanent loss of agricultural land (Economic resettlement
- Loss of agricultural products and trees (Economic resettlement)
- Loss of pasture lands and prevention of passageways (Economic resettlement)

Loss of Housing / Structure and Other Assets

There will be limited physical displacement in relation to project activities. Physical displacement is potentially considered to be a social impact problem because it will lead to

involuntary resettlement. Within the scope of the project land purchase activities, the number of physically displaced houses was determined to be 17 (according to the land purchase data available as of January 2020).

The distribution of the number of affected houses by villages / neighborhoods is given in Table 5-65. As seen in the table, 14 of the affected houses are in Sazköy village. It is seen that only 1 house was affected in Aşağıihsaniye. It has been determined that 13 of the affected houses in Sazköy registered in the name of Treasury are abandoned and not used. These houses have been abandoned for a long time since they are located within the borders of the Industrial Zone and were expropriated (See Figure 5-24-Figure 5-26). Only 1 of the houses remaining in this area continues to be used (See Figure 5-28). It was determined that this household continued to live here by paying rent to the General Directorate of National Real Estate. They used to reside here before the houses were expropriated in 1996 and since they did not want to leave their houses after expropriation,started to pay rent.

Table 5-65: Houses Affected by the Project

Settlement	Masonry House/Used	Masonry House/Abandoned
Aşağıihsaniye	1	-
Sazköy	1	13
Gökçeler	-	2
Total	2	15

Source: GDII, 2020


Figure 5-24: View of Abandoned Houses-1

Figure 5-25: View of Abandoned Houses-2

Figure 5-26: View of Abandoned Houses-3

Figure 5-27: View of Used Houses-2-Sazköy

Another one of the houses that are affected by the project and in use remains within the borders of the village of Aşağıihsaniye (Figure 5-23). It is learned that this two-storey house was built 45 years ago, there is permanent residence on one floor and periodic residence on the other floor.

Figure 5-28: View of Used Houses- -Aşağıihsaniye

One of the two houses that are affected by expropriation and in use is located on the national treasury land and one on the private land. Therefore, one of these households is a tenant in the treasury land and the other household is a property owner. It is estimated that households may experience loss of moral bonds, uncertainty and feelings of anxiety due to physical displacement. Economic uncertainty may also be involved. These impacts will be discussed in more detail in the RAP.

The list of other structures that will be affected by the project is given in Table 5-66. In the determinations made regarding the usage of these structures, it was learned that the garage, greenhouse, coop, a barn and a hayloft are currently in use. The water well is located on private land, and other structures (greenhouse, haystack, fountain, garage, folder etc.) are located in the national treasury. The effects on the users of these structures will be analyzed in detail in the RAP.

Table 5-66: Project Affected Assets (Structures)

Structure Affected	Number	Structure Affected	Number
Water Well	1	Greenhouse	1
Garage	1	Hayloft	3
Graveyard	1	Fountain	1
Barn	3	Poultry House	1

Source: GDII, 2020

These impact magnitudes are high and receptor sensitivity is high. Thus, the overall impact will be Highly Important.

Loss of Agricultural Land

The land acquisition to be realized within the scope of the project and the loss of lands used for agricultural activity create the concept of economic displacement. In this context, there may be impacts such as loss of livelihoods related to land owners or users, decrease in economic welfare level, loss of traditional ties.

The fact that the majority of the lands in the construction corridor of the project remain within the previously expropriated area ensures that the effects of economic displacement

are limited. Agricultural activities in the region have decreased significantly compared to the past, because the agricultural lands were expropriated within the Industrial Zone in 1998 and there were no alternative agricultural areas due to the geographical limitation in the region. Agricultural activities continue in the limited agricultural areas, although not very intensive. The people of the region generally produce vegetables for household consumption in small gardens rather than at home, rather than commercial agriculture. Loss of these gardens and limited agricultural areas may have negative effects on households economically. On the other hand, 82 of the 139 private parcels were not used, and it was determined during the interviews with land owners and users. These lands are generally multi-shareholder parcels and are not used for any purpose and remain empty.

In the case of partial acquisition of land, as in this project, total land assets and basic livelihoods are important for landowners and users. RAP to be made within this framework may require compensation applications over the expropriation value. First of all, in order to ensure compliance with international standards, the preference of a “replacement price” in which the replacement costs are added in addition to the market price, instead of the expropriation payment.

There are also those who operate state treasury lands through leasing in the region. In the interviews with these people, it was determined that the amount of land they rented is too large and the areas to be expropriated will not significantly affect their livelihood activities. It has also been learned that the main livelihoods of these public land users are not dependent on the land, and that agricultural activities are carried out as additional income. Therefore, it is foreseen that those who use the public land by renting will not be adversely affected by the land acquisition of the project.

These impact magnitude factors are moderate and receptor sensitivity is moderate. Therefore, the overall impact will be Moderately Important.

Loss of Agricultural Products and Trees

Due to the project expropriation, the removal of agricultural products and trees in the lands will be possible during the pre-construction and the construction phase. This effect can also occur in the form of damage to agricultural products in neighboring parcels due to machinery and equipment movements during construction.

Loss of agricultural products and trees to be affected by the project were determined by the asset identification study carried out by GDII. Even though all crops cultivated in vegetable gardens could not be identified individually, since agricultural crops are generally vegetable gardens and asset determination is carried out in the winter, information about whether or not gardens are planted and which crops are generally grown. It has been learned that vegetables such as kale, beans, corn, tomato, pepper, eggplant, cucumber, spinach, parsley, leek, and onion are planted for household consumption in vegetable gardens. The loss of vegetable gardens, which are produced for household consumption, will mostly occur in Gökçeler village. In Sazköy and Aşağıihsaniye, it was determined that vegetable gardens were affected, although to a small extent. In the interviews with people who rented state lands and engaged in agricultural activities, it was learned that commercial products such as wheat, corn, vetch, oats, barley, corn, alfalfa were grown in these lands.

Due to the widespread forest climate in the region, wooded areas are quite high and the number of trees expected to be affected due to expropriation is approximately 1,347. While this number is not exact, it represents the total figure obtained in the first land asset

determination studies and interviews with land users. In parallel to the high number of hazelnut fields in the region, it is seen that there are 561 hazelnut trees expected to be affected by the project. Apart from this, trees such as willow, walnut, poplar and daphne are also quite large. Daphne is widely found in the areas to be expropriated especially in Sazköy and it is traded by the households in this settlement. It is learned that there are daphne trees on Gökçeler village but they are not traded.

Table 5-67: Assets Affected by the Project (Trees)

Tree Type	Number	Tree Type	Number
Pine tree	10	Apple	18
Pear	11	Chestnut	7
Hezelnut	561	Pomegranate	6
Grape	4	Cherry	12
Walnut	144	Fig	33
Apricot	1	Mulberry	5
Peach	2	Plum	16
Cherry	4	Willow	190
Plane	1	Poplar	118
Olive	1	Oak	98
Daphne	100	Alder	5
Total	1,347		

Source: GDII, 2020

These impact magnitude factors are moderate and receptor sensitivity is moderate. Therefore, the overall impact will be Moderately Important.

Loss of Pastures and Prevention of Access to Pasture Lands

As mentioned in the baseline data, in some of the project affected settlements, most of the grazing lands remain in the area declared as Freezone under the Filyos Valley Project and was expropriated in 1998. In Sazköy and Derecikören villages located on the right side of the project area and located in a geographically limited area, the expropriated state lands are still used for grazing as there are no alternative pasture areas (See Figure 5-29). Pasture areas of Aşağıihsaniye village were also expropriated, but it was learned that the households used their own gardens, fields or forest areas for grazing and mostly fed the animals with feed.

Sefercik neighborhood has alternative pasture lands other than the expropriated ones. It has been learned that households use both expropriated treasury lands and alternative pasture lands, but grazing is mostly performed in pasture lands. Gökçeler neighborhood has sufficient alternative pasture lands for grazing.

It has been determined that the access to the M3 pasture area (treasury land), which is the only grazing land of Sazköy settlement, will be prevented with the start of the construction phase of the Project. Although the usage of this area as a pasture will already be prevented with the realization of the activities within the scope of the Industrial Zone, the usage continues now since the activities have not started yet. Therefore, the restriction of its usage during this period will have an impact on the Project. It is estimated that this access prevention can significantly affect livelihoods In Sazköy, since animal husbandry is an important source of income and given that the agricultural lands have already been largely lost due to previous expropriation..Alternative pasture areas are not available due to the geographical limitation as the back part of the settlement is forested. Herders will have to continue their grazing activities in a restricted area, or they will have to travel from a longer distance to reach pasture areas with the implementation of the Project. This impact is not expected to occur in other settlements due to the presence of alternative pasture lands and grazing activities are not performed in Project-affected lands. Also, their access to pasture lands are not affected by the Project.

These impact magnitude factors are high and receptor sensitivity is moderate. Thus, the overall impact is considered to be Major.

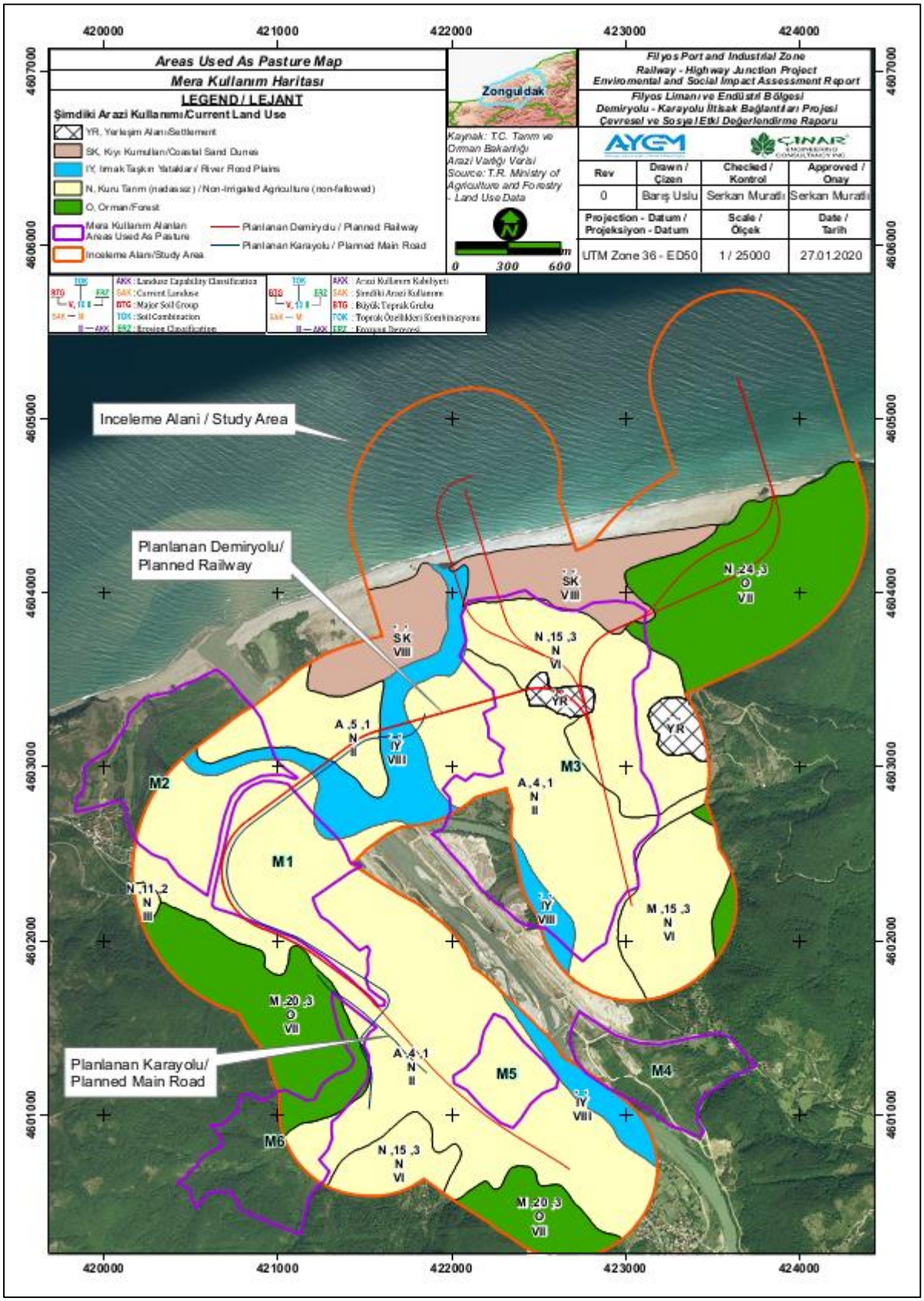

Figure 5-29: Pasture Usage Map

Operation Phase

Since there will be no construction work or additional expropriation during the operational phase of the project, no loss of agricultural land, no new effects on agricultural crops and trees are expected at this stage. However, problems related to pastureland access will continue during the operational phase. Since the use of this area as a pasture will actually be prevented with the realization of the activities within the scope of the Industrial Zone, the Project will not have a new effect.

Mitigation Measures

The World Bank ESS5 has been prepared with the idea that the project related land purchases and restrictions on land use may have negative effects on the communities and people using these lands. To reduce this effect, ESS 5 defines basic requirements. These definitions are as follows;

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
- To avoid forced eviction.
- To reduce the negative social and economic impacts that are unavoidable due to land acquisition or restrictions on land use: (a) to provide timely compensation for loss of assets at the cost of substitution, and (b) to the displaced persons and to the pre-displacement levels or the start of project implementation. assist in improving or at least reinstating levels that are valid at first (whichever is higher);
- Improve the living conditions of physically displaced poor or disadvantaged people by ensuring adequate accommodation, access to services and facilities and frequency of security;
- To comprehend and carry out resettlement activities as sustainable development programs and to provide sufficient investment resources for displaced persons to benefit directly from the project due to the nature of the project;
- To ensure that resettlement activities are planned and implemented through appropriate information sharing, meaningful consultation and informed participation of those affected.

Land acquisition of the project will be in accordance with national laws and in case of gaps between ESS5, necessary measures will be introduced to close these gaps. Therefore, the Project adheres to international standards for land acquisition and mandatory resettlement. The project route was created to be away from residential areas to minimize physical resettlement. However, due to engineering standards, 17 houses could not be avoided on the Project route. For this reason, the Resettlement Action Plan (RAP) defining the rights according to international standards is created within the scope of the project.

When displacement cannot be avoided, appropriate compensation for loss of assets will be provided through project-specific measures to be developed for displaced communities and individuals. In order to reduce the impact of economic displacement and minimize impacts such as a drop in household income or loss of land, affected people will be compensated and consulted with these affected people (especially with vulnerable groups) and necessary measures will be taken to reconstruct livelihoods of the affected population. Persons eligible for compensation are those who own (or partially own) land; these include (i) people who have official legal rights on the land or assets they reside or use, and (ii) people who do not

have formal legal rights on the land or assets, but who have a claim on the land that may or may be recognized under national law. Some land users use informal or custom land use that will not be recognized under national law. These groups will be identified and will be offered additional compensation according to the rights matrix to be defined in the RAP.

Impacts on income sources are also defined as (1) landowners, (2) land users and beneficiaries. Under the RAP, measures to prevent loss of income will be offered for both groups. The expropriation price to be paid to the landowners and the agricultural product / tree price to be paid to the people who use the land should be in "replacement" value including additional costs. Users of the land may be operating formally or informally. Both situations create rights. As a matter of fact, it is known that there are people who rent the public lands in the region. Identifying such persons, examining income sources, measuring income losses and identifying their rights ownership will be within the scope of RAP. Therefore, it is vital to develop procedures for the Resettlement Action Plan (RAP), to establish procedures for monitoring and evaluation of their implementation and to implement corrective action.

It is important to timely identify and compensate for additional damages to agricultural products and activities in adjacent parcels that may not be foreseen at this stage but may occur during construction, except in cases where legally entitled and compensated within the scope of the project. Unauthorized use of privately owned lands, damage to adjacent lands, etc. will be handled via the grievance mechanism of the project. It is necessary to make evaluations / inquiries according to the case by ensuring that complaints are received and to plan and implement corrective actions where necessary.

In order to avoid the adverse effects that may arise as a result of permanently preventing passage to pasture areas in Sazköy due to the railway, safe and appropriate crossing points should be determined by conducting continuous consultations with local people and who are engaged in animal husbandry. Technical solutions should be explored to ensure access to pasture areas, and appropriate crossings should be attempted to restore access after construction. If access can not be provided during construction, land users should be compensated with additional supports as defined in RAP.

Consultations within the scope of the SEP and the sound functioning of the grievance mechanism are also of great importance in the good management of the impacts on land, other assets and thus the economic structure.

5.9.2.3. Local Economy, Livelihood Sources and Employment

This chapter evaluates the short and long-term local economy, livelihoods and possible impacts on employment during the construction and operation phases of the Project. Most of these impacts are related to the previous section mentioned from the lands planned to be acquired, and the parcel owners extend from the private to the general population.

Land Preparation and Construction Phase

Local Economy

Construction of the project, by the Project in the construction and related industries (construction vehicles and machinery, building materials, etc.) and transportation, catering, laundry, food supply, security services etc. will result in temporary economic effects from the purchase of other goods and services. The procurement of goods and services for the project is expected to contribute to the local economy to the extent that these outputs are purchased locally and regionally. Economic impacts on construction workers, who will have increased income to spend and more money in the local economy, may also be counted as

temporary economic effects (indirect effects). Therefore, this effect has been evaluated as positive.

The increase in the income of local workers, as well as the employment of non-local people, may provide some minor benefits to the local community in relation to increased spending in the Project area. This positive effect is anticipated as the closest places to the project area are mostly small-scale settlements. The impact size factors are moderate (Beneficial) and the receptor sensitivity is moderate. Therefore, the overall impact will be Moderately Important.

Livelihood Sources

Especially long-term effects from land acquisition reveal transformative and transformative effects on livelihoods. Basic changes that land preparation and construction activities will create with cumulative effects;

- Narrowing of the agricultural activity areas and increasing household consumption costs,
- Increasing feed costs, decreasing income from animal husbandry and turning to new livelihoods due to the barrier / loss of access to pasture areas where livestock activities can be carried out.

It was explained in the previous sections that agricultural activity in the region was not done commercially, but it was generally carried out in gardens where vegetables / fruits were grown for household consumption. Usually, products such as nuts and laurels are traded. The fact that most of the project affected lands are not being used currently indicates that the impacts on agricultural activities will be limited. Therefore, a limited negative impact will arise due to the loss of gardens for household consumption in local agricultural activities, which may lead to an increase in household consumption costs. Impact magnitude factors are moderate and receiver sensitivity is moderate. Therefore, the effect will be Moderately Important. Additional measures for the households who actively use these vegetable gardens for household consumption should be provided to ensure their household income is not adversely affected. The loss of vegetable gardens will mostly occur in Gökçeler village. It was determined that vegetable gardens were affected in Sazköy and Aşağıihsaniye settlements too, although to a small extent. RAP studies identified 20 households who will loss vegetable gardens due to Project which are currently in use. First of all, restoring this traditional livelihood activity should be the basic approach to be adopted by the Project. Before cash assistance, it is necessary to consult with the immovable owners whether this traditional production can be maintained in another land owned by them or another land owned by public authorities that may be rented or allocated to these PAPs. As most of the lands are expropriated in the region and belongs to treasury, GDII may consider getting in contact with relevant authorities for a land-to-land compensation. If possible, additional support for the establishment of a vegetable garden elsewhere (with a consultancy support of an Agricultural Engineer) should also be provided. If land-to-land is not possible for the Project, temporary livelihood support for covering extra costs of households deriving from necessity of households to purchase the agricultural products from market which they used to produce themselves.

Access to pasturelands is blocked only in Sazköy whereas in other settlements, no impact on livestock activities I expected. For this reason, although significant changes are not expected in livestock activities in the region, it is estimated that animal husbandry may decline in Sazköy settlement. Impact magnitude factors are high and receptor sensitivity is moderate. So the overall impact will be Highly Important.

Among the livelihoods related to the land in the region, collecting and beekeeping from forest areas are also available. No beehives have been identified in the area of the project. In addition, there are no beehives that can be damaged due to effects such as dust and noise in close proximity to the construction site. Beekeeping is usually carried out near forest areas or in gardens near the home. Therefore, it was observed that there was no effect that would directly affect beekeeping and carry the beehives. It has been learned that gathering activities from the forest are carried out in a very wide area and not in a certain region. Therefore, it is not expected that the restricted forest land to be used by the Project will have any adverse effect on collectors.

Employment

Employment of local workers during the construction phase is a source of positive impact not only for the local economy and livelihoods, but also for the positive image of the project. Low level of education will enable semi-skilled and unskilled labor to be provided from the region. However, it may make it difficult to obtain the elements from the region with the characteristics that the population is desired to be low. It is expected that a maximum of 180 personnel will be employed during the land preparation and construction phase.

The scope of utilization of the low income, less educated population from the employment opportunities created by the project will depend in part on the skill level of the positions to be filled. Unemployment rates are high in the affected settlements, especially among the young population, and during social field work, it has been revealed that mukhtars and household members have an intense expectation about employment.

The impact size factors are moderate (Beneficial) and the receptor sensitivity is moderate. Therefore, the overall impact will be Moderately Important (Beneficial).

Operation Phase

These effects related to land preparation and construction phases are known to be temporary. The permanent impacts of the project during the operational phase emerge as direct and indirect effects. While direct effects are the decrease in livestock in Sazköy and losing importance as the source of livelihood over time are seen due to restriction of reaching the pasture land and loss of limited pasture areas, while indirect effects are evaluated with the Filyos Valley Project, which is under construction in the region.

Local Economy

The operation phase of the project is expected to improve connectivity for the transportation of goods and services, thereby leading to economic growth in the region. In addition to this developing trade, it will include better accessibility for markets in the region to expand their regional markets and resources to more developed provinces in the region.

The railway project is considered by the people of the region as part of the Filyos Valley Project and therefore there are expectations that it will be implemented as soon as possible. Because the Filyos Valley Project causes significant livelihood losses in the region due to the previous expropriations, but it is considered as an important investment as a result of the regional people's search for new business areas and their search after time. It is thought that the region will come to life as before with the port's operation, industrial investments, employment opportunities created. As a matter of fact, considering that young people in the region migrated out of the city due to unemployment, they are very likely to return to / stay in the region if employment opportunities are provided. Also, in the focus group meeting held in Gökçeler village, women in the region also expressed their expectations on this matter:

"There were a lot of immigrants to find a job. If job opportunities arise from this project, young people who go out to work can return to their villages. They went to places with employment opportunities like Istanbul, and if they find a job in their village and return to those who will rent it there, at least they do not rent. We want to build a factory here in the future, our children will return if there is work. Our grandchildren are small now but in the future they can have jobs when they grow up. "

One of the most prominent issues in the interviews with the local people as the positive effects of the project is that the railway 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 migration 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.

These impact magnitude factors are moderate and receptor sensitivity is moderate. Therefore, the overall impact will be Moderately Important (Beneficial).

Employment

During the operation phase, personnel will be employed in the station areas, maintenance and operation centers and service areas, which will create long-term employment opportunities for the local, regional and national workforce. During the operation phase, local workforce will be used to operate these centers. The net numbers of employment have not yet been identified for the operational phase of the project.

These impact magnitude factors are moderate and receptor sensitivity is moderate. Therefore, the impact will be Moderately Important (Beneficial).

Mitigation and Development Measures

The following mitigation / development measures have been identified to reduce the identified impacts associated with the Project:

- The Human Resources Policy, developed by GDII in line with the national Labor Law and ESS 2, should be developed and implemented throughout the project.
- The implementation of this Policy by the Contractors should be made mandatory by contract terms
- In addition to the Employment and Training Plan prepared by GDII, a Purchasing Plan including purchasing provisions should be prepared and implemented.
- The project owner should increase the local benefits of the Project by employing local employees as much as possible.
- Recruitment processes should be transparent, open to the public, and in a manner that will ensure discrimination and equal rights in terms of ethnicity, religion, language, gender and sexual orientation.
- GDII and Contractors should give clear information about the recruitment process and pay particular attention to informing local people about employment opportunities through different channels such as muhtars and local associations.

- Any kind of construction-related restrictions regarding livelihoods should be consulted with the local people immediately, and solutions should be provided in a way that does not have a negative impact on livelihood activities.

5.9.2.4. Infrastructure Status, Education and Health Services

Land Preparation and Construction Phase

Infrastructure and Public Services

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. In Gökçeler, the widening of the existing village road passing by the houses may cause restrictions in transportation. It is recommended that these obstacles to be prevented by offering alternative routes for a short time of period. 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.

Workers' accommodation and 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.

Given the frequency of construction activities and the temporary time frame and the local scope of the works, the magnitude of impact can be assumed to be Medium. These impact magnitude factors are moderate and receiver sensitivity is moderate. Therefore, the impact will be Moderately Important.

Education and Health Services

There is no education or health service to be directly affected by the project. These impact size factors are negligible and the receptor sensitivity is minor. Therefore, the impact will be Minor.

Operation Phase

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.

Mitigation Measures

- A Traffic Transport Management Plan should be prepared to analyze and reduce any traffic effects that may arise during the construction and operation phases.
- In order to reduce the economic negative effects of short-term road closure and route changes, creating alternative routes and announcing these changes with local media and corporate announcements is a necessity of positive stakeholder engagement.
- In the selection of the roads to be used during the construction phase, the understanding of not passing through the settlements and keeping the use of the roads in its vicinity at a minimum level should be adopted if possible.
- The construction phase can have an damaging impacts on roads. In order to prevent such impacts from affecting daily and economic life negatively, it is recommended that complaints about the issue are taken into consideration and necessary maintenance and repair works are carried out.
- Construction vehicles can also cause physical damage due to various accidents. Fences, walls, wells, trees, etc. damaged due to construction activities. Assets should also be compensated. These situations should be stipulated in contractor contracts.
- In order to minimize the socio-economic impacts that may occur if the construction activities temporarily disrupt infrastructure services such as water, electricity and internet in a planned or unplanned manner, it is important to make a plan that avoided cuts as much as possible and to announce planned cuts to stakeholders with local media and corporate announcements. .
- During the transportation of the construction materials, the time to and from the school should be taken into consideration. Mukhtars should be informed about the date and time of the next construction activities.

5.9.2.5. Community Health and Safety

Land Preparation and Construction Phase

Public health and safety problems to be encountered during land preparation and construction phase are community tensions that may arise due to traffic safety, the risk of infectious diseases, excavation management and construction related activities.

Construction activities will increase traffic in the project area, so a Traffic Transport Management Plan will be prepared and implemented. The residents of the region have concerns about the safety of life and property. Especially Gökçeler village expects roads to be used in a controlled and safe manner. The main road to be widened within the scope of the project, passes through Gökçeler village and houses are located very close to the road. Even in the current situation, it is stated that the risks of accidents are high due to the fact that this road is narrow and very close to the houses. In the focus group meeting with women in Gökçeler village, concerns about traffic effects were also expressed:

"Since our village is on the road, there are many accidents. We are afraid that there will be accidents with the increase in traffic of the project construction. We do not want the trucks to pass through our village. We have children with disabilities, we take them out in the meantime, if they pass near our house, we cannot take our children out since there is a risk of accident (both from trucks and trucks and the train)."

The operation of the machinery and vehicles that will be used in the construction of the railway and road connection during the construction works of the project can generate noise and these noise impacts can be felt more especially due to the proximity of the settlements to the project area in Gökçeler and Sazköy. At the same time, dust emissions during the operation of the project vehicles may be exposed and negatively affect the nearby settlements.

These effect magnitude factors are high and receiver sensitivity is high. So the effect will be Majorly Important.

Operation Phase

With the decrease in construction traffic and completion of the existing road widening during the operation phase, the transportation infrastructure will be developed in a way that positively affects public health and safety.

Mitigation Measures

- A Traffic Transport Management Plan will be developed and implemented by the Contractor to manage the construction-related traffic flow at construction sites and facilities.
- Necessary hygiene measures will be taken at the construction sites. These measures include periodic health screenings for employees, medical facilities at construction sites, water treatment and waste management at construction sites.
- As with the traffic safety measures during the construction phase, it should be ensured that the necessary renewals in the traffic signs are made quickly by the local authorities during the operational phase. It is known that the activity will not start without the traffic signs regarding the level crossings to be created.
- Passages should be structured to allow safe passage of humans and animals. When bovine and ovine are not under shepherd management and children are not under adult supervision, measures should be taken to prevent entry into the railway route.
- Within the scope of the project, the personnel should operate in 07.00-19.00 as a single shift in the works to be done in the open area during the land preparation and construction phases. Attention should be paid to equipment that emits noise that should not be used outside the hours of 07.00-19.00.
- Watering of the roads should be done regularly to prevent dust emissions that may occur during construction activities.

5.9.2.6. Vulnerable Groups

Land Preparation and Construction Phase

Possible socio-economic impacts on local communities have been studied so far. The groups that are more likely to experience these impacts more intensely and have relatively low capacity to reach mitigation measures and stakeholder participation opportunities are the vulnerable fragile groups of the project. Considering all types of impacts during the land

preparation, construction and operation phases, it is the subject of this heading that the special situations of vulnerable individuals and the reduction of extra impacts arising from these situations.

Vulnerable groups that may be affected by the project and which may be disadvantageous compared to other people / groups are defined in the following categories.[51];

- Households receiving in- cash support from the Social Assistance and Support Foundation (SASF), very poor, in need of help from others
- People with physical or mental disabilities
- Households using public lands such as treasury land, village legal entity, pasture, forest
- Senior citizens over 65 years old who need care
- People whose lands have been affected by other infrastructure or investment projects (highway, railway, oil or gas pipelines etc.) in the region and whose lands will be affected within the scope of this project.

It is estimated that very poor households receiving support from SASF may be more negatively affected by the acquisition of private land than other landowners. No very poor households that use public lands have been identified. However, there may be people who indirectly benefit from these public lands and contribute to household consumption. These people will be identified within the scope of RAP.

It has been determined that there are few households that use public lands such as treasury land, village legal entity, pasture and forest for their livelihood activities. Livelihood losses of these households will be evaluated within the scope of RAP and will be compensated if necessary.

People with physical or mental disabilities have been identified as a vulnerable group under the project. Elderly individuals are another vulnerable group in terms of need for care. Individuals with disabilities may not have access to employment opportunities to be created, individuals with disabilities and older people may not be able to participate in the consultation activities of the project and therefore fall into a disadvantage.

These effect magnitude factors are high and receiver sensitivity is high. So the effect will be Majorly Important.

Operation Phase

Operational phase effects should be monitored to ensure that vulnerable groups are not adversely affected by Project activities.

These effect magnitude factors are high and receiver sensitivity is high. So the impact will be Majorly Important.

Mitigation Measures

- During the preparation of RAP, vulnerable people who may be affected by the Project will be identified through detailed field studies.

[51] During the mukhtar meetings, it was learned that there are no households in the settlements that “do not have a land of their own but use other lands in the village (with or without renting)”. So this group has been removed from vulnerable group definitions.

- There is a detailed strategy for the sharing and disclosure of information presented in the SEP, for the inclusion of vulnerable groups in all communication related to the Project, and for their active participation.
- Vulnerable groups should be given priority regarding the employment benefits of the project. The Employment and Training Plan covering local employment provisions should target vulnerable groups and subcontractors should be responsible for providing employment to designated vulnerable groups.
- Measures will be included in the grievance mechanism to ensure timely response to and complaints from vulnerable groups.

5.9.3. Impact Significance, Mitigation Measures and Residual Impacts

Table 5-68 provides a summary of social impact assessments. This table summarizes the significance of impacts identified before and after the implementation of mitigation measures.

Table 5-68: General Assessment of Social Impacts

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			
Internal Population Flow	Land Preparation and Construction	Local people	Local	Medium	Short-term reversible	Short term	One-off	Medium	**Low**	Minor Importance (Beneficial)	Minor Importance (Beneficial)
	Operation	Local people	Local	Medium	Short-term reversible	Medium Term	Intermittent	Medium	**Low**	Minor Importance (Beneficial)	Minor Importance (Beneficial)
Creating Local Employment and Job Opportunities	Land Preparation and Construction	Local people and nearby settlements People living in the region Businesses near Route	Wide	Medium	Short-term reversible	Short term	Intermittent	Medium	**Medium**	Moderate Importance (Beneficial)	Moderate Importance (Beneficial)
	Operation	Local people and nearby settlements People living in the region	Wide	Medium	Short-term reversible	Long term	Intermittent	Medium	Medium	Moderate Importance (Beneficial)	Moderate Importance (Beneficial)
Labor Influx	Land Preparation and Construction	Local people Businesses near Route	Local	Medium	Short-term reversible	Short term	Intermittent	Medium	Medium	Moderate Importance (Beneficial)	Moderate Importance (Beneficial)
			Local	Medium	Short-term reversible	Short term	Intermittent	Medium	Medium	Moderate Importance	Minor Importance

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			
Loss of housing / structure and other assets and physical resettlement	Land Preparation and Construction	People who will lose their housing / structure and other assets	Limited	Low	Irreversible/Long-term reversible	Short term	One-off	High	High	Major	Moderate
Agricultural land, loss of crops and trees and economic displacement	Land Preparation and Construction	People who will lose their assets on the land	Limited	Medium	Irreversible/Long-term reversible	Long term	Intermittent	Medium	Medium	Moderate	Minor
Loss of Pastures and Prevention of Passages	Land Preparation and Construction	People whose pasture access will be restricted in Sazköy	Limited	Medium	Irreversible/Long-term reversible	Long term	Continuous / recurring	High	Medium	Major	Moderate
	Operation										
Impacts on Local Economy	Land Preparation and Construction	Local people and nearby settlements People living in the region Businesses near the route	Wide	Medium	Short-term reversible	Short term	Intermittent	Medium	Medium	Moderate (Beneficial)	Moderate (Beneficial)
	Operation (cumulative)		Wide	Medium	Short-term reversible	Medium Term	Intermittent	Medium	Medium	Moderate (Beneficial)	Moderate (Beneficial)
Impacts on Livelihoods (Agriculture)	Land Preparation and Construction	Local people and nearby settlements	Local	Medium	Irreversible/Long-term reversible	Long 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)	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude			
	Operation										
Impacts on Livelihoods (Livestock)	Land Preparation and Construction	The livestock in Sazköy	Limited	Medium	Irreversible/Long-term reversible	Long term	Continuous / recurring	High	Medium	Major	Moderate
	Operation										
Impacts on infrastructure and public services	Land Preparation and Construction	Local people	Local	Medium	Short-term reversible	Short term	Intermittent	Medium	Medium	Moderate	Minor
Education and Health Services	Land Preparation and Construction	Local people	Local	Low	Not Applicable	Not Applicable	Not Applicable	Negligible	Low	Negligible	Negligible
Impacts on public health and safety	Land Preparation and Construction	Local people	Wide	High	Short-term reversible	Short term	Intermittent	High	High	Major	Moderate
Impacts on Vulnerable Groups	Land Preparation and Construction	Local people	Local	Medium	Irreversible/Long-term reversible	Long term	One-off	High	High	Major	Moderate
	Operation										

5.10. Labor and Working Conditions

5.10.1. Methodology and Project Standards

5.10.1.1. Methodology

The project owner, the General Directorate of Infrastructure Investments (GDII), the project, has 358 personnel, 160 of which are technical personnel. The General Directorate consists of 13 departments, including General Directorate of Railway Construction and the General Directorate of Railways Survey Projects that are the relevant departments to the Project.

The construction phase of the project is expected to be approximately 24 months. The number of personnel to be employed, their qualifications and camp sites where the personnel will be accommodated are not yet known. These information has been estimated by evaluation of previous project experiences presented in the Labor Management Plan (LMP). LMP contains principal standards and will be enhanced by the finalization of information that is not yet known

Data sources of this Chapter are:

- Draft Labor Management Plan (November 2019),
- Laws and Practices of Turkish Republic,
- International Standards,
- 2018 Activity Report of the Ministry of Transport and Infrastructure
- Other institutional reports,
- Previous Experiences.

5.10.1.2. Project Standards

The national legislation and international standards to be followed within the scope of the project are:

- Turkish Labor Law and related regulations
- Turkish Law on Occupational Health and Safety and related regulations
- WB Environmental and Social Standard 2: Labor and Working Conditions (ESS2),
- ILO conventions to which Turkey is a party.
    - Right to Organize and Collective Bargaining Convention
    - Abolition of Forced Labor Convention
    - Conventions on Minimum Age and Child Labor
    - Conventions on Discrimination and Equal remuneration

There is no gap between Turkish Law and ESS2 requirements as Turkey is a party of ILO Conventions

The recommendations presented in this section cover all Project workers. These workers may be involved in the project in different ways, but they have full rights based on the laws and standards adopted. The different groups of workers according to the ESS2 are:

- **Direct workers:** is a worker directly employed by the financier or project owner to work in the project
- **Contracted workers:** is a worker employed or engaged by a third party to perform work or provide services related to the core functions of the project.
- **Primary supply workers:** is a worker employed or engaged by a primary supplier

ESS2 applies to project workers, including full-time, part-time, temporary, seasonal and migrant workers.

5.10.2. Impact Assessment

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

Based on experience with construction projects, overtime is considered as risk potential. This risk is discussed in the Employment and Training Plan.

Operation Phase

The Ministry of Transport and Infrastructure is authorized with the construction and operation of the railway. Terms and conditions applied to GDII personnel are specified in the Civil Servants Law No. 657. There is no gap between Turkish Law and ESS2 requirements as Turkey 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

5.10.3. Impact Significance, Mitigation Measures and Residual Impacts

The suggestions presented in Chapter 5.9 are mitigating the impacts for project workers as well as local communities. In particular, measures for traffic and social relations will include employees.

Accommodation conditions of the workers will be discussed in the Construction Site Management Plan. Accommodation Sites should be healthy, safe providing basic occupational health and safety procedures. Discrimination should be eliminated.

Principles related to Labor and Working conditions are presented in ETP. In all applications, the following principles are essential:

- Equitable treatment of employees, non-discrimination and equal opportunity
- To maintain and improve the employee-management relationship
- Ensuring compliance with national employment and labor laws
- To protect vulnerable employees such as child labor, migrant workers, personnel supplied by third parties
- To provide safe and healthy working conditions
- To meet necessary health requirements
- Preventing forced labor

Considering the above listed principles, the determined mitigation measures are as follows;

- All workers, direct, contracted and others in the supply chain should have the right to associate. In this regard, grievance mechanism have an important part. A secure grievance mechanism system should be established that workers of all levels can benefit form. A fair and transparent employment procedure should be adopted. Positive discrimination should be practiced for disadvantaged groups.
- 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, gender based accommodation facilities, etc.)
- Ensure compliance with Workers' accommodation: processes and standards for onsite facilities (canteen, sanitary facilities, adequate amenities for socialization and resting, etc.).
- Survey accommodation facilities to be provided off-site (if any) and ensure they are also in compliance with Project standards.
- Ensure drinking and utility water to be supplied meet the requirements of the Turkish Regulation on Water Intended for Human Consumption and WHO Guidelines for Drinking Water Quality.
- Provide all accommodation sites with sufficient emergency response equipment such as first aid kits and fire-fighting equipment and conduct periodic checks to ensure they are in working condition.
- Provide trainings to personnel on general waste management, housekeeping, first aid practices and communicable diseases.

- Conduct visual checks on site to ensure proper housekeeping.
- Ensure proper first aid equipment is kept on site, at various related locations.
- Conduct periodic medical checks for personnel and provide vaccination and/or other mitigating measures when required.
- Establish adequate medical rooms at the camp sites, provide sufficient human resources and keep a suitable patient transport vehicle on site.
- Ensure construction phase personnel's retrenchment is conducted in compliance with all applicable legal requirements and WB ESS2.
- Ensure contractual requirements are fulfilled during the process.
- Ensure the personnel are aware of the process and dates (through appropriate and transparent information dissemination).
- To the extent possible, ensure personnel that may also be employed during the operation phase (e.g. security personnel) are not included in the scope of retrenchment at the end of construction phase.
- Regarding the management of occupational health and safety related risks, a site-specific Occupational Health and Safety (OHS) Management Plan was developed as part of ESMP and the following mitigation measures were determined;
- Development of a site specific OHS risk assessment and management plan
- Implementation of OHS Management Plan
- Risk assessment study within the scope of every activity to be conducted for the project will be conducted before commencing the works.
- Employees will be aware of any possible OHS risks and will be trained against them properly.
- Contractor must ensure immediate response to and timely reporting, analysis and communication of all incidents to GDII
- All incidents shall be recorded in the approved incident reporting system, and be analyzed to a level commensurate with the actual consequence or potential risk rating, whichever is higher
- Contractor is committed to return workers to meaningful and productive employment at the earliest possible time
- Contractor employees will undergo a medical assessment to ensure they are medically fit to perform their role before commencing the works and these controls will be repeated annually
- Contractor must ensure that health assessments are carried out in respect of all personnel who engage in specific tasks with the potential for occupational exposure
- Contractor recognizes that fatigue may arise from hours and patterns of work and activities, and travel/commute time
- Contractor acknowledges the risk associated with project area operations, and provides for the reporting and rectification of hazards
- Where personnel are required to work alone, the activities and conditions shall be risk assessed and a safe system of work developed
- Where a manual handling task is required a risk assessment shall be completed to identify the Hazards. The risk of injury should be assessed for each hazard, and appropriate controls implemented, including manual handling training as appropriate
- Contractor must supply suitable facilities for personnel
- Contractor must ensure commitment to monitoring and reporting of occupational health hazards and hazardous occupational environments, and implement controls to reduce risk in accordance with all applicable regulations and, wherever practicable, with regard to accepted best practices

- Contractor must ensure the safe control of hazardous substances and reduce the level of exposure to personnel, property and the environment in accordance with the ESIA Requirements
- Contractor must ensure that all personnel and visitors wear or use personal protective equipment provided if it is necessary to protect them from harm
- Contractor must ensure that sufficient Safety Signs are posted in workplaces and travel ways to prevent incidents, identify hazards
- Contractor must ensure that all personnel undertaking activities where there is a risk of a person falling from one level to another do so in a controlled manner to reduce the risk of personal injury
- Task specific hazard identification will be done for each activity.
- Access to the project area will be restricted by the Contractor and necessary precautions will be taken such as fencing the area and placing relevant signs etc.
- Site inductions will be carried out by the contractor.
  Inspections of the project site should be carried out weekly. Contractor will undertake weekly inspections of the whole work site

In case of a need for new quarry/borrow site to be used during the construction activities, the following measures will be taken by Contractor:

- Excavators, dumpers, dozers, wagon-drills, and other automated equipment that requires an operator should be equipped with air conditioned, dustproof, and soundproof cabs;
- Use of personal breathing protection will be provided.
- Necessary measures will be taken for noise prevention,
- Implementation of specific personnel training on work-site safety management;
- Implementation of geological–geotechnical monitoring programs will be conducted
- Accurate assessment of the work site by rock scaling of each surface exposed to workers to prevent accidental rock falling and /or landslide, especially after blasting activities will be done,
- Adoption of natural barriers, temporary railing, or specific danger signals along rock benches or other pit areas where work is performed at heights more than 2 m from ground level will be conducted
- Maintenance of yards, roads, and footpaths, providing sufficient water drainage and preventing slippery surfaces with an all-weather surface, such as coarse gravel will be conducted

During operation phase, to prevent any type of incident, significant occupational health and safety measures should be taken, such as;

- Major railway failures that can lead accidents such as broken wheel or axle and broken rail or track buckle will be controlled via control train and OHS Personnel of TCDD Monthly.
- Suitability of the signalisation system will be controlled in a daily manner.
- No personnel will be working without having necessary trainings.
- Level Crossings will be controlled daily.
- Operation will be stopped immediate if any factor that may lead accidents is reported.

5.11. Community Health and Safety

5.11.1. Methodology and Project Standards

5.11.1.1. 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. (social study area; see Chapter 5.9)

Main data sources and guidance used to compile the baseline information, conduct impact assessment and develop related mitigation measures are listed below:

- World Bank Environmental and Social Standards ESS 4 Community Health and Safety
- World Bank Group, Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines: Construction and Decommissioning (April 30, 2007)
- World Bank Group, Environmental, Health, and Safety (EHS) Guidelines: Railways (April 30, 2007)
- Turkish Statistical Institute (TURKSTAT) website and related statistics (www.tuik.gov.tr)
- General Directorate of Highways (KGM) website and related statistics and maps(www.kgm.gov.tr)
- General Directorate of Security Affairs Department of Traffic Services (trafik.gov.tr)

Assessment of potential community health and safety risks and impacts of the Project has been done in consideration of the existing local conditions, measures that will be inherently taken in accordance with the requirement of the national legislation, and benefit from the expert knowledge and experience of typical sectorial risks associated with the construction. International standards and guidelines have also been taken into consideration to develop additional measures for the management of CHS aspects. The assessment has been based on professional judgment that relies on a qualitative approach.

In accordance with ESS 4 (Community Health and Safety), the following general aspects have been covered in the scope of the assessment:

- Infrastructure and Equipment Design and Safety
- Hazardous Materials Management and Safety
- Emergency Preparedness and Response
- Security Personnel

In the assessment of impact significance, magnitude factors have been determined based on professional 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.

5.11.1.2. 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 risks and 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.

5.11.2. Impact Assessment

5.11.2.1. Land Preparation and Construction Phase

Traffic and Pedestrian Safety

The Project will involve a significant number of construction vehicles and equipment in the land preparation and construction phase. Even though the activities will be mainly conducted within Project's land acquisition corridor, off-site traffic load is expected particularly from the transportation of construction materials from the quarries/borrow sites 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 land acquisition corridor in the vicinity of settlements.
- Personnel transport vehicles transporting large numbers of workers from construction camp sites to related Project construction sites.
- Material transport vehicles transporting required materials from the quarries and material borrow sites 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
- Diversion or temporary closure of some of the existing roads due to construction activities such as construction of interchanges connecting the Project to existing roads, effective on local communities.

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. In addition, elder people, cyclists and motorcyclists are also considered to be relatively more vulnerable to accidents. Accordingly, children, older people, cyclists, motorcyclists and all pedestrians, who live in the settlements located close to the Project's land acquisition corridor, camp, quarry and borrow sites, access and services roads as well as who use the existing roads where the interchanges, underpasses and overpasses 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 and good planning and communication of the road diversion/closure activities would be required to prevent/minimize construction traffic-related risks and impacts on local communities and users of the existing roads.

Explosive Use and Blasting

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.

In the feasibility studies carried out within the scope of the project, an area where blasting will be required on the project route has not been determined. However, considering the occurrence of possible blasting requirement, community health and safety risks and mitigation measures that need to be taken into account during the blasting process are described in this section. In addition to the Noise assessment described in the Chapter 5.3 and Air Quality assessment defined in Section 5.4, a new study containing all the details related to the possible blasting before any blasting operation and related management plans will be revised when necessary.

Emergency Preparedness and Response

Potential emergency situations that may arise during the land preparation and construction phase of the Project include various subjects such as natural hazard related emergencies, fires originating from the work areas, wild fires, accidents, hazardous material related emergencies such as spills, sabotage, etc. These emergencies should be responded as appropriate to the considerations in the Emergency Preparedness and Response Plan.

Earthquake risk, landslide risk and potential structural stability risks associated with engineering structures are assessed in Chapter 5.2 ("Land Use, Soils and Geology") and mitigations related to the impacts of flood events are assessed in Chapter 10 ("Water Resources and Wastewater Management").

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 is 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 abuses and are trained in terms of applicable law, appropriate conduct, gender sensitivity and cultural sensitivities of the region. The risk is considered to be temporary to land preparation and construction phase.

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 GDII 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.

5.11.2.2. Operation Phase

Traffic and Pedestrian Safety

In the feasibility studies carried out within the scope of the project, it is assumed that 25 percent of the loads transported to the port will be carried by the highway connection to be built. In addition, calculations have been carried out for passenger transportation that will occur within the highway connection and the number of daily vehicles that will use the highway connection of the project in 2052 has been calculated as follows.

Table 5-69: Number of Daily Vehicles to be used in the Operation Phase of the Project

Passenger Transportation		
Automobile	**Medium Commercial Vehicle**	**Bus**
8.083	2.358	357
Freight Transportation		
Truck	**Trailer Truck**	**Medium Commercial Vehicle**
219	133	313

In addition, since there are various crossings with the existing and planned highways along with the project route, various disruptions in road traffic may also affect the railway operation.

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 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 can require a comprehensive approach which many instituiiuns should take part in.

It is known that railway accidents mainly include[52]:

- Collisions of trains
- Derailments of trains
- Level-crossing accidents
- Accidents to persons
- Fires in rolling stock
- Other accidents

These accidents can be affect for any people, nonethlesss, it is kown that fatalities are in question for major unauthorised persons (Figure 5-1).

[52]Eurepean Railway Agency, 2014, *Railway Safety Performance In The European Union*

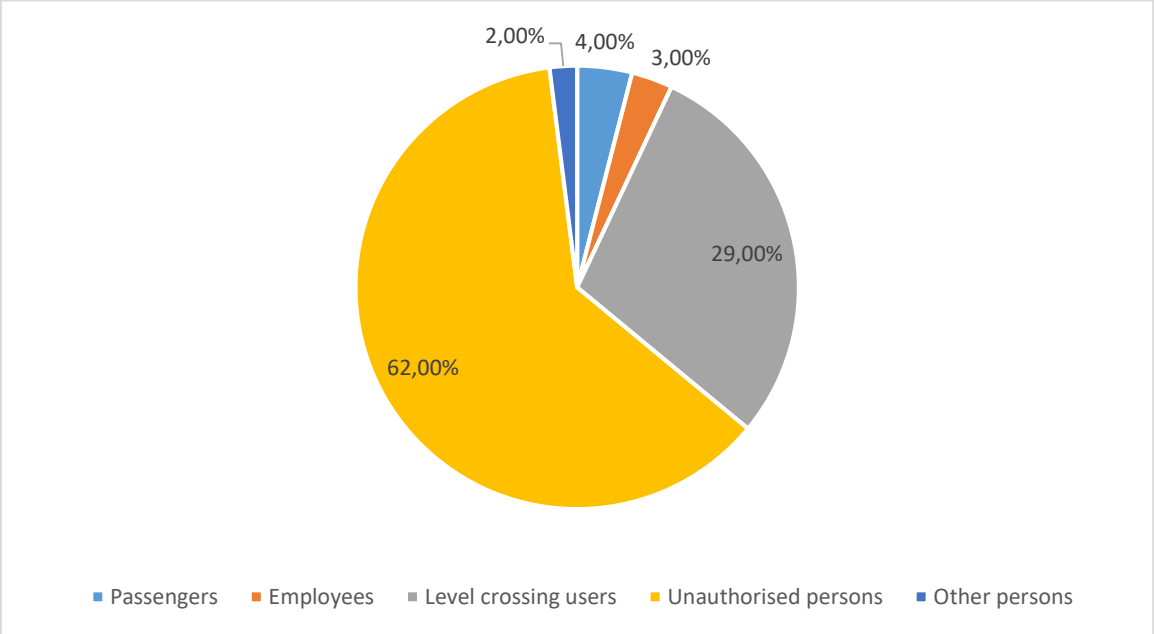

Figure 5-1 Relative share of fatalities per victim category among all fatalities (2010-2012)

Source: Eurepean Railway Agency, 2014, *Railway Safety Performance In The European Union*

The above figure shows that, majority of the fatilites occur due to having unauthorised people on railway and poor level crossing management. Therefore monitoring the project route possesses a great importance.

Furthermore; a series of steps needsto be followed if a railway emergency is faced:

- 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 as the I.C.
- The Incident Commander assesses the need for additional resources.
- In conjunction with the Incident Commander, law enforcement will sets up security and establishes access and traffic control.
- The TCDD Branch Director shall appoint supervisors to EMS 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 is 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.

Wild fires may result in emergency related impacts for communities in the vicinity, as well as impacts on air quality, soil quality, wildlife, agricultural produce and water resources

(due to exhaustion of water resources for fire-fighting and transport of fire extinguishing chemicals to soil and water resources).

In this context, it can trigger an increased risk of fire along the route. Therefore, management measures should be developed to minimize and / or prevent emergency risks associated with project operation.

5.11.3. Impact Significance, Mitigation Measures and Residual Impacts

Contractor and related subcontractors responsible from construction activities in the land preparation and construction phase of the project, will prepare an Emergency Plan covering the subjects; fires, earthquakes, floods, storms and tornadoes, sabotage, accidents and incidents, work accidents, spills and leakages, machinery and equipment failure, gas leakage and explosions, collapse of structures, first aid, evacuation and emergency contacts.

In addition, during the operation phase of the project, TCDD will continue to operate the current emergency procedures. The emergency plan that will be prepared will consist of 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 will cover both on-site and off-site measures. Besides, the notification and communication systems to be established for workers, the Project Company 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 will also be covered as part of the Emergency Preparedness and Response Plan to be developed and 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 provide 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 a result of the effective implementation of the main elements mentioned above and the mitigation measures mentioned below, the risks to the public health and safety of the project will be minimized.

- 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 and clear warning signs at the entry points (e.g. stations and level crossings),
  - Installation of fences or other barriers at the ends of the station and other areas and preventing unauthorized access to the rails,
  - Providing trainings about not entering the area without permission, especially for local youth,
  - Ensuring that the specified route is safe, clearly determined and easy to use,
  - Establishment of closed-circuit security cameras and monitoring systems (CCTV) to monitor railway stations, and an emergency announcement system to prevent violations in other areas where intruders are frequent

Table 5-70: Community Health and Safety Mitigation Measures and Residual Impacts

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	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	High	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident related injuries or deaths)	Short-term	Intermittent	High	High	Major	Develop and implement the Traffic Management Plan. Develop and 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 restriction 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.	Minor
		Communities Along the Transport Routes Vehicles Along the Transport Routes	Wide	Medium	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident related injuries or deaths)	Short-term	One-off	Medium	High	Major	Avoid passage of construction traffic through the settlements, whenever alternative roads are present. Where passage through existing settlements is unavoidable, take all necessary measures (i.e. speed limits, traffic signs, driver trainings) to prevent safety risks on local communities, engage with community representatives to plan the traffic by taking the daily life of the communities into account (i.e. selection of routes, school transportation hours, market days, etc.) and inform the communities about the construction schedule, activities to be conducted and safety measures taken, through appropriate means such as meetings and leaflets, notices, signs, etc. Allow only drivers/operators with valid licenses specific to each construction phase vehicle to drive/operate vehicles. Provide driving skills improvement trainings in consideration of the requirements of specific vehicles, machinery, etc. Implement speed limits at all construction sites Conduct periodic medical checks for drivers/operators. Conduct periodic vehicle maintenance. Initiate construction only after relevant permits are obtained and all required measures such as signage, barriers, fencing, lighting, etc. are taken. Prioritize selection of material borrow sites and quarries in the areas that does not interact with public Use only licensed firms for explosives delivery to ensure safety along the existing roads to be used for transport of explosives.	Minor
Risk on traffic and pedestrian safety due to highway connection	Operation	Users of highway connection	Restricted	Low	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident related injuries or deaths)	Short-term	Intermittent	Medium	High	Major	Install fencing, walls and similar restriction structures along the Project route to restrict access of communities and wild animals to the area; and regular checks and maintenance activities for those structures Install all required signage (i.e. traffic signs, cautionary signs, etc.) and markings (traffic lines, flashing ground signage) along the route Use stone mastic asphalt (SMA) for paving to ensure high durability and enhanced/safer driving conditions (reduced waterspray effect, reduced glare effect reflected from the road surface, better visibility of road markings, lower noise generation due to high speed traffic).	Negligible

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											Prior to and following adverse weather conditions, conduct chemical ice inhibition and de-icing (i.e. salt (NaCl), calcium chloride (CaCl2), magnesium chloride (MgCl2), etc.) and physical snow/ice removal works. In case of large scale oil/hazardous material spillage events, wash the road surface to ensure avoidance of slippery surface. Installation and control of the necessary warning system for regular controls at the crossing of the highway connection and the railway route and to prevent accidents related to the railway.	
Explosives Use and Blasting	Land Preparation and Construction	Local Communities	Restricted	Medium	Short term Reversible	Short-term	Intermittent	Medium	High	Major	Extension cables to be connected to the igniting primer will be carefully connected and well insulated. The cartridges of the igniting dynamite will be connected in a bundle by cable and this bundle will be lowered by another cable. Electrical cables will not be damaged during wadding Resistance control of the ignition circuit will be checked before connection of cables to the magneto. Before ignition, the siren will be alarmed and the watchers will be at critical points. The ignition cable will be extended to ignition area for immediate ignition During rain, blasting will not take place due to static electricity risk. Nobody except authorities will be allowed to enter blasting area. Blasting operations will be carried out by experts. Explosives will be brought to the blasting area in a special vehicle, dynamite and capsules will be transported in separate vehicles. Necessary safety measures will be taken for non-blasted places and will be rendered harmless according to the procedure. After blasting, the zone will be checked by responsible people and necessary measures will be taken for blocks that threat the construction machinery For the explosive materials to be purchased within the scope of the project, the delivery, transportation, distribution, retrieval and storage of the explosive materials will be carried out by persons trained for this purpose and appointed by the science supervisor according to the relevant legislation provisions. Filling, wadding, cleaning, binding and ignition of the capsule wires will be done by the firefighter, who has been assigned a professional with a proficiency certificate. Late ignition system will be used to prevent vibration. The necessary security measures will be taken before the blasting and will be done under the control of Gendarmerie. After ignition is completed, responsible people will check the blasting area and safety risks will be prevented. During the operation phase, provisions of the “Regulation on Occupational Health and Occupational Safety Measures to be Taken in the Mine and Quarries and Tunnel Construction” published in the Official Gazette No.18553 dated 22.10.1984 and “Decree on the Implementation of the Regulation on the Measures to be Taken in the Workplaces and Working with Explosive, Hazardous and Harmful Substances” shall be complied with. Bags of explosive materials used in blasting will be returned to firms supplying explosives. By-law of “Inspection Procedures of the Production, Import, Transport, Storage, Storage, Sale, Use, Destruction, of Unmonopolized Explosive Substances and Hunting Materials and Similar Products" (Amended: RG-12.11.2004-25641) that came into force by being published in the Official Gazette dated 29.09.1987 will be complied with.during the operation in the field of activity.	Moderate

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											In addition, in line with the relevant articles of the Occupational Health and Safety Regulation, all employees will be provided with protective materials in accordance with the standards determined according to the environmental risks and they will be ensured to comply with the conditions of use.	
Emergency Preparedness and Response	Land preparation and construction	Local Communities Project employees	Local	Negligible to High (depending on the type of incident, number of people affected)	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 prevention of emergencies and during emergency situations, where necessary. Communicate to the media through qualified, trained persons and/or by using appropriate tools (i.e. press releases), where necessary.	Negligible
	Operation	Local Communities Users of Railway and Highway Connection	Restricted	High	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident related injuries or deaths)	Short-term	One-off	High	High	Major	Develop and implement a project-specific Emergency Preparedness and Response Plan for the operation phase of the Railway. Regular controls of the Route Safety Cooperation with related authorities (for emergency prevention and during emergencies)	Minor
Security Personnel	Land preparation and construction	Local Communities	Local	Low	Short term Reversible	Short-term	Intermittent	Low	Medium	Minor	Conduct legal inquiries during the hiring process of security personnel (or the company the security service is procured from) to check competency and existence of any former abuse incidents. Provide trainings on code of conduct, gender sensitivities and local cultural sensitivities to security personnel or ensure that the company the security service is procured from provides its personnel with similar trainings. The trainings will ensure force is used only for preventive and defensive purposes and in proportion to the threat. Provide necessary identification, communications devices, and any other equipment required for the job to the security personnel to ensure maximum efficiency. The security personnel will not be allowed to carry firearms. Investigate any grievance from local communities regarding inappropriate conduct of security forces immediately. Ensure appropriate conduct of security personnel through document rand incident report reviews, as well as review of grievances received. Ensure all measures are included in contractual agreements.	Negligible
Community exposure to health problems	Operation	Local Communities	Restricted	Low	Short-term reversible or	Short-term	Intermittent	High	High	Moderate	In order to avoid the spread of diseases among the workforce of the project, air conditioning and ventilation in accordance with the current climate conditions,	Minor

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
					irreversible (depending on the impact result)						minimum space requirement, etc. ensuring compliance with the processes and standards related to the housing of workers involving issues. Training of all staff on health and general hygiene and cleaning. Periodic medical checks of staff, vaccination when necessary and / or other mitigation measures developed. Developing and implementing appropriate water and wastewater management plans. Carrying out health awareness raising activities involving local people.	
General railway operational security	Operation	Local Communities	Restricted	Negligible or high (depending on the impact result)	Short-term reversible or irreversible (depending on the impact result)	Medium-term	Intermittent	High	High	Major	Implement railway operational safety procedures, such as a positive train control (PTC) system, aimed at reducing the likelihood of train collisions. Unless the full PTC system is considered practical, automatic rail trusses are available, where manual trusses are located, reporting is made when the train passes from the main line to the side road in the absence of signaling, and that this information is returned to all employees and train officers on the train. Regular inspection and maintenance of railway lines and facilities to operate in accordance with national and international railway line safety and standards. Implement a general safety management program equivalent to internationally recognized railway safety programs.	Minor
Level crossing security	Operation	Local Communities	Restricted	Negligible or high (depending on the impact result)	Short-term reversible or irreversible (depending on the impact result)	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 risks of road traffic.) Regular inspection / maintenance to ensure automatic doors installation and smooth operation in all level crossings.	Minor
Pedestrian safety	Operation	Local Communities	Restricted	Negligible or high (depending on the impact result)	Short-term reversible or irreversible (depending on the impact result)	Medium-term	Intermittent	High	High	Major	Put clear and distinctive warning signs at entry points (e.g. stations and level crossings). Installation of fences or other barriers at the end 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. To ensure 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
Emergency Preparedness	Operation	Local Communities Passengers Employees	Restricted	Negligible to High (depending on the type of incident, number of people affected)	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident related injuries or deaths)	Medium-term	Intermittent	High	High	Major	Implemeting a site specific Emergency Preparedness and Response Plan Controlling the project route for unauthorized people If a railway emergency happens: • 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 as the I.C. • The Incident Commander assesses the need for additional resources. • In conjunction with the Incident Commander, law enforcement will sets up security and establishes access and traffic control. • The TCDD Branch Director shall appoint supervisors to EMS Divisions/Groups.	Minor

Impact Description	Project Phase	Impact Magnitude							Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
		Receptor	Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											• 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 is 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.	

5.12. Cumulative Impact Assessment

Within the scope of this Environmental and Social Impact Assessment Study, evaluations were made regarding the possible effects of the Filyos Project. There is no other infrastructure project established or planned for freight transportation for industrial purpose in the project area and its surroundings. However, a Cumulative Impact Assessment study was carried out within the scope of Filyos Port and the planned Industrial Zone, which is under construction.

5.12.1. Methodology and Project Standards

The Cumulative Environmental and Social Impact Assessment study that is conducted for Filyos Project, follows the methodologies specified by relevant international guidelines as stated below. The Good Practice Handbook on the Cumulative Impact Assessment and Management (IFC, August 2013) will be the main reference document for the methodology to be applied in this assessment, while the following additional key references 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).

IFC defines cumulative impacts as "those that result from the successive, incremental, and/or combined effects 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) (See Figure 5-30).

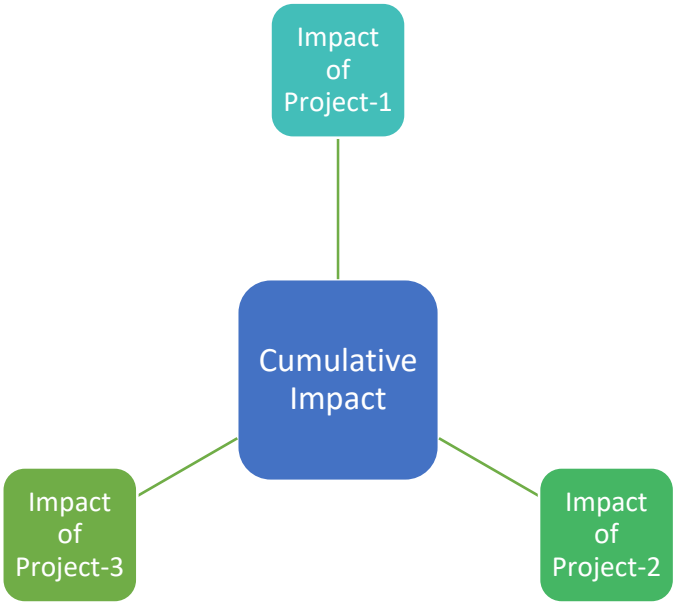

Figure 5-30: Illustration of Cumulative Impacts

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.

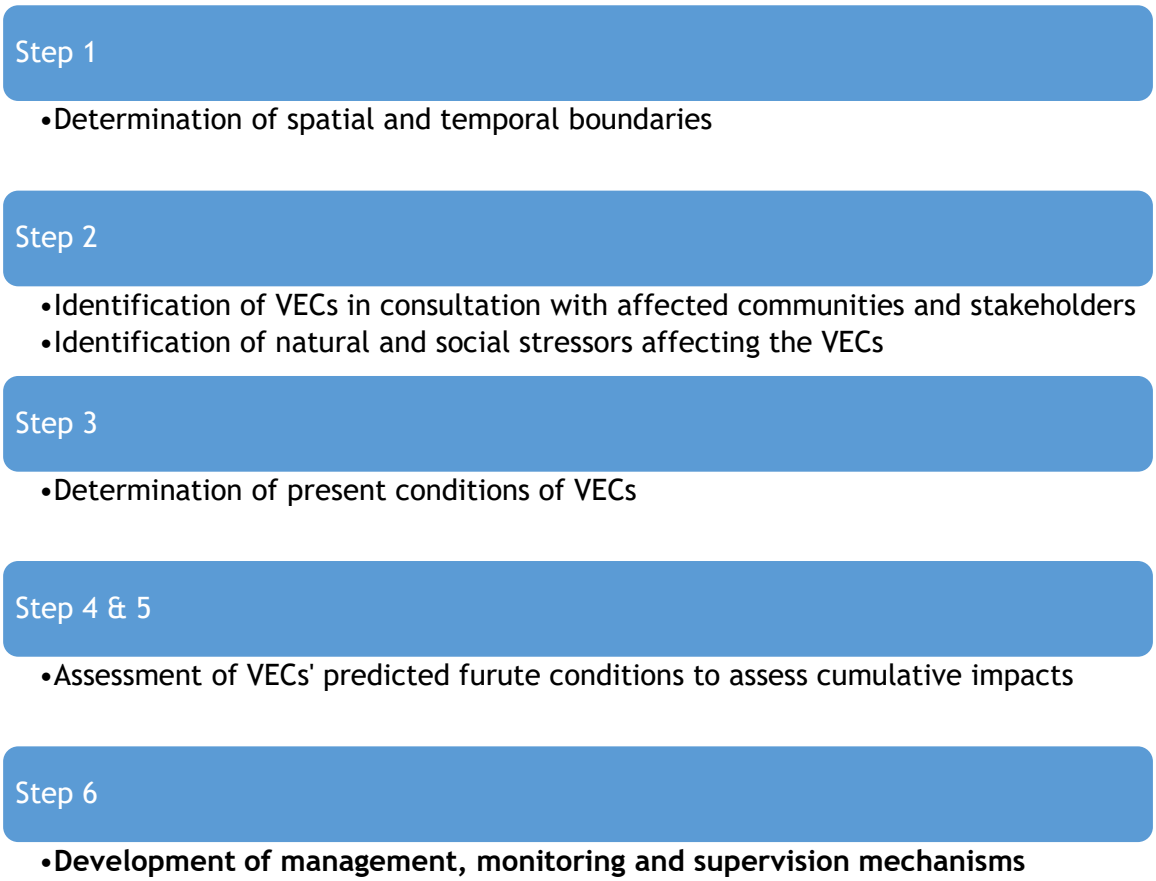

Figure 5-31: Cumulative Impact Assessment Approach

Steps to be followed in the scope of the CIA study for the Filyos 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 Step: Managing Cumulative Impacts

5.12.2. Cumulative Impact Assessment

5.12.2.1. Step 1: Scoping Phase I-VECs, 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 Study Area. Details of the Step 1 assessments are provided in the following sections.

Valued Environmental and Social Components (VECs)

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 Fiyos Project, valued environmental and social components to be considered in the CIA have been selected as presented below:

Table 5-71: Valued Environmental and Social Components (VECs)

Environmental/ Social Subject	VEC	Specified VESCs
Specific VESCs	Critical Habitat	B1.4: Coastal fixed dune pastures (gray dunes)
	Natural Habitats	C1.2: Permanent mesotrophic lakes, ponds and pools C2.2: Constantly flowing streams and rivers G1.1: riparian forests on the river bank D5.1: Sedge beds with free water on the surface E3.4: Moist and wet eutrophic and mesotrophic meadows F5.3: False maquis G1.A: Meso- and eutrophic mixed deciduous forests G1.D: Hazelnut orchards
	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-1 • Sazköy-2 • Derecikören
Cultural Heritage	Registered Protected Areas	Sazköy 3rd Degree Archaeological Sites Öteyüz Mahallesi 1st and 3rd Degree Archaeological Sites

Environmental/ Social Subject	VEC	Specified VESCs
Socio-Economic Environment	Land and Assets	People who will lose their lands and assets located on the lands
	Economy	Agricultural Activities Industrial activities and employment Tourism
	Quality of Life	Access to healthcare, education, commercial facilities Air pollutants and noise

Spatial and Temporal Boundaries

Cumulative impacts can occur (a) when there is "spatial crowding" as a result of overlapping impacts from various actions on the same VESC in a limited area, (e.g., increased noise levels in a community from industrial developments, existing roads, and a new highway or a railway; or landscape fragmentation caused by the installation of several transmission lines in the same area) or (b) when there is "temporal crowding" as impacts on a VESC from different actions occur in a shorter period of time than the VESC needs to recover. (IFC, August 2013).

For the determination of spatial boundaries of the CIA study, an iterative process has been applied. In this context, the relevant and readily available data were evaluated and a larger region covering important industrial infrastructure projects was examined. As a result of the examination, the cumulative impacts from Filyos Port, whose construction activities are continuing, planned Industrial Zone and Existing Railway, were evaluated. (Figure 5-32).

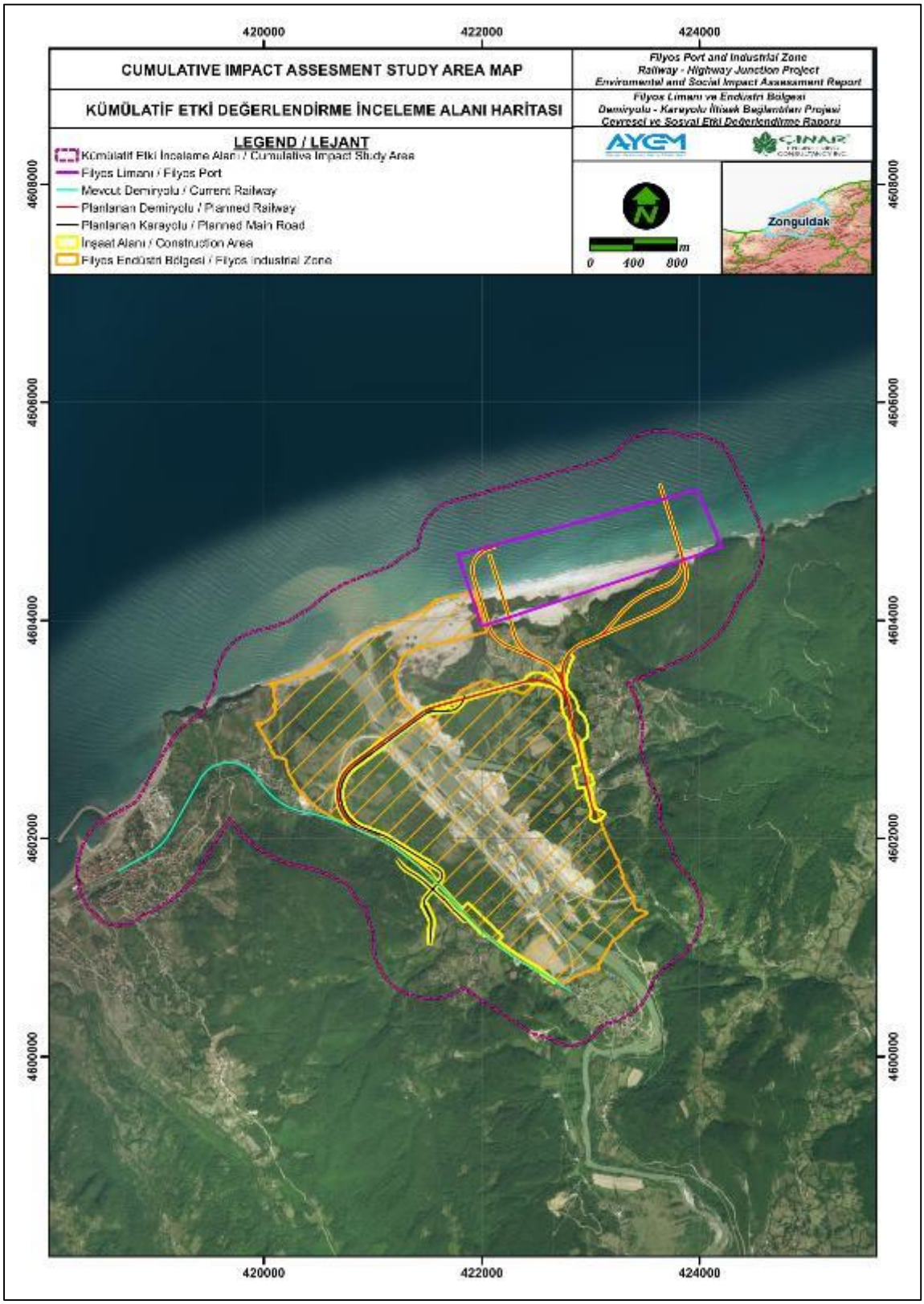

Figure 5-32: Cumulative Impact Assessment Study Area

5.12.2.2. Step 2: Scoping Phase II- Environmental Drivers

Environmental drivers refer to natural drivers and other stressors, such as fires, droughts, floods, predator interactions, human migration, new settlements, etc. that may exert an influence on the VESCs. For example, the fire regime in forested areas is a major driver that shapes social, ecological and economic systems (IFC, August 2013).

The majority of land acquisition works on the project route has been completed. As stated in Chapter 5.9, 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 accesses to lands trigger the potential for developments. These may include but not limited to residential, industrial, cultural and tourism developments and thus, land use patterns in areas accessed by the motorway are prone to further changes over time.

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 2014-2015. 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.

5.12.2.3. Step 3: Establish Information on Baseline Status of VECs

Information on the baseline status of the VESCs will be mainly based on the information gathered for each environmental and social subject in scope of the ESIA study. Thus, relevant information on the baseline status for VESCs are presented in the related chapters of this ESIA Report.

5.12.2.4. Step 4: Assess Cumulative Impacts on VECS

Assessment of potential cumulative impacts of the Filyos Project together with other projects/activities/developments identified in the CIA Study Area on the selected VESCs has been based on a qualitative approach. The cumulative impact potential on the VESCs has been evaluated considering the projects affecting the VESC along with the Filyos Project (the Project under Assessment).

In this regard, the cumulative impact potential on each VESC has been classified as none, low, medium or high depending on the criteria described in Table 5-72.

Table 5-72: Criteria for Magnitude of Cumulative Impact Potential

Magnitude of Cumulative Impact Potential	Criteria
Negligible	The VEC is affected only by the Filyos Project
Low	The VEC is affected by Filyos Project and 1 other project
Medium	The VEC is affected by Filyos Project and 2 other projects
High	The VEC is affected by Filyos Project and 3 or more projects

Potential impacts of the Filyos Project on social and economic environment are discussed in detail above and adverse and beneficial cumulative impacts of VECs are evaluated in the table below. In the evaluation below, the nationally protected areas are not included in the evaluation, as they are not in the boundaries of the study area.

Table 5-73: Cumulative Impacts on VECs

Environmental and Social Factor	VECs	Specified VECs	*Filyos Railway and Highway Connection Project*	*Filyos port*	*Filyos Industry Region*	*Existing Railway*
Biodiversity and Natural Resources	Critical Habitat	B1.4: Coastal fixed dune pastures (gray dunes)	Negligible	Hgih	High	
	Natural Habitats	C1.2: Permanent mesotrophic lakes, ponds and pools C2.2: Constantly flowing streams and rivers G1.1: riparian forests on the river bank D5.1: Sedge beds with free water on the surface E3.4: Moist and wet eutrophic and mesotrophic meadows F5.3: False maquis G1.A: Meso- and eutrophic mixed deciduous forests G1.D: Hazelnut orchards	Low	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	
Land Use	Agricultural Areas	Arable lands	Medium		High	
Air emissions and noise	Air quality and noise levels in settlements	Gökçeler	Medium		Medium	
		Sefercik	Medium		Medium	

Environmental and Social Factor	VECs	Specified VECs	*Filyos Railway and Highway Connection Project*	*Filyos port*	*Filyos Industry Region*	*Existing Railway*
	along the Project Route	Sazköy-1	Medium		Medium	
		Sazköy-2	Medium		Medium	
		Derecikören	Medium		Medium	
Cultural Heritage	Registered Protected Areas	Sazköy 3rd Degree Archaeological Sites	High			
		Öteyüz Neighborhood 1st and 3rd Degree Archaeological Sites	Highr			
Socio-economic Environment	Land and Assets	People who will lose their lands and assets located on the lands	Medium		High	
	Economy	Agricultural Activities	Low			
		Industrial activities and employment	Negligible	Negligible	Negligible	Negligible
		Tourism	Negligible	Negligible	Negligible	Negligible
	Quality of Life	Access to healthcare, education, commercial facilities	Negligible	Negligible	Negligible	Negligible
		Air pollutants and noise	Medium			

5.12.2.5. 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. .[53]

Table 5-74: 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 VECs are as follows;

VECs	Significance	Description
Biodiversity and Natural Resources	Minor	Nearly half of the Biodiversity Study Area defined for the Project, which is about 1,000 hectares, is composed of natural habitats. Possible effects on natural habitats, although they originate from many projects, correspond to a limited part of the total area.
Land Use	Moderate	A considerable portion of the agricultural land is expropriated however, agricultural activities are generally performed for household consumption in the region.
Air emissions and noise	Minor	Possible impacts on the lands
Cultural Heritage	Minor	Access to these areas is not blocked within the scope of projects.
Socio-economic environment	Moderate	As stated in Chapter 5.9, many issues such as influx of population, local employment and employment opportunity, agricultural and pasture lands are evaluated cumulatively, impact significance is

[53] UK Highways Directorate 205/08: Design Booklet for Bridges and Roads; http://www.standardsforhighways. co.uk /ha/standards/dmrb/

VECs	Significance	Description
		determined as moderate when considered with negative and positive elements.

It is important to highlight that, cumulative impacts typically result from actions of multiple stakeholders and the responsibilities for management of these potential impacts are versatile.

Project level mitigation measures are defined in 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:

- 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 VECs).
- Collaborative protection and enhancement in other regional cumulative impact management strategies.
- Collaborative engagement in other regional cumulative impact management strategies.
- Participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts.

Overall management for the cumulative impacts will be the responsibility of GDII. GDII 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 Industry Region and Existing Railway (in this case, Ministry of Industry and Technology, Management of Industrail Zone and TCDD) will be informed by GDII periodically and WB will be informed about the interactions between these authorities.

6. PROJECT ALTERNATIVES

6.1. 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 signalling 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 criteria in route planning will be affected by the following:

- Length of route;
- Linespeed (affected by gradients, curvature, signalling, connections to existing network and conflict with other rail traffic);
- Number of station 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, as specified in the Project Feasibility Study, the following criteria have been taken into consideration in determining the project route:

- Geological formation and soil structure,
- Location of the settlements,
- Land use types,
- Location of the water structures (dam, pond),
- Cut and fill balance,
- 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,
- Location of existing railway

The proposed route was determined considering all above mentioned criteria together with other technical limitations and requirements regarding the nature of the railway structures. Therefore, no feasible route alternative could be determined during the feasilibity studies. The environmental and social impacts related with the only route alternative (the proposed route) are considered as detailed in Chapter 5. of this ESIA.

6.2. 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.

6.3. 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, it is considered appropriate to choose conventional systems with speeds up to 160 km/h.

The signalling system to be installed as part of the Project will be suitable for train speeds up to and including 160 km/h. Trains travelling at speeds lower than 160 km/h will also be able 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 braking, minimising 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-kilometre 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).

6.4. Construction Camp Sites

During the ESIA studies, the process of evaluating Construction Camp Sites alternatives is ongoing. During selection of the alternative necessary environmental and social assessments will be done and WB will be informed. Necessary revisions in ESMP and sub-management plans will be done.

6.5. Quarries and Material Borrow Sites

During the ESIA studies, the process of evaluating material borrow sites and quarry alternatives is ongoing. Main selection criteria will be the availability of "EIA Positive" or "EIA not reqiuried" decision of the quarry.

During selection of the alternative necessary environmental and social assessments will be done and WB will be informed. Necessary revisions in ESMP and Sub-management plans will be done.

6.6. Access Roads

During the ESIA studies, the process of evaluating access roads alternatives is ongoing by GDII. Before construction, a detailed logistics study will be conducted and necessary environmental and social assessments will be done and WB will be informed. Necessary revisions in ESMP and sub-management plans will be done.

6.7. No Project Alternative

Within the scope of the feasibility studies carried out with the project, operation analysis, economic benefits and costs in the case of no project implemented were analyzed and compared with the scenario where the project is implemented.

It is assumed that the trucks would carry freight from port using the existing Zonguldak-Çaycuma highway. Along with distance and cruise times during usage of highways, fuel consumption, truck fleet needs, driver costs, maintenance costs, operation-maintenance costs of trucks were evaluated Considering the stated costs of when the project is implemented the following benefits will be acquired :

- Operating income of TCDD Taşımacılık A.Ş which will be the operating institution of the transportation with railway
- Annual operation-maintenance expenses, earnings comparing the trucks carrying freight in the case of having a project with railways
- The monetary values of the saved time of the employees working in the transportation using the railway compared to those working in the transportation with the trucks

Evaluation of the effects on security and environment:

- Difference in the number of traffic accidents
- Difference in noise emissions
- Difference in air pollution are expected.

In the feasibility report, the project is evaluated according to the followings

- Train maintenance expenses
- Train energy expenses
- Train driver expenses

- Train crew expensed
- Operating expenses due to train employees
- Operation-maintenance expenses

The followings are considered when the project is not implemented

- Freight transport by trucks
- Frequency of trips
- Distance covered by trucks
- Time spent in transportation by trucks
- Fuel consumption
- Truck fleet requirements
- Driver expenses
- Truck maintenance expenses
- Indirect expenses

In addition to the components given above, the monetary values of the annual time gains were calculated and the cases with and without projects were compared. Considering the most critical load scenario, the Low Load scenario, these investments are considered to be economically feasible.

It was determined during the feasibility studies that in 2052 daily 14,098.00 tonnes of shipment is foreseen to be arrived to Filyos Port and most of these shipment will be arriving for Filyos Industrial Zone. Thus, an adequate, safe and economically feasible way of transporting was needed. Therefore, constructing a railway was the most effective way for providing these needs.

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 alternative of no-project alternative is not appropriate.

7. STAKEHOLDER ENGAGEMENT

7.1. Engagement Undertaken to Date

Stakeholders have been identified and negotiations were commenced with these stakeholders both during the ESIA process and later during the RAP preparation, as of 2020. Public authorities, Mukhtars, land owners/users and other PAPs have been consulted many times for different purposes. Therefore, the stakeholders identified in the region have been informed about the location, components and land requirements of the Project. A summary of previous engagement activities for the Project is given in the Table below.

Table 7-1: Summary of previous engagement activities

Date	Venue	Participants	Scope of Meeting
08.01.2020	Sazköy Village Council	Mukhtar, community members	General description and information about the project, planned project activities and timeframe, land requirements, potential impacts on local communities have been provided to Project-affected parties
08.01.2020	Aşağıihsaniye Village Council	Mukhtar, community members	General description and information about the project, planned project activities and timeframe, land requirements, potential impacts on local communities have been provided to Project-affected parties
08.01.2020	Derecikören Village Council	Mukhtar, community members	General description and information about the project, planned project activities and timeframe, land requirements, potential impacts on local communities have been provided to Project-affected parties
09.01.2020	Sefercik Quarter-Coffeehouse	Mukhtar, community members	General description and information about the project, planned project activities and timeframe, land requirements, potential impacts on local communities have been provided to Project-affected parties
09.01.2020	Gökçeler Village Council	Mukhtar, community members	General description and information about the project, planned project activities and timeframe, land requirements, potential impacts on local communities have been provided to Project-affected parties
09.01.2020	Öteyüz Mukhtars Room	Mukhtar, community members	General description and information about the project, planned project activities and timeframe, land requirements, potential impacts on local communities have been provided to Project-affected parties
09.01.2020	District Directorate of Agriculture and Forestry / Village-	Agricultural Engineers, personnel of Directorate and Office	General description and scope of the project, stakeholders' opinions,

Date	Venue	Participants	Scope of Meeting
	Coop Çaycuma Office		receiving data on agricultural and husbandry activities on affected region
03.02.2020	Aşağıihsaniye Village Council	Mukhtar, PAPs (affected land owners/ shareholders/ users)	Detailed information about land requirements of the Project, affected assets/immovable have been provided to Project-affected parties
03.02.2020	Sazköy Village Council	Mukhtar, PAPs (affected land owners/ shareholders/ users)	Detailed information about land requirements of the Project, affected assets/immovable have been provided to Project-affected parties
03.02.2020	Filyos Municipality	Mayor and Deputy Mayor of Filyos Municipality	General description and scope of the project, land requirements, potential impacts, stakeholders' opinions
04.02.2020	Sefercik Quarter-Mukhtars Room	Mukhtar, PAPs (affected land owners/ shareholders/ users)	Detailed information about land requirements of the Project, affected assets/immovable have been provided to Project-affected parties
04.02.2020	Öteyüz Mukhtars Room	Mukhtar, PAPs (affected land owners/ shareholders/ users)	Detailed information about land requirements of the Project, affected assets/immovable have been provided to Project-affected parties
05.02.2020	Gökçeler Village Council	Mukhtar, PAPs (affected land owners/ shareholders/ users)	Detailed information about land requirements of the Project, affected assets/immovable have been provided to Project-affected parties

The important topics raised during the initial engagement activities are summarized here below;

- Have the areas to be expropriated been determined or not?
- Have the unit land prices been determined or not?
- When the project construction phase will start?
- How construction and excavation works will be carried out in project area?
- Will the Project activities prevent our access to grazing lands?
- Will there be employment opportunities for local people?

The clear information covering all concerns of PAPs has been provided during the initial consultations. Besides, once the draft versions of the Project documents (ESIA, ESMP, RAP and SEP) were finalized, they were 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.

As the COVID-19 pandemic has coincided with the preparation studies of these documents, the GDII has adopted additional measures during the disclosure of the Project documents as part of the stakeholder consultation process. As a national lockdown is currently in place, the electronic copies of the documents and additional tools such as presentations and informative videos on the environmental and social impacts of the project, including land-based impacts, have been disseminated via the GDII's official website, other social media channels and direct messaging on individual basis for the PAPs.

The feedbacks on the disclosed documents have been collected through official correspondences, online feedback forms, e-mails and a hotline established for this purpose. As the public disclosure is limited to these channels due to the outbreak, additional consultations have been conducted with the Mukhtars to ensure all PAPs have been informed about the Project documents and received the informing messages from the GDII. The availability and efficiency of the adopted ways of disclosure have been consulted with the settlement heads and additional measures were implemented accordingly. For the PAPs who could not find access to the online channels, an informative summary text of the disclosed documents has been prepared and shared with them. The Mukhtars have also been asked to convey the questions and concerns of the PAPs who are not able to access to the communication channels, if any.

The GDII have also communicated with the institutional stakeholders during the disclosure process in accordance with the SEP. Opinions have been requested from the institutions and organizations with an official correspondence about the disclosed documents of the Project. All national and local institutional stakeholders have been sent an official letter by the GDII.

The questions and concerns received from the stakeholders during the disclosure process are presented in detail in the SEP and RAP documents. The feedbacks received from the stakeholders are about many different subjects such as expropriation, compensation payments, physical resettlement, impacts on common properties, alternative assessments and environmental impacts. In addition to the concerns regarding the environmental impacts of the Project, there are also requests for a change in the Project design to eliminate the need for physical resettlement. Questions and concerns were also expressed about the expropriation process, payments and valuation methods. Although the raised issues are addressed in the relevant documents, the GDII will provide feedbacks to the PAPs in response to their questions and concerns.

7.2. Planned Engagement

Stakeholder engagement is a continuous process that began prior to the development of this SEP and will continue through the life of the Project. GDII will be in active communication with the stakeholders determined throughout the life of the project. In particular, GDII will seek feedback from stakeholders on the environmental and social performance of the project, and the implementation of the mitigation measures determined. If there are significant changes to the project that result in additional risks and impacts, particularly where these will impact project-affected parties, GDII will provide information on such risks and impacts and consult with project-affected parties as to how these risks and impacts will be mitigated.

The methods and materials such as consultation meetings, in-depth interviews, focus group discussions, presentations, project brochures/leaflets, grievance mechanism, phone line and corporate website will be used within the scope of the engagement starting from the scoping stage of the project until the operation and closure stages. The scope and frequencies for these engagement methods are described in detail in SEP.

7.3. Grievance Mechanism

7.3.1. Purpose and Scope

Key elements of a grievance mechanism include:

- Clear instructions on how grievances are submitted and handled after submission, including a minimum period that a stakeholder must wait to receive a reply; and
- Presenting alternatives tools for submitting a grievance in person to a staff member if a stakeholder is not able to or comfortable with submitting a grievance in writing.

Prime Ministry Communication Center, BIMER, is the line established for all kinds of problems, complaints and requests of citizens. BIMER system has been actively used by citizens since its establishment. BIMER is used by a software program and a web page developed by the Prime Ministry IT Department. By keeping the communication channels between citizen and government open, BIMER ensures that applications can be made anytime and anywhere.

BIMER system enables stakeholders to communicate directly with the GDII, but a separate system will be established for the project in which the stakeholders can receive their responses locally and communicate their complaints. This local grievance system will be established within the body of GDII, implemented and followed by both GDII PIU and Constructor during construction, operation and decommissioning/closure phases, which will be more easily accessible for stakeholders and will encourage them to voice their complaints.

7.3.2. Procedure and Responsibilities

Recording and follow up of grievances (including environmental issues) will be the primary responsibilities of the GDII PIU. GDII PIU will have personnel assigned for the grievance management process both on site and on Headquarters. Social Specialist on Headquarters and Community Liasion Officer (CLO) on site will be primarily responsible for grievance management as well as Contractors' social staff. GDII will regulate the contractual agreements with Contractor to ensure that they have a CLO on site who will be responsible for recording and follow up of grievances on site office. These assigned staff will follow the Grievance Redress Mechanism established to record and resolve all complaints from the stakeholders and follow up corrective actions taken. Contact information will be provided via Project website, through public information meetings, consultation meetings and Project brochures to raise awareness and offer transparency of how stakeholders can voice their grievances. Various channels for stakeholders to vocalize their grievances formally include:

- Phone line: (Stakeholders can call the GDII PIU directly ((0312) 203 10 00) and speak to a contact person: Güzide SAYIN [or directly call on 0312 203 17 96] or Ali KETENCİOĞLU [or directly call on 0312 203 17 98])
- E-mail: (Complaints can be sent via e-mail to guzide.sayin@uab.gov.tr or ali.ketencioglu@uab.gov.tr)
- Face-to-face: (PAPs can forward their complaints to the relevant staff of GDII or the Contractor in the site)
- Grievance registration form: (PAPs can fill in grievance registration forms that will be available at the construction site and also other public locations that all stakeholders can access)
- Online application: (PAPs can fill in a complaint registration form online at https://aygm.uab.gov.tr/dunya-bankasi-turkiye-de-demiryolu-lojistigini-gelistirme-projesi)

The steps to be followed during the grievance management are detailed SEP.

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Zonguldak İlinde Göçün Sosyo-Ekonomik Nedenleri ve Alınabilecek Tedbirler, Bülent Ecevit Üniversitesi Yayınları, No: 1

ANNEX 1 LIST OF THE INDIVIDUALS/ORGANİZATIONS PREPARED OR CONTRIBUTED TO ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

Individual/Organization	Position/Expertise	Relevant ESIA Chapter
Cevdet Kabal	Project Manager/ Env. Engineer	Full ESIA
Zeynep Çeliker	Project Manager/ Env. Engineer	Full ESIA
Murat Avcı	Environmental Specialist / Env. Engineer	Chapter 5.4 Air Quality and Greenhouse Gas Emissions
Tuğçe Ataç	Biologist/ Biologist	Chapter 4.6 Biodiversity
Nilay Aygüney Berke	Biodiversity Specialist / Biologist, Environmental Scientist	Chapter 4.6 Biodiversity Chapter 5.7 Biodiversity
Serkan Muratlı	Environmental Specialist / Geo. Engineer	Chapter 4.1 Land Use, Soils and Geology Chapter 5.2 Land Use, Soils and Geology
Yasemin Çaktu	Environmental Specialist / Env. Engineer	Full ESIA
Ebru Demir Aykan	Social Impact Specialist / Sociologist	Chapter 4.8 Socio-Economic Environment Chapter 4.9 Labor and Working Conditions Chapter 5.9 Socio-Economic Environment and Social Impact Assessment Chapter 7 Stakeholder Engagement Annex-2 Example of Settlement Questionnaire Annex-3 Example of Household Questionnaire Annex-4 Example of Semi-Structured In-depth Interview Form Annex-5 Example of Focus Group Interview Form
CINAR Environmental Laboratory Inc.		Full ESIA
Sigun Ecological Consultancy Ltd. Inc.		Chapter 4.6 Biodiversity Chapter 5.7 Biodiversity
REGIO Cultural Heritage Management Consultancy Inc.		Chapter 4.7 Cultural Heritage Chapter 5.8 Cultural Heritage Annex-7 Archaeological Baseline Table Annex-8 Prediction Model Maps for Archaeological Potential

ANNEX-2 SAMPLE PUBLIC SURVEY QUESTIONNAIRE

FİLYOS PORT AND INDUSTRIAL ZONE CONNECTIONS PROJECT

AFFECTED SETTLEMENT MUKHTAR SURVEY

SURVEY DESCRIPTION

Filyos Port and Industrial Zone Connections Projects is carried out by the Ministry of Transport and Infrastructure, General Directorate of Infrastructure Investments.

The project will be constructed in Zonguldak Çaycuma district and includes the construction of a 12 km railway line, a 4.5 km highway, a bridge over the Filyos river and two stations. Project components pass through agricultural fields, pasture and forest lands. The affected lands will be expropriated temporarily or permanently according to the requirements of the Project components.

This meeting is held to gather information about the settlements affected by the Project and to record the residents' feedback on the project and to prepare the ESIA report. The information you provide will help to better understand the region where the Project is located and will contribute to the decision making processes.

The information you provide will be used only for this project, and your name and any information you share will be kept confidential.

Thank you for your time and participation.

Date:	
Province:	
District:	
Village/Neighborhood:	
Mukhtar Name	
Mukhtar Contact Information:	

A. POPULATION AND DEMOGRAPHY

A.1. How many households are there in the village (12 months present)?

A.2. How many people are there in the village (12 months present)?

A.3. How many households live in the village in the winter/summer?

01 Winter …….. 02 Summer ……..

A.4. How is the village population distribution?

01 Elderly population (Older than 65) ……..….. people

02 Working population (16-65) ……..….…… people

03 Children (0-16) …… People

A.5. Did this village emigrated?

01 Yes

a. If yes, what is the number of landowners (half, most, 10 households, etc.) emigrated? ……

b. In which years did the emigration mainly take place?

02 No

03 Very few people emigrated

A.6. What are the provinces and districts where this village emigrated? (It will be written in order of the most frequent immigrants).

1.
2.
3.
4.

A.7. What are the reasons of the emigration?

A.8. Does emigration continue?

01 Yes

02 No, population is constant

03 Population is increasing (explain) ……

A.9. Does this village receive immigration?

01 Yes

02 If yes, from where and for what purpose, at what periods, how much?

03 No

A.12. Are there any temporary/seasonal agricultural workers or forest workers in the village?

01 Yes …… qualification and number ……..

02 No …….

B. VULNERABLE GROUPS

B.1. How many people or households in the village are very poor, in need of help from others?

People ……. Households…….

B.2. How many people with physical / mental disabilities are in the village, in how many households?

…….. People ……. Households

B.3. How many households or people are there in the village that do not have their own land but use the other lands in the village (with or without renting)?

People ……. Household ……..

Names and contact details of these people, if any:

B.4. How many households or people use public lands in the village?

People ……. Household ……..

Names and contact details of these people, if any:

B.5. How many elderly people over the age of 65, who live alone, who may need care?

Women …… Men…….

B.6. How many people or households are there in the village who receive in-kind / cash support from the Social Assistance and Support Foundation?

People ……. Household ……..

B.7. Are there people in the village, whose land is affected by other infrastructure or investment projects (highway, railway, oil or gas pipelines) in the region? Are the lands of these people affected by this project? About how many people?

C. EDUCATION SERVICES

C.1. Is there any school in the village? (Write down which schools)

A. If yes, is it open?

Yes …….. No……

What is the total number of students? ……

B. No schools available

C.2. How many households do children attend to nearby schools outside the village every day? How many children are in the village benefiting from education with transportation support? Where do they study (in which neighborhood, district, village ...)?

C.3. How many households send their children to boarding schools? If there are, how many children are studying at boarding schools? Which schools are these, where?

D. HEALTH SERVICES

D.1. Is there a health service in the village?

01 If yes,

If yes; Does the doctor and / or other health personnel regularly come to your village?

How often

02 No there isn't.

If no, how many kilometers is it from the nearest health center / hospital?

E. ECONOMY

E.1. What are the main economic activities of the village? Please sort them by importance;

Economic Activity	Order of importance		
	1	2	3
Agriculture			
Animal Husbandry			
Forestry			
Beekeeping			
Salaried employee			
Seasonal labor (construction, etc.)			

Economic Activity	Order of importance		
	1	2	3
Trading			
Retirement			
Salaried employee (public sector)			
Other			

E.2. Which agricultural products are grown in your village?

Name of the product	
Wheat	
Barley	
Sugar beet	
Beans	
Chickpea	
Rice	
Hazelnut	
Pistachio	
Melon/watermelon	
Tomato	
Corn	
Sunflower	
Clover	
Vetch	
Sainfoin	
Other (Please specify.....)	

E.3. Indicate the five main products produced in the village (in order of importance):

1 .....

2 .....

3 .....

4 .....

5 .....

E.4. How many times the products are harvested per year?

E.5. What percentage of the cultivated land is irrigated?

E.6. Is there an official irrigation union / cooperative? If available, name, number of members?

E.7. How many of the households are doing irrigated farming?

E.8. What are the resources used by households for irrigation?

1. Wells — Number _____?
2. Irrigation channel — How many people are benefiting _____?
3. Lake/stream — How many people are benefiting _____?
4. Other.....

F. FOREST

F.1. How do you benefit from the forest? For what purposes do the villagers use this land? (For example, wood, forest products, mushroom picking and sale, etc.)

F.2. Are there people who use the lands that the project will use as forest land in your village? How do they use it?

F.3. Does anyone work as a forest worker in the village / neighborhood? How many people, if any?

F.4. Is there a forest cooperative? If there is, what is its name?

G. ANIMAL HUSBANDRY

G.1. Are there any households doing agricultural activities in your village?

Yes

How many households are bovine breeding?

How many households are ovine breeding?

How many households are poultry farming?

How many households are beekeeping?

No

G.2. What is the total number of cattle and small cattle in the village

Cattle_____ Small cattle _____

G.3. How many decares of pasture lands are there in the village?

_____ decare

G.8. Do you have pasture land affected by the project? How many decares if it is affected? (To be shown on the map)

G.9. If affected, are there other lands that can be used as pasture in the vicinity?

G.10. Are there assets for grazing land / pasture, agricultural land or other livelihoods where your access will be restricted due to the project? (To be shown on the map)

H. TRADING

H.1. What is the main agricultural product marketed commercially? How much are their total amounts annually? Where and how is this product marketed?

H.2. In your opinion, what percentage of the households in the village only produce animal or agricultural products for household consumption (without placing on the market)?

H.3. Is there a grocery / market / store / bazaar in the village?

İ. INFRASTRUCTURE

İ.1. Could you please give some information about the infrastructure of the village? For example, is there a central sewage system in the Village?

İ.2. Is electricity supplied regularly or are there often power cuts?

İ.3. Is there a good quality drinking water in the village? If not, what can be done?

İ.4. Do you have internet and telephone lines in the village?

İ.5. How is the current situation of the village roads?

İ.6. How many days of the year are village roads closed to traffic?

İ.7. In your opinion, what are the most important infrastructure deficiencies in the village? Please list starting from the most important.

J. CADASTRE

J.1. Have there been cadastre and land registry studies on the lands in the village?

Yes _____ No _____ Ongoing _____

J.2. Were there any complaints due to the land registry and cadastral works? (Wrong measurement, deed to the wrong person, missing spelling, etc.)

Yes _____ No _____

If yes, explain _____

J.3. Has land consolidation been done in your village?

Yes _____ No _____ Ongoing _____

J.4. If so, how much land in total was consolidated? How did land consolidation affect agriculture and irrigation?

K. LAND

K.1. What is the average selling price of 1 decare of irrigated land in good condition (i.e., accessible, non-sloping, arable agricultural land)?

K.2. How many liras of the 1 decare of irrigated land in good condition is rented?

K.3. What is the average selling price of 1 decare of dry land in good condition (i.e., accessible, non-sloping, qualified agricultural land)?

K.4. How many liras of the 1 decare of dry land in good condition is rented?

K.5. In 2018, how many households bought or sold land in the village? Is there a sale of land in the village?

01 Households that bought land ……..

02 Households that sold land ……

K.6. Many landowners no longer live in their village. In your opinion, what percentage of landowners in this village have already left the area?

K.7. Who use the land, whose owners do not farm and how?

K.8. Does the village legal entity have land affected by the Project?

01 Yes 02 No

Decares_____

K.9. If yes, for what purpose are these lands used?

K.9. In the village, are there people in the position of the landlord, tenant etc. that use the lands of others. If yes, whose lands are they?

L. DEVELOPMENT OF LIVELIHOOD and COURSES

L.1. What are the topics that can help you the most in improving your livelihoods? (Starting from 1 in order of importance, up to 5 options)

Topics	Importance
01 Cattle breeding	
02 Small cattle breeding	
03 Beekeeping (Beehive and equipment)	
04 Livestock inputs (cheap feed, etc., veterinary services)	
05 Livestock facilities (building / renovation of barns)	
06 Greenhouse Cultivation	
07 Field crops inputs (cheap seeds, medicines, fertilizers, etc.)	
08 Irrigated agriculture	
09 Orcharding/Horticulture	
10 Fishery	
11 Poultry breeding	
12 Household economy supports	
13 Cooperation (Type.....)	
14 Training courses (Please specify.....)	
15 Starting a business (.....)	
16 Other.....	

L.2. Regarding the above question, are there people in the village who have initiatives on these issues? Or is there such a history of initiative? Or is there anyone planning?

L.3. What kind of courses should be organized for women and youth? (Starting from 1 in order of importance, up to 5 options)

Topics	Importance
01 Computer	
02 Household economy	
03 Clothing, sewing	
04 Agriculture	
05 Animal husbandry	
06 Beekeeping	
08 Foreign language	
09 Vocational training (Please specify……)	
10 Other (Please specify ……)	

M. CULTURAL HERITAGE

M.1. Are there historical / cultural buildings / assets in your village / nearby area? (ancient finds, aqueduct, tumulus, bridge, etc.)

Yes

M.1.1. Where exactly is this asset / structure?

(Please specify its location)

M.1.2. Is this asset / structure registered?

Yes (1)

No (2)

I do not know (3)

No

N. INFORMATION ABOUT THE PROJECT

M.1. Are you aware of the project? If yes, where did you get this information?

M.2. Are there other Projects in or around your region? If yes, which one/ones?

M.3. If yes, can you share your experiences about these other projects?

M.4. Do you have any questions about this project? What are them?

	Yes	Information source (Mukhtar, institution officials etc.)
When will the project construction begin?		
Will our homes be affected?		
Will the project have environmental impacts?		
Will the traffic density increase?		
Will our treasury, pasture or other common lands be affected?		
Will our private lands be affected? How?		
Will expropriation be done consentingly or is it compulsory / urgent?		
When will I find out how much of my land is affected?		
I use treasury land. Will I be entitled to compensation?		
How many people will be employed in the project?		
Where should we apply for recruitments?		
When will the railway construction be completed?		
Will the railway pass through / near the village?		
How will we go to the land we use?		
Other_____		
_____		

M.6. What are the topics you want to add about the project?

ANNEX-3 SAMPLE HOUSEHOLD SURVEY QUESTIONNAIRE

FİLYOS PORT / INDUSTRIAL ZONE CONNECTIONS PROJECT

HOUSEHOLD SOCIO-ECONOMIC STATUS SURVEY

SURVEY DESCRIPTION

Filyos Port and Industrial Zone Connections Projects is carried out by the Ministry of Transport and Infrastructure, General Directorate of Infrastructure Investments.

The project will be constructed in Zonguldak Çaycuma district and includes the construction of a 12 km railway line, a 4.5 km highway, a bridge over the Filyos river and two stations. Project components pass through agricultural fields, pasture and forest lands. The affected lands will be expropriated temporarily or permanently according to the requirements of the Project components.

This meeting is held to gather information about the settlements affected by the Project and to record the residents' feedback on the project and to prepare the ESIA report. The information you provide will help to better understand the region where the Project is located and will contribute to the decision making processes.

The information you provide will be used only for this project, and your name and any information you share will be kept confidential.

Thank you for your time and participation.

Date:	
Province:	
District:	
Village/Neighborhood:	
Name of the interviewee:	

INFORMATION OF INTERVIEWEE	
Residence at the settlement:	(1) Constant ☐
	(2) Seasonal ☐

	Province-District.....
	03 Rarely ☐ **Province-District**..... (only on holidays, etc.)
	(4) Doesn't live here ☐ **Province-District**.....

A. HOUSEHOLD INFORMATION

A1. Number of people living in the household:	……. People	
The person interviewed;		
A2. Age:		
A3. Sex:	Man	01
	Woman	02
A4. Educational Status:	Illiterate	01
	Literate	02
	Left primary school	03
	Primary school graduate	04
	Secondary school graduate	05
	High school graduate	06
	College student	07
	College graduate	08
	University student	09
	University graduate	10
	Graduate Student	11
	Masters graduate	12
A5. Occupation:	Farmer	01
	Tradesman	02
	Retired	03
	Daily / Seasonal Worker	04
	Worker	05
	Unemployed	06
	Civil Servant	07
	Elderly	08
	Artisan	09
A6. Social Security:	Retirement Fund	01
	Bağkur-Agriculture	02
	Bağkur	03

	Green Card	04
	Ssk	05
	Special Insurance	06
	No	07
A7. Is there any illiterate in the household?	..... People	01
	No-one	99
A8. How many members of the household work?	..... People	01
	No-one	99
A9. How many people are in your household looking for and not finding a job?	..... People	01
	No-one	99
A10. Do you have a retired person in your household?	..... People	01
	No-one	99

B. HOME AND INFRASTRUCTURE

B1. Is the house you use belong to you?

01 Yes, belong to only us

02 Shared but we are using

03 No, it belong to out close relatives, we use it without paying rent

04 No, we are tenants
05 Other……

B2. What is the drinking water source of the house?

01 Water supply network

02 Water tank

03 Well water

04 Spring water

05 Artesian, water pump

06 Other……..

B3. Is drinking water supply sufficient? If no, why not?
01 Yes

02 No, because……..

B4. What is the energy source you use for heating?(Please rank by the most frequently used and priority)

01 Wood

02 Coal

03 Electricity

04 Bottled gas

05 Dry dung

06 Other……..

B5. Is there any other house and / or shop besides the house you live / use?
(If no, please go to Section C)

01. Yes – house Location……..

02. Yes – shop Location ……

03. No

B6. For what purpose is your other property (house-shop) used?

01 Permanent (own use)

02 Investment (Leasing)

03 Summer-winter house (own use)

04 Other……

C. HAYVANCILIK

C1. Do you have an animals?

01 Yes

02 No *(If No, please go to Section D))*

C2. How many animals are you keeping?

Animal	**Number**
Cattle (calf, bullock, cow, buffalo, all included)	
Small cattle (sheep, goat)	
Bee (Number of hives)	
Poultry (chicken, turkey, goose)	

C3. Do you have a barn?

01 Yes …… (If yes,…… m^2)

02 No

C4. Where do you often feed your animals throughout the year? (Multiple answers can be received)

	Please mark
Barn near the house	( )
In the village pasture	( )
On public land	( )
On the land of the village legal entity	( )
O forest land	( )
On the private agricultural land after harvest	( )

Other	( )

C5. What do you do with the products you get from animal husbandry?		We consume ourselves at home	we sell in the market	We sell to manufacturer, trader, factory etc.
	Milk			
	Cheese			
	Butter			
	Egg			
	Other (Please explain)			

D. AGRICULTURE

D1. Are there any lands that you use or own?

01 Yes

02 No *(If No, please go to Section E)*

D2. What is your land asset? (Shared or full, with title)

Type	**Currently existing decare** (If there is no land, please write 0)
1.Vineyard	
2.Garden	
3.Field	**Dry** (Decare):
	Irrigated(Decare):
	Total(Decare):
4. Orchard	

5. Woodland (Poplar tree etc.)

7. Total

D3. Is there any other land that you do not have a title deed but use? (If no, please write 0)

	Currently available dry (decare)	**Currently available irrigated (decare)**	**Currently available Total (decare)**
Public land			
Rented (Contracted-paid)			
Rented (Contract-free, paid)			
Someone else's (a relative, neighbor, etc.)			
Total			

D4. How do you use your land? (There may be multiple responses)
01 We plow the field
02 It stands empty
03 We rent to someone else
04 Sharecropping
05 We are animal breeding, use for grazing
06 We left the land, we don't know
07 Casual workers plow the land, we take the product
08 Other (Please specify……..)

D5. What agricultural products do you grow on the land?

Name of the product	*Please mark (√) If no products, write 0)*
Wheat	
Barley	
Sugar beet	

Beans	
Chickpea	
Rice	
Hazelnut	
Pistachio	
Melon/Water melon	
Tomato	
Corn	
Sunflower	
Clover	
Vetch	
Sainfoin	
Other (Please specify below)	

D6. Which products that you planted bring the most income?

D7. Do you have a bearer tree or yielding tree? (Olive, Walnut, Poplar Tree, etc.)?

01 Yes
02 No *(If no, please go to 20th question)*

D8. If yes, what are their types and numbers?

Type of tree	Number

D9. Do you or any of your family members have any of the following assets?

Family Owned Assets	Number (if not 0)
(1) Automobile	
(2) Truck	
(3) Minibus	
(4) Tractor	
(5) Harvester	
(6) Bus	
(7)....	

E. SOURCES OF INCOME

E1. What kind of income does your household have below, what are your household income? (Please tick according to importance, write down if quantity can be specified**).**

Sources of Income	1 (Primary source of income)	2 (Side income)	3 (Side income)	Annual income (average)
1.Paid employment (Worker) income				
2.Salaried employment (civil servant) income				
3. Tradesman / artisan / trade income				
4. Retirement Income				
6. Seasonal Job Income				
7. Sent by children / relatives				
8.Agricultural income (Field crops)				
9. Agricultural income (Orcharding, Grapery, etc.)				
10.Livestock income (Animal sales)				
11. Animal products (Egg, milk, cheese, etc.)				
12.Rent earnings (Housing, land, shop, field)				
13.( )Widow /( )Disabled / ( )Elderly ( )Salary Income				
14.Unemployment pay				

15. Community benefit work program

16.Other *(Please Specify …….……)*

E2. Do you sell animals?

01 Yes

02 No *(Please go to 24th question)*

E3. Can you indicate the number of animals and animal products you sell in a year? (If there is no sale, write 0**).**

Type of Animal	Number of animals sold in a year
1.Sheep	
2.Goat	
3.Ram	
4.Lamb	
5.Calf (0-6 months)	
6.Calf (6-15 months)	
7.Cow	
8.Bullock	
9.Chickes	
10.Rooster	
11.Turkey	
12.Goose	
13.Other…….	

E4. Is your village close to the forest?

a. Yes ……..
b. No …….. *(Please go to Section F)*

E5. Do you use the forest for any purpose? *(Please read all the categories and mark the ones answered yes by the participant)*

We collect the wood we use for heating from the forest	
We collect mushrooms / herbs / spices / etc. for our own use	
We collect mushrooms / herbs / spices / etc. for selling	
We work as paid workers in the forest	
We graze our animals	

F. PERCEPTION OF THE OWN

F1. At what level can you meet the basic needs and livelihood of your household?

01 Easy
02 More or less
03 Difficult
04 Very difficult
05 I don't know

F2. How do you see your economic level compared to a year ago?

01 Same
02 Worse
03 Better
04 I don't know.

F3. How do you evaluate the future, in 5 years?

01 It will be better.
02 It will be worse
03 It will be the same
04 Other……

G. THE MOST IMPORTANT PROBLEMS OF THE SETTLEMENT

G1. What do you think are the most important problems of the village / neighborhood? (If there is no problem,please go to Section H)

Problems (Multiple options can be selected)	**Write 1,2,3 in the order of importance.**
Unemployment	
Economy (livelihood, low income)	
Incomplete / insufficient infrastructure (electricity / sewerage)	
Agricultural irrigation	
Transportation to the city	
Transportation to the land	
Educational services	

Health services	
Communication (internet, mobile phone network)	
Garbage	
Social facilities (carpet pitch, etc.)	
Inadequate shelter conditions / heating conditions	
Problems with relatives and neighbors	
Pasture / plateau land is insufficient	
Insufficient agricultural areas	
Insufficient drinking water infrastructure	
Other	

H. INFORMATION ABOUT THE PROJECT

H1Are you aware of the Filyos Port and Filyos Industrial Zone Railway Connections Project?

(1) ……. No, I don't know. *(Please briefly inform about the project before moving on to the next question, explanation in the survey can be used.)*
(2) ……. Yes, I am aware. Where did you hear/Who did you receive information? (Please circle multiple responses below)?

01 Family members
02 Mukhtar
03 Municipality
04 Company officials visits, meetings
05 Workers at the company
06 TV/Radio
07 İnternet
08 Newspapers
09 Brochure
10 Administrative Districts / Governor's Office
11 Other……

H2. What would be the negative effects of the project? (Starting from 1 in order of importance, up to 5 options)

Topics	Importance
01 Our access to land is prevented	
02 Land becomes damaged / unusable	
03 The crops and trees in the land would be damaged	
04 Pasture lands and meadows would be damaged/decreased affecting households economically	

05 Livelihoods would be negatively affected due to expropriation

06 Dust would be generated/increased

07 Noise would be generated/increased

08 Traffic accident risks would increase

09 Human, community and animal health would be negatively affected

10 Other…….

2. **What do you think can be done to reduce negative effects? (Starting from one, in the order of importance)**

Topics	Importance
1. Making income generating (agriculture-animal husbandry) studies in settlements	
2. Generating solutions to provide access to land	
4. Calculation of expropriation compensations to meet losses	
5. Prioritizing local employment in the project	
5. Opening vocational courses	
6. Opening of social courses (women, children, youth)	
7. Correction of infrastructure deficiencies (electricity, sewer system, drinking water)	
9. Road modification / construction (village-village, village-city, neighborhood-neighborhood, neighborhood-district, etc.)	
10. School construction, development of educational services	
11. Improving-increasing health services	
12. Construction of social facilities used for common purposes (wedding hall, carpet pitch, etc.)	
13. Other……	

3. **What would be the positive effects of the project in your opinion?** (Starting from 1 in order of importance, up to 5 options)

Topics	Importance

01 It would contribute to the economic development of the region

02 It would contribute to the development of the country

03 It would provide local employment

04 Transport infrastructure would improve

10 Other…….

İ. SUGGESTIONS AND THOUGHTS

What do you want to add or say about the project and / or this research in general?

Thank you; End of the Survey

ANNEX-4 SAMPLE FORM OF SEMI-STRUCTURED IN-DEPTH INTERVIEW

STAKEHOLDER INTERVIEW FORM

Place:

Date:

Institution / Organization:

Name of the interviewee:

Title, job and profession:

Contact Information:

1. Do you have any previous information about the project? If so, how much and from which source did you get it?

2. What role does your institution / organization have and would have in relation to the Project?

3. What can be the positive impacts of the project on the people of the region? Is it possible to increase this impact? Could your institution have a role?

Social:

Economic:

Environment, infrastructure, public health:

4. What might be the negative impacts of the project for you? Is it possible to reduce this impact? Could your institution have a role?

Social:

Economic:

Environment, infrastructure, public health:

5. (Information, document, number, report etc. to be obtained from the institution)

6. What are your opinions and suggestions on the subject and would do like to add anything?

ANNEX-5 SAMPLE FORM OF FOCUS GROUP INTERVIEW

Location: **Group Type:** **Date:**

(Firstly, information is provided about the project by making use of maps and other materials)

Topics		Construction Phase	Operation Phase	How to improve?
Do you think this project will have a positive or negative impact on social services and infrastructure?	Road, Transportation			
	School, Education			
	Traffic safety			
	Services such as electricity, water, internet			
	Waste, waste water and sewer system			

Do you think the Project will have a positive or negative impact on the economy of your village / town, Employment and Livelihoods?	Impacts on welfare level and wages			
	Impacts on houses, land and fields			
	Impact on basic existing livelihoods			
	Impacts on employment opportunities			
Do you expect the project to have a positive or negative impact on your Quality of Life?	Noise, vibration			
	Impacts on air quality (dust)			
	Social adaptation of			

	the incoming workers			
Are there any topics you would like to be informed about?				

ANNEX-6 FIELD STUDY PHOTOGRAPHS





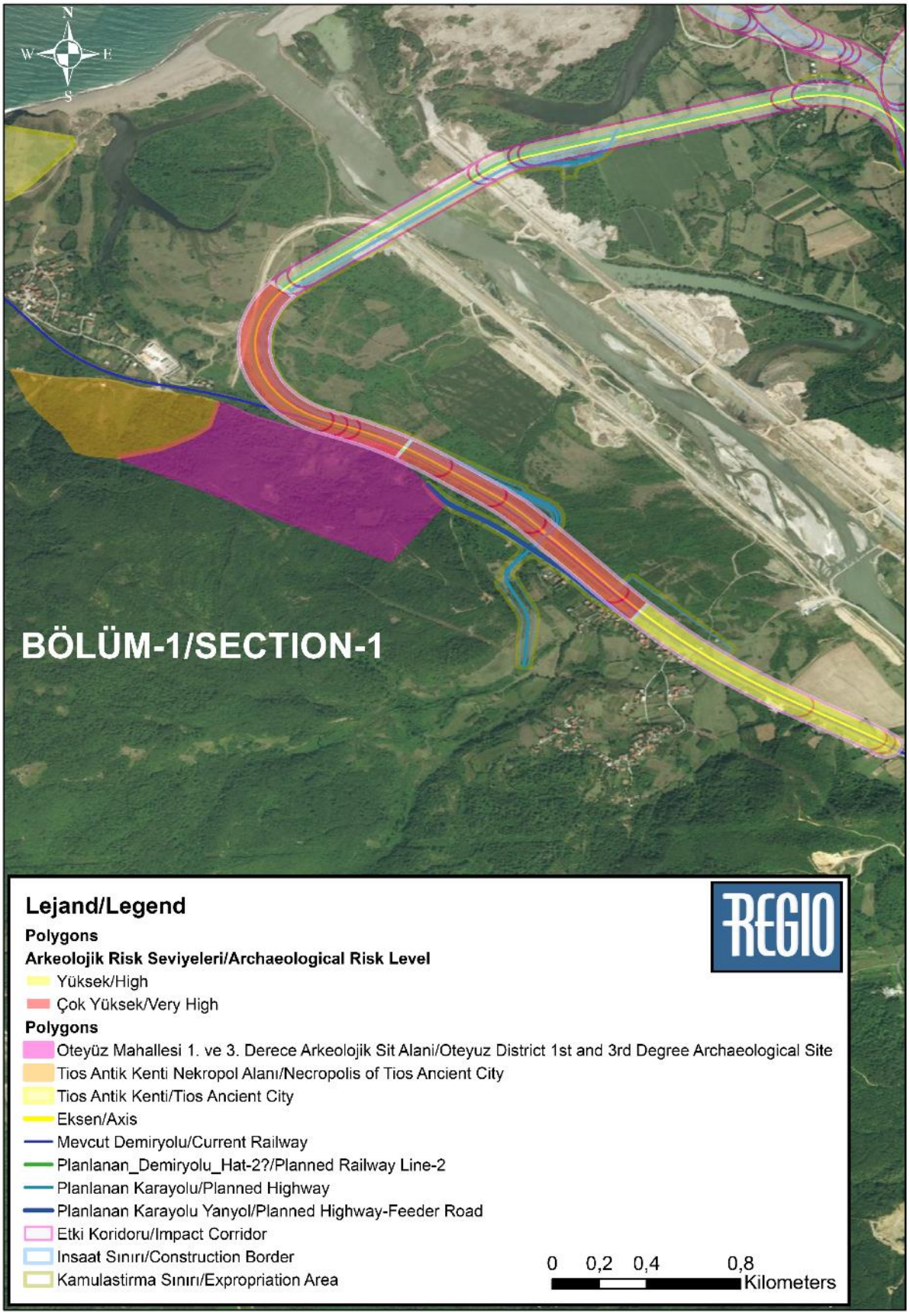

ANNEX-7 ARCHEOLOGICAL STATUS TABLE

LOCATION OF SITES				DATA RESOURCES		LOCATION OF SITES IN WITHIN THE PROJECT AREA				PROPOSED MITIGATION MEASURES								TYPE OF THE ARCHAEOLOGICAL TRACES/SURFACE FINDINGS			EXPLANATIONS
No	Site Name	Province	District/ Village	Ministry of Culture and Tourism	Field Survey	Within Expropriation Border	Within Impact	Approximate Distance to Expropriati	KM	Archaeological Test Excavation	Geophysical Survey	Archaeological Salvage Excavation	Technical Documentat	Restoration	Removal to Another Place	Archaeological Monitoring	Physical Interventio	Ceramic Sherds	Architectural Remains	Other (Bone, Stone Tool, etc.)	
1	Sazköy 3. Degree Archaeological Site	Zonguldak	Çaycuma/Sazköy	x		x	x	0	Jetty (0+150 - 0+390) and Ferry Connection Line (0+500 - 0+940)	x		x	x			x	x	x	x	x	Sazköy 3rd Degree Archeological Site is located on the planned Railway Dock Connection (0 + 150- 0 + 390 km) and the planned Railway Ferry Connection (between 0 + 500- 0 + 940 km). As a result of the studies, it has been identified that the cultural asset, which we think is a necropolis area, will be adversely affected by the construction activities. For this reason, it is recommended that the Filyos Railway Dock and Ferry Connection route should be revised in a way that it does not destroy the registered area. If such a revision is not possible, it may be necessary to plan test pit and salvage excavations in the areas where the railway route cuts the site, and to implement them before the construction period. 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.
2	Öteyüz Mahallesi 1. and 3. Degree Archaeological Sites	Zonguldak	Çaycuma/Filyos/Öteyüz	x			x	9	Railway Route (2+130 - 2+012)	x		x	x			x	x			x	Öteyüz Mahallesi 1st and 3rd Degree Archeological Site, also located in Section-2. The area lies between the 2 + 130- 2 + 012 kilometer points of the Section-2 railway branch line and within the impact corridor. For this reason, all kinds of excavation, skimming, logging, cleavage etc. activities to be carried out within the project

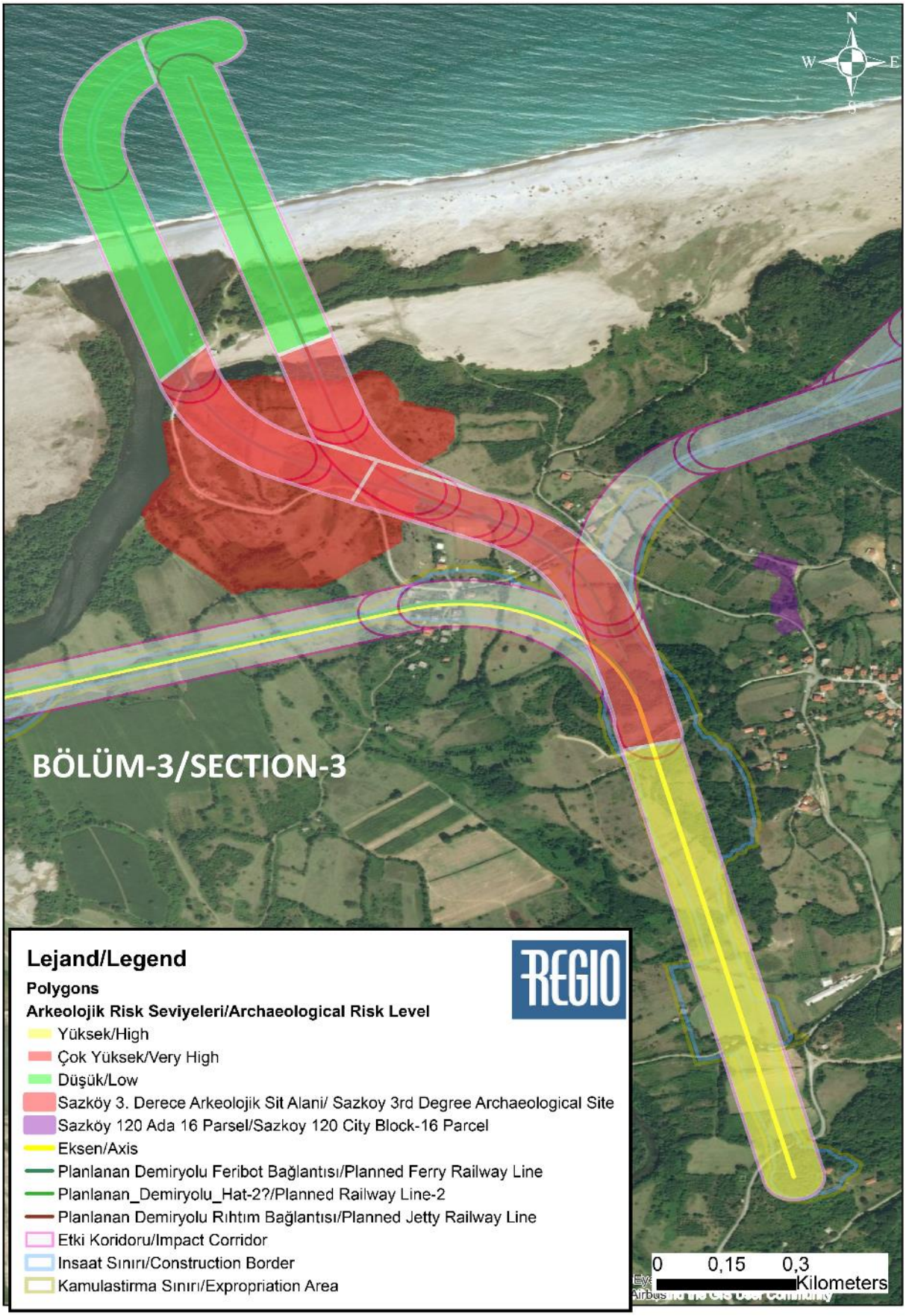
LOCATION OF SITES				DATA RESOURCES		LOCATION OF SITES IN WITHIN THE PROJECT AREA				PROPOSED MITIGATION MEASURES								TYPE OF THE ARCHAEOLOGICAL TRACES/SURFACE FINDINGS			EXPLANATIONS
No	Site Name	Province	District/ Village	Ministry of Culture and Tourism	Field Survey	Within Expropriation Border	Within Impact	Approximate Distance to Expropriati	KM	Archaeological Test Excavation	Geophysical Survey	Archaeological Salvage Excavation	Technical Documentat	Restoration	Removal to Another Place	Archaeological Monitoring	Physical Interventio	Ceramic Sherds	Architectural Remains	Other (Bone, Stone Tool, etc.)	
																					construction boundaries must be carried out under the supervision of an archaeologist. While planning the side activities of the project such as opening service roads related to the project, determining the locations of the quarries, creating an excavation storage area, the protection limits of the registered archaeological site should be taken into consideration and any intervention in the area should be avoided. Starting from the design phase of the project for any project, revision and similar applications to be carried out in Öteyüz Mahallesi 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.
3	Tios	Zonguldak	Çaycuma/Filyos	x				1030	Railway Route (2+700)							x	x	x	x	x	Ancient City of Tios and Tios Necropolis Area. Both areas are located very close to the expropriation limit. For this reason, the plans and projects of all kinds of construction activities planned to be carried out near the sites should be submitted to the Karabük Cultural Heritage Conservation Regional Board under the Law No. 2863, and the opinion of the official institution should be consulted. The decisions to be taken by the protection board must be followed at all stages of the project. In addition to the decision of the Board, it is highly recommended that all construction works to be

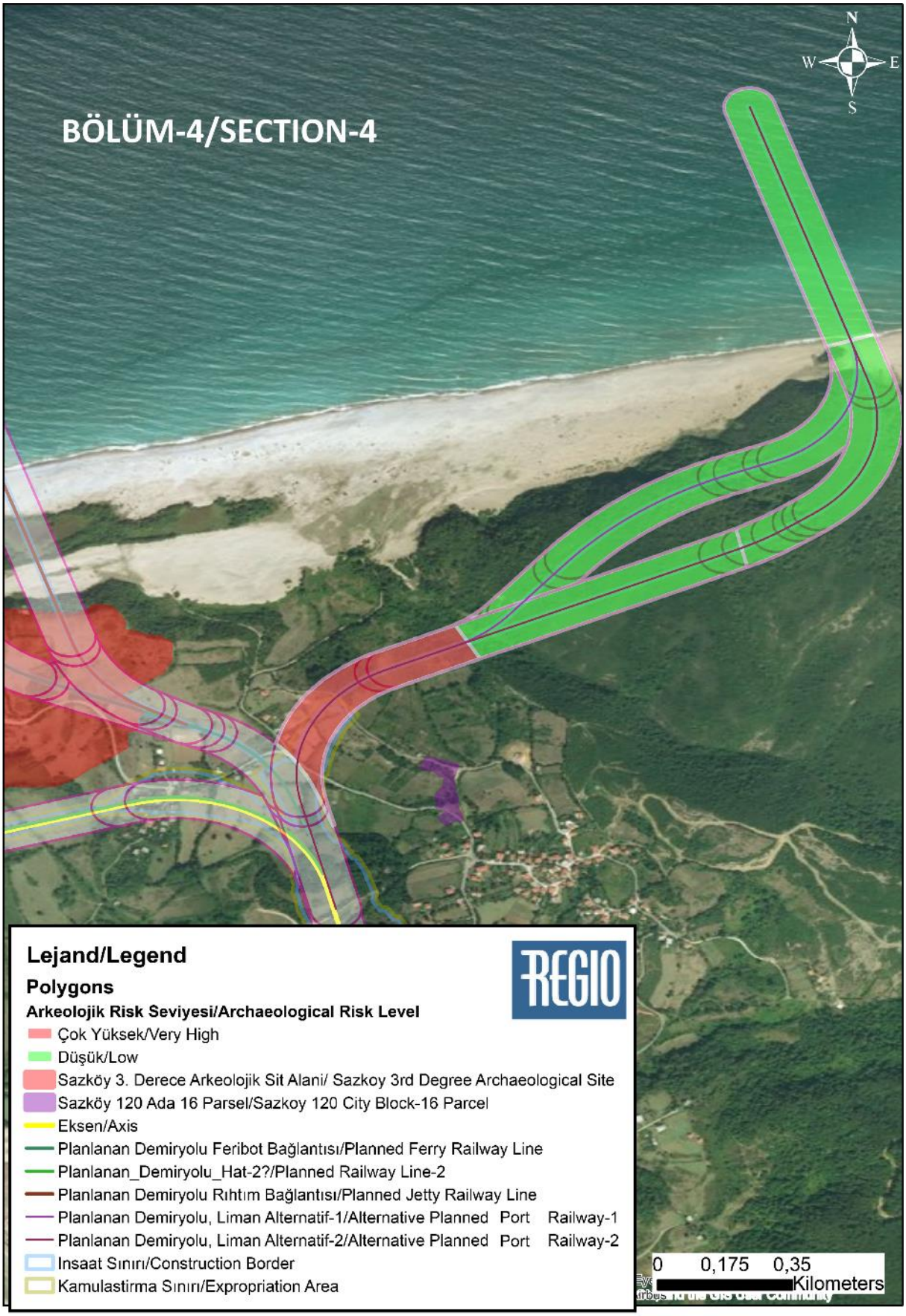
LOCATION OF SITES				DATA RESOURCES		LOCATION OF SITES IN WITHIN THE PROJECT AREA				PROPOSED MITIGATION MEASURES								TYPE OF THE ARCHAEOLOGICAL TRACES/SURFACE FINDINGS			EXPLANATIONS
No	Site Name	Province	District/ Village	Ministry of Culture and Tourism	Field Survey	Within Expropriation Border	Within Impact	Approximate Distance to Expropriati	KM	Archaeological Test Excavation	Geophysical Survey	Archaeological Salvage Excavation	Technical Documentat	Restoration	Removal to Another Place	Archaeological Monitoring	Physical Interventio	Ceramic Sherds	Architectural Remains	Other (Bone, Stone Tool, etc.)	
																					carried out in these areas and its surroundings to be implemented under the supervision of an archaeologist.
4	Tios Ancient City and Tios Necropolis	Zonguldak	Çaycuma/Filyos	x				160	Railway Route (2+550)							x	x		x	x	Ancient City of Tios and Tios Necropolis Area. Both areas are located very close to the expropriation limit. For this reason, the plans and projects of all kinds of construction activities planned to be carried out near the sites should be submitted to the Karabük Cultural Heritage Conservation Regional Board under the Law No. 2863, and the opinion of the official institution should be consulted. The decisions to be taken by the protection board must be followed at all stages of the project. In addition to the decision of the Board, it is highly recommended that all construction works to be carried out in these areas and its surroundings to be implemented under the supervision of an archaeologist.

ANNEX-8 ARCHAEOLOGICAL POTENTIAL MODELING MAPS

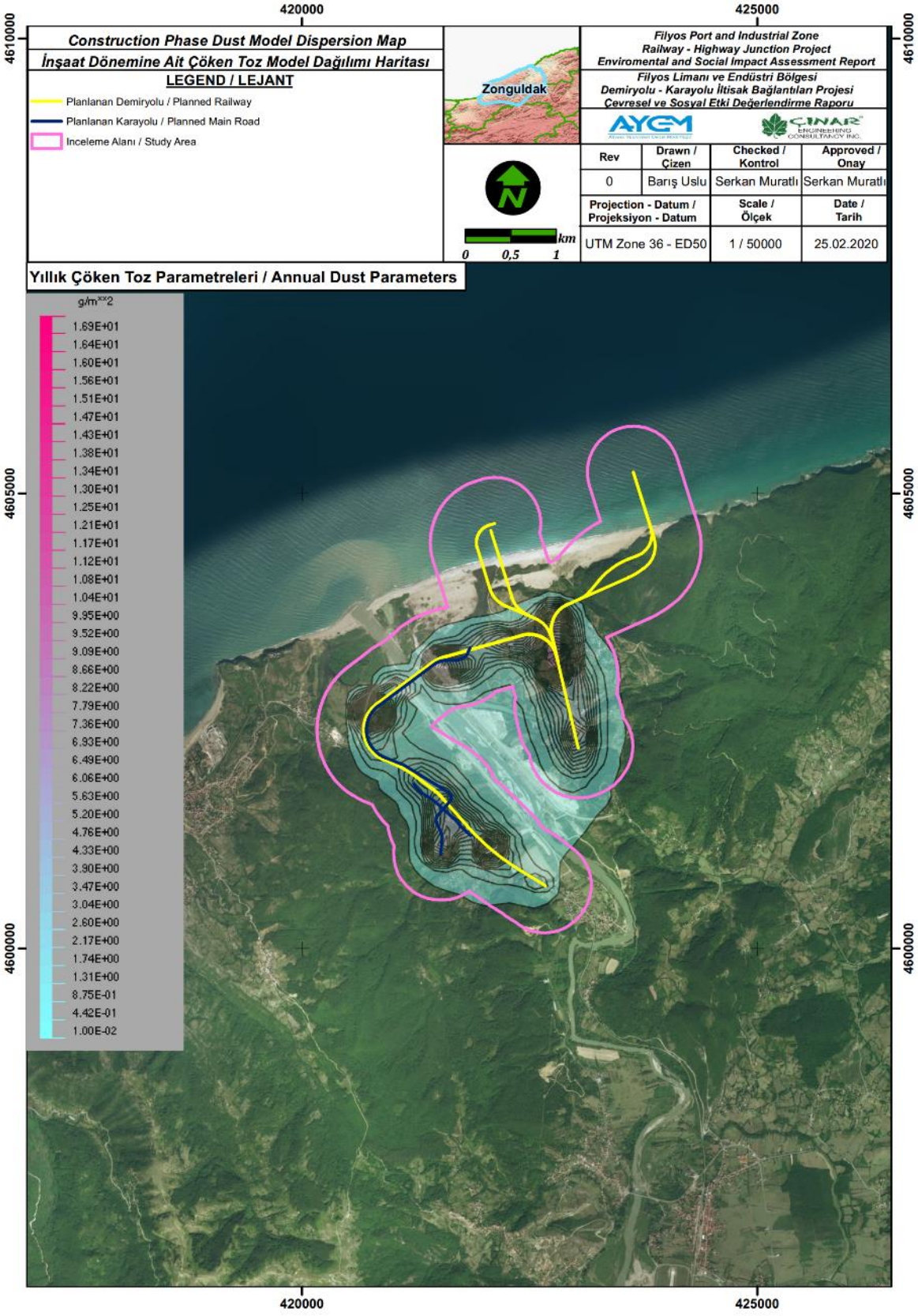

N
W
E
S
BÖLÜM-1/SECTION-1
Lejand/Legend
REGIO
Polygons
Arkeolojik Risk Seviyeleri/Archaeological Risk Level
Yüksek/High
Çok Yüksek/Very High
Polygons
Oteyüz Mahallesi 1. ve 3. Derece Arkeolojik Sit Alani/Oteyuz District 1st and 3rd Degree Archaeological Site
Tios Antik Kenti Nekropol Alanı/Necropolis of Tios Ancient City
Tios Antik Kenti/Tios Ancient City
Eksen/Axis
Mevcut Demiryolu/Current Railway
Planlanan_Demiryolu_Hat-2?/Planned Railway Line-2
Planlanan Karayolu/Planned Highway
Planlanan Karayolu Yanyol/Planned Highway-Feeder Road
Etki Koridoru/Impact Corridor
Insaat Sınırı/Construction Border
Kamulastirma Sınırı/Expropriation Area
0 0,2 0,4 0,8
Kilometers

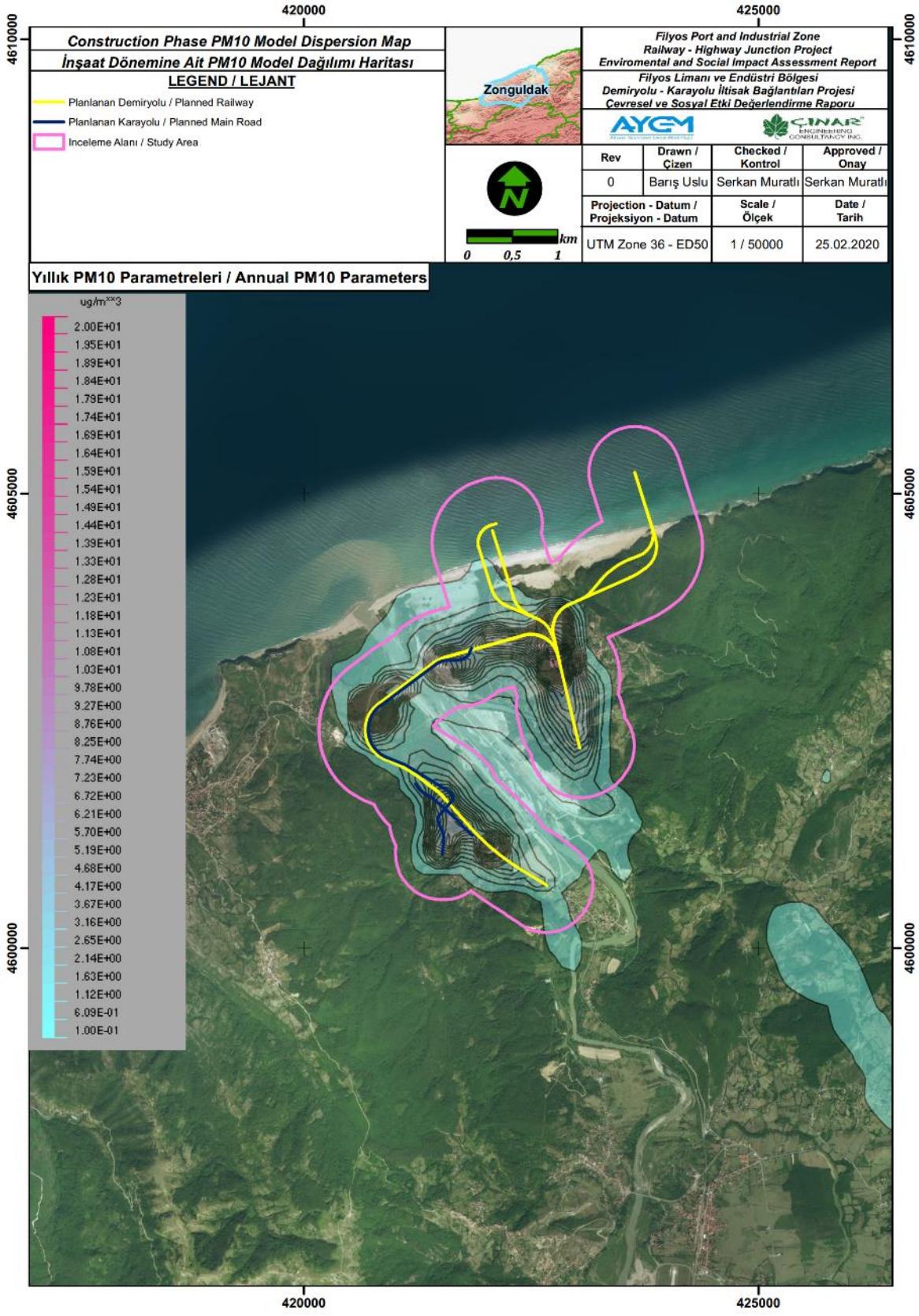

BÖLÜM-2/SECTION-2
N
W
E
S
Lejand/Legend
REGIO
Polygons
Arkeolojiik Risk Seviyeleri/Archaeological Risk Level
Çok Yüksek/Very High
Düşük/Low
Sazköy 3. Derece Arkeolojik Sit Alanı/ Sazkoy 3rd Degree Archaeological Site
Eksen/Axis
Mevcut Demiryolu/Current Railway
Planlanan_Demiryolu_Hat-2?/Planned Railway Line-2
Etki Koridoru/Impact Corridor
Insaat Sınırı/Construction Border
Kamulastirma Sınırı/Expropriation Area
0 0,175 0,35
Kilometers
and the GIS User Community

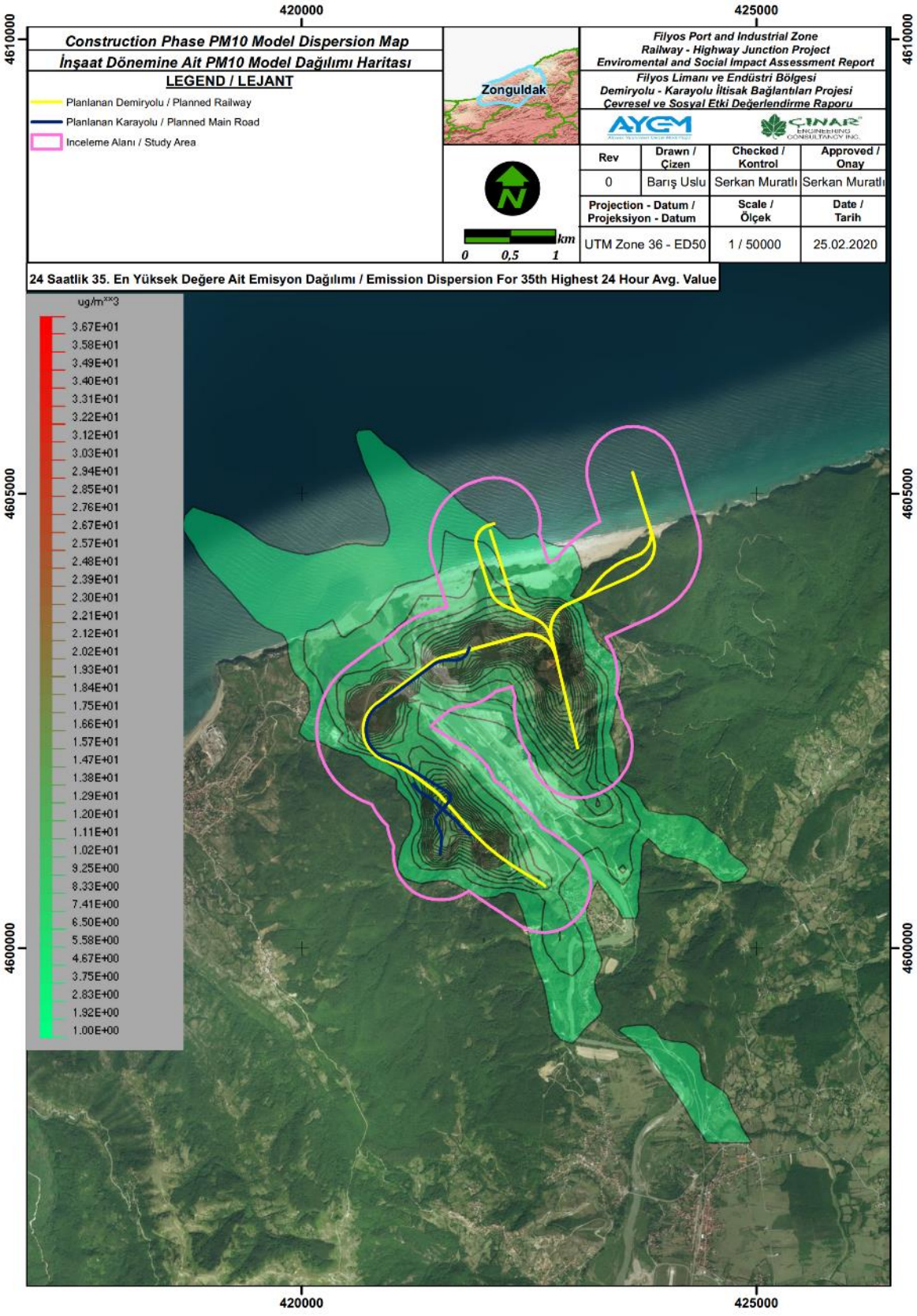

N
W
E
S
BÖLÜM-3/SECTION-3
Lejand/Legend
REGIO
Polygons
Arkeolojik Risk Seviyeleri/Archaeological Risk Level
Yüksek/High
Çok Yüksek/Very High
Düşük/Low
Sazköy 3. Derece Arkeolojik Sit Alani/ Sazkoy 3rd Degree Archaeological Site
Sazköy 120 Ada 16 Parsel/Sazkoy 120 City Block-16 Parcel
Eksen/Axis
Planlanan Demiryolu Feribot Bağlantısı/Planned Ferry Railway Line
Planlanan_Demiryolu_Hat-2?/Planned Railway Line-2
Planlanan Demiryolu Rıhtım Bağlantısı/Planned Jetty Railway Line
Etki Koridoru/Impact Corridor
Insaat Sınırı/Construction Border
Kamulastirma Sınırı/Expropriation Area
0 0,15 0,3
Kilometers


BÖLÜM-4/SECTION-4
N
W
E
S
Lejand/Legend
REGIO
Polygons
Arkeolojik Risk Seviyesi/Archaeological Risk Level
Çok Yüksek/Very High
Düşük/Low
Sazköy 3. Derece Arkeolojik Sit Alanı/ Sazkoy 3rd Degree Archaeological Site
Sazköy 120 Ada 16 Parsel/Sazkoy 120 City Block-16 Parcel
Eksen/Axis
Planlanan Demiryolu Feribot Bağlantısı/Planned Ferry Railway Line
Planlanan_Demiryolu_Hat-2?/Planned Railway Line-2
Planlanan Demiryolu Rıhtım Bağlantısı/Planned Jetty Railway Line
Planlanan Demiryolu, Liman Alternatif-1/Alternative Planned Port Railway-1
Planlanan Demiryolu, Liman Alternatif-2/Alternative Planned Port Railway-2
Insaat Sınırı/Construction Border
Kamulastirma Sınırı/Expropriation Area
0 0,175 0,35
Kilometers

ANNEX-9 AIR QUALITY MODEL DISTRIBUTION MAPS




420000
425000
4610000
4605000
4600000
Construction Phase PM10 Model Dispersion Map
İnşaat Dönemine Ait PM10 Model Dağılımı Haritası
LEGEND / LEJANT
Planlanan Demiryolu / Planned Railway
Planlanan Karayolu / Planned Main Road
Inceleme Alanı / Study Area
Zonguldak
Filyos Port and Industrial Zone
Railway - Highway Junction Project
Enviromental and Social Impact Assessment Report
Filyos Limanı ve Endüstri Bölgesi
Demiryolu - Karayolu İltisak Bağlantıları Projesi
Çevresel ve Sosyal Etki Değerlendirme Raporu
Rev
Drawn / Çizen
Checked / Kontrol
Approved / Onay
0
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
km
0 0,5 1
Yıllık PM10 Parametreleri / Annual PM10 Parameters
ug/m^3
2.00E+01
1.95E+01
1.89E+01
1.84E+01
1.79E+01
1.74E+01
1.69E+01
1.64E+01
1.59E+01
1.54E+01
1.49E+01
1.44E+01
1.39E+01
1.33E+01
1.28E+01
1.23E+01
1.18E+01
1.13E+01
1.08E+01
1.03E+01
9.78E+00
9.27E+00
8.76E+00
8.25E+00
7.74E+00
7.23E+00
6.72E+00
6.21E+00
5.70E+00
5.19E+00
4.68E+00
4.17E+00
3.67E+00
3.16E+00
2.65E+00
2.14E+00
1.63E+00
1.12E+00
6.09E-01
1.00E-01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425000
4610000
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4600000
Construction Phase PM10 Model Dispersion Map
İnşaat Dönemine Ait PM10 Model Dağılımı Haritası
LEGEND / LEJANT
Planlanan Demiryolu / Planned Railway
Planlanan Karayolu / Planned Main Road
Inceleme Alanı / Study Area
Zonguldak
Filyos Port and Industrial Zone
Railway - Highway Junction Project
Enviromental and Social Impact Assessment Report
Filyos Limanı ve Endüstri Bölgesi
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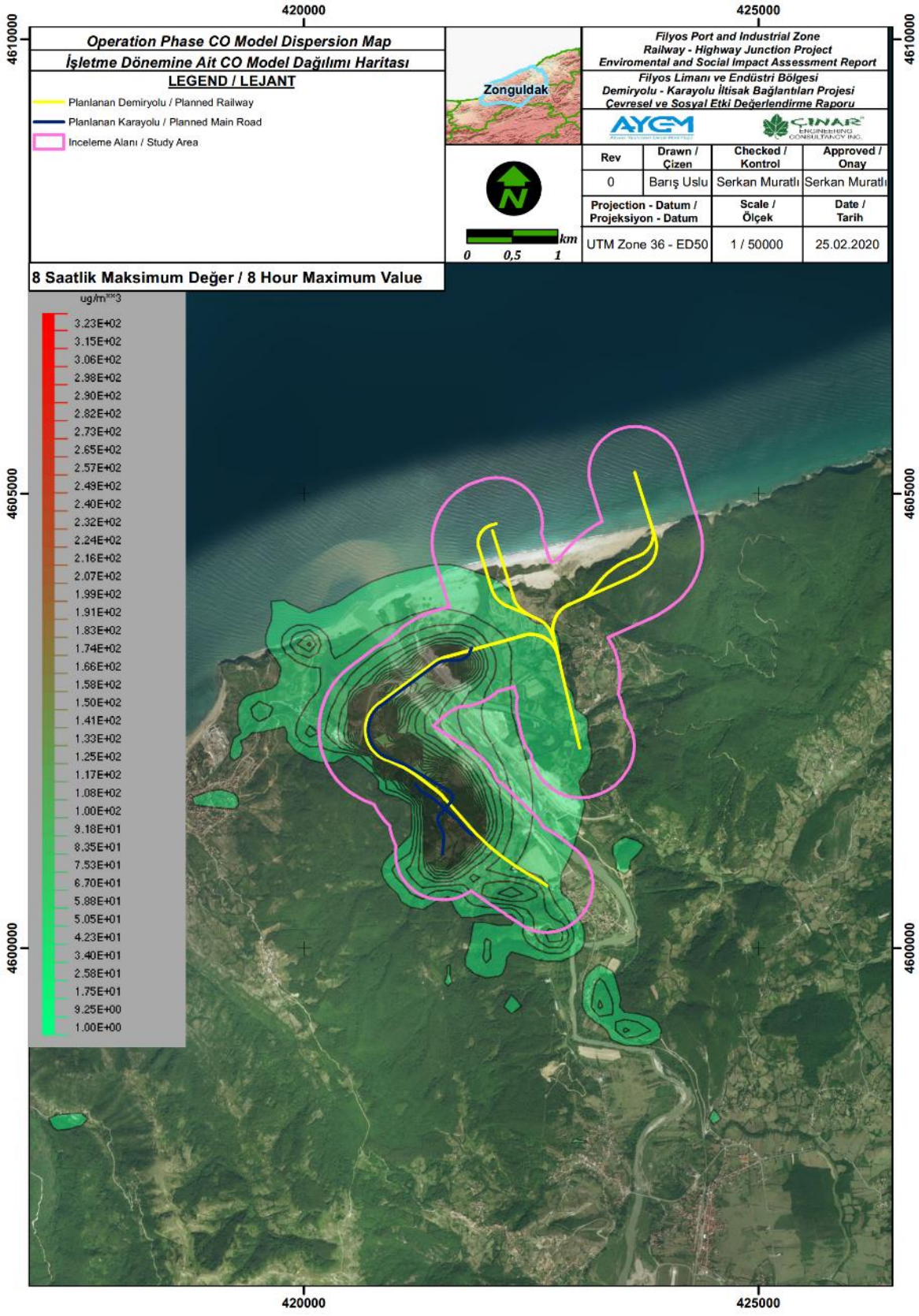
Çevresel ve Sosyal Etki Değerlendirme Raporu
Rev
Drawn / Çizen
Checked / Kontrol
Approved / Onay
0
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
N
km
0 0,5 1
24 Saatlik 35. En Yüksek Değere Ait Emisyon Dağılımı / Emission Dispersion For 35th Highest 24 Hour Avg. Value
ug/m^3
3.67E+01
3.58E+01
3.49E+01
3.40E+01
3.31E+01
3.22E+01
3.12E+01
3.03E+01
2.94E+01
2.85E+01
2.76E+01
2.67E+01
2.57E+01
2.48E+01
2.39E+01
2.30E+01
2.21E+01
2.12E+01
2.02E+01
1.93E+01
1.84E+01
1.75E+01
1.66E+01
1.57E+01
1.47E+01
1.38E+01
1.29E+01
1.20E+01
1.11E+01
1.02E+01
9.25E+00
8.33E+00
7.41E+00
6.50E+00
5.58E+00
4.67E+00
3.75E+00
2.83E+00
1.92E+00
1.00E+00


420000
425000
4610000
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4600000
Operation Phase CO Model Dispersion Map
İşletme Dönemine Ait CO Model Dağılımı Haritası
LEGEND / LEJANT
Planlanan Demiryolu / Planned Railway
Planlanan Karayolu / Planned Main Road
Inceleme Alanı / Study Area
Zonguldak
Filyos Port and Industrial Zone
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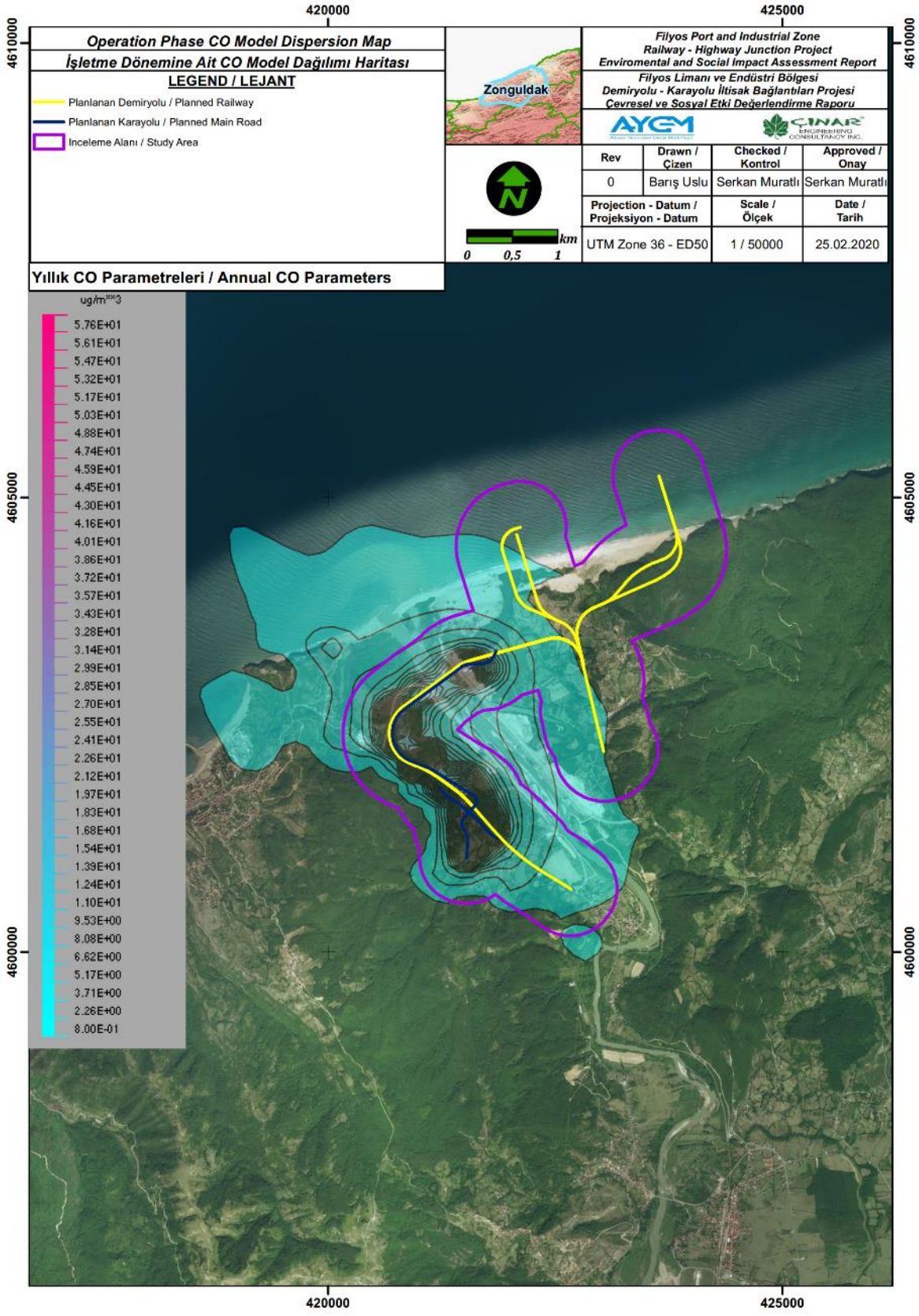
Demiryolu - Karayolu İltisak Bağlantıları Projesi
Çevresel ve Sosyal Etki Değerlendirme Raporu
Rev
Drawn / Çizen
Checked / Kontrol
Approved / Onay
0
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
N
km
0 0,5 1
8 Saatlik Maksimum Değer / 8 Hour Maximum Value
ug/m**3
3.23E+02
3.15E+02
3.06E+02
2.98E+02
2.90E+02
2.82E+02
2.73E+02
2.65E+02
2.57E+02
2.49E+02
2.40E+02
2.32E+02
2.24E+02
2.16E+02
2.07E+02
1.99E+02
1.91E+02
1.83E+02
1.74E+02
1.66E+02
1.58E+02
1.50E+02
1.41E+02
1.33E+02
1.25E+02
1.17E+02
1.08E+02
1.00E+02
9.18E+01
8.35E+01
7.53E+01
6.70E+01
5.88E+01
5.05E+01
4.23E+01
3.40E+01
2.58E+01
1.75E+01
9.25E+00
1.00E+00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425000
4610000
4605000
4600000
Operation Phase CO Model Dispersion Map
İşletme Dönemine Ait CO Model Dağılımı Haritası
LEGEND / LEJANT
Planlanan Demiryolu / Planned Railway
Planlanan Karayolu / Planned Main Road
Inceleme Alanı / Study Area
Zonguldak
Filyos Port and Industrial Zone
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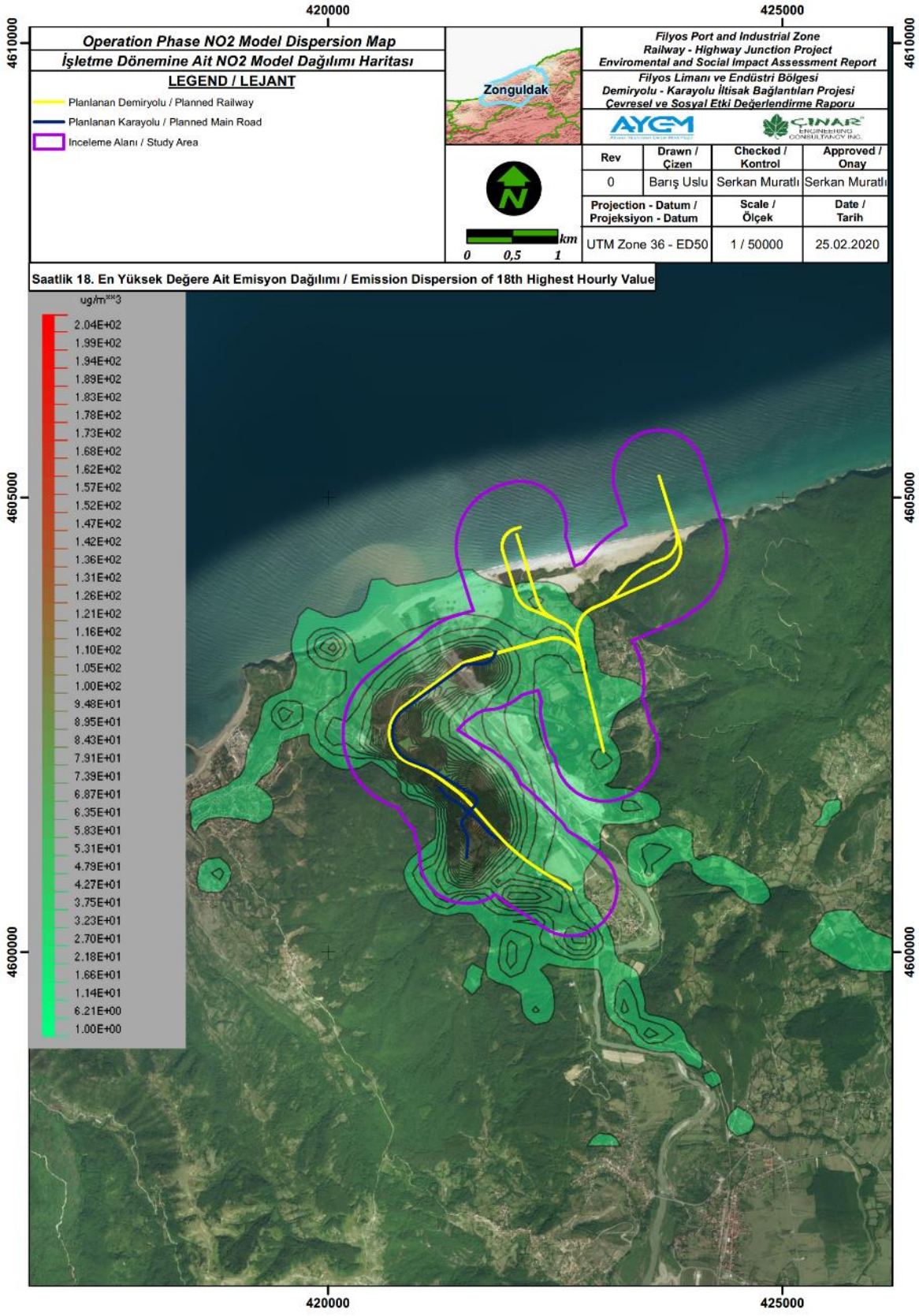
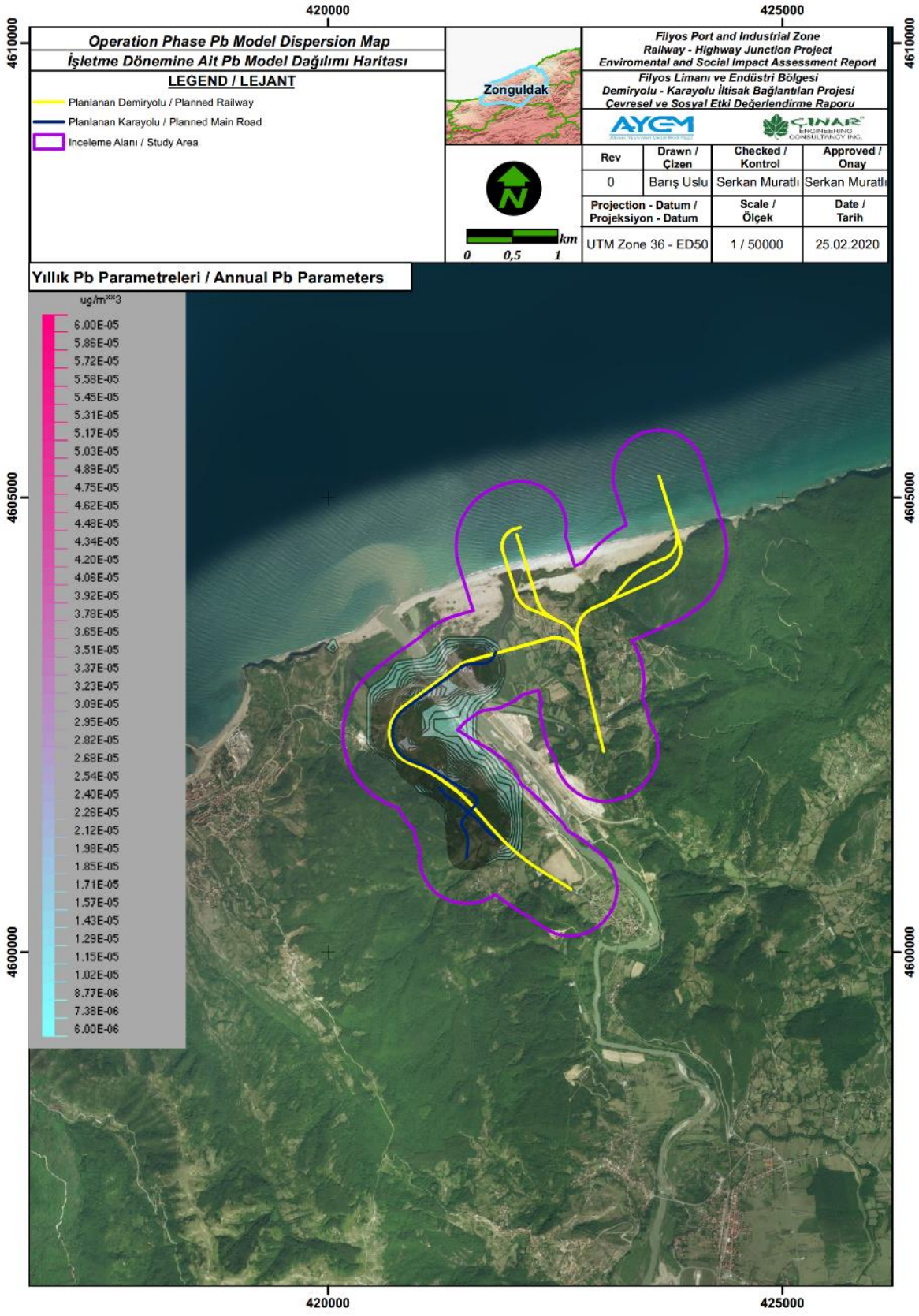
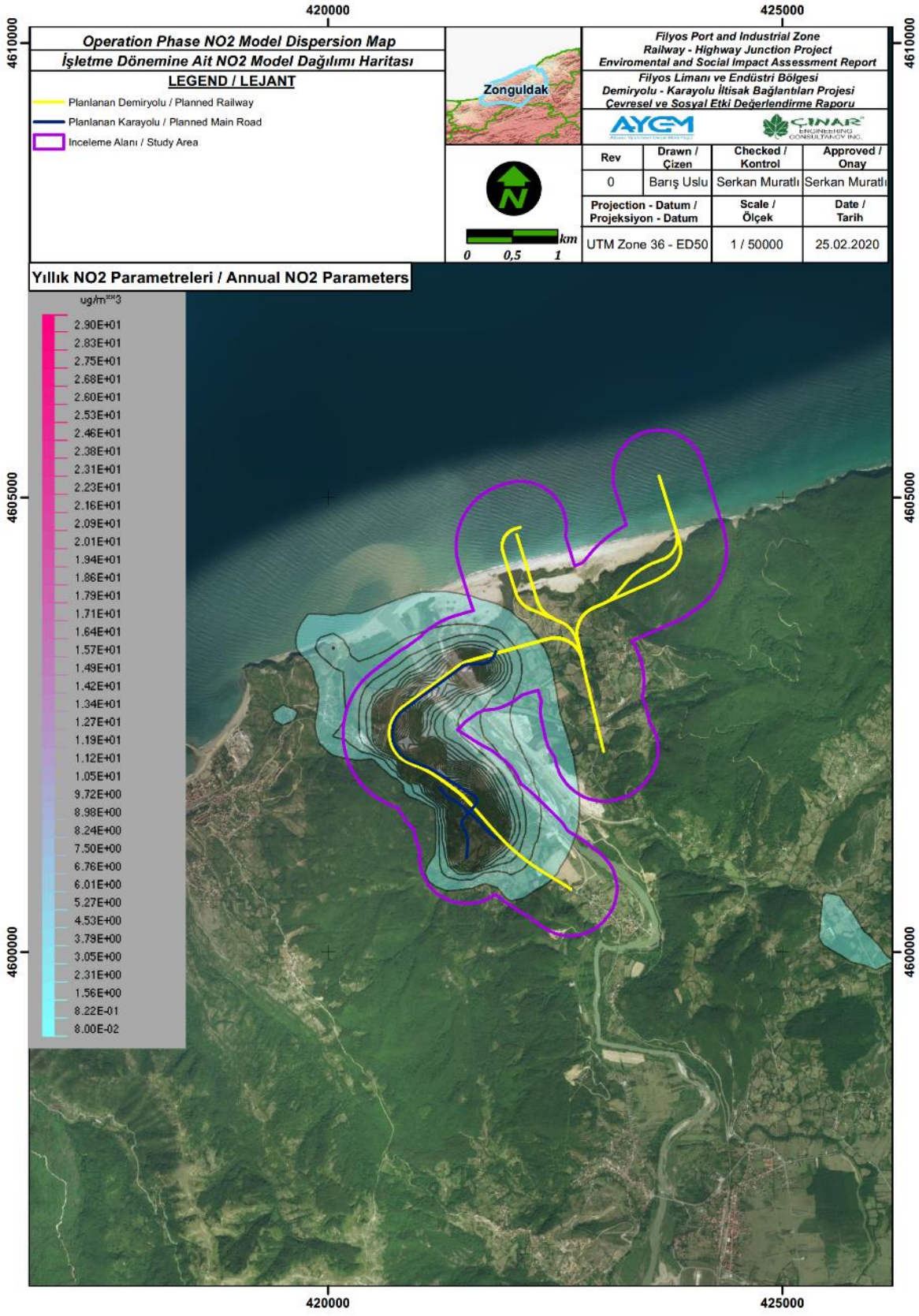
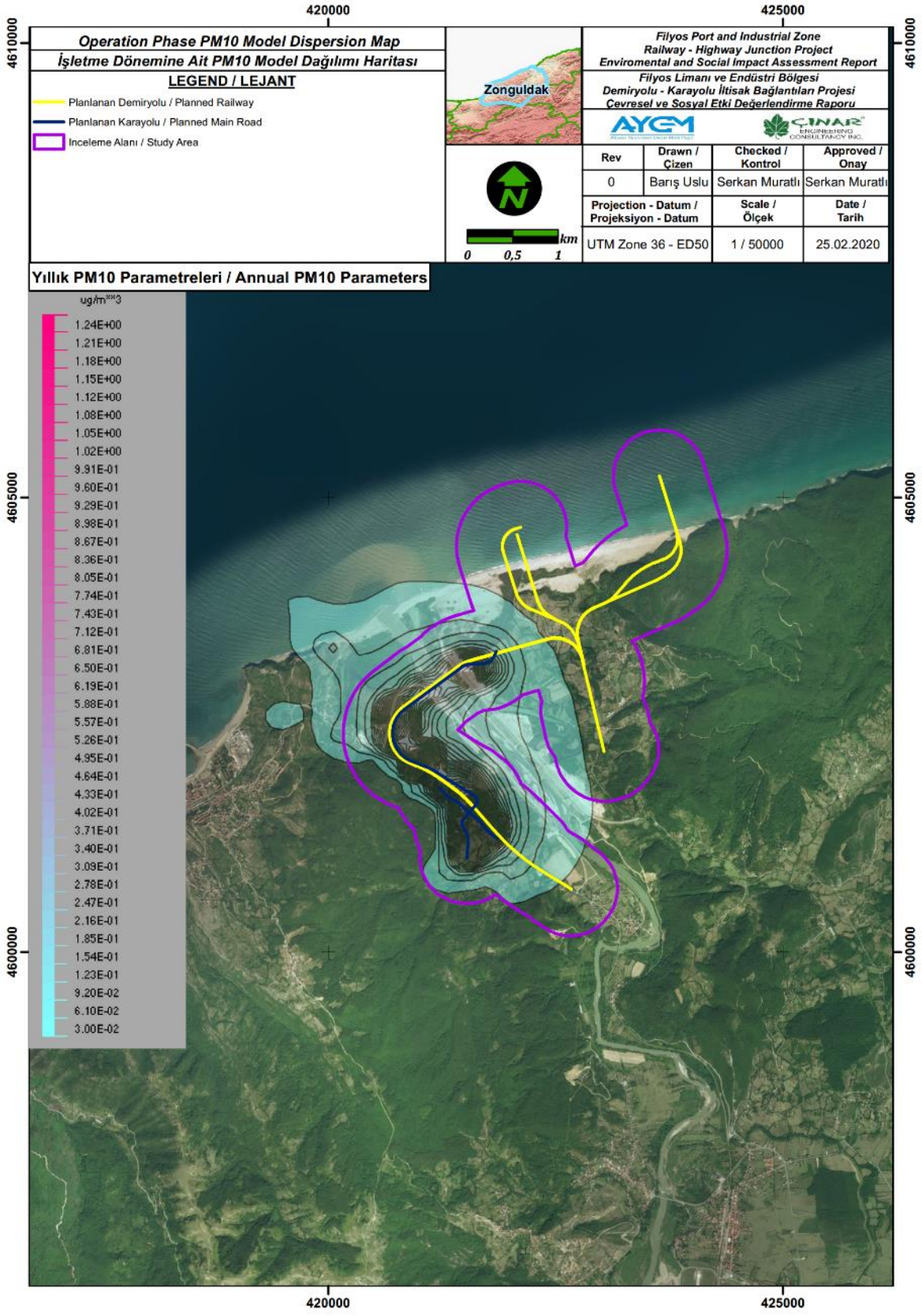
Demiryolu - Karayolu İltisak Bağlantıları Projesi
Çevresel ve Sosyal Etki Değerlendirme Raporu
Rev
Drawn / Çizen
Checked / Kontrol
Approved / Onay
0
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
N
km
0 0,5 1
Yıllık CO Parametreleri / Annual CO Parameters
ug/m^3
5.76E+01
5.61E+01
5.47E+01
5.32E+01
5.17E+01
5.03E+01
4.88E+01
4.74E+01
4.59E+01
4.45E+01
4.30E+01
4.16E+01
4.01E+01
3.86E+01
3.72E+01
3.57E+01
3.43E+01
3.28E+01
3.14E+01
2.99E+01
2.85E+01
2.70E+01
2.55E+01
2.41E+01
2.26E+01
2.12E+01
1.97E+01
1.83E+01
1.68E+01
1.54E+01
1.39E+01
1.24E+01
1.10E+01
9.53E+00
8.08E+00
6.62E+00
5.17E+00
3.71E+00
2.26E+00
8.00E-01


Operation Phase NO2 Model Dispersion Map
İşletme Dönemine Ait NO2 Model Dağılımı Haritası
LEGEND / LEJANT
Planlanan Demiryolu / Planned Railway
Planlanan Karayolu / Planned Main Road
Inceleme Alanı / Study Area
Zonguldak
Filyos Port and Industrial Zone
Railway - Highway Junction Project
Enviromental and Social Impact Assessment Report
Filyos Limanı ve Endüstri Bölgesi
Demiryolu - Karayolu İltisak Bağlantıları Projesi
Çevresel ve Sosyal Etki Değerlendirme Raporu
Rev
Drawn / Çizen
Checked / Kontrol
Approved / Onay
0
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
km
0 0,5 1
Saatlik 18. En Yüksek Değere Ait Emisyon Dağılımı / Emission Dispersion of 18th Highest Hourly Value
ug/m**3
2.04E+02
1.99E+02
1.94E+02
1.89E+02
1.83E+02
1.78E+02
1.73E+02
1.68E+02
1.62E+02
1.57E+02
1.52E+02
1.47E+02
1.42E+02
1.36E+02
1.31E+02
1.26E+02
1.21E+02
1.16E+02
1.10E+02
1.05E+02
1.00E+02
9.48E+01
8.95E+01
8.43E+01
7.91E+01
7.39E+01
6.87E+01
6.35E+01
5.83E+01
5.31E+01
4.79E+01
4.27E+01
3.75E+01
3.23E+01
2.70E+01
2.18E+01
1.66E+01
1.14E+01
6.21E+00
1.00E+00
420000
425000
4610000
4605000
4600000


420000
425000
4610000
4605000
4600000
Operation Phase Pb Model Dispersion Map
İşletme Dönemine Ait Pb Model Dağılımı Haritası
LEGEND / LEJANT
Planlanan Demiryolu / Planned Railway
Planlanan Karayolu / Planned Main Road
Inceleme Alanı / Study Area
Zonguldak
Filyos Port and Industrial Zone
Railway - Highway Junction Project
Enviromental and Social Impact Assessment Report
Filyos Limanı ve Endüstri Bölgesi
Demiryolu - Karayolu İltisak Bağlantıları Projesi
Çevresel ve Sosyal Etki Değerlendirme Raporu
Rev
Drawn / Çizen
Checked / Kontrol
Approved / Onay
0
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
km
0 0,5 1
Yıllık Pb Parametreleri / Annual Pb Parameters
ug/m^3
6.00E-05
5.86E-05
5.72E-05
5.58E-05
5.45E-05
5.31E-05
5.17E-05
5.03E-05
4.89E-05
4.75E-05
4.62E-05
4.48E-05
4.34E-05
4.20E-05
4.06E-05
3.92E-05
3.78E-05
3.65E-05
3.51E-05
3.37E-05
3.23E-05
3.09E-05
2.95E-05
2.82E-05
2.68E-05
2.54E-05
2.40E-05
2.26E-05
2.12E-05
1.98E-05
1.85E-05
1.71E-05
1.57E-05
1.43E-05
1.29E-05
1.15E-05
1.02E-05
8.77E-06
7.38E-06
6.00E-06


Operation Phase NO2 Model Dispersion Map
İşletme Dönemine Ait NO2 Model Dağılımı Haritası
LEGEND / LEJANT
Planlanan Demiryolu / Planned Railway
Planlanan Karayolu / Planned Main Road
Inceleme Alanı / Study Area
Zonguldak
Filyos Port and Industrial Zone
Railway - Highway Junction Project
Enviromental and Social Impact Assessment Report
Filyos Limanı ve Endüstri Bölgesi
Demiryolu - Karayolu İltisak Bağlantıları Projesi
Çevresel ve Sosyal Etki Değerlendirme Raporu
Rev
Drawn / Çizen
Checked / Kontrol
Approved / Onay
0
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
km
0 0,5 1
Yıllık NO2 Parametreleri / Annual NO2 Parameters
ug/m^3
2.90E+01
2.83E+01
2.75E+01
2.68E+01
2.60E+01
2.53E+01
2.46E+01
2.38E+01
2.31E+01
2.23E+01
2.16E+01
2.09E+01
2.01E+01
1.94E+01
1.86E+01
1.79E+01
1.71E+01
1.64E+01
1.57E+01
1.49E+01
1.42E+01
1.34E+01
1.27E+01
1.19E+01
1.12E+01
1.05E+01
9.72E+00
8.98E+00
8.24E+00
7.50E+00
6.76E+00
6.01E+00
5.27E+00
4.53E+00
3.79E+00
3.05E+00
2.31E+00
1.56E+00
8.22E-01
8.00E-02
420000
425000
4610000
4605000
4600000


Operation Phase PM10 Model Dispersion Map
İşletme Dönemine Ait PM10 Model Dağılımı Haritası
LEGEND / LEJANT
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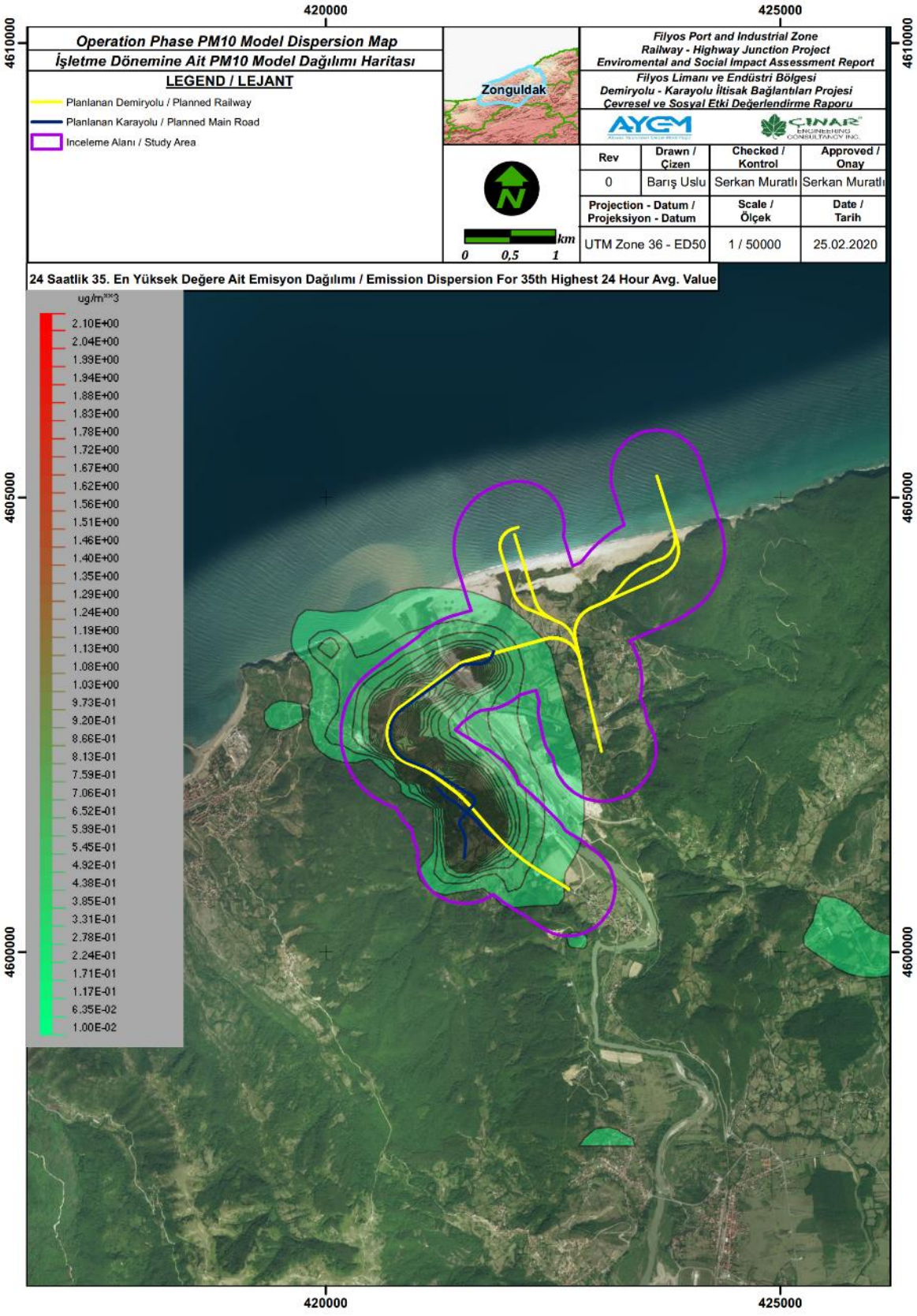
Rev
Drawn / Çizen
Checked / Kontrol
Approved / Onay
0
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
km
0 0,5 1
Yıllık PM10 Parametreleri / Annual PM10 Parameters
ug/m^3
1.24E+00
1.21E+00
1.18E+00
1.15E+00
1.12E+00
1.08E+00
1.05E+00
1.02E+00
9.91E-01
9.60E-01
9.29E-01
8.98E-01
8.67E-01
8.36E-01
8.05E-01
7.74E-01
7.43E-01
7.12E-01
6.81E-01
6.50E-01
6.19E-01
5.88E-01
5.57E-01
5.26E-01
4.95E-01
4.64E-01
4.33E-01
4.02E-01
3.71E-01
3.40E-01
3.09E-01
2.78E-01
2.47E-01
2.16E-01
1.85E-01
1.54E-01
1.23E-01
9.20E-02
6.10E-02
3.00E-02
420000
425000
4610000
4605000
4600000


Operation Phase PM10 Model Dispersion Map
İşletme Dönemine Ait PM10 Model Dağılımı Haritası
LEGEND / LEJANT
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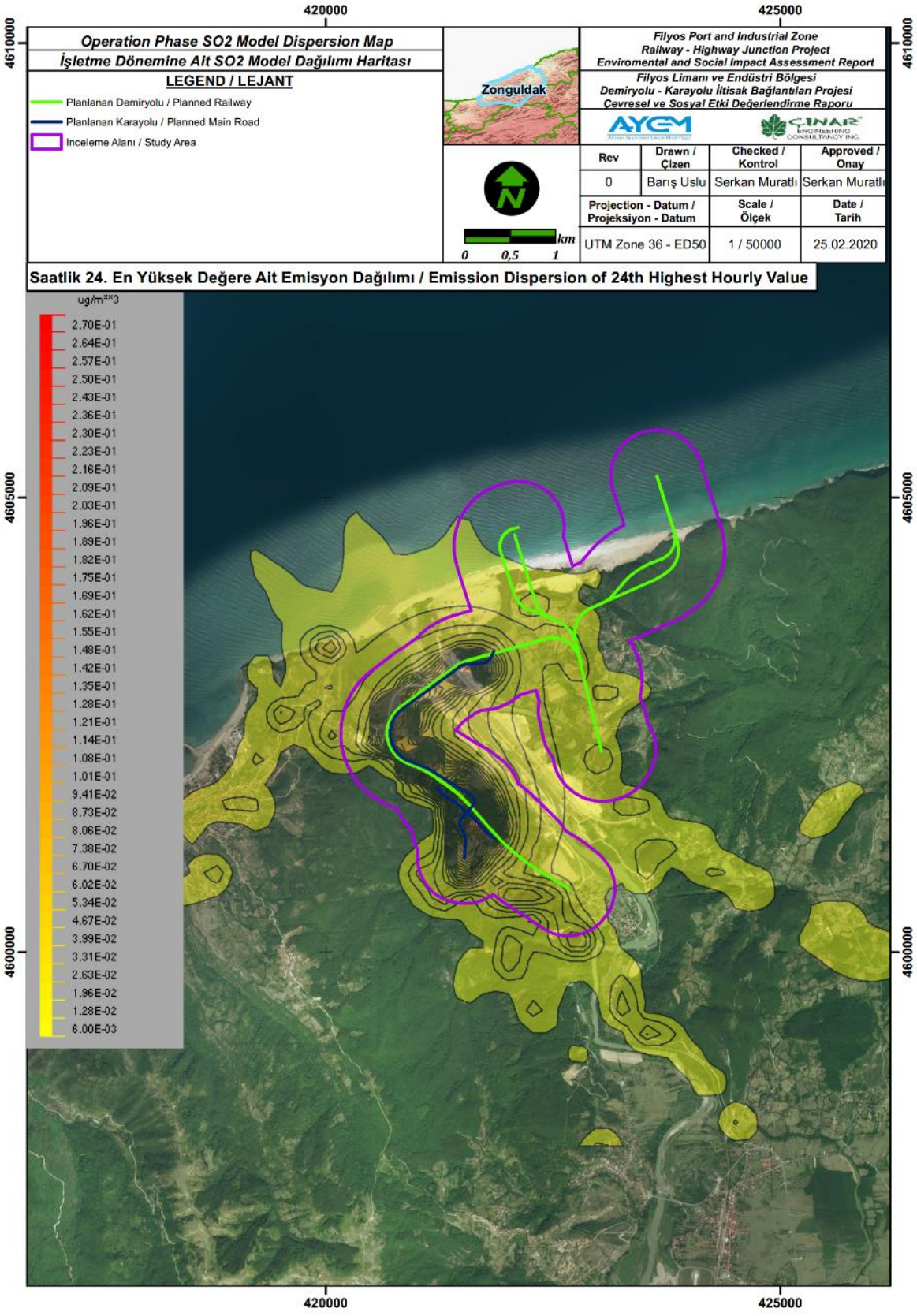
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
N
km
0 0,5 1
24 Saatlik 35. En Yüksek Değere Ait Emisyon Dağılımı / Emission Dispersion For 35th Highest 24 Hour Avg. Value
ug/m**3
2.10E+00
2.04E+00
1.99E+00
1.94E+00
1.88E+00
1.83E+00
1.78E+00
1.72E+00
1.67E+00
1.62E+00
1.56E+00
1.51E+00
1.46E+00
1.40E+00
1.35E+00
1.29E+00
1.24E+00
1.19E+00
1.13E+00
1.08E+00
1.03E+00
9.73E-01
9.20E-01
8.66E-01
8.13E-01
7.59E-01
7.06E-01
6.52E-01
5.99E-01
5.45E-01
4.92E-01
4.38E-01
3.85E-01
3.31E-01
2.78E-01
2.24E-01
1.71E-01
1.17E-01
6.35E-02
1.00E-02
420000
425000
4610000
4605000
4600000


420000
425000
4610000
4605000
4600000
Operation Phase SO2 Model Dispersion Map
İşletme Dönemine Ait SO2 Model Dağılımı Haritası
LEGEND / LEJANT
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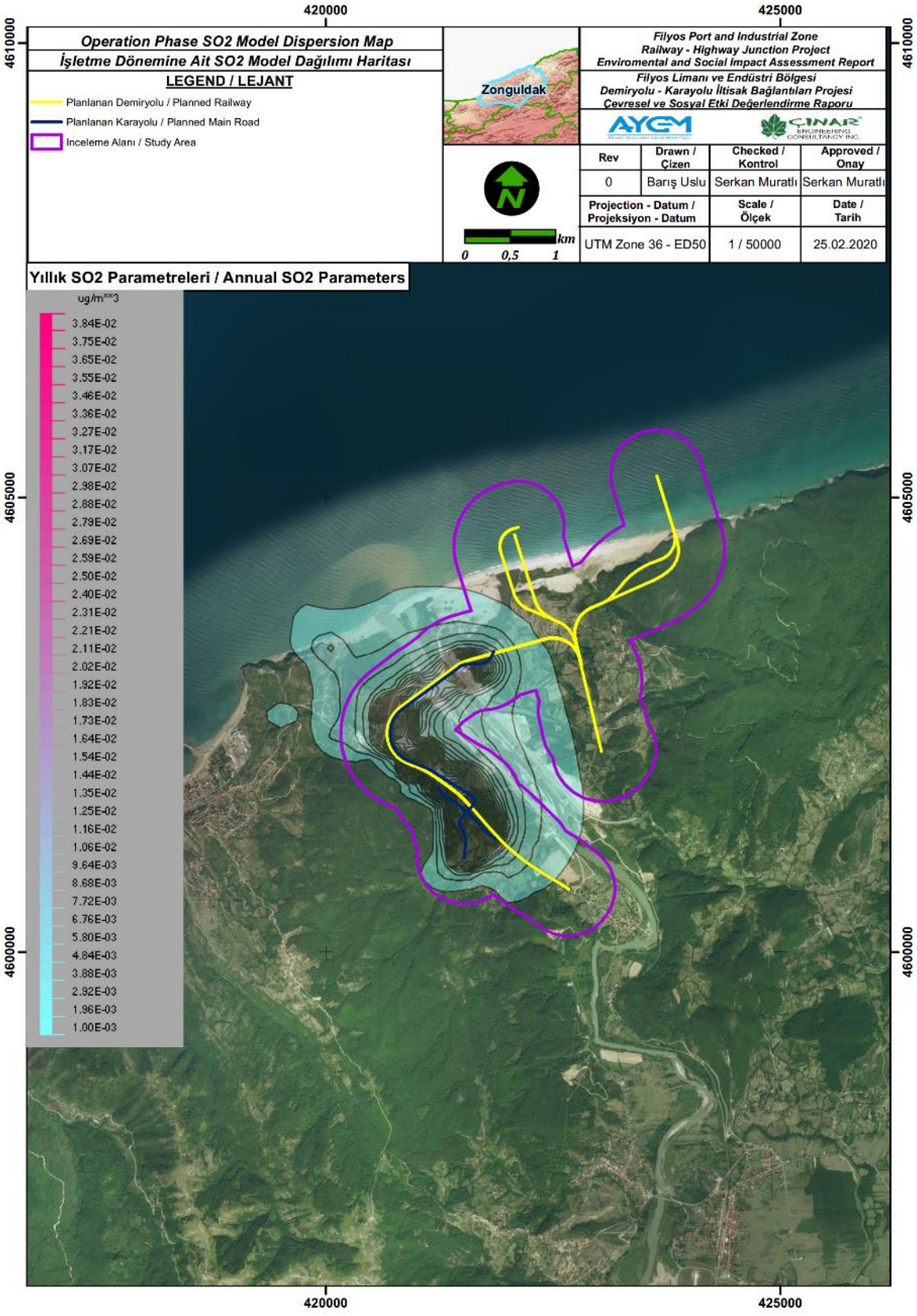
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
N
km
0 0,5 1
Saatlik 24. En Yüksek Değere Ait Emisyon Dağılımı / Emission Dispersion of 24th Highest Hourly Value
ug/m**3
2.70E-01
2.64E-01
2.57E-01
2.50E-01
2.43E-01
2.36E-01
2.30E-01
2.23E-01
2.16E-01
2.09E-01
2.03E-01
1.96E-01
1.89E-01
1.82E-01
1.75E-01
1.69E-01
1.62E-01
1.55E-01
1.48E-01
1.42E-01
1.35E-01
1.28E-01
1.21E-01
1.14E-01
1.08E-01
1.01E-01
9.41E-02
8.73E-02
8.06E-02
7.38E-02
6.70E-02
6.02E-02
5.34E-02
4.67E-02
3.99E-02
3.31E-02
2.63E-02
1.96E-02
1.28E-02
6.00E-03


Operation Phase SO2 Model Dispersion Map
İşletme Dönemine Ait SO2 Model Dağılımı Haritası
LEGEND / LEJANT
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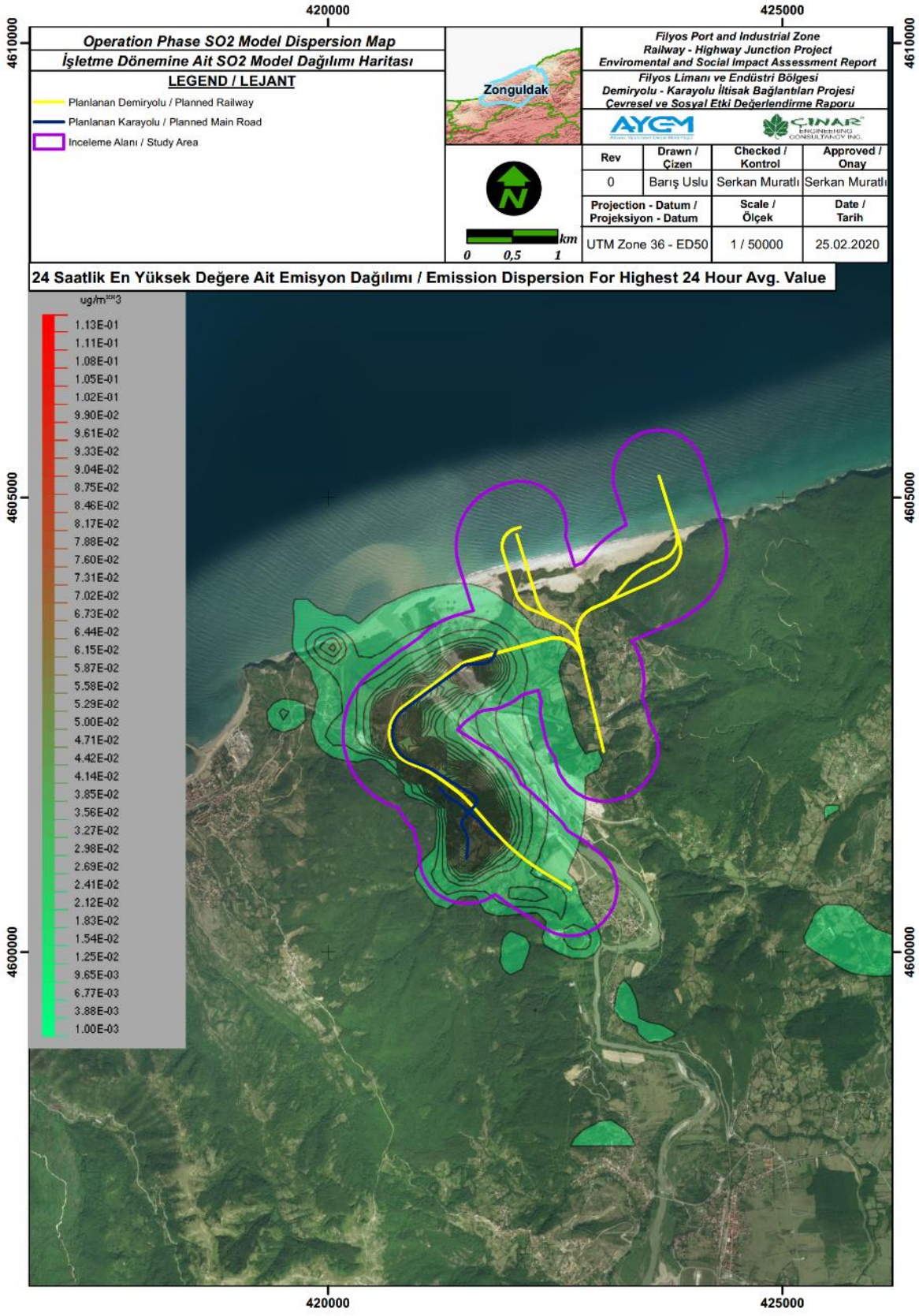
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
km
0 0,5 1
Yıllık SO2 Parametreleri / Annual SO2 Parameters
ug/m**3
3.84E-02
3.75E-02
3.65E-02
3.55E-02
3.46E-02
3.36E-02
3.27E-02
3.17E-02
3.07E-02
2.98E-02
2.88E-02
2.79E-02
2.69E-02
2.59E-02
2.50E-02
2.40E-02
2.31E-02
2.21E-02
2.11E-02
2.02E-02
1.92E-02
1.83E-02
1.73E-02
1.64E-02
1.54E-02
1.44E-02
1.35E-02
1.25E-02
1.16E-02
1.06E-02
9.64E-03
8.68E-03
7.72E-03
6.76E-03
5.80E-03
4.84E-03
3.88E-03
2.92E-03
1.96E-03
1.00E-03
420000
425000
4610000
4605000
4600000


420000
425000
4610000
4605000
4600000
Operation Phase SO2 Model Dispersion Map
İşletme Dönemine Ait SO2 Model Dağılımı Haritası
LEGEND / LEJANT
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Demiryolu - Karayolu İltisak Bağlantıları Projesi
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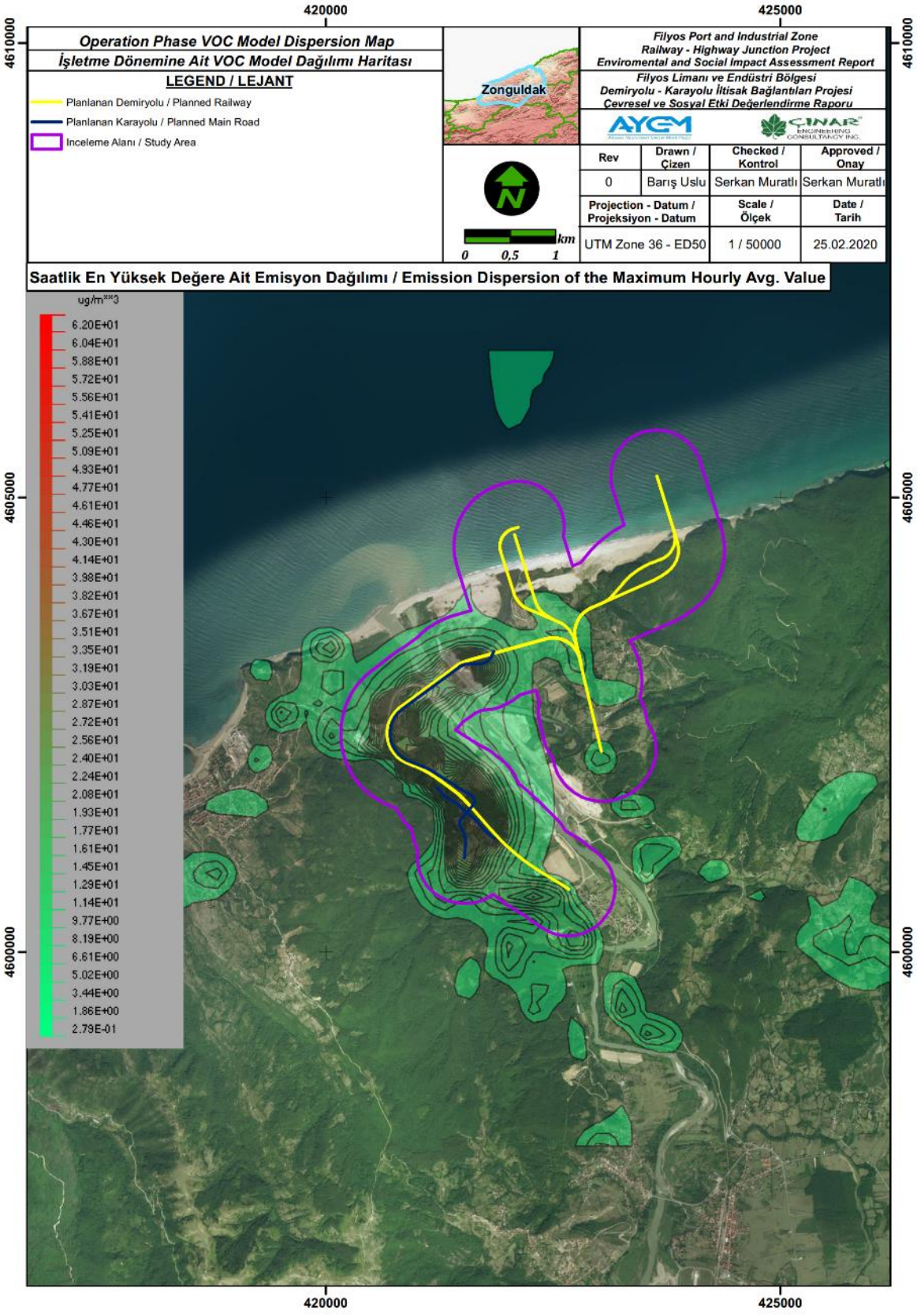
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
km
0 0,5 1
24 Saatlik En Yüksek Değere Ait Emisyon Dağılımı / Emission Dispersion For Highest 24 Hour Avg. Value
ug/m^3
1.13E-01
1.11E-01
1.08E-01
1.05E-01
1.02E-01
9.90E-02
9.61E-02
9.33E-02
9.04E-02
8.75E-02
8.46E-02
8.17E-02
7.88E-02
7.60E-02
7.31E-02
7.02E-02
6.73E-02
6.44E-02
6.15E-02
5.87E-02
5.58E-02
5.29E-02
5.00E-02
4.71E-02
4.42E-02
4.14E-02
3.85E-02
3.56E-02
3.27E-02
2.98E-02
2.69E-02
2.41E-02
2.12E-02
1.83E-02
1.54E-02
1.25E-02
9.65E-03
6.77E-03
3.88E-03
1.00E-03


420000
425000
4610000
4605000
4600000
Operation Phase VOC Model Dispersion Map
İşletme Dönemine Ait VOC Model Dağılımı Haritası
LEGEND / LEJANT
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Planlanan Karayolu / Planned Main Road
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Rev
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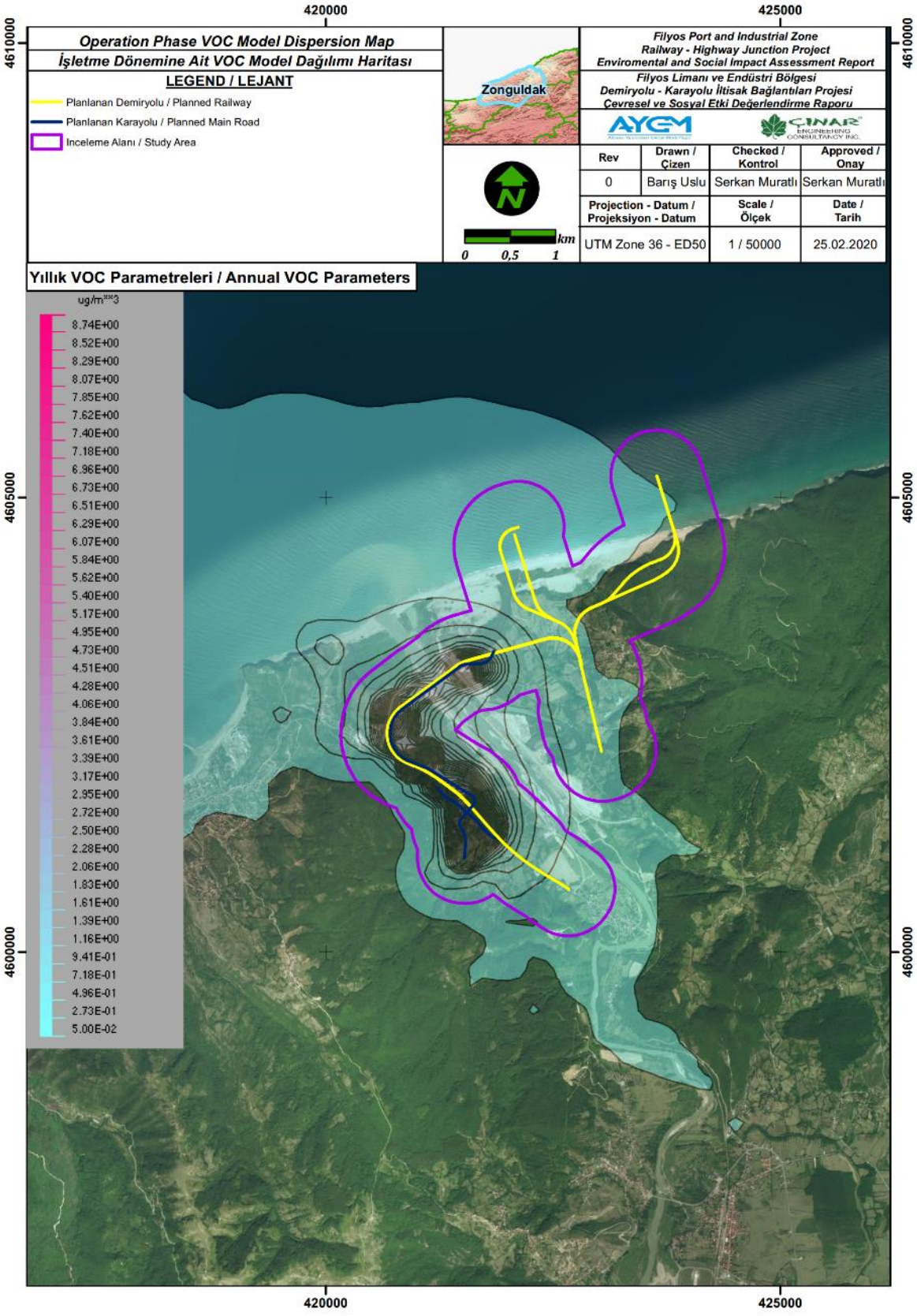
Checked / Kontrol
Approved / Onay
0
Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
N
km
0 0,5 1
Saatlik En Yüksek Değere Ait Emisyon Dağılımı / Emission Dispersion of the Maximum Hourly Avg. Value
ug/m**3
6.20E+01
6.04E+01
5.88E+01
5.72E+01
5.56E+01
5.41E+01
5.25E+01
5.09E+01
4.93E+01
4.77E+01
4.61E+01
4.46E+01
4.30E+01
4.14E+01
3.98E+01
3.82E+01
3.67E+01
3.51E+01
3.35E+01
3.19E+01
3.03E+01
2.87E+01
2.72E+01
2.56E+01
2.40E+01
2.24E+01
2.08E+01
1.93E+01
1.77E+01
1.61E+01
1.45E+01
1.29E+01
1.14E+01
9.77E+00
8.19E+00
6.61E+00
5.02E+00
3.44E+00
1.86E+00
2.79E-01


Operation Phase VOC Model Dispersion Map
İşletme Dönemine Ait VOC Model Dağılımı Haritası
LEGEND / LEJANT
Planlanan Demiryolu / Planned Railway
Planlanan Karayolu / Planned Main Road
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Barış Uslu
Serkan Muratlı
Serkan Muratlı
Projection - Datum / Projeksiyon - Datum
Scale / Ölçek
Date / Tarih
UTM Zone 36 - ED50
1 / 50000
25.02.2020
N
km
0 0,5 1
Yıllık VOC Parametreleri / Annual VOC Parameters
ug/m^3
8.74E+00
8.52E+00
8.29E+00
8.07E+00
7.85E+00
7.62E+00
7.40E+00
7.18E+00
6.96E+00
6.73E+00
6.51E+00
6.29E+00
6.07E+00
5.84E+00
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5.17E+00
4.95E+00
4.73E+00
4.51E+00
4.28E+00
4.06E+00
3.84E+00
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9.41E-01
7.18E-01
4.96E-01
2.73E-01
5.00E-02
420000
425000
4610000
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4600000