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ENGINEERING
CONSULTANCY INC.

CUKUROVA REGION AND ISKENDERUN BAY RAILWAY CONNECTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Prepared According to the World Bank Environmental and Social Standards

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Project Location	**Adana Province, Yumurtalık District, Osmaniye Province, Toprakkale District, Hatay Province Erzin District**
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ABBREVIATIONS & ACRONYMS

ANFO	Ammonium nitrate / fuel oi
AoI	Area of Influence
GDII	General Directorate of Infrastructure Investments
BMP	Biodiversity Management Plan
CBD	Convention on Biological Diversity
CCTV	Closed-Circuit Security Cameras and Monitoring Systems
CIA	Cumulative Impact Assessment
CINAR	CINAR Engineering and Consulting Inc.
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLRTAP	Convention on Long Range Transboundary Air Pollution
DAF	Eastern Anatolian Fault
DIFZ	Düziçi - İskenderun Fault Zone
DSI	State Hydraulic Works
EHS	Environmental Health and Safety
EIA	Environmental Impact Asseessment
EOO	Extent of occurrence
ESCP	Environmental and Social Committment Plan
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Asseessment
ESMP	Environmental and Social Management Plan
ESR	Ecosystem Services Review
ESS	Environmental and Social Standard
EU	European Union
EUNIS	European Nature Information System
FAO	UN Food and Agriculture Organization

FIs	Financial Intermediaries
GEF	Global Environment Fund
GHG	Greenhouse gas
GIIP	Good International Industry Practices
GIS	Geographical Information Systems
GISD	Invasive Species Database
GISP	Global Invasive Species Programme
GLC	Ground level concentration
GRIIS	Global Register of Introduced and Invasive Species
HHA	Household surveys
HKDYY	Regulation on Air Quality Assessment and Management
IAS	Invasive Alien Species
IBA	Important Bird and Biodiversity Area
IPA	Important Plant Area
IPF	Investment Project Financing
IUCN	International Union for Conservation of Nature
Jemirko	Turkish Association for Geological Heritage Protection
KBA	Key Biodiversity Area
KGM	General Directorate og Highways
Km	Kilometer
KP	Kilometer point
RAP	Resettlement Action Plan
LMP	Labor Management Plan
LTV	Long Term Value
MA	Millennium Ecosystem Assessment
MGM	General Directorate of Meteorology

MoEU	Ministry of Environment and Urbanization
MTA	General Directorate of Mineral Research and Exploration
NGO	Non-governmental Organization
O.G.	Official Gazette
OGT	Focus Group Meetings
OHS	Occupational Health and Safety
OIZ	Organized Industrial Zone
PIF	Project Introduction File
PS	IFC Performance Standards
PTC	Positive Train Control
RAMEN	Regulation on Management of Environmental Noise
RCIAP	Regulation on the Control of Industrial Air Pollution
RLE	Red List of Ecosystems
RWIHC	Regulation on Waters Intended for Human Consumption
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment
SPA	Special Protection Area
SSC	IUCN Species Survival Commission
SSK	Social Security Insurance
STV	Short Term Value
SWQR	Surface Water Quality Regulation
SYDV	Social Assistance and Support Foundation
TAYSEB	Toros Adana Yumurtalık Free Zone
TÜİK	Tuskish Statistical Institute
the Project	Çukurova Region and İskenderun Bay Railway Connection Sub-Project
VESC	Valued Environmental and Social Component

WHO	World Health Organization
WPCR	Turkish Water Pollution Control Regulation
WRI	World Resources Institute

LIST OF ANNEXES

EXECUTIVE SUMMARY

Improving Rail Connectivity in Turkey Project, which is planned to be financed by the World Bank, in line with the aims of 11th Development Plan, aims to increase the freight modal share of railways in Turkey through last-mile connectivity improvements and strengthening of institutional capacity. Within the scope of the 1st Component of the Improving Rail Connectivity in Turkey Project, which consists of 3 components, it is planned to construct a railway connection line to the industrial facilities in Çukurova Region and İskenderun Bay - Yumurtalik Free Zone industrial centers and ports. The main purpose of the Çukurova Region and İskenderun Bay Railway Connection Sub-Project (the Project) is to make the transportation of raw materials and products economical by making infrastructure connection between the industrial areas. The railway connection line will connect the existing Osmaniye OIZ, Ceyhan OIZ and Ceyhan Energy Specific OIZ planned in the Yumurtalık Free Zone to the existing Toprakkale - Iskenderun railway line at the existing Erzin Station, which is planned to be extended.

The General Directorate of Infrastructure Investments (GDII) affiliated to the Ministry of Transport and Infrastructure is responsible for the implementation of the Railway Connections Improvement Project planned to be financed by the World Bank.

Çukurova Region and İskenderun Bay Railway Connection Project is located within the boundaries of Yumurtalık District in Adana Province, Toprakkale District of Osmaniye Province and Erzin Disrtict of Hatay Province in south of Turkey. There are 4 lines within the scope of the project. These are:

1. **Connection Line:** The planned line starts from the existing Erzin Station (Km: 0+000), continues parallel to the Toprakkale-Iskenderun Railway Line about 1,900 m to the South, and leaving to continue to the West. Between Km: 7+000 and Km: 8+000, it passes through west of Yukarıburnaz and arrives to Toros Adana Yumurtalık Free Zone (TAYSEB).
2. **OIZ-Port Line:** It is the line that will provide the connection between Osmaniye Organized Industrial Zone (OIZ) and the new port located in the Yukarıburnaz Neighborhood. In this context, the line will be located in the borders of Osmaniye and Hatay Provinces. The line starting from Osmaniye OIZ and proceeding in the south-southwest direction, starting from Km: 5+600, reaches to the port, which has not came into service, by continuing parallel to the OIZ-Port Connection Highway.
3. **Other Connection Lines:** There will be two connection lines in this scope. These lines are the 2 connection lines planned to be established in order to provide the connection between the above mentioned 1st Line and 2nd Line, OIZ-Port Connection Line, through Station-1.

The total length of all lines to be built in this project is approximately 36 km.

Çukurova Region and İskenderun Bay Railway Connection Project was evaluated to be exempt from Environmental Impact Assessment Regulation, which was published in the Official Gazette dated 25.11.2014 No. 29186 as all the lines are junction and/or connection lines.

As of October 1, 2018, the Environmental and Social Framework (ESF) applies to all new World Bank investment project financing. The Environmental and Social Framework (ESF) enables the World Bank and Borrowers to better manage the environmental and social risks of the projects and to improve development outcomes.

According to the Environmental and Social Framework of World Bank, Çukurova Region and İskenderun Bay Railway Connection Project is classified as “Substantial” in terms of risk assessment. Therefore, detailed environmental and social impact assessment and

preparation of environmental and social management plans listed below are required in accordance with the World Bank requirements and relevant laws and requirements in Turkey:

- Environmental and Social Management Plan (ESMP),
- Construction Impacts Management Plan,
- Community Health and Safety Management Plan,
- Community Relations Management Plan,
- Employment and Training Plan,
- Aggregate Management Plan,
- Traffic (Transportation) Management Plan,
- Cultural Heritage Management Plan,
- Pollution Prevention Plan,
- Waste Management Plan,
- Emergency Preparedness and Response Plan,
- Biodiversity Management Plan,
- Occupational Health and Safety Management Plan,
- Management of Change Process Form,
- Stakeholder Engagement Plan (SEP), and
- Resettlement Action Plan (RAP).

A contract was signed between GDII and CINAR Engineering and Consulting Inc. (CINAR) in December 2019, for preparation of an Environmental and Social Impact Assessment Report together with ESMP and sub-management plans listed above of the Project according to the World Bank standards.

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.

Aşağıburnaz, Yukarıburnaz, Turunçlu and Yeşilkent Neighbourhoods in Erzin District of Hatay Province, Sarımazı Neighbourhood in Ceyhan District of Adana Province, Yumurtalık District in Adana Province and Toprakkale District in Osmaniye Province were visited during the site reconnaissance.

The Project will have a construction area of approximately 127.4 hectares. According to the data of the Ministry of Agriculture and Forestry, there are shrubs, pasture areas, fallow dry agricultural areas, irrigated agricultural areas, coastal dunes, insufficient irrigated agricultural areas and abandoned lands on the construction area. 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.

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

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

During the construction phase of the Project, there will be no water use other than the drinking and utility water use of 140-180 Project personnel and moistening water to be used for minimizing uncontrolled dust emissions. Since there is no wastewater (sewage) system in the field of activity and its immediate surroundings, wastewater generated due to the construction activities will be collected in a septic tank that will be impervious, in accordance with "Regulation on Pit Opening Where Sewer System Construction is not Applicable" being published in Official Gazette No.13783 dated 19.03.1971. When the tanks are filled, wastewater will be removed by sewage trucks, and disposal will be provided within the scope of the protocol to be made with the municipality that has a wastewater infrastructure system.

Drinking and utility water will be needed at the stations for the staff and visitors during the operation phase. Any surface water and groundwater resources will not be used during the operation phase. The domestic wastewater to be generated during the operation phase will be collected in septic tanks to be built at the stations and will be transmitted to the nearest wastewater treatment plant with the sewage trucks of the relevant municipality. In addition to the domestic wastewater to be generated during the operation phase, there will be industrial effluents due to rail car maintenance and refurbishment activities.

There are many main irrigation canals, backup channels, tertiary channels, drying channels, drainage channels, and operational maintenance routes in Aşağı Ceyhan Aslantaş 3rd Stage Erzin Dörtyol Irrigation Area operated by the 6th Regional Directorate of the State Hydraulic Works (DSI), where the project routes pass. As stated in the official letter of the 6th Regional Directorate of DSI dated 14.11.2018 and numbered 38292074-611.99-782653, Delihalil basalts on the Project routes were declared as "Burnaz Spring Group Groundwater Reserve and Protection Area" published in the Official Gazette dated 03.06.2011 and numbered 27953. During the land preparation and construction phases as well as the operation phase, the significance of the impact on the irrigation area is moderate. As long as all works related to the Project routes which pass through the irrigation area, including the engineering structures, are carried out within the knowledge of DSI, the Design and Supervision Consultant have the water crossing structure projects approved by DSI, and all construction works for the water crossing structure projects approved by DSI are carried out within the knowledge and under the supervision of the 63rd Branch Directorate of DSI in Hatay, the 64th Branch Directorate of DSI in Osmaniye and ACO (Ceyhan) Branch Directorate of DSI, the significance of the residual impact will be minor. On the other hand, during the land preparation and construction phases as well as the operation phase, the significance of the impact on the groundwater resources is assessed to be major and according to the declared provisions of the "Burnaz Spring Group Groundwater Reserve and Protection Area", the sections of the Project routes that fall within the strict protection area and 1st degree protection area and the section that overlaps with "Yumurtalik Drinking Water Well" of Adana Water and Sewerage Authority (ASKİ) should be revised in line with the official opinion of the 6th Regional Directorate of DSI.

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 operation phase, procurement of materials would be required for the maintenance and repair works to be conducted on the railway and associated structures.

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

The Biodiversity Study Area defined for the Project is about 3,300 hectares. About 1,300 hectares of this area consists of natural habitats. Plantation areas and citrus fruit gardens cover a total of 780 hectares. Natural habitats on the Project route, which will be directly affected, correspond to 52 hectares, which is about 4% of the natural habitat extent along the Project route. "F6.2: Eastern garrigues" habitat has the largest extent within the Biodiversity Study Area, covering about 1,140 hectares. It is estimated that 4.4% of the habitat will be directly affected by the Project activities. The Project-related impacts on the most sensitive habitat after the grey dunes and dune heaths; the water-dependent 1C1.2: Permanent mesotrophic lakes, ponds and pools" will also be avoided.

The mitigation measures defined in this ESIA study for the potential impacts on biodiversity receptors will be further developed based on the 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, it has been determined that there are 3 registered areas and 3 unregistered archaeological / potential archaeological sites. Issus Ancient Waterway and Ancient City of Issus belonging to Roman Period, which are registered and taken under protection by the law numbered 2863 are located within the boundaries of the Project. Issus Ancient Waterway will be negatively affected from the construction activities of the Project in 4 different locations. For this reason, the OIZ-Port Line route should be revised in a way that it will not damage the ancient waterway. If such a revision is not possible, the route should be replanned with viaducts in the sections where the route cuts the ancient waterway in order to avoid destruction of the ancient structure. From the design phase of the Project, for any kind of Project planning, Project revision and similar applications to be made in and around the ancient waterway, the Hatay Cultural Heritage Conservation Regional Board should be consulted, and the decisions to be taken by the Conservation Board should be followed at all stages of the Project as dictated by Law No. 2863.

The other registered site that is affected by the Project activities is the Ancient City of Issus. 0 + 000 - 0 + 470 kilometer points of the connection line pass through the borders of the Ancient City. This part also includes the existing Erzin Station (Station Building-Logistics Directorate building), which is a registered cultural asset. For this reason, in this part of the Project, it is recommended that the Project be revised to remain outside the boundaries of the ancient city of Issus. If it is not possible to avoid the site, in all phases of the Project

such as Project design and Project revision around the Ancient City of Issus and Erzin Station, the Hatay Cultural Heritage Conservation Regional Board should be consulted, and the decisions to be taken by the Conservation Board should be followed at all stages of the Project as dictated by Law No. 2863. In addition, the vibration and sound waves that would result from the construction and operational activities may damage other remains, especially the aqueducts of the Ancient City of Issus over time. Considering this risk, it is recommended to design "sound barriers" in the section mentioned during the design phase of the Project in a way not to disturb the visual landscape, and to incorporate these sound barriers into the railway project, and to construct the railway by designing the material that will prevent vibration as much as possible.

Both positive and negative socio-economic impacts were identified within the scope of 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 have also been identified. Mitigation measures were specified for each impact in order to minimize and/or mitigate these impacts.

The significance of the impact on livelihoods due to land acquisition is not assessed as major. However, the affected lands are fertile and inadequacy of land assets may increase the magnitude of the impact. Assets such as trees and irrigation systems in the lands are also affected by the Project. Also, physical displacement of two businesses including Süper Enerji Coal Depot and Processing Plant Inc. and Toros Tarım Sanayi and Ticaret Inc. is also considered as a significant impact of the Project. Süper Enerji Coal Depot and Processing Plant Inc. which operates across Yumurtalik Free Zone, will be displaced since it is located on the land where a train station will be built in the scope of the Project. The screening and packaging processes are carried out in the facility to make the coal coming from overseas market ready for use in Turkey. Toros Tarım Sanayi and Ticaret Inc. operates as a major fertilizer producer in Turkey. The affected parking area, which is located on the land where a train station will be built within the scope of the project, is used not only for the activities of this company, but also for the transportation activities required by all industrial enterprises in Yumurtalik Free Zone.

Access to land and pastures in Yukarıburnaz village will be prevented. To ensure that this prevention will not cause any loss of income, necessary support should be provided during the construction phase, and access opportunities should be developed if possible to traditional roads during the operation phase. The RAP prepared includes details impacts to land and livelihood assests and mitigation measures are proposed.

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 feedbacks received from the stakeholders during the disclosure process are presented in detail in the SEP and RAP documents, with reference to the relevant sections of the RAP and ESIA documents. The RAP and ESIA field studies have shown that the public views on the Project are mostly positive.

1. INTRODUCTION

Building on the findings and results of the Bank-funded Technical Assistance on Last Mile Connectivity/Options to Improve Freight Rail Logistics in Turkey (P165757), Improving Rail Connectivity in Turkey aims to increase the freight modal share of railways in Turkey through last-mile connectivity improvements and strengthening of institutional capacity.

The project is developed around three main categories:

- Component I – Works is expected to include two main branching lines, Çukurova Region & Iskenderun Bay railway connection & Filyos Port/Industrial Zone connections, as well as two or three more projects to be selected from the list of 10 potential LMCs.
- Component II – Design & Consultancy is expected to include the survey, design & feasibility studies for the 10 potential LMCs identified by the Ministry as well as supervision of the construction works under Component I.
- Component III – Institutional Capacity Development is expected to include operating costs of the Project Implementation Unit as well as development costs of sectoral reforms and institutional capacity.

Within the scope of the 1st Component of the Project for Improving Railway Connections, it is planned to construct a railway connection line to the industrial facilities in Cukurova Region and İskenderun Bay - Yumurtalik Free Zone industrial centers and ports. The main purpose of the Çukurova Region and İskenderun Bay Railway Connection Sub-Project (the Project) is to make the transportation of raw materials and products economical by making infrastructure connection (such as OIZ - Port connection, OIZ - Main line connection) between the industrial areas. The railway connection line will connect the existing Osmaniye OIZ, Ceyhan OIZ and Ceyhan Energy Specific OIZ planned in the Yumurtalık Free Zone to the existing Toprakkale - Iskenderun railway line at the existing Erzin Station, which is planned to be extended.

General Directorate of Infrastructure Investments affiliated to the Ministry of Transport and Infrastructure is the party responsible for the execution and operation, also, the beneficiary of the financing of the Project for Improving Railway Connections, which is planned to be funded by the World Bank.

In the context of the 1st Component, survey-project, feasibility and EIA studies for the construction of railway connection line to the industrial facilities in the Çukurova Region and İskenderun Bay-Yumurtalık Free Zone industrial centers and ports (the Project) have been started in 25.04.2018 and completed the accepted. The tender documents for the 36 km railway connection line construction work are in progress and the tender for the construction work is predicted to take place in the third quarter of 2020 by GDII.

As of October 1, 2018, the Environmental and Social Framework (ESF) applies to all new World Bank investment project financing. The Environmental and Social Framework (ESF) enables the World Bank and Borrowers to better manage environmental and social risks of projects and to improve development outcomes.

According to Environmental and Social Framework of World Bank, Çukurova Region and İskenderun Bay Railway Connections Project is classified as “Substantial” in terms of risk assessment. Therefore, detailed environmental and social impact assessment and preparation of environmental and social management plans listed below are required in accordance with the World Bank requirements and relevant laws and requirements in Turkey:

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- Biodiversity Management Plan,
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- Stakeholder Engagement Plan (SEP), and
- Resettlement Action Plan (RAP).

A contract was signed between GDII and CINAR Engineering and Consulting Inc. (CINAR) in December 2019, for the preparation of the Environmental and Social Impact Assessment Report together with ESMP and sub-management plans listed above of the Project according to the World Bank standards.

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

Aşağıburnaz, Yukarıburnaz, Turunçlu and Yeşilkent Neighborhoods in Hatay province, Erzin District, Kurtpınar and Sarımazı Neighborhoods in Adana Province Ceyhan District, Yumurtalık District in Adana Province and Toprakkale District in Osmaniye Province was visited during site reconnaissance. It was observed during the reconnaissance site visit that no land preparation and construction work has been started.

1.1. Project Background

11th Development Plan (2019-2023) prepared by the Republic of Turkey Presidential Directorate of Strategy and Budget emphasizes that railways should be focused among Turkey's transportation investments. (Türkiye Cumhuriyeti Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı, 2019).

On the scope of the First Development Plan, Turkey's competitive manufacturing horizontal policy areas intersecting the selected priority manufacturing industry to provide efficient recovery strengthening the structure of the accelerator, ecosystem healing and sustainability provider policies are grouped under three topics, namely. By strengthening the logistics and energy infrastructure under the horizontal policy areas that improve ecosystem, access to the business environment in an on-time and cost-impactive manner will be increased. Focusing on freight transportation in railway investments and expanding inter-modal transportation are among the main objectives of strengthening the logistics and energy infrastructure. In this context, the following policies and measures are included in the Eleventh Development Plan:

- To serve major freight centers including petro-chemical plants, manufacturing facilities for the automotive industry and ports, OIZ and mineral sites, ensuring the dissemination of inter-mode transportation and increasing the competitiveness of the industry The share of the railway in freight transportation will be increased, the share

of the railway in freight transportation will be increased from 5.15 percent to 10 percent.

- Investments in railway freight transportation will be increased in order to strengthen the logistics infrastructure needed by the industry. In this regard, a total of 294 km long relation lines will be built for 38 OSB, private industrial zone, port and free zone and 36 production facilities.
- The standards of existing and on-construction logistics centers, especially in Çukurova, Western Black Sea and Marmara regions, will be raised in order to take priority sectors to the list, while the new load and logistics centers have high demand for cargo railway corridors. (Türkiye Cumhuriyeti Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı, 2019).

The following table summarizes Turkey's logistics objectives:

Table 1-1 Logistic Objectives of Turkey

Objective	2018	2023
Turkey's Ranking in the Logistics performance Index	47	25
Share of Railways in Total Freight Transport (Land Transport, %)	5.15	10
Railway line Efficiency (Passenger-Km + Ton-Km)/ (Main Line Length)	1.48	2.77
Cargo Amount Carried by Rail (Billion, Net Ton-Km)	14.5	32.4
Electrified Line Percentage (%)	43	77
Signalled Line Percentage (%)	45	77
Connection Line Length (km, Cumulative)	433	727
Total Container Handling (Million TEU)	10.8	13.5
Transit Load Rate in Sea Freight Handling (%)	15.5	17.3
Turkish Commercial Fleet with 1000 GRT and Above Turkish Ownership (Million DWT)	28.6	36.0
International Airline Total Cargo Traffic (Thousand Tons)	1355	1529

Source: (Türkiye Cumhuriyeti Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı, 2019)

As it is targeted with the 11th Development Plan, Improvement of Railway Connections Plan, aims to increase the share of railways in freight transport through improvements in last kilometer connections and strengthening institutional capacity.

1.2. Project Location

Cukurova Region and İskenderun Bay Railway Connection Project is located within the boundaries of Yumurtalık District in Adana Province, Toprakkale District of Osmaniye Province and Erzin Disrtict of Hatay Province, in the South of Turkey. There are 4 lines within the scope of the project. These are:

1. **Connection Line:** The planned line starts from existing Erzin Station (Km: 0+000), continues parallel to the Toprakkale-Iskenderun Railway Line about 1,900 m to the South, and leaving to continue to the West. Between Km: 7+000 and Km: 8+000, it passes through west of Yukarıburnaz and arrives to Toros Adana Yumurtalık Free Zone (TAYSEB). This line will be located within the borders of Adana-Hatay Provinces. Two station locations are planned in this line. These are:
    - Station-1 between Km: 7+740 and Km: 8+940 in the North of Yukarıburnaz
    - Station-2 between Km: 15+000 and Km: 16+100 (Free Zone)

    The existing Erzin station will be expanded. At this station, the connection between existing Osmaniye OIZ, Yumurtalık Free Zone and planned Ceyhan OIZ and Ceyhan Energy Specific OIZ, and connection between existing Toprakkale-İskenderun railway line will be provided.
2. **OIZ-Port Line:** It is the line that will provide the connection between Osmaniye Organized Industrial Zone (OIZ) and the new port located in the Yukarıburnaz Neighborhood. In this context, the line will be located in the borders of Osmaniye and Hatay Provinces. The line starting from Osmaniye OIZ and proceeding in the south-southwest direction, starting from Km: 5+600, reaches to the port, which has not came into service, by continuing parallel to the OIZ-Port Connection Highway. The total length of the line is 14,340 m. Two station locations are planned in this line. These are:
    - Station-3 between Km: 0+000 and Km: 0+900 (OIZ)
    - Station-4 between Km: 13+480 and Km: 14+340 (Port)
3. **Other Connection Lines:** There will be two connection lines in this scope. These lines are the 2 connection lines planned to be established in order to provide the connection between the above mentioned 1st Line and 2nd Line, OIZ-Port Connection Line, through Station-1. Of them:
    - OIZ-Station Connection Line is about 2,315 m,
    - Station-Port Connection Line is about 2,110 m.

The total length of all lines to be built in this project is approximately 36 km. Most of the lines planned in this project are within the boundaries of Hatay Province, a few are located in the boundaries of Adana Province. Only 1.7 km of the line is in Osmaniye Province.

The project's area of influence passes through industrial lands, a coal storage facility, pasture lands, agricultural production areas, fruit orchards, and apiculture area. The closest settlement is Yukarıburnaz approximately 30 m away from the project site.

1.3. Project Owner

General Directorate of Infrastructure Investments (GDII) affiliated to the Ministry of Transport and Infrastructure is responsible for the implementation of the Railway Connections Improvement Project planned to be financed by the World Bank.

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

GDII with detailed, solid organizational structure and institutionalization; has 358 personnel (160 of which are technical staff) and consists of 13 departments which includes Railways Construction Department and Railways Survey Project Department. The Railways Construction Department and The Railways Survey Project Department are the main departments related to the planned Projects in the context of this work. The Railways Construction Department works on the process of tender and construction of projects. The

Railways Survey Project Department is responsible for survey, budget estimate, feasibility studies on technically, economically, and environmentally viable projects.

The Railway Construction Department consists 3 units: Unit of Substructure Construction, Unit of Superstructure Construction and Unit of Tender and Final Account.

The Railway Survey Department consists 3 units: Unit of Substructure Survey, Unit of Superstructure Survey and Unit of Tender and Final Account.

1.4. Environmental and Social Impact Assessment under National Legislation

The Project is evaluated under the Annex-2, Article 32 of the Environmental Impact Assessment Regulation, which was published in the Official Gazette dated 25.11.2014 No. 29186 as:

> e) Railway projects that are not located in the Annex-1 List (except from connection lines)

The Project was evaluated to be exempt from EIA Regulation process by the Ministry of Environment and Urbanization as all the lines are junction and/or connection lines.

1.5. 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, "Railway Connection Line to the Industrial Facilities in Cukurova Region and Iskenderun Bay - Yumurtalik Free Zone Industrial Centers and Ports Feasibility Report" and ""Railway Connection Line to the Industrial Facilities in Cukurova Region and Iskenderun Bay - Yumurtalik Free Zone Industrial Centers and Ports Geologic - Geotechnic Survey Report" were 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 camp sites that will be used during the construction phase of the project, are not determined while ESIA is being prepared. Therefore, camp sites could not be included in the assessments for the construction phase.
- The locations, layouts and technical specifications of associated facilities such as energy transmission lines & substation, quarries and material burrow pits are not determined or finalized yet. Consequently, enery transmission lines & substation, quarries and material burrow pits are not included in the evaluations (e.g. Land Use, Air Quality).
- 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.

2. INSTITUTIONAL AND LEGAL FRAMEWORK

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 Figure2-1.

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 Çukurova Region & Iskenderun Bay Railway Connection 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 Cadastrate
- 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 5th Regional Directorate of the Ministry of Transport and Infrastructure (Adana), Adana, Osmaniye and Hatay Governorates Provincial Directorate of Environment an Urbanization, Provincial Directorates of Agriculture and Forestry, Provincial Directorates of Culture and Tourism, Forestry Regional Directorates, Provincial Special Administrations and DSİ 6th Regional Directorate.

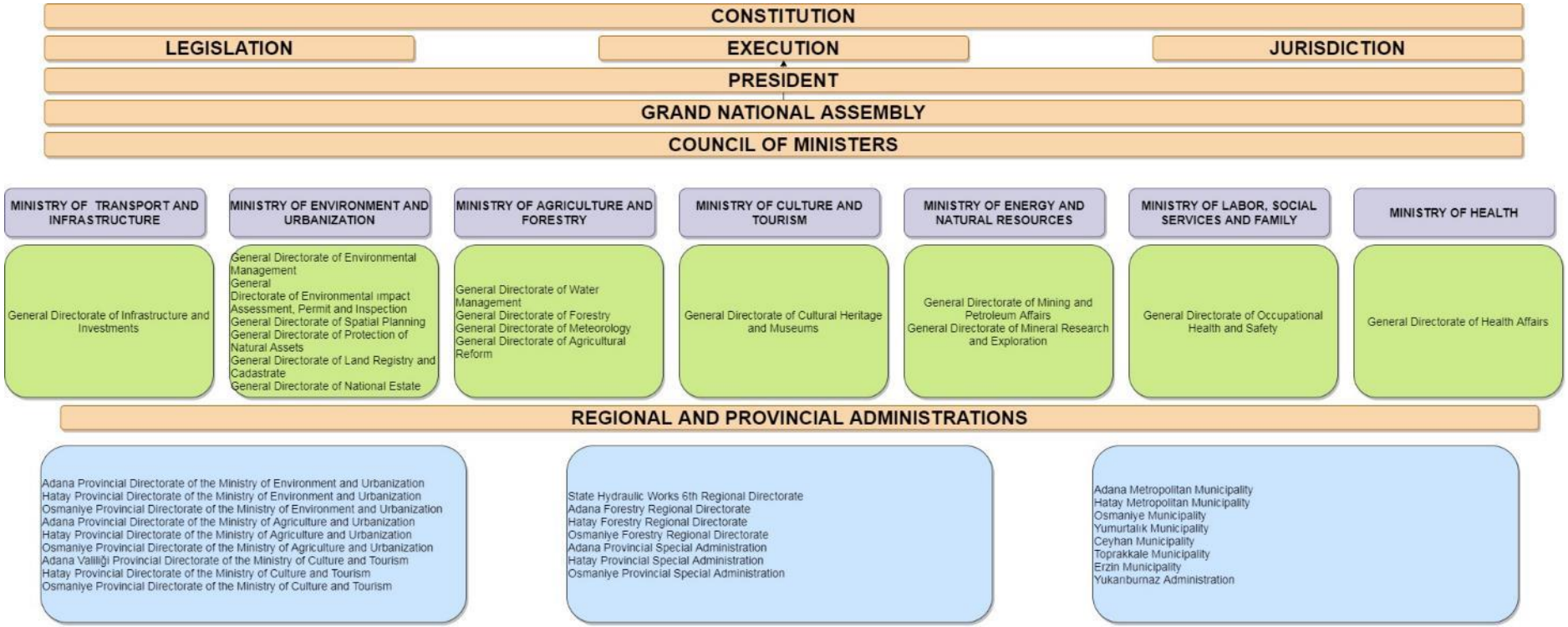

Figure 2-1 Legal Framework Related to the Project

2.1.3. Local Administrations

The Project is located in Adana, Osmaniye and Hatay provinces in southern Turkey. On the designated route, there is Yukarıburnaz settlement of Erzin district of Hatay Province. Adana and Hatay Metropolitan Municipalities and Osmaniye Municipality, related districts, municipalities and village mayors are considered as local authorities related to the project.

2.2. National Legislation

National legislation in relation with environmental management therefore constructing the legal basis for the 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 Electronik 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 Equipments
- 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 (EIA)

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 our country. 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 impacts, determination of possible environmental (direct and indirect) impacts,
- Determination of standards related to environmental impacts and determination of future distribution (investment and operation periods)
- Determination of analysis criteria in terms of quantity and quality,
- Determining and examining the existing transportation system,
- Taking the necessary images both in the project area and the environment in the field with the digital camera,
- 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.

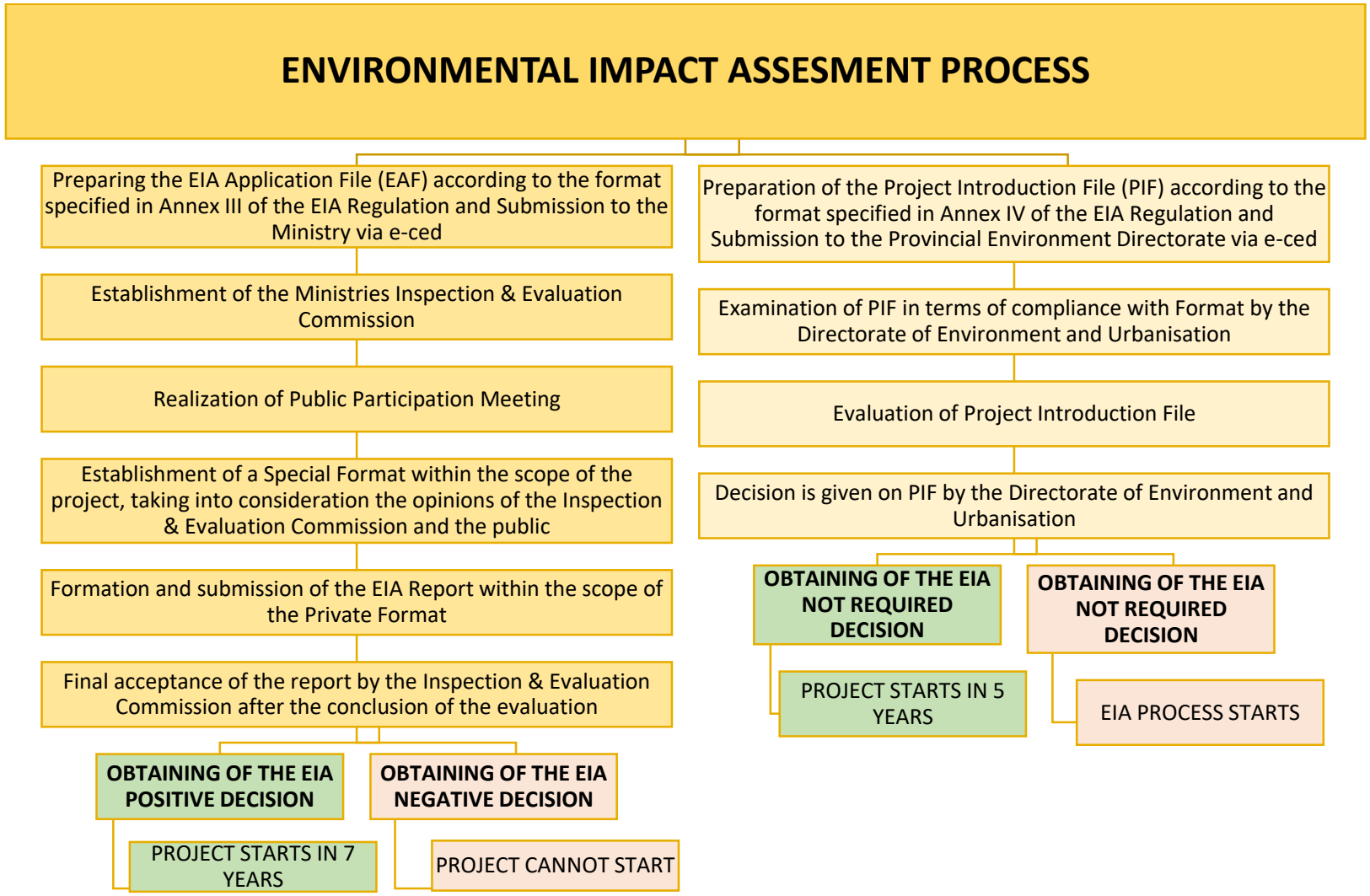

Figure 2-2 EIA Process in Turkey

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 Asseets
- 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 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	Impactive 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 impacts 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 impacts 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 permited 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 route planned within the scope of the Çukurova Region and İskenderun Bay Railway Connections Project will be done in accordance with the applicable laws and regulations as well as with the World Bank's Environmental and Social Standards.

National Legislation Related to Expopriation

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

Prosedures 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

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, labor and worker related 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.

In the upper part of the railway route, a section of Isos Antique City (a culturally protected area according to Turkish Law). Although, the project area of Çukurove railway has no international protection status, there are internationally protected areas close-by as Amanos Mountains, Burnaz Dunes and Sugözü-Akkum.

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
- Aggreements with licenced waste management and disposal facilities

2.3. 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 (Date of Signature: 6.11.1986) (O.G. 23.10.1988, No: 19968)
- The Convention on the Protection of the Black Sea Against Pollution and related Conventions (Bucharest Convention) (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)
- The 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 Biological Diversity (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)

2.4.World Bank Environmental and Social Standards

Activities supported by the World 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 26 states that all relevant environmental and social risks and impacts as the result of the project should be covered in the assessment, including:

1. Environmental Risks and Impacts covering the following issues:
   - The ones defined by Environmental Health and Safety Guidelines (EHSG)
   - Community safety
   - 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.

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.

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.

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

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.

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.

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

This standard is not valid for Çukurova Region and İskenderun Bay Railway Connections 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.

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. Impactive stakeholder engagement contributes to the projects in terms of improvement of environmental and social sustainability, enhancement of project acceptance and successful project design.

2.5. Other Guidelines

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

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

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

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

2.5.2. Canada Environmental Law and Standards

This Act, respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development, is used to compare with the soil quality standards within the scope of this project. Aforementioned soil quality standards were used in the assessment of soil quality and to classify the baseline conditions in terms of soil quality. Relevant information is presented in Chapter 4.1.

2.6. Project Environmental and Social Categorization

World Bank classifies all projects (including projects involving Financial Intermediaries (FIs)) into one of four classifications: High Risk, Substantial Risk, Moderate Risk or Low Risk. In determining the appropriate risk classification, the 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 Bank will disclose the project's classification and the basis for that classification on the Bank's website and in project documents.

As per the World Bank's Concept Environmental and Social Review Summary (2019), the environment and social risks 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 physical and economic displacement for individuals and businesses, (ix) potential impacts on culturally and naturally protected areas.

3. PROJECT DESCRIPTION

3.1. Project Route

Cukurova Region and İskenderun Bay Railway Connection Project is located within the boundaries of Yumurtalık District in Adana Province, Toprakkale District of Osmaniye Province and Erzin Disrtict of Hatay Province, in the South of Turkey. There are 4 lines within the scope of the project. These are:

1. **Connection Line:** The planned line starts from the existing Erzin Station (Km: 0+000), continues parallel to the Toprakkale-Iskenderun Railway Line about 1,900 m to the South, and leaving to continue to the West. Between Km: 7+000 and Km: 8+000, it passes through west of Yukarıburnaz and arrives to Toros Adana Yumurtalık Free Zone (TAYSEB). This line will be located within the borders of Adana-Hatay Provinces. Two new stations are planned on this line. These are:
   - Station-1 between Km: 7+740 and Km: 8+940 in the North of Yukarıburnaz,
   - Station-2 between Km: 15+000 and Km: 16+100 (Toros Adana Yumurtalık Free Zone (TAYSEB)).

   The existing Erzin station will be expanded. At this station, the connection between the existing Osmaniye OIZ, Yumurtalık Free Zone and planned Ceyhan OIZ and Ceyhan Energy Specific OIZ, and connection between existing Toprakkale-İskenderun railway line will be provided.
2. **OIZ-Port Line:** It is the line that will provide the connection between Osmaniye Organized Industrial Zone (OIZ) and the new port located in the Yukarıburnaz. In this context, the line will be located in the borders of Osmaniye and Hatay Provinces. The line starting from Osmaniye OIZ and proceeding in the south-southwest direction, starting from Km: 5+600, reaches to the port, which has not came into service, by continuing parallel to the OIZ-Port Connection Highway. The total length of the line is 14,340 m. Two new stations are planned on this line. These are:
   - Station-3 between Km: 0+000 and Km: 0+900 (OIZ)
   - Station-4 between Km: 13+480 and Km: 14+340 (Port)
3. **Other Connection Lines:** There will be two connection lines in this scope. These lines are the 2 connection lines planned to be established in order to provide the connection between the above mentioned 1st Line and 2nd Line, OIZ-Port Connection Line, through Station-1. Of them:
   - OIZ-Station Connection Line is about 2,315 m,
   - Station-Port Connection Line is about 2,110 m.

The total length of all lines to be built in this project is approximately 36 km. Most of the lines planned in this project are within the boundaries of Hatay Province, a few are located in the boundaries of Adana Province. Only 1.7 km of the line is in Osmaniye Province.

A map presenting the Project route and affected settlements is provided in Figure 3-1 below.

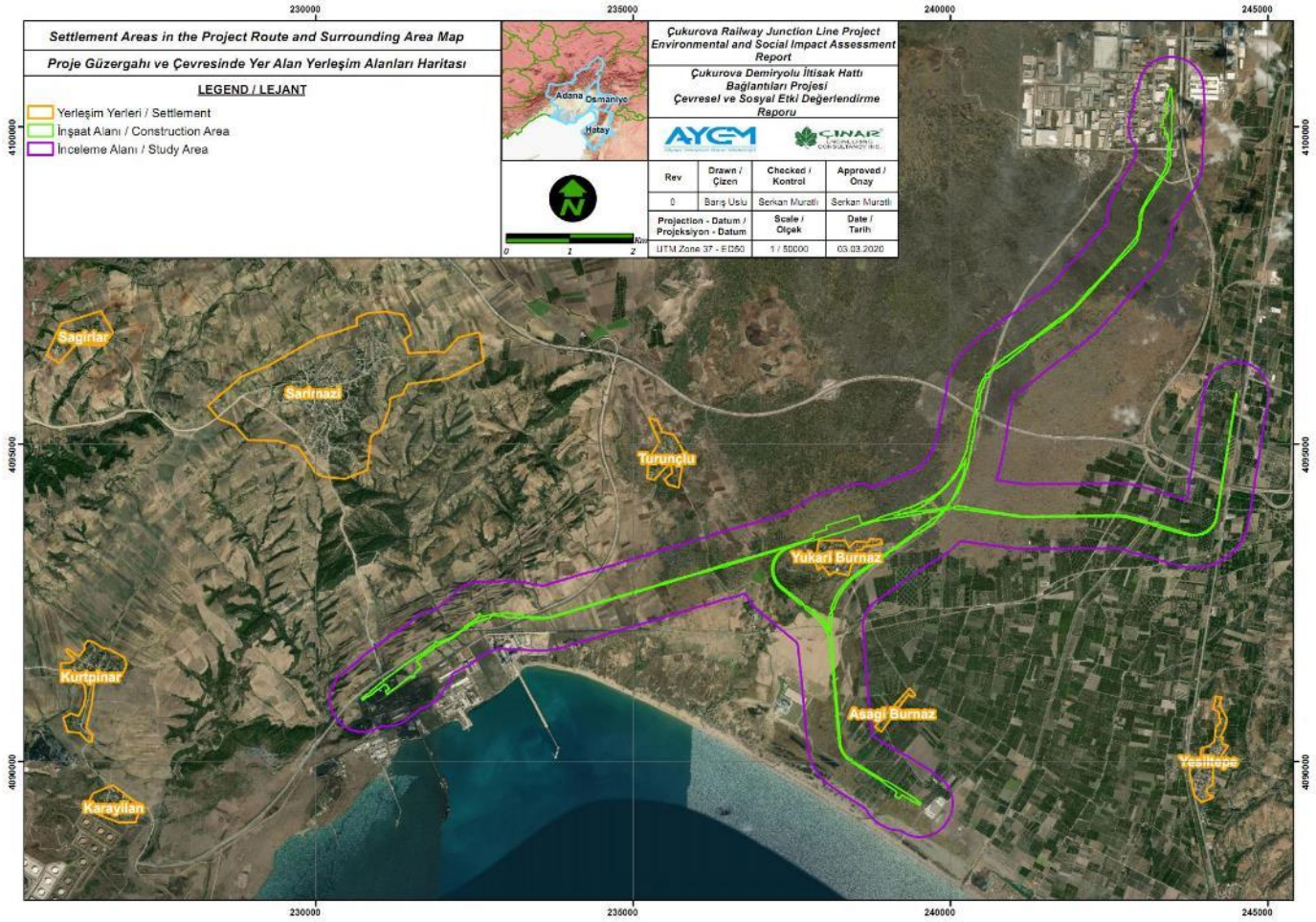

Figure 3-1 A Map presenting the Project Route and Affected Settlements

3.1.1. Settlements along the Route

The area of influence of the project passes from industrial facilities, a coal storage facility, pasture areas used for grazing, agricultural areas, orchards and areas used for beekeeping. The nearest settlement is Yukarıburnaz, approximately 30 m from the project site.

The location of the lines and stations within the scope of the project are given in the table below.

Table 3-1 Location of Lines and Stations

Line	Length	Province	Neighborhood	Stations	Neighborhood
1. Line / Connection Line	16.3 km	Adana - Hatay	Erzin Station, Yukarıburnaz, TAYSEB Neighborhood	1. Station	North of Yukarıburnaz
				2. Station	Free Zone
2. Line / OIZ-Port Line	14.34 km	Osmaniye - Hatay	Osmaniye OIZ, Yukarıburnaz, Aşağıburnaz	3. Station	Osmaniye OIZ
				4. Station	Port
Other Connection Lines	2.315 km 2.110 km	Hatay	Yukarıburnaz	No Station	-

3.1.2. Land Use Characteristics and Land Ownership

The project area consists of state-owned treasury lands, agricultural areas, pasture areas, forest areas and private lands.

Osmaniye OIZ has facilities focusing mainly on iron and steel, chemical products and yarn production. Çukurova region is a productive and flat plain. The area of influence of the project passes from industrial facilities, a coal storage facility, pasture areas used for grazing, agricultural production areas, orchards and areas used for beekeeping.

3.1.3. 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 and PS6:

> *"A protected area is a clearly defined geographical space, recognized, dedicated and managed, through legal or other impactive 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 impactiveness,
- 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 3-2 . 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 3-2 Legally Protected Areas near the Project Route

Protected Area	IUCN Protected Area Category	Distance to the Project Route (km)
Osmaniye Zorkun Wildlife Development Area	IV	11.2
Ciftmazi Nature Park	V	14.1
Yumurtalık Lagoon Nature Conservation Area, National Park, Ramsar Site	Ia, II, VI	30.6

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 impactive 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".

Burnaz Kumsalı (Dunes) is one of the KBAs identified by the inventory, which covers the 14-kilometer coastline and its associated habitats within Erzin district boundaries. The OIZ-Port connection line passes along terrestrial boundary of KBA in the north-south direction. A 6-kilometer section of the KBA is intensely used as a beach. Starting from the coastline, there are dunes, dune grassland, ponds that have been formed due to water extraction and reedbeds in the KBA.

Detailed assessment concerning legally protected areas are given in Chapter 4.6.2.2.

3.2. Project Components

3.2.1. Railway Connection Lines

Osmaniye OIZ - Erzin Port railway connection line (14.34 km long) with dual lines, electrical, signalization planned to be built within the scope of the project will have 2 stations (Osmaniye OIZ and Erzin Port) and the line will connect Osmaniye OIZ to Erzin Port, which is under construction.

The single-line Connection Line (Erzin - TAYSEB Line) which has total length of 16.3 km will start from the existing TCDD Erzin Station and continue approximately 1.9 km to the south and turn to the west direction. It is planned to reach the Toros Adana Yumurtalik Free Zone (TAYSEB) at the 13th km through the west of Yukariburnaz. Two station locations, namely Yukarıburnaz Station (Station-1) on the north of Yukarıburnaz and TAYSEB Station (Station-2) are planned on this line.

In addition, it is planned to establish 2 connection lines in order to provide connection between Connection Line and OIZ - Port Line through Yukarıburnaz Station (Station-1), which is envisaged as a logistics station. Of them; the length of the OIZ - Station-1 Connection Line is approximately 2.315 km, and the length of Station-1 - Port Connection Line is approximately 2.110 km.

The design speed of the railway is 80 km/h.

3.2.2. Engineering Structures

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

Table 3-3 List of Engineering Structures

Line	Kilometer	Engineering Structure	Location
1. Line / Connection Line	0 + 711.190	Underpass	Rural Road
	1 + 461.031	Underpass	Highway
	2 + 278.092	Overpass	Dirt Road
	3 + 081.026	Overpass	Dirt Road
	3 + 226.109	Bridge	Irrigation Canal
	3 + 583.343	Bridge	Rural Road
	3 + 783.723	Bridge	Oil Pipeline
	4 + 235.960	Overpass	Dirt Road
	5 + 538.774	Overpass	Dirt Road
	6 + 353.599	Bridge	Road
	6 + 458.244	Bridge	OIZ – Port Line Crossing
	6 + 740.978	Overpass	Rural Road

Line	Kilometer	Engineering Structure	Location
	9 + 417.975	Overpass	Rural Road
	10 + 284.802	Overpass	Rural Road
	11 + 479.948	Overpass	Dirt Road
	13 + 310.139	Underpass	Highway Connection Road
	14 + 441.018	Underpass	Highway Connection Road
	14 + 468.50	Underpass	Road
	15 + 878.50	Bridge	Road
	16 + 612.619	Underpass	Highway Connection Road
2. Line / OIZ – Port Line	0 + 958.000	Bridge	Road in OIZ
	1 + 431.197	Bridge	Highway
	3 + 054.320	Bridge	Monument
	5 + 596.637	Underpass	Road
	6 + 286.798	Underpass	Highway
	7 + 908.808	Bridge	Connection Line Crossing
	9 + 035.600	Bridge	Rural Road
	9 + 810.024	Overpass	Rural Road
	10 + 373.000	Bridge	Stream
	10 + 656.498	Bridge	Road
Other Connection Lines	1 + 318.589	Underpass	Rural Road
	0 + 319.666	Overpass	Dirt Road
	0 + 596.937	Overpass	Dirt Road
	1 + 315.000	Bridge	Stream
	1 + 830.114	Bridge	Road

3.2.3. Construction Camp Sites

Contracted workers will accommodate in “worker camps”, meeting the requirements of labor legislation of Turkey.

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 Standart 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.

As indicated in the World Bank's Concept Environmental and Social Review Summary (2019) for the Improving Rail Connectivity Project in Turkey, the camp sites formerly utilized by the Directorate General of Highways are planned to be used during the construction phase. Nevertheless, the footprints of the camp sites are yet to be identified. The information related with relevant baseline and impacts about the camp sites will be available at the final design stage of the Project. The additional studies for baseline data collection and environmental and social impact assessment for camp sites will be performed in line with World Bank Environmental and Social Framework requirements, and that the environmental and social impacts and respective mitigation measures will be analyzed and determined under supplementary site-specific ESMPs.

3.2.4. Other project components

Other project components include electricity transmission lines for electrification of the railways, quarries for supply of materials and access roads.

3.2.4.1. Access Roads

As specified in the World Bank's Concept Environmental and Social Review Summary (2019) for the Improving Rail Connectivity Project in Turkey, the project sites are already accessible through existing roads, therefore no construction of additional temporary and permanent access roads are anticipated in the scope of the Project. In case new access roads are considered necessary according to the results of the additional studies to be undertaken at the final design stage, the environmental and social impacts of the new access roads will be identified and assessed through the use of the Management of Change Process detailed as part of the ESMP in line with World Bank Environmental and Social Framework requirements, and that the environmental and social impacts and respective mitigation measures will be analyzed and determined under supplementary site-specific ESMPs.

3.2.4.2. Energy Transmission Lines

As specified in the Special Technical Specification of the Railroad Lines, for the feeding of the catenary system, there will be 1 substation and 9 traction posts on the route. There will be two 154 kV / 27.5 kV, 50 Hz single phase transformers in the substations and distribution of these transformers between phases will be provided in a balanced system. Transformers will be placed on rails to be laid on foundations. In addition, oil collection pit will be provided for each transformer. Transformer foundations will be designed to be earthquake resistant.

Even though the substation area is planned to be 70x100 m, the location of the substation area is not determined yet and will be specified based on the results of the additional studies to be undertaken at the final design stage. The Construction Contractor to be determined will perform the construction works such as excavation, control building, foundation, perimeter wall, wire fence, rail, concrete channel, stone pavement and access road for the substation. Crushed gravel with a thickness of 15 cm will be laid on the floor of the substation and the gravel will be covered with asphalt with a thickness of 15 cm. In order to prevent water accumulation in the substation area, the gravel and asphalt coating will be sloped in a herringbone pattern.

Drainage channels will be constructed in order to prevent the substation site from being affected by rain water, and these drainage channels will be laid in a way that will surround the substation. Rain water accumulating in the channels will be discharged out of the substation area with channels / pipes to be placed every 20 meters.

Similarly, the route and technical details of the energy transmission line that will provide energy to the substation are not determined yet and will be defined based on the results of the additional studies to be undertaken at the final design stage.

The environmental and social impacts of the energy transmission line and substation (including resettlement subjects) as well as respective mitigation measures will be analyzed and determined by GDII (and Design and Supervision Consultant) under supplementary site-specific ESMPs in line with ESF requirements when the locations and technical specifications of these facilities are finalized prior to the construction activities. The operation of the energy transmission line and substation will be in line with the World Bank Environmental and Social Framework (ESF) requirements.

3.2.4.3. Quarries and Material Borrow Pits

Material quarries surveys were carried out for the determination of materials to be used in railway lines (infrastructure, superstructure, engineering structures, concrete works, etc.) during the feasibility studies. Accordingly, basalts borrow quarry located 50 meters to the right side of the OIZ – Station 1 Line KM = 0+500. Assuming that an average of 4-5 meters of material will be taken, there are approximately 2,500,000 m^3 of material reserves in the quarry. The quarry material is suitable for use as fill material. It can also be used as rock fill material. However, the mentioned area remains within the 1st Degree Protection Area on the "Burnaz Spring Group Groundwater Reserve and Protection Area" and material extraction activities are not permitted in this area. Therefore, consent of 6th Regional Directorate of State Hydraulic Works (DSI) have to be taken in order to use the determined quarry. If the consent can not be taken, other existing quarries (such as Yılankale (Kokartepe) Quarry) previously used by the General Directorate of Highways will be used. The material at Yılankale (Kokartepe) Quarry, which is approximately 47 km away from the Connection Line, is broken and sieved and suitable for use in subbase, subballast, concrete aggregate and engineering structures. There are more than 1.000.000 m^3 of reserves in the quarry area. Quarry is on the treasury land, licensed on behalf of the 5th Regional Directorate of Highways and operated by a private company. Material purchase will be provided by purchasing from the private company operating the quarry. In addition, there is Badilli Quarry at a distance of 310 km from the Connection Line. In Badilli Stone Quarry, the quarry material is broken and sieved; it will be made suitable for use as ballast material. There are more than 1.000.000 m^3 of reserves in the quarry area. The quarry is licensed on behalf of the private company, and the quarry is still in operation. Material purchase will be provided by purchasing from the private company operating the quarry.

The environmental and social impacts of the quarries and material borrow pits as well as respective mitigation measures will be analyzed and determined by GDII (and Design and Supervision Consultant) under supplementary site-specific ESMPs once they are specified based on the results of the additional studies to be undertaken at the final design stage. The operation of the quarries and material borrow pits will be in line with the World Bank ESS1 and the World Bank Group Environmental, Health, and Safety Guidelines for Construction Materials Extraction.

3.3. Other Projects/facilties with Footprints Geographically Overlapping with the Project Area

, In the region, there is Erzin Port to be constructed in line with the priorities of the Turkish transport sector. The construction of Erzin Port is however not dependent on the construction of the railway network and therefore not considered as associated facility. Moreover, there is TAYSEB in the Cukurova Region, of which the footprints geographically overlap with the Project area. However, there is no publicly available information on whether these new facilities to be built required any expropriation or not, and whether they are built on public/treasury state land. This will be further assessed during the project implementation to ensure ES due diligence.

3.3.1. Erzin Port

Tosyalı Holding A.Ş. planned to construct Erzin Port in a parcel owned by Treasury in Turunçlu Village, Erzin District of Hatay Province in 19.09 hectares of land located in the sea side obtained by embankment of the sea and port hinterland in the 11.60 hectares of the parcel at the back side of the coastal line. Additionally, shipyard and two piers one of which is connected to the port and other to the shipyard will be constructed in the 37.65 hectares of the parcel.

In this context, the "Port and Shipyard EIA Report" was submitted to the Former Ministry of Environment and Forestry and the "EIA Positive" decision was taken for the Port and Shipyard Project with the letter of the Ministry dated 05.04.2011 and numbered 29072. Currently, no investment has been started for the project with the EIA Positive Decision and no construction activity has been carried out. No construction activity will be carried out within the scope of the Port and Dredging Project in the area where the "EIA Positive" decision has been taken for the Port and Shipyard, before the completion of the EIA Process of the Planned Port and Dredging Project. As a result, "Port and Dredging Project" is planned by making changes in the Port and Shipyard Project, where the EIA Positive Decision has been taken in April 2017. In the area where EIA positive decision was taken, Tosyalı Denizcilik ve Liman İşletmeciliği A.Ş. planned to operate only the port facility with a project change.

Within the scope of the planned port facility; hinterland area will be established, including the coastal line sea side and the embankment area on the shore, where the container, bulk dry cargo - general cargo, ore and fuel stock areas will be located. In addition, 29,222 m^2 west jety and dock, 44,575 m^2 east jety and dock, 46,620 m^2 pier will be constructed in the sea part and the port facility will cover a total area of 1,039,436 m^2.

In the parcel owned by Treasury in Turunçlu Village, Erzin District of Hatay Province,

- 305,108.30 m^2 with Easement of Convenience Agreement,
- 462,376.70 m^2 with Residential Usage Licence Agreement,

A total of 767,485 m^2 area is currently leased by Tosyalı Denizcilik ve Liman İşletmeciliği A.Ş. for 49 years. As the port facility will be located on an area of 1,039,436 m^2 in total, an additional 271,951 m^2 will be leased for the project.

In the Final EIA Report presented on 03.03.2017, the works and transactions carried out so far regarding the project are listed below:

- "Decision of Public Utilities" decision taken with the letter of the General Directorate of Shipyards and Coastal Structures dated 09.02.2015 and numbered 8926,
- 1/5000 scale approved zoning plan where Port and Shipyard Project area is issued,
- Geological-Geotechnical Survey Report prepared on the basis of the approved zoning plan,
- Ship Maneuver Simulation Modeling Report,

- Sea Turtles and Mediterranean Monk Seal evaluation reports,
- Revised Zoning Plan (dated 22.07.2014 and No. 35300) approved by General Directorate of Shipyards and Coastal Structures where Port and Dredging are issued
- KGM 5th Regional Directorate and Osmaniye OSB connection road approvals and connection road plan for the connection road from Osmaniye OSB to the Port and Bottom Dredging project area,
- Opinion of Hatay Governorate, Provincial Directorate of Environment and Urbanization about natural assets - natural sites in the project area.

The works to be completed after the EIA process of the project are listed below:

- Approval of Revised Zoning Plans,
- Obtaining a construction license from the relevant Municipality and informing the port authority that the construction has started,
- The Dredging Environmental Management Plan Report will be prepared and submitted to the Ministry of Environment and Urbanization, and permission will be obtained for the use of the dredging process and the dredging material dump site,
- In accordance with the Regulation on Starting Up and Operating a Workplace, obtaining Business License and sub-permits,
- Application to Environmental License on Waste Water Discharge, Noise, Environmental Permits and Waste Acceptance Facility,
- Obtaining Business Certificate
- Preparation of Emergency Response Plans,
- Permissions will be obtained such as non-agricultural use permits for agricultural lands likely to be used, etc.

The construction of the Erzin Port is planned to be started in January 2021 at the latest and foreseen to be completed in approximately 3 years. According to the EIA legislation in force at the time when the EIA Report was approved in 2017, the EIA monitoring studies aren't required to be conducted throughout the construction phase of the project.

The project area does not have any natural disaster risk such as landslides and rock falls. However, a large part of Erzin Port is located in the sea and soil sediments are the dominant lithology. As a result of the calculations and observations made, the port area was evaluated as "Areas where precautions should be taken in terms of liquefaction risk: Preventive Area 1.1 (ÖA-1.1)".

The port area is located in the 1st degree seismic zone and all planned buildings will be constructed in accordance with the "Regulation for the Structures to be built in Disaster Areas". In addition, all construction measures will be taken for the specified geological risks as stated in the results and suggestions chapters of the geological-geotechnical survey report prepared for the port area.

Regarding Sarısu Stream within the boundaries of the port area, it has been stated that surface waters related to the region are collected and generally not exposed to flooding, but under the influence of flooding in extreme possible precipitation according to official letter of 6th Regional Directorate of State Hydraulic Works (dated 20.10.2009 and No: B.12.4.İLM.031.00.01.03/9045)

In this context, according to annual flood flow data with 500 recurrences of Sarısu Stream within the port boundaries, route change was prepared and approved by the 6th Regional Directorate of State Hydraulic Works.

All measures will be taken by the port owner against the flood risk in case of extreme precipitation, the water basement level of buildings will be applied at sufficient height from

the natural ground level, and no damage loss will be requested from DSI regarding the damage that the port owner and the third parties may face due to the construction, DSI will not be held responsible for flood losses.

In the port area, it has been determined that there are Tadpole and Green Sea Turtles in the marine zone, Soft Shell Nile Turtle in the Terrestrial Zone, and again the Soft Shell Nile Turtle in the lentic and lotic zones. Considering the IUCN and BERN Lists of the species found in the area, it is seen that all of them are protected species both at national and international level, which are highly endangered and at risk.

Considering the risk conditions of the species, the establishment and operation of the port in the specified area without taking the measures specified in the Final EIA Report will have serious adverse impacts, especially for the Trionyx triunguis / Soft Shell Nile Turtle, which are critically endangered. The mitigation measures set out in the approved EIA report include, protection of the wetlands around the port area and its immediate surroundings (<30 m) that these species utilize, and no construction activities will be allowed during spawning period resulting in light and noise disturbance on the species, the water sources, reed and dune areas around wetlands will be protected [1]. Doctorate level relevant biodiversity expertise is required for activities to be carried out in the zone close to these areas. During the construction and operation phases, monitoring studies will be carried out regularly and in every nesting season (during May-October) under the supervision of a doctorate level relevant biodiversity expert who has worked in the area or its immediate surroundings. All activities will be carried out under the consultancy and approval of the expert until the end of the construction and operation phases of the port.

Apart from these suggestions and practices, it is recommended to carry out the necessary studies and take precautions in line with the expert opinions in order to solve the problems that may arise regarding the subject. If the suggestions presented under this heading are implemented, the negative impacts that the facility to be established on the sea and brackish turtles will be minimized.

The provisions of the Law on the Principles of Emergency Response and Compensation of Damages in the Contamination of Marine Environment with Petroleum and Other Harmful Substances (No: 5312) and its legislations will be followed and the Coastal Facility Risk Assessment and Emergency Response Plan will be prepared in line with the legislations by the institution authorized by the Ministry before the facility is operational. In case the risk changes at the facility, “Risk Assessment and Emergency Response Plan” will be prepared again. If the risk does not change, necessary revisions will be made and submitted for approval. In case of any accident in the marine environment, necessary measures will be taken under this plan.

Since the port area has a flat land structure, no erosion hazard and sedimentation formation is expected. However, necessary measures have to be taken against the sedimentation risk that may occur in Iskenderun Bay during excavation and filling operations.

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 Erzin 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

[1] Sarısu Stream is the only habitat of the Soft Shell Nile Turtles in this area. For this reason, a comprehensive plan and programme should be prepared for this species before the route change. This study should include the steps of evaluating, planting coastal dunes in accordance with the location of the new route, transferring Soft Shell Nile Turtles to this area and evaluating success after transportation.

by the recommendations of the EIA Study. Main monitoring parameters within the project area, such as noise level, vibration, air quality and soil quality, biodiversity will be monitored throughout the project implementation, and mitigation measures will be updated accordingly, if needed.

3.3.2. TAYSEB

The Adana Yumurtalık Free Zone which is in the same area as Toros Tarım's production and terminal facilities in Ceyhan, was founded in 1990 and is being managed and operated by Toros Adana Yumurtalık Serbest Bölgesi Kurucu ve İşleticisi A.Ş. (TAYSEB) under a thirty-year contract. Occupying 4,635 thousand m^2 of grounds and with all of its infrastructure fully completed, TAYSEB is one of Turkey's biggest free zones.

TAYSEB was also the first free zone in Turkey that was set up explicitly for the conduct of industrial endeavours. Owing to its convenient location on the Gulf of İskenderun and to its access to a wide range of transportation options, TAYSEB offers substantial advantages for industrial concerns that want to benefit from freezone incentives. A location immediately adjacent to the Ceyhan Specialized Energy Industry Zone (CEİB), which is set to become the site of major investments in energy in the future, is yet another feature that enhances TAYSEB's appeal.

Owing especially to a surge in petrochemical and chemical industry activities in recent years, TAYSEB has become a preferred investment and production centre to which both sectors are giving priority. There are currently twelve firms in the zone that are engaged in activities associated with the production, storage, importation, exportation, and trade of chemicals. Also on the horizon are a number of big-ticket investments involving the production of chemicals which currently must be imported. In the near and medium terms therefore, TAYSEB is expected to become a production centre for the strategic chemicals that Turkey needs.

TAYSEB also provides its tenants with terminal services at the Torosport Ceyhan Terminal. Major industrial establishments located in the zone are allowed to build jetties of their own (Tekfen Holding, 2016).

The geographical footprint of TAYSEB overlaps with TAYSEB Station that will be constructed in the scope of Project. TAYSEB and its tenants are subject to Turkish environmental and social regulations and there are no public sources indicating incomplaince with the national regulations or major violations. Based on the analysis of available information no major environmental and social risk are expected to be caused to the project activities by the operation of TAYSEB as its environmental and social management will be in accordance with the requirements of the national environmental legislation.

3.4.Project Activities

3.4.1. Land Preparation and Construction Activities

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

- Geodetic and topographic studies, mapping studies,
- Preparation of implementation projects and expropriation plans,
- Initial field works (rootball removal, chopping, off-site transfer etc.),
- Earthworks (excavation and fill works, soil leveling, soil compaction, soil stabilization, etc.),
- Construction of railway superstructure elements (ballast and lower ballast layers, ties and connections and railway lines),

- Rail compression, rail welding, rail stretching, rail lubrication, rail grinding, rail system switch assembly works,
- Construction of engineering structures,
- Construction of stations (all rough and fine construction works and electrical and mechanical installation works of stations),
- Electrification, signalization and telecommunication works

3.4.1.1. Earthworks

As stated in the Geological-Geotechnical Survey Report prepared for the Project, Delihalil basalts consist of Karataş formation, Kızıldere formation and very few alluviums. Basalts that will come out from the cuts can be used in fillings. However, materials that will come out of alluvial cuts, Karataş formation materials and Kızıldere formation materials that will come out of cuts should not be used in fillings. As a result, the cut materials that will come out of Karataş and Kızıldere formations consisting of mudstone, claystone, siltstone, sandstone, marl units, and clayey floors on the upper parts of them should not be used in fillings and should be disposed of. According to the Geological - Geotechnical Survey Report, alluvial cuts are small enough to be neglected, and the materials that will come out of these cuts should not be used in fillings and should be disposed of.

As stated in the Geological - Geotechnical Survey Report, the basalts 50 meters away from the OIZ - Station (1) line at Km: 0+500 was determined as borrow pit. The area to the northwest of the borrow pit is also shown as a depot area. The dimensions of the depot area are 500x1000 meters. Some of this area was previously used by Directorate of Highways as a depot area. The materials that are not used in the fillings that will come out from the cuts should be properly stored on this depot area in a way that does not cause environmental pollution.

According to the Geological – Geotechnical Survey Report, there are high cuts and fills in some sections along the railway routes. The slope plan and cross sections are examined and the cut/fill lists containing the cut/fill intervals and maximum heights are prepared. Cut slopes will be created with 2y/1d slope. Basalt cuts, in some sections, was found appropriate to have a 2y/1d slope in order to have the upper levels in the form of slag and meet some of the fill material needs along all the railways routes. The fills will be formed with a 3y/2d slope with the materials to be extracted from basalt cuts and the materials to be drawn from the borrow pit consisting of basalts.

According to the Feasibility Study Report, the estimated earthworks volume along the railway routes is 1,515,190.75 m^3.

3.4.1.2. Construction Material Requirements

Materials to be required for the construction works will include concrete, aggregate, water, bitumen, additives, etc.

3.4.1.3. 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, the fuels to be used by construction equipment and machinery constitute the remaining main hazardous materials requirement of the Project construction phase.

3.4.1.4. Construction Machinery and Equipment

Estimated type and number of main construction equipment and machinery required to complete the Project execution in time is provided in the table below.

Table 3-4 Main Construction Phase Equipment and Machinery Requirement

Machinery and Equipment	Number of Machinery and Equipment
Water Truck	2
Concrete Mixer	6
Concrete Pump	6
Truck	14
Pickup	10
Backhoe loader	9
Water Tanker	3
Traier	9
Fuel Tanker	3

3.4.2. Operation and Maintenance Activities

The Project will be transferred to General Directorate of State Railways after completion of its construction.

Only freight trains will be operated on the lines to be built in the project. It is planned to run 43 freight trains on the OIZ-Port line and 53 freight trains on the Connection line in 2043, which is the target year of the project. Therefore, the total number of trains on both lines is 96. It is foreseen that the trains will run 20 hours a day and their average speed will be 60 km/h.

After the completion of the construction of the railway connection lines, the Contractor will present a test program to be approved by GDII and all errors and deficiencies observed during the system control will be removed before energizing. During acceptance tests, when the system is de-energized, control of the mechanical condition and electrical openings of the tramline with pantograph at different train speeds, control of the current drawn at different train speeds and dynamic and static tests of the system according to 120 km/h speed will be performed. Due to the nature of the work, temporary acceptance can be made in parts and the system will be energized after the temporary acceptance phase. After energizing the

catenary system, a trial run will be made on the line with an electric rail vehicle to observe whether the system is working properly. After the Contractor declares that the lines are ready for temporary acceptance, the Contractor will carry out the works and procedures within the framework of "Construction Works Inspection and Acceptance Regulation" and "Construction Works General Specification" by GDII. The period following the temporary acceptance of all catenary systems is called the trial operation period. The trial operation period of the system is 12 months. Final acceptance is made 12 months after the temporary acceptance of the whole system. The warranty of the system will begin after temporary acceptance and will be guaranteed for 24 months against system design defects, dysfunctional work or malfunctioning. Faults occurring within the warranty period will be reported to the Contractor as soon as possible. The contractor will intervene the malfunctions within 12 hours of the notification, and make the system ready for service within 2 days at the latest.

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.

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 (eg 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 (eg 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);

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

- 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 epair 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 operatoion failure;
- Maintenance of electrical and non-electrical signs;
- Maintenance and repair of lighting equipment;
- Landscaping work (eg 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.

3.5. Project Workforce

The following categories and numbers of labor force are required during the land preparation and construction phases of the Project:

- 12 - 20 heavy machinery operators;
  - Excavator operators (crawler, rubber wheel, with suitable attachments according to the type of work),
  - Loader operators,
  - Grader operators,
  - Cylinder operators (single bandage and tandem rollers with drum),
  - Truck, pumper etc. drivers,
  - Dozer operators,
  - Paver operators,
  - Ballast regulator operator,
  - Buffer machine operator,
  - Locomotive operator,
  - Dynamic line stabilizer operator,
- 25 - 30 employees for railway superstructure-line works team;
  - Railway superstructure bed forming employees (lower ballast-ballast layers, regulation),
  - Specialists of traverse-rail connection assembly and scissor placement,
  - Scissor engine assemblies expert employees,
  - Rail butt welding, ray aluminothermic welding specialist employees,
  - Welding grinding, welding stripping works, ultrasonic inspection expert employees,
  - Detensioning expert employees,
  - Line field mathematics specialist employees,
  - Line stabilization expert employees,
- 25-30 employees for the railway engineering structure works team;
  - Filling, cutting, compacting, soil improvement works workers (except heavy machinery operators),
  - Experts working in explosive parts, if any,
  - Drainage workers, slope arrangement workers (except heavy machinery operators),
  - Engineering structure concrete - mold - iron works, insulation works workers (excluding heavy machinery operators),
- 30-35 employees for the station buildings construction team;

  - Rough construction workers (concrete works-formwork-reinforcement works, roof works-infill wall works etc.),
  - Fine construction workers (insulation works, plaster works, floor coverings, paint works, assembly works, plaster, facade coating etc. works),
  - Electrical works employees,
  - Mechanical works, installation etc. employees,
- 25-30 employees for the electromechanical works team;
  - Line electrification, catenary systems and signaling works employees,
  - Telecommunication works employees,
- 12 to 16 engineers and technicians;
  - Civil engineer,
  - Geomatics engineer,
  - Electrical and electronics engineer,
  - Mechanical engineer,
  - Construction, electricity, machine technician,
  - Map and measurement team,
  - Foreman,
  - OHS team,
- 12 to 16 administrative support staff;
  - Accountants,
  - Employees engaged in manufacturing-field-vehicle maintenance-repair,
  - Security guard,
  - Secretary
  - Refectory employee,
  - Driver,
  - Tea maker, cleaner etc.

Accordingly, approximately 140 - 180 personnel will be employed for land preparation and construction activities to be carried out within the scope of the project. More than 180 personnel are not expected to be employed for land preparation and construction activities. It is estimated that most or all of the staff will be provided from the local and regional workforce.

The number of personnel foreseen to be employed during the operation phase is not determined yet.

3.6. Implementation Program

The construction of the railway route is planned to start in the second half of 2021 and will take approximately 24 months. Construction is planned to be completed by 2023.

3.7. Project Costs and Income

According to the Feasibility Study Report, foreseen amounts in USD and Turkish Lira and their distribution over the years are given below (Table 3-5 and Table 3-6).

Table 3-5 Foreseen Amounts in USD and Distribution Over the Years

Year	Total		Osmaniye OIZ Station - Erzin Port Station Line		Existing TCDD Erzin Station - Station Line	
	Investment Amount ($)	Investment Rate (%)	Investment Amount ($)	Investment Rate (%)	Investment Amount ($)	Investment Rate (%)
2020	3,014,783	3.13%	1,880,682	3.53%	1,134,101	2.63%

Year	Total		Osmaniye OIZ Station - Erzin Port Station Line		Existing TCDD Erzin Station - Station Line	
	Investment Amount ($)	Investment Rate (%)	Investment Amount ($)	Investment Rate (%)	Investment Amount ($)	Investment Rate (%)
2021	46,363,272	48.08%	25,516,892	47.94%	20,846,380	48.26%
2022	47,041,944	48.79%	25,829,130	48.53%	21,212,814	49.11%
Total Exc. VAT	96,419,999	100.00%	53,226,704	100.00%	43,193,295	100.00%
VAT (%18)	17,355,600	15.25%	9,580,807	15.25%	7,774,793	15.25%
Total Inc. VAT	113,775,599	100.00%	62,807,511	100.00%	50,968,088	100.00%

Table 3-6 Foreseen Amounts in Turkish Lira and Distribution Over the Years

Year	Total		Osmaniye OIZ Station - Erzin Port Station Line		Existing TCDD Erzin Station - TAYSEB Station Line	
	Investment Amount (TL)	Investment Rate (%)	Investment Amount (TL)	Investment Rate (%)	Investment Amount (TL)	Investment Rate (%)
2020	17,223,457	3.13%	10,744,337	3.53%	6,479,120	2.63%
2021	264,873,370	48.08%	145,778,002	47.94%	119,095,368	48.26%
2022	268,750,631	48.79%	147,561,822	48.53%	121,188,809	49.11%
Total Exc. VAT	550,847,458	100.00%	304,084,161	100.00%	246,763,297	100.00%
VAT (%18)	99,152,542	15.25%	54,735,149	15.25%	44,417,393	15.25%
Total Inc. VAT	650,000,000	100.00%	358,819,310	100.00%	291,180,690	100.00%

4. BASELINE CONDITIONS

4.1. Land Use, Soils and Geology

4.1.1. Land Use

Cukurova Region and Iskenderun Bay railway connection line project is located within the borders of Yumurtalik District of Adana Province, Toprakkale District of Osmaniye Province and Erzin District of Hatay Province. Most of the railway connection lines within the scope of the project are within the boundaries of Hatay Province, and a few are in Adana Province. In the Osmaniye Province, only 1.7 km of the line is located.

The Project area will have a construction area of approximately 127.4 hectares. According to the data of the Ministry of Agriculture and Forestry, there are shrubs, pasture lands, fallow dry agricultural areas, irrigated agricultural areas, coastal dunes, insufficient irrigated agricultural areas and abandoned lands on or around the construction area.

The land use map of the project study area is given in Figure 4-1.

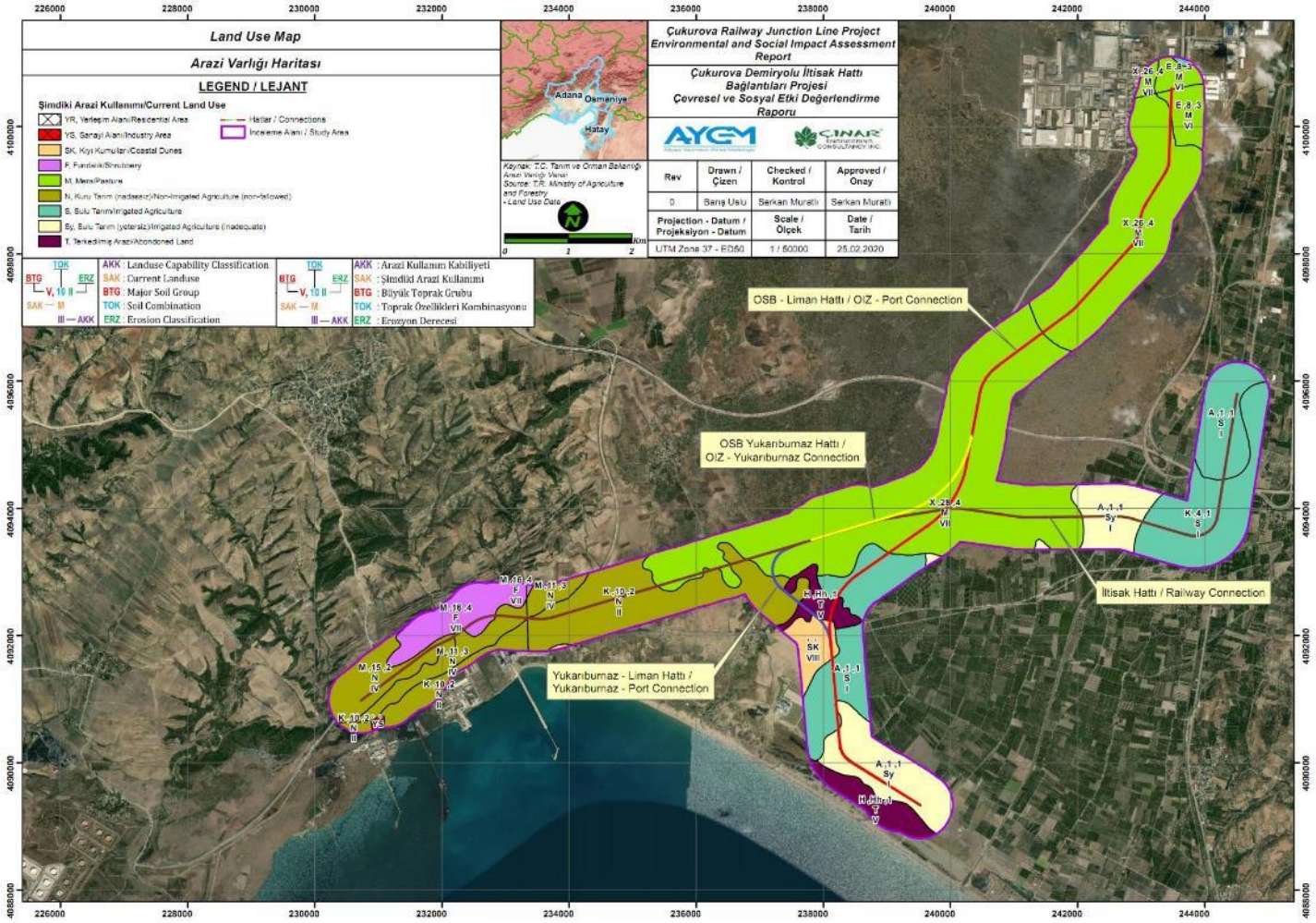

Figure 4-1 Land Use Map of the Study Area

When Figure 4-1 and Table 4-1 are examined, it is seen that a significant part of the Project study area (55.43%) is located on pasture lands.

Table 4-1 Land Use Types on the Project Construction Area

Land Use Types	Total Area (ha)	Percentage (%)
Pasture Lands	70.62	55.43
Fallow Dry Agricultural Areas	26.42	20.73
Irrigated Agricultural Areas	11.53	9.05
Inadequately Irrigated Agricultural Areas	10.06	7.89
Coastal Dunes	3.90	3.06
Abandoned Lands	2.48	1.94
Shrubs	2.41	1.89
Total	**127.40**	**100**

Lands are classified according to the land use capability between the first class lands, which can be cultivated with the easiest and most economical way without causing erosion and eigth class lands which are not suitable for agriculture, can not be used as meadow or forest, but can create an environment for natural life or recreational areas/parks for people (Ministry of Agriculture and Forestry). General definitions of these classes are given in Table 4-2.

Table 4-2 Land Use Capability Classes

Arability	Capability Class	Description	Factors Restricting Agriculture
Agricultural lands suitable for soil cultivation	I	First class land; It is a land containing flat or nearly flat, deep, fertile and easily cultivable soils where conventional agricultural methods can be applied. Soils have good drainage, they are not exposed to flood damage. They are suitable for anchor crops and other intensively grown crops. First-class lands irrigated where there is little precipitation are those that have less than 1% inclination, deep, loamy structure, good water holding capacity, and moderately permeable soils (Ministry of Agriculture and Forestry).	There may be very little water and wind erosion in this class of land (Ministry of Agriculture and Forestry).
	II	Second class land is a good land that can be easily cultivated only by taking some special measures (Ministry of Agriculture and Forestry).	The difference of this class from first class land is one or more of the limiting factors such as mild inclination, moderate erosion exposure, moderately thick soil, occasional moderate flooding and contain moderate wetness that can be easily isolated (Ministry of Agriculture and Forestry).

Arability	Capability Class	Description	Factors Restricting Agriculture
	III	The third-class land is a moderately good land for the anchor crops, which generates a lot of income by using a good crop rotation and applying appropriate agricultural methods (Ministry of Agriculture and Forestry).	Moderate inclination, excessive sensitivity to erosion, excessive wetness, shallow soil, presence of base stone, excess sandiness or graveliness, low water holding capacity and low productivity are the properties of this class of land (Ministry of Agriculture and Forestry).
	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.	These include marshland, desert, terrains containing very deep cavities, high mountainous, overly defective, stony lands.

As can be seen from Figure 4-1, a significant part of the Project study area (45.37%) is located on pasture lands and classified as VI. and VII. class pasture lands containing soils that are not suitable for cultivation. 27.11% of the project study area consists of irrigated agricultural land and insufficient irrigated agricultural land with Class I.

Table 4-3 Land Use Capability Classes of the Project Study Area

Land Use Types	Capability Class	Area (ha)	Percentage (%)
Pasture Lands	VI	79.42	2.46
	VII	1386.24	42.91
Irrigated Agricultural Areas	I	594.135453	18.39
Fallow Dry Agricultural Areas	II	375.59	11.63
	IV	217.23	6.72

Land Use Types	Capability Class	Area (ha)	Percentage (%)
Abandoned Lands	V	117.77	3.65
Insufficient Irrigated Agricultural Areas	I	281.75	8.72
Coastal Dunes	VII	57.24	1.77
Shrubs	VII	117.73	3.64
Industrial Lands	VIII	3.46	0.11

The suitability of different land classes for cultivation, grazing and forestry activities is identified within the scope of the Technical Procedure on Soil and Land Classification Standards published by the former Ministry of Agriculture and Rural Services in 2008, as presented in Table 4-4.

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

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

Source: (T.C. Tarım ve Orman Bakanlığı)

4.1.2. Soil

4.1.2.1. Major Soil Groups

According to the data of the Ministry of Agriculture and Forestry, the main soil types on the construction area are given in Table 4-5 below. Accordingly, 55.42% of the Project construction area is Basaltic Soils, 18.17% Brown Forest Soils, 14.48% Alluvial Soils, 8.16% Colluvial Soils, 2.01% Hydromorphic Alluvial Soils and 1.76% Red Brown Mediterranean Soils.

In Chapter 4.1.1, 3.90 hectares of coastal dunes of approximately 127.40 hectares construction area, are not included in the major soil group assessment.

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

Major Soil Groups	Total Area (ha)	Percentage (%)
Basaltic Soils	68.45	55.42
Brown Forest Soils	22.44	18.17
Alluvial Soils	17.89	14.48

Major Soil Groups	Total Area (ha)	Percentage (%)
Colluvial Soils	10.08	8.16
Hydromorphic Alluvial Soils	2.48	2.01
Red Brown Mediterranean Soils	2.17	1.76
Total	**123,50**	**100**

The major soil group map of the project study area is presented in Figure 4-2.

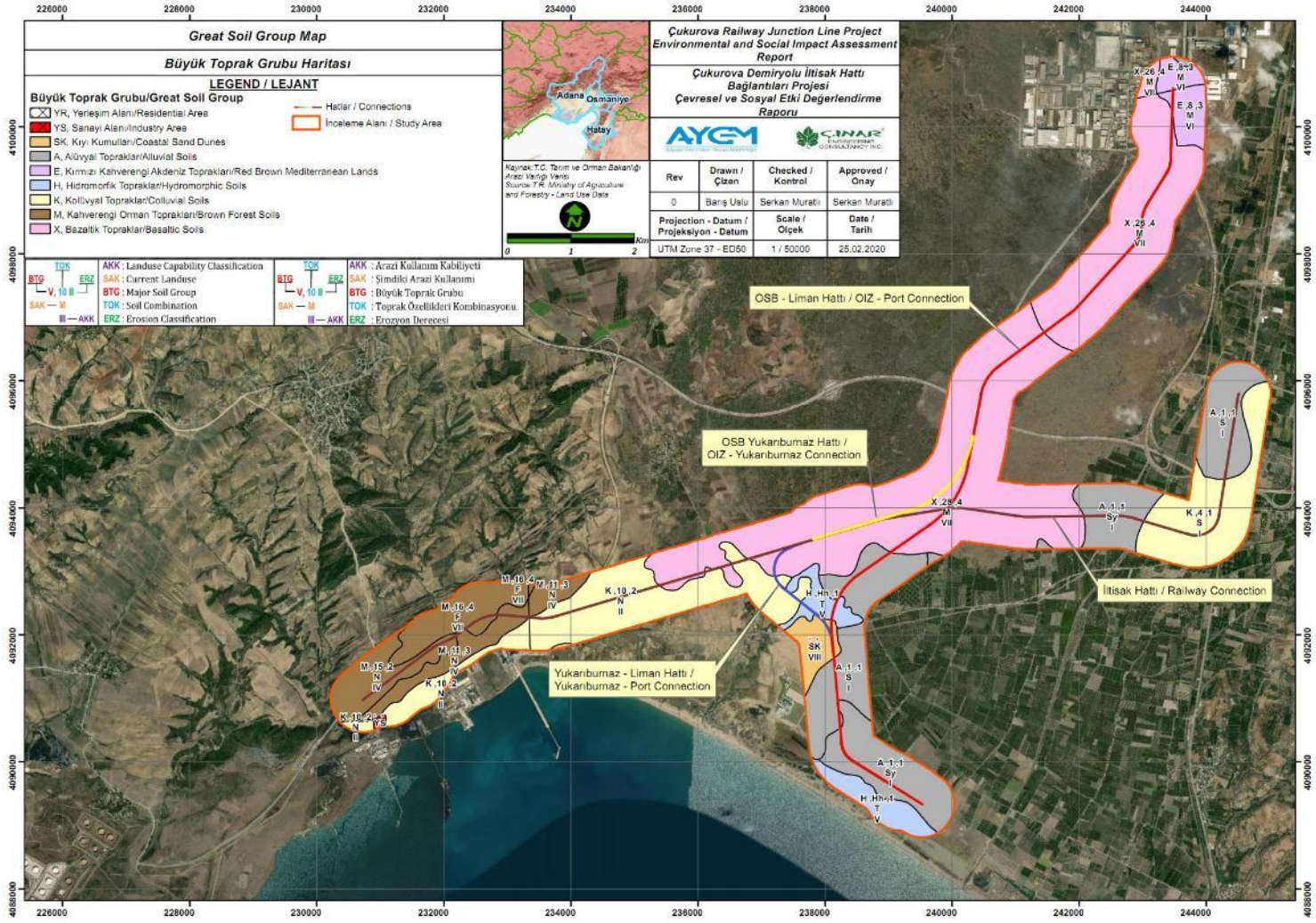

Figure 4-2 Major Soil Group Map of the Study Area

Major soil groups in the study area are described as the following:

Basaltic Soils (X)

These are heavy clay, dark colored soils and their profiles are not well developed. These often contain no lime. Soil reaction varies between neutral and medium calevi. Soils are relatively poor in organic matter. Since their physical properties are bad, their efficiency is mostly low. Since some of the soils are quite stony, they should be cleaned from the stones for intensive use (Ministry of Agriculture and Forestry).

Brown Forest Soils (M)

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

Alluvial Soils (A)

These young soils that form on fresh sedimentary deposits have no layers or development of their layers is quite low. Yet they contain mineral layers of different characteristics. These soils are mostly under the influence of groundwater. Significant in terms of agriculture, these soils are suitable for all culture plants that the climate allows. Productivity can range from very high to very low.

Colluvial Soils (K)

These soils that form on colluvial materials, which are deposited after carried for short distances through gravity, landslide, surface runoff, or nearby streams, are young and resemble soils of higher land in the surroundings. They involve layers of various sizes of segments based on the precipitation and runoff severity, and inclination. These layers are not parallel to one another, as in alluvial soils. Their drainage is good. Soils are occasionally subject to flooding. Type of the natural vegetation depends on the climate. When irrigated, they provide good agricultural productivity.

Hydromorphic Alluvial Soils

These soils are not suitable for agriculture. Some of these soils have surface or near ground water for most of the year. In some, in wet cool seasons, the water is close to the surface, but it drops below 1 m for a short time in late summer. Some of the soils are exposed to floods. Topography is flat or concave. Surface drainage and internal drainage are very bad or no drainage. Therefore, especially the lower floors are age. The rising and lowering of the seawater causes successive oxidation and reduction in the part of the soil above it. The result is bluish-gray reduction and reddish oxidation (oxidation, rust) spots. Although the depth is high in these soils, the reduced floors limit the root zone (Ministry of Agriculture and Forestry).

Red Brown Mediterranean Soils

They are dense clay soils developed on conglomerate.

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 fourdegree 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

According to the land asset data of the Ministry of Agriculture and Forestry, the distribution of soils on the construction area by erosion degrees is presented in Table 4-6. Accordingly, 19.48% of the land on the construction area is Degree 1, 17.22% Degree 2, % 5.93 Degree 3 and 57.38% Degree 4.

Table 4-6 Erosion Degree Classification of the Construction Area

Erosion Degree	Total Area (ha)	Percentage (%)
Degree 1	24.06	19.48
Degree 2	21.26	17.22
Degree 3	7.32	5.93
Degree 4	70.86	57.38
Total	**123.50**	100.00

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

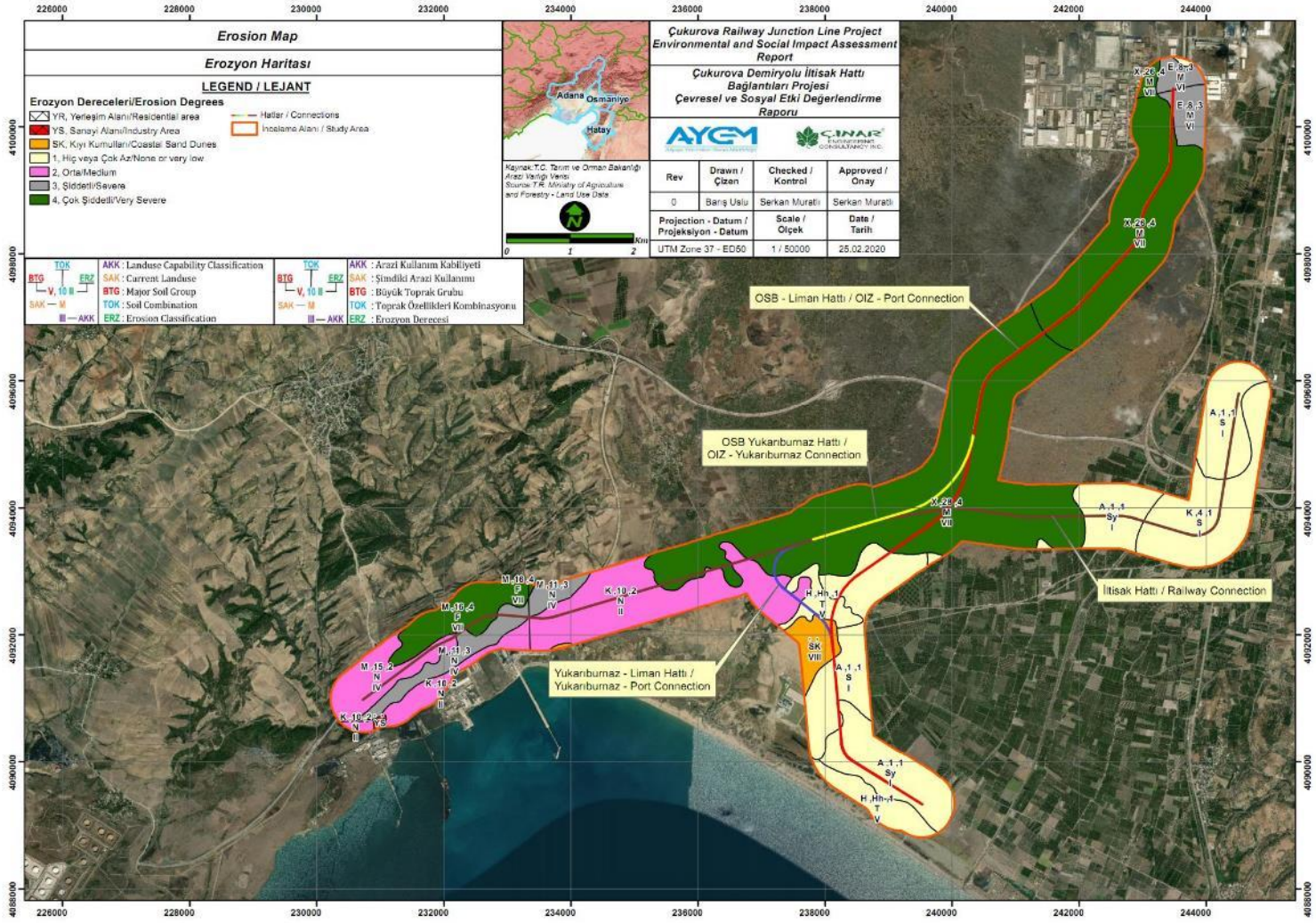

Figure 4-3 Erosion Map of the Study Area

4.1.2.3. Soil Quality

In order to determine the baseline soil quality around the construction area, samples were taken from 4 points. The coordinates of the points from which soil samples are taken are listed in Table 4-7 and shown in Figure 4-4 below.

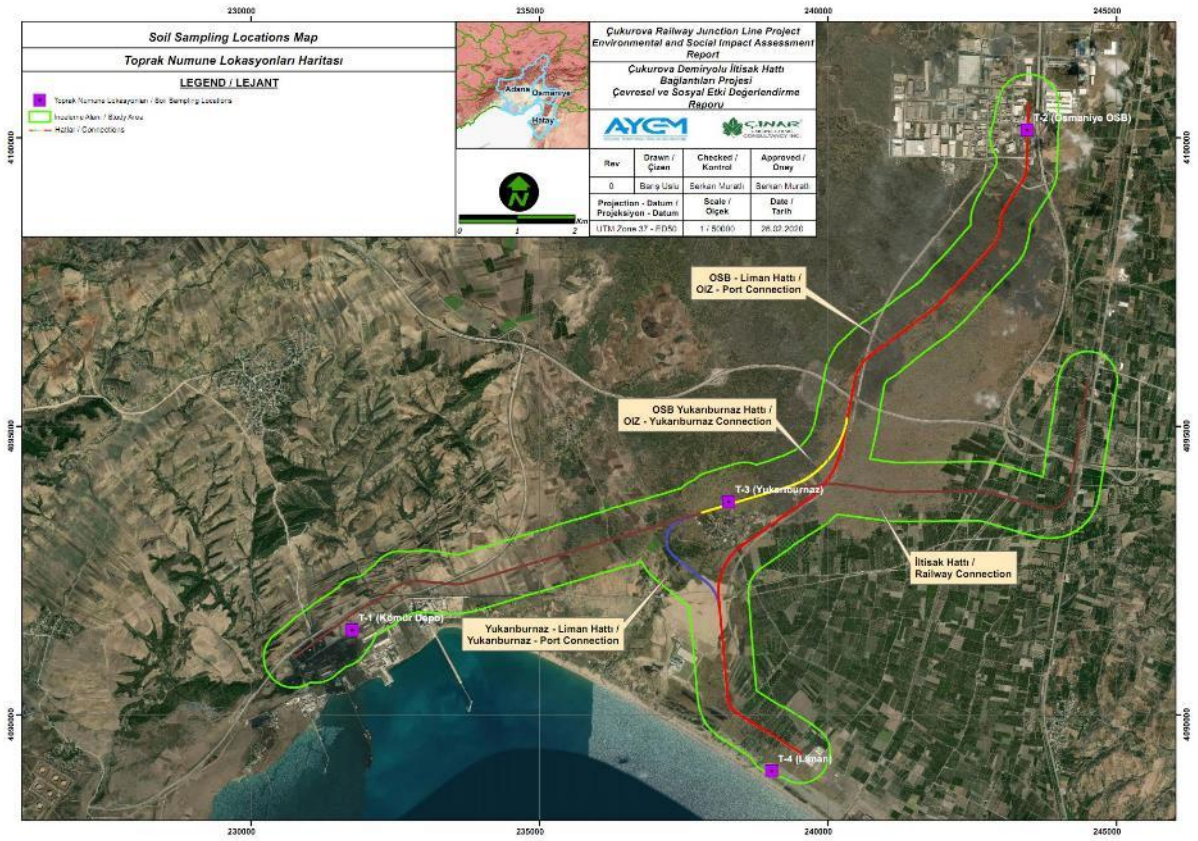

Figure 4-4 Soil Sampling Locations

Table 4-7 Soil Sampling Locations

Sampling Location	No	Coordinates
Coal Storage	T-1	36 S 766155 D/4091223 K
Osmaniye OIZ	T-2	37 S 243440 D/4099955 K
Yukarıburnaz	T-3	37 S 238263 D/4093511 K
Port	T-4	37 S 239010 D/4088846 K

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 of soil samples and related limit values are given in Table 4-8.

Table 4-8 Analysis Results of Soil Samples

Parameter	Unit	T-1	T-2	T-3	T-4	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	-	7.35	6.67	7.45	7.32	6 - 8	6 - 8	6 - 8	6 - 8
Antimony (Sb)	mg/kg	0.146	0.213	0.094	0.056	20	20	40	40
Arsenic (As)	mg/kg	3.41	4.12	4.13	7.26	12	12	12	12
Copper (Cu)	mg/kg	26.3	19.6	25.5	13	63	63	91	91
Barium (Ba)	mg/kg	62.3	229	101	12.3	750	500	2000	2000
Berilium (Be)	mg/kg	0.403	0.579	0.9	0.084	4	4	8	8
Boron (B)	mg/kg	< 2.00	< 2.00	< 2.00	< 2.00	2	-	-	-
Mercury (Hg)	mg/kg	0.37	0.66	0.149	0.196	6.6	6.6	24	50
Zinc (Zn)	mg/kg	52.3	310	73.3	25.4	250	250	410	410
Silver (Ag)	mg/kg	0.574	0.739	0.492	0.597	20	20	40	40
Cadmium (Cd)	mg/kg	0.236	1.2	0.294	0.069	1.4	10	22	22
Tin (Sn)	mg/kg	0.217	0.769	0.568	0.135	5	50	300	300
Cobalt (Co)	mg/kg	11.7	10.6	25	22.2	40	50	300	300
Lead (Pb)	mg/kg	6.39	35.5	12.7	3.96	70	140	260	600
Molybdenum (Mo)	mg/kg	0.264	0.596	0.485	0.189	5	10	40	40
Nickel (Ni)	mg/kg	83.9	100	109	516	45	45	89	89
Selenium (Se)	mg/kg	0.645	0.507	1	0.232	1	1	2.9	2.9
Talium (Tl)	mg/kg	0.098	0.097	0.203	< 0.050	1	1	1	1
Titanium (Ti)	mg/kg	445	1163	3251	142	-	-	-	-

Parameter	Unit	T-1	T-2	T-3	T-4	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 Coımmercial Purposes (mg/kg)	Use for Industrial Purposes (mg/kg)
Uranium (U)	mg/kg	0.575	1.43	1.04	0.613	23	23	33	300
Vanadium (V)	mg/kg	54.9	36.8	82.1	25.9	130	130	130	130
Chromium(Cr)	mg/kg	56.9	66.2	85.6	720	64	64	87	87
Oil and Grease	%	< 0.02	< 0.02	< 0.02	< 0.02	-	-	-	-
BTEX	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-
TVOCs	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-
TPH	mg/kg	< 100	< 100	< 100	< 100	-	-	-	-

*: (Kanada Çevre Bakanları Konseyi, tarih yok)

As can be seen from the table above, Nickel at T-1 (Coal Depot) point, Zinc, Nickel and Chromium at T-2 (Osmaniye OIZ) point, Nickel and Chromium at T-3 (Yukarıburnaz) and T-4 (Port) points, exceed the relevant guidance values.

Nickel concentrations measured at all points were observed to exceed the guidance values. Nickel is an element naturally found in the soil with the decomposition of the bedrock. Agricultural fertilizers, especially phosphates, are one of the Nickel sources in the soil. In addition, wild storage areas where wastes are randomly poured into the soil are known as one of the sources of Nickel (McGrath, 1995). Among the measured points, the highest Nickel concentration was observed at T-4 (Port). Nickel concentration monitored here can be associated with intensive agricultural activities in the area and fertilizer use in agricultural activities. At other points, Nickel concentrations determined above guidance values may likewise be linked to fertilizer use. In addition, Nickel concentrations observed over the guidance values at all points sampled in the region may also indicate high baseline concentrations.

In T-2 (Osmaniye OIZ) point, all parameters exceeding the relevant guidance values are heavy metals. There are mainly steel, iron-steel, casting, fertilizer and yarn production facilities in Osmaniye OIZ, located near the sampled point. Here heavy metals exceeding the relevant guidance values can be associated with the mentioned industrial activities in the region.

At T-2 (Osmaniye OIZ) point, one of the parameters exceeding the guidance values is Zinc. Zinc (Zn) is most commonly used in metal coatings and alloys. Zn is especially found in metal processing wastewater with silk thread, fiber production, steel industry and cooling systems that apply cathode treatment (Seven, Can, Darende, & Ocak, 2018). High Zinc values can be associated with industrial activities carried out in Osmaniye OIZ.

At T-2 (Osmaniye OIZ), T-3 (Yukarıburnaz) and T-4 (Port) points, it was observed that the Chromium parameter was above the guidance values. Chrome has a wide range of applications such as paper industry, chemical industry, fertilizers, metal works and foundries, leather tanning, power plants. Wastewater discharge having chromium may be the cause of high levels in the soil at T-2 (Osmaniye OIZ) and T-4 (Port). In the region where T-3 (Yukarıburnaz) point is located, intensive agricultural activities are carried out. Since the other activities mentioned above are not observed in the region, the high concentration of Chromium here can be associated with the use of fertilizers in the agricultural activities carried out.

4.1.3. Regional Geology

General geology and structural geology of the project area was prepared by using the Mersin-O35 and O36 sheets of 1/100,000 scale Geological Map of Turkey and 1987 Misis-Andırın stratigraphy and structural evolution study of Kozlu, H.

4.1.3.1. Geology

The oldest unit in the region is the Late Cretaceous Early Eocene-aged Dokuztekne Formation. Volcanism is active at the lower levels of this formation. During this volcanism under the sea, blocks of various ages from the environment with gravity shifts have settled in this unit. The upper levels of the formation include sandstone and clayey limestone lithologies formed in a calmer environment. From the Middle Eocene to the Lower Miocene phase, the Andirin Formation, which contains the blocks of rocks of different ages in the serpentinite matrix, which has been moved from place to place, is located. In the Early-Middle Miocene, the Karataş Formation with the flysch character was deposited. There are blocks from the older units in the Karataş Formation, and large blocks and nappe slices of the Andirin Formation.

In the eastern parts of the region, there is the Late Miocene aged Kızıldere Formation of the Amonos sequence, which outcrops in the Amonos Mountains. The rocks representing the shallow marine form the Kızıldere Formation.

The region was compressed after Miocene (Tortonian) with the impact of approximately north south directional compression tectonics and gained a position close to today.

Post tectonically; The Plio-Quaternary Hamış Formation in the delta facies is located in the region. Quaternary aged Delihalil basalt was formed as the final product of tectonic movements in the region. Caliche and alluviums seen in large areas are other Quaternary formations.

4.1.3.2. Structural Geology

The project area is located in one of the major tectonic regions of Turkey. Units monitored in the region continue to provide wider outcrops towards North-NorthEast. Formations between the Taurus Troops in the Kozan-Feke-Saimbeyli regions and the West-Northwest region of the Amanos Mountains have been influenced by the compression tectonics that have survived until today and have gained their present position. Evidence of compression tectonics begins in Eocene, continues in Miocene, and after the Upper Miocene (Tortonian), the outline of the region becomes evident.

In the Norteast parts of the region, the Dokuztekne formation around Doruk-Selimiye villages is overlayed on the Karataş formation. The most important broken line in the region is the fault between the Misis Stack and Kızıldere formation, which we call the Yumurtalic Fault. This fault was observed as a high-angle reverse fault up to the Gaziantep - N36 b2 map in NE, around Yumurtalik district in the south. Although the northern block has been observed to be elevated, there is also a left directional component. Basaltic volcanism occurred in the Quaternary phase, using the Yumurtalik Fault, which attained its current position at the end of the Tortonian. There is another high angle reverse fault that starts to be observed around Karataş district in the southwest, which is damped in Delihalil region and affects only Karataş formation.

The extension of the Neogene aged tectonic lines of the South East Anatolian region turns into NE-SW strike strike-slip faults and thrusts in the region, and traces of all kinds of intense tectonic impacts (fault, thrust, drift) can be seen in the area. A schematic map showing important tectonic lines between the basins in the region (Kozlu, 1987) is given in Figure 4-5.

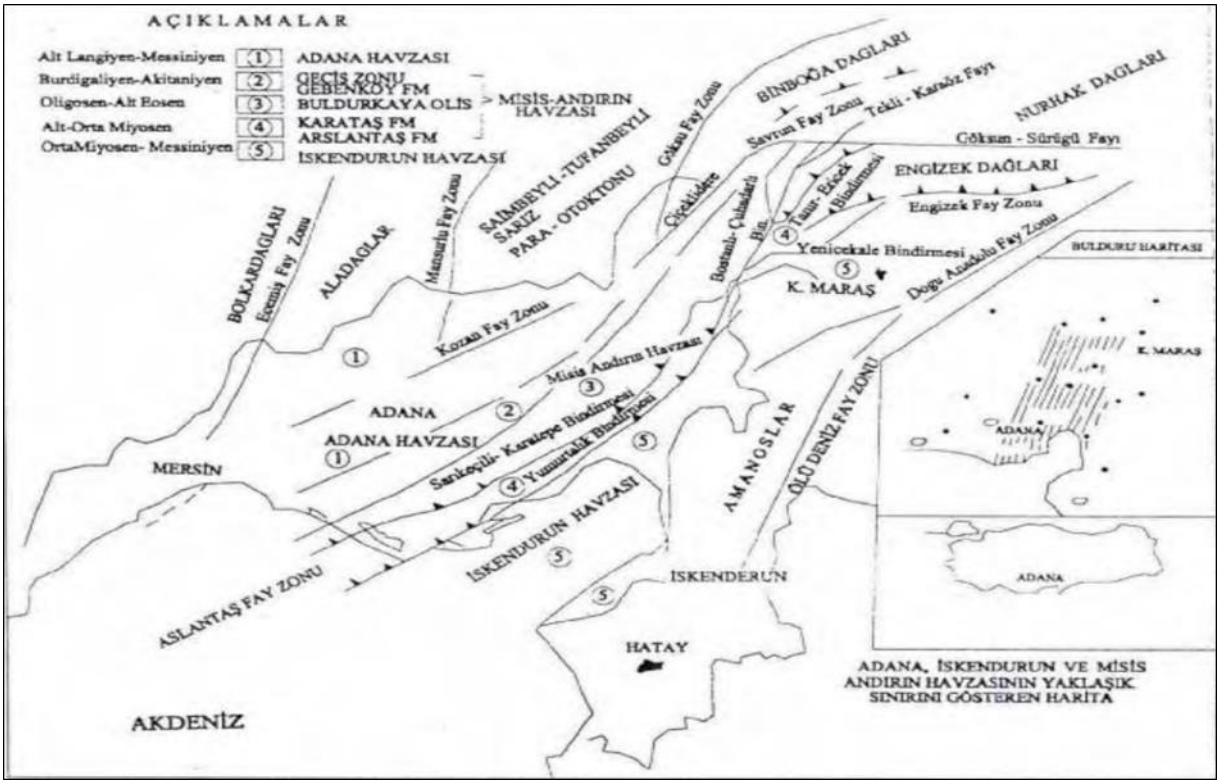

Figure 4-5 Schematic Map Showing Important Tectonic Lines between Basins in the Region (Kozlu, 1987)

4.1.4. Geology and Geotechnical Characteristics

A geological - geotechnical survey report was prepared by Temelsu Uluslararası Mühendislik Hizmetleri A.Ş. and Altaş Infrastructure International Engineering Consulting Inc. in 2019 for the project area. The geological units and their lithological features, geotechnical evaluations and disaster status observed as a result of the surface geology studies carried out within the scope of the geological - geotechnical survey report are summarized as below.

4.1.4.1. Stratigraphy

Units passed along the railway route, from old to young; Upper Miocene aged Kızıldere Formation, Quaternary aged Delihalil Basalt and Quaternary aged Alluvial deposits. The lithological features of these units are explained below, from old to young, and the stratigraphic column sections showing the project route and the outcropping units are given in Figure 4-6. The geology map of the project study area is given in Figure 4-7.

Neogene

Upper Miocene

Kızıldere Formation (Tmkı)

The same name has been adopted for the interlacing of conglomerate, reef limestone, which forms the lower levels of the unit located outside the study area, and for sandstone - marl alternations corresponding to the upper levels of the unit outcropping in the study area.

In the study area, there are proportional upper levels of Kızıldere formation. The sequence between Uzunkelli locality in the east of Yumurtalik district and Iskenderun Bay is typical for this unit.

There are red conglomerates and reef limestones at the levels of the formation located on the western slopes of Amonos Mountains. There are sandstones and marls in general, and

clayey limestones in the study area. External view of sandstones; dark gray, brownish gray, grayish - yellowish - light yellowish - blackish gray. Its fresh surface is in shades of gray. It is very loose cement in places. Grain sizes are fine and coarse sandy. It is terrestrial and small gravelly. Pebbles are less angular and mostly derived from quartzite, quartz and ophiolites.

The maximum gravel size can sometimes reach the block size. Marls are dark gray in color. Clayey limestones are light cream colored, fragile and irregular laminated. There are plant residues at the alternation levels of clayey limestone and marls. In addition, basalt lavas were observed at intermediate levels.

The unit is located on the Amonos sequence with angular unconformity, sometimes with red pebbles and sometimes reef limestones. The upper contact of the unit cannot be seen.

The unit has been cut by the Yumurtalik fault within this study area and towards the northeast. Researchers working in the region previously stated that they could not determine their thickness precisely because of the mixed structure in the field, and suggested thicknesses between 1500-2000 meters. Considering the uncertainty of the upper boundary of the formation, approximately 1500 meters thickness is considered.

Abundant macrofossils and foraminifer species have been identified in the reefs that fall outside the study area and form the lower levels of the unit. The outcrops in the study area represent the upper levels of the unit, and somatr from these levels, and forms with marine feature, were found in places.

According to the fossil findings, the age of the unit was accepted as Late Miocene.

Quaternary

Delihalil Basalt (Qd)

Quaternary aged basalts that originate from Yumurtalik, Ceyhan, Osmaniye and Haruniye regions and are identified as Delihalil basalts, leaving the main exit center on Delihalil Tepe, in west of the study area.

Delihalil Tepe is in the form of volcanic chimney complex. The perimeter of the hill is surrounded by basaltic lava flows. Basaltic lavas and tuffs under the lavas can be studied at Arnavut Tepe and Hayıtlı Tepe, southwest of the village of Akpınar in the study area.

There are basaltic lava flows in the study area and yellow - pink colored loosely tuffs under them. The lava flows are very resistant and bear flow traces.

In the petrographic examination of the basalts, it is noticeable that they are generally in the intergranular porphyritic tissue and the ophitic (obstructive) tissue and contain abundant cooling gas cavities.

Phenocrystals are plagioclase, olivine and titanium augite. The dough consisted of titanium augite, augite and few olivine micro grains and plagioclase microlites. In the examination of tuffs under the basaltic lavas, it was observed that they consisted of limonitized microlitic textured volcanic rock fragments again in the totally dyed paste.

Delihalil basalt lavas are in the form of lava flows in the study area, in areas covering Arnavut and Hayıtlı Hills. Under the basalts, yellow-pink colored tuffs were found in places close to the bed.

The age of Delihalil basalts was considered as Quaternary.

Alluvion (Qal)

Generally alluviums forming topographic plains; they consist of sand, gravel and shafts.

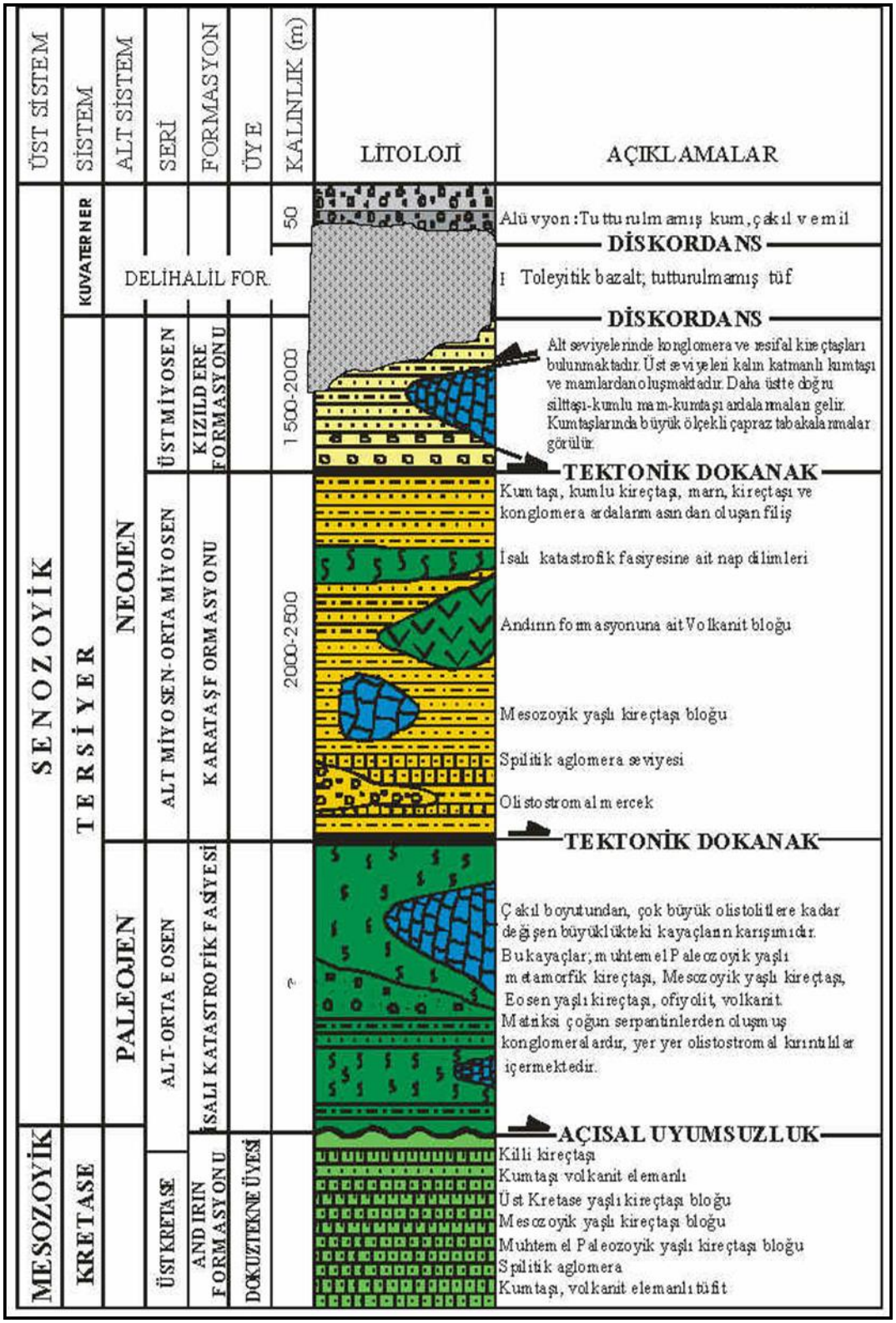

Figure 4-6 The Stratigraphic Column Sections of the Study Area and Surroundings

***Source:** Kozlu, 1987*

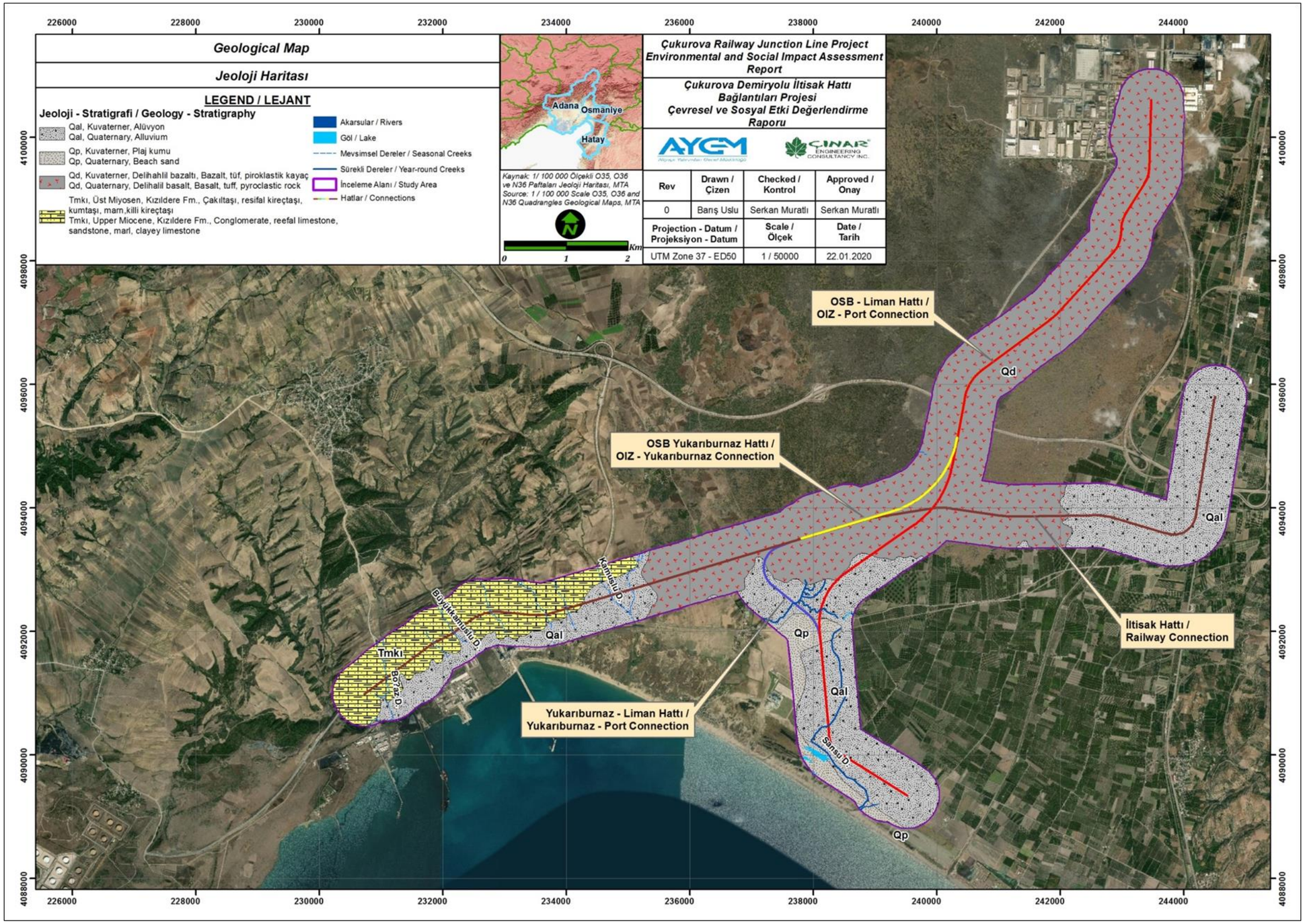

Figure 4-7 Geology Map of the Study Area

***Source**: Bilgin, A.Z., 2013; Sümengen,A., 2014; Usta,D. ve Beyazpirinç,M., 2018*

4.1.4.2. Geotechnical Characteristics

Geological - Geotechnical Evaluation of Railway Route

Within the scope of the project, 41 basic exploration drillings on the Connection Line, with depths ranging from 10.00 to 22.62 m, on the OIZ - Port Line; A total of 25 basic exploration drillings with depths ranging from 10.00 to 20.00 m, one 14 meters deep exploration drilling on OIZ - Yukariburnaz Line and a total of 6 basic exploration drillings with depths ranging from 10.00 to 20.00 m on Yukariburnaz - Port Line were performed. Apart from that, geophysical studies were carried out by using seismic, microtremor and multiple electrode methods on routes.

The aim of the drillings were 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 abused / undisturbed. Physical and mechanical laboratory experiments were carried out on soil and rock samples.

Connection Line

KM: 0+000 - 2+000

In this section, the connection line is located just to the right of the existing railway. In this interval, the connection line passes through the cuts and fills on the alluviums. Cut and Fill heights are less than 2.50 meters. In this section, 6 basic exploration drillings were performed. Basalts were cut under the alluvium in the first three drillings. According to laboratory test results; Alluviums and SPT samples consist of sandy silty clay, sandy clay silt, silty sandy gravel, pebbly silty sand grounds.

KM: 2+000 - 4+400

In this section, the connection line will pass over the filling material to be made on the alluviums. In this section, 10 basic exploration drillings were opened. According to laboratory test results; Alluviums and SPT samples consist of sandy silty clay, sandy clay silt, pebbly silty sand, sandy silty gravel. Basalts were cut under alluvial floors in other drillings except for İSK - 7 drilling.

KM: 4+400 - 11+130

The connection line will pass through the basalt in this interval with cuts and fills. In this section, 9 basic exploration drillings were opened. Basalts according to surface geology and drilling data; strength-moderate strength, partly moderately weak strength, less-medium separation, partly decomposed. Gas gaps are generally observed. Station-1 site will be designed between KM: 7+771 - 8+871. The station area is located on basalts. The engineering structures in this section are situated on basalts.

KM: 11+130 - 13+000

In this section, the connection line will pass over the filling material to be made on the alluviums. In this section, 6 basic exploration drillings were opened. Only in ISK-31 drilling, sandy silty pebble lenses were cut between sandy silty clays. In this range, there are underpasses at KM: 11+495 and according to ISK-27 drilling data on the underpass floor; 3.60 meters thick sandy silty clay on top and basalt underneath.

KM: 13+000 - 16+272.70

The connection line in this section; KM: 13+000 - 13+250 alluvium, KM: 13+250 - 16+272.70 will pass through the Kızıldere formation with cuts and fills. In this section, 11 basic exploration drillings were opened. Only İSK-32 drilling was opened in alluviums.

Kızıldere formation consists of mudstone, claystone, siltstone, sandstone, marl units. It is yellowish light brown-gray, dark greenish gray. In the lower parts, the formation is rock-like and generally weak-very weak-resistant, moderately weak-resistant, moderately-very decomposed, and partially-less-moderately weathered. The upper parts are separated and generally consist of sandy silty clays. There are silt and pebble lenses in between.

The upper parts of the formation between KM: 13+990 - 14+255 present the appearance of blocky pebbly clayey sand. Station-2 will be situated between KM: 15+019.61 - 16+269.61. There is Kızıldere formation on the ground floor of the station area. The upper parts of the formation are separated and turned into sandy silty clay (residual ground). There are high cuts and fills in this section.

OIZ-Port Line

KM: 0+000 - 9+090

In this interval, the OIZ - Port line will pass through the cut and fill to be produced on basalts. In this section, 11 basic exploration drillings were opened. Basalts are generally blackish dark gray colored, generally gas void, and joint surfaces are very rough. It usually looks like a slag on the surface. It is durable - medium strength, partly medium weak strength, less - medium separation, partly decomposed. Station: 4 area between KM: 0+050 - 0+900 is located on basalts.

KM: 9+090 - 14+085

OIZ-Port line will pass with the fills to be produced on alluviums in this section. It will be passed by cuts at a short distance only between KM: 13+160 - 13+260. In this section, 14 basic exploration drillings were opened. Basalt was cut under alluvium in 6 drillings. According to laboratory results; Alluviums and SPT samples consist of sandy clay silty, sandy silty clay, silty clay, sandy silty gravel, silty sand, gravel silty sand.

OST-14, OSK-15, OSK-16, OSK-17 drillings opened between KM: 9+700 - 10+560, are at the upper levels of alluviums with SPT - N values on silty clayey soils 2-5 (soft - middle floor) 5-8 on gravel sand floors (loose) between. According to the drilling data, in the sections where there are engineering structures; there are alluvium at the top and basalts at the bottom.

OIZ-Yukarıburnaz Line

KM: 0+000 - 2+314.692

OSB - Yukariburnaz Line will pass completely through the cut and fill that will be produced on basalts. In this section, 1 basic exploration drilling was opened. Basalts are generally blackish dark gray colored, generally gas void, and joint surfaces are very rough. It usually looks like a slag on the surface. It is resistant - medium strength, partly moderately weak strength, less - medium separation, partly decomposed.

Yukarıburnaz-Port Line

KM: 0+000 - 2+252.15

Yukarıburnaz - Port line will be passed through the fills to be completely produced. In this section, 6 basic exploration drillings were opened. According to drilling data there are basalts between KM: 0+000 - 0+510; and there are alluvial floors Between KM: 0+510 - 2+252.15. Basalts are generally blackish dark gray colored, generally gas void, and joint surfaces are very rough. It usually looks like a slag on the surface. Strength - medium strength, occasionally medium weak strength, less-medium separation. Alluviums, sandy silty clay between KM: 0+510 - 1+800 and KM: 1+800 - 2+252.15 consists of gravelly silty sand grounds. According to the drilling data of underpass at KM: 0+460sits on basalts. In sections with other engineering structures; there are alluvium at the top and basalts at the bottom.

In order to determine the geotechnical properties of the geological units surfacing along the route, the following studies were conducted during geotechnical surveys:

- Geological unit boundaries were revised using the drilling data and necessary revisions were made.
- Existing highway cut / fill slopes, which cross the route and located nearby, have been studied to make use of.
- Rocks and soils were evaluated for detachability.
- Layer and joint positions of geological units were measured at points that can be measured, joint gaps, gaps, continuity, roughness, type and properties of filling material, water status were investigated.
- In order to evaluate the availability of splitting materials in fillings, research pits were opened in some splittings and samples were taken for laboratory experiments.
- Units, weathering, hardness, strength etc. of the units. Information about its features was collected.

Usability of Excavation Materials in Fills

4 research pits were opened in the cuts to investigate the use of excavation materials in fills. Sieve analysis, atterberg limits, standard proctor and wet CBR + swelling tests have been carried out for these samples; and evaluations have been made for the use of excavation materials in fills.

As a result, in general; The Kızıldere formation, which consists of conglomerate, sandstone, marl units, is not usable in fills since it does not meet the fill material standards from the cut parts consisting of clayey floors on the upper part of them and the materials coming out of a small amount of alluvial cuts. However, only the materials that will come out of basalt cuts are in accordance with the fill material standards and can be used in fills.

Cut and Fills

There are high cuts and fills in some sections along the railway routes. Cut and fill slopes; were determined by evaluating the field observations together with the drilling data and laboratory test results and supported by stability analysis.

The fills will be formed with 3Y/2D slope with the materials to be extracted from basalt cuts and the materials to be drawn from the borrow quarry consisting of basalts. Basalt cut slopes, on the other hand, have been found suitable to be opened with 2Y/1D slopes, considering that their upper parts are in the form of slag in some places and will meet the fill need along the routes.

4.1.4.3. Seismicity

Movements between the Eurasian-African-Arabian plates, which are defined as the main or large plates, determine the earthquakes in Ceyhan and its vicinity. The border of the Arab and African plates with the Anatolian plate is the Bitlis Thrust Belt in Eastern Anatolia, and the other is the Cyprus Plunge-Submersion belt, which reaches the Gulf of Antalya by drawing a bow from the south of İskenderun Bay to Cyprus. The Dead Sea Fault, which separates these two different seismotectonic belts and moves left-handed, advances in the north-south direction and reaches the Cyprus arc in the northeast of Iskenderun Bay. They form a triple joint known as the “Maraş Trilateral Merger” by crossing the Dead Sea Fault, Eastern Anatolian Fault and the Cyprus Arc's northeastern extension around the Maraş region in the Eastern Taurus Mountains. The movements of Arab and African plates towards the Anatolian

plate create neotectonic deformations on these fault belts and the region acquires an active seismicity character.

The Project area was marked on Earthquake Hazard Map of Turkey as shown in Figure 4-8. The project area and its immediate 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 0.302 g.

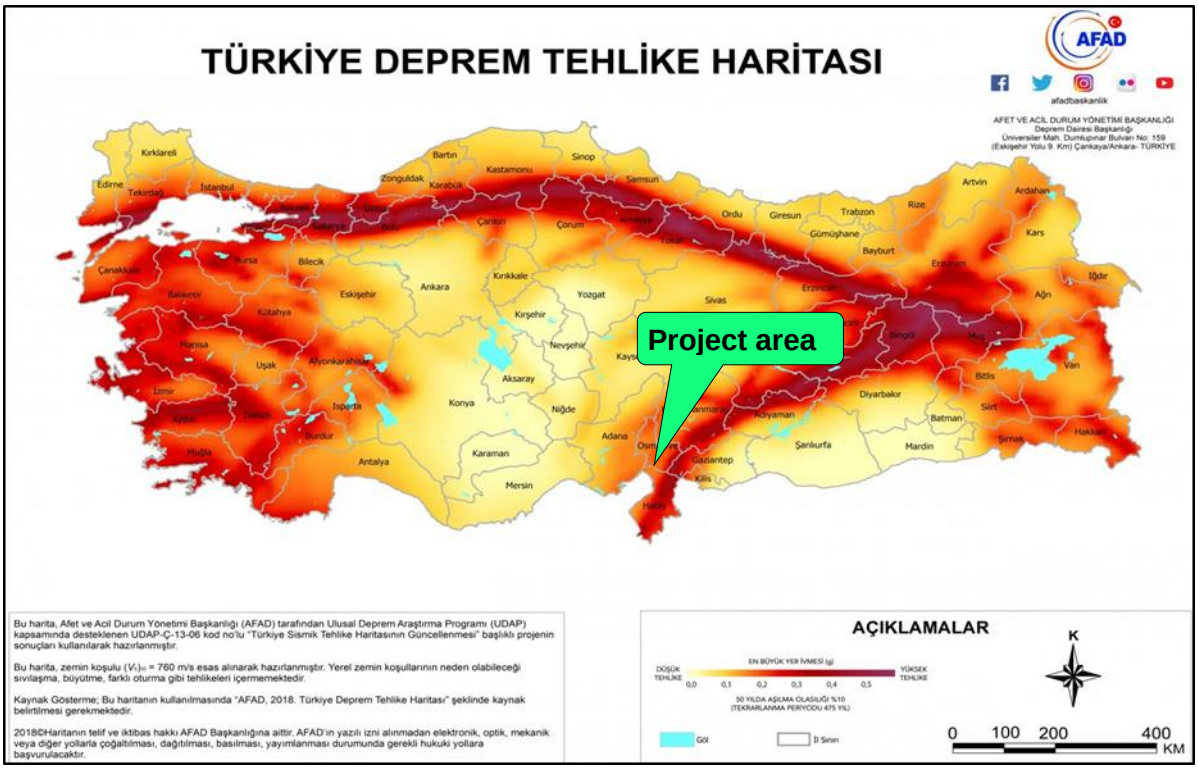

Figure 4-8 Earthquake Hazard Map of Turkey

***Source**: AFAD, 2018, Turkey Earhquake Hazard Map*

The region covers a seismically impactive area among the active tectonic structures such as the Eastern Anatolian Fault System, Ecemiş Fault Zone and the Helen-Cyprus arc. Therefore, the seismicity of the region is controlled by the main active structures mentioned above and their branches.

Looking at the historical and instrumental earthquake records, it is seen that there are many medium and large scale earthquakes in the region from BC. 69 to date. IX intensity earthquakes that occurred in 1114 and 1268 are among the first important earthquake records in Çukurova region. The 1513 earthquake, most likely produced by the Eastern Anatolian Fault System, had a devastating impact on the Tarsus-Adana-Malatya axis and was felt throughout the Eastern Mediterranean region. Later, the biggest earthquakes in the region occurred in Antakya in 1822 and in Amik Lake in 1872 and caused a significant damage in a geography including Çukurova region.

It is also noteworthy that damaging earthquakes that occurred in Tarsus-Antakya-Aleppo axis between 1500 and 1800. It is observed that there were many earthquakes that entered the Aleppo and Antakya records, especially from the early 1600s to the mid-1800s. In the 19th century, it is observed that there was no activity in terms of major earthquakes in the region especially after the 1822 and 1872 earthquakes. In the 20th century, many medium and small earthquakes occurred in the region. According to the list of major earthquakes published by

Kandilli Observatory and Earthquake Research Institute, a total of 5 major earthquakes (M> 5) have occurred in Adana and Hatay (Antakya) Region since 1900 and are listed below (Kandilli Observatory and Earthquake Research Institute website, is http://www.koeri.boun.edu.tr)

- 20.03.1945 Ceyhan-Misis (Adana) M = 6.0 13 people died and 2500 damaged buildings occurred.
- 22.10.1952 Ceyhan-Misis (Adana) M = 5.6 10 people died and 617 damaged buildings occurred.
- 27.06.1998 Ceyhan (Adana) M = 6.2 146 people died and 31463 damaged buildings have occurred.
- 8.4.1951 İskenderun (Antakya) M = 6.0 6 people died and 13 damaged buildings occurred.
- 22.1.1997 Antakya M = 5.4 1 person died and 1841 damaged buildings occurred.

On June 27, 1998, at 16:55 local time, an earthquake with magnitude of 6.2 occurred in an area between Ceyhan and Misis of Adana province. The earthquake caused quite common liquefaction in the Ceyhan river floodplain deposits. The main shock (Mw = 6.3) and the aftershock-earthquake (Ms = 5) of 4 July 1998 caused liquefaction (Department of Disaster and Emergency Management, Department of Earthquake).

Karataş-Osmaniye Fault Zone:

Karatas Fault extends north across the Gulf of Iskenderun N40°E direction according to the Active Fault Map of Turkey. The fault, which is observed for 64 km between Osmaniye in the east and Karataş in the west, has a left lateral strike slip character with a reverse slip component. The northern block of the fault is located morphologically higher. The 16 km part of the Karataş fault in the east is located in the Early-Middle Miocene aged Karataş formation, and the 38 km long central part is located between the Karataş formation and the Quaternary sediments and the 10 km west section corresponding to the coastal line. The fault reaching the Mediterranean in Karataş region continues from the sea floor to Cyprus according to the literature information (Yavuzoğlu, A., Özalp, S., Et al., 2016).

Yumurtalık Fault:

The Yumurtalik fault in the Sürgü-Misis fault zone borders İskenderun Bay from the north. It is located between Delihalil Quaternary Volcano and Ceyhan Delta, in the direction of K55ºE and it is 41 km long. Yumurtalik Fault, which shows left lateral strike slip character, is divided into two parts (west and east) in İncirli, with its tabbed, left and left tab structure, 2 km wide and 4 km long. Quaternary basalt outlets observed in the tab area where the fault morphology with slope slip component is clearly observed should be related to this structure. The western part (24.5-km) combines Miocene deltaic and turbiditic sedimentary units with tectonic contact. The eastern part (16.5 km), which is mostly observed in the Quaternary lava, ends in the Delihalil volcano cone (Kara, M., Elmacı, H., et al., 2016).

Düziçi İskenderun Fault:

Düziçi - İskenderun Fault Zone (DIFZ) is located between the northern and southern branches of the Eastern Anatolian Fault (DAF) Zone, one of the most important inland trans-form faults of the Eastern Mediterranean Region. The Fault Zone consists of normal faults extending parallel to the western skirts of the Amanos Mountains and inclined to the west. Düziçi-İskenderun Fault Zone (DIFZ); It consists of four segments; Düziçi, Osmaniye, Erzin and Payas segments. The Düziçi segment is a 19-km-long normal fault extending in the NW direction and inclined to the west. The segment consists of two fault sections. The eastern part of the

Düziçi Fault segment forms the border between the Amanos mountains and the Düziçi Quaternary basin. Due to the current activity Osmaniye Segment, on the other hand, is a 24 km long normal fault extending in the general direction of N45°E and inclined to the NW. It consists of three fault sections separated from each other by stepwise tabs. The 11 km long eastern part of the Osmaniye segment cut Miocene clastic and carbonate rocks. The 13 km-long middle section extends between Issizca in the north and Dereobasi villages (south of Osmaniye) in the south, and mostly cuts the Quaternary sediments and Miocene aged clastic and carbonated rocks. The 4 km long western section extending in the direction of D-B around the village of Fakıbaba (south of Osmaniye) brings together the Plio-Quaternary deposits and Miocene aged carbonated rocks (Özdemir, E., Kürçer, A., et al., 2016).

Active Fault Map of the Project Area is given in Figure 4-9.

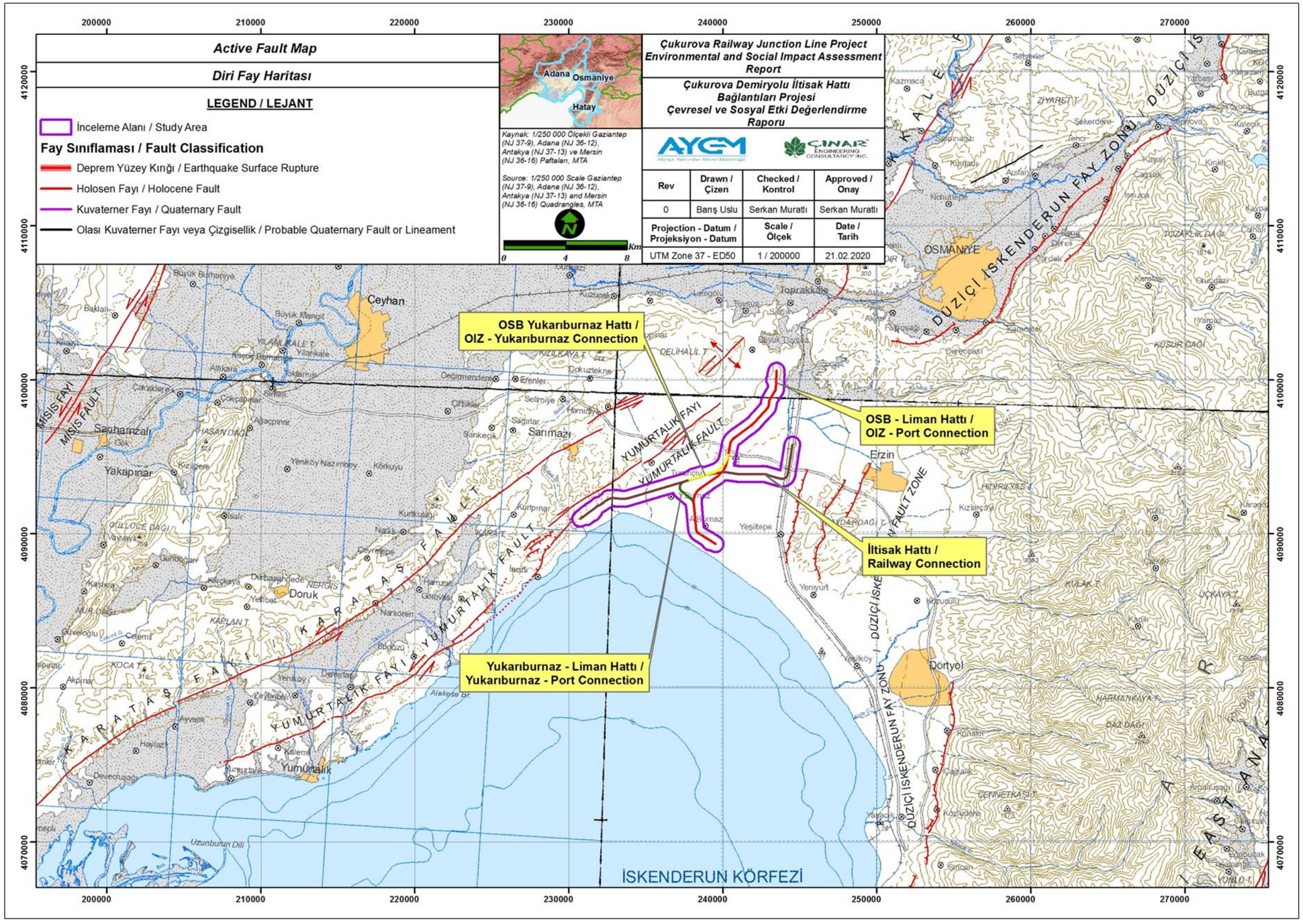

Figure 4-9 Active Fault Map of the Project Area

***Source**: Emre ve Duman, 2011., Emre ve diğ., 2012a, 2012b, 2012c*

4.1.4.4. Landslides

Both detailed geological and geotechnical survey reports and the online Geoscience Map Viewer of MTA was used to scan for active land slide zones around the Project area. As a result, it was identified that no active or former landslide areas exist in the entire Project vicinity. The landslide map of the project area is given in Figure 4-10.

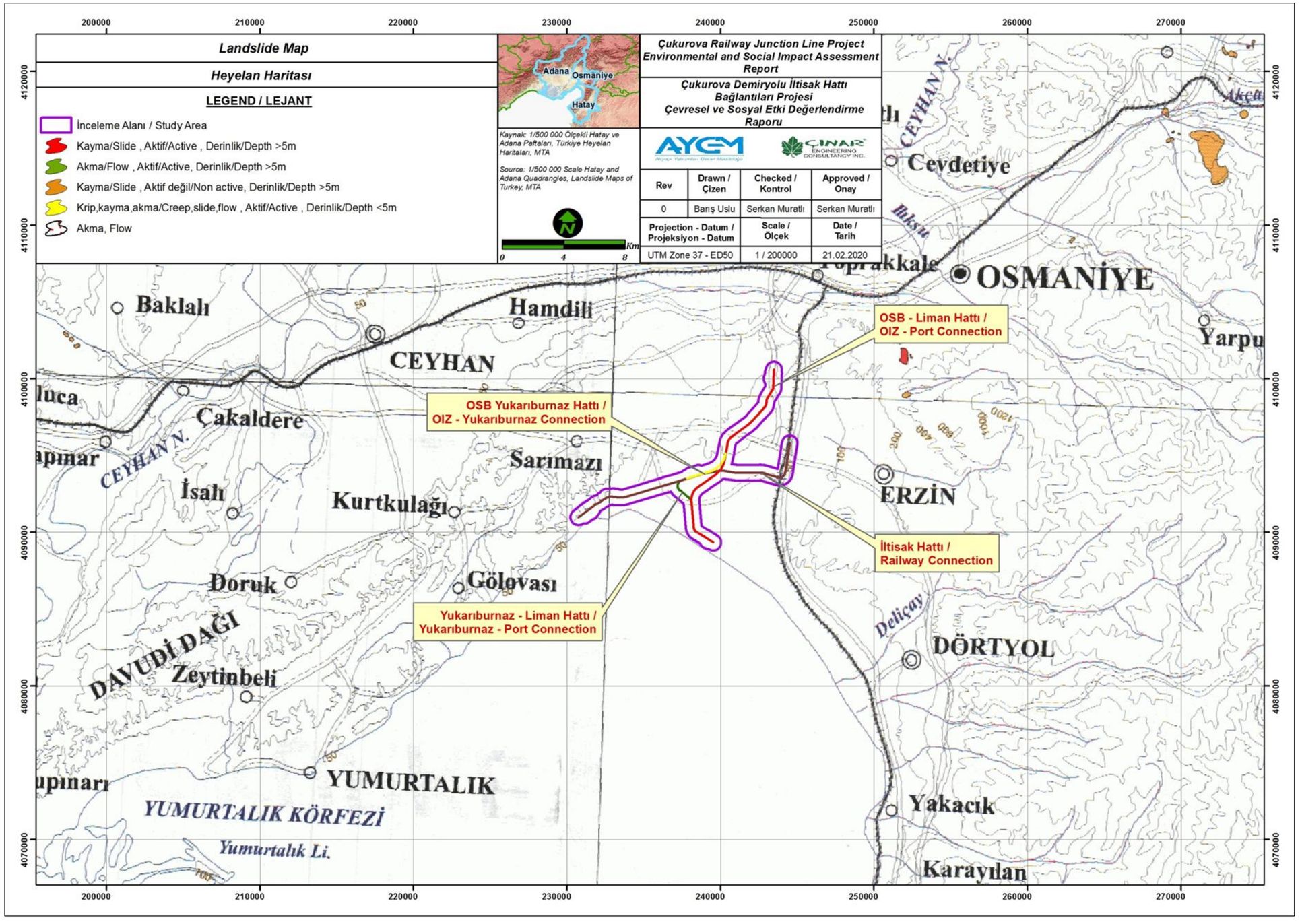

Figure 4-10 Landslide Map of the Project Area

***Source**: Duman ve diğ., 2009a, 2009b*

4.1.4.5. Geosites

Turkish Association for Geological Heritage Protection (Jemirko) provides a geological heritage sites inventory.

Typical localities that explain the evolution of the Earth's crust are geological elements with a large visual side, beautiful representatives of the well-known events or processes, rare occurrences, and "geological heritage" fragments to be preserved. They can be important fossil deposit, tectonic structure, type section, ground shape, mineral community, mineral deposit, rock etc. These are always necessary for both the learning of the earth and earth science education. Geosite, with its broadest scope, is a rock, mineral, fossil community, structure, piling, landform or terrain that expresses any geological process, event or feature. Those with archaeological or historical value are Cultural Geosite. The area where the same or different types of geosites are collectively smaller than the pedestrian distance 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).

Information on geosites listed in the inventory of Jemirko and located Adana province, is provided in Table 4-9 and as can be seen, no listed geological heritage site was identified to be located on the Project area.

Table 4-9 Geosites in the Vicinity of the Project Area

Name	Province	Description	Distance to the Project (km) and Direction
Akyatan Lake	Adana/Karataş	Akyatan lagoon-lake is a place to study today's delta and sedimentation environments. It is proposed to be a geopark.	63 km – SW
Ceyhan River, Yumurtalik Bay South Shores, Delta Formation Areas	Adana/Yumurtalık	Ceyhan river, Ağyatan lagoon, Yumurtalik Bay shores, Akyatan lake (small size), Avci Ali lake, Big and small old, new coastal lakes, fixed, moving old, new dunes, marches, marshy areas, abandoned streams. It is a large region with interconnected delta forms such as deposits, large and small sand islands, submarine sandsets, coastal languages, various coastal arrows, cliffs, natural embankments, grooves, ridges, crevas depots, bed edge steeples, and a wide variety of current sediments. It is not protected, it is proposed to be a geopark.	33.5 km – SW
Yali Stones (Coastal Stone) is located at the streams between Muttalip Farm and Yumurtalik Port.	Adana/Yumurtalık	They are contemporary formations of various lithological character, formed by the combination of loose materials on the shore with limestone cement. It is not protected.	10.8 km-SW
Hardened Fossil Dunes, Yumurtalik District-Sultan Suleyman Tower surroundings	Adana/Yumurtalık	They are hardened old fossil dunes where cementization is strong, covering 5-7m on the shore and 10-12m in height and 50-100m in width. They gained resistance	52 km-SW

Name	Province	Description	Distance to the Project (km) and Direction
		against erosion as a result of calcification. It is not protected.	

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

4.2. Noise

In order to assess the impacts of noise arising from the construction and operation activities of the project, background noise measurements were carried out at a total of 4 points (noise sensitive receptors) selected along the routes of railway connection lines that have the potential to be adversely affected by construction and operation activities.

Background noise measurements were made for 48 hours to assess hourly noise levels. Lmin, Lmax and L90 values were recorded in 10 minutes logs with Leq at 4 points for 48 hours.

Environmental noise measurements were carried out in accordance with TS 9315 ISO 1996-1 and TS ISO 1996-2 standards. TS 9315 ISO 1996-1 standard describes the basic quantities to be used for the description of noise in collective environments and explains basic determination processes. TS ISO 1996-2 standard covers methods for how sound pressure levels can be measured directly, how the measurement results can be calculated by external estimation (extrapolation) or determined only by calculation, to provide a basis for the assessment of environmental noise.

The background noise measurement points are listed in Table 4-10 below and shown in Figure 4-11.

Table 4-10 Background Noise Measurement Locations

Measurement Location	No	Coordinates	Number of Nearby Dwellings
Turunçlu-2	G-2	36S 236847 D 4092583 K	2
Yukarıburnaz	G-3	37S 238054 D 4093212 K	15
Aşağıburnaz	G-4	37S 238848 D 4090334 K	5
Sirincir	G-5	37S 244909 D 4095375 K	4

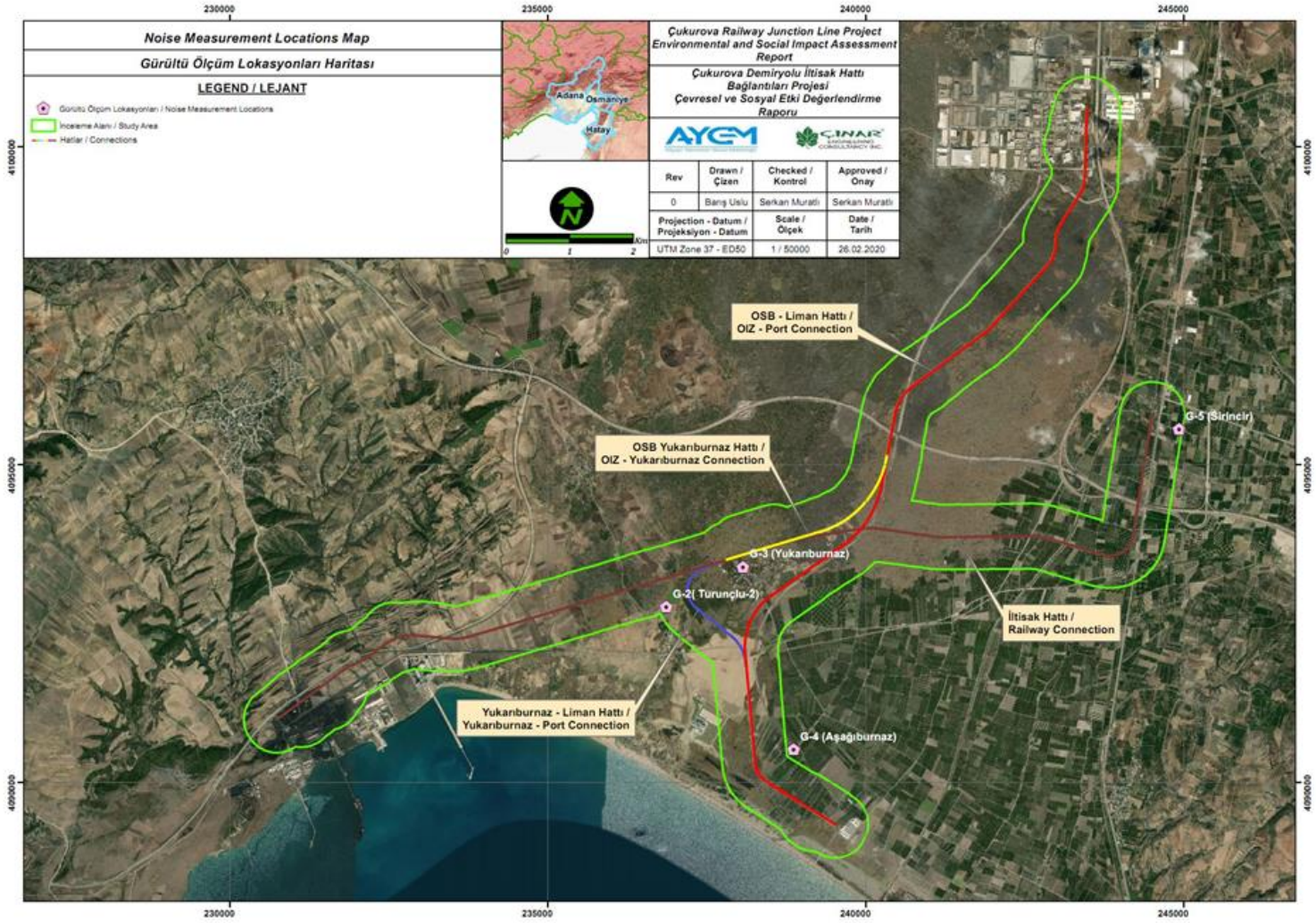

Figure 4-11 Background Noise Measurement Locations

The results of background noise measurements performed between January 21 - January 27, 2020, are averaged for Daytime (07:00 - 19:00), Eveningtime (19:00 - 23:00) and Nighttime (23:00 - 07:00) within the scope of Regulation on Assessment and Management of Environmental Noise (RAMEN). The averages for Daytime (07:00 - 22:00) and Nighttime (22:00 - 07:00) periods within the scope of the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for Environmental Noise Management were also calculated and presented in Table 4-11 below.

Table 4-11 Background Noise Measurement Results

Measurement Location	Date	Results				
		RAMEN			World Bank Group	
		Daytime (07:00-19:00) (dBA)	Eveningtime (19:00-23:00) (dBA)	Nighttime (23:00-07:00) (dBA)	Daytime (07:00-22:00) (dBA)	Nighttime (22:00-07:00) (dBA)
G-2 (Turunçlu-2)	21 – 23 January 2020	50.69	42.94	45.00	49.80	**45.00**
G-3 (Yukarıburnaz)	23 – 25 January 2020	66.05	49.64	61.40	**65.19**	**61.36**
G-4 (Aşağıburnaz)	25 – 27 January 2020	54.68	54.01	49.57	54.64	**49.56**
G-5 (Sirincir)	25 – 27 January 2020	61.24	52.27	50.14	**60.02**	**50.97**
World Bank Group Environmental Noise Limit Values					**55**	**45**

As can be seen from Table 4-11, background noise measurement results at G-3 (Yukarıburnaz) and G-5 (Sirincir) points exceed the daytime limit value of the World Bank Group for residential areas. In addition, the nighttime results at all points are above the night limit value of the World Bank Group.

4.3. Air Quality and Greenhouse Gas Emissions

4.3.1. Air Quality

In order to assess the impacts of air pollutant emissions from the construction and operation activities of the project, baseline air quality measurements were carried out at selected locations along the railway connection lines routes that have the potential to be adversely affected by construction and operation activities. In this context, PM_{10} and $PM_{2.5}$ were measured at a total of 4 points, and NO_2 and SO_2 concentrations were measured at a total of 8 points. PM_{10} and $PM_{2.5}$ measurements were carried out between January 21, 2020 and January 27, 2020 for 24 hours in a week. The coordinates of the PM_{10} and $PM_{2.5}$ baseline measurement points are listed in Table 4-12 below and shown in Figure 4-12.

Table 4-12 PM_{10} and $PM_{2.5}$ Measurement Locations

Measurement Location	Coordinates
Yukarıburnaz	37 S 238078 D; 4093206 K
Aşağıburnaz	37 S 238856 D; 4090340 K
Sirincir	37 S 244922 D; 4095369 K
Turunçlu	37 S 236827 D; 4092607 K

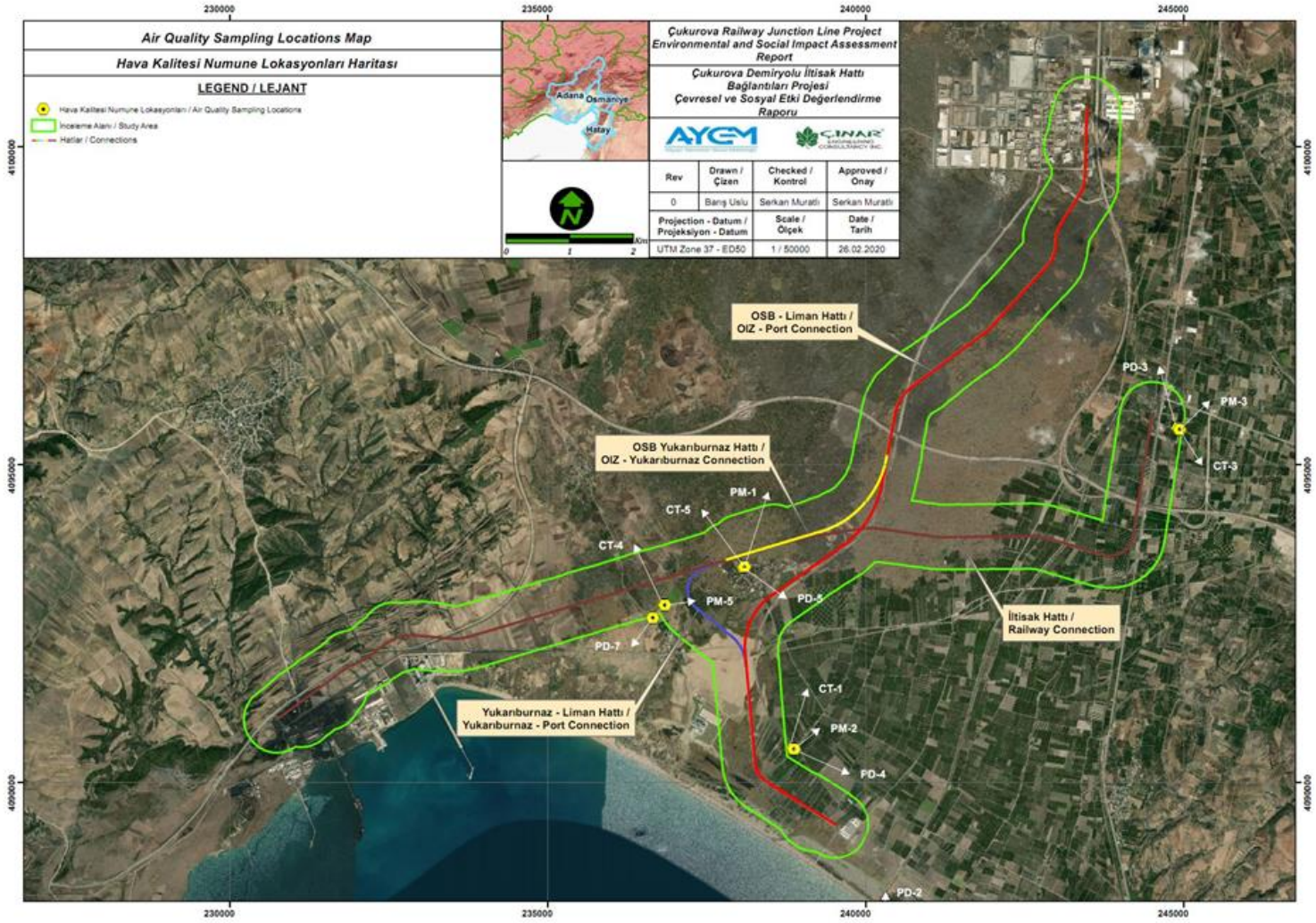

Figure 4-12 PM_{10} and $PM_{2.5}$ Measurement Locations

Baseline PM_{10} and $PM_{2.5}$ measurement results are presented in Table 4-13 below together with the relevant national and international limit values.

Table 4-13 PM_{10} and $PM_{2.5}$ Measurement Results

PM_{10}				$PM_{2.5}$	
Measurement Location	**24-Hr Average PM_{10} Measurement Result ($\mu g/m^3$)**	**Regulation on Air Quality Assessment and Management (HKDYY) 24-Hr Average PM_{10} Limit Value ($\mu g/m^3$)**	**World Health Organization (WHO) 24-Hr Average PM_{10} Limit Value ($\mu g/m^3$)**	**24-Hr Average $PM_{2.5}$ Measurement Result ($\mu g/m^3$)**	**World Health Organization (WHO) 24-Hr Average $PM_{2.5}$ Limit Value ($\mu g/m^3$)**
Yukarıburnaz	31.79	50	50	8.08	25
Aşağıburnaz	29.85			7.56	
Sirincir	30.98			7.98	
Turunçlu	31.76			7.99	

As can be seen from Table 4-13, 24-hour average PM_{10} baseline measurement results are below the limit value (50 $\mu g/m^3$) given Regulation on Air Quality Assessment and Management (HKDYY). For $PM_{2.5}$ parameter, there is no limit value defined in the national legislation.

PM_{10} and $PM_{2.5}$ baseline measurement results are below the 24-hour average PM_{10} and $PM_{2.5}$ limit values given in the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for Environmental Air Emissions and Ambient Air Quality (2007) (50 $\mu g/m^3$ and 25 $\mu g/m^3$, respectively).

NO_x and SO_2 passive sampling studies are currently ongoing and the results will be inserted into the Final ESIA report when the measurements are completed.

4.3.2. Greenhouse Gases

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-kilometres served by electricity (International Energy Agency (IEA), 2019).

About 7% of global freight transport activity (measured in tonne-kilometres) 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 4-13.

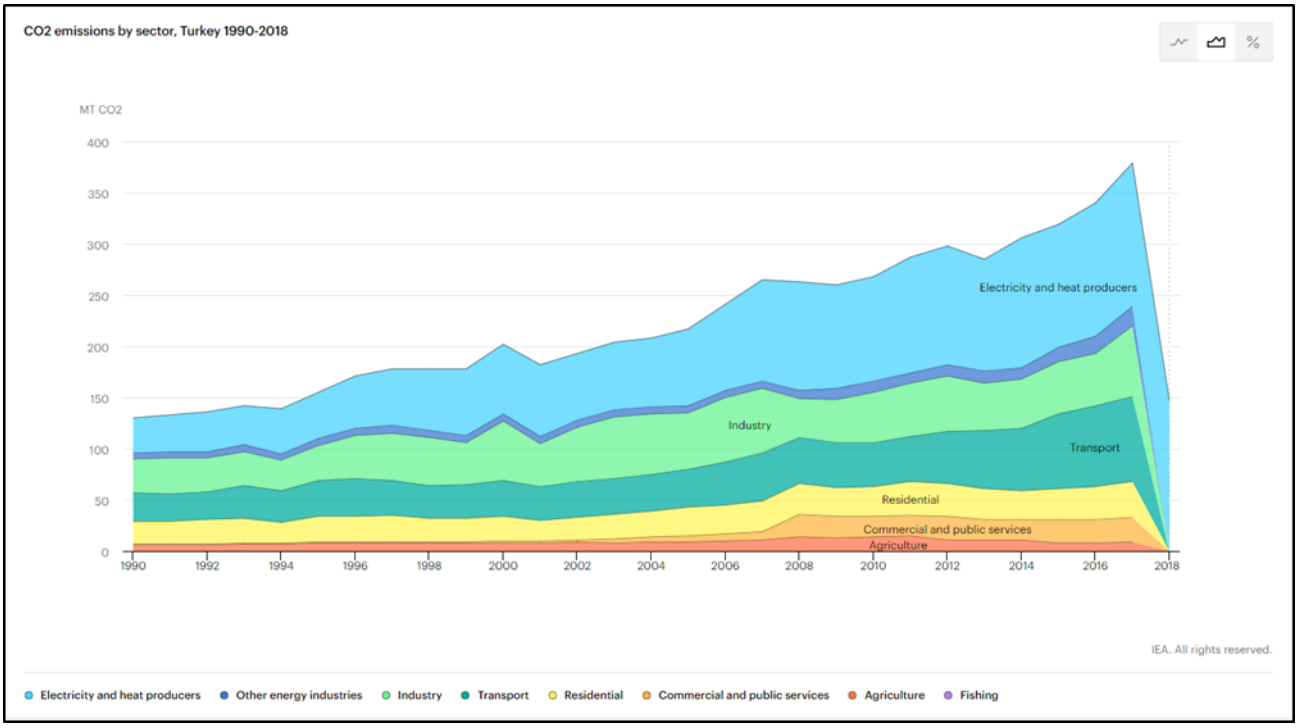

Figure 4-13 Sector-based CO_2 emissions in Turkey (1990 – 2018) (International Energy Agency, 2020)

CO_2 emissions from the transport sector in Turkey, as shown in Figure 4-13 represents a significant amount of CO_2 emissions. The distribution of CO_2 emissions within the transport sector is presented in Figure 4-14. 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).

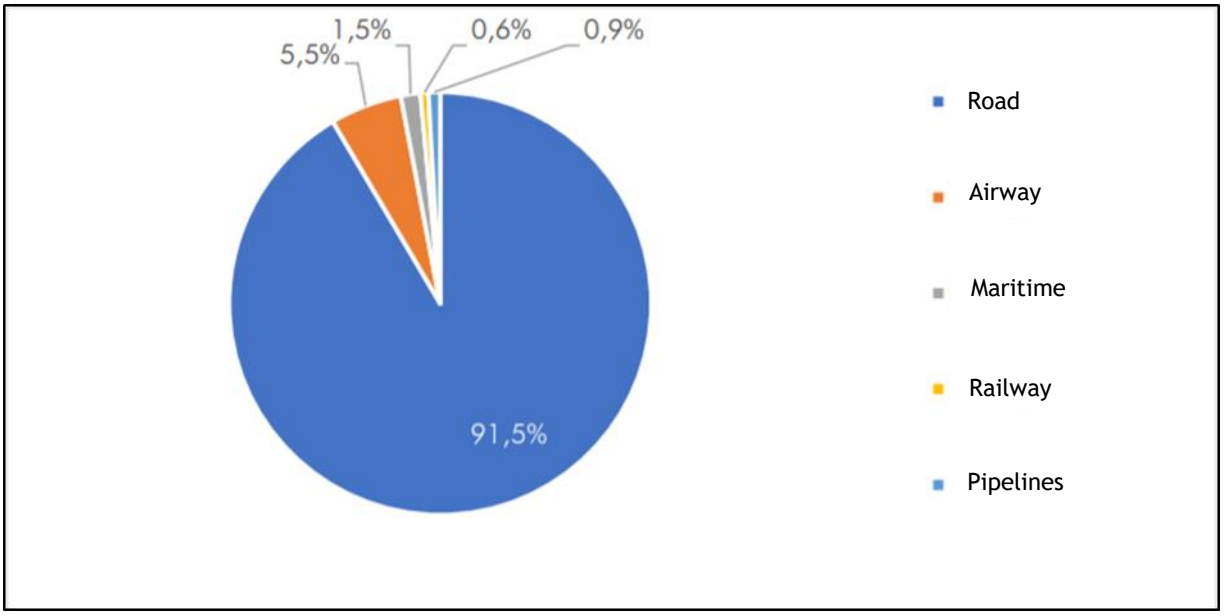

Figure 4-14 Distribution of CO_2 Emissions in Transport Sector in Turkey

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

4.4. Hydrology and Hydrogeology

All information presented in this section regarding surface and groundwater resources is based on the information and data in the reports and online database of the institutions.

- Data of Adana Province, Osmaniye Province and Hatay Province maps prepared in 2012 by Former Ministry of Forestry and Water Affairs, Department of Information Technology, Geographical Information Systems (GIS) Directorate., 2012;
- '2018 Annual Report' published by the Ministry of Agriculture and Forestry, General Directorate of State Hydraulic Works (DSI) in 2019;
- 'Project-Feasibility and EIA Services Work, Geological-Geotechnical Investigation Report' for the Connection Lines to the Industrial Facilities in Cukurova Region and Iskenderun Bay, Yumurtalik Free Zone Industrial Centers and Ports, prepared by Ministry of Transport and Infrastructure, General Directorate of Infrastructure Investments (GDII), Temelsu Uluslararası Mühendislik Hizmetleri A.Ş. and Alttaş Infrastructure International Engineering Consulting Inc. in 2019;
- Online 'Geodata Application' database (http://www.geodata.gov.tr) of Ministry of Agriculture and Forestry

4.4.1. Surface Water Resources

The Project area is located in Asi Basin which is one of the 25 water basins in turkey (Figure 4-15, DSI, 2019). In the Asi Basin, there are streams with continuous flow and numerous dry streams with seasonal flow that feed them, and these streams discharge directly into the Mediterranean. In addition, there are many natural lakes, ponds, dams, wetlands and lagoons, water structures and irrigation project sites in this water basin.

The map showing seasonal and continuous flows, streams, natural lakes and protected areas, which are surface water resources located on and around the project area, is presented in Figure 4-16.

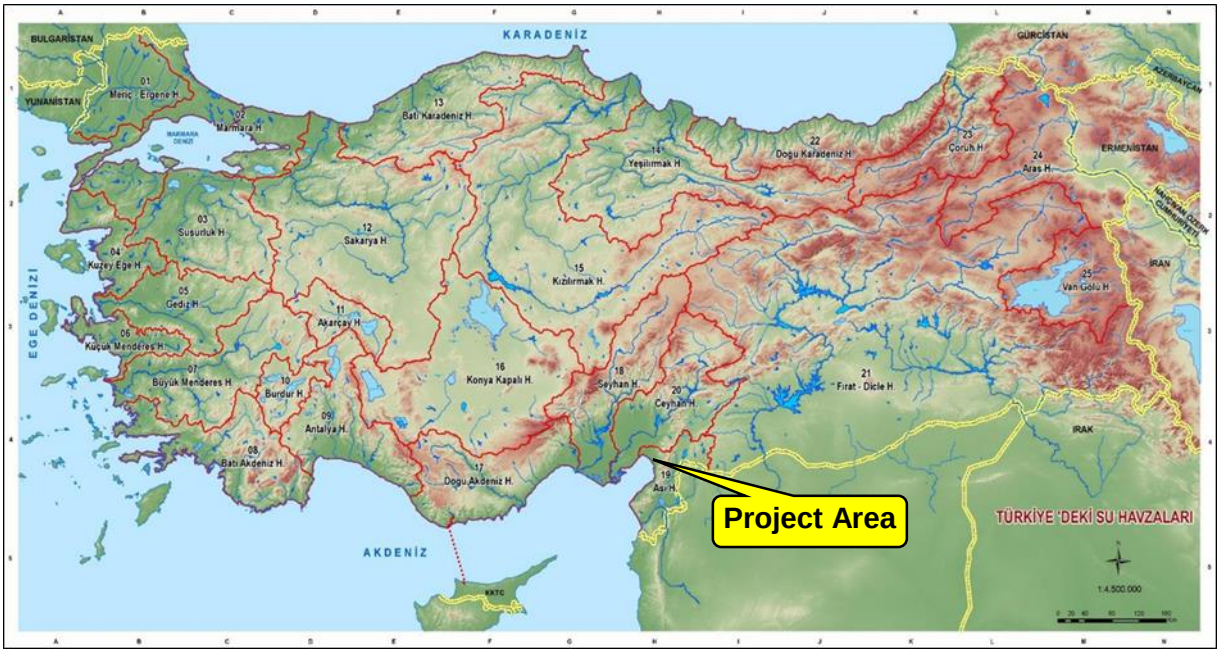

Figure 4-15 Water Basins in Turkey

***Source:** DSİ, 2019*

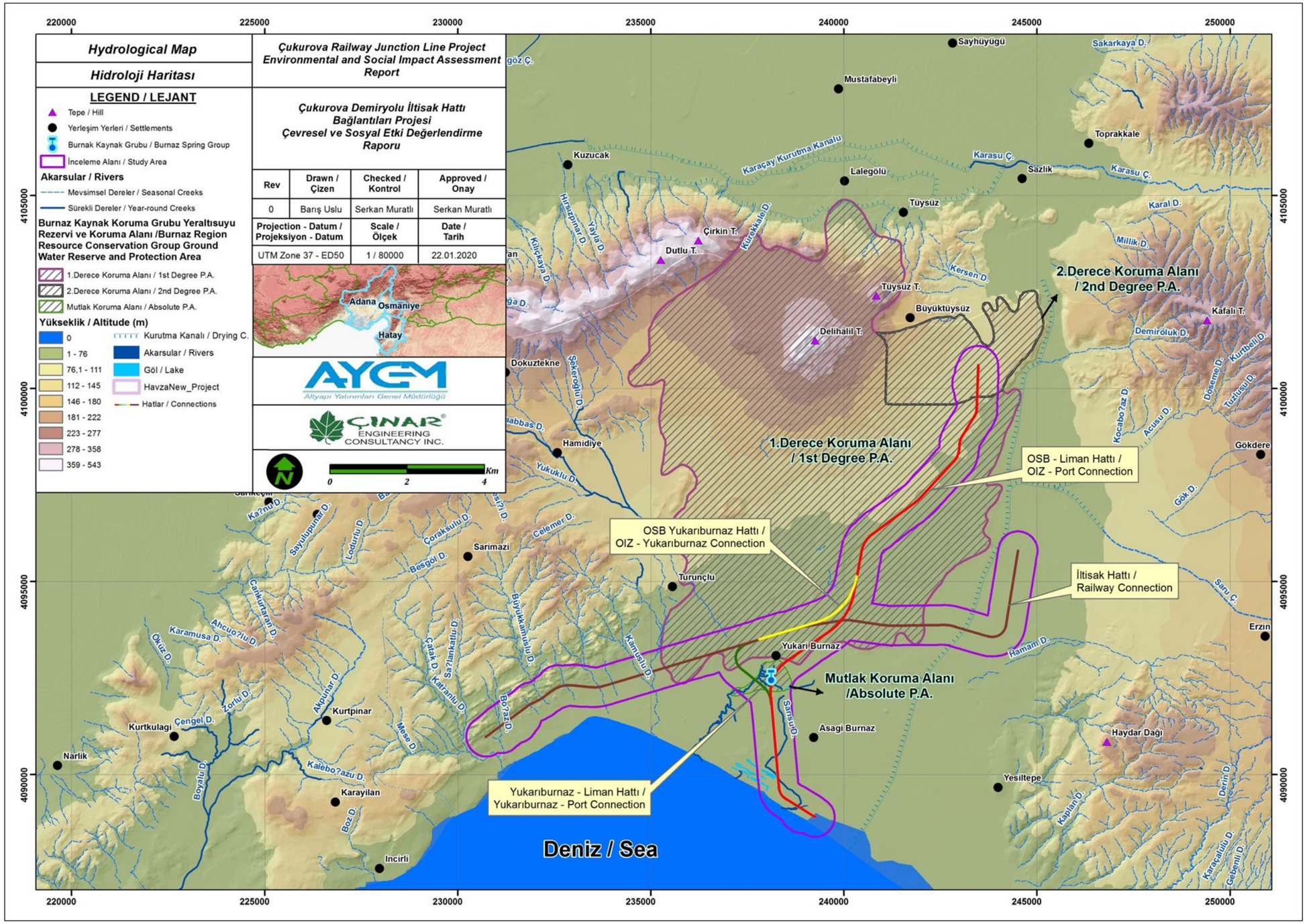

Figure 4-16 Hydrological Map of the Project Area

Rivers and Streams

Deli stream, Koca stream, Gönen stream, Fındık stream, Höpür stream, Muratpaşa stream, Büyükkara stream, Karasu stream are the main streams with continuous flow, fed by numerous streams with seasonal flow in the Asi Basin.

The railway lines other than the Connection line and OIZ-Port line do not cross any stream / dry stream; Table 4-14 presents information about the streams in and around the lines.

Table 4-14 Rivers & Streams around the Project Area

River/Stream	Basin	Railway Line	Section
Uknown Stream with Seasonal Flow	Asi Basin	Connection Lİne	3+240 (dying canal), 11+500, 11+800 (Kamuslu stream), 12+575, 12+950, 13+500, 13+815, 14+515, 15+800 (Boğaz stream),
Uknown Stream with Continuous Flow	Asi Basin	OIZ-Port Line	10+390
			12+285 (Sarısu stream)
Uknown Stream with Continuous Flow	Asi Basin	Yukarıburnaz- Port Line	1+470

Natural Lakes, Wetlands, Lagoons and Marshes

There are natural lakes, wetlands, lagoons and marshes in Ceyhan Basin and Asi Basin, where the project area is located. But; the railway lines do not cross these surface water resources, and information on these surface water resources located around the project area are presented in Table 4-15.

Table 4-15 Natural Lake, Wetlands, Lagoons and Marshes in the Vicinity of the Project Area

Name	Province	Railway Line & Section	Direction	Distance (km)	Protection Status
Marsh with seasonal surface water	Hatay	Yukarıburnaz-Port Line 0+510 – 2+252	-	-	-
Seasonal surface water	Hatay	OIZ-Port Line 10+100 – 10+468	-	-	-
Marsh with seasonal surface water	Hatay	OIZ-Port Line 10+500	East	0.365	-
Marsh with seasonal surface water	Hatay	OIZ-Port Line 10+300	West	0,370	-

Name	Province	Railway Line & Section	Direction	Distance (km)	Protection Status
Marsh with seasonal surface water	Hatay	OIZ-Port Line 12+800	West	440	-
Akyayan Lake and small lakes around	Adana	Connection Line 16+000	Southwest	53	-
Yumurtalık Lagoon	Adana	Connection Line 16+000	Southwest	40.6	National Park
Akyatan Lake Wetland	Adana	Connection Line 16+000	Southwest	66.7	National Park, Ramsar site
Karataş Aslantaş Lake	Osmaniye	OIZ-Port Line 0+000	North-Northeast	32	National Park

Source: www.geodata.gov.tr

Dams and Ponds

Information on the dams and ponds situated around the study area are presented in Table 4-16. Aslantaş Dam, approximately 32 km north-northeast of the Connection Line and Anlıkaş Pond approximately 38.9 km northeast from OIZ-Port line are the closest surface water resources to the project area.

Table 4-16 Dams and Ponds in the vicinity of the Project Area

Name	Province	Intended Use	Phase	Storage Cap. (hm^3)	Active Cap. (hm^3)	Surface Water Area (km^2)	Railway Line & Section	Direction
Aslantaş Dam	Osmaniye	Irrigation, Flood control, Power, Drinking	Operation	1840.00	680.00	62.00	Connection Line 0+000	North-northeast 32.5
Kalecik Dam	Osmaniye	Irrigation	Operation	32.75	31.25	1.54	OIZ-Port line	Northeast 36
Tahtaköprü Dam	Gaziantep	Irrigation, Flood control	Operation	200.00	185.00	23.40	OIZ-Port line 2+300	East-northeast 48.5
Adana Seyhan Dam	Adana	Irrigation, Flood control, Power	Operation	1004.00	634.00	79.06	Connection Line 16+000	Northwest 58.7

Name	Province	Intended Use	Phase	Storage Cap. (hm^3)	Active Cap. (hm^3)	Surface Water Area (km^2)	Railway Line & Section	Direction
Çatalan Dam	Adana	Irrigation, Flood control, Power, Drinking	Operation	2100.00	700.00	84.50	Connection Line 16+000	Northwest 68.7
Seyhan Yedigöze Dam	Adana	Irrigation, Power	Operation	642.82	300.48	14.94	Connection Line 16+000	Northwest 70.3
Kozan Dam	Adana	Irrigation	Operation	196.67	165.2	7.07	Connection Line 16+000	North 66.5
Mehmetli Dam	Osmaniye	Irrigation, Flood control	Operation	65.15	52.63	3.09	Connection Line 13+000	North 63.6
Anlıkaş Pond	Osmaniye	Irrigation	Operation	1.872	1.672	0.194	OIZ-Port line	Northeast 38.9
Aşağı Seyhan Kılıçlı Pond	Adana	Irrigation, Flood control	Operation	9.50	7.094	0.98	Connection Line 23+500	North-northwest 41.2
Seyhan-Hakkıbeyli Pond	Adana	Irrigation	Operation	7.70	5.25	1.33	Connection Line 16+000	North-northwest 48.5
Demrek Pond	Hatay	Irrigation	Operation	1.995	1.65	0.395	OIZ-Port line 14+085	Southeast 42.5

Source: www.geodata.gov.tr

Irrigation Projects

Adana Province, Osmaniye Province and Hatay Province water data maps were prepared by the Former Ministry of Forestry and Water Affairs in 2012 and according to the online geodatabase, there are a number of irrigation projects either in operation, construction and planning phases in the vicinity of the project area.

The section between KM: 0+000 and KM: 4+070 of the Connection line, the section between KM: 10+600 and KM: 12+400 of OSB-Port line and the section between KM: 1+800 and KM: 2+252.147 of Yukariburnaz-Port line are located in Aşağı Ceyhan Aslantaş 3rd Stage Erzin Dörtyol Irrigation Area which is in operation.

In addition, as mentioned in the official letter of DSİ 6th Regional Directorate dated 14.11.2018 and numbered 38292074-611.99-782653, the proposed railway lines cross many irrigation canals, reserve canals and tertiary canals, drying canals, drainage canals and maintenance roads.

4.4.2. Groundwater Resources

According to the Geological-Geotechnical Investigation Report of the Connection Line to the Industrial Facilities, Yumurtalik Free Zone Industrial Centers and Ports in Çukurova Region and İskenderun Bay prepared by Temelsu Uluslararası Mühendislik Hizmetleri A.Ş. and Altaş Infrastructure International Engineering Consulting Inc., the Upper Miocene aged Kızıldere formation, one of the geological units where the project area is located, crops out between KM: 13+250 and KM: 16+272.70 of the Connection line. These formations; generally includes mudstone, sandstone, siltstone, claystone, marl, sparse clayey-sandy limestone units. Also, members of these formations, claystone, marl, mudstone units are reported as impermeable-less permeable and sandstone, clayey-sandy limestone units are reported as permeable.

In addition, the Quaternary aged Delihalil basalt is exposed along the entire OIZ-Yukariburnaz line, along the section between KM: 4+400 and KM: 11+130 of Connection line and along the section between KM: 0+000 and KM: 0+510 of OIZ-Port line. This basalt unit is determined to be permeable as well as conveying groundwater through well-developed fracture-crack systems with gas voids. In addition, in the mentioned geological-geotechnical survey report, it is stated that the slags in the upper parts of this basalt are highly permeable.

As stated in the official letter titled 'Çukurova Region and İskenderun Bay Connection Line' numbered 38292074-611.99-782653 of DSİ 6th Branch Directorate of Ministry of Agriculture and Forestry, the section between KM: 8+000 – KM: 9+000 of Connection Line coincides with the borehole that provides drinking water to the Yumurtalik district, which belongs to ASKI.

Groundwater resources in the mentioned basalt unit are naturally protected by the provisions of the "Burnaz Spring Group Groundwater Reserve and Protection Area Announcement" published in the Official Gazette dated 03.06.2011 and numbered 27953. According to these provisions, the section between KM: 0+000 and KM: 0+814 of the OIZ-Port line is located in Burnaz Springs 2nd Degree Protection Area. In addition, the section between KM: 0+814 and KM: 9+625 of the Connection line, the entire OIZ-Yukarıburnaz line, the section between KM: 0+000 and KM: 0+900 of the Yukariburnaz-Port line and the section between KM: 4+275 and KM: 1+149 of the Connection Line are located in Burnaz Springs 1st Degree Protection Area. Moreover, the section between KM: 9+790 and KM: 10+575 of the Connection line and the section between KM: 1+436 and KM: 1+865 of Yukariburnaz-Port line are situated in the Strict Protection Area (See Figure 4-16).

In the hydrogeological survey report prepared by DSİ in 1974 for the Dörtyol-Erzin Plain in Hatay Province, it was stated that the safe reserve of the Burnaz Springs, which are groundwater resources in this basalt unit, is 37 hm^3/year.

Burnaz springs are located in 70 m away to the west of OIZ-Port line (Strictly Protection Area) at KM: 10+200; in 465 m away to the east of Yukarıburnaz-Port line (Absolute Protection Area) at KM: 10 + 200; in 1025 m away to the south of Connection line at KM: 8+300 and OIZ-Yukarıburnaz line at KM: 2+900 (1st Degree Protection Area). The flow rate of these springs is 1920 lt/sec and these springs used as drinking and irrigation water.

Other geological units where the project routes pass are Quaternary aged beach sand and alluvial deposits. Due to the fact that these units consist of gravel, clay, silt and sand in general, the units can hold, transport and transmit groundwater. In addition, a number of basic boreholes were drilled in this unit within the scope of the geological-geotechnical survey study prepared by GDII. Of these 41 wells drilled along the Connection line, 28 of the boreholes were drilled at a depth of 1.60-14.00 m from the surface; Out of 25 basic boreholes drilled in the OIZ-Port line, 15 of them have depths of 0.60-5.10 m and 1 of them have artesian groundwater. While groundwater was not found in the main borehole drilled in the

OIZ-Yukarıburnaz line, 5 out of 6 boreholes drilled in the Yukariburnaz-Port line encountered groundwater at a depth of 0.50-2.50 m.

4.4.3. Flood Events near the Project Area

No flooding events are expected due to the high permeability of the basalts in the areas where the project routes pass over the Delihalil basalts. In the relatively lower elevated areas of the project routes, surface waters are taken under control with the existing drying canals. In addition, surface water accumulation can be observed after rains in winter and spring at reed and marshy areas crossed by the routes. In all routes, large stream crossings will be crossed by bridges, in areas where there are dry streams with small seasonal flows and streams with continuous flows, water flow will be provided by placing culverts.

In order to assess the project routes and the extraordinary meteorological events around it, the records of the extraordinary meteorological events (MGM, 2020) of the years of manual operation at the Yumurtalik Meteorology Station, which are being observed by the General Directorate of Meteorology (MGM), were examined. According to these records, in Yumurtalik District of Adana Province; in 1988, 1994 and 2004, 3 extraordinary meteorological events took place in total. On May 24, 1988, the hail storm and flood damaged the agricultural products. On September 19, 1994, the storm damaged the environment, settlements and agricultural products. On May 15, 2004, the vegetable gardens were damaged due to the hail storm.

4.4.4. Surface Water Quality

The quality of surface water resources was performed according to the principles of the Surface Water Quality Regulation (SWQR), 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.

SWQR evaluates surface waters in four different classes in terms of general chemical and physico-chemical parameters. This classification is made 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 SWQR Annex-5 are given below.

Table 4-17 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 6 locations near the proposed railway line routes to be constructed within the scope of the project 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 4-18 below and shown in Figure 4-17.

Table 4-18 Surface Water Sampling Locations

Sampling Location	Coordinates
S-1	37 S 238708 D; 4088941 K
S-2	37 S 237536 D; 4092115 K
S-3	37 S 234729 D; 4092406 K
S-4	36 S 766647 D; 4091668 K
S-5	36 S 764555 D; 4090514 K
S-6	36 S 763406 D; 4092709 K

The analysis results of surface water samples are given in Table 4-19.

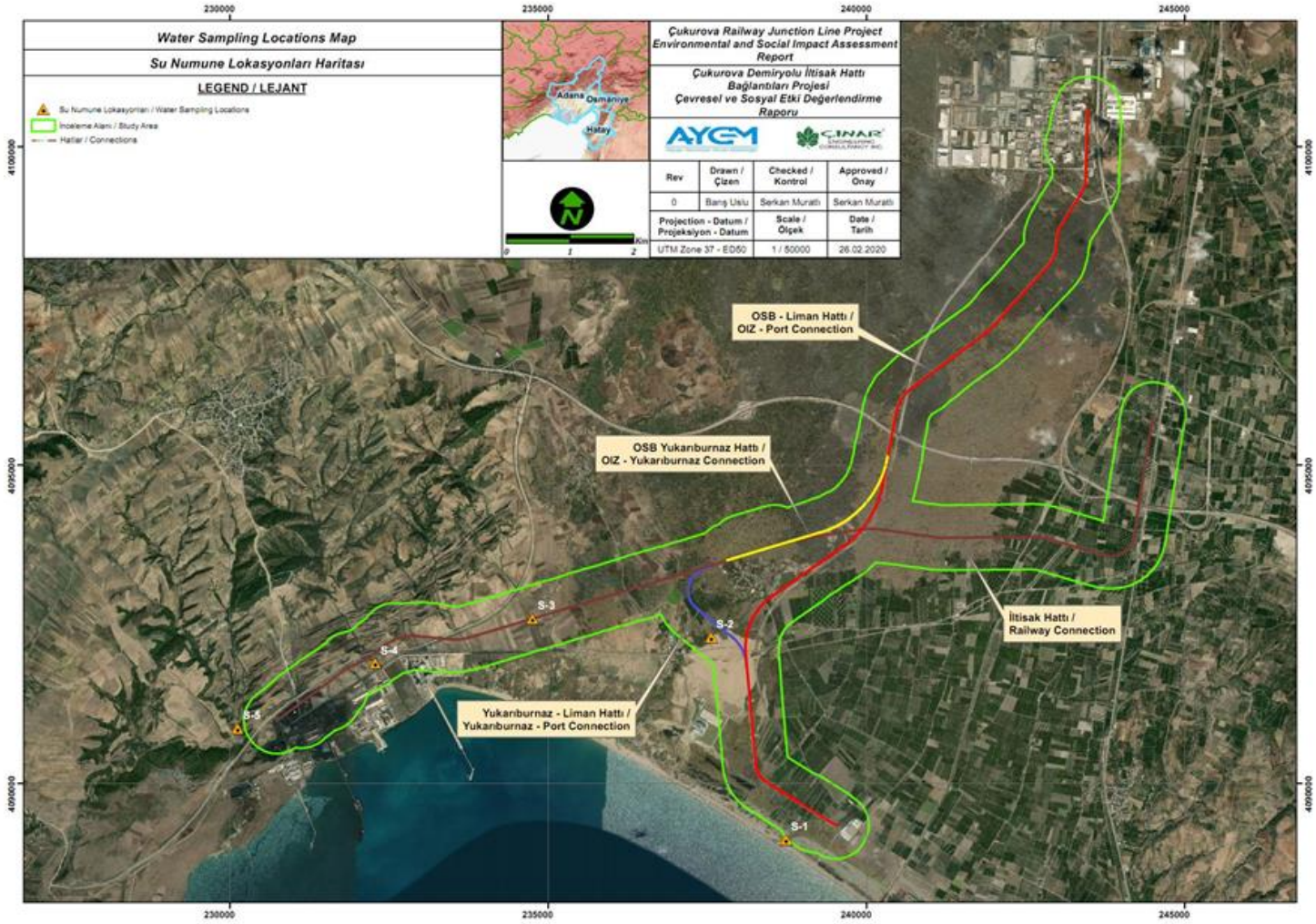

Figure 4-17 Surface Water Sampling Locations

Table 4-19 The Analysis Results of Surface Water Samples

Parameter	Unit	SWQR Annex-V Table 2				1. Point	2. Point	3. Point	4. Point	5. Point	6. Point
		Very Good (I.Class)	*Good (II. Class)*	*Moderate (II. Class)*	*Poor (IV. Class)*						
pH	-	-	-	-	-	8.25	8.35	-	7.1	8.25	8.13
Conductivity	µS/cm	<400	1000	3000	>3000	1051	746	-	1375	1032	999
Dissolved Oxygen	mg/L	>8	6	3	<3	8.69	9.01	-	11.49	11.17	15.75
Color (436 nm)	m^{-1}	RES 436 nm: ≤ 1.5	RES 436 nm: 3	RES 436 nm: 4.3	RES 436 nm: > 4.3	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1
Color (525 nm)	m^{-1}	RES 525 nm: ≤ 1.2	RES 525 nm: 2.4	RES 525 nm: 3.7	RES 525 nm: > 3.7	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1
Color (620 nm)	m^{-1}	RES 620 nm: ≤ 0.8	RES 620 nm: 1.7	RES 620 nm: 2.5	RES 620 nm: > 2.5	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1
BOD	mg/L	<4	8	20	>20	< 3	< 3	-	< 3	< 3	< 3
COD	mg/L	<25	50	70	>70	10	< 10	-	10.5	< 10	< 10
Amonium Nitrogen	mg/L	<0.2	1	2	>2	0.081	< 0.016	-	0.023	< 0.016	< 0.016
TotalKjeldahl Nitorgen (Tk-N)	mg/L	<0.5	1.5	5	>5	0.935	< 0.1	-	0.973	< 0.1	< 0.1
Total Nitrogen (N)	mg/L	<3.5	11.5	25	>25	4.055	8.789	-	19.95	13.65	26.91
Sulphide (S^{2-})	mg/L	≤0.002	0.005	0.01	**>0.01**	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1
Flouride (F^{-})	mg/L	≤ 1	1.5	2	> 2	< 0.1	< 0.1	-	0.298	0.289	0.338
Nitrate Nitrogen	mg/L	<3	10	20	>20	4.05	8.78	-	18.97	13.65	26.91
Phosphate Phosphorus	mg/L	<0.05	0.16	0.65	>0.65	0.136	< 0.1	-	< 0.1	< 0.1	< 0.1
Total Phosphorus (P)	mg/L	<0.08	0.2	0.8	>0.8	0.056	0.097	-	0.012	0.025	0.009
Manganese (Mn)	mg/L	≤ 0.1	0.5	3	> 3	0.037	0.026	-	0.005	0.006	0.003
Selenium (Se)	mg/L	≤ 0.01	0.0015	0.02	>0.02	0.001	0.001	-	0.003	0.002	0.001
Oil and Grease	mg/L	< 0.2	0.3	0.5	> 0.5	< 10	< 10	-	< 10	< 10	< 10

When the analysis results given in Table 4-19 are analyzed, the 1st Sampling location is classified as Class III in terms of Conductivity. The high conductivity value can be related with the sea water interference.

According to Table 4-19, 2nd Sampling location was classified Class II in terms of Conductivity, Total Nitrogen, Nitrate Nitrogen and Total Phosphorus parameters.

When the 3rd Sampling location was visited at the site, it was observed that the location was dry and thus no sampling could be performed from this point.

According to Table 4-19, 4th Sampling location is classified as Class III in terms of Conductivity, Total Nitrogen and Nitrate Nitrogen parameters. It is observed that there are agricultural lands on the upstream of the sampled point. Total Nitrogen, Nitrate Nitrogen and Kjeldahl Nitrogen parameters can be associated with agricultural activities.

5th Sampling location was classified as Class III in terms of Conductivity, Total Nitrogen and Nitrate Nitrogen parameters. As this point is close to the shoreline, the conductivity level is high. Total Nitrogen and Nitrate Nitrogen parameters can be associated with agricultural land around the location.

6th Sampling location was classified as Class IV in terms of Total Nitrogen and Nitrate Nitrogen parameters. Total Nitrogen and Nitrate Nitrogen parameters can be associated with agricultural areas located on the upstream of the sample location and fertilizer use.

4.5. Resource and Waste Management

4.5.1. Material Requirements

As mentioned in Chapter 3.3.1.2, According to the Procurement Strategy prepared for the Improvement of Railway Connections Project by the Ministry of Transport and Infrastructure General Directorate of Infrastructure Investments (September 2019), within the scope of the 1st Component of the Project, the railway connection lines having total length of approximately 36 km are planned to be built for industrial facilities in Çukurova Region and İskenderun Bay - Yumurtalik Free Zone. For the railway connection lines, a total length of approximately 72 km (length of the rail welded to each other), about 58,000 railway tie and about 144,000 m^3 of ballasts will be provided.

According to the Procurement Strategy (September 2019), high-volume production of high quality rails are made in Turkey (KARDEMİR Inc. is a strategic partner of TCDD). However, demand for rail in the domestic market is considerably higher than annual rail production. For this reason, special type rails are supplied from foreign companies. In Turkey, there are factories producing concrete tie used in the railways. Some of the signaling and electrification works in Turkey are carried out by foreign companies.

As stated in Section 3.3.1.2, material quarries surveys were carried out for the determination of materials to be used in railway lines (infrastructure, superstructure, engineering structures, concrete works, etc.). Accordingly, basalts borrow quarry located 50 meters to the right side of the OIZ – Station 1 Line KM = 0+500. Assuming that an average of 4-5 meters of material will be taken, there are approximately 2,500,000 m^3 of material reserves in the quarry. The quarry material is suitable for use as fill material. It can also be used as rock fill material. However, as stated in Section 5.5.2.1, the mentioned area remains within the 1st Degree Protection Area on the "Burnaz Spring Group Groundwater Reserve and Protection Area" and material extraction activities are not permitted in this area.

As mentioned in the Environmental and Social Review Summary (2019) document, it is planned to use existing quarries (such as Yılankale (Kokartepe) Quarry) and camping areas previously used by the General Directorate of Highways. As mentioned in Chapter 3.3.1.2,

at the Yılankale (Kokartepe) Quarry, which is approximately 47 km away from the Connection Line, the quarry material is broken and sieved; will be made suitable for use in subbase, subballast, concrete aggregate and engineering structures. There are more than 1.000.000 m^3 of reserves in the quarry area. Quarry is on the treasury land, licensed on behalf of the 5th Regional Directorate of Highways and operated by a private company. Material purchase will be provided by purchasing from the private company operating the quarry. In addition, there is Badilli Quarry at a distance of 310 km from the Connection Line. In Badilli Stone Quarry, the quarry material is broken and sieved; it will be made suitable for use as ballast material. There are more than 1.000.000 m^3 of reserves in the quarry area. The quarry is licensed on behalf of the private company, and the quarry is still in operation. Material purchase will be provided by purchasing from the private company operating the quarry.

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

Adana Metropolitan Municipality, Hatay Municipality of and Osmaniye Municipality and Turkey's average daily waste removal values are given in Table 4-20. Turkey's average daily waste generation rate is 1.16 kg per person in 2018, the average municipal waste generation value for Adana Metropolitan Municipality is 0.98 kg/day, 1.21 kg/day for Hatay Municipality and 0.85 kg/day for Osmaniye Municipality.

Table 4-20 Municipal Waste Generation Statistics (2018)

Municipality	Waste Generation (kg/day/person)		
	Domestic (Non-Recyclable)*	Recyclable*	Total
Adana	0.69	0.294	0.98
Hatay	0.85	0.363	1.21
Osmaniye	0.60	0.255	0.85
Turkey Average	0.81	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

Adana Metropolitan Municipality, which is located on the project route, has planned the Integrated Solid Waste Disposal Facility in 2008 and Adana Integrated Solid Waste Disposal Facility started its operations in the beginning of 2011 as a result of rehabilitation works in the area used as wild storage area for many years. As mentioned in Adana Province 2018 Environmental Status Report, disposal, composting and regular storage of domestic solid wastes, commercial and institutional domestic solid wastes at the facility and disposal of medical wastes from hospital, treatment and preventive health service units are provided. In Adana Province, 90% of domestic waste is disposed to sanitary landfill. II. Class landfill is located in Saricam District of Adana Province. The facility has a total area of 110 ha and approximately 25 ha of this constitutes the structure of the facility. 60 ha of the total area is reserved for landfill. Although 1,134,608 m^3 of the facility with a total storage capacity of 7,175,888 m^3 has been filled, the remaining 6,041,280 m^3 is expected to be filled by 2041. Adana Metropolitan Municipality Integrated Solid Waste Disposal Facility brings 2,000 tons of domestic solid waste per day, collected from residential, commercial and institutions in all districts of Adana province (total 15 district municipalities). Domestic solid wastes in

Çukurova, Sarıçam and Yüreğir District Municipalities are brought to the solid waste disposal facility integrated with semi-trailer trucks belonging to Adana Metropolitan Municipality and domestic wastes brought to transfer stations from Adana Metropolitan Municipality (Adana Provincial Directorate of Environment and Urbanization, 2019).

As mentioned in the 2018 Environmental Status Report of Hatay Province, one of the provinces on the project route, the amount of waste generated within 6 districts (İskenderun, Arsuz, Payas, Dörtyol, Belen, Erzin) of 15 districts of Hatay province is approximately 534 tons per day. These wastes are disposed of to the Solid Waste Landfill in Düğünyurdu, which is operated by the Gulf Solid Waste Association (Hatay Governorate, Provincial Directorate of Environment and Urbanization, 2019).

The management of solid wastes in Osmaniye Province is carried out by Osmaniye Solid Waste Disposal and Infrastructure Services Local Administrations Association. Solid wastes are stored in Municipal Waste and Non-Hazardous Waste Regular Storage facility located in the Central District. An average of 200 tons of domestic solid waste is brought to the facility daily (Osmaniye Governorate, Provincial Directorate of Environment and Urbanization, 2019).

4.6. Biodiversity

4.6.1. Biodiversity Study Area

Cukurova Region and Iskenderun Bay Railway Connection Project route passes through Yumurtalik and Ceyhan districts of Adana, Toprakkale district of Osmaniye, and Erzin district of Hatay. There are four lines within the scope of the Project. The connection line is planned to start from the existing Erzin Station, extend towards south running parallel to Toprakkale-Iskenderun Railway line, and then divert in the western direction. It will pass to the west of Yukariburnaz village at km=07+000 – 08+000, and reach Toros Adana Yumurtalik Free Zone at km=13+000. OIZ – Port Line will be connecting Osmaniye OIZ to the new port to be constructed in Asagiburnaz (Erzin, Hatay). The total length of these two main branches will be 42.77 km. The other connection lines are planned to be constructed to connect the Railway Line to the OIZ-Port line through Station-1.

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 vantage points, representing different habitats, and also along transect lines. A map showing sampling/vantage points is presented in Figure 4-18 .

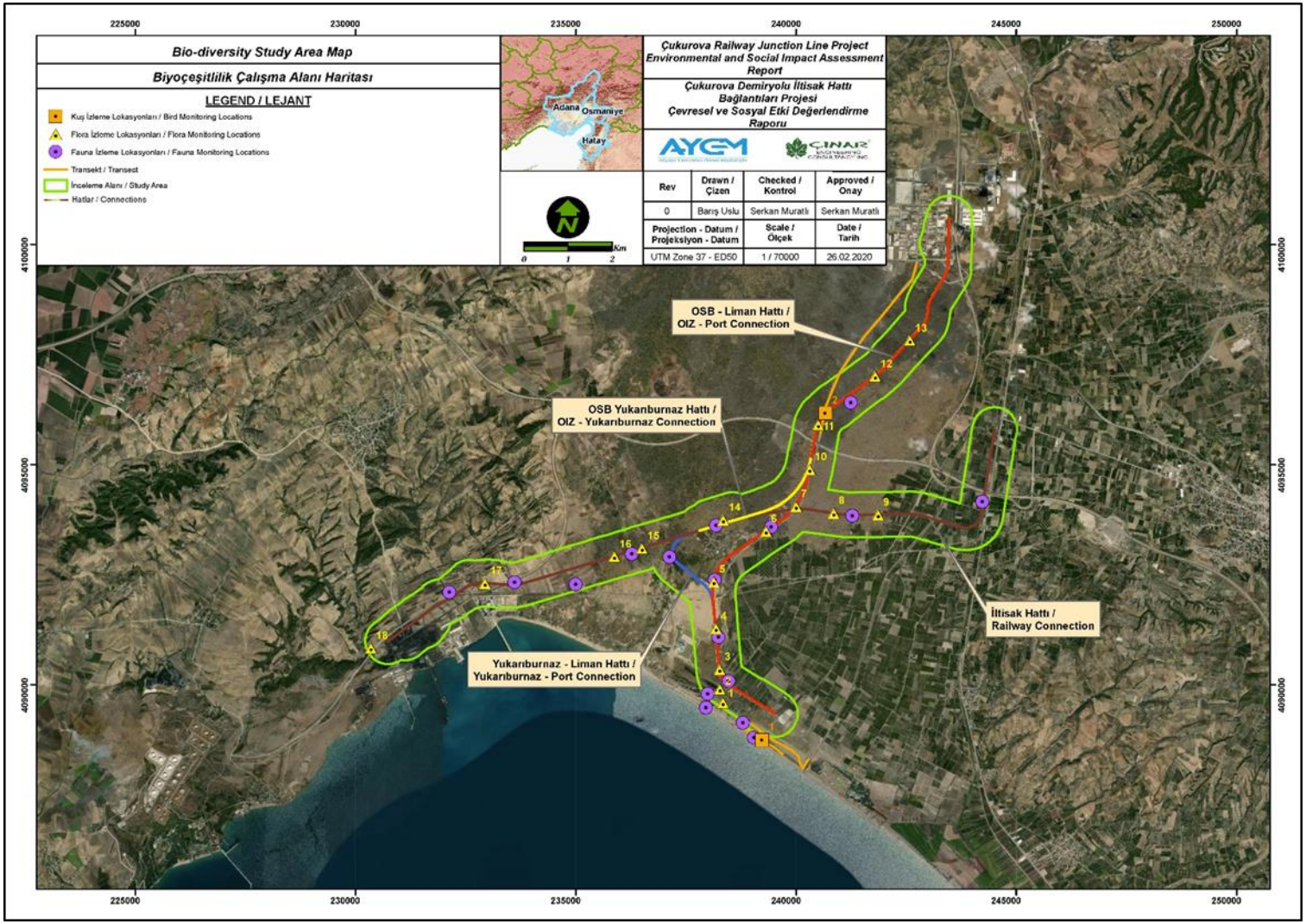

Figure 4-18 Biodiversity Study Area and Sampling/Vantage Points

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 PS6 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 impactive 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 and PS6:

> *"A protected area is a clearly defined geographical space, recognized, dedicated and managed, through legal or other impactive 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 impactiveness,
- 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 3-2 , and a map showing the locations of the protected areas with respect to the Project route is presented in Figure 4-19 . 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 4-21 Legally Protected Areas near the Project Route

Protected Area	IUCN Protected Area Category	Distance to the Project Route (km)
Osmaniye Zorkun Wildlife Development Area	IV	11.2
Ciftmazi Nature Park	V	14.1
Yumurtalık Lagoon Nature Conservation Area, National Park, Ramsar Site	Ia, II, VI	30.6

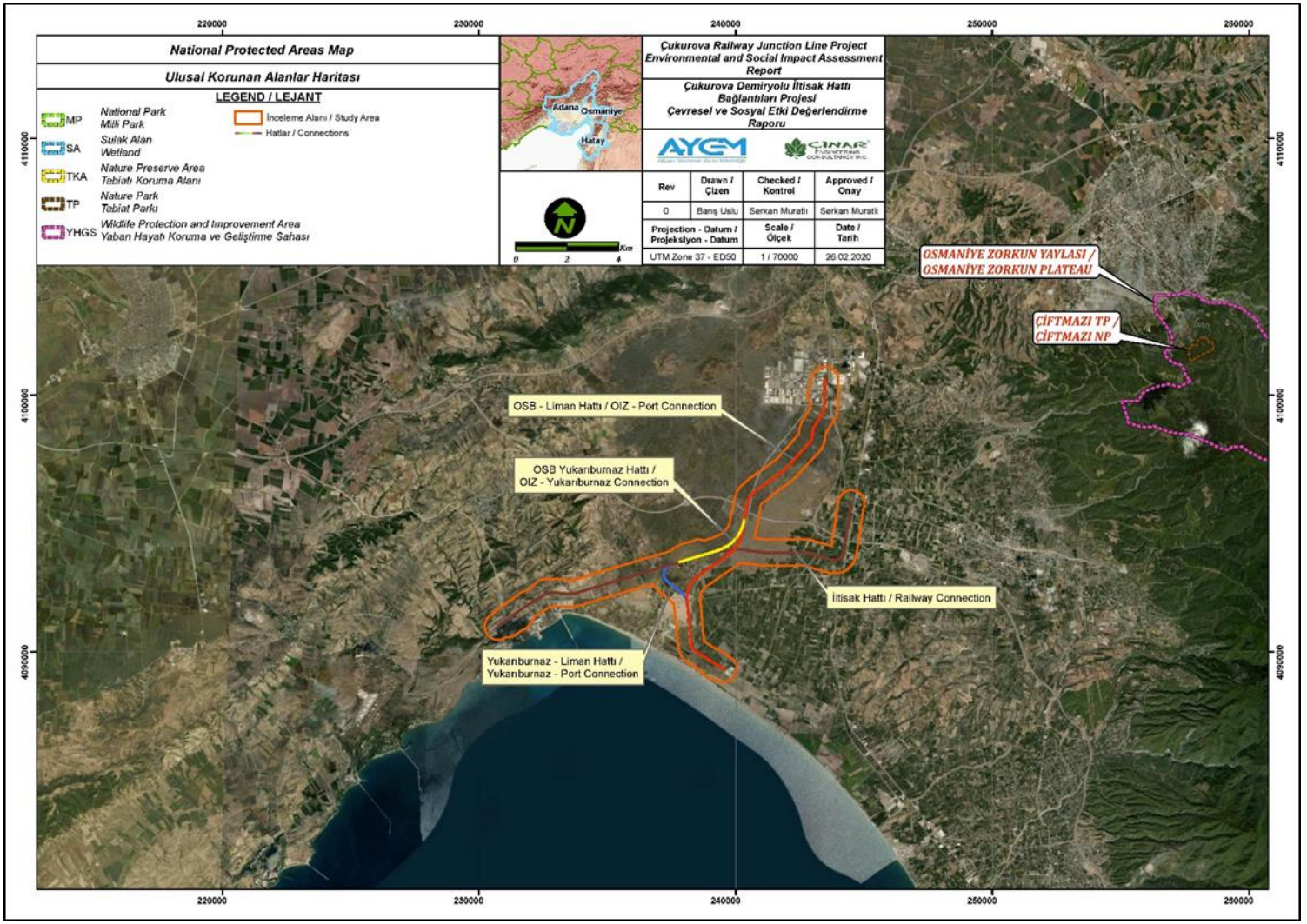

Figure 4-19 Legally Protected Areas

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 impactive 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".

Burnaz Kumsalı (Dunes) is one of the KBAs identified by the inventory, which covers the 14-kilometer coastline and its associated habitats within Erzin district boundaries. The OIZ-Port connection line passes along terrestrial boundary of KBA in the north-south direction. A 6-kilometer section of the KBA is intensely used as a beach. Starting from the coastline, there are dunes, dune grassland, ponds that have been formed due to water extraction and reedbeds in the KBA.

Burnaz Dunes meets the KBA criteria for an endemic reptile species that only inhabits coastal dunes and some inland habitats in Cyprus, Syria, Lebanon, Israel and Turkey. *Acanthodactylus schreiberi* – Iskenderun lizard is listed as Endangered (EN) according to the IUNC Red List criteria.

To conserve the species and its habitats in Turkey, a Species Action Plan covering 2015-2020 was prepared by Hatay Branch Office of the General Directorate of Nature Conservation and National Parks, based on studies conducted by CINAR (DKMPGM, 2005). The Action Plan provides estimations on the population size of the species, and its population distribution and range between Adana Yumurtalik Free Zone and Asagiburnaz village. The Plan also includes the current threats that the lizard is facing in Turkey, and actions to be taken to ensure conservation of its population. Threats that are of high significance were identified as changing land use to agricultural land, stubble fire, pollution due to construction wastes, urbanization and construction of new plants and roads, and the fact that local people do not know much about the importance of the species.

There are also two regional endemic species that are categorized as Critically Endangered (CR) by the Red List, which are not included in the KBA inventory but identified during ESIA studies; *Echinops dumanii* and *Astragalus antiochianus.* The natural distribution are for both species are coastal dunes and dune heaths. Their populations are also continuously threatened by anthropogenic impacts.

Burnaz Dunes 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. Considering its habitat characteristics and species it supports, which are endemic and threatened by extinction, Burnaz Dunes KBA has been assessed to be a Category Ia: Strict nature reserve as per IUCN protected area management categories.

The main objective of Category Ia is to conserve regionally, nationally or globally outstanding ecosystems, species (occurrences or aggregations) and/or geodiversity features. Use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as reference areas for scientific research and monitoring.

At the scoping phase of the ESIA studies, it was identified that the port connection line of the Project was planned to pass through the dune habitat. The General Directorate of Infrastructure Investments (GDII) was informed about the conservation priorities for Burnaz Dunes and *Acanthodactylus schreiberi*. In line with the mitigation hierarchy, in order to avoid potential impacts of the Project, alternative routes were considered by the GDII and the line was redesigned so that it does not pass through the dune habitat. Although Burnaz KBA has been assessed as part of the ESIA as it is located within the Biodiversity Study Area, there will be no Project-related impacts on the dune habitats and species populations they support. Details on the redesign is detailed in Project Alternatives section of this ESIA Report, where Route Selection and Optimization are discussed.

Photographs of Burnaz Dunes and *Acanthodactylus schreiberi* are provided in Figure 4-20 , while a map showing the updated route assessed in this ESIA Report, KBA boundaries and the distribution of Iskenderun lizard defined in the Action Plan is presented in Figure 4-21 .

Figure 4-20 Burnaz Dunes Key Biodiversity Area and Acanthodactylus schreiberi

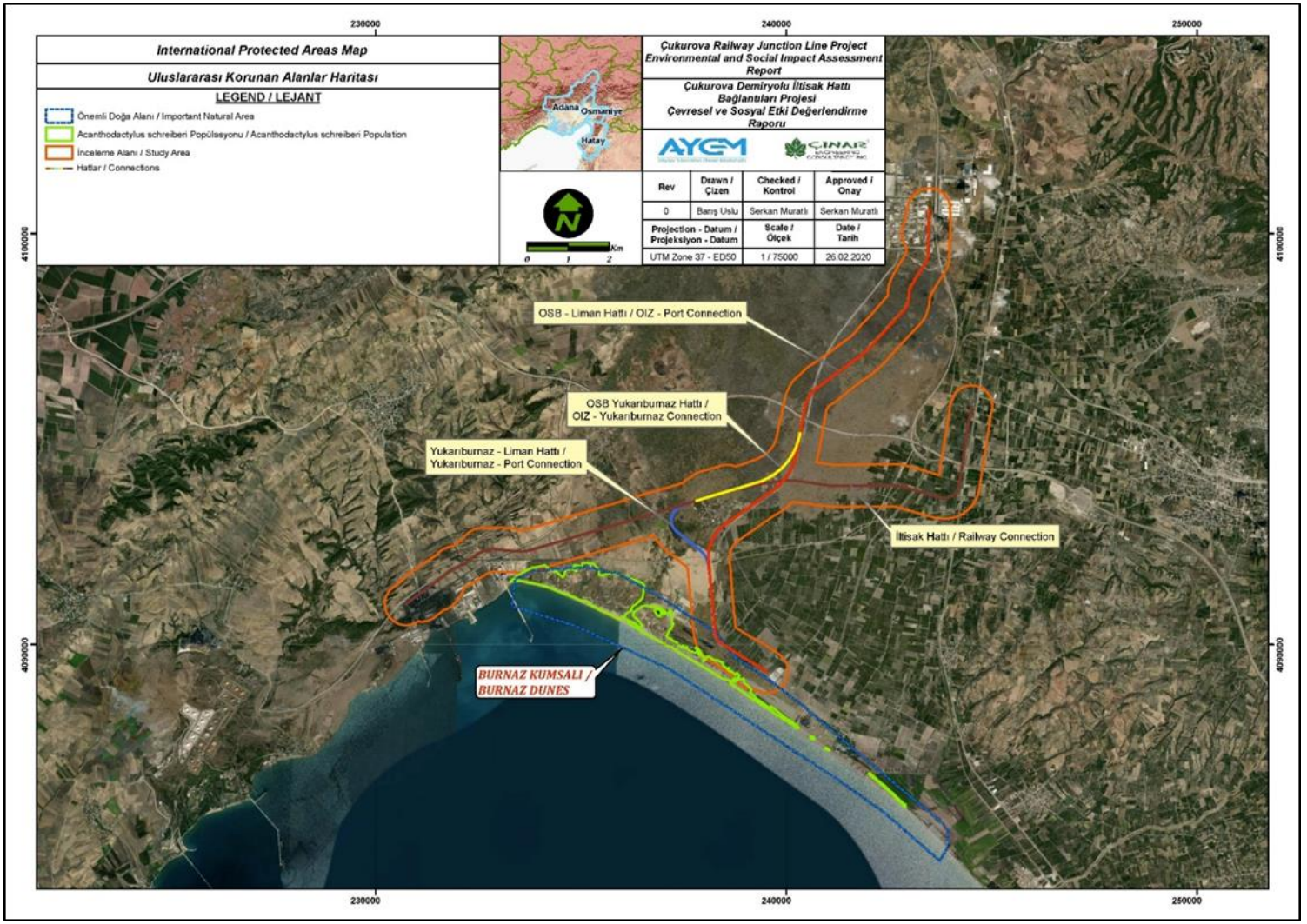

Figure 4-21 Burnaz Dunes Key Biodiversity Area and Acanthodactylus schreiberi Distribution Map

4.6.3. Biodiversity Baseline Studies

Cukurova Region and Iskenderun Bay Railway Connection Project route starts from Osmaniye industrial zone and is divided into two branches in Yukariburnaz village; the first being connected to Erzin railway, while the second branching further in the south.

Baseline studies conducted in the Biodiversity Study Area as shown in Figure 4-22 , 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 4-22 . In addition to habitats explained in the table there are also modified and artificial habitats that can be listed as; G2.8: Highly artificial broadleaved evergreen forestry plantations, J1.2: Residential buildings of villages and urban peripheries, J1.4: Urban and suburban industrial and commercial sites still in active use, J1.6: Urban and suburban construction and demolition sites, J2.6: Disused rural constructions, J2.7: Rural construction and demolition sites, J4.2: Road networks, J4.3: Rail networks, J5.4: Highly artificial non-saline running waters and J6.1: Waste resulting from building construction or demolition.

Photographs of the natural and modified EUNIS habitat types of the Biodiversity Study Area are presented in Figure 4-22 and a map showing the habitats is provided in Figure 4-23 .

Table 4-22 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)	• Found near the port connection line • Coastal dunes in the area are at their climax phase and are quite healthy. Dominant species are; *Euphorbia paralias, Eryngium maritimum, Thymelaea hirsuta, Helianthemum stipulatum*. • There is also regional endemic *Echinops dumanii* inhabiting the area.
B1.5: Coastal dune heaths	2100 – Proposed Natura 2000 Code	• This habitat represents the sand hills behind the dunes. • Dominant species are; *Myrtus communis, Erica manipuliflora, Pistacia lentiscus, Thymelaea hirsuta* and *Helianthemum stipulatum*. • There are also regional endemic species of *Echinops dumanii ve Astragalus antiochianus*.
C1.2: Permanent mesotrophic lakes, ponds and pools	3130: Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoeto-Nanojuncetea	• Represents the permanent ponds at the Biodiversity Study Area. • *Nuphar lutea* (Yellow water lily) has good populations in the ponds.
C3.2: Water-fringing reedbeds and tall helophytes other than canes	3210: Fennoscandian natural rivers	• Dominant species of this habitat representing pond and stream banks are species with high water demand like *Arundo donax, Phragmites australis, Lythrum salicaria, Epilobium parviflorum*.
D5.1: Reedbeds normally without free-standing water	-	• This habitat is observed in areas with high water table at the inner sections of the coastal dunes. • Characteristic species of the habitat are species with high water demand; *Phragmites australis, Cladium mariscus, Bolboschoenus maritimus, Juncus acutus, Juncus effusus, Juncus littoralis, Cyperus rotundus, İmperata cylindrica, Elymus hispidus*.
F5.2: Maquis	-	• Covers very limited areas in the Biodiversity Study Area.
F6.2: Eastern garrigues	-	• Garrigues are the most widespread habitat type in the area. Dominant buckthorns are *Paliurus spina-christii* and *Zizyphus lotus*. • There are also species like *Urginea maritima, Asphodelus aestivus* and *Cyclamen persicum* in areas of volcanic rocks.
G2.9: Evergreen orchards and groves	-	• One of the widespread modified habitats of the area, where the main produce are *Citrus limon* (lemon), *Citrus paradisi* (grapefruit), *Citrus reticulata* (clementine), *Citrus sinensis* (orange) and *Olea europaea* (olive).
I1.3: Arable land with unmixed crops grown by low-intensity agricultural methods	-	• Limited within the Biodiversity Study Area, agricultural land is used for crops and vegetables.

		
B1.4: Coastal stable dune grassland (grey dunes)	B1.5: Coastal dune heaths	C1.2: Permanent mesotrophic lakes, ponds and pools
		
C3.2: Water-fringing reedbeds and tall helophytes other than canes	D5.1: Reedbeds normally without free-standing water	F5.2: Maquis

		
F6.2: Eastern garrigues	G2.9: Evergreen orchards and groves (Orange)	G2.9: Evergreen orchards and groves (Olive)

Figure 4-22 Habitats of the Biodiversity Study Area

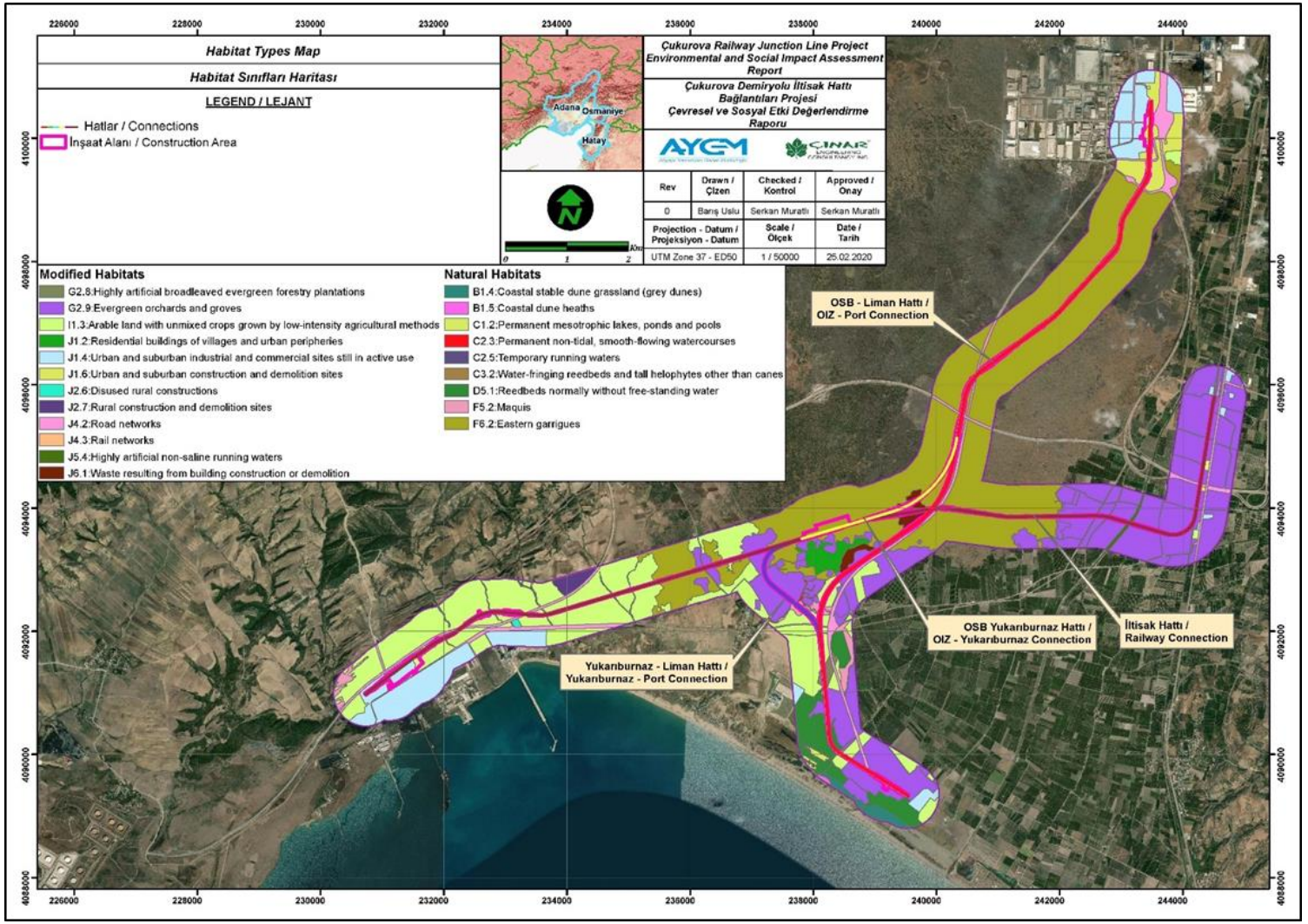

Figure 4-23 Habitat Map

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.

As the Project route is located in the Mediterranean Region of Turkey, it is under the influence of the Mediterranean climate, where the vegetation also presents regional characteristics. The Biodiversity Study Area is naturally composed of maquis, garrigue, coastal dune heath and grassland, riparian and reedbed habitats. There are also intense agricultural areas, which are used to grow citrus fruits and olives.

Natural habitats of the Biodiversity Study Area have populations of natural shrubs like *Phillyrea latifolia, Paliurus spina-christii, Zizyphus lotus, Olea europaea, Quercus coccifera.* There are also cultivated plants of *Citrus limon* (lemon), *Citrus paradisi* (grapefruit), *Citrus reticulata* (clementine), *Citrus sinensis* (orange), *Olea europaea* (olive), *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 309 plant taxa were identified during flora surveys conducted at the Biodiversity Study Area, which belong to 71 plant families (see Table 4-23). 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.

Three of these species are regional endemics; *Echinops dumanii, Astragalus antiochianus, Alopecurus adanensis,* and another two rare species; *Cyclamen persicum* and *Sternbergia pulchella*. Endemic species of *Echinops dumanii, Astragalus antiochianus* and *Alopecurus adanensis* are only found in Eastern Mediterranean coastal dunes and coasts of Cukurova region. Range of these species is in continuous decline due to impacts on coastal dunes. Therefore, although species populations are in good condition, due to increasing habitat loss, populations are in decline as well. The Red List category for all three species is "Critically Endangered".

Populations of *Echinops dumanii* and *Astragalus antiochianus* in the dune habitats were identified during the field surveys conducted in January 2020. With the change in the Project route, any potential direct impacts on these populations have been avoided. *Alopecurus adanensis* record in the area, on the other hand, is based on previous studies. Although the known population of the species is not located on the Project footprint, it is still in the AoI and might be impacted due to planned activities. The current status of the population is required to be identified through pre-construction surveys and assessments conducted within the scope of this ESIA Report should be updated based on up-to-date data.

Cyclamen persicum and *Sternbergia pulchella* are not endemic but rare species that are also found in coastal areas of the Eastern Mediterranean. *Cyclamen persicum* is distributed in local populations along the Mediterranean and Aegean coasts of Turkey and is listed as Vulnerable according to the Red List. *Sternbergia pulchella* is also distributed in Syria and Lebanon, besides Turkey. The first time it was recorded in Turkey was in 2020 near Osmaniye. The Biodiversity Study Area is the second known locale of the species. The Red List category

for the species was assigned as Endangered based on expert judgement, considering its current population status and anthropogenic impacts that its habitats are facing.

Photographs of endemic and rare species are presented in Figure 4-24 , and a list of all flora species identified at the Biodiversity Study Area are given in Figure 4-25 .

Echinosp dumanii (regional endemic)

Astragalus antiochianus (regional endemic)

Alopecurus adanensis (regional endemic)

Sternbergia pulchella (rare)

Cyclamen persicum (CITES Appendix I)

Figure 4-24 Endemic and Rare Plant Species

Table 4-23 Flora Species Identified at the Biodiversity Study Area

FAMILY	NO	SPECIES	TURKISN NAME	PHYTOGEOG. REGION	RED LIST		ENDEMIZM	BERN	CITES			HABITAT											RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
PTERIDOPHYTA																												
EQUISETACEAE	1	*Equisetum ramosissimum* Desf.	Atkuyruğu	Widespread												x									x			
HYPOLEPIDACEAE	2	*Pteris vittata* L.	Eğrelti	Widespread													x								x			
SINOPTERIDACEAE	3	*Cheilanthes fragrans* (L.) Sw.	Eğrelti	Widespread													x	x							x			
ASPLENIACEAE	4	*Ceterach officinarum* DC.	Altın otu	Widespread													x	x							x			
SPERMATOPHYTA																												
GYMNOSPERMAE																												
CUPRESSACEAE	5	*Cupressus sempervirens* L.	Selvi	Plantation																x					x			
PINACEAE	6	*Pinus brutia* Ten.	Kızılçam	Mediterranean																x							x	
	7	*Pinus pinea* L.	Fıstıkçamı	Plantation																x						x		
EPHEDRACEAE	8	*Ephedra campylopoda* C.A. Meyer	Deniz üzümü	Widespread													x	x		x					x			
ANGIOSPERMAE																												
DICOTYLEDONES																												
ANACARDIACEAE	**9**	*Pistacia lentiscus* L.	Sakız ağacı	Mediterranean									x				x	x								x		
APIACEAE	10	*Torilis leptophylla* (L.) Reichb.	-	Mediterranean											x	x									x			
	11	*Torilis arvensis* (Huds.) Link.	-	Widespread											x	x									x			
	12	*Eryngium maritimum L.*	-	Widespread								x													x			
	13	*Eryngium creticum* Lam.	Şeker dikeni	Widespread													x	x							x			
	14	*Eryngium falcatum* Delar	-	Mediterranean													x	x		x					x			
	15	*Berula erecta* (Hunds.)Coville	-	Widespread											x										x			
	16	*Daucus carota* L.	Yabani havuç	Widespread											x										x			
	17	*Caucalis platycarpus* L.	-	Widespread													x	x							x			
	18	*Turgenia latifolia* (L.) Hoffm.	Demir pıtrak	Widespread													x	x		x					x			
APOCYNACEAE	19	*Nerium oleander* L.	Zakkum	Mediterranean											x										x			
	20	*Vinca herbacea* Waldst.& Kit	-	Widespread													x	x							x			
	21	*Trachomitum venetum* (L.) Woodson	-	Mediterranean											x										x			
ASCLEPIADACEAE	22	*Cionura erecta* (L.) Griseb.	-	Mediterranean									x												x			
	23	*Cynanthum acutum* L. subsp. *acutum*	-	Widespread									x												x			
BORAGINACEAE	24	*Echium plantagineum* L.	Kurt kuyruğu	Widespread													x	x							x			
	25	*Echium angustifolium* Miller	-	Widespread									x												x			
	26	*Anchusa aggregata* Lehm.	-	Mediterranean									x	x											x			
	27	*Buglossoides arvensis* (L.) Johnston	-	Widespread													x	x							x			
	28	*Heliotropium hirsutissimum* Grauer	-	Mediterranean													x	x							x			
	29	*Lithodora hispidula* (Sm.) Griseb. Subsp. *hispidula*		Mediterranean																x				x				
BRASSICACEAE	30	*Erophila verna* (L.) Chevall. Subsp. *praecox* (Stev.) Walters	Gıvışgan otu	Widespread													x	x							x			
	31	*Descurainia sophia* (L.)	-	Widespread																	x				x			
	32	*Hirschfeldia incana* (L.) Lag.-Foss.	-	Widespread													x	x			x				x			
	33	*Cardaria draba* (L.) Desv. Subsp. *draba*	Yabani tere	Widespread																	x				x			
	34	*Clypeola jonthlaspi* L.	-	Widespread													x	x							x			
	35	*Eruca sativa* Miller	Roka	Widespread												x					x				x			
	36	*Biscutella didyma* L.	-	Widespread													x	x							x			
	37	*Arabis verna* (L.) DC.	-	Widespread										x			x	x							x			
	38	*Neslia apiculata* Fisch.	-	Widespread													x	x							x			
	39	*Capsella bursa-pastoris* (L.) Medik.	Cobancantasi	Widespread										x		x	x	x							x			
	40	*Sisymbrium officinale* (L.) Scop.	Çalgıcı otu	Widespread												x					x				x			
	41	*Cakila maritima* Scop.	Deniz teresi	Widespread									x												x			
	42	*Thlaspi perfoliatum* L.		Widespread												x	x	x							x			
CAMPANULACEAE	43	*Michauxia campanuloides* L'Herit. ex Aiton	Çançiçeği	Mediterranean																x					x			
CAPPARACEAE	44	*Capparis spinosa* L. var. *spinosa*	Kebere	Widespread														x							x			
CARYOPHYLLACEAE	**45**	*Minuartia hamata* (Hausskn.) Mattf.	-	Widespread													**x**	**x**							**x**			
	46	*Minuartia mediterranea* (Ledeb.) K. Maly	-	Mediterranean													x	x							x			
	47	*Saponaria glutinosa* Bieb.	-	Widespread												x									x			
	48	*Vaccaria pyramidata* Medik. var. *grandiflora* (Fisch. ex DC.) Cullen	Ekin ebesi	Widespread																	x				x			
	49	*Silene vulgaris* (Moenc) Garcke var. *vulgaris*	Gıvışkan otu	Widespread																	x				x			
	50	*Silene dichotoma* Ehrh	-	Widespread																	x				x			
	51	*Silene kotschyi* Boiss. var. *maritima*	-	Widespread									x	x											x			
	52	*Silene colorata* Poiret	Gıvışkan otu	Widespread									x	x											x			
	53	*Dianthus strictus* Banks. & Sol. Var. *strictus*	Karanfil	Widespread														x	x						x			
	54	*Agrostemma githago* L.	Buğday çiçeği	Widespread																	x				x			
CHENOPODIACEAE	55	*Chenopodium foliosum* (Moench) Aschers	Kaz ayağı	Widespread												x									x			
CISTACEAE	56	*Cistus creticus* L.	Laden	Widespread												x	x	x								x		

FAMILY	NO	SPECIES	TURKISN NAME	PHYTOGEOG. REGION	RED LIST		ENDEMIZM	BERN	CITES			HABITAT												RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
	57	*Cistus salviifolius* L.	Laden	Widespread													x	x								x		
	58	*Helianthemum stipulatum* (Forsk.) Christensen		Mediterranean									x													x		
	59	*Helianthemum salicifolium* (L.) Miller		Widespread													x	x							x			
	60	*Tuberaria guttata* (L.) Fourr. Var. *plantaginea* (Willd.)Gross.		Widespread													x	x							x			
	61	*Fumana thymifolia* (L.) Verlot var. *thymifolia*		Widespread													x	x							x			
COMPOSITAE (ASTERACEAE)	62	*Anthemis tinctoria* L. var. *tinctoria*	Papatya	Widespread													x	x							x			
	63	*Inula viscosa* (L.) Aiton	-	Mediterranean												x									x			
	64	*Aster subulatus* Michaux	-	Widespread												x									x			
	65	*Bellis perennis L.*	Koyun gözü	Widespread													x	x							x			
	66	*Senecio vernalis* Waldst. et Kit	-	Widespread													x	x			x				x			
	67	*Atractylis cancellata* L.	-	Mediterranean													x	x							x			
	68	*Xeranthemum annuum* L.	-	Widespread													x	x							x			
	69	*Cichorium intybus* L.	Karahindiba	Widespread											x		x	x							x			
	70	*Carduus pycnocephalus* L.	Kenger	Widespread											x										x			
	71	*Carduus nutans* L. sensu lato	Kenger	Widespread											x										x			
	72	*Onopordum acanthium* L.	-	Widespread													x	x							x			
	73	*Silybum marianum* (L.) Gaertner	Boga dikeni	Widespread																	x				x			
	74	***Echinops dumanii* C. Vural**	**-**	**Mediterranean**	**x**		**CR**					**x**	**x**													**x**		
	75	*Conyza bonariensis* (L.) Cranquist	-	Widespread												x									x			
	76	*Cardopodium corymbosum* L.	-	Mediterranean												x									x			
	77	*Logfia arvensis* (L.) Holub.	-	Widespread													x	x							x			
	78	*Lapsana communis* L.	-	Widespread												x	x	x							x			
	79	*Centaurea calcitrapa* L. ssp. *calcitrapa*	-	Widespread									x												x			
	80	*Centaurea iberica* Trev. ex Sprengel	Çakır dikeni	Widespread									x												x			
	81	*Centaurea babylonica* (L.) L.	Peygamber çiçeği	Mediterranean																x					x			
	82	*Carthamus glaucus* Bieb. *subsp. glaucus*	-	Mediterranean																	x				x			
	83	*Carlina vulgaris* L.	-	Mediterranean												x					x				x			
	84	*Cirsium vulgare* (Savi) Ten.	Su dikeni	Widespread												x									x			
	85	*Sonchus asper* (L.) Hill. Subsp. *glauco-escens* (Jordon) Ball.	-	Widespread												x									x			
	86	*Crepis sancta* (L.) Babcock	-	Widespread													x	x							x			
	87	*Scolymus hispanicus* L.	-	Mediterranean																	x				x			
	88	*Scolymus maculatus L.*	-	Widespread																	x				x			
	89	*Crupina crupinastrum* (Moris) Vis.	-	Widespread													x	x							x			
	90	*Picnomon acarna* (L.) Cass.	-	Widespread													x	x							x			
	91	*Aetheorhiza bulbosa* (L.) Cass. Subsp. *microcephala* Rech. Fil.	Keklikotu	Mediterranean													x	x		x					x			
	92	*Ptilostemon diacantha (Lab.) Greuter subsp. turcicus Greuter*	Devedikeni	Widespread													x	x							x			
	93	*Koelpinia linearis* Pallas		Iran-Turan													x	x		x					x			
	94	*Notobasis syriaca* (L.) Cass.		Mediterranean																	x				x			
	95	*Pallenis spinosa* (L.) Cass.		Mediterranean													x	x							x			
	96	*Xanthium strumarium* L. subsp. *cavanillesii* (Schouw) D. Löve & P. Dansereau	Pıtrak	Widespread									x	x		x										x		
CONVOLVULACEAE	97	*Convolvulus arvensis* L.	Kuzu sarmaşığı, Kaplumbağa otu	Widespread																	x				x			
	98	*Ipomea stolonifera* (Cyr.) J. F. Gmelin		Mediterranean									x	x											x			
CRASSULACEAE	99	*Umbilicus horizontalis* (Guss.) DC. Var. *intermedius* (Boiss.) Chamberlain	Damkoruğu	Widespread													x	x							x			
CYNOCRAMBACEAE	100	*Theligonum cynocrambe*L.		Widespread													x	x							x			
DIPSACACEAE	101	*Scabiosa argentea* L.	Süpürge otu	Widespread													x	x		x					x			
	102	*Scabiosa atropurpurea* L. Subsp. m*aritima* (L.) Arc.	-	Widespread													x	x							x			
ERICACEAE	103	*Erica manipuliflora* Salisb.	Sürürge otu	Mediterranean										x												x		
	104	*Arbutus unedo* L.	Kocayemiş	Widespread													x							x				
EUPHORBIACEAE	105	*Mercurialis annua L.*		Widespread													x	x			x				x			
	106	*Euphorbia rigida* Bieb.	Sütleğen	Mediterranean													x	x							x			
	107	*Euphorbia falcata* L. subsp. *falcata* var. *falcata*	Sütleğen	Widespread													x	x								x		
	108	*Euphorbia paralias* L.	Sütleğen	Widespread									x	x											x			
	109	*Euphorbia apios* L.	Sütleğen	Mediterranean													x								x			
	110	*Euphorbia peplis* L.	Sütleğen	Mediterranean									x	x											x			
	111	*Euphorbia palustris* L.	Sütleğen	Euro-Siberian												x									x			
	112	*Chrozophora tinctoria* (L.) Rafin	-	Widespread																	x				x			
FABACEAE	113	*Acacia farnesiana* (L.) Willd.	Amber ağacı	Plantation																	x				x			
	114	*Prosopis farcta* (Banks & Sol.)		Widespread																	x				x			

FAMILY	NO	SPECIES	TURKISN NAME	PHYTOGEOG. REGION	RED LIST		ENDEMIZM	BERN	CITES			HABITAT												RELATIVE ABUNDANCE				
					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
	115	*Spartium junceum* L.	Katır tırnağı	Mediterranean													x	x							x			
	116	*Calicotome villosa* (Poiret) Link	Azgan	Mediterranean													x	x		x					x			
	117	*Anthyllis tetraphylla* L.		Mediterranean													x	x		x					x			
	118	*Hippocrepis unisiliquosa* L. subsp. *unisiliquosa*		Widespread													x	x							x			
	119	*Coronilla scorpioides* (L.) Koch		Widespread													x	x							x			
	120	*Coronilla varia* L.	Adi geven	Iran-Turan													x	x							x			
	121	*Hymenocarpus circinnatus* (L.) Savi.		Widespread													x	x		x					x			
	122	*Astragalus stella* Gouan	Geven	Mediterranean									x				x								x			
	123	*Astragalus hamosus* L.	Geven	Widespread													x	x							x			
	124	***Astragalus antiochianus* Post**	**Geven**	**Mediterranean**	**x**		**CR**						**x**													**x**		
	125	*Astragalus gossypinus* Fischer	Geven	Mediterranean																x					x			
	126	*Lathyrus cicera* L.	Burçak	Widespread													x	x							x			
	127	*Lathyrus sativus* L.		Widespread													x	x			x							
	128	*Medicago minima* (L.)Bart. Var. *Minima*	Yonca	Widespread													x	x							x			
	129	*Medicago orbicularis* (L.) Bart.	Yonca	Widespread													x	x		x					x			
	130	*Medicago x varia* Martyn	Yonca	Widespread																	x				x			
	131	*Melilotus alba* Desr.		Widespread												x									x			
	132	*Pisum sativum* L. Subsp. *elatius* (Bieb.) Aschers. & Graebn. Var. *Elatius*	Yabani bezelye	Mediterranean													x	x							x			
	133	*Trifolium resupinatum* L. var. *resupinatum*	Üçgül	Widespread												x									x			
	134	*Trifolium stellatum* L. var. *stellatum*	Ucgul	Widespread													x	x							x			
	135	*Trifolium campestre* Schreb.	Ucgul	Widespread													x	x							x			
	136	*Trifolium physodes* Stev. ex Bieb. *pyhsodes*	Üçgül	Widespread													x	x		x					x			
	137	*Trifolium arvense* L. subsp. *arvense*	Üçgül	Widespread													x	x		x					x			
	138	*Trifolium cherleri* L.	-	Mediterranean													x	x							x			
	139	*Trifolium purpureum* Lois. var. *purpureum*	Üçgül	Widespread												x					x				x			
	140	*Trigonella spicata* Sibth.&Sm.	-	Mediterranean													x	x							x			
	141	*Trigonella brachycarpa* (Fisch.) Moris	Yabani Çemen	Iran-Turan													x	x							x			
	142	*Trigonella spruneriana* Boiss. var. *spruneriana*	-	Iran-Turan													x	x							x			
	143	*Trigonella monantha* C.A. Meyer subsp. *Monantha*	-	Iran-Turan													x	x							x			
	144	*Vicia cracca* L. subsp. *stenophylla* Vel.	Fiğ	Widespread													x	x										
	145	*Psoralea bituminosa* L.		Mediterranean													x	x							x			
	146	*Ononis spinosa* L.subsp. *leiosperma* (Boiss.) Sirj.	Köy göçüren	Mediterranean												x									x			
	147	*Scorpiurus muricatus* L. Var. *Subvillosus* (L.) Fiori		Mediterranean													x	x							x			
FAGACEAE	148	*Quercus coccifera* L.	Kermes meşesi	Mediterranean									x				x	x									x	
GENTIANACEAE	149	*Blacstonia perfoliata (*L.) Hudson subsp *perfoliata*		Widespread												x									x			
	150	*Centaurium erythraea* Rafn subsp. *erythraea*		Widespread												x	x								x			
GERANIACEAE	151	*Erodium ciconium* (L.) L'Herit	Turna gagası	Widespread																	x				x			
	152	*Geranium lucidum* L.	Turna gagası	Widespread												x	x								x			
	153	*Geranium molle* L. subsp. *molle*	Turna gagası	Widespread													x	x							x			
LAMIACEAE	154	*Melissa officinalis* L.subsp. *inodora* (Bornm.) Bornm.	Oğul otu	Mediterranean												x									x			
	155	*Teucrium scordium* L. subsp. *scordioides* (Schereber) Maire & Petit.	-	Euro-Siberian												**x**									**x**			
	156	*Teucrium polium* L.	Bozot	Widespread									x	x			x	x							x			
	157	*Lavandula stoechas* L. susp. *stoechas*	Lavanta	Mediterranean													x	x							x			
	158	*Prunella vulgaris* L.	-	Euro-Siberian											x										x			
	159	*Satureja hortensis* L.	Kekik	Widespread										x		x									x			
	160	*Sideritis montana* L. subsp. *remota* (d'Urv.) P.W. Ball ex Heywood	-	Widespread													x	x		x					x			
	161	*Sideritis perfoliata* L.	Dağçayı	Mediterranean																x					x			
	162	*Stachys annua* (L.) subsp. *annua* var. *annua*	-	Widespread									x												x			
	163	*Mentha longifolia* (L.) Hudson	-	Widespread												x									x			
	164	*Origanum vulgare* L.	-	Widespread													x	x							x			
	165	*Marrubium vulgare* L.		Widespread													x	x							x			
	166	*Molucella spinosa L.*	-	Widespread													x	x							x			
	167	*Salvia viridis* L.	Adaçayı	Mediterranean									x	x											x			
	168	*Micromeria myrtifolia* Boiss. & Hohen		Mediterranean													x	x							x			
	169	*Phlomis longifolia* Boiss. & Bl. var. longifolia	Çoban çırası	Mediterranean													x	x							x			
	170	*Thymbra spicata* L. var. *spicata*	Zahter	Mediterranean													x	x							x			
LAURACEAE	171	*Laurus nobilis* L.	Defne	Widespread													x	x								x		
LINACEAE	172	*Linum nodiflorum* L.	Yabani keten	Mediterranean													x	x							x			
	173	*Linum tenuifolium* L.	Yabani keten	Widespread													x	x							x			
LORANTHACEAE	174	*Viscum album* L. subsp. album	Ökse otu	Widespread																	x				x			
LYTHRACEAE	175	*Lythrum salicaria* L.		Euro-Siberian												x									x			
MALVACEAE	176	*Malva sylvestris* L.	Ebegümeci	Widespread												x									x			

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					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
	177	*Malva neglecta* Wallr.	Ebegümeci	Widespread													x	x							x			
	178	*Althaea cannabina* L.	-	Widespread												x									x			
MORACEAE	179	*Ficus carica* L. subsp. *carica*	İncir	Plantation													x	x							x			
	180	*Morus alba* L.	Akdut	Plantation																	x				x			
MYRTACEAE	181	*Myrtus communis* L.	Mersin	Widespread									x													x		
	182	*Eucalyptus cameldunensis* Dehnh.	Ökaliptus	Plantation												x					x					x		
NYMPHAEACEAE	183	*Nuphar lutea* (L.) Sm.	Sarı nilüfer	Widespread										x											x			
OLEACEAE	184	*Jasminum fruticans* L.	Yasemin	Mediterranean													x	x							x			
	185	*Olea europaea* L.var. *sylvestris*	Yabani zeytin	Mediterranean													x	x								x		
	186	*Olea europaea* L.var. *europaea*	Zeytin	Plantation															x									x
	187	*Phillyrea latifolia* L.	Akkesme	Mediterranean													x	x		x								x
	188	*Fontanesia phillriaeoides* Labill. Subsp. *phillriaeoides*		Mediterranean													x	x								x		
ONAGRACEAE	189	*Epilobium parviflorum* Schreber		Widespread												x									x			
OROBANCHACEAE	190	*Orobanche caryophyllacea* Smith	Canavar otu	Widespread													x								x			
PAPAVEARACEAE	191	*Papaver rhoeas* L.	Gelincik	Widespread																	x				x			
PLANTAGINACEAE	192	*Plantago maritima* L.	Sinir otu	Widespread												x									x			
	193	*Plantago lanceolata* L.	Sinir otu	Widespread												x									x			
PLUMBAGINACEAE	194	*Plumbago europea* L.	Diş otu	Euro-Siberian													x	x							x			
POLYGONACEAE	195	*Polygonum cognatum* Meissn.	Madımak	Widespread												x									x			
	196	*Polygonum billardii* All.	Madımak	Widespread												x									x			
	197	*Polygonum equisetiforme*Sibth.&Sm.	Madımak	Widespread								x	x												x			
PORTULACACEAE	198	*Portulacca oleracea* L.	Semiz otu	Widespread																	x				x			
PRIMULACEAE	199	*Anagallis arvensis* L. Var. *caerulea* (L.) Gouan		Widespread												x					x				x			
	200	***Cyclamen persicum*** Miller	**Sıklamen**	**Mediterranean**						**EK1**							**x**	**x**							**x**			
RANUNCULACEAE	201	*Clematis vitalba* L.	Akasma	Widespread												x									x			
	202	*Anemone coronaria* L.	Anemon	Mediterranean													x	x							x			
	203	*Ranunculus chius* DC.	Düğün çiçeği	Widespread													x	x							x			
	204	*Ranunculus arvensis* L.	Düğün çiçeği	Widespread															x		x				x			
	205	*Ranunculus repens* L.	Düğün çiçeği	Widespread															x		x				x			
	206	*Ranunculus constantinopolitanus* (DC.) d'Urv.	Düğün çiçeği	Widespread																	x				x			
	207	*Ranunculus rionii* Lagger	Düğün çiçeği	Widespread														x							x			
	208	*Ranunculus ficaria* L. subsp. *ficariiformis* Rouy & Fouce	Düğün çiçeği	Widespread													x	x							x			
RHAMNACEAE	209	*Paliurus spina-christi* Miller	Karaçalı	Widespread													x	x										x
	210	*Zizyphus lotus* (L.) Lam.	Hannip	Mediterranean													x	x								x		
	211	*Rhamnus oleoides* L. subsp. *graecus* (Boiss.Rreut.) Holmboe	Cehri	Mediterranean													x	x							x			
ROSACEAE	212	*Potentilla recta* L.	Dik parmak otu	Widespread													x	x							x			
	213	*Sarcopoterium spinosum* (L.) Spach	-	Widespread													x	x							x			
	214	*Sanguisorba minor Scop. Subsp. muricata (Spach)Brig*	Çayırdüğmesi	Widespread												x	x	x							x			
	215	*Prunus spinosa* L. var. *dasyphylla* (Schur) Domin	Yabani erik	Widespread													x	x							x			
	216	*Rosa canina* L.	Kusburnu	Widespread														x							x			
	217	*Rubus canascens* DC. Var. *Canascens*	Böğürtlen	Widespread												x									x			
	218	*Rubus discolor* Weihe & Nees	Böğürtlen	Widespread												x									x			
RUBIACEAE	219	*Callipeltis cucullaria* (L.) Steven		Iran-Turan													x	x							x			
	220	*Cruciata taurica* (Pallas ex Willd.) Ehrend.	-	Iran-Turan													x	x							x			
	221	*Galium fissurense* Ehrend.& Schönb. -Tem.	Yogurt otu	Iran-Turan												x		x							x			
	222	*Galium verum* L. subsp. *verum*	Yogurt otu	Euro-Siberian												x									x			
	223	*Rubia tinctorum* L.	Kökboya	Iran-Turan													x	x							x			
	224	*Sherardia arvensis* L.		Mediterranean													x	x		x					x			
RUTACEAE	225	*Citrus limon* (L.) Burm.f.	Limon	Plantation															x									x
	226	*Citrus paradisi* Macfad.	Greyfurt	Plantation															x									x
	227	*Citrus reticulata* Blanco	Mandalina	Plantation															x									x
	228	*Citrus sinensis* (L.) Osbeck	Portakal	Plantation															x									x
SANTALACEAE	229	*Osyris alba* L.		Mediterranean													x	x							x			
SCROPHULARIACEAE	230	*Veronica bozakmanii* M.A. Fischer	-	Iran-Turan													x	x							x			
	231	*Veronica arvensis* L.	-	Widespread													x	x							x			
	232	*Veronica triloba* (Opiz) Kerner	-	Widespread													x	x							x			
	233	*Veronica anagallis-aquatica* L.	-	Widespread												x									x			
	234	*Verbascum cheiranthifolium* Boiss. var. Cheiranthifolium	Sığırkuyruğu	Widespread										x			x								x			
	235	*Verbascum sinuatum L.*	Sığırkuyruğu	Mediterranean										x			x								x			
	236	*Scrophularia scopolii* (Hoppe ex) Pers var. Scopolii	-	Widespread													x	x							x			
	237	*Linaria simplex* (Willd.) DC.	-	Mediterranean													x	x							x			
	238	*Parentucellia latifolia* (L.) Caruel *subsp. latifolia*	-	Mediterranean													x	x							x			

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	239	*Kickxia lanigera* (Desf.) Hand.- Mazz.	-	Widespread													x	x							x			
SIMAROUBACEAE	240	*Ailanthus altissima* (Miller) Swingle	Kokarağaç	Widespread															x						x			
SOLANACEAE	241	*Mandragora autumnalis* Bertol	Adamotu	Mediterranean													x	x							x			
	242	*Datura stramonium* L.	Bıru çiçeği	Widespread									x			x									x			
STYRACACEAE	243	*Styrax officinalis* L.	Tesbih ağacı	Widespread													x	x		x					x			
TAMARICACEAE	244	*Tamarix tetranda* Pallas ex Bieb	Ilgın	Widespread									x			x										x		
THYMELAEACEAE	245	*Thymelaea hirsuta* (L.) Endl.	-	Mediterranean									x												x			
URTICACEAE	246	*Urtica dioica* L.	Isırgan	Euro-Siberian															x		x				x			
	247	*Parietaria lusitanica* L.		Mediterranean													x	x							x			
VALERIANACEAE	248	*Valerianella balansae* Mathews		Widespread													x	x							x			
VERBANACEAE	249	*Phylla nodiflora*(L.) Greene		Widespread												x									x			
	250	*Vitex agnus-castus* L.	Hayıt	Mediterranean									x			x									x			
ZYGOPHYLLACEAE	251	*Tribulus terrestris* L.	Demirdikeni	Widespread															x		x				x			
MONOCOTYLEDONES																									x			
AMARYLLIDACEAE	**252**	***Sternbergia puchella* Boiss. & Blanche**	**Hoş Karaçiğdem**	**Mediterranean**			**VU**												**x**					**x**				
ARACEAE	253	*Arum dioscoridis* Sm. var. *syriacum* (Blume) Engler	Yılan yastığı	Mediterranean													x	x							x			
	254	*Arisarum vulgare* Targ.-Tozz. subsp. *vulgare*		Mediterranean													x	x							x			
CYPERACEAE	255	*Cladium mariscus* (L..) Pohl.	-	Widespread												x									x			
	256	*Bulboschoenus maritimus* (L.) Palla var. *maritimus*	-	Widespread									x			x										x		
	257	*Carex otrubae* Podp.	-	Euro-Siberian												x									x			
	258	*Cyperus capitatus* Vandelli	-	Widespread								x	x													x		
	259	*Cyperus rotundus* L.	-	Widespread												x									x			
DIOSCEREACEAE	260	*Tamus communis* L. subsp. *communis*	Siyah akasma	Mediterranean												x									x			
GRAMINEAE (POACEAE)	261	*Poa bulbosa* L.	-	Widespread													x	x							x			
	262	*Lagurus ovatus* L.	-	Widespread									x								x				x			
	263	*Digitaria sanguinalis* (L.) Scop.	-	Widespread												x									x			
	264	*Bracypodium sylvaticum* (Hudson) P. Beauv.	-	Widespread												x									x			
	265	*Elymus hispidus* (Opiz) Melderis subsp. *hispidus*	-	Widespread												x									x			
	266	*Koeleria cristata* (L.) Pers.	-	Widespread													x								x			
	267	*Cynosurus effusus* L.	-	Mediterranean													x	x							x			
	268	*Bromus arvensis* L.	-	Widespread													x	x							x			
	269	*Bromus tectorum* L	-	Widespread									x				x	x			x				x			
	270	*Dactylis glomerata* L. subsp. *hispanica* (Roth) Nyman	Parmak otu	Mediterranean													x	x							x			
	271	*Briza humilis* Bieb.	-	Widespread													x	x							x			
	272	*Lolium perenne* L.	Çim	Widespread													x	x							x			
	273	*Apera intermedia* Hackel	-	Iran-Turan													x	x							x			
	274	*Alopecurus arundinaceus* Poiret	-	Euro-Siberian												x									x			
	275	***Alopecurus adanensis* M. Doğan**	**-**	**Mediterranean**	**x**		**CR**						**x**								**x**				**x**			
	276	*Cynodon dactylon* (L.) Pers. Var. *dactylon*	Ayrık	Widespread												x									x			
	277	*Polypogon monspeliensis* (L.) Desf.	-	Widespread												x									x			
	278	*Phleum bertolonii* DC.		Mediterranean												x									x			
	279	*Arundo donax* L.	Kargı	Widespread											x	x												x
	280	*Phragmites australis* (Cav.)Trin. Ex Steudel	Kamış	Widespread											x	x												x
	281	*Saccharum ravennae* (L.) Muray	Şeker kamışı	Widespread											x	x									x			
	282	*Imperata cylindrica* (L.) Raeuschel	-	Widespread											x	x									x			
	283	*Sporobolus virginicus* (L.) Kunth	-	Widespread											x	x									x			
	284	*Avena sativa L.*	Yulaf	Widespread													x	x							x			
	285	*Psilurus incurvus* (Gouan) Schinz & Thell	-	Widespread													x	x							x			
	286	*Melica minuta* L.	-	Mediterranean													x	x							x			
	287	*Psilurus incurvus* (Gouan) Schinz & Thelll.		Widespread													x	x							x			
	288	*Pennisetum orientale* L.C.M. Richard		Iran-Turan													x	x							x			
	289	*Piptatherum miliaceum* (L.) Cosson subsp. *thomasii* (Duby) Freitag		Widespread													x	x							x			
	290	*Stipa bromoides* (L:) Dörfler		Mediterranean													x	x							x			
	291	*Trachynia distachya* (L.) Link		Mediterranean													x	x							x			
JUNCACEAE	292	*Juncus acutus* L.	-	Widespread											x	x										x		
	293	*Juncus littoralis* C.A. Meyer	-	Mediterranean											x	x									x			
	294	*Juncus capitatus* Weigel	-	Widespread											x	x										x		
	295	*Juncus effusus* L.		Widespread											x	x										x		
LILIACEAE																												
	296	*Smilax aspera L*	-	Mediterranean													x	x							x			
	297	*Ruscus aculeatus* L. var. *angustifolius* Boiss.	-														x	x							x			
	298	*Asphodelus aestivus* Brot.	Çirişotu	Mediterranean													x	x							x			
	299	*Allium junceum* Sm. subsp. *junceum*	Yabani sarımsak														x	x							x			
	300	*Urginea maritima* (L.) Baker	Kum zambağı	Mediterranean													x	x										x

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					R	W		Anx1	App1	App2	App3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
	301	*Asparagus acutifolius* L.	Kuşkonmaz														x	x							x			
	302	*Asparagus officinalis* L.	-														x	x							x			
	303	*Asparagus acutifolius* L.	Kuşkonmaz	Widespread													x	x							x			
	304	*Ornithogalum narbonense* L.	Yıldız çiçeği	Mediterranean													x	x							x			
	305	*Muscari comosum* (L.) Miller	Köpek sümbülü	Mediterranean													x	x							x			
	306	*Scilla autumnalis* L.	-	Mediterranean													x	x							x			
	307	*Gladiolus illyricus* W. Koch	Gladiyol	Mediterranean													x	x							x			
POTAMOGETONACEAE	308	*Potamogeton pectinatus* L.		Widespread											x	x									x			
THYPHACEAE	309	*Thypa angustifolia* L.	Hasırotu	Widespread											x	x									x			

ENDEMİZM

R: Regional endemic

W: Widespread endemic

HABITAT CLASSIFICATION

1: Coastal stable dune grassland (grey dunes) (B1.4)
2: Coastal dune heaths (B1.5)
3: Permanent mesotrophic lakes, ponds and pools (C1.2)
4. Water-fringing reedbeds and tall helophytes other than canes (C3.2)
5. Reedbeds normally without free-standing water (D5.1)
6. Maquis (F5.2)
7. Eastern garrigues (F6.2)
8. Evergreen orchards and groves (G2.9)
9. Conifer plantations (G3.F)
10. Low-intensity agricultural areas (I1.3)
11. Urban and suburban industrial and commercial sites still in active use (J1.4)
12. Road network (J4.2)

RELATIVE ABUDNDANCE

1: Very rare
2: Rare
3: Moderately abundant
4: Abundant
5: Very abundant

4.6.3.3. 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 and PS6, other species that might be further identifies should also be assessed within the scope of the Environmental and Social Management Plan (ESMP) and Environmental and Social Commitment Plan (ESCP).

The list of fauna species identified at the Biodiversity Study Area through previous records, direct observations and habitat suitability is provided in Table 4-24 . Potential critical habitat triggering species are further assessed in Chapter 4.6.5, and impact assessment on fauna species can be found in Chapter 5.

Table 4-24 Fauna Species of the Biodiversity Study Area

Biodiversity Feature	IUCN Red List	Endemizm	Direct Observation
Mammals			
Canis aureus	LC	-	-
Vulpes vulpes	LC	-	X
Arvicola amphibius	LC	-	-
Cricetulus migratorius	LC	-	-
Microtus guentheri	LC	-	X
Microtus levis	LC	-	X
Microtus socialis	LC	-	X
Erinaceus concolor	LC	-	X
Herpestes ichneumon	LC	-	-
Hystrix indica	LC	-	-
Lepus europaeus	LC	-	X
Miniopterus schreibersii	NT	-	-
Apodemus flavicollis	LC	-	-
Apodemus mystacinus	LC	-	-
Meriones tristrami	LC	-	-
Mus macedonicus	LC	-	-
Mus musculus	LC	-	-
Rattus norvegicus	LC	-	-
Rattus rattus	LC	-	X
Martes foina	LC	-	X
Martes martes	LC	-	X
Meles meles	LC	-	X
Mustela nivalis	LC	-	-
Rousettus aegyptiacus	LC	-	-
Rhinolophus blasii	LC	-	-
Rhinolophus euryale	NT		-
Rhinolophus ferrumequinum	LC		-
Rhinolophus hipposideros	LC		-
Rhinolophus mehelyi	VU		-
Crocidura leucodon	LC		-
Crocidura leucodon	LC		-
Neomys anomalus	LC		-
Nannospalax ehrenbergi	DD		X
Sus scrofa	LC		-

Biodiversity Feature	IUCN Red List	Endemizm	Direct Observation
Hypsugo savii	LC	-	-
Myotis blythii	LC	-	-
Myotis capaccinii	VU	-	-
Myotis emarginatus	LC	-	-
Myotis myotis	LC	-	-
Pipistrellus kuhlii	LC	-	-
Pipistrellus pipistrellus	LC	-	-
Plecotus kolombatovici	LC	-	-
Birds			
Tachybaptus ruficollis	LC	-	X
Bubulcus ibis	LC	-	X
Egretta garzetta	LC	-	X
Ardea alba	LC	-	X
Ardea cinerea	LC	-	X
Anas crecca	LC	-	X
Anas platyrhynchos	LC	-	X
Aythya ferina	LC	-	-
Milvus migrans	LC	-	-
Circus aeruginosus	LC	-	X
Circus cyaneus	LC	-	X
Accipiter gentilis	LC	-	-
Accipiter nisus	LC	-	-
Buteo buteo	LC	-	X
Falco tinnunculus	LC	-	X
Falco columbarius	LC	-	X
Falco peregrinus	LC	-	-
Fulica atra	LC	-	X
Stercorarius parasiticus	LC	-	-
Ichthyaetus melanocephalus	LC	-	X
Hydrocoloeus minutus	LC	-	-
Chroicocephalus ridibundus	LC	-	-
Chroicocephalus genei	LC	-	X
Larus canus	LC	-	-
Larus michahellis	LC	-	X
Columba livia	LC	-	X
Streptopelia decaocto	LC	-	X
Alcedo atthis	LC	-	X
Halcyon smyrnensis	VU	-	X
Ceryle rudis	EN	-	X
Dendrocopos syriacus	LC	-	X
Alauda arvensis	LC	-	X
Anthus pratensis	LC	-	X
Anthus cervinus	LC	-	-
Motacilla cinerea	LC	-	-
Troglodytes troglodytes	LC	-	-
Erithacus rubecula	LC	-	X
Phoenicurus ochruros	LC	-	-
Turdus merula	LC	-	X
Turdus pilaris	LC	-	X
Turdus philomelos	LC	-	-
Cisticola juncidis	LC	-	X
Prinia gracilis	LC	-	-
Sylvia melanocephala	LC	-	-
Phylloscopus collybita	LC	-	X
Cyanistes caeruleus	LC	-	-
Parus major	LC	-	X
Remiz pendulinus	LC	-	-
Garrulus glandarius	LC	-	X
Pica pica	LC	-	X
Coloeus monedula	LC	-	X
Corvus frugilegus	LC	-	X
Corvus cornix	LC	-	X

Biodiversity Feature	IUCN Red List	Endemizm	Direct Observation
Corvus corax	LC	-	X
Sturnus vulgaris	LC	-	X
Passer domesticus	LC	-	X
Fringilla coelebs	LC	-	-
Fringilla montifringilla	LC	-	-
Chloris chloris	LC	-	X
Carduelis carduelis	LC	-	X
Spinus spinus	LC	-	-
Emberiza schoeniclus	LC	-	X
Emberiza calandra	LC	-	X
Reptiles			
Stellagama stellio	LC	-	-
Pseudopus apodus	NE	-	-
Blanus strauchi	LC	-	-
Blanus strauchi	LC	-	-
Eryx jaculus	NE	-	-
Chamaeleo chamaeleon	LC	-	-
Caretta caretta	VU	-	-
Chelonia mydas	EN	-	-
Dolichophis jugularis	LC	-	-
Eirenis levantinus	LC	-	-
Eirenis modestus	LC	-	-
Platyceps najadum	LC	-	-
Telescopus fallax	LC	-	-
Emys orbicularis	NT	-	-
Hemidactylus turcicus	LC	-	-
Mediodactylus kotschyi	LC	-	-
Mauremys caspica	NE		-
Mauremys rivulata	NE		-
Acanthodactylus schreiberi	EN		-
Lacerta media	LC		-
Ophisops elegans	NE		-
Phoenicolacerta laevis	LC		-
Natrix tessellata	LC		-
Ablepharus budaki	LC		-
Ablepharus chernovi	LC		-
Chalcides ocellatus	NE		-
Eumeces schneideri	NE		-
Heremites auratus	LC		-
Heremites vittatus	LC		-
Testudo graeca	VU		X
Trionyx triunguis	VU		-
Xerotyphlops vermicularis	LC		-
Macrovipera lebetina	NE		-
Amphibians			
Bufotes variabilis	DD	-	-
Hyla savignyi	LC	-	-
Pelophylax bedriagae	LC	-	-
Pelophylax ridibundus	LC	-	X
Ommatotriton vittatus	LC	-	-
Salamandra infraimmaculata	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 and PS6, 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 impactive 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 and PS6. 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 PS6 requirements accordingly.

Modified habitats, in the most general sense, are those that have been subject to some form of alteration, often resulting in agricultural land. Despite the fact that some modified habitats might lose all of their natural characteristics, it is still required to minimize further impacts. Natural habitats are composed of plant and/or animal species that are mostly of native origin, where human activity has not been significant enough to modify ecological functions and species composition within. In areas of natural habitat mitigation measures are required to be designed to achieve no net loss of biodiversity.

Critical habitats are those that are of high biodiversity value. Both natural and modified habitats may contain high biodiversity values qualifying as critical habitat. While habitat types are defined by the degree of human-induced modification, this is not necessarily an indicator of the biodiversity value of a habitat as per ESS6.

Critical habitat criteria as put forward by ESS6 that forms the basis of critical habitat assessment are as follows:

Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species

Criterion 2: Endemic or restricted-range species

Criterion 3: Migratory or congregatory species

Criterion 4: Highly threatened and/or unique ecosystems

Criterion 5: Key evolutionary processes

ESS6 requires the Borrower (clients) not to implement any project activities in areas of critical habitat unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project in habitats of lesser biodiversity value;
- All due process required under international obligations or national law that is a prerequisite to a country granting approval for project activities in or adjacent to a critical habitat has been complied with;
- The potential adverse impacts, or likelihood of such, on the habitat will not lead to measurable net reduction or negative change in those biodiversity values for which the critical habitat was designated;
- The project is not anticipated to lead to a net reduction in the population of any Critically Endangered, Endangered, or restricted-range species, over a reasonable time period;
- The project will not involve significant conversion or significant degradation of critical habitats. In circumstances where the project involves new or renewed forestry or agricultural plantations, it will not convert or degrade any critical habitat;
- The project's mitigation strategy will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated; and
- A robust and appropriately designed, long-term biodiversity monitoring and evaluation program aimed at assessing the status of critical habitat is integrated into the Borrower's management program.

It should also be noted that Critical Habitat Assessment is independent of a project's potential impacts on biodiversity value within its AOI or an extended area. The outcome of the Critical Habitat Assessment does not indicate a particular impact associated with project activities or requirement for a mitigation measure. Rather it provides a thorough analysis of the existing biodiversity value in a given area and informs the applicability of ESS6 requirements. For the project-related impacts a mitigation hierarchy is to be applied and measures are required to be defined for different phases of a project.

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 extent of occurrence (EOO) as such:

- For terrestrial vertebrates and plants, a restricted-range species is defined as those species which have an EOO less than 50,000 km^2.
- 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 PS6. The thresholds are as the following:

(a) areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.

(b) areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress.

The significant groups of migratory and congregatory species that are potential critical habitat triggers in the area are birds. The timing of site surveys 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, World Bank requires the Client to use the IUCN Red List of Ecosystems (RLE) where formal assessments have been performed, and if not to use assessments using systematic methods at the national/regional level, carried out by government bodies, recognized institutions and/or other relevant qualified organizations. The thresholds are:

(a) areas representing ≥5 percent of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.

(b) other areas, not yet assessed by IUCN, but determined to be of high priority for conservation by regional or national systematic conservation planning.

As Burnaz Dunes KBA has been appointed the IUCN Protected Area Management Category Ia, it meets critical habitat criteria. "Coastal stable dune grassland" and "coastal dune heath" habitats have been assessed as potential critical habitat triggers 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 4-25 .

Table 4-25 Potential Critical Habitat Triggering Taxa as per Criterion 1 and 2

Biodiversity Feature	IUCN Red List Category	Endemic / Restricted-Range
Plants		
Echinops dumanii	CR	Endemic
Astragalus antiochianus	CR	Endemic
Alopecurus adanensis	CR	Endemic
Sternbergia pulchella	EN	-
Cyclamen persicum	VU	-
Reptiles		
Acanthodactylus schreiberi	EN	Endemic
Testudo graeca	VU	-
Trionyx triunguis	VU	-
Birds		
Ceryle rudis	EN	-
Halcyon smyrnensis	VU	-
Clanga clanga	VU	-
Apus affinis	VU	

Potential critical habitat triggering Critically Endangered species are all native to coastal dune habitats. *Echinops dumanii* population in the Biodiversity Study Area was identified to be about 150 individuals, which represents 5-10% of its known population in Turkey. Since the Biodiversity Study Area holds more than 0.5% of the species' global population, it is designated as critical habitat for *Echinops dumanii*. *Astragalus antiochianus* population was identified to be about 200 individuals. This corresponds to about 2-3% of its known population so it does not meet Criterion 1 numerical thresholds. Similarly, *Alopecurus adanensis*

population that had previously been identified had about 100 individuals, also corresponding to 2-3% of its known population.

Critical Habitat Assessment was conducted to cover the entire Biodiversity Study Area. Potential impacts on *Echinops dumanii* and *Astragalus antiochianus* populations, and the dune habitats holding these populations will be avoided within the scope of Cukurova Region and Iskenderun Bay Railway Connection Project. In order not to have any direct impacts on *Alopecurus adanensis*, current status of the species in the area will be confirmed through pre-construction surveys prior to the finalization of the detailed design, and assessments in the ESIA Report will be updated within the scope of the ESMP.

Sternbergia pulchella has been assessed to be Endangered, based on expert judgement within the scope of the ESIA studies. The population of about 100 individuals identified on the Project route is one of the two known locations of the species and represents about 20% of its population in Turkey. IUCN's global population assessment on the species estimates that there is a total of 4500-5000 individuals scattered across Turkey, Syria and Lebanon. Yet, due to lack of adequate data on the species, and precise locations of the populations outside Lebanon, it is categorized as Data Deficient by the Red List. On-site data acquired during the field surveys in January 2020 and the IUCN assessment suggest that with 100 individuals corresponding to nearly 5% of *Sternbergia pulchella*'s global population, the Biodiversity Study Area is a potential critical habitat for this species. Given uncertainties on the species global status and the need for more thorough assessments on its taxonomy, population and range, more data is required to first provide evidence that the localities identified in Turkey are of the same population. Pre-construction flora surveys will provide additional data on other localities in the area, if any, and specimens from the site can be further studied to better understand the species' taxonomy.

Unlike the other threatened flora species, *Sternbergia pulchella* population is located directly on the Project route within the construction corridor. With a more conservative approach, until additional data become available, the Biodiversity Study Area will be considered as a potential critical habitat for the species, where ESS6 requirements will be applied accordingly. In line with the mitigation hierarchy, seeds of the species should be collected, and a translocation study should be undertaken before the onset of Project activities, at a seasonally appropriate time between March 1 and April 15. Meanwhile, other localities for the species will be researched during pre-construction surveys prior to the finalization of the detailed design, which will inform the updated critical habitat assessment. Seed collection and translocation studies will be implemented within the scope of the Biodiversity Management Plan, and monitored in line with the Biodiversity Monitoring and Evaluation Program to define additional action requirements. Based on the monitoring results, if there are residual impact on the *Sternbergia pulchella* population, as per ESS6 and PS6, following the mitigation hierarchy, offset strategies are required to be developed.

Population of the Endangered *Acanthodactylus schreiberi* in the Biodiversity Study Area also meets Criterion 1 thresholds and triggers critical habitat. However, Project-related impact on *Acanthodactylus schreiberi*, together with *Echinops dumanii, Astragalus antiochianus* and Burnaz dune habitats, have been avoided with the changes made to the Project route during the scoping phase of the ESIA. A Critical Habitat Map showing the locations of *Critically Endangered and Endangered species'* populations is presented in Figure 4-25.

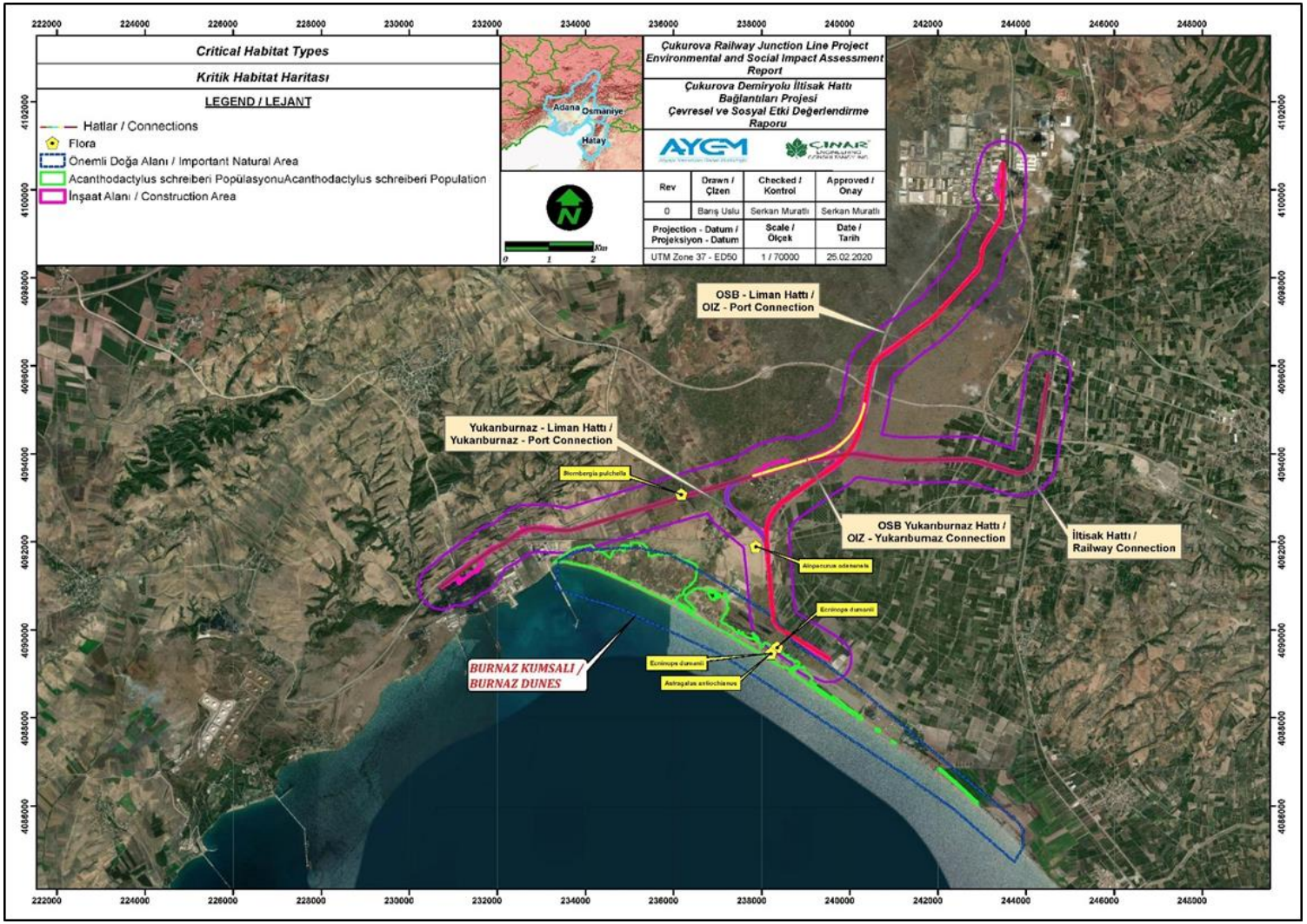

Figure 4-25 Critical Habitat Map

Another potential critical habitat trigger is *Ceryle rudis* (Pied kingfisher), whose global Red List category is Least Concern, while the European Red List suggests that the species is Endangered on a regional scale. The only population assessed within the scope of the European Red List is the *Ceryle rudis* population in Turkey. BirdLife International states that the species' global range is very wide that (see Figure 4-26) it cannot reach the IUCN's Vulnerable category under the EOO criterion. Although its current population is not known, even under the population trend criterion, it is not estimated to be declining at a rate to reach Vulnerable thresholds. The species mostly occupies small and large lakes, large rivers, estuaries, coastal lagoons, sandy and rocky coasts, freshwater and brackish dams and reservoirs (BirdLife, 2020). The single individual recorded during the ornithological studies conducted in January 2020 was observed at the reedbed behind the coastal dunes in the Biodiversity Study Area.

Based on the records from Turkey that inform the European Red List categorization, approximately 100-200 *Ceryle rudis* pairs are estimated to be found in different basins of Turkey as shown in Figure 4-26 (IUCN, 2020). Considering the species global range and known population in Turkey, the Biodiversity Study Area population cannot possibly meet Criterion 1 thresholds for critical habitat. That being said, since the European population of *Ceryle rudis* has limited distribution only in Turkey, it is a species of high conservation concern at regional level. Habitat use characteristics of the species will be studied through pre-construction surveys, and species-specific strategies to manage Project-related impacts will be developed and implemented within the scope of the BMP.

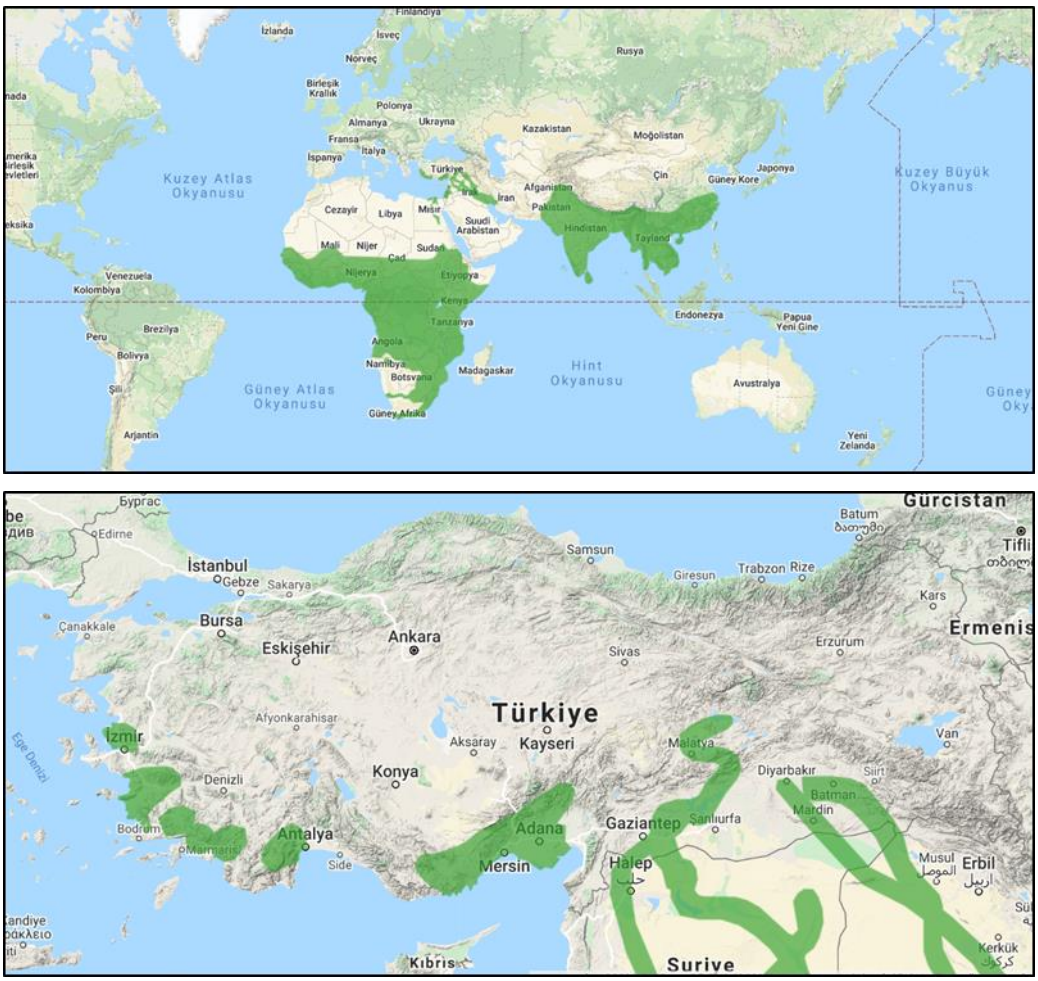

Figure 4-26 Ceryl rudis Global Range and Distribution in Turkey (BirdLife, 2020)

Populations of Vulnerable species listed in Table 4-25; *Cyclamen persicum* (Persian cyclamen), *Testudo graeca* (Common tortoise), and *Trionyx triunguis* (African softshell turtle), were estimated based on expert judgement. The Biodiversity Study Area does not hold significant populations of neither of these species, the loss of which would cause a change in their Red List categories. *Halcyon smyrnensis* (White-throated kingfisher) and *Apus affinis* (Little swift) are regionally Vulnerable species, but are globally listed as Least Concern due to their very large ranges. Based on current estimates of their populations in the area, threat categories of these species would not be subject to any change due to Project activities. C*langa clanga* (Greater spotted eagle), on the other hand, lays over at its wintering sites in Greece, Turkey and Israel during its migration. There are records of wintering individuals in Hatay, but the species was not observed during the field surveys in January 2020.

Available data suggest that Vulnerable species do not trigger critical habitat. If additional data become available during pre-construction surveys that will be conducted during appropriate seasons (Spring-Summer) prior to the finalization of the detailed design, or new species are identified, the Critical Habitat Assessment will be updated, and actions to conserve species and their habitats will be taken within the scope of the ESMP.

Although they do not trigger critical habitat, in line with ESS6 and PS6 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.

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 prior to the finalization of the detailed design 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 and PS6, 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 4-26.

Table 4-26 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
B1.5: Coastal dune heaths	-	-	EN	A3, CD1
C1.2: Permanent mesotrophic lakes, ponds and pools	NT	CD1	LC	-

Coastal stable dune grassland (grey dunes)" has been assessed to be Endangered (Janssen, 2016), due to its extent of occurrence (B1), extent of occupancy (B2) and reduction in its abiotic and/or biotic quality (CD1) both at the European and Turkish scales.

"Coastal dune heaths" habitat in the area is different than the European B1.5 habitats in terms of its species composition. However, considering it should be evaluated with habitats of the same class, it has been considered as a Habitats Directive provisional Annex I habitat. Since the European Red List does not provide an assessment for this habitat in Turkey, the habitat has been assessed at the national scale. Based on present and future (next 50 years) reduction in its quantity (A2b) and reduction in the habitat's abiotic and/or biotic quality (CD1) it is categorized as Endangered. It has not been possible to identify how much of the global extents of these two habitats are represented in the area. However, considering their relatively narrow range and threats they have been facing, the dune habitats in the Biodiversity Study Area have been designated as critical habitat.

There will be no Project-related impacts on the grey dunes, the dune heaths, and the *Echinops dumanii, Astragalus antiochianus* ve *Acanthodactylus schreiberi* populations they support, all of which also triggers critical habitat. In line with ESS6 and PS6 provisions, and following the mitigation hierarchy, potential impacts on critical habitat have been avoided within the scope of the Project.

Although "Permanent mesotrophic lakes, ponds and pools" does not meet Criterion 4 thresholds, it is 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 natural habitats are further discussed in line with the mitigation hierarchy 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 and PS6 also recognize the importance of maintaining benefits that people, including businesses, derive from ecosystems. PS6 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 and PS6 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 which are detailed in Chapter 4.8, have also been used.

Guidelines developed by the WRI provide a useful tool to incorporate evaluation of ecosystem services into the Project ESIA studies. The first step in the Ecosystem Services Review (ESR) is identifying ecosystem services based on the following criteria:

- Impact: Direct impact on a particular ecosystem service caused by project activities that also impacts the community
- Dependence: Project's dependence on the ecosystem service for its operations
- Relevance to Affected Community: Ways in which livelihood, health, safety or culture of a community will be impacted
- Management Control: The project's control over the ecosystem service in question

Socio-economic and biodiversity studies conducted within the scope of the ESIA process identify relevant ecosystem services as explained in Table 4-27 .

Table 4-27 Ecosystem Services

Ecosystem Service	Sub-Category	Ecosystem Service on the Project Route	Status
Provisioning Services			
Food	Crops	Grains	Mostly for household consumption.
		Vegetables	
	Livestock	Large / small cattle	Livestock is a significant source of income at all of the settlements that have been subject to the Social Impact Assessment (SIA).
		Poultry	
		Grazeland	
		Fisheries	50 households in Kurtpinar village are involved in fisheries.
	Apiculture		One household interviewed within the scope of the SIA has beehives.
	Wild food	Citrus fruits	The most significant produce in terms of income generation (citrus fruits generating the most)
		Olives	
		Mushroom, herbs	Mostly for household consumption.

Ecosystem Service	Sub-Category	Ecosystem Service on the Project Route	Status
Biological raw material	Timber and other wood products	Firewood	Derived from the forest for household consumption.
Freshwater	Agricultural irrigation		99% of citrus fruit production depends on drip irrigation.

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 4-27 , 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 4-27 provides a useful tool to prioritize relevant ecosystem services according to potential project impacts on beneficiaries.

Assessment of each identified ecosystem service according to the decision tree yielded priority ecosystems as listed in Table 4-28 , which also shows how the decision tree has been implemented to prioritize relevant ecosystem services.

A detailed assessment on significance of ecosystem services in terms of livelihoods, and Project-related impacts is provided in Chapter 4.8: Socio-Economic Environment.

It has been identified that the most significant impacts on ecosystems with the implementation of the Project will incur as the loss of citrus fruit orchards and as impacts on water resources. Loss of olive gardens and grazeland on the route, and restriction of access to grazelands have also been assessed as priority ecosystem services.

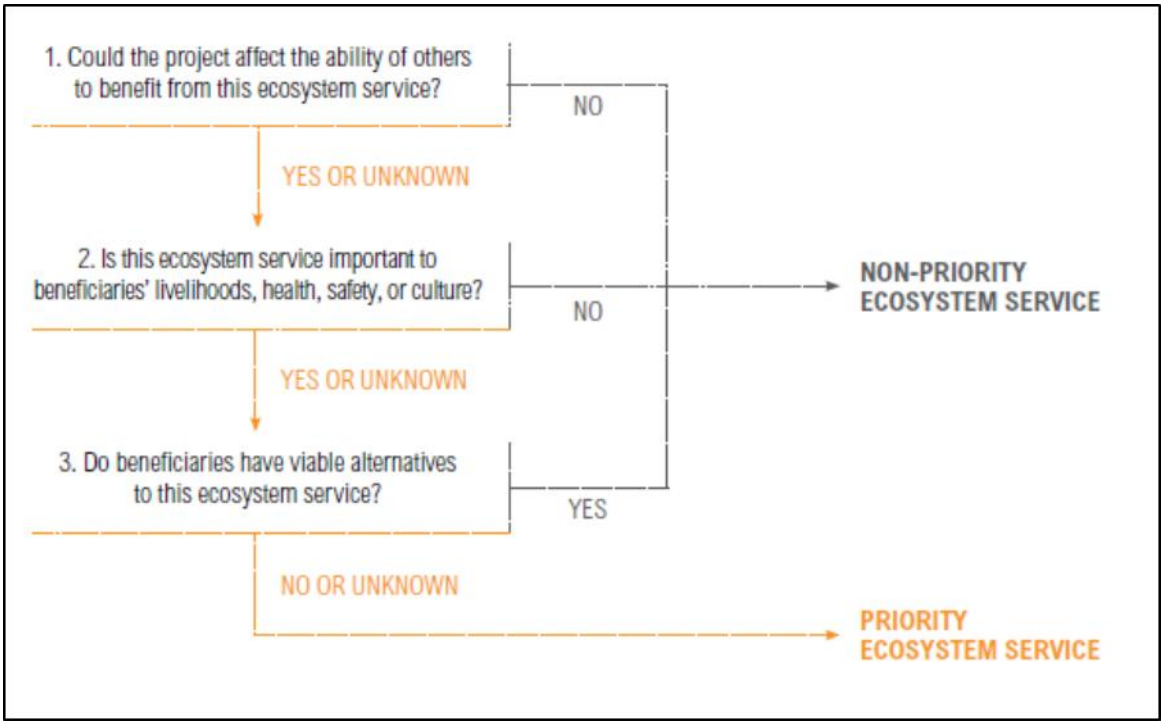

Figure 4-27 Decision Tree to Prioritize Ecosystem Services

Table 4-28 Prioritization of Relevant Ecosystem Services

Ecosystem Service	Decision-Tree Question			Decision
	1	2	3	
Grains	Yes	No	-	Non-priority service
Vegetable gardens	Yes	No	-	Non-priority service
Large/small cattle	No	-	-	Non-priority service
Poultry	No	-	-	Non-priority service
Grazeland	Yes	Yes	Unknown	Priority service
Apiculture	No	-	-	Non-priority service
Mushroom, herbs	Yes	No	-	Non-priority service
Citrus fruits	Yes	Yes	Unknown	Priority service
Olive	Yes	Unknown	-	Potential priority service
Firewood	Yes	No	-	Non-priority service
Agricultural irrigation	Yes	Yes	Unknown	Priority service

Loss of land and immovables due to expropriation, which also include citrus fruit orchards and the irrigation system, will be assessed in further detail within the scope of the Resettlement Action Plan (RAP). Income losses 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

Çukurova, formed by the widest and most fertile plains of Anatolia, forms the southern part of the Neogene Adana Basin. Surrounded by the Taurus Mountains in the north, Amanos Mountains in the east and the Mediterranean in the south, the western border of the region is determined by the Ecemiş fault line[3]. The plain formed by the common delta of the Tarsus (Cydnus), Seyhan (Sarus) and Ceyhan (Pyramus) rivers and named as the Aeolian[4] plain in ancient sources is located in the southwest of the region. The southern part of the basin, which is entirely called the Adana Plain, is called Çukurova, while the northern part is called Yukarı Ova (Anavarza). The Misis (Cebelinur) Mountains separate the two plains. This topography was called Ovalık Kilikya (Cilicia Pedias or Campestris[5]) in ancient times.

Ovalık Kilikya, which has the appearance of a closed basin at first due to the mountains surrounding it, breaks this closed basin appearance as it is located on important roads connecting Central Anatolia to Syria and Mesopotamia. One of the most important of these roads is the road that descends from Taurus Mountains to Tarsus via Gülek Passage (Pylai Kilikias[6]), reaches to Kinet Huyuk, which was localized as the ancient Issus[7] through Misis (Mopsuhestia) , and connects to Syria and Mesopotamia through the Belen Pass (Syriai Pylai) [8] in Amanos Mountains (Figure 4-28). This aforementioned road has a route crossing the protected archaeological sites such as Karanlık Kapı 1st and 3rd Degree Archaeological Site which is located close to project licence area and Muttalip Huyuk in Toros Gübre premises.

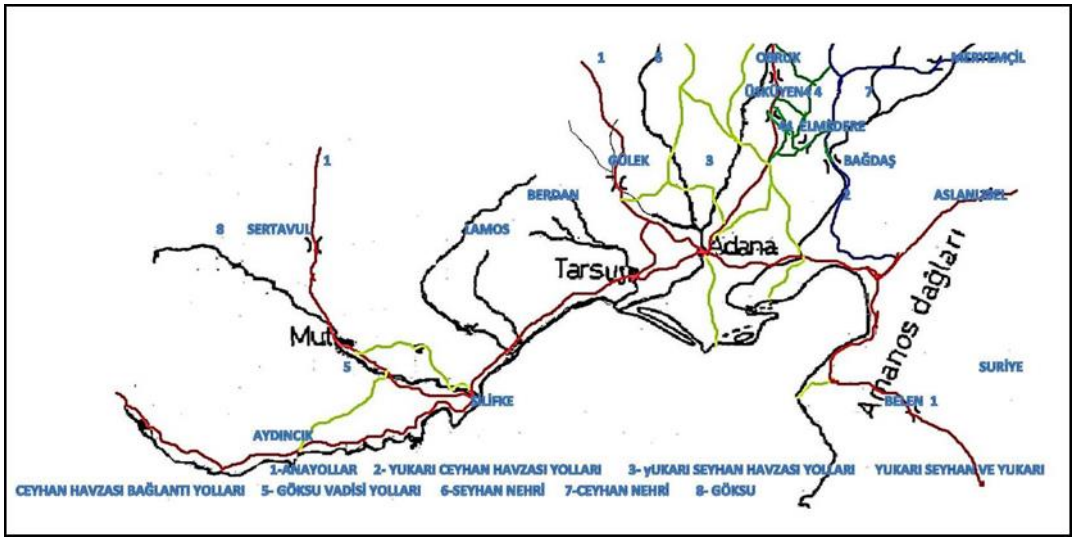

Figure 4-28 Ancient Period Roads of Clicia Region

Starting from the ancient city of Soli / Pompeiopolis to the foothills of the Amanos Mountains, Ovalık Kilikya has attracted human communities from prehistoric times thanks to its fertile soil and water resources.

The Neolithic Period is the period seen in Anatolia between 9500 BC and 5500 BC and is called the "New Stone Age". Important residential areas of this period close to the project

[3] Şenyurt vd. 2006:12; Gürbüz 1992:212.

[4] Şenyurt vd. 2006:12; Magie 1950: 271.

[5] Strabon XIV: 5.1.

[6] Şenyurt vd. 2006:16; Hild-Hellenkemper 1990: 387.

[7] Şenyurt vd. 2006:16; Gates 1999: 304.

[8] Strabon XIV: V.1; Erzen 1940:14-16,27-29.

area are Tarmil (Tırmıl), Tatarlı, Şamsı, Tömük (Elvanlı), Yunus, Kinet, Kabarsa and Çavuşlu Huyuks (Table *4-29* , Figure 4-29).

The Chalcolithic Period (5500 BC- 3200 BC) was experienced after the Neolithic period in Ovalık Kilikya. Anazarbos (Anazarva), Aigaea (Yumurtalık), Hierapolis-Kastabala (Osmaniye), Mopsuestia-Misis (Yakapınar), Domuz Tepe, Sirkeli Huyuk, Tülek Huyuk, Boyalı Huyuk, Adatepe Necropolis, Adatepe Huyuk, Kinet Huyuk, Tatarlı Huyuk ve Muttalip Huyuk in Toros Gübre can be listed among the important settlements of this period, close to the project area limits. (Table 4-29 , Figure 4-29).

After the Chalcolithic Period, Bronze Age was experienced in Anatolia (3200 BC-1200 BC). It is known from the excavations and field surveys that large settlements were established in Ovalık Kilikya, as in other parts of Anatolia. In this period when bronze, obtained by mixing tin and copper, began to be used in metal tool making. Yarım Huyuk, Tülek Huyuk, Boyalı Huyuk, Maltepe Huyuk, Sirkeli Huyuk, Çatalhöyük, Sarı Huyuk, Kameroğlu Huyuk, Adatepe Huyuk, Adatepe Necropolis, Karahöyük, Yunus Huyuk, Muttalip Huyuk and Kinet Huyuk can be listed among the Bronze Age settlements close to the project site. (Table 4-29 , Figure 4-29).

In the middle of the 2nd Millennium BC, the Kizzuwatna Kingdom dominated the region, and until it was annexed to the Hittite Empire in the 1350s BC, it emerged as an independent kingdom between Hittite and Mitanni, a Hurri kingdom. Among the important settlements in the region belonging to this period are; Karatepe-Aslantaş Huyuk, Pasgüden Huyuk, Hacılar Huyuk, Yarım Huyuk, Adatepe Necropolis, Adatepe Huyuk, Bakırlı Çiftlik Huyuk, Bozhöyük, Muttalip Huyuk, Sirkeli Huyuk and Ertekin Bey Huyuk (Table 4-29 , Figure 4-29).

The first millennium BC is known as the “Iron Age”. In this period when iron became widespread in making tools, the impacts of the Late Assyrian Empire (858 BC-612 BC) and the New Babylonian State (626 BC-539 BC) are observed while the existence of city states belonging to the Late Hittite period is also known. Karatepe, Sirkeli Huyuk, Tatarlı Huyuk, Tülek Huyuk, Boyalı Huyuk, Maltepe Huyuk, Muttalip Huyuk and Botaş Huyuk are among the most important settlements of this period (Table 4-29 , Figure 4-29)

The region also hosted events that changed the course of history. Important settlements and necropolises from the Hellenistic and Roman periods are also known in the region which was the scene of the Battle of Issus in 333 BC, between Alexander the Great, the king Macedonia and Persian King Darius III. Yüceören, Hierapolis-Kastabala, Anavarza (Anazarbos), Flaviopolis (Kadirli), Domuztepe, Neronias/Irenepolis (Düziçi), Sarımazı OIZ, Babilik, Misis-Yakapınar (Mopsouhestia), Kurtkulağı Ölçü Tepesi, Maltepe Huyuk, Kabaktepe, Botaş Huyuk, Muttalip Huyuk, Tülek Huyuk, Boyalı Huyuk, Gökdere, Kurtpınarı, Yumurtalık (Aegeai), Karanlık Kapı, Erzin (Epiphaneai), Baias (Payas) are some of these settlements (Table 4-29 , Figure 4-29).

Many settlements in the region were rebuilt during the Roman period. Sarımazı OIZ, Babilik, Kurtkulağı Ölçü Tepesi, Kabaktepe, Tülek Huyuk, Muttalip Huyuk, Boyalı Huyuk, Gökdere, Yüceören, Sokuluk, Kurtpınarı, Botaş Huyuk, Su Gözü, Gölovası, Turunçlu Building Ruins belong to some of these settlements (Table 4-29 , Figure 4-29). Roads connecting these settlements to the inner regions were also built during the Roman period. One of these roads is Aleppean Road. The road is partly within the borders of Ceyhan Petrochemical Industrial Zone. It is known that, after crossing the southern shore of Pyramos (Ceyhan River) from the ancient bridge in Misis (Yakapınar), the road reaches Tardequieia, which was established as a road station 15 Roman miles away and localized in the village of Kurtkulağı, and from there to Muttalip Huyuk via Karanlıkapı.

In this period, besides the roads, it is known that important aqueducts were built to meet the water needs of the increasing population in the Roman period. Fresh water from the water source in the Amanos Mountains was brought from Epiphaneia to the Genoese port

city on the seafront in Burnaz and, as it was cliamed, to Ayas (Yumurtalik). The known length of the waterway on a land of volcanic basalt stones reaches 30 km. One branch of the mentioned Ancient waterway is considered to be the Kurtpınar Ancient Waterway within the project licence area.

After the Roman Empire was divided into two in 375, the Cilicia Region remained under the rule of Eastern Rome. Throughout the Medieval Ages the region was ruled by Byzantines, Arabs, Thessalonians, Armenians, Mamluk State, Ramazanoğulları, respectively. The region came under Ottoman rule in 1517. There are many historical buildings and settlements belonging to these periods in the region. Medieval Turkish Cemetery, Kazankaya Tepesi, Kurtkulağı Mosque, Kurtkulağı Caravansary, Yılankale, Sirkeli Huyuk and Yumurtalik Kalesi are among them (Table 4-29 , Figure 4-29). After a short time remaining in the French occupation zone during the Turkish War of Independence, the region first became a sovereign stated and annexed to the Republic of Turkey on 23 June 1939.

Table 4-29 Archaeological Sites around the Project Area

NO	Name of the Archaeological / Immovable Cultural Heritage	Province	District	Nearest Distance to Project Expropriation Area (km)	Approximate km Point of the Railway (Kilometre Point)	HISTORICAL PERIODS											
						Paleolithic	Neolithic Period	Chalcolithic Period	Early Bronze Age	Middle Bronze Age	Late Bronze Age	Iron Age	Hittite Period	Hellenistic Period	Roman Period	Byzantine Period	Ottoman Period	Early Republican Period
1	Kuzucak Quarry	Adana	Ceyhan	10,86	0+000 (OIZ-Port Line)													
2	Davultepe Necropolis	Adana	Ceyhan	8,49	0+000 (OIZ-Port Line)													
3	Dutlupınar Tepeüstü Settlement	Adana	Ceyhan	9,45	10+800 (Connection Line)													
4	Dutlupınar 1st Degree Archaeological Site	Adana	Ceyhan	9,50	10+800 (Connection Line)													
5	Soğukpınar Necropolis	Adana	Ceyhan	9,9	13+900 (Connection Line)													
6	Sarımazı OIZ 3rd Degree Archaeological Site	Adana	Ceyhan	0,15	13+960 (Connection Line)													
7	Muttalip Huyuk	Adana	Ceyhan	0,5	15+800 (Connection Line)													
8	Kurtpınarı Ancient Waterway	Adana	Ceyhan	1,25	16+750 (Connection Line)													
9	Karanlık Kapı 1st and 3rd Degree Archaeological Site	Adana	Ceyhan	0,32	16+870 (Connection Line)													
10	Botaş Huyuk	Adana	Ceyhan	6,54	17+100 (Connection Line)													
11	Çamdan Dağı Necropolis Area	Adana	Ceyhan	6,5	20+900 (Connection Line)													
12	Adatepe Necropolis	Adana	Ceyhan	9,19	21+000 (Connection Line)													
13	Maltepe Huyuk	Adana	Ceyhan	0,69	21+400 (Connection Line)													
14	Adatepe Huyuk	Adana	Ceyhan	8,1	21+500 (Connection Line)													
15	Kabaktepe Archaeological Site	Adana	Ceyhan	3,32	22+180 (Connection Line)													
16	Gökdere Archaeological Site	Adana	Ceyhan	1,25	22+300 (Connection Line)													
17	Yüceören Necropolis	Adana	Ceyhan	1	22+600 (Connection Line)													
18	Medieval Turkish Cemetery	Adana	Ceyhan	1,55	23+300 (Connection Line)													

NO	Name of the Archaeological / Immovable Cultural Heritage	Province	District	Nearest Distance to Project Expropriation Area (km)	Approximate km Point of the Railway (Kilometre Point)	HISTORICAL PERIODS												
						Paleolithic	Neolithic Period	Chalcolithic Period	Early Bronze Age	Middle Bronze Age	Late Bronze Age	Iron Age	Hittite Period	Hellenistic Period	Roman Period	Byzantine Period	Ottoman Period	Early Republican Period
19	Tülek Huyuk	Adana	Ceyhan	4,58	23+400 (Connection Line)													
20	Kurtkulağı Ölçü Tepesi 1st Degree Archaeological Site	Adana	Ceyhan	5	23+500 (Connection Line)													
21	Babillik Necropolis Area	Adana	Ceyhan	0,95	23+600 (Connection Line)													
22	Babillik Ancient Aqueduct	Adana	Ceyhan	0,95	23+600 (Connection Line)													
23	Yunus Huyuk	Adana	Ceyhan	10	23+600 (Connection Line)													
24	Kazankaya Hill	Adana	Ceyhan	2,76	23+600 (Connection Line)													
25	Kurtkulağı Caravansary	Adana	Ceyhan	3,88	23+600 (Connection Line)													
26	Kurtkulağı Mosque	Adana	Ceyhan	3,93	23+600 (Connection Line)													
27	Boyalı Huyuk	Adana	Ceyhan	4,97	23+600 (Connection Line)													
28	Sokuluk Flat Settlement	Adana	Ceyhan	1,14	23+600 (Connection Line)													
29	Kurtpınarı Necropolis Area	Adana	Ceyhan	1,16	23+600 (Connection Line)													
30	Sugözü 1st Degree Archaeological Site	Adana	Yumurtalık	12,3	16+750 (Connection Line)													
31	Gölovası 3rd Degree Archaeological Site	Adana	Yumurtalık	8,21	16+750 (Connection Line)													
32	Gölovası Huyuk	Adana	Yumurtalık	7,93	23+600 (Connection Line)													
33	Delihalil Archaeological Site 1	Osmaniye	Toprakkale	3,78	0+000 (OIZ-Port Line)													
34	Delihalil Archaeological Site 2	Osmaniye	Toprakkale	3,78	0+000 (OIZ-Port Line)													
35	Harmupkayası Hilltop Settlement	Osmaniye	Toprakkale	3,98	0+000 (OIZ-Port Line)													
36	Kürek Castle	Osmaniye	Toprakkale	5,73	0+000 (OIZ-Port Line)													
37	Yağankaş Rock-Cut Tombs and Waterway Remains	Osmaniye	Toprakkale	3,14	0+000 (OIZ-Port Line)													

NO	Name of the Archaeological / Immovable Cultural Heritage	Province	District	Nearest Distance to Project Expropriation Area (km)	Approximate km Point of the Railway (Kilometre Point)	HISTORICAL PERIODS												
						Paleolithic	Neolithic Period	Chalcolithic Period	Early Bronze Age	Middle Bronze Age	Late Bronze Age	Iron Age	Hittite Period	Hellenistic Period	Roman Period	Byzantine Period	Ottoman Period	Early Republican Period
38	Toprakkale Aqueduct	Osmaniye	Toprakkale	2,85	0+000 (OIZ-Port Line)													
39	Kabirliktepe Ancient Settlement	Osmaniye	Toprakkale	3,17	0+200 (OIZ-Port Line)													
40	Ancient City of Issus	Hatay	Erzin	0	0+000 (Connection Line)													
41	Yeşilkent 3rd Degree Archaeological Site	Hatay	Erzin	7,44	1+700 (Connection Line)													
42	Issus Ancient Waterway	Hatay-Osmaniye	Erzin-Toprakkale	0	2+150 - 2+500 2+950 - 3+140 3+600 - 3+920 4+865 - 5+350 (OIZ-Port Line)													
43	Kuzuculu 1st Degree Archaeological Site	Hatay	Erzin	8,97	2+100 (Connection Line)													
44	Kuzuculu 2nd Degree Archaeological Site	Hatay	Erzin	8,97	2+100 (Connection Line)													
45	Kuzuculu 3rd Degree Archaeological Site	Hatay	Erzin	8,97	2+100 (Connection Line)													
46	Yeşiltepe 3rd Degree Archaeological Site	Hatay	Erzin	3,03	2+300 (Connection Line)													
47	Karahöyük 1st Degree Archaeological Site	Hatay	Erzin	2,17	5+000 (Connection Line)													
48	Adsız Harabeler 1st Degree Archaeological Site	Hatay	Erzin	0,54	12+000 (Connection Line)													
49	Yanık Değirmen Ancient Settlement	Hatay	Erzin	1,18	12+100 (OIZ-Port Line)													
50	Turunçlu Ancient Building Remains	Hatay	Erzin	0,64	13+300 (Connection Line)													
51	Kinet Huyuk	Hatay	Dörtyol	9,37	14+400 (OIZ-Port Line)													
52	Tüpraş Tarlası 1st Degree Archaeological Site	Hatay	Dörtyol	8,61	14+400 (OIZ-Port Line)													
53	Tigem Mosaic Area	Hatay	Erzin	3,12	14+400 (OIZ-Port Line)													

Figure 4-29 Archaeological / Historical Sites Located on the Project Routes and Its Vicinity

Table 4-30 List of Archaeological / Historical Sites

No	Name	No	Name
1	Sarımazı OIZ	26	Kinet Huyuk
2	Dutlupınar Archaeological Site	27	Tüpraş Tarlası
3	Dutlupınar Hilltop Settlement	28	Tigem Mosaic Area
4	Soğukpınar Necropolis	29	Karahöyük
5	Kuzucak Quarry	30	Yanık Değirmen
6	Davultepe Necropolis	31	Adsız Harabeler
7	Babillik Ancient Aqueduct	32	Turunçlu Ancient Building Remains
8	Kurtkulağı Ölçü Tepesi	33	Karanlık Kapı
9	Kabaktepe Archaeological Site	34	Medieval Turkish Cemetery
10	Adatepe Necropolis	35	Babillik Necropolis
11	Adatepe Huyuk	36	Botaş Huyuk
12	Yunus Huyuk	37	Kurtpınarı Necropolis Area
13	Kazankaya Hill	38	Sokuluk Düz Yerleşimi
14	Muttalip Huyuk	39	Camdan Dağı Necropolis
15	Kurtkulağı Caravansary	40	Deli Halil Archaeological Site1
16	Kurtkulağı Mosque	41	Deli Halil Archaeological Site 2
17	Tülek Huyuk	42	Kabirlik Hill
18	Boyalı Huyuk	43	Kürek Castle
19	Yeşiltepe	44	Harnup Rock
20	Gökdere Archaeological Site	45	Yağankaş Rock-Cut Tombs
21	Maltepe Huyuk	46	Toprakkale Aqueduct
22	Yüceören Necropolis	47	Ancient City of Issus
23	Su Gözü	48	Yeşilkent
24	Gölovası Archaeological Site	49	Kuzuculu 3
25	Gölovası Huyuk	50	Kuzuculu 1 ve 2

4.7.1.2. Background for Intangible Cultural Heritage

UNESCO defines intangible cultural heritage as traditions or life experiences such as oral traditions, performing arts, social practices, rituals, celebration events, knowledge and practices about nature and the universe, or knowledge and skills related to the production

of traditional arts, which we inherit from our ancestors and will pass on to our future generations.

Most of the local people living in the project impact area are Yoruk. Turkmens living in nomadic life in Anatolia and Thrace were called "Yoruk". Yoruks are nomadic Turkmens who live in plateaus in summer, "güzlük" in fall and "kışlak" in winter, as groups of small and large by dealing with animal husbandry. The settlement of the Turkmens to present-day Çukurova took place after 1800s[9]. Turkmen tribes living intensely in the region are Avşarlar, Ceritler, Karakoyunlu, Karahacılı, Tekeli, Aydınlı, Tecirli, Bozdoğanlar, Honamlı etc. Today, Yoruks continue to cultivate their own culture, despite the transition from nomadic to settled lifestyle. However, the developments in the field of science and technology in the last century and the impact of the established culture have led to the gradual forgetting of the Yoruk culture. Apart from the Yoruks, Abazins and Crete immigrants were also found in the settlements in the study area. It is also known that Noghais, Tatars and Balkan immigrants live in the region.

After the 1877-78 Russian War, the Crimea, Abazins and Papaks started to come to the region and were placed in Çukurova by the Ottoman State during the Balkan War[10,11]. On the other hand, the Nogai settled in the region after the Russian pressures following the Crimean War of 1853-1856[12]. At the end of the 19th century, many Yoruk tribes settled on the plains and established villages[13]. When the demography of the region is analyzed, the majority of Yoruk population is prominent[14]. This broad cultural quality is reflected in traditions, dances and food.

The traditions of the people living around the project route is visible in the rituals of birth, circumcision, farewell rituals for military service, marriage and death, which are the transition periods of life. These stages, which are important for people, are integrated with the local culture of the region. In Turkish folk culture, tombs, grand trees, springs are sacred according to the Ancestor Cult. These places have been holy places in search of solutions to problems encountered in life[15]. In our research area, it was determined that places which are considered sacred are visited, wows are made, and animals are sacrificed in order to have children. Hosting dinners called "toy" and the loud announcement of the gifts the boy's house purchased while marrying; giving gifts called "okuntu" along with invitation cards before circumcision ceremonies and weddings; and attaching a red flag to tombstones are examples of these traditions.

The transition periods of life, which starts with birth and ends with death, have local customs in the region. The protection and survival of festivals, agriculture, animal husbandry, historical buildings and the natural environment are the issues that the local people pay attention to.

Finally, the cultural qualities 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 life, such as traditions, dances, food and the transition periods of life.

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[9] Cin, Firdevs, Ceyhan Yörüklerinde Halk Kültürü Araştırmaları, Çukurova Üniversitesi Sosyal Bilimler Enstitüsü, Adana, 2004: 8.

[10] October 8, 1912- Jul 18, 1913

[11] Muradiye Malı. Sirkeli, Yassıca

[12] Mangıt, Mercimek, Toktamış Villages

[13] Karakayalı, Burhaniye, Kösreli, Dokuztekne, Sanmazı tribes

[14] Adana City Yearbook, 1991: p. 25

[15] January, 1992: 11

4.7.2. Overall Assessment

4.7.2.1. Overall Assessment of Tangible Cultural Heritage

During the desktop study, it was discovered that there are 3 registered archaeological sites on the railway project route. These areas are Issus Ancient City, Issus Ancient Waterway and Erzin Train Station (Figure 4-30, Table 4-31). Apart from the registered cultural assets, 1 archaeological site and 2 potential archaeological sites have been identified within the Section-1 project impact area.

Figure 4-30 Archaeological Sites in the Study Area

The ancient city of Issus (Epiphaneia) is one of the most important registered archaeological sites in the impact area of the project. According to ancient sources, the city was established in the Hellenistic Period in Ovalık Kilikya. In this period, Antakya was made the capital of Seleucid State by Macedonian commander Seleukos and the city of Issus was rebuilt. The city later passed under the domination of the Romans and experienced its brightest period. Many ruins from the Hellenistic, Roman and Byzantine periods are still visible on the ground in the

Ancient City of Issus, which continues to exist as an important junction in sea and land trade[16]. The ceramic pieces identified and documented in the settlement area are dated to the Late Roman Period and Late Antiquity. The city corresponds to Km: 0 + 000 – Km: 0 + 470 of Connection Line. This part of the project is within the boundaries of the registered sites of the Ancient City of Issus.

Figure 4-31 The Ancient City of Issus

[16] Tempesta, 2005:84

Figure 4-32 Project Route with Issus Ancient City and Existing Erzin Station

Another registered archaeological asset on the railway project route, which may be adversely affected by the project construction, is the Issus Ancient Waterway, which is approximately 30 kilometers long. (Figure 4-33). The general material of the architectural structure is mortar and rough stones (Opus Caementicium). The mortared rough stones used in the building contain volcanic natural soil. The use of the water system consisting of these mortared stone walls is quite common in the Roman states. In order to seal the walls, the inner parts of the channel that are in contact with water were plastered with mortar. It is possible to see this mortar in the part of the waterway remaining in the project license area. Although they dry late, the materials with this structural feature are very strong[17]. Due to the difference of elevation in the land, the waterway is in the form of an aqueduct in some sections (Figure 4-34), and a mortar, rubble stone braided and possibly closed channel in other sections. Since such ducts are usually made on slopes that are not too steep, they are covered with plate stones or mortar mesh systems in accordance with the elevation of the

[17] Vann 1976, 169.

slope. Against natural disasters such as landslides, the aqueducts prevent the accumulation of soil or stones on the channel thanks to the elevation adapted to the slope.

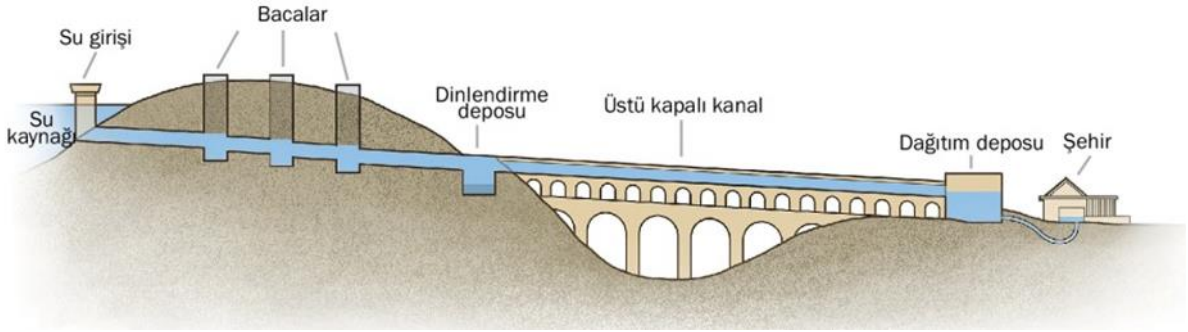

Figure 4-33 Ancient Water Transport System[18]

Figure 4-34 Issus Ancient Waterway Arches

Issus Ancient Waterway intersects the OIZ-Port Line in 4 different sections (Figure 4-35). These sections are between kilometers of;

- 2+150 – 2+500
- 2+950 – 3+140
- 3+600 – 3+920
- 4+865 – 5+350

[18] https://slideplayer.com/slide/9648332/

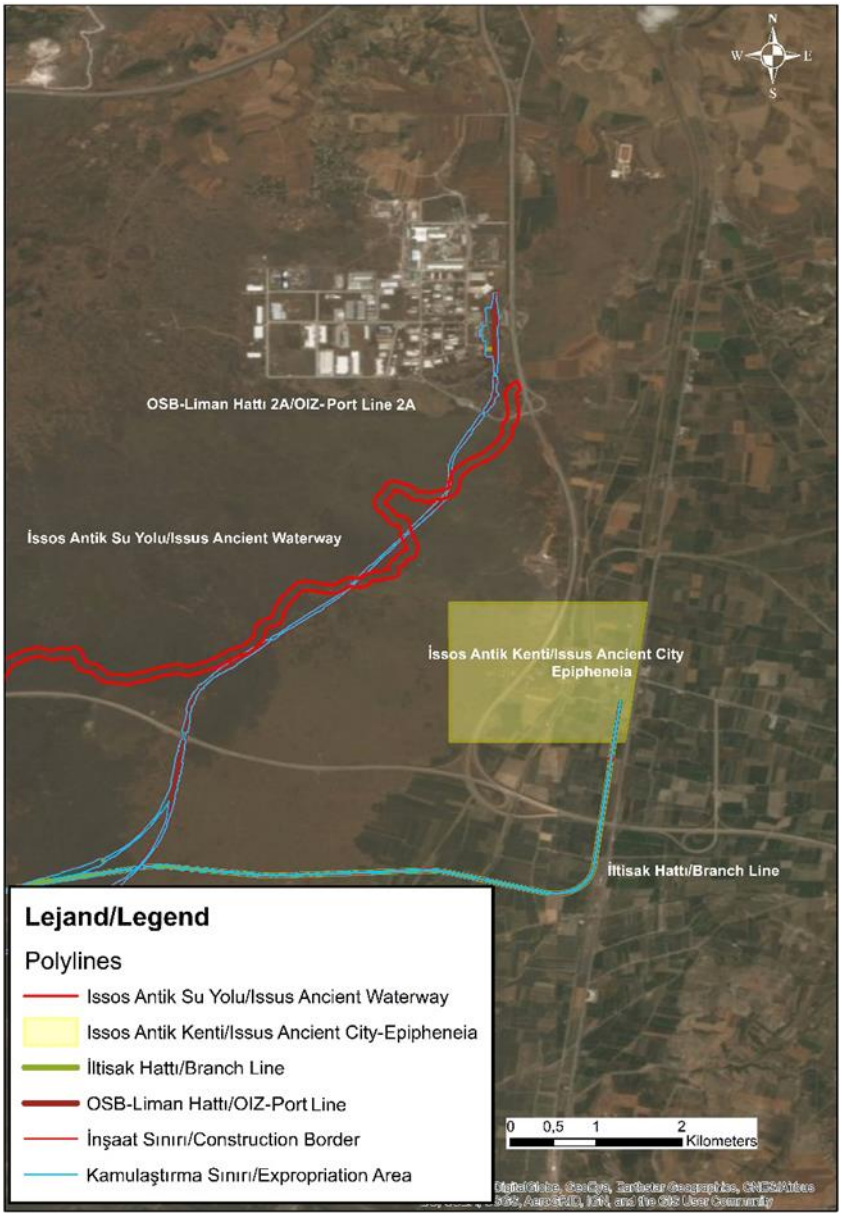

Figure 4-35 Issus Ancient Waterway, Issus Ancient City Site Borders and Project Route

Another immovable cultural heritage asset that remains in the project impact area is the historical Erzin Station. Built as an example of Ottoman-Arab architecture in the early 1900s, the complex was registered and taken under protection by the Adana Cultural Heritage Preservation Regional Board as an immovable cultural asset. (Figure 4-36).

Figure 4-36 Existing Erzin Station

Apart from the above mentioned, one archaeological site (Çatakpınar Archaeological Site) and two potential archaeological sites were identified on the study area during the field studies conducted within the scope of the project (Figure 4-37).

Figure 4-37 Archaeological and Potential Archaeological Sites Detected in Field Studies

The archaeological area identified was named as Çatakpınar Archaeological Site. The archaeological area, located on the borders of Kurtpınar District, is located between the Connection Line 19 + 010 and- 19 + 210 kilometer points, and to the west of the water basin formed by Çatakpınar stream. The area is a slope settlement. The area is 4 meters away from the expropriation boundaries and is located within the impact corridor. Ceramic pieces dating to the Byzantine Period and rubble stones that may belong to architecture were observed on the surface of the slope settlement.

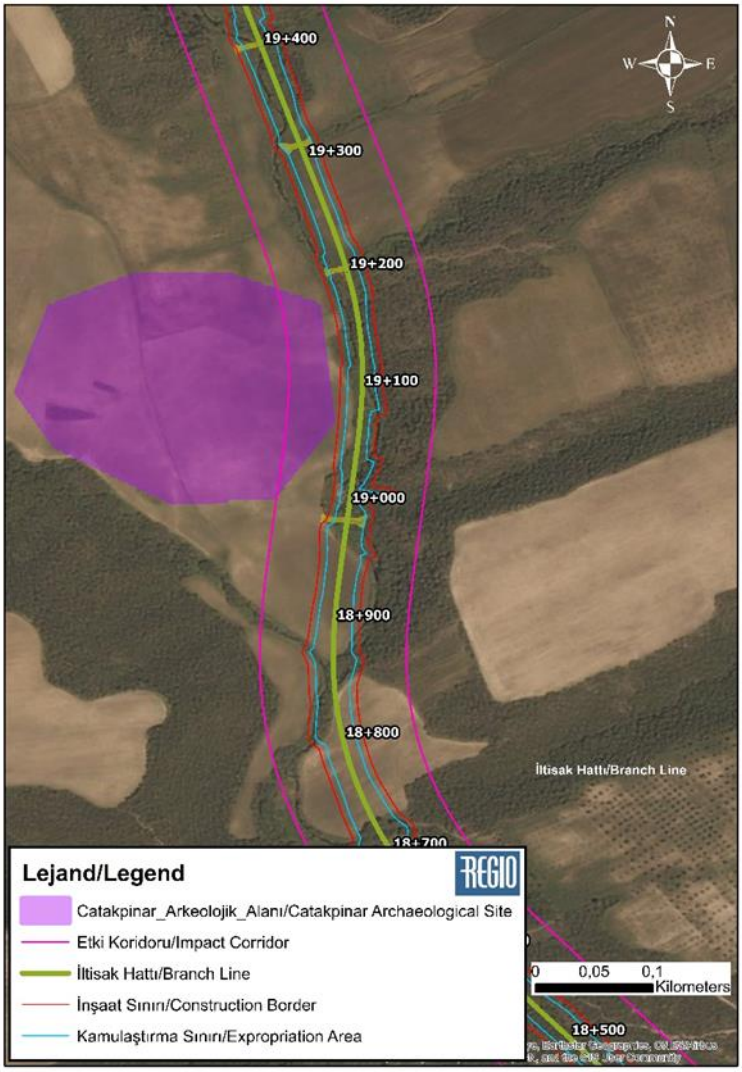

Figure 4-38 Çatakpınar Archaeological Site and Project Route

Figure 4-39 Çatakpınarı Archaeological Site

Figure 4-40 Ceramic Pieces from the Byzantine Period

Two potential archaeological sites were also identified during the field studies. One of these areas, "Potential Archaeological Site-1", is located between the Connection Line 17 + 550 and 17 + 670 kilometer points and to the west of the route (Figure 4-41). Part of the area is within the expropriation limit. Ceramic pieces thought to belong to the Late Roman and Early Byzantine Periods and irregular rubble stones that may belong to architecture were found on the surface of the potential archaeological area having a slight hill look.

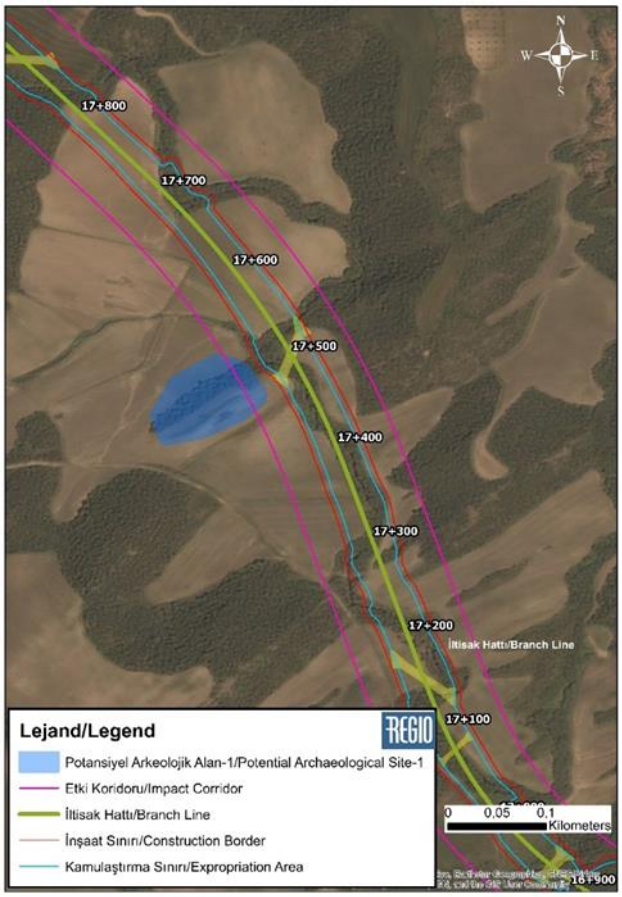

Figure 4-41 Potential Archaeological Area-1 and Project Route

Figure 4-42 Potential Archeological Site -1

Figure 4-43 Late Roman - Early Byzantine Period Ceramic Pieces

The other identified area, "Potential Archaeological Area-2", is between the 16 + 400 and 16 + 600 kilometer points of the Connection Line and to the south of the Connection Line. It is 4 meters from the expropriation limit and remains within the impact corridor. Ceramic pieces thought to belong to the Late Roman and Early Byzantine Periods were found on the surface of the archaeological site.

Figure 4-44 Potential Archaeological Site-2 and Project Route

Figure 4-45 Potential Archeological Site-2

Figure 4-46 Late Roman – Early Byzantine Period Ceramic Pieces

As a result of desk and field studies, it has been identified that there are three registered cultural assets that need to be protected in the study area. It was also identified that there is one archaeological site and two potential archaeological sites in the study area. (Table 4-31).

Table 4-31 List of Tangible Cultural Assets on the Project Route and Its Vicinity

No	Name of the Area	Province	District/Neighborhood	Distance to Expropriation Area	Registration Decision
1	Issus Ancient City 1st Degree Archaeological Site	Hatay	Erzin/Yeşilkent	0 m.	It will be added to the final version of the report
2	Issus Ancient Waterway	Hatay	Erzin/Turunçlu	0 m.	Adana Cultural Heritage Preservation Regional Board decision dated 28.05.1999 and numbered 3414
3	Existing Erzin Station	Hatay	Erzin	0 m.	It will be added to the final version of the report

4.7.2.2. Overall Assessment of Intangible Cultural Heritage

Field studies for intangible cultural heritage have been carried out with qualitative interview technique in 6 settlements in the immediate vicinity of the project route. 37 people were interviewed within the scope of the study. Of these participants, 3 people live in Kurtpınarı, 10 people in Kurtkulağı, 4 people in Sarımazı, 4 people in Yukarıburnaz, 4 people in Aşağıburnaz, and 12 people in Turunçlu.

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

Table 4-32 Settlements Included in the Study

Province	District	Neighborhood	Distance to Project License Area (km)
Adana	Ceyhan	Kurtpınarı	1 km
Adana	Ceyhan	Kurtkulağı	3.8 km
Adana	Ceyhan	Sarımazı	1.6 km
Hatay	Erzin	Yukarıburnaz	0 km
Hatay	Erzin	Aşağıburnaz	0.9 km
Hatay	Erzin	Turunçlu	1.7 km

Kurtpınarı, Kurtkulağı, Sarımazı, Yukarıburnaz and Aşağıburnaz settlements located at a close distance to the project route are inhabited by Yoruks. Unlike all these settlements, Cretan immigrants live in Turunçlu settlement. All the local people living in the region speak Turkish, but Turunçlu people also speak Crete among themselves. Except for the Turunçlu people, the people of all other settlements are Sunni Muslims. The people of Turunçlu are Bektashi.

Within the scope of oral traditions passed from generation to generation, the people of the five settlements in the field of study know the stories of their ancestors who went to the

Battle of Çanakkale, and the heroic stories of the militia who defended the national independence against the French occupation during the Turkish War of Independence. It was also informed by the local people that in Kurtkulağı Village there is a mansion that was seized and turned into a French Hospital. In Turunclu settlement, people know the stories of their ancestors migrating from Crete. Apart from heroic and immigration stories, other oral traditions (such as fairy tales, lullabies, legends, beliefs, idioms, proverbs, folk songs, poems, etc.) are maintained.

In the interviews, it was determined that some customs belonging to the turning points of life (birth, circumcision, military service, wedding and death) still live in the region. These are briefly composed of the following traditions and practices:

Birth: In pre-natal traditions, warm soil (or heated pot / heated cere or heated tile) is wrapped around the abdomen and groin to eliminate the infertility of women without children. When the time of birth is approaching the bed for the mother to lie down; clothes and the crib for the baby are prepared. The umbilical cord is cut, the honey with salt is prepared and the whole body of the baby is soaked in saltwater for a brief period and the baby is immediately washed with warm water and powdered. Salting is done more carefully in the mouth, armpits and feet, it is believed that when these parts are well salted, they will not smell when the baby grows up. After the baby's umbilical cord is cut, it is buried in places such as schools, hospitals etc. depending on the profession expected for the baby. When babies are born, a white lamp is lit in the room where the mother and baby sleep and a yellow muslin is covered over the cradle to prevent the baby from infant jaundice.

Circumcision: While circumcision was formerly made by circumcisers and celebrated with circumcision feasts in the village, circumcision is performed in hospitals today. The circumcised child is guided by a car convoy and a special circumcision suit is dressed. Care is taken that the child is circumcised before starting primary school.

Military Service: A little entertainment is organized for those who will go to the military. A flag is hung on the candidate soldier's house and henna is applied in his hands. In order for the soldier not to forget his home and to return safely, he is asked to lick the pacifier which he used as a baby and to bite a bagel. The pacifier and the bagel are hung on the wall and they remain there until he returns home. The candidate for the military is sent with a convoy on his journey.

Wedding: Marriages in the region are arranged with advice of the elderly (matchmaking). Love marriages are also allowed. It is preferred for girls to marry from the age of 18 and for men from the age of 20-22. Generally, the age limit for marriage is considered to be 30. Betrothal ceremony is called "küçük tatlı" ("small dessert"). Today, there is no tradition of bride wealth. In the past, carpets were woven as dowry in Sarımazı, but today young people do not continue this tradition. Traditional handicrafts such as cross stitch crochet of cotton or wool still continued to be made. Prior to the wedding, together with the invitation cards, gifts called "okuntu" such as shalwars, carpets, muslins and socks are given to the guests according to their degree of closeness. During the wedding, a flag is hung on the wedding house. The flag is hung after the prayer on Friday, one day before the wedding, after eating the so-called "ağız tadı" (gusto which also means, enjoyment, harmony). Weddings take 3 days. Before the wedding, the animals are butchered and the main wedding dishes such as soup, tandoor kebab, analı kızlı (kind of soup made of meat and wheat), mantı (kind of ravioli), beans, rice pilaf, and ashura are prepared. Neighbors and relatives help with cooking. In addition to these traditions, some of which have disappeared in time, local folk dances are played in weddings in the region, such as oyun havası (traditional dance music) and çiftetelli (a folk dance performed in Turkey and the Balkan countries) etc. Musical

instruments such as traditional drums and flutes (davul&zurna) are among the main traditional musical instruments used in weddings.

Death: The chin and toes of the deceased are tied. An iron knife is put on the abdomen after bathing of the dead is completed. The obituary is announced to the neighbors by the relatives through the mosque. Condolence reception takes 7 days. Food is brought to the funeral home by relatives and neighbors for seven days and shared with visitors.

Figure 4-47 Interviews in Turunçlu Coffeehouse

In addition to the traditions of the turning points of life mentioned above, it was determined that some customs were also kept alive in the celebration of religious feasts in the region. Preparations for religious feasts begin on the day of Arefe when cemetery visits are made, and refreshments are prepared for the guests coming during the feast. Generally, kömbe fort the feats is made, and holiday clothes are purchased for everyone, especially children. After the feast prayer, neighbors, relatives and friends pay visits to see each other. Newroz Festival is also celebrated in the region to meet the arrival of spring. While Newroz used to be celebrated collectively with a picnic at the seaside as festive, it has lost its former importance today. The “Cretan Festival” is held in the first week of September in Turunçlu settlement.

In addition, within the scope of traditional folk beliefs; vows are made to entombed saints. These sacred areas are visited for requests such as recovery from illness, having a job or childe, having fortune, a safe return from the military. For this purpose, mostly “Topçu Dede Türbesi” (Topçu Dede Tomb) is visited. Topçu Dede Türbesi is located on Esbak Mountain in Kurtkulağı settlement. Its distance to the project route is about 4.86 km. It was determined that the tomb would not be affected by the construction activities of the railway project. People living in Kurtkulağı and Kurtpınar go to the nearby Kazankaya Hill and tie cloth to the wish trees. The hill in the Kurtkulağı District is approximately 2.75 km from the project route. It has been determined that the hill will not be affected by the construction activities of the railway project. There is no wish tree tradition in other settlements. It has been observed that customs such as evil eye beads and pouring lead to repel evil eye continue. In Sarımazı settlement, large and small cattle skull sare hung on fences which indicates the

garden boundary in order not to touch the evil eye, which have been seen in Anatolia since the Neolithic period.

As part of traditional medicine and healing practices, gentian is collected from the nearby mountains in all settlements. Yellow centaury oil, which is formed by dipping in olive oil, is applied to wounds, burns and rashes. In traditional folk medicine, bonesetters and healers, for umbilical hernia, are visited. It is believed that skin eruption[19] treatment passes by praying. Healers continue their tradition by lending a hand to one of their relatives before they die. Also, the people of the region stated that they took precautions by spreading salt which was chanted by a healer called "Yılancı Hacı" living in Hatay/Dörtyol in order to keep snakes and scorpions away from their homes until the healer's death in 2009. In diseases such as flu and pneumonia, cupping treatment is still preferred. In Turunçlu settlement, healers are called "sınıkçı".

The public economy based on local production and consumption, which is followed by local people to maintain their lives, in animal husbandry and agriculture performed traditionally based on the knowledge obtained from ancestors. As an agricultural product; wheat, sunflower, corn, peanut, watermelon, tangerine, orange are produced in most of the farms. In addition to these products, olive cultivation is made in Sarımazı settlement. There are Agricultural Credit Cooperative branches for farmers in all settlements.

During the interviews, it was found that traditional games such as tipcat, hide-and-seek, a sound, marble and leapfrogging were widely played by children in the past but today, these games were mostly replaced by computer games.

Within the scope of traditional handicrafts, cross stitch crochet of cotton and wool still continue. In addition, sewing courses are opened periodically in some settlements. According to the traditional architecture of the region, houses built using stone, wood and adobe together are no longer built. Single or double story buildings, mostly made of reinforced concrete, form today's architecture.

Traditional culinary culture consists of kömbe, börek (a general name for filled pastries in various shapes), bayram çöreği (a sweet pastry), analı kızlı (a kind of soup made of wheat and meat), sıkma (pastry filled with inced tomatoes and onions and served for breakfast), tırşik (soup of a local herb - arum maculatum), kebab, semolina halva, tulumba and hamur kızartma tatlısı (syrup-soaked pastries) çökelek (cottage cheese), tomato paste, pepper, jam and butter are made for the winter (Figure 4-48). Bringing people from different geographies and cultural structures in the past and having them resettled in this region exhibits itself in the local dishes of the villages in the region. It is observed that in Turunclu settlement where Cretan immigrants are living, a diet based on seafood and vegetables (chicory, mustard, zucchini flower, bostan, mushroom, nopitaraca) has been adopted, whereas in other 5 settlements where Yoruks are located, meat-based diet is common.

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 impacts on intangible cultural heritage. The preparation of social investment projects for rural tourism, including various projects including the ancient city of Issus (Epiphaneia), which is included in the project impact area, and their implementation together with the local actors in the region r 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.

[19] Shingles

Figure 4-48 Making Çökelek (Skim Milk Cheese) and Tereyağı (Butter) from Traditional Culinary Culture-Yukarıburnaz

4.8. Socio-Economic Environment

The main purpose of the socio-economic baseline environment studies is to determine the current social and economic conditions of the settlements and households within the study area. This is also a central part of the planning and implementation process because 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 Demographic Features

4.8.1.1. Population of the Provinces & Districts

The project area is located in Adana, Hatay and Osmaniye provinces, which are situated in TR62 (Adana) and TR63 (Hatay and Osmaniye) subregions according to Turkey Statistical Regional Units Classification system. The population distribution of the regions and provinces in the study area as of 31 December 2018 is presented in the table below.

Table 4-33 Population of Regions in 2018

Year	Region Code	Region	Total Population	Male	Female
2018	TR	Turkey	82,003,882	41,139,980	40,863,902
2018	TR6	Mediterannean	10,461,409	5,249,107	5,212,302
2018	TR62	Adana, Mersin	4,034,593	2,012,331	2,022,262
2018	TR621	Adana	2,220,125	1,106,811	1,113,314
2018	TR63	Hatay, Kahramanmaraş, Osmaniye	3,289,122	1,659,769	1,629,353
2018	TR631	Hatay	1,609,856	809,484	800,372
2018	TR633	Osmaniye	534,415	269,875	264,540

Source: TUİK, ADNKS 2018

Population distributions and population growth rates of the lower units of the provinces are presented in the table below. The high population rates of province and district centers are due to the transformation of villages into neighborhoods with the Metropolitan Municipality Law No. 25531. Although the affected settlements appear as neighborhoods in the population registration system, they maintain their rural characteristics in terms of lifestyle.

Table 4-34 Population of Province, District, Town and Village

Name	Total Population	Population of Province & District Centers	Population of Town and Villages	Ratio of Province & District Population to Total Population (%)	Ratio of Town & Village Population to Total Population (%)	Annual Population Growth Rate (‰)
Türkiye	82,003,882	75,666,497	6,337,385	92.27	7.73	14.66
Akdeniz	10,461,409	10,129,087	332,322	96.82	3.18	15.16
Adana, Mersin	4,034,593	4,034,593	-	100	-	6.01
Adana	2,220,125	2,220,125	-	100	-	1.65
Hatay, Kahramanmaras, Osmaniye	3,289,122	3,162,764	126,358	96.16	3.84	17.96
Hatay	1,609,856	1,609,856	-	100	-	21.75
Osmaniye	534,415	408,057	126,358	76.36	23.64	12.6

Source: TUİK, ADNKS 2018

Annual population growth rate in the Mediterranean region is slightly above average. The annual population growth rates of Adana-Mersin subregion (6.01 %) and especially Adana (1.65 %) are below the region rate. Hatay, Kahramanmaraş, Osmaniye subregion population growth rate is above Turkey average and the population growth rate of Hatay has the hagihest value (21.75 %).

Table 4-35 Distribution of Populations of Districts by Years and Genders

Year	Province-District	Male Rural Population	Male Urban Population	Female Rural Population	Female Urban Population
2009	Adana (Ceyhan)	26,746	52,105	27,050	52,467
	Hatay (Erzin)	4,762	15,090	4,624	15,266
	Osmaniye (Toprakkale)	2,902	4,015	2,876	3,828
2010	Adana (Ceyhan)	26,321	52,922	26,529	52,957
	Hatay (Erzin)	4,853	15,066	4,753	15,274
	Osmaniye (Toprakkale)	3,905	4,159	3,028	3,904
2011	Adana (Ceyhan)	25,894	53,298	25,996	53,189
	Hatay (Erzin)	4,888	15,188	4,769	15,383
	Osmaniye (Toprakkale)	4,138	4,159	3,015	4,049
2012	Adana (Ceyhan)	25,503	53,999	25,373	53,892

Year	Province-District	Male Rural Population	Male Urban Population	Female Rural Population	Female Urban Population
	Hatay (Erzin)	4,891	15,489	4,793	15,603
	Osmaniye (Toprakkale)	4,076	5,425	3,038	4,252
2013	Adana (Ceyhan)		79,864		79,379
	Hatay (Erzin)		20,705		20,592
	Osmaniye (Toprakkale)	970	8,214	920	6,518
2014	Adana (Ceyhan)		79,991		79,463
	Hatay (Erzin)		20,691		20,542
	Osmaniye (Toprakkale)	4,832	5,270	2,789	4,797
2015	Adana (Ceyhan)		80,002		79,502
	Hatay (Erzin)		20,742		20,548
	Osmaniye (Toprakkale)	5,496	5,351	2,766	4,836
2016	Adana (Ceyhan)		80,396		79,775
	Hatay (Erzin)		20,993		20,619
	Osmaniye (Toprakkale)	5,599	5,273	2,815	4,918
2017	Adana (Ceyhan)		80,585		80,031
	Hatay (Erzin)		20,772		20,654
	Osmaniye (Toprakkale)	5,681	5,345	2,856	5,003
2018	Adana (Ceyhan)		80,485		79,989
	Hatay (Erzin)		20,735		20,633
	Osmaniye (Toprakkale)	6,123	5,758	3,041	5,205

Source: TUİK, ADNKS 2018

In all regions, there is an accumulation between rural and urban populations towards the provinces. Ceyhan district population tends to increase regularly from 2011 to 2017. This trend has declined in 2018. While the population of the district was 160,616 in 2017, it decreased to 160,474 in 2018. In addition, it is observed that the population growth rate has decreased rapidly since 2016.

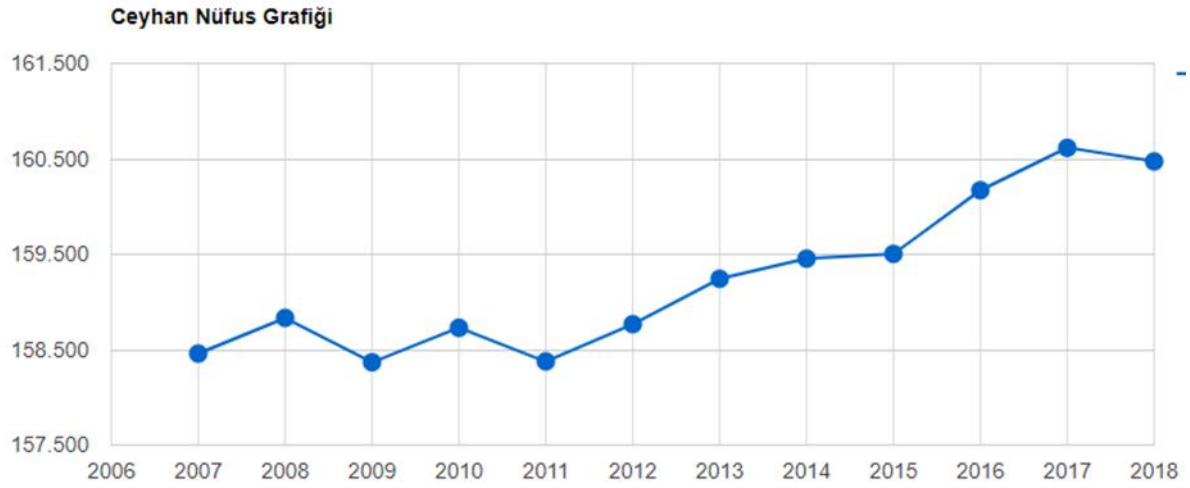

Figure 4-49 Ceyhan District Population Change Graph

Erzin population has increased steadily between 2007 and 2013 and after 2013, population growth remained stable. While Erzin's population was 41,297 in 2013, this figure was 41,368 in 2018. The difference is 71. It is seen that the population has not increased almost in the last five years.

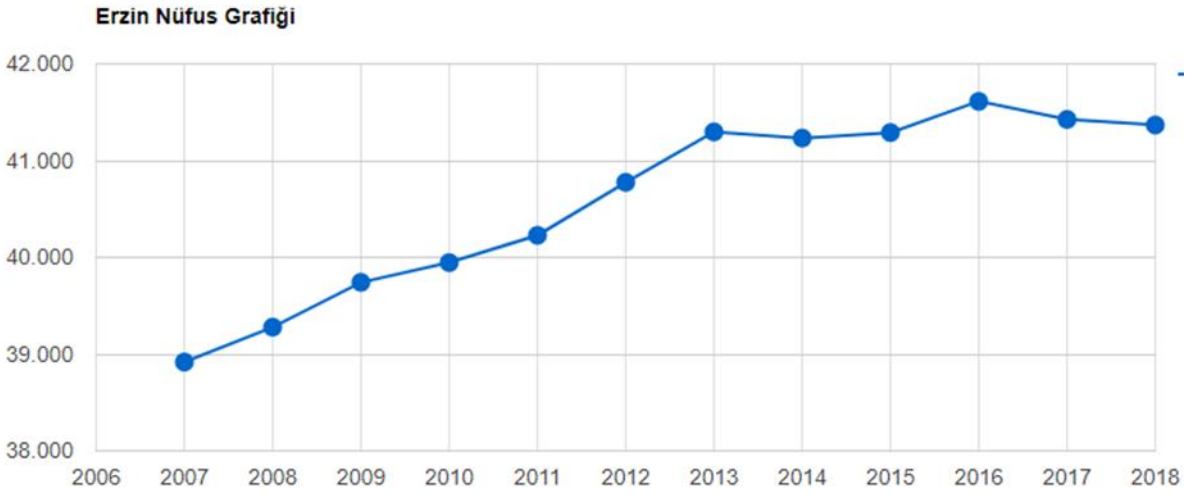

Figure 4-50 Erzin District Population Change Graph

The population of Toprakkkale district has increased steadily since 2007. It is noteworthy that the population difference between 2017 and 2018 was 1242 people. It is seen that the investments and job opportunities in the province and district are attracting the population to itself.

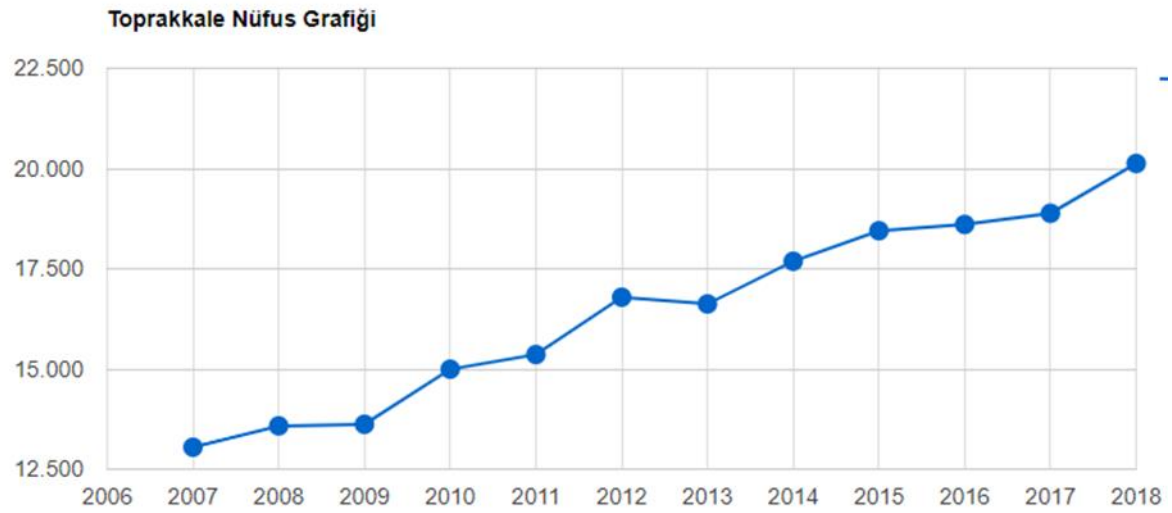

Figure 4-51 Toprakkale District Population Change Graph

4.8.1.2. Movement of Migration and Net Migration Rates

Adana with 15 district and 828 neighborhoods is Turkey's 5th largest province. Adana province; urbanization rate, the annual growth rate of population and in terms of the proportion of the total employment of workers in the agriculture is above the average of Turkey. However, the province is below Turkey's average in terms of per capita gross domestic product and total employment rate of workers in the industry sector. The net migration rate of Adana province has been decreasing even though it has not been regular in the last five years. It is seen that the population has remained almost at the same level in the last five years.

Hatay province has 15 districts. Erzin district ranks 11th in terms of size. Although the population has increased in the last five years, the net migration rate has fluctuated over the years. Although the population of Hatay has not increased significantly in the past five years, the population decline in 2017 returned to an increase in 2018.

Osmaniye, which has 7 districts, is the province with the least population among the provinces in the study area. After gaining provincial status, its population increased. In 2016, net migration rate has followed an upward trend and in other years it has decreased.

Table 4-36 Migration Statistics in Adana, Hatay and Osmaniye in Last Five Years

		Migration/Person	Net Migration/Person	Net Migration Rate
2014	Adana	51562	-11619	-5,35
	Hatay	32678	-6503	-4,27
	Osmaniye	17880	-334	-0,66
2015	Adana	52647	-11545	-5,27
	Hatay	32868	-8651	-5,63
	Osmaniye	18567	-736	-1,43
2016	Adana	51466	-9293	-4,21
	Hatay	34195	-3432	-2,2
	Osmaniye	19558	1875	3,6
2017	Adana	49509	-13325	-5,99

		Migration/Person	Net Migration/Person	Net Migration Rate
	Hatay	33745	-6878	-4,36
	Osmaniye	18842	-166	-0,31
2018	Adana	51660	-18978	-8,51
	Hatay	36499	-6156	-3,82
	Osmaniye	19965	-935	-1,75

Source: TUİK, Göç İstatistikleri

4.8.1.3. Population and Demographic Features of the Sampled Study Area Settlements

Population growth in the study area is most evident in Büyüktüysüz. Its population has doubled since 2011. It is observed that the population of the other settlements has remained normal over the years.

Table 4-37 Population of the Settlements in the Study Area by Years

Settlement	2011	2012	2013	2014	2015	2016	2017	2018
Sarımazı	3,794	3,779	3,884	3,790	3,763	3,717	3,646	3,568
Turunçlu	611	590	592	607	587	576	576	562
Aşağıburnaz	271	253	256	259	242	252	272	280
Yeşiltepe	1,102	1,120	1,126	1,141	1,174	1,167	1,282	1,267
Yukarıburnaz	592	614	625	634	653	650	628	596
Büyüktüysüz	2,335	2,292	2,198	2,985	3,629	3,683	3,795	4,169

Source: TUİK, ADNKS

Table 4-38 shows the seasonal population changes according to the information received during the interviews with the headman of the settlements in the study area. Accordingly, it is observed that the population of majority of the affected settlements do not change much in the summer and winter months. As an exception, in Turunçlu Village, a certain part of the summer population is engaged in seasonal agricultural work in the summer.

Table 4-38 Seasonal Population Changes in Settlements at the Study Area

Settlement	Population (Summer)	Number of Household (Summer)	Population (Winter)	Number of Household (Winter)	Population Difference in Summer and Winter
Aşağıburnaz	300	83	300	85	0
Yukarıburnaz	592	130	592	130	0
Yeşiltepe	1300	350	1300	350	0
Turunçlu	462	300	562	146	438

Source: SIA Studies, Mukhtar Interviews, 2020

Sarımazı	5500	2000	5500	2000	0
Büyüktüysüz	632	170	632	170	0

It is seen that the active population is mostly in the settlements in the study area. While the settlement with the highest active population rate is Yukarıburnaz (78.04%), the lowest active population rate is in Yeşiltepe (38.46%). In Yeşiltepe, the child population is at the forefront among other settlements with 46% compared to the total population. The elderly population rate is highest in Sarımazı with 27%.

Table 4-39 Distribution of Population by Age Groups in Settlements in the Study Area

Settlement	Total Population	Elderly Population (over 65)	Active Population (16-65)	Child Population (0-16)
Aşağıburnaz	300	60	180	60
Yukarıburnaz	592	30	462	100
Yeşiltepe	1300	200	500	600
Turunçlu	462	120	242	100
Sarımazı	5500	1500	2500	1500
Büyüktüysüz	632	32	450	150

Source: SIA Studies, Mukhtar Interviews, 2020

According to the muhtar meetings, it was learned that Asagiburnaz migrated out. The number of landowners immigrating is about 10 households. This migration occurred mainly in 2000s. Erzin and Dörtyol are the places where this village gives the most external migration. The reasons for this migration are explained as education and finding new employment. Currently, external migration continues due to educational status. In addition, seasonal migration movements ocur in certain seasons to work in seasonal jobs in the village. About 100-150 workers, who come to work as both agriculture and forestry workers, mostly come and go in the winter months. In addition to these workers from Urfa, Diyarbakır and Osmaniye provinces, Syrians living in the Osmaniye temporary accommodation center nearby also come to the village as seasonal workers.

Yukariburnaz migrated out. The number of landowners immigrating is 15-20 households. This migration occurred mainly in the 1990s. Erzin is the place where this settlement gives the most external migration. These migrations were made for training and working purposes. Currently, external migration does not continue, the population is stationary. Temporary / seasonal agricultural workers or forestry workers do not work in the settlement and the settlement does not receive permanent migration.

Yesiltepe has migrated out like other villages. It was learned that in 1995, when the migration in the settlement was intense, it migrated to Çanakkale, İstanbul, Adana and Ankara. The reasons for this migration are education and work as in other settlements. However, despite this migration movement, the population of the settlement gradually increases with the migration from outside. More than 100 new houses were built 5 years ago. As it is close to the industrial zone, it receives migration from the surrounding settlement as well as those who come for work. There are around 50-60 temporary / seasonal agricultural workers or forest workers in the settlement. There are people who come from the rural areas of Kahramanmaraş with their family for citrus and olive harvesting. In general, women

work as seasonal workers. The resident population that goes to work in seasonal jobs is also considerably high in the settlement.

Turunclu also migrated out about 75 households in the 1990s. The provinces and districts where this settlement migrated are Adana (Center), İskenderun (Center), Dörtyol and Ceyhan, respectively. The reasons for this migration are education and working. It has been learned that while migration is still continuing, it also receives migration. Two families came to the settlement permanently by Adana and Ceyhan since the settlement is close to the industrial areas. Around 40 people, usually women, come to the settlement every year to work as temporary / seasonal agricultural or forestry workers.

Sarımazı receives migration from neighboring settlement, Ceyhan, Dutlupınar and Dokuztekne. In the 1990s, nearly 50 families were permanently settled in the settlement. Every year, around 500 people come to the settlement to work in certain seasons, mostly women workers, temporary / seasonal agricultural or forest workers.

Büyüktüysüz migrated to Osmaniye in the 1980s up to 20 households. Families migrated for studying and working. Although external migration does not continue, the settlement also receives migration. After Osmaniye OIZ was established, there are people who come here to work. Although there are no temporary / seasonal agricultural or forest workers in the settlement, there are people coming from Osmaniye and Adana to settle permanently.

According to the results of the survey conducted with households in settlements, the average household size is 3.97. Sarımazı, Yukarıburnaz, Büyüktüysüz have above-average household size. The lowest average household size was observed in Turunçlu (2.87), while the highest average household size was in Büyüktüysüz (4.6).

Table 4-40 Average Household Size of the Households in the Sample

Settlement	Average Household Size
Aşağıburnaz	3.25
Yukarıburnaz	4.25
Yeşiltepe	3.81
Turunçlu	2.87
Sarımazı	4.35
Büyüktüysüz	4.6
Average Household Size	3.97

Source: Socio-Economic Household Survey, 2020

More than half (51.3%) of the interviewee in the settlements were primary school graduates. 21.2% of the interviewee stated that they left high school. While there are 2 university graduates in Yeşiltepe and Yukarıburnaz, there are 14 high school leaving interviewee in Sarımazı. In general, the settlement where the educated population is the highest is Sarımazı. The literacy rate of those living in households is 81.4.

Table 4-41 Educational Status of the Settlements

	Aşağıburnaz	Büyüktüysüz	Sarımazı	Turunçlu	Yeşiltepe	Yukarıburnaz	**Total**
Illiterate	0	0	0	0	1	2	4
Literate Only	0	1	0	0	0	0	1
Primary School Abandoned	0	0	0	0	0	1	1
Primary School Graduate	8	6	8	10	7	9	58
Middle School Graduate	0	0	7	1	2	0	10
High School Abandoned	0	0	14	3	3	1	24
High School Graduate	0	3	1	2	2	2	11
Junior College Student	0	0	0	0	0	0	1
Junior College Graduate	0	0	1	0	0	0	1
University Graduate	0	0	0	0	1	1	2
Total	8	10	31	16	16	16	**113**

4.8.2. Land Use and Ownership and Other Assets

Erzin has 12.848 ha of agricultural land out of an area of 25.800 ha (49%). Animal assets in Erzin were recorded as 11,347 small cattle and 2,815 cattle in 2017. The total number of poultry assets is 26,257 and the number of beehives is 6,500[20].

An important part of Ceyhan is agricultural land and its area is 1,424 km^2. The total agricultural area is 893,864 decares. While the number of cattle in Ceyhan was determined as 25,510 in 2016, the number of small cattle is 32,925[21].

It has been determined that there are 4,700 cattle and 19,415 small cattle in Toprakkale in 2016. 68.103 decares of 110,300 decares of district land is agricultural land[22].

4.8.2.1. Land Use of Settlements

[20] Hatay Tarım İlçe Müdürlüğü (2017) faaliyet Raporu http://hatay.tarımveorman.gov.tr

[21] Ceyhan Ticaret Odası (2017) Sosyo-Ekonomik Rapor. http://www.ceyhanto.org.tr/veriler/bilgi_bankasi/2017_sosyo_ekonomik_rapor.pdf

[22] Demir, Ş & Sevindi, C. (2017) Toprakkale Kasabası'nın (Osmaniye) Kuruluş ve Gelişimi. https://dergipark.org.tr/en/download/article-file/468241

67.3% of the households in the sample stated that they have a land used or owned, 32.7% stated that they do not own a land. 19.5% of the households that have title deeds (with or without share) stated that they own a garden, 19.5% have a field and 30% have an orchard.

While 45.5% of the households in the sample have total 0-5 acres of land assets, 16.2% of the households have land assets between 11-20 acres. The total land ownership rate of more than 50 decares is 7.35%.

Table 4-42 Average Land Size Owned by the Households in the Sample (Total)

Total Land Size (Acre)	Number of Household	Percentage (%)
0-5	31	45.5
6-10	9	13.2
11-20	11	16.2
21-30	4	5.95
31-50	8	11.8
51+	5	7.35
Total	68	100

Source: Socio-Economic Household Survey, 2020

While 23.81% of the respondents who state that they own land indicate that their land is between 11-20 acres, the ratio of those who have lands of 0-5 acres, 6-10 acres and more than 51 acres is 19.05%. Vegetable gardens are generally between 0-5 decares. Among those interviewed, 72.73% of those who declared that they own a vegetable garden have a vegetable garden between 0-5 decares. This is also an indication that vegetable production is made for households. On the other hand, 28.58% of those with orchards have land between 11-30 acres.

Table 4-43 Land Sizes Owned in the Households in the Sample (Distribution by Land Type)

Land Size (Acre)	Agricultural Land		Vegetable garden		Orchard	
	Number of Household	Percentage (%)	Number of Household	Percentage (%)	Number of Household	Percentage (%)
0-5	4	19.05	16	72.73	14	50
6-10	4	19.05	3	13.64	2	7.14
11-20	5	23.81	2	9.09	4	14.29
21-30	1	4.76	0	0	4	14.29
31-50	3	14.29	1	4.55	3	10.71
51+	4	19.05	0	0	1	3.57
General Average	21	100	22	100	28	100

Source: Socio-Economic Household Survey, 2020

4.8.2.2. Other Land Use

15% of the households in the sample stated that they use other non-proprietary land resources. The number of households included in the sample stating that they use other lands (treasury, leased land, etc.) that are not their own is 17 and these households use 21 pieces of other land in total. Total other land use is 422.5 decares.

Table 4-44 Land Sizes Owned in the Households in the Sample

Land Type	Number of Household	Total Land Size (Acre)
Treasury land	13	178.5
Leased Land (Contracted)	3	72
Leased Land (No Contract)	1	60
Someone else's (neighbor, relative etc.)	4	112
General Average	21[23]	422.5

Source: Socio-Economic Household Survey, 2020

4.8.2.3. Land Use Pattern

94.9% of the households in the sample engaged in farming determined that they did cultivation with the household members. The proportion of those who rent their land to someone else is 1.3%, which is the same level as those who use their land to graze animals. According to these figures, it is seen that almost all of the households interested in farming cultivate and harvest themselves.

Table 4-45 Land Use of the Households in the Sample

Land Use	Number of Household	Percentage (%)
Cultivation by household members	74	94.9
Empty	2	2.6
Renting	1	1.3
Livestock/grazing	1	1.3
Toplam	52	100

Source: Socio-Economic Household Survey, 2020

4.8.2.4. Ownership of Immovable Assets (Homes, Barns)

[23] Some households use more than one other land.

While 80.5% of the sampled households have the legal title of the house in which they live, 9.7% live in the house with shares. 4.4% stated that they live in the house of their relatives without paying rent. The rate of households that are tenants is 4.4%.

Table 4-46 Home Ownership of the Households in the Sample

	Number of Household	Percentage (%)
Have the legal title of the house	91	80.5
Live in the house with shares	11	9.7
Live in the house of their relatives without paying rent	5	4.4
Tenant	5	4.4
Other	1	0.9
Total	113	100

Source: 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 shop. While 12.4% of the households have a house other than the house where they live, 7.1% also have a shop. It has been observed that other houses owned outside the residence are usually located in the district centers. 62.1% of the households stated that they use the property permanently for the purpose of using the other property owned and 31% stated that they leased it for investment purposes.

Table 4-47 Ownership of Other Real Estate (Home / Shop) of the Households in the Sample

	Number of Household	Percentage (%)
House	14	12.4
Shop	8	7.1
Both house and shop	6	5.3
None	85	75.2
Total	113	100,0

Source: Socio-Economic Household Survey, 2020

55.9% of households who are engaged in livestock activities stated that they own a barn. The size of the barns owned range from 5 m^2 to 190 m^2.

4.8.2.5. Ownership of Vehicles

67.3% of the households in the sample have at least one vehicle. 48.5% of the households with the vehicle owns car. While car ownership is followed by tractor ownership with 36.57%, the motorcycle ownership for personal use is 8.2% and the ownership commercially used minibus and truck is 2.99% and 3.74%, respectively.

Table 4-48 Vehicle Ownership of the Households in the Sample

	Number of Household	Percentage (%)
Car	65	48.50
Minibus	4	2.99
Tractor	49	36.57
Motorcycle	11	8.20
Truck	5	3.74
Total	134[24]	100

Source: Socio-Economic Household Survey, 2020

4.8.3. Local Economy, Livelihood Sources and Employment

The main economic activities in the study area are agriculture and livestock. Agriculture and livestock are dealt with both subsistence and commercial. It has been observed that livestock is mostly made as fattening livestock and that in some households, animal sales are stated as a source of income. Only 12.4% of the respondents stated that they sell animals.

According to the information received from Erzin District Directorate of Agriculture and Forestry, there are 120 acres of citrus production area in Erzin, 600,000 tons of production is made and approximately 80% of this product is exported to Russia, Arabian and European countries as fresh fruit. All of the lands are irrigated with a drip irrigation system. There are about 20 decares of citrus orchards in the region. It is stated that citrus has a high yield and profitability compared to other agricultural products.

The population that migrating to the settlements in the region works in the places where industrial intensive works such as OIZ.

The main economic activities in Aşağıburnaz and Yukarıburnaz are agriculture, transportation and livestock. Revenues are obtained by selling citrus, olive, wheat, corn and tomato products produced in the settlements.

The economic activities in Yeşiltepe are agriculture, regular labor and retirement. Citrus (80%) and olives (10%) are grown in the settlement. The interviewees stated that due to the impact of the operating thermal power plant, the vegetable harvest is made in late seasons. While 100 households were planting 20 years ago, 1-2 households are planting vegetables now. Since vegetables have disease, there is no subsistence vegetable planting in the garden of houses. However, 95% of the households are engaged with irrigated farming.

Agricultural products constitute the main source of income in Turunçlu. The products grown are wheat, barley, beans, chickpeas (occasionally), sunflower, peas. Harvesting is done twice a year and irrigated farming is done in 10% of the cultivated land.

Sarımazı, like other settlements, has mainly agricultural economy. The five main products produced in the settlement are citrus, olive, wheat, sunflower and barley. Harvesting is done once a year. There is no irrigated land in the settlement and dry farming is carried out completely.

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

4.8.4. Main Income Sources

Mukhtar meetings held in the settlements in study area provided more in-depth information on the main sources of income. Agriculture and livestock are the primary sources of income. Transportation is also an important source of income in Aşağıburnaz and Yukarıburnaz. As there are industrial establishments close to the region, regular jobs also is the secondary source of income.

Table 4-49 Main Sources of Income in Settlements in the Study Area

Settlement	Main	Secondary	Tertiary
Aşağıburnaz	Agriculture	Transportation	Livestock
Yukarıburnaz	Livestock	Agriculture	Transportation
Yeşiltepe	Agriculture	Regular Job	Emeklilik
Turunçlu	Agriculture	Livestock	Trade
Sarımazı	Agriculture	Regular Job	Trade
Büyüktüysüz	Agriculture	Livestock	Regular Job

Source: SIA Studies, Mukhtar Interviews, 2020

4.8.5. Household Income

Workers and retirees constitute almost half of the sample group. 24% of the respondents in the sample are workers. Retirees follow this rate with 22.1%. According to the household survey, retirement rate in the household is 47.8%. While 15.9% of the interviewees are farmers, 11.5% are unemployed.

Table 4-50 Occupational Status of the Sampled Population

Occupation	Number of People	Percentage (%)
Farmer	18	15.9
Self Employed/Tradesman	9	8
Retired	25	22.1
Daily/Seasonal Worker	1	0.9
Worker	28	24.8
Unemployed	13	11.5
Civil Servant	3	2.7
Housewife	16	14.2
Total	113	100

Source: Socio-Economic Household Survey, 2020.

20% of the sample is unemployed. The rate of those who could not earn income is 25.7% considering 14.2% housewives who do not have direct income. According to the household

survey, it is concluded that noone works in 32.7% of the households. In addition, the rate of those who could not find a job in households is 26.5%.

Table 4-51 Main Income Sources of the Households in the Sample

Main Income Source	Number of Household	Percentage (%)
Paid Labor Income	39	34.5
Salaried Work (Civil Servant) Income	4	3.5
Tradesman / Artisan / Trade Income	9	8
Retirement Income	35	31
Seasonal Workers	4	3.5
Sent by Children / Relatives	1	0.9
Agricultural Income (Field Products)	1	0.9
Agricultural Income (Fruit Growing, Viticulture etc.)	11	9.7
Livestock Income (Sales)	1	0.9
Widow, Orphan, Disabled, Old Age Salary	1	0.9
Rent income	3	2.7
Other	4	3.5
Total	113	100

Source: Socio-Economic Household Survey, 2020

Paid labor income is at the forefront with 34.5% among the main income sources of the households in the sample. Retirement income is the second group with 31%. These two groups constitute 65.5% of the sample in total and other main sources of income are Tradesman / Artisan / Trade Income with 8%, Seasonal Worker with 3.5% and Salaried Work (Civil Servant) income with 3.5%, respectively.

61.1% of the households stated that they have a secondary income source. 44.30% of those who have a secondary income source stated that they have agricultural side income such as fruit growing and viticulture and this rate was followed by field crops with 12.66%. Agricultural production stands out with a rate of 56.96% in total incomes. While the rate of those who have retirement income is 12.66%, the rate of those with livestock side income over the sale of animals is 10.13%.

Table 4-52 Secondary Income Sources of Households in the Sample

Secondary Income Source	Number of Household	Percentage (%)
Paid labor Income	4	5.06
Tradesman / Artisan / Trade Income	1	1.27

Emeklilik Geliri	10	12.66
Retirement Income	2	2.53
Seasonal Workers	10	12.66
Agricultural Income (Fruit Growing, Viticulture etc.)	35	44.30
Livestock Income (Sales)	8	10.13
Animal Products	7	8.86
Widow, Orphan, Disabled, Old Age Salary	2	2.53
Total	69	100

Source: Socio-Economic Household Survey, 2020

4.8.6. Perception of the Households on Economic Status

While 41.6% of the households in the sample see themselves as people struggling to meet their expenditures, 51.3% stated that they could get along in a moderate way and 7.1% had more than enough income to meet their basic needs and could easily get along. Accordingly, it is seen that there are no serious differences between those who think they have economic sufficiency and those who think they are inadequate in the sample group.

Table 4-53 Economic Status Perception of Households in the Sample

Economic Sufficiency	Number of Household	Percentage (%)
Easily	8	7.1
Medium	58	51.3
Hardly	34	30.1
Very Hardly	13	11.5
Total	113	100

Source: Socio-Economic Household Survey, 2020

In addition, below questions were asked to learn the perception of households' economic sufficiency. "How do you see your economic situation compared to a year ago?" 58.4% of respondents answered "worse" and 26.5% answered "same". "How do you evaluate the future 5 years later economically?" 44.2% of the respondents answered “it will be worse” and 15% answered “it will be better”. When the given responses are evaluated, it is observed that the majority of the households in the sample think that they have a worse status compared to previous years and that they do not have much belief that the situation will improve in the future.

Table 4-54 Health Insurance Status of the Households in the Sample

	Number of Household	Percentage (%)
Retirement fund of civil servants	12	10.6
Social Security for Farmers	9	8
Social security for artisans and self-employed	19	16.8
Health card for uninsured people (green card)	3	2.7
Social security insurance (SSK)	50	44.2
Private insurance	1	0.9
No insurance	19	16.8
Total	113	100

Source: Socio-Economic Household Survey, 2020

16.8% of the interviewees stated that they do not have any health insurance. According to the General Insurance Law No. 26200, people without any social security can benefit from health insurance under this law. However, General Health Insurance is a system that people can benefit from by paying premiums according to their income. 44.2% of the participants stated that they have social security insurance (SSK).

4.8.7. Agricultural Production

According to the information received from Erzin District Directorate of Agriculture and Forestry, the crops and cultivation areas in the region are as presented in the table below.

Table 4-55 Crops and Cultivation Areas Planted in Erzin (2019)

Crops	Cultivation Area (da)	Crops	Cultivation Area (da)
CEREAL PRODUCTS		GREENHOUSE PRODUCTS	
Wheat	3,500	Watermelon	1,000
Barley	200	Tomato	3
Corn	850	Banana	45
OIL SEED PLANTS		FRUIT PRODUCTS	
Cotton	550	Avocado	39
Peanut	350	Plum	25
Sunflower	2,650	Peach	25
LEGUMES		Apricot	45
Pea	700	Olive	19,150
Beans (Fresh)	850	Orange	32,250
VEGETABLE PRODUCTS		Mandarin	67,561
Okra	65	Grapefruit	1,000
Eggplant	75	Lemon	658
Lettuce	60	Pomegranate	27
Parsley	200	Fodder plant	850
Dill	225		
Onion	45		

Source: Erzin District Directorate of Agriculture and Forestry

Vegetable production in settlements in the study area is generally done for household consumption. Wheat comes to the forefront in the region. It is seen that olive production is in the foreground besides wheat and citrus production. (Table 30).

Table 4-56 Main Agricultural Products Grown in Settlements in the Study Area

Settlement	Main	Second	Third	Fourth
Aşağıburnaz	Wheat	Kavun/Karpuz	Tomato	Corn
Yukarıburnaz	Wheat	Citrus	Olive	
Yeşiltepe	Citrus	Olive		
Turunçlu	Wheat	Barley	Bean	Chickpea

Sarımazı	Citrus	Olive	Wheat	Sunflower
Büyüktüysüz	Wheat	Barley	Sunflower	Olive

Source: SIA Studies, Mukhtar Interviews, 2020

The agricultural products grown in vegetable gardens are mostly Wheat, Pepper, Eggplant, and Sunflower. It is understood that this production was made mainly for household consumption. As a matter of fact, the households state the agricultural production do not generate income so that they produce for their own household consumption. Some households stated that sunflower and corn are sold abroad, while others stated that products such as wheat and barley are used as animal feed.

Table 4-57 Agricultural Products Mostly Grown by the Households in the Sample

Product	Number of responses showing the household growing the product	Percentage (%)	Product	Number of responses showing the household growing the product	Percentage (%)
Barley	3	2.80	Corn	5	4.67
Sunflower	10	9.34	Chickpea	1	0.93
Pepper	14	13.08	Eggplant	13	12.15
Wheat	21	19.63	Leek	2	1.87
Tomato	6	5.61	Cucumber	1	0.93
Bean	4	3.74	Onion	3	2.80
Spinach	5	4.67	Soy	1	0.93
Lettuce	7	6.54	Radish	3	2.80
Parslet	7	6.54	Peanut	1	0.93

Source: Socio-Economic Household Survey, 2020

According to the household survey, the proportion of respondents who have fruit or yield trees is 71.7%. Olive, mandarin, orange and lemon come to the fore in the planting products grown in the region. Looking at the average of the number of trees owned per household, the first place is the mandarin/orange with 409.92 trees, while 214.9 olive trees, 200 plum trees and 140.1 lemon trees per household.

Table 4-58 Income Tree Ownership of the Households in the Sample

Product	Number of Household	Number of Tree	Average Number of Tree
Walnut	5	12	2.40
Fig	5	11	2.20
Apple	2	2	1.00
Mandarin/Orange	38	15,577	409.92

Product	Number of Household	Number of Tree	Average Number of Tree
Lemon	10	1,401	140.10
Olive	67	14,398	214.90
Plum	1	200	200.00
Pomegranate	6	20	3.33
Peacj	2	3	1.50
Pear	1	2	2.00
Grape	1	1	1.00

Source: Socio-Economic Household Survey, 2020

4.8.8. Livestock Production

According to the information received from the headmen, it was observed that poultry were raised in almost every house in the settlements in the study area. In the study area, it is seen that the number of small cattles is 12,600 and the number of cattle is 1,270.

Table 4-59 Livestock Figures of Households in Settlements in the Study Area

Settlement	Number of Households (Poultry)	Number of Cattle	Number of Small Cattle	Number of Households (Beekeepping)
Aşağıburnaz	60	20	1,000	1
Yukarıburnaz	100	100	250	0
Yeşiltepe	300	40	150	0
Turunçlu	2	10	1,000	3
Sarımazı	1,000	200	5,000	0
Büyüktüysüz	20	100	200	0
Total	**1882**	**1270**	**12600**	**4**

Source: SIA Studies, Mukhtar Interviews, 2020

52.2% of the households in the sample are engaged in livestock. While 15.9% of the households have cattles, 10.6% of them have small cattles but small cattle production is observed more than cattle production. Although it is seen that half of the households produce poultry products, the rate is 40.7%. 0.9% of the respondents stated that they are engaged in beekeeping.

Table 4-60 Animal Ownership Type in Households in the Sample

Type	Number of Households	Percentage (%)
Cattle	18	15.9
Small Cattle	12	10.6
Poultry	46	40.7
Beekeeping	1	0.9
Total	113	100

Source: Socio-Economic Household Survey, 2020

There are 18 cattle in total and 3.6 small cattle per household among the households in the sample dealing with livestock. While the number of households with cattle is 11, the number of cattle per household is 22.72. The number of poultry is 317. The average number of poultry households is 22.6. Beekeeping is done in a household and this household has 125 beehives.

Table 4-61 Average Animal Ownership in Households in the Sample

Animal Ownership	Number
Number of Cattle	18
Number of Household	5
Average cattle/household	3.6
Number of Small Cattle	250
Number of Household	11
Average small cattle/household	22.72
Number of Poultry	317
Number of Household	14
Average poultry/household	22.6
Number of Beehives	125
Number of Household	1
Average beehives/household	125

Source: Socio-Economic Household Survey, 2020

The animals are also cared in barns (35.62%) and poultry houses (42.47%). Since animal care is not done professionally and as a basic income, barns and poultry are not modern but suitable for subsistence animal care.

Table 4-62 Animal Care During the Year

Place	Number of Household	Percentage (%)
Barn next to the house	26	35.62
Pasture Land of the settlement	8	10.96
Pasture Land of the Village Legal Entity	6	8.22
Poultry	31	42.47
Treasury Land	1	1.37
Other	1	1.37
Total	**73**	**100**

Source: Socio-Economic Household Survey, 2020

It is seen that production is mostly made for household consumption. Some of the honey is consumed and the remaining part is sold. While 55% of the households stated that they consume the produced milk at home, 35% stated that they sell it in the public market and 10% to the merchant/factory. Cheese production is consumed in 52.9% of households, while market-oriented production is 47.1%. While 77.8% of the butter production is consumed in the household, only 22.2% is sold in the settlements and public market. Egg production is also produced for household consumption (86.4%) and the remaining part is sold in the market.

Table 4-63 Animal Product in Households in the Sample

Animal Production	Use	Number of Household	Percentage (%)
Milk	Household Consumption	11	55
	Sold in Public Market/Settlement	7	35
	Sold to Merchant/Factory	2	10
	Total	20	100
Cheese	Household Consumption	9	52,9
	Sold in Public Market/Settlement	8	47,1
	Sold to Merchant/Factory	0	0
	Total	17	100
Butter	Household Consumption	7	77,8
	Sold in Public Market/Settlement	2	22,2
	Sold to Merchant/Factory	0	0

	Total	9	100
Egg	Household Consumption	38	86,4
	Sold in Public Market/Settlement	6	13,6
	Sold to Merchant/Factory	0	0
	Total	44	100
Honey	Household Consumption	1	50
	Sold in Public Market/Settlement	1	50
	Sold to Merchant/Factory	0	0
	Total	2	100

Source: Socio-Economic Household Survey, 2020

4.8.9. Forestry

Besides agricultural and livestock activities, livelihood activities related to forestry are also carried out due to the close forest areas in some of the settlements in the region. Among the settlements within the study area, Sarımazı is closer to the forest than other villages. Income generating or income supporting activities related to forestry includes working as forest worker, obtaining firewood, collecting and selling products from the forest, and grazing animals. It is seen that the relationship with the forest in the sample is on collecting firewood rather than economic activity. 42 of the respondents did not answer the question and 78.9% of the respondents stated that they do not use the forest.

Table 4-64 Using Forest Areas among the Households in the Sample

Using Forest Areas	Number of Household	Percentage (%)
Collecting firewood	11	15.5
Collecting mushrooms / herbs / spices for houshold consumption	2	2.8
Collecting mushrooms / herbs / spices for selling	1	1.4
Grazing animals	1	1.4
No use	56	78.9
Total	71	100

Source: Socio-Economic Household Survey, 2020

4.8.10. Industry and Local Business

The provinces and districts where the project is located are planned to become important centers in terms of industry and trade and are subject to investments.

Ceyhan has very important industrial infrastructure such as crude oil pipelines, free zone, energy specialization zone and organized industrial zone. Ceyhan is expected to become an energy and petrochemical industry region as a result of some industrial and industrial

infrastructure investments in the region. Ceyhan Energy Specific OIZ was established in 2007. Founded with the received Cabinet decision of 1985, Yumurtalik Free Zone is Turkey's first and the only free zone established for investments in heavy industry such as chemistry, petro-chemical, iron and steel, power plants, shipyards and cement factories. Ceyhan Organized Industrial Zone was established on August 02, 2016 in an area of 121 hectares. There is also a Ceyhan Small Industry Site in Ceyhan[25].

The development of industrial activities in the study area begins after 1994. As a matter of fact, Osmaniye OIZ was established in the said year with the contributions of Adana Special Provincial Administration, Osmaniye Chamber of Industry and Commerce and Osmaniye Businessmen Association. Prior to the establishment of the OIZ, large and small industrial enterprises were available along the D400 Highway (Osmaniye-Adana), which provided the Osmaniye-Toprakkale connection. These businesses were mostly engaged in citrus packaging, peanut processing and feed production. With the establishment of OIZ, new ones were added to these enterprises and the number of employees in the industrial sector in Toprakkale increased and unemployment problem was solved to a great extent. 54.7% of the working population (6,338) in Toprakkale works in agriculture, 24.8% in service, 9.7% in trade and 5.6% in industry. 45.3% of the active population earns from agriculture. This rate is increasing every year especially in favor of the trade and industrial sectors, and the number of the population making income from agricultural activities is decreasing[26].

4.8.10.1. Organized Industrial Zones (OIZ)

Erzin OIZ

There are 182 enterprises in 3 OIZs active in Hatay Province and 8,397 people are employed. These are Antakya, İskenderun and Payas OIZs. While the second phase of İskenderun OIZ is being built, another OIZ is planned in Erzin. This railway connection project is also important for this OIZ.

1.750 decares of area is reserved for Erzin OIZ in Turunçlu. 29.3% of this area belongs to OIZ, whereas 70.7% is private land. As of January 2017, 220 companies have requested land allocation for approximately 10,000 decares of investment from Erzin OIZ[27].

Osmaniye OIZ

Osmaniye OIZ was established in 1994 on a 100-hectare area in Büyüktüyisüz of Toprakkale District, with the partnership of the Special Provincial Administration, Chamber of Commerce and Industry and Osmaniye Industrialists' Association. The OIZ, consisting of five stages with the incentives in 2004 and 2010, has an area of 699 hectares and continues its expansion. In the OIZ, there are intensive Iron and Steel Industry Enterprises and the number of these enterprises is 43. This sector is followed by textile with a total of 16 enterprises. 6,554 of the total 8,270 employees were employed in these two sectors (www.oosb.org.tr).

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[25] Ceyhan Ticaret Odası (2017) Sosyo-Ekonomik Rapor. http://www.ceyhanto.org.tr/veriler/bilgi_bankasi/2017_sosyo_ekonomik_rapor.pdf

[26] Demir, Ş & Sevindi, C. (2017) Toprakkale Kasabası'nın (Osmaniye) Kuruluş ve Gelişimi. https://dergipark.org.tr/en/download/article-file/468241

[27] Antakya Ticaret ve Sanayi Odası (2018) Sosyo-Ekonomik Rapor, http://www.antakyatso.org.tr/dokumanlar/2017%20yayinlar%20veriler/ekonomik%20rapor%202018/EKONOM%C4%B0K%20RAPOR%202018.pdf

Figure 4-52 Osmaniye OIZ

Interviews were made with OIZ managers in GDII. Except for the technical services, the authorities, who state that the number of current people working in the industry sector is 9,889 and 885 among them is women and stated that the number of industrial enterprises in operation is approximately 100.

Yumurtalık Free Zone (TAYSEB)

According to the Free Zones Law No. 3218, free zones are established to promote export-oriented investment and production, to accelerate foreign direct investment and technology entry, to direct businesses to exports and to develop international trade. Their difference from other zones is that they are divided into regions where some valid legal and administrative regulations are not implemented within the country and where broader incentives are provided for industrial and commercial activities[28].

Yumurtalık Free Zone is one of Turkey's largest free zones having 5 km of coastline and built on 4.6 million m^2. It is planned to built one of the stations within the scope of the project at the entrance of this zone.

[28] https://www.mevzuat.gov.tr/MevzuatMetin/1.5.3218.pdf

Figure 4-53 Location of Yumurtalık Free Zone (TAYSEB)

The fact that Yumurtalik Free Zone is located in the combination of Adana-Hatay provinces in Iskenderun Bay and its proximity to the markets in the Middle East, Near East, Europe and North Africa makes this area more important. The free zone, which is 80 km from Adana Şakirpaşa Airport, has a direct highway connection. Erzin Station is 16 km away. This distance will be shorter with the railway connection line to be built within the scope of the project.

TAYSEB's Operations Manager and Sales & Marketing Chief were interviewed and information about their positions regarding the project was obtained as an important stakeholder of the project.

The free zone has an important logistics potential with its port and highway connections. It is seen in the chart that the Free Zone, where 27 industrial enterprises operate and where approximately 1,200 people work, has an increasing trade volume.

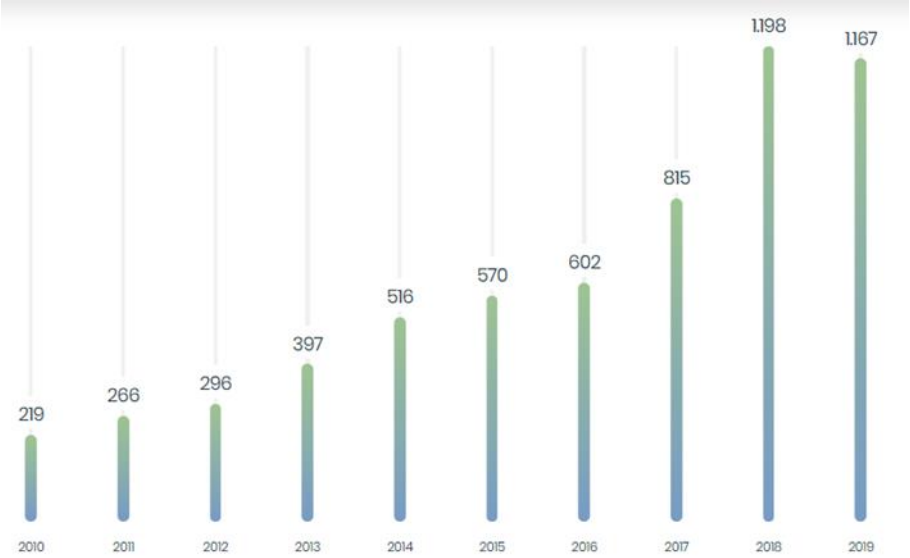

Figure 4-54 Trade Volume of the Yumurtalik Zone by years (Million USD)

Industrial facilities in different sectors such as shipyard, cement, iron-steel, food and feed sector, especially chemistry-petrochemistry, have operated in the Free Zone. According to the statements of the officials providing updated information, clinker and cement (2 million tons) production is at the forefront today in the Free Zone. The cement production here is thought to have potential in terms of future commercial relations with Iraq and Syria.

Torosport Ceyhan Port

Torosport Ceyhan Port, used by industrial enterprises in Yumurtalik Free Zone, is a general port. Many products are transported from cereals to coal from this port. 500,000 tons of imported liquid chemicals and oils are shipped from here. 6-7 million tons of coal trade is realized through Torosport and Sanko Ports. Torosport is also an important fuel transit port. A significant amount of crude oil coming from Iraq by road tankers is stored, loaded and shipped in the port. Processed oil is also sent from various countries of the world to countries such as Iraq. This area, where 5-6 million tons of products are handled and intense port activity is an important port for TCDD.

4.8.10.2. Local Businesses

Süper Enerji Coal Depot and Processing Plant Inc.

Süper Enerji Coal Depot and Processing Plant Inc. is operating across Yumurtalik Free Zone. This facility will be displaced since it is located on the land where a train station will be built in the scope of project.

The screening and packaging processes are carrid out in the facility to make the coal coming from overseas market ready for use in Turkey. 26 blue collar and 4 white collar personnel are working in the facility. Approximately 10 blue collar workers (seasonal workers) may join the team periodically depending on the workload. All of the personnel are men except one white collar woman employee. Daily working time is 8 hours and overtime practice is rarely performed. Since there is no public transportation opportunity to the region, the staff comes to work with the service.

Table 4-65 Number of Personnel Working in the Facility

Personnel	Number
Operations Manager	1
Deputy Operations Manager	1
Secretary	1
Foreman	1
Unskilled Worker	26
TOTAL	30
Seoasonal Workers	10
Toplam	**40**

Considering the age distribution of the personnel, it is learned that there are no employees under the age of 18, 27 people between the ages of 18-50, and 3 people above the age of 50. Most of the personnel come from Sarımazı and Dörtyol. There are also personnel coming from surrounding districts such as Erzin, Osmaniye and Ceyhan.

The Operations Manager stated that local people are given priority in recruitment and assistance was received from the Employment Agency for unskilled jobs. The company does not have health personnel. Regular (annual) health screenings are carried out due to highly hazarodous work. Occupational health and safety service is taken from a company. The firm conducts regular inspections and trainings.

The company has a washing facility project that will increase the quality of the product and the business potential of the company within the next three years of investment plans. The washing facility, which is planned to be established within the current land, is expected to improve the quality of the product and increase the company's competitiveness and employment.

Toros Tarım Sanayi ve Ticaret Inc.

The parking area, which is the waiting area of trucks and trucks that will load and unload at the port, is located on the land to be used for the station to be built within the scope of the project. Toros Tarım Sanayi ve Ticaret Inc., which is the roof company of Tekfen Agri-Industry Group, was established in 1974 to operate mainly in the field of agricultural inputs and started the first fertilizer production in 1981. Today operates as a major fertilizer producers in Turkey. Taking into account the 38% of the total installed generation capacity in Turkey in the field of fertilizer production is done by this company, the total installed production capacity in the three provinces and market share as Turkey's largest fertilizer producers.

The affected parking area is used not only for the activities of this company, but also for the transportation activities required by all industrial enterprises in Yumurtalik Free Zone.

Porting has an important place among the non-agricultural activities of this company. The Torosport Ceyhan Terminal, built in 1981 within the Ceyhan Production Facility and expanded to serve third parties in the following years, is now the second largest commercial bulk port of İskenderun Bay. Free zone management, another non-agricultural activities of this company, has been maintained through Yumurtalik Free Zone since 1998.

4.8.11. Infrastructure Status

Information on the infrastructure status of the settlements in the study area was taken from the muhtars interviewed during the field study. Although there is an electrical infrastructure in all the settlements, it has been stated that there are frequent power cuts in Yukarıburnaz and Turunçlu. For heating, wood and coal are used in all settlements. In addition, the need for heating is met with air conditioning, electricity and solar energy. The most important problem in all settlements is the infrastructure problem related to sewerage network.

Although there is no general problem in terms of drinking water quality, it has been stated that drinking water quality has changed negatively from day to day due to trout facilities in Aşağıburnaz. While 63.7% of the households in the sample stated that they use mains water, 54.9% of the participants find the drinking source sufficient. 9.7% of the respondents stated that they use bottled water. Telecommunications and internet infrastructure are available in all settlements.

Table 4-66 Infrastructure Status in Settlements in the Study Area

Settlement	Sewerage Network	Electricity	Dringkin Water Quality	Road Status	Telecommunication & Internet
Aşağıburnaz	No sewerage, septic tanks are used	No problem	Although drinking water quality is good, the quality has decreased due to trout facilities	Good	No problem
Yukarıburnaz	No sewerage	Regular cuts		Roads are damaged and unable to handle the movement of heavy tonnage vehicles	No problem
Yeşiltepe	No sewerage, septic tanks are used	No problem	Drinking water quality is good	Roads are damaged	Internet and telephone lines are not working well
Turunçlu	No sewerage, septic tanks are used	Regular cuts	Drinking water quality is good	No roads in the inner quarters, damaged roads	Internet and telephone lines are not working well
Sarımazı	No sewerage	No problem	Drinking water quality is good	Roads are damaged	No problem
Büyüktüysüz	No sewerage	Regular cuts	Drinking water quality is good	Good	No problem

Source: SIA Studies, Mukhtar Interviews, 2020

4.8.12. Education Services

There are no open schools in Aşağıburnaz, Yukarıburnaz and Turunçlu. There is a school in the middle of Aşağıburnaz, Yukarıburnaz and Turunçlu. Some of the primary and secondary school age children go to this school, some to Şükrüpaşa Primary School, Girls' Vocational High School, Bahri Çelen Imam Hatip High School, Technical Anatolian High School in Erzin. The number of children in primary, secondary and high school age who benefit from mobile

education in the settlement is 35. 2 students from 2 different households in the settlement study at high school in Dörtyol. Some of the students in Yukarıburnaz go to Erzin. The number of primary and secondary school age children who benefit from the mobile education in the settlement is 120. The number of children going to high school in Erzin is 20. Six students in the settlement study at high schools.

There is one school open in Yeşiltepe. Headman do not know the number of students. There are children who benefit from mobile education. 60 people go to various schools in Erzin district for high school education. Ten households send their children to boarding school. A total of 20 children go to the nearby districts of Erzin, Dörtyol and Hatay. Turunçlu Burnaz Primary School has 244 students. All the children of the settlement benefit from this mobile education. 5 students go to high school in Erzin, Osmaniye and Gaziantep.

There are two schools open in Sarımazı. 125 and 291 students receive education in the Şehit Adnan Sürücü Middle School and Toros Tarım Necati Akçağlılar Primary School, respectively.

There is an open primary school in Büyüktüysüz. The number of students here is 100. 100 students benefit from mobile education. For secondary and high school, they go to the vocational high school in Osmaniye OIZ, and different schools in Asagilatuysüz and Toprakkale. 10 households send their children to Osmaniye and Osmaniye OIZ high school.

Table 4-67 Educational Services in Settlements in the Study Area

Settlements	Primary School	Secondary School	High School	Number of Students Benefiting from Mobile Education	Place of Mobile Education
Aşağıburnaz	No	No	No	35	Erzin
Yukarıburnaz	No	No	No	120	Erzin
Yeşiltepe	Yes	No	No	20	Erzin
Turunçlu	No	No	No	Not known	Erzin
Sarımazı	Yes	Yes	No	-	-
Büyüktüysüz	Yes	No	No	100	Osmaniye

Source: SIA Studies, Mukhtar Interviews, 2020

4.8.13. HealthServices

Almost all of the settlements in the study area have a health center. Although it can not be described as a health center in Asagiburnaz, one room is used for health services, while there is no health center in Büyüktüysız. A doctor comes to the settlements once a week, and in settlements where there are health centers, there is a nurse or midwife every day.

Table 4-68 Health Services in Settlements in the Study Area

Settlement	Health Center	Family Doctor	Distance to the Closest Health Center
Aşağıburnaz	No	Once in a week	17 km
Yukarıburnaz	Yes	Once in a week	-
Yeşiltepe	Yes	Twice in a week	-
Turunçlu	Yes	Twice in a week	-

Settlement	Health Center	Family Doctor	Distance to the Closest Health Center
Sarımazı	Yes	Everyday	-
Büyüktüysüz	No	-	3 km

Source: SIA Studies, Mukhtar Interviews, 2020

4.8.14. Social Relations and Community Tension

There was no tension observed in connection with the Project during the field studies, but concerns about adverse impacts to agricultural activity were encountered. Industrial development in the region is known to all stakeholders. They have the expectation that this development will contribute positively to their economic welfare levels.

The agricultural importance and infrastructure status of Erzin plain raises expectations about protection of the plain. Represantative of institutions and organizations operating in the agricultural field expect sensitivity for the protection of agricultural areas in this region.

4.8.15. 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 who receive in-kind / cash support from the Social Assistance and Support Foundation (SYDV).
- Physically or mentally disabled people
- Households that do not own land but use other land in the settlement (with or without rent)
- Households using public lands such as treasury land, village legal entity, pasture, forest
- Elderly people over the age of 65 who live alone and need care
- Persons whose lands were previously affected by other infrastructure or investment projects in the region

The presence of these vulnerable groups was questioned in interviews with the headman at the settlements. Especially in Sarımazı, the number of residents in need of help and living with the help of SYDV is high. The number of people over 65 years old in need of care is higher in Yeşiltepe. There are households whose land has been expropriated previously by other projects and whose land will be expropriated again. The lands of the people living in Yeşiltepe are mostly affected by the project. Many people have been affected by the highways, Free Zone, other OIZ projects and investments made in Sarımazı. Although the same people are thought to be affected by this project, the number is unknown.

There are many residents in Büyüktüysız, which were affected by Osmaniye OIZ. However, within the scope of this project, the use of private lands belonging to Büyüktüysüz is not in question.

Table 4-69 Vulnerable Groups in Settlements in the Study Area

Settlement	Support from SYDV (household)	Physically or mentally disabled (person)	Households that do not own land but use other lands	Households using public lands	Approximate number of informal users expected to be affected by the project	Over 65 years old, in need of care (person)	Households whose lands were affected by other projects
Aşağıburnaz	70	1	7	4	0	3	50
Yukarıburnaz	75	1	30	80	2-3	-	Not known[29]
Yeşiltepe	55	5	50	300	0	50	20
Turunçlu	55	5	1	150	6-7	10	Not known
Sarımazı	300	20	Yok	2500	2-3[30]	10	Not known
Büyüktüysüz	45	5	5	Yok	0	10	30

Source: SIA Studies, Mukhtar Interviews, 2020

Vulnerable households/individuals affected by the project will be defined in more detail in RAP that will be developed and implemented within the scope of the project.

In addition, it is possible to identify those who are illiterate in such projects where stakeholder participation is important, as a vulnerable group. It was also examined whether there are illiterate individuals in the households that make up the sample and the ratio of households containing at least one illiterate adult individual was 18.6%.

Table 4-70 Number of Households with Illiterate Members

Illiterate Member in Household	Number of Household	Percentage (%)
Yes	21	18.6
No	92	81.4
Total	**113**	**100**

Source: Socio-Economic Household Survey, 2020

The location of the region also increases the likelihood of encountering Syrian refugees. Refugees living in nearby settlements have not been identified, but are known to be in provincial and district centers. There are Temporary Accommodation Centers established for Syrian refugees in all three provinces. Although a large number of refugees in provinces reside in these centers, it is known that they also live in province and district centers. As of January 2020, the number of refugees living in the provinces where the Project is located is presented in the below table[31]. In other words, there are no Syrian refugees residing in the project area (towns and villages).

Due to the intensive agricultural activity, the region offers the opportunity to earn income from seasonal agricultural work for Syrian refugees. The proximity of Hatay to the border is

[29] These people will be examined in detail within the scope of RAP.

[30] One of them is a private company. It also uses public land for storage purposes.

[31] Mülteciler Derneği (2020) Türkiye'deki Suriyeli Sayısı Ocak 2020, https://multeciler.org.tr/turkiyedeki-suriyeli-sayisi/

also effective here. It was learned that seasonal workers from the East worked instead of the local people during the harvest period. However, Syrian workers have taken places of workers coming from the East in recent years. According to the information received from the headman interviews, approximately 2,000 Syrian refugees are within the scope of the project as seasonal agricultural workers.

Table 4-71 Number of Syrian Refugees in Three Provinces

Province	Ratio in Population (%)	Number of Refugees
Adana	10.99	243,933
Hatay	27.23	438,330
Osmaniye	9.30	49,690
Total		**731,953**

Source: Mülteciler Derneği, Ocak 2020

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[32]:

- 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 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.

[32] ULAŞTIRMA VE ALTYAPI BAKANLIĞI (2019) 2018 Yılı Faaliyet Raporu, https://www.uab.gov.tr/uploads/pages/butce-raporlari/2018-idare-faaliyet-raporu.pdf

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 below.

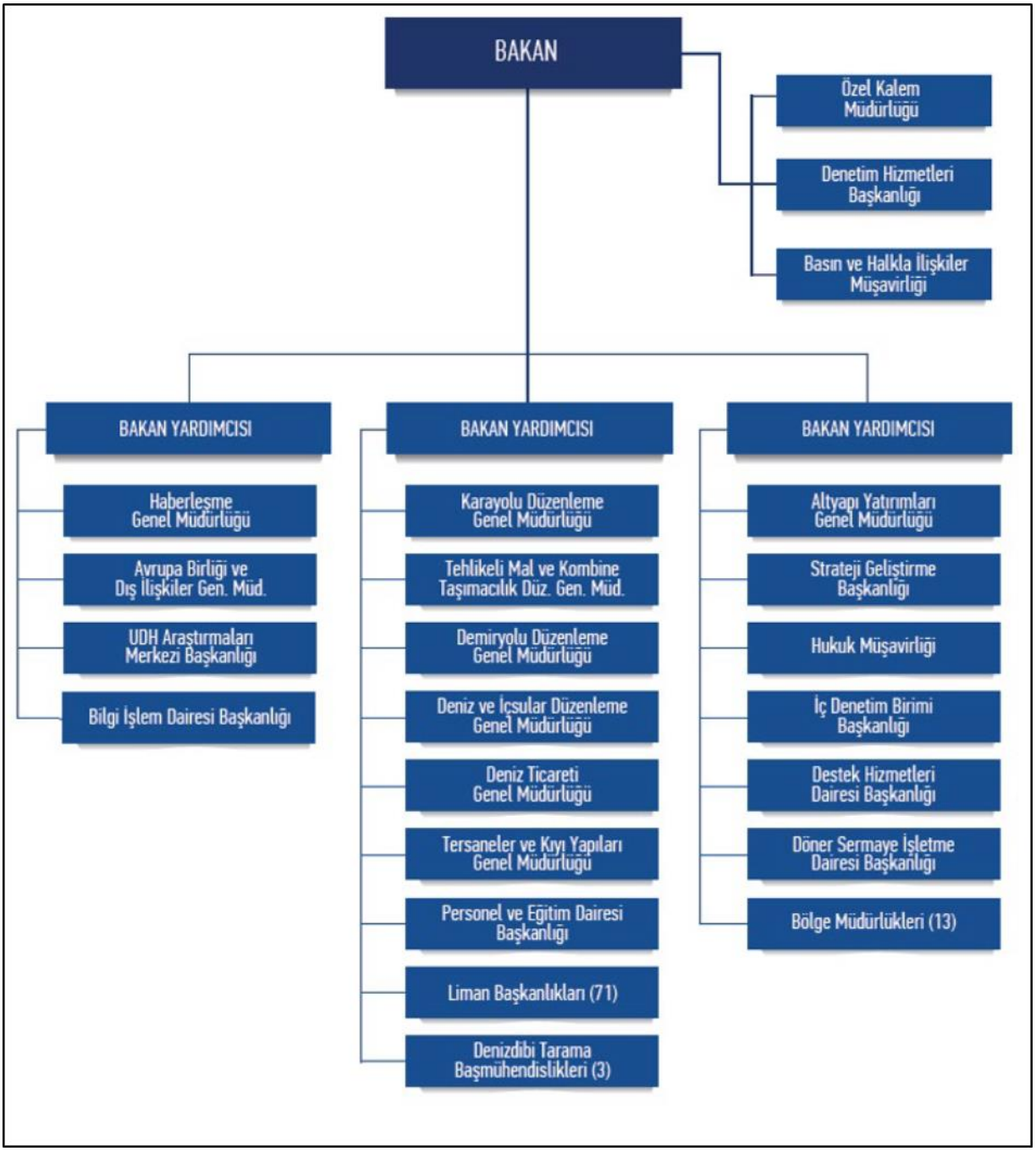

Figure 4-55 Organization Chart of the Ministry of Transport and Infrastructure

Activities within the scope of this project are carried out by the General Directorate of Infrastructure Investments. GDII has prepared a Labor Management Plan (LMP) for the management of the process.

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.

Table 4-72 Employment type and gender distribution of the Ministry Personnel

	Central		Pronvicial		Total	
	Female	Male	Female	Male	Female	Male
Civil servant	421	991	297	1257	718	2248
Worker	90	209	161	594	251	803
Total	511	1200	458	1,851	969	3,051
Total	1,711		2,309		4,020	

Source: Ulaştırma ve Altyapı Banaklığı, 2018 Yılı Faaliyet Raporu, 2019

The distribution of civil servants by service class is concentrated in the field of General Administrative Services and Technical Services (Figure 4-56).

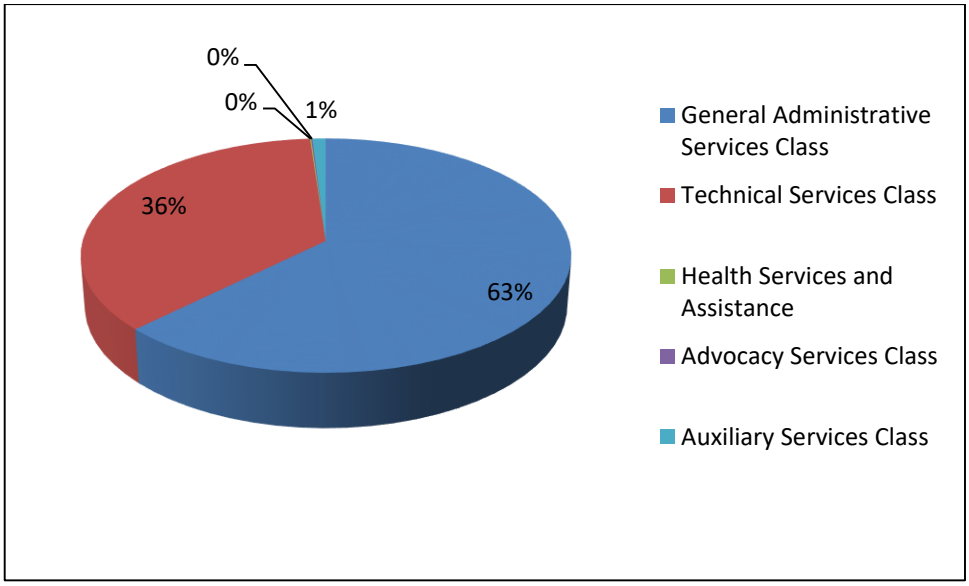

Figure 4-56 Distribution of Civil Servants by Service Class

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. Tender documents for the construction of the Project are still under preparation. It is estimated that the auctions will be announced in the third quarter of 2020. 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. The expected number of workers for the construction of the project is 140-150 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 4-73 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)	1	It is estimated that about 30 to 40 workers will be employed in each team.
Superstructure and electromechanical team	1	It is estimated that 50-60 workers will be employed in each team and 10-20 employees in one-road superstructure.
Construction (station) team	1	It is estimated that about 30 to 40 workers will be employed in each team.
Maintenance and repair team	1	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: Labor Management 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

Regulations on civil servants and workers' labor laws do not allow child labor. The minimum working age in Turkey is 15 but the "youth workers" between 15 and 18 are only allowed for certain sectors and tasks and not allowed for working in hazardous works. Thus, people under 18 will be prohibited to work in the Project as defined in LMP document.

4.9.2. Unregistered/Uninsured Employment

Regulations on civil servants and workers' labor laws do not allow precarious informal employment.

4.9.3. 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)[33].

4.9.4. 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 çivil 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)[34].

4.9.5. Occupational Health and Safety

Two main indicators of working life are occupational accidents and occupational diseases. Work accident rates have declined significantly over the past 40 years in Turkey. But the work accident rate is still high in Turkey. According to the Occupational Health and Safety

[33] 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

[34] 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

Profile Report (2016), the distribution of worker deaths in 2014 by field of activity is as follows[35]:

- Production, manufacturing, processing, storage: 105,538
- Excavation, construction, repair, demolition: 19,177
- Movement, sports, artistic activity: 6.672
- Service provided to the business and/or the public; intellectual activity: 4,592
- Agriculture, forestry, gardening, fish farming, working with live animals: 1,300
- No information: 8.477
- Other: 71,248

Traffic accidents have been identified as the primary cause of worker deaths in Turkey. 25% of workers who died in April 2019 lost their lives due to a traffic accident. Again, construction is the sector with the highest rate of worker deaths[36].

The number of occupational diseases in Turkey has always been below the expectations. The occupational disease rates are low compared to the the worldwide statistics. However, several hundred cases of occupational diseases are reported each year. In addition, the frequency of occupational diseases has declined in the past years. Before 2008, the frequency of occupational diseases was between 15-22 in 100,000 workers, and then it decreased to less than 5 in 100,000 workers. Nobody died in 2014 due to occupational disease[37].

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 Transport Network and Traffic Conditions

The lowest mortality mode is the airline and then the railway. These are followed by buses and cars. As a result of the worldwide rail accidents in Turkey are being studied for the reduction of fatalities. In order to reduce the number of deaths caused by railway accidents, it is necessary to first know the causes of accidents and make comparisons. In most countries, railways under state monopoly began to be liberalized or privatized until the 1990s. The aim of liberalization and privatization is to improve the economic performance of railways without changing the safety performance. For this reason, the need to take precautionary measures has emerged. In this context, in TCDD; safety management system studies started in 2009 with the start of high-speed train management, and the Railway Safety Regulation prepared by the General Directorate of Railway Regulations entered into force in 2015. In 2015, the Regulation for Investigation and Investigation of Railway Accidents and Incidents prepared by KAIK entered into force.

Death cases caused by railway accidents tend to decrease in the world. The lowest values among those countries belong to Australia and the European Union. The death rate per million km in Australia, EU, USA, Korea, Canada is between 0.15-0.8 years between 2003 and 2012. From 2003 until 2012. Turkey is also a rapid decline despite the realization has come down below the 1.5 level. According to the world average value in 2012, it is understood that the fatalities occurred in Turkey about three times of the world average.

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[35] Çalışma ve Sosyal Güvenlik Bakanlığı (2016) İş Sağlığı ve Güvenliği Profili, https://www.ailevecalisma.gov.tr/medias/4578/kitap09.pdf

[36] İşçi Sağlığı ve İş Güvenliği Meclisi (2019) 2019 İş Kazası İstatistikleri, https://osgbistanbul.com.tr/2019-is-kazasi-istatistikleri/

[37] Çalışma ve Sosyal Güvenlik Bakanlığı (2016) İş Sağlığı ve Güvenliği Profili, https://www.ailevecalisma.gov.tr/medias/4578/kitap09.pdf

In the years 2010-2013, a total of 143.6 million train-km freight carried in Turkey, 607 accidents occurred. The amount of accidents for Turkey was calculated as 4.2 accidents per million train-km. The closest counties to Turkey are Estonia, Romania and Lithuania. More than half of the European Union countries have value below 1 accidents per million train-km.

In 2010-2012, a comparison between European Union and Turkey was carried out according to the the number of serious accidents and causes. Accordingly, both the European Union and Turkey has caused serious accidents in accordance with the less accurate respectively; the fall of the train and the collision of the train with the person, parade collision, derailment, train collision, fire in the railway vehicle. The ratio of number of serious accidents occurring due to the impact of a person's fall from train to train with 61% for the European Union, 42% for Turkey. The most striking difference compared Turkey with the European Union is seen derailment. While this rate was 4% in the European Union is 26% in Turkey. In a study conducted based on FRA database in the USA; it was determined that the majority of the derailment were due to broken/cracked rails, road geometry defects, bearing defects in vehicles and broken wheels. It is concluded that measures should be taken for the broken/cracked rails and road geometry defects in Turkey.

One of the indicators that measure the safety of the infrastructure operator is the ratio of automatic level crossings. Most level crossing accidents are caused by violations of road drivers. This can only be prevented by automatic level crossings. Automatic level crossings greatly reduces gate collisions. Parade collision accidents account for approximately 25% of all railway accidents.

In 2010-2012, total feight carried in Turkey is 114.7 million train-km and 84 people lost their lives due to the level crossing accident. Total number of deaths caused by accidents for level passage between 2010 and 2012 is calculated as 0.7 million train-km in Turkey. For the years between 2010 and 2012, deaths are observed as a result of the clash in the European Union countries.

Found that 53% of active barriers in the European Union in 2010, it was 30% in Turkey. In the same year, 359 people died in the European Union as a result of a level crossing accident. In the same year, 3,148 million train-km of transport was carried out in the European Union. With these values, the number of deaths as a result of level crossing accident per million trainings per km in the European Union for 2010 was calculated as 0.1. In Turkey, in 2010 this value is calculated as 0.6. Thus, it is concluded that by increasing the number of level crossings with an active system, the mortality rate passage collision will decrease. The number of deaths as a result of the passage collision was 25 and 43 in Turkey in 2010 and 2014, respevtively. Although the level crossings with an active system increased by 4%, the death rate has not decreased, on the contrary, it has increased which means that the active level crossings should be built in the right places (AKBAYIR, 2016).

4.10.2. Accident Statistics

Railway operation accident statistics taken from the 2018 Statistical Yearbook of TCDD are given in Table 4-74 .

Table 4-74 Railway Operation Accidents by Years

Operation Accidents	2014	2015	2016	2017	2018
I. ACCIDENT (Number)					
RAILWAY ACCIDENTS	18	40	35	13	16
Train collision	2	4	6	2	4
Derailment	10	28	23	8	6
Falling off the train	3	2	2	2	1
Other accidents	3	6	4	1	5
TRAIN COLLISION TO HUMAN	34	34	34	17	32
LEVEL CROSSING COLLISION	41	27	51	23	23
TOPLAM	**93**	**101**	**120**	**53**	**71**
II. DEATH (Person)					
PASSENGER	1	-	1	3	32
Train collision	-	-	-	-	6
Derailment	-	-	-	3	25
Falling off the train	1	-	1	-	1
PERSONNEL	-	1	-	3	6
Train collision	-	1	-	-	3
Derailment	-	-	-	3	1
Falling off the train	-	-	-	-	2
OTHER PEOPLE	64	49	80	34	38
Train collision to human	21	26	22	11	22
Level Crossing Collision	43	23	58	21	15
Other	-	-	-	2	1
TOTAL	**65**	**50**	**81**	**40**	**76**
III. INJURY (Person)					
PASSENGER	1	2	1	1	25
Train collision	-	-	-	-	-
Derailment	-	-	-	-	25

Falling off the train	1	2	1	1	-
PERSONNEL	-	2	-	1	3
Train collision	-	2	-	-	1
Derailment	-	-	-	-	-
Falling off the train	-	-	-	1	2
OTHER PEOPLE	50	29	71	23	23
Train collision to human	15	6	11	6	9
Level Crossing Collision	35	23	60	17	14
TOTAL	**51**	**33**	**72**	**25**	**51**

Source: (TCDD Taşımacılık A.Ş.)

4.10.3. Communicable Diseases Encountered in the Region

There is malaria risk which exists only in the south-eastern part of Turkey. The transmission of malaria is seasonal, lasting from March to October. *An. sacharovi* is the most important vector in Turkey, followed by *An. superpictus*. *An. maculipennis* and *An. sulbapinus* are regarded as secondary vectors. Only *P. vivax* is being transmitted (WHO Regional Office for Europe, tarih yok).

In 1945, more than 2 million patients were treated for malaria in Turkey, although the first control programme had been launched in 1925. Residual spraying of houses using DDT was introduced in 1956, and a national malaria eradication programme was established in 1957. By 1968, the disease was largely under control. Prior to the introduction of control activities, *P. falciparum* was the predominant species, but only *P. vivax* cases have been reported since the early 1970s (WHO Regional Office for Europe, tarih yok).

From 1971 onwards, the number of malaria cases in the Çukurova and Amikova plains began to increase, reaching epidemic proportions in 1976 and 1977, when 37,320 and 115,512 cases were reported, respectively. Many factors contributed to the deterioration of the situation, including a sharp increase in the density of *Anopheles sacharovi* and the internal migration of workers from areas of Turkey where malaria was, at that time, more prevalent. Insufficient coverage by the surveillance system in 1970–1975 also played a major role (WHO Regional Office for Europe, tarih yok).

Through concentrated efforts and at considerable cost, the incidence of malaria began to decline in this area in 1978, following the reintroduction of large-scale control operations. By 1979, the reported number of malaria cases had dropped to 29,324, and the epidemic was contained (WHO Regional Office for Europe, tarih yok).

The situation deteriorated again, however, with over 34,000 cases in 1980 and 66,673 in 1983. The main reasons for these large figures included insecticide resistance in *An. sacharovi* populations and increased refusals to accept house spraying by inhabitants, due to objections to the unpleasant odour of the insecticides (WHO Regional Office for Europe, tarih yok).

From 1990 to 1996, the malaria situation remained critical. Case numbers peaked at 84,321 in 1994. The situation began to improve only in 1997, when case numbers were cut in half from the previous year (WHO Regional Office for Europe, tarih yok).

Incidence increased particularly significantly in areas where the Southeastern Anatolia Project (GAP) irrigation programme was being implemented. However, outbreaks cannot be attributed solely to the impact of expanding the irrigation network, as they occurred in areas where construction had not yet begun. The rise in the number of cases reported in other regions most likely resulted from importation of malaria by migrant workers (WHO Regional Office for Europe, tarih yok).

After all, Turkey has a high risk of malaria transmission because of increasing internal and external population mobility. Besides irrigated agriculture, resistances to anti-malarial drugs and to insecticides are some other factors that might affect the pattern of malaria prevalence rates. Malaria was a health concern in the past in Turkey and remains a public health issue today (Birgul Piyal, 2013). Therefore, in case of employing migrant workers within the scope of the Project, malaria may occur in the Project region.

Coronavirus Disease (COVID-19) Outbreak Across the World

Coronaviruses (CoV) are a large family of viruses that cause illness ranging from the common cold to more severe diseases. A novel coronavirus (nCoV) is a new strain that has not been previously identified in humans.

On 30 January 2020, the WHO Director-General declared the novel coronavirus (2019-nCoV) outbreak a public health emergency of international concern (WHO Regional Office for Europe, 2020).

Turkey started preparing itself to respond to the COVID-19 pandemic even before it was first identified in the country. A COVID-19 Scientific Advisory Board (CSAB) was established by the Ministry of Health (MoH) on January 10, 2020, two months before the first case was identified in Turkey. This board's duty was to manage the preparedness to COVID-19 and related response in the country. On January 24, 2020, the CSAB published comprehensive guidelines for health professionals about COVID-19 which includes: general info on COVID-19, case definition and case management, and infection control and isolation.

The first COVID-19 case was identified on March, 10, 2020. It was announced via live-stream by the Minister of Health which was open to public and further broadcasted on Turkish news television channels. A public website (https://covid19bilgi.saglik.gov.tr/tr/) was established under the domain of the MoH Public Health General Directorate and it publishes (1) up-to-date number of COVID-19 cases, (2) general info on COVID-19, (3) CSAB recommendations to ministries, municipalities and presidency of religious affairs, (4) Q&As for public and health professionals and (5) all related informative materials including guidelines, presentations, algorithms, forms, banners/posters, materials for billboards and CLPs, brochures and leaflets for both public and health professionals. The website is frequently updated. Public service ads on COVID-19 have been broadcasted. In addition, the MoH has been publishing "Turkey Daily COVID-19 Dashboard" which includes daily and total numbers of tests performed, new cases, deaths, patients recovered, patients in intensive care units, and intubated patients on their Twitter, Facebook and Instagram accounts and website. CSAB has been holding regular meetings approximately twice/thrice a week to follow and discuss on updates related to COVID-19 and make recommendations. After important CHAB meeting, the Minister announces summaries of the meeting and some statistics on daily and total COVID-19 cases via live-stream which is open to public and answering the questions of press after his speech (Pavel Ursu, 2020).

5. ENVIRONMENTAL AND SOCIAL RISKS AND IMPMACTS & MITIGATION MEASURES

5.1. Environmental and Social Impact Assessment Methodology

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.

5.1.1. ESIA Process and Approach to the Assessment

As of October 1, 2018, all investment projects financed by the World Bank are subject to the 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’s rating has been determined terms of environmental and social risk as “Substantial”. 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),
- Construction Impacts Management Plan,
- Community Health and Safety Management Plan,
- Community Relations Management Plan,
- Employment and Training Plan,
- Aggregate Management Plan,
- Traffic (Transportation) Management Plan,
- Cultural Heritage Management Plan
- Pollution Prevention Plan,
- Waste Management Plan,
- Emergency Preparedness and Response Plan,
- Biodiversity Management Plan,
- Occupational Health and Safety Management Plan,
- Management of Change Process Form,
- Stakeholder Engagement Plan (SEP), and
- 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, 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 impact 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***
Geographşcal 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		Impacts are considered to be very important and are likely to be material in decision-making, which would be associated with sites or features of international, national or regional importance as well as local importance if the site or feature is subject to a major change. Mitigation measures are imperative to reduce the significance to lower levels before proceeding with the Project.			
Moderate		Impacts are not likely to be key decision-making factors. The cumulative impacts of such factors may influence decision-making, if they lead to an increase in the overall adverse impact on a particular receptor. If possible, impact significance are to be reduced to lower levels by taking mitigation measures; otherwise acceptance of associated risks is required for proceeding with the Project.			

Minor	Impacts may be raised as local factors, which are unlikely to be critical in the decision making process, but important in enhancing the subsequent design of the Project. Assurance of compliance with standards and safety criteria is sufficient to proceed.
Negligible	No impact or impacts are beneath the level of perception so that they are acceptable with normal operating procedures.

5.1.3. Area of Influence (AoI) and ESIA Study Area

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

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

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 will be expanded as needed to cover impacts 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 (expropriation) corridor will be considered.

5.1.4. Structure of the ESIA Report

The general outlines of the ESIA Report covering the important environmental and social issues related to the 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 9.	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

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

The Project will have a construction area of approximately 127.4 hectares. According to the data of the Ministry of Agriculture and Forestry, there are shrubs, pasture areas, fallow dry agricultural areas, irrigated agricultural areas, coastal dunes, insufficient irrigated agricultural areas and abandoned lands on the construction area. Accordingly, the activities to be carried out under the Project will be subject to the provisions of the national laws and regulations listed below:

- Agricultural Reform Law on Land Rearrangement in 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

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

- Land Asset Data of the inistry 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)
    - Disaster and Emergency Management Presidency (Earthquake Research Department Database)
    - Disaster and Emergency Management Presidency (Natural Disasters Database).

The significance of the impacts was assessed based on the sensitivity of the receptors and the overall magnitude of the impact. 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 Chapter 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
- Construction of Engineering Structures
- Traffic signs, marking of track and guardrail
- Service areas, parking areas
- Construction of stations and provision of infrastructure
- Electrification and signaling works
- After the expropriation works are completed, the construction of the railway 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.

After the expropriation works are completed, the construction of the railway route components will begin with the stripping of the topsoil, 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.

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 acquisition 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

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, GDII will ensure that necessary corrective measures are taken at its own cost in line with the provisions of related authorities.

Soils

The major Project impacts and/or risks on soils during land preparation and construction phase and that are to be managed in the scope of the Project are listed below:

- Loss of top soil (in terms of quantity and/or vegetative quality);
- Soil disturbance and erosion, due to earthworks: excavation and filling operations;
- Soil contamination risk from accidents and improper management of hazardous materials and waste.

Topsoil Stripping

Topsoil along the Project route will be stripped for land preparation and construction of the Project components, as well as the construction facilities at a depth ranging between 5 and 50 cm, depending on soil properties at the related site. As stated in the Geological - Geotechnical Survey Report prepared within the scope of the project, the topsoil depth to be stripped from the components along the railway connection lines are presented in the table below.

Table 5-4 Depth of Topsoil to be Stripped along the Railway Connection Lines

Connection Line (Km= 0+000 - 16+300)	
Section	**Stripping Depth (cm)**
0+000 - 4+400	50
4+400 - 11+130	-
11+130 - 13+000	-

13+000 - 16+300	50
OIZ-Port Line (Km= 0+000 – 14+340.682)	
Section	**Stripping Depth (cm)**
0+000 - 9+090	-
9+090 - 13+160	-
13+160 - 13+260	50
13+260 - 14+340.682	-
OIZ -Station (1) Line (Km= 0+000 – 2+314.692)	
Section	**Stripping Depth (cm)**
0+000 - 2+314.692	-
Station (1)-Port Line (Km= 0+000 – 2+252.147)	
Section	**Stripping Depth (cm)**
0+000 - 2+252.147	-

Earthworks

According to the Feasibility Study Report, the estimated earthwork volume projected along the railway routes is 1,515,190.75 m^3.

Soil Disturbance and Erosion

As mentioned in the World Bank Group General Environmental, Health and Safety (EHS) Guidelines for Construction and Decommissioning, soil erosion may result from soils exposure to rain and wind during first field works of soil surfaces (root removal, fragmentation, off-site transfer etc.) and earthworks (topsoil stripping, excavation and fill works, soil leveling, soil compaction, soil stabilization, etc.). Soil erosion can trigger the transport of soil through surface drainage networks, which can affect the quality of surface water resources. Soil erosion and water resources management approaches recommended in the World Bank Group's relevant Environmental, Health and Safety (EHS) Guidelines for land preparation and construction periods include:

- Under extreme weather conditions, land preparation and construction works will be altered wherever feasible to avoid risk of erosion
- Shaping and minimizing the length and steepness of slopes
- Mulching to stabilize the exposed areas
- All of the disturbed sites will be re-vegetated to the most possible extent in a timely manner following the completion of stripping and excavation works.
- Erosion control measures will be implemented following the completion of excavation works, also at the culvert outlets, and slopes will be improved
- Lining steep channels and slopes (using jute mat)
- Using settling ponds, silt fences and water treatment to prevent or reduce sediment transport outside the site and suspend land preparation and construction activities as much as possible in heavy rain and strong wind conditions;

- Depending on the potential for adverse impacts, installing free-opening structures (eg one-eyed culverts) for water crossings;
- Reducing the duration and timing of river crossing activities and avoiding these activities during critical periods of the biological cycles of flora and fauna (eg migration, spawning etc.);
- Using isolation techniques (sets or derivation) during construction activities to limit exposure of abandoned sediments to flowing water during river crossing activities;
- Take impactive short-term measures for slope stabilization and sediment control until long-term measures are implemented for the operation phase;
- Installing adequate drainage systems to minimize and control leaks.

Soil Contamination

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. 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 impactive management of soil contamination. Some of the fundamental measures are listed below, to ensure that with avoidance and response measures in place, the amount of release can be taken under control before reaching substantial amounts and the significance of the spill or leakage can be kept at minimum levels, even if not considered negligible:

- Discharge of materials into soil that would cause contamination will be prohibited.
- Accidental spills and leakages will be managed through implementation of the Emergency Preparedness and Response Plan.
- Solid wastes, hazardous wastes and wastewater to be generated as a result of land preparation and construction activities at Project sites will be further managed through implementation of the related management plans (Waste Management Plan, Pollution Prevention Plan etc.).

Geology

Geological and Geotechnical Risks

There are areas for high cut and fills on the project routes. These cuts and fills were evaluated as geological - geotechnically critical sections and examined in detail. Stability analyzes were carried out for fills and slopes using the results of surface geology studies, drilling studies and laboratory experiments.

SPT - N values were determined between 2 - 6 and 8 - 5 in some drillings opened in OIZ - Port Line and the ground consists of very soft - middle floor, sandy clay silty - sandy silty clays and loose silty sands. Poor ground cannot bear the fill load. Therefore, approximately OIZ - Port Line Km: 9+700 - 10+560 section is defined as a weak ground. There are basalts under the weak ground layer. Depending on the low slope and high groundwater level, in the areas with weak ground, water will form on the surface in rainy seasons.

Since the Kızıldere formation consisting of mudstone, claystone, siltstone, sandstone, marl units, which will come out of the cuts, and the cut materials made up of clay floors on the upper parts of this formation, and the materials that will come out of the alluvial cuts in a small amount do not meet the fill material standards. Only the materials that will come out

of the basalt cuts comply with the fill material standards and are suitable for use as fill material.

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, Adana and Hatay Section. However, caution should be taken against landslides that may develop locally, especially in the cut process performed in clastic rocks of Kızıldere formation during the construction phase.

Seismicity Related Risks

As stated in section 4.1.4.3, the movements of Arab and African plates towards the Anatolian plate in the region create neotectonic deformations on these fault belts and the region acquires an active seismicity character.

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 4-8 . 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 0.302 g.

Geosite Loss and Damage

The closest geosite is the "Yali Stones (Coastal Stone) is located at the streams between Muttalip Farm and Yumurtalik Port" and it is located 10.8 km southwest to the Project site 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.

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 and Mitigation Measures

Assessment of impacts on land use, soils and geology was performed according to the methodology presented in Chapter 5. 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 chapters and typical descriptor of defined in Chapter 5. 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)
Topsoil	Lands having land use capability of Class I-II according to database of the Ministry of Agriculture and Forestry (agricultural lands suitable for agricultural soil cultivation) where topsoil is located	Lands having land use capability of Class III-IV according to database of the Ministry of Agriculture and Forestry (agricultural lands suitable for agricultural soil cultivation) where topsoil is located	Lands having land use capability of Class V-VII according to database of the Ministry of Agriculture and Forestry (agricultural lands not suitable for soil cultivation) where topsoil is located	Land with no topsoil
Soil (Erosion)	Soils of Degree 4: Very severe erosion risk	Soils of Degree 3: Severe erosion risk	Soils of Degree 2: Moderate erosion risk	Soils of Degree 1: None or very low level of erosion risk
Soil (Pollution)	Nationally and Internationally protected areas, areas with ecologically critical habitat status	Lands having national importance, Lands having Class I-II land use capability, residential areas	Lands having Class III-IV land use capability.	Lands having Class V-VII land use capability, industrial and mining areas.

Mitigation Measures to Address Geological-Geotechnical Impacts

There are high cut/fill areas on the project route. Cut and fill slopes have been defined through evaluation of the field observations along with analysis of the drilling data and laboratory test results and finalized based on seismic effect and stability analysis. According to the results of the slope analysis performed, the cut and fill slopes will be constructed along the route as follows.

Along the railway routes, all cut slopes will be constructed with 2C/1F slope. Basalt cuts are also considered appropriate to be constructed with 2C/1F slope, considering that the upper levels are in the form of clinker in some parts and meet part of the demand for fill material along all the routes of the railways.

The fills along the route will be constructed with 3C/2F slope with the materials from the basalt cuts and materials from the material borrow pits consisting of basalts.

In cut and fills with heights more than 10 meters, 5-meter wide benches will be constructed at every 8 or 10 meters according to the maximum height. The slope ratios defined for the cut and fills, are based upon the stability analysis and no stability problems are anticipated on the railway routes. Apart from this, during the cut excavations in the construction phase, if weak zones are determined by the expert engineer, additional necessary measures will be taken at these cuts.

No area with any landslide potential was encountered during the surveys conducted along the route.

Between the kilometric points of 9 + 700 and 10 + 560 on the OIZ - Port Line, the ground was identified to be weak according to the SPT values obtained. The route will pass over the embankment to be constructed in this part. In order to carry the load of the enbankment, the weak ground in this part of the route consisting of sandy clay silts (alluvium) will be gradually digged out by 2 to 4 meters, 20 meters to the left and right from the fill slopes and replaced with the rockfill materials (basalt) brought from the material borrow pits for ground improvement.

During the ground improvement works at this section of the route, after the site surveys by the expert engineer, the weak ground layer to be removed will be examined and the ground improvement depth will be redefined again, if necessary, with the approval of the supervising engineer.

In addition, since the groundwater level in this section is very close to the ground surface and the slope of the land is not high, drainage measures will be taken in order to prevent water accumulation on the surface in rainy seasons, to decrease the groundwater level and to remove it from the embankment body.

Mitigation Measures to Address Seismic Impact – Earthquake Impact

The Project route is shown on the updated "Earthquake Hazard Map of Turkey" published in the Official Gazette dated 18/03/2018 and numbered 30364 (bis) and entered into force on 01/01/2019, as provided in Figure 4-8. The railway routes planned in the scope of the Project and their immediate surroundings were examined on the interactive earthquake hazard map published by the Ministry of Interior, Disaster and Emergency Management Presidency (AFAD). According to this map, the peak ground acceleration for a 475-year return period (PGA 475) was identified as 0.302 g, which indicates that earthquakes pose a significant risk for the region.

All engineering and ground structures (cut and fills) as part of the project will be designed and constructed considering the earthquake-resistant design parameters and criteria.

Mitigation Measures to Address Landslide Risks

As stated in Chapter 4.1.4.4, there is no active or passive landslide risks on the planned railway routes and their immediate surroundings pursuant to the site surveys conducted within the scope of the geological-geotechnical survey report for the Project route as well as Adana and Hatay Sections of Turkey Landslide Inventory Map of the General Directorate of Mineral Research and Exploration (MTA). However, caution should be taken against the landslides that may develop locally, especially in the cut process performed in clastic rocks of Kızıldere formation during the construction phase through observing excavations and via sprayed concrete, wire mesh, rock bolt, etc.

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	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. GDII 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
		Local communities		Medium	Irreversible	Long-term	One-off	Medium	Medium	Moderate		Minor
Impacts on pasture land	Land preparation and construction	Arable lands	Restricted	High	Irreversible	Long-term	One-off	High	High	Major	In order to mitigate fragmentation impacts, agricultural/pasture underpasses and culverts are either available or will be constructed throughout the entire Project route. 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. Trainings and information sharing with community members who are using pasture land during land preparation before construction. GDII 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.	Minor
		Local communities		Medium	Irreversible	Long-term	One-off	Medium	Medium	Moderate		Minor
Topsoil stripping	Land preparation and construction	Arable lands	Restricted	High	Irreversible	Long-term	One-off	High	High	Major	Strip fertile topsoil along the Project area including the railway route, quarries/material borrow sites, storage sites at a sufficient depth suitable for local soil conditions prior to construction activities. Store topsoil separately from subsoil at designated topsoil storage areas along the route and other work sites at suitable conditions so as to preserve its vegetative properties. Do not carry out stripping when soil is wet, so that soil compaction is avoided. Provide drainage at topsoil storage areas by open channels. If storage of topsoil will last longer than three months, plant upper part of fertile soil temporarily so that the organic content is conserved. Select proper species and seed mixture ratios. Apply organic or inorganic materials on the topsoil to improve quality and avoid erosion, desiccation or invasion of wild species. Reuse topsoil stored at suitable conditions for the rehabilitation of temporary construction sitesafter the completion of construction activities, for the finalization of side slopes and in landscape activities. Loosen topsoil to a depth of 15 cm before reinstatement (Increase depth of loosening up to 40-50 cm for compact heavy clay soils) Keep depth of topsoil for areas to be planted suitable for side slopes, shrub plantation areas, tree roots etc. Conduct grading operation in line with the natural slope and drainage conditions following thereinstatement of topsoil.	Moderate
		Pasture lands	Restricted	High	Irreversible	Long-term	One-off	Low	Low	Major		Minor
		Lands with no topsoil	Restricted	Medium	Irreversible	Long-term	One-off	Negligible	Negligible	Negligible		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				
Soil Erosion	Land preparation and construction	Lands with Erosion Degree 4	Local	Medium	Irreversible or long-term reversible	Long-term	Intermittent	High	High	Major	Before the onset of land preparation and construction works, erosion control measures like drainage channels, settling structures, etc. will be implemented. In order to eliminate the risk of erosion in periods of excessive rainfall, the waters from the project surrondings 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.	Moderate
		Lands with Erosion Degree 3	Local	Medium	Irreversible or long-term reversible	Long-term	Intermittent	Medium	Medium	Moderate		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 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 (Waste Management Plan, and Pollution Prevention Plan).	Negligible
General Geotechnical Risks	Land preparation and construction, Operation	Project personnel, Railway users	Restricted	High	Short-term reversible	Short-Term	One-off	Medium	High	Major	All slope slopes will be created with 2Y/1D slope along the railway routes. 3Y/2D slope will be created with the fills to be made along the routes, the materials to be removed from the basalt pits and the materials to be taken from the quarry consisting of basalts. In the cuts and fills with a height of H>10 meters, a 5 meter wide coat will be created in 8 or 10 meters according to the maximum height. Ground improvement will be made with rock fill material (basalt) that will be removed by digging 4 m and brought to the borrow quarry at OIZ-Port Line Km: 9 + 700-10 + 560. During the ground improvement at this intersection of the route, after the on-site determinations by the expert engineer, the weak ground layer to be removed will be checked and the ground improvement depth will be determined again, if necessary, with the approval of the control engineer. Also, in this section, the groundwater level is very close to the surface, and since the slope of the land is not too high, drainage measures will be taken in order to prevent water accumulation on the surface in rainy seasons, to decrease the groundwater level and to remove it from the filling body. Units belonging to the Kızıldere formation consisting of mudstone, claystone, siltstone, sandstone, marl units that will come out of the cuts are not in compliance with the fill material standards. Only the materials that will come out of the basalt cuts comply with the fill material standards and will be used as filling material.	Minor
Seismicity Related Risks	Land preparation and construction, Operation	Project personnel, Railway users	Wide	High	Irreversible	Long-term	Intermittent	Medium	High	Major	All engineering structure and superstructures (fill, cut) in the project closure will be designed and constructed taking into account the earthquake resistant design parameters and criteria. In the structures to be constructed within the scope of the project, Disaster and Enforcement which was published in the Official Gazette dated 18.03.2018 and numbered 30364 published in the Official Gazette dated 18.03.2018 and published in the Official Gazette dated 18.03.2018 and published in the Official Gazette of the Ministry of Public Works and Settlement dated 14/07/2007. Emergency Management Presidency of Turkey "Earthquake Building Regulations" provisions will be strictly followed. Developing additional durability and structural measures in fill and cuts, by performing periodic inspection and maintenance activities along the routes, especially when necessary (especially after natural disasters-earthquakes and post-flood art structures, cracks, ruptures, sliding, sitting, deformation, etc. problems that may occur in fillings and cuts); implementation will be provided.	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				
Landslide Risk	Land preparation and construction, Operation	Project personnel, Railway users	Restricted	Low	Short-term reversible	Short-Term	One-off	Low	Negligible	Negligible	During the construction phase in the cracked rocks of Kızıldere formations, special attention will be given and precautions should be taken against the landslides that may develop locally, by observing excavations, sprayed concrete, wireframe, rock bolt, etc.	Negligible
Loss of/ Damage to Geosites	Land preparation and construction, Operation	Geosites	Wide	Negligible	-	-	-		Negligible	Negligible	-	Negligible

5.3. Noise

In this chapter, the assessment of the impacts of noise levels due to the construction and operation activities to be carried out within the scope of the Project is presented. In order to assess the impacts of noise levels arising from the project activities, background noise measurements were carried out at a total of 5 points (noise sensitive receptros) selected along the railway routes (Chapter 4.2), and noise modeling studies were carried out for the construction and operation phases of the Project.

Potential noise sources during the construction phase of the project can be listed as construction activities to be carried out in railway routes 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 is the main source of noise.

5.3.1. Methodology and Project Standards

5.3.1.1. Methodology

Noise modeling studies were carried out for both construction and operation periods. Noise modeling results were evaluated in Chapter 5.3.2 according to the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for Environmental Noise Management and Regulation on Management of Environmental Noise (RAMEN) and preventive/mitigation measures are presented in Chapter 5.3.3.

SoundPLAN 7.3 software was used in the noise modeling works carried out for both the construction and operational periods of the project. Information about the data used for noise modeling studies is given in the table below.

Table 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

Noise modeling studies were carried out in two separate parts of the Project area for construction and operation periods. Information on the two segments identified is given below:

- First section;
  - Connection Line: Km = 13+500 - 16+300,
- Second section;
  - Connection Line: Km = 0+000 - 13+500,
  - OIZ-Port Line,
  - OIZ-Station Line,
  - Station-Port Line.

During the land preparation and construction activities of the project, noise is expected from the equipment and machinery to be used within the scope of these activities. During the operation phase, the noise that will result from the movement of freight trains is the main source of noise.

Assumptions and Limitations

The following assumptions were made during modeling:

- During the construction phase, it was assumed that all the machinery and equipment planned to be used will operate simultaneously.
- Railway route is defined as a line noise source.
- When calculating the noise levels in the residential area affected by the project, the closest household in the residential area was taken into consideration.
- It was assumed that in the operation phase, railway 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 on Environmental Noise Management 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 contruction sites determined in the RAMEN published in the Official Gazette No. 27601 dated 04.06.2010, are gven 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 Legislation

World Bank Group General EHS Guidelines on Environmental Noise Management 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 the World Bank Group General EHS guidelines.

Table 5-9 Noise Limit Values Determined by the World Bank Group General EHS Guidelines on Environmental Noise Management

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

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 Machinery & Equipment to be Used During Land Preparation and Construction Phase

MACHINE AND EQUIPMENT	NUMBER OF MACHINE AND EQUIPMENT	
	1. Section	2. Section
Water Truck	1	1
Concrete Mixer	1	5
Concrete Pump	1	5
Truck	5	9
Pickup Truck	2	8
Backhoe Loader	2	7
Water Tanker	1	2
Trailer	2	7
Fuel Tanker	1	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.

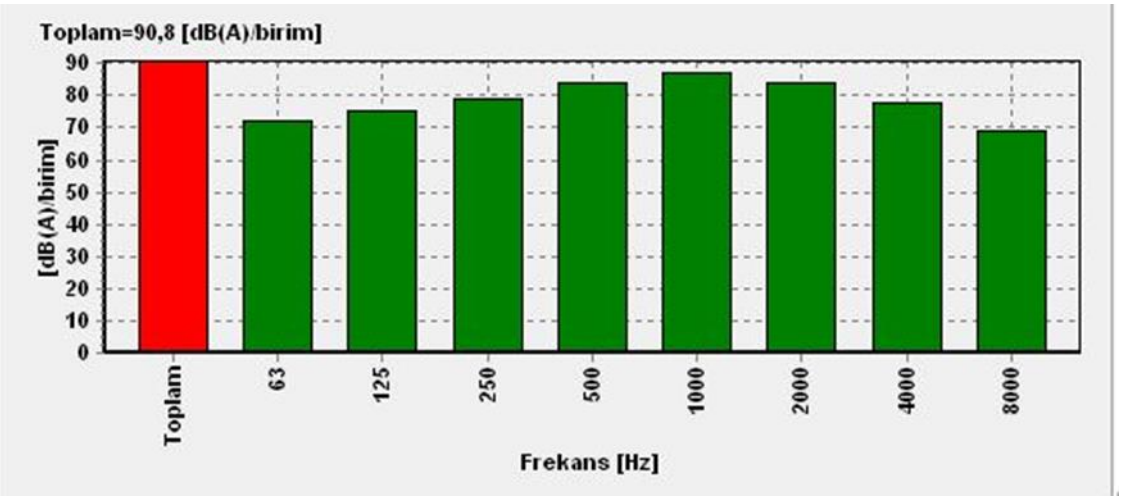

Figure 5-2 Water Truck Noise Level Frequency Analysis

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.

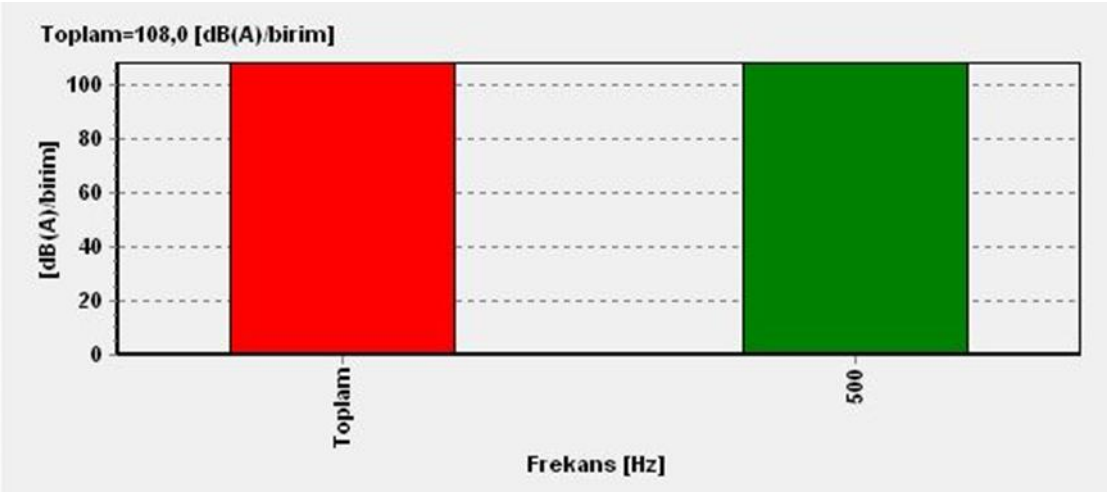

Figure 5-3 Concrete Mixer Noise Level Frequency Analysis

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.

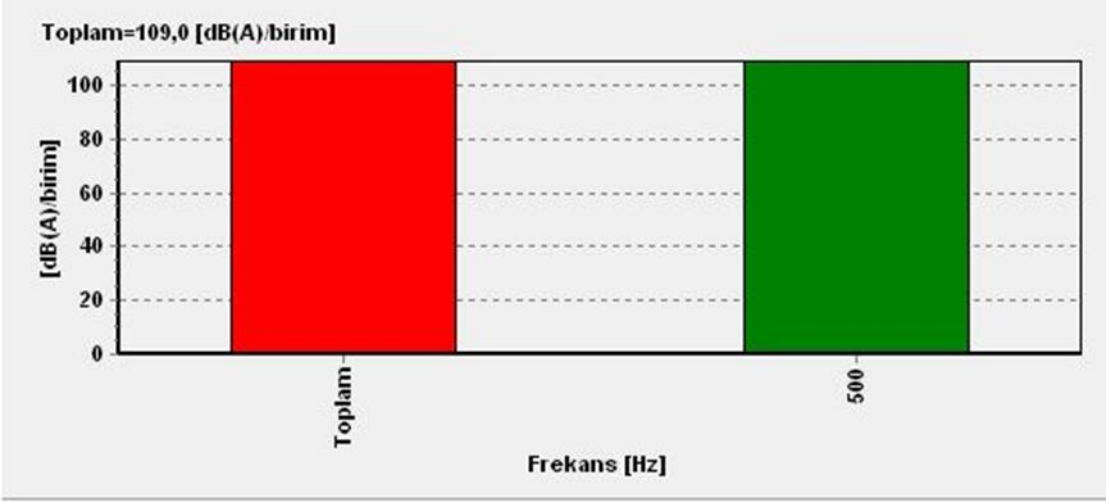

Figure 5-4 Concrete pump Noise Level Frequency Analysis

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.

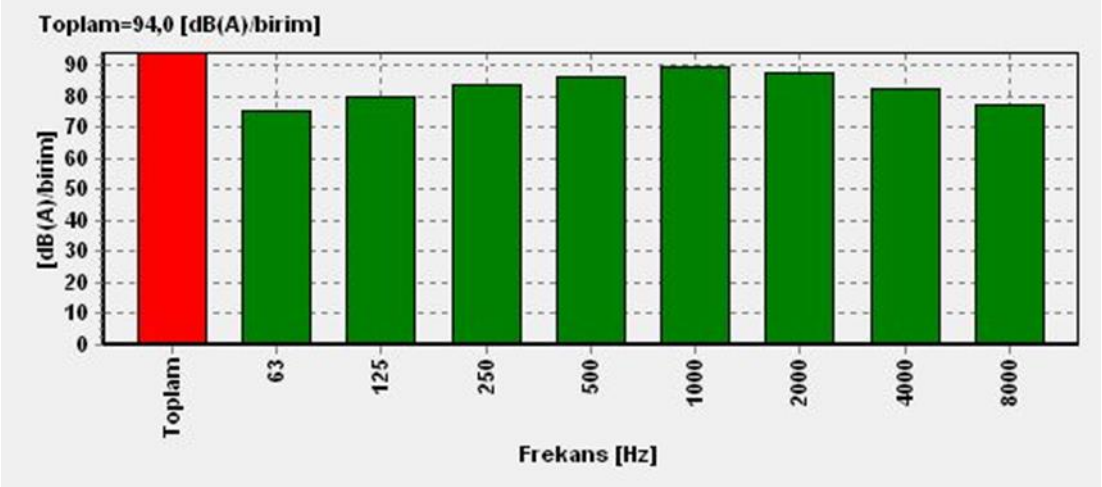

Figure 5-5 Truck Noise Level Frequency Analysis

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.

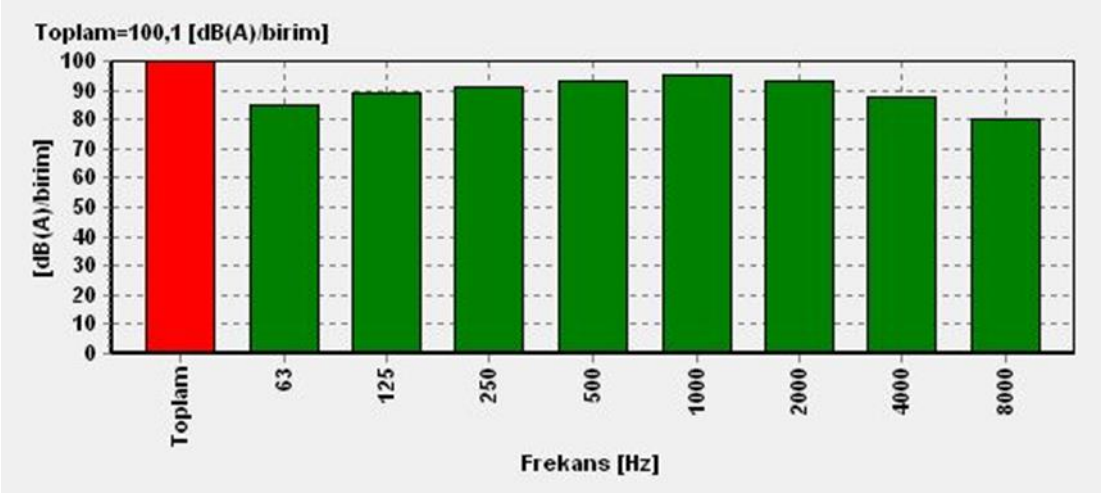

Figure 5-6 Pickup Truck Noise Level Frequency Analysis

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.

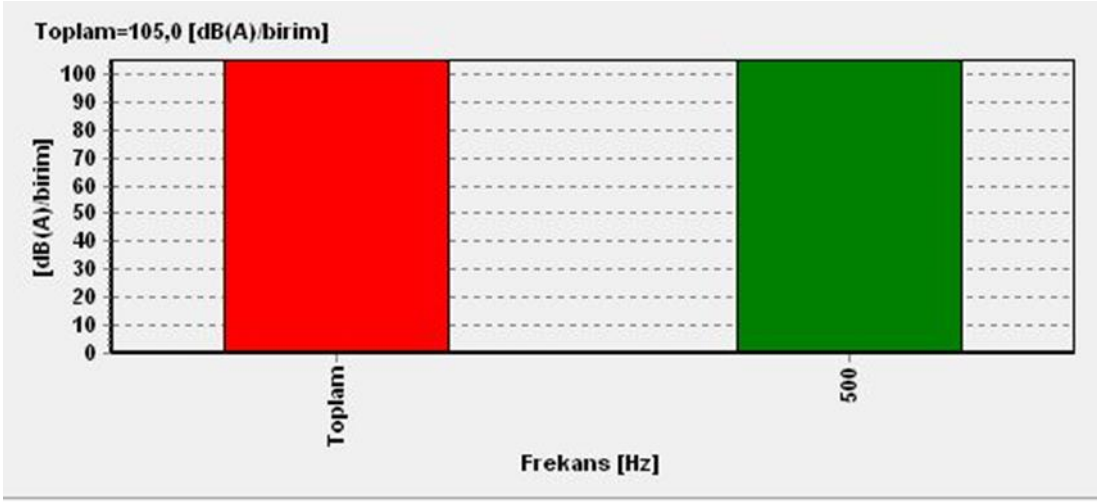

Figure 5-7 Backhoe Loader Noise Level Frequency Analysis

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.

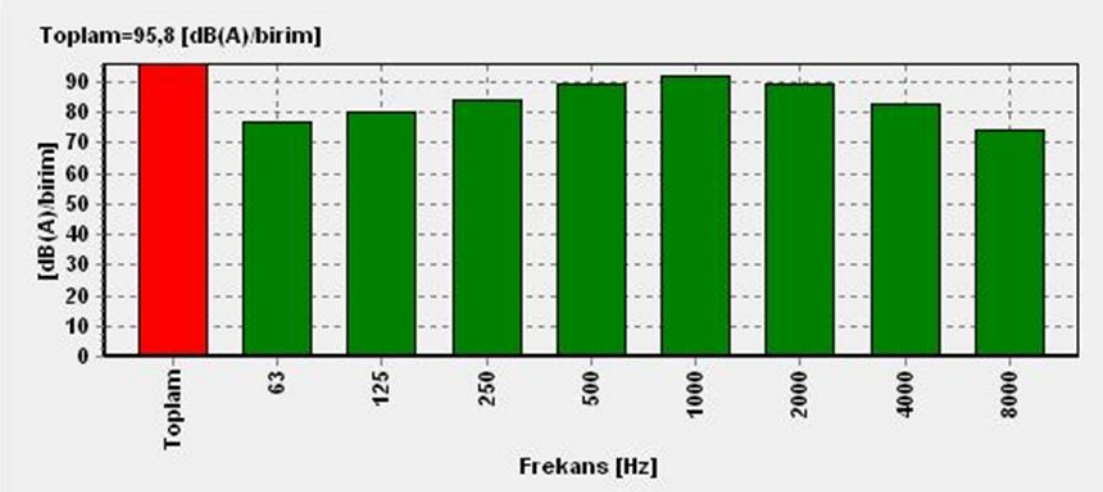

Figure 5-8 Water Tanker-Fuel Tanker Noise Level Frequency Analysis

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.

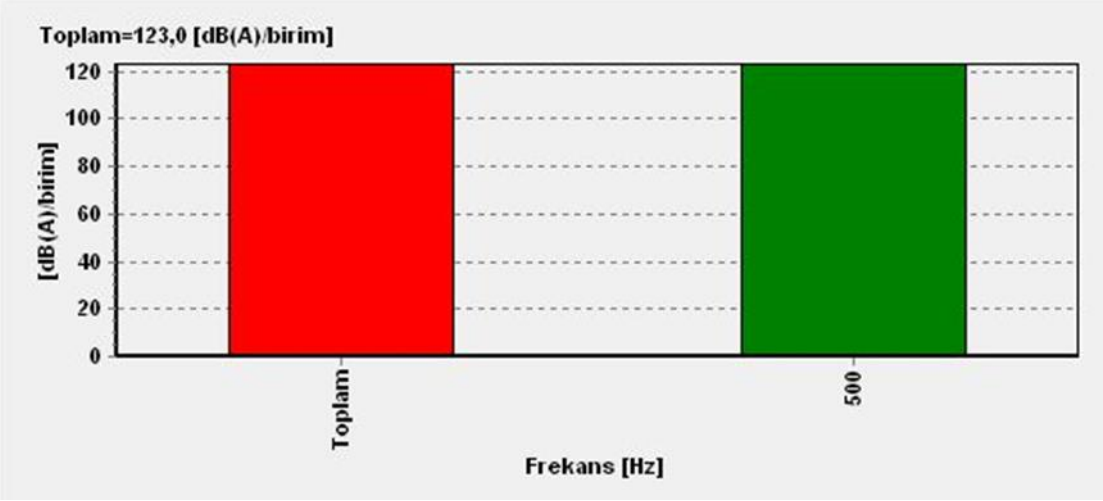

Figure 5-9 Trailer Noise Level Frequency Analysis

Calculation of Total Noise Level that May Occur 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 ground model (DGM) was created. Then, the noise source was drawn by introducing the data in the software in accordance with the model standards. As a result oh 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 connection operation during the operation period were calculated.

The noise levels are modeled separately for two sections of the Project that remain in the 36 N and 37 N regions in the UTM WGS 84 projection. The noise maps created as a result of modeling studies are presented below. In addition, the noise values calculated for the nearest settlements and their coordinates are presented in Table 5-11 .

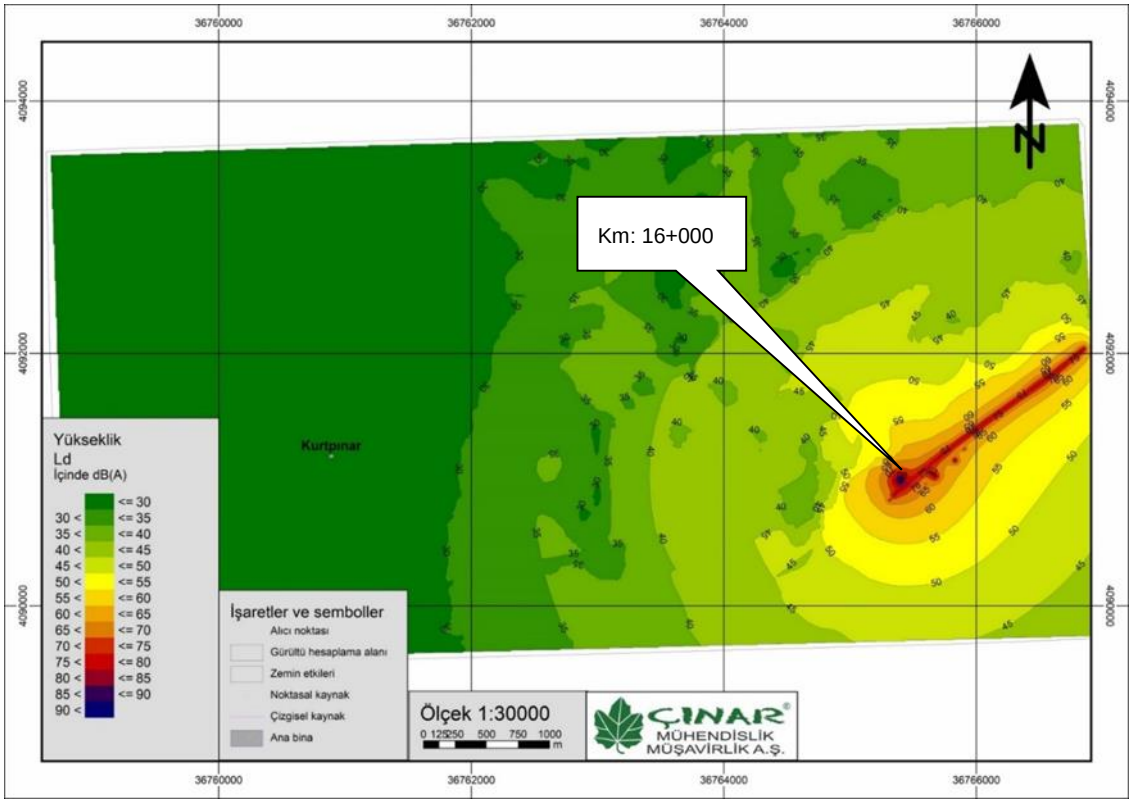

Figure 5-10 1. Section Grid Noise Map (Land Preparation and Construction Phase)

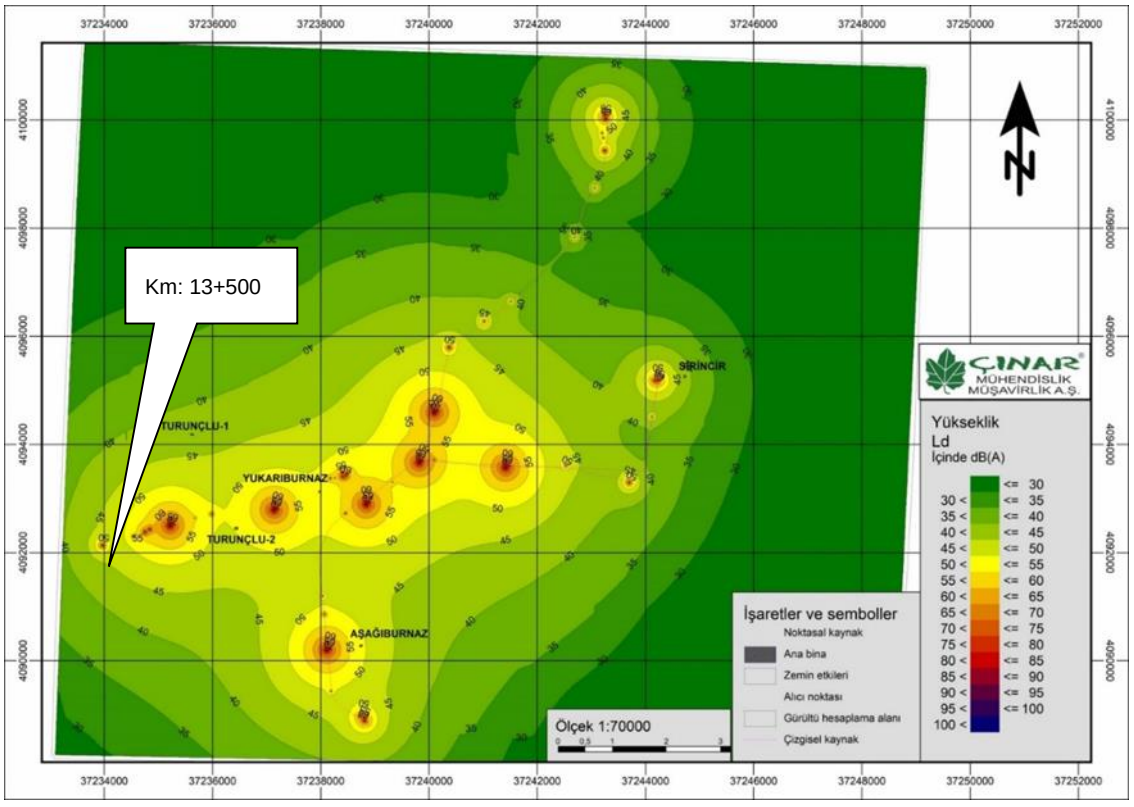

Figure 5-11 2. Section Grid Noise Map (Land Preparation and Construction Phase)

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 impact 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	Zone	X (m)	Y (m)	Z (m)	Ld dB(A)
Aşağıburnaz	37	238848.00	4090274.0	5.91	51.7
Sirincir	37	244909.00	4095250.8	53.84	42.4
Turunçlu-1	36	760906.00	4094161.6	54.27	42.9
Turunçlu-2	37	236847.00	4092477.5	13.28	50.4
Yukarıburnaz	37	238054.00	4093143.8	11.28	46.3

5.3.2.2. Operation Phase

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

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.

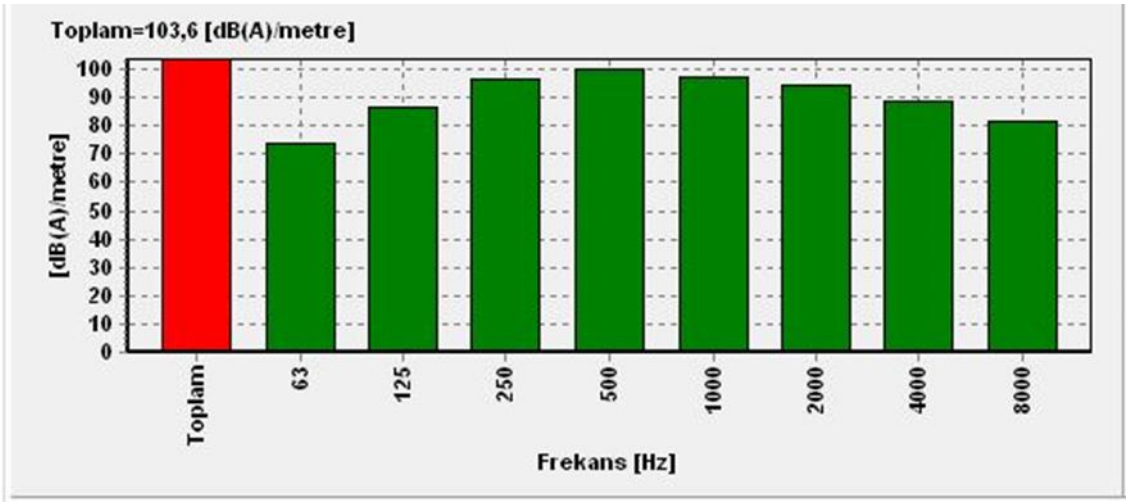

Figure 5-12 Freight Train Noise Level Frequency Analysis

Calculation of Total Noise Level that May Occur during Operation

The noise levels that will occur at the receptors were determined for daytime (07: 00-22: 00) and nighttime (22: 00-07: 00) for two separate sections of the Project remaining in the 36 N and 37 N regions of the UTM WGS 84 projection. The noise maps created as a result of modeling studies are presented below. In addition, the noise values calculated for the nearest settlements and their coordinates are presented in Table 5-12.

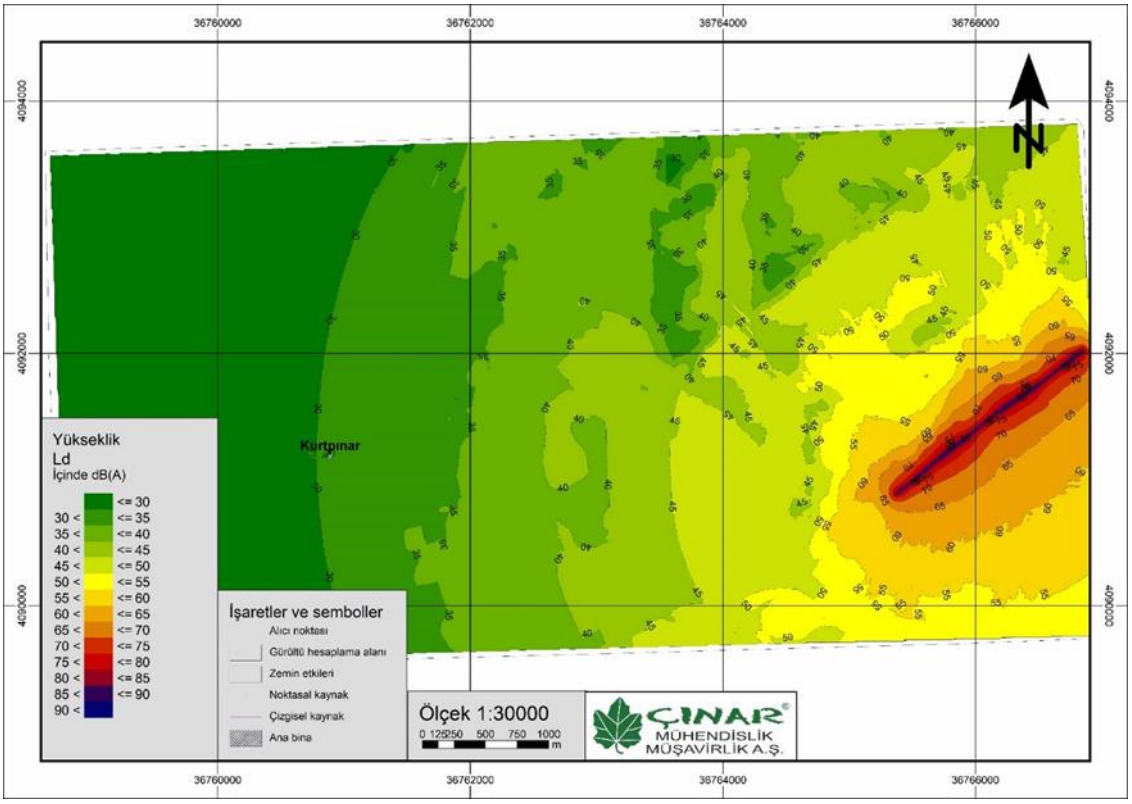

Figure 5-13 1. Section Grid Noise Map (Operation Phase-Day)

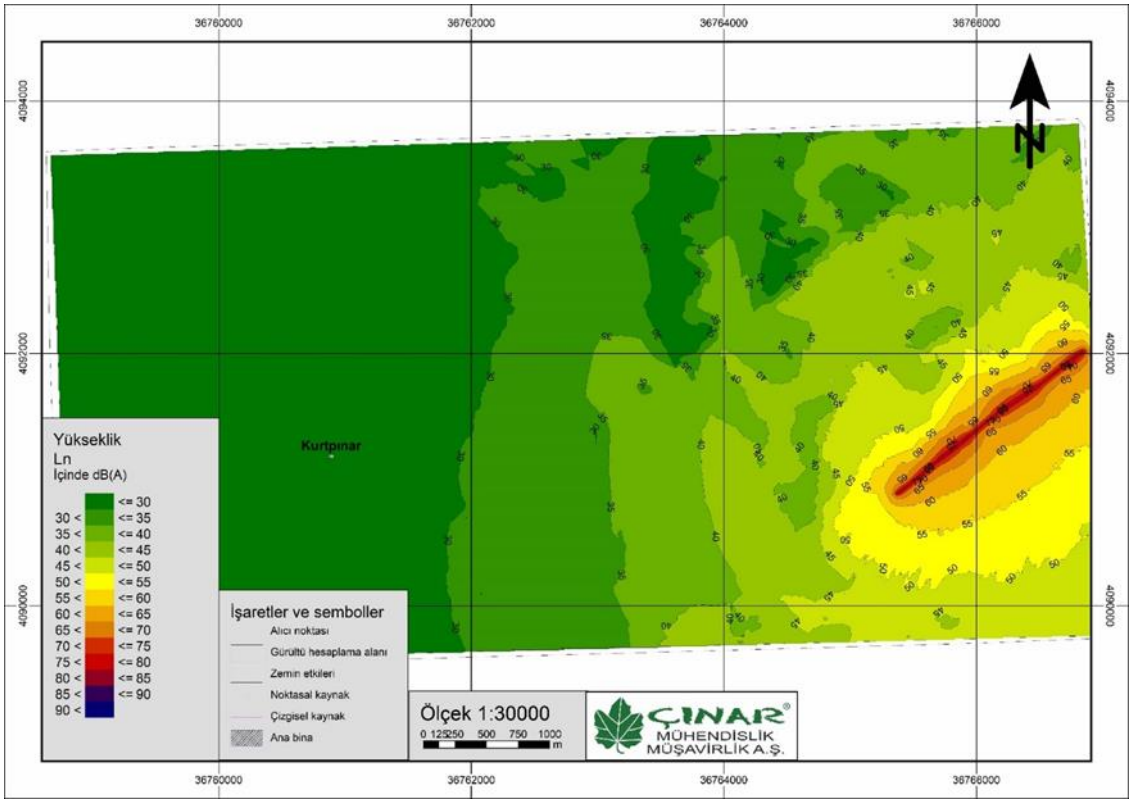

Figure 5-14 1. Section Grid Noise Map (Operation Phase-Night)

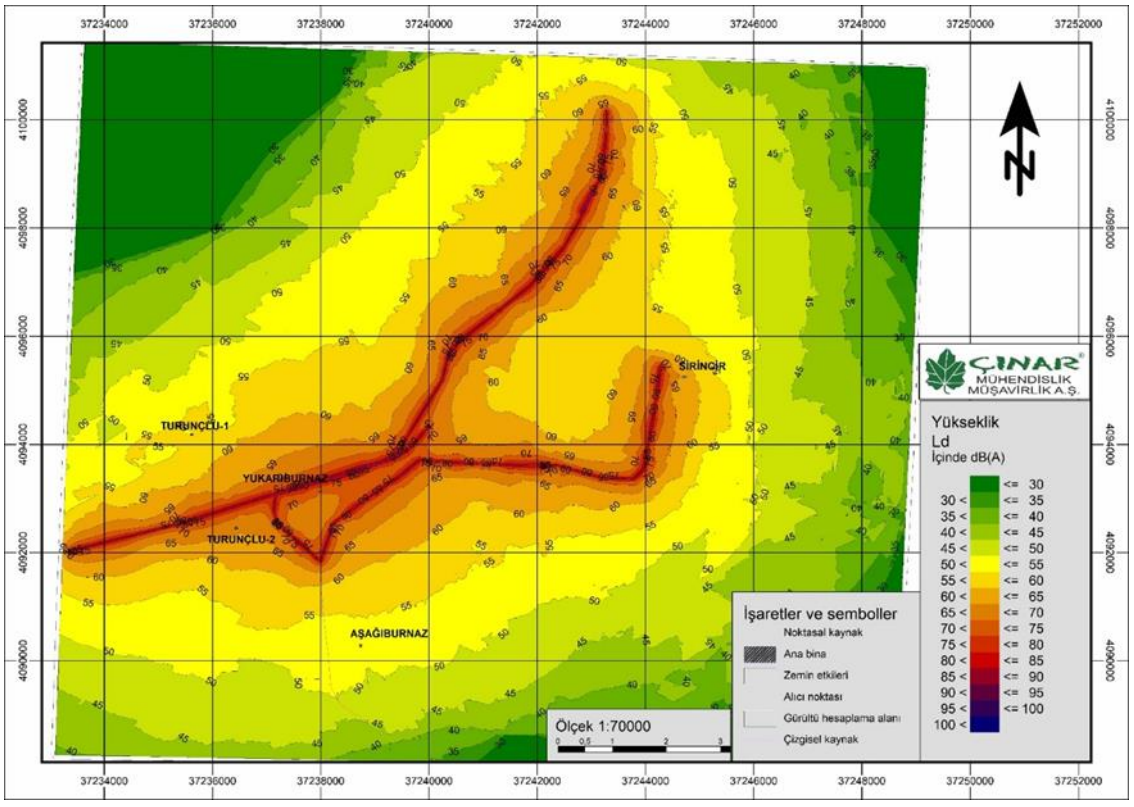

Figure 5-15 2. Section Grid Noise Map (Operation Phase-Day)

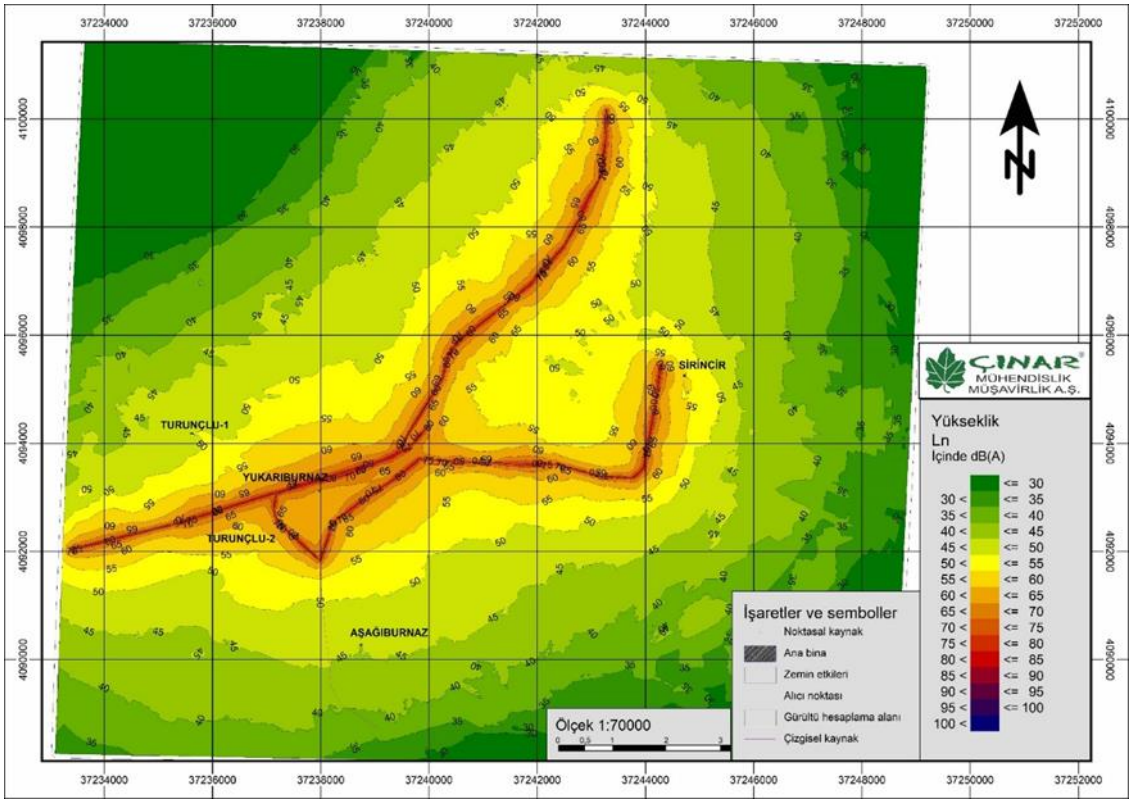

Figure 5-16 2. Section Grid Noise Map (Operation Phase-Night)

As can be seen from Table 5-12, the estimated noise levels at Turunçlu-2 (G-2), Yukarıburnaz (G-3), Sirincir (G-5) ve Turunçlu-1 exceeds the both daytime and nighttime noise limit value. From these points, daytime background noise levels at Yukariburnaz (G-3) and Sirincir (G-5) are above the daytime limit value of 55 dBA. The cumulative noise values calculated for the operation phase at these receptors should not exceed background noise values by more than 3 dBA. However, the cumulative noise values calculated for daytime at Yukarıburnaz (G-3) and Sirincir (G-5) exceed the background noise values by more than 3 dBA.

The background noise levels measured at Turunçlu-2 (G-2), Yukarıburnaz (G-3) and Sirincir (G-5) is over 45 dBA. Moreover, the estimated noise levels caused by the operation of the trains on the railway lines at these receptors are above the measured nighttime background noise levels.

In the noise modeling studies, it was assumed that all freight trains would move on the railway lines at the same time as the most conservative scenario. However, during the operation phase, it will not be possible for all trains to move on the railway lines at the same time. Therefore, it is expected that noise levels will be lower than the calculated levels with modeling studies during the operational activities of the Project.

Table 5-12 Noise Levels Calculated at the Receptors during the Operation Phase

Receptor	Coordinates	Background Noise Level - Daytime (dBA)	Lday (dBA)	World Bank Standard - Daytime	Background Noise Level - Nighttime (dBA)	Lnight (dBA)	World Bank Standard - Nighttime
G-2 (Turunçlu-2)	Z:37 236847.00; 4092477.5	49.80	66.0	55	**45.00**	59.4	45
G-3 (Yukarıburnaz)	Z:37 238054.0; 4093143.8	**65.19**	71.5		**61.36**	64.6	
G-4 (Aşağıburnaz)	Z:37 238848.00 4090334.0	54.64	51.1		**49.56**	44.5	
G-5 (Sirincir)	Z: 37 244909.00; 4095250.8	**60.02**	62.9		**50.97**	56.3	
Turunçlu-1	Z: 36 760906.00 4094161.6	-	55.9		-	49.3	

5.3.3. Impact Significance, Mitigation Measures and Residual Impacts

Noise impact levels of construction and operation activities related to the project were evaluated according to the noise modeling results and background noise 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 as follows:

- Optimization / design of the railway 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)
- 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).

Since there is no available information regarding the applicability of above mentioned mitigation measures at this stage, these 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.

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 impacts of the following project on the noise levels:

- Modeling studies conducted for the impac assessment of construction and operation phases are done in accordance with the construction equipments stated in the feasibility phase.
- During construction period noise monitoring will be conducted in order to identify the impactiveness 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 2042. For this reason, these impacts are expected to occur in 2042. Defined mitigation measures will be implemented repeatedly. In this context, following years where the project will be executed (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 background noise levels for the impact assessment, the points where noise measurements are made were selected as receptors and the impact on the change in the background noise level was defined.

The magnitude of noise impacts was assessed due to the deviation from the background noise leves 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

Table 5-15 Noise 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				
Increase in noise levels	Land Preparation and Construction	G-2 (Turunçlu-2)	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor	Implement the 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 the World Bank Group 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 may be created during construction phase due to heavy machinery use.	Negligible
		G-3 (Yukarıburnaz)	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
		G-4 (Aşağıburnaz)	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
		G-5 (Sirincir)	Local	Medium	Short Term Reversible	Short-term	Continuous	Medium	Medium	Minor		Negligible
		Turunçlu-1	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
	Operation	G-2 (Turunçlu-2)	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-3 (Yukarıburnaz)	Local	High	Irreversible	Long-term	Intermittent	High	Medium	Major		Moderate
		G-4 (Aşağıburnaz)	Local	High	Irreversible	Long-term	Intermittent	High	Medium	Major		Moderate
		G-5 (Sirincir)	Local	High	Irreversible	Long-term	Intermittent	High	Medium	Major		Moderate
		Turunçlu-1	Local	High	Irreversible	Long-term	Intermittent	High	Medium	Major		Moderate

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, the receptors were defined in Chapter 4.3 where the current air quality measurements were made. Since all of these areas are residential areas, their sensitivities are 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 5-16 .

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 5-16 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 (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Sulfur hexafluoride (SF_6)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)

The Project's contribution to climate change was assessed with the calculation of amount of GHG emissions anticipated. 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 impacts 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 impacts. Therefore, the regulation defines a limit value for gas contaminants and particulate matter.

Limit values to be followed between 2019 and 2023 and after 2024 are given below according to this regulation:

Table 5-17 Air Quality Limit Values of 2019-2023 and after 2024

Parametre	Time	Unit	2019-2023	2024 and after
SO_2	Hour (cannot exceed more than 24 times annually)	$\mu g/m^3$	350	350
	UVS		60	60
NO_2	Hour (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	KVS	mg/m^2day	390	390
	UVS		210	210
CO	Max daily 8 hours average	mg/m^3	10	10
VOC	Hour	$\mu g/m^3$	280	280
	KVS	$\mu g/m^3$	70	70
Pb	Annual	$\mu g/m^3$	0,5	0,5

International Requirements

The World Bank Group standards and requirements are applicable to the Project. In this regard, the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for 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 or 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 World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for Environmental Air Emissions and Ambient Air Quality refers to the WHO Ambient Air Quality Guidelines. Ambient air quality guideline values recommended by the World Bank Group are presented in Table 5-18 .

Table 5-18 The World Bank Group – WHO – Ambient Air Quality Guideline Values

Parameter	Duration	Guideline Value (µg/m^3)
SO_2	10 minute	500
	24-hour	20
NO_2	1-hour	200
	1-year	40
Particulate Matter (PM_{10})	24-hour	50
	1-year	20
Particulate Matter ($PM_{2.5}$)	24-hour	25
	1-year	10
O_3	8-hour daily maximum	100

Source: The World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for Environmental Air Emissions and Ambient Air Quality

5.4.2. Impact Assessment

5.4.2.1. Land Preparation and Construction Phase

Air Quality

Possible impacts on air quality within the scope of the project are especially the dust emissions during the construction of the railway route.

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 impacts 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 impacts that may occur in the land during the land preparation and construction phase 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.

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 Industrial Air Pollution Control 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 5-19 Emission Factors to be Used in Dust Emission Mass Flow Calculations

Operation	Emission Factor	
	Uncontroled	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)

While calculating the total dust emission during the earthworks to be carried out within the scope of the Project, the total construction area was taken as 1,735,939.65 m^2 along the railway routes, and the average excavation depth was assumed as 1.3 m. Accordingly, the total amount of excavation was calculated as 2,256,721.55 m^3. When the excavation density is taken as 1.6 tons/m^3, it is foreseen that 3,610,754.47 tons of excavation will be done. The construction works to be carried out within the scope of the project are planned to be completed in approximately 2 years, 10 hours a day, 305 days a year (taking into account holidays). Accordingly, it is understood from Table 5-19 that 591.93 tons of excavation will be generated in the land preparation and construction stages of the Project. With the assumption that all activities will be carried out in a controlled manner, hourly removal and loading emissions are calculated.

While calculating the total dust emission amount that will occur during the earthworks to be carried out within the scope of the project, it is also assumed that an average of 1 m filling will be made in the entire construction area along the railway routes. Accordingly, the total filling amount was calculated as volume and mass and hence, hourly discharge emission was found with the assumption that the hourly filling amount and all activities would be carried out in a controlled manner. Accordingly, total hourly dust emission is calculated as 12.64 kg/hour. In the calculations made, the most unfavorable conditions were evaluated and it was assumed that all construction activities were carried out at the same time.

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 12.64 kg/hour. Therefore, as stated in Annex-2 of the Regulation on the Control of Industrial Air Pollution (Amended R.G. 20.12.2014-29211), "Calculation of Air Pollution Contribution" is required by using an internationally accepted distribution model in the facility's impact area if the pollutant mass flow specified in the Table 2.1 of the regulation are exceeded, for new facilities to be established.

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 PM_{10} has been calculated by using AERMOD Model to determine the impacts 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, "Yumurtalık 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 parmeters

Modeling study is performed as stated in SKHKKY Annex-2; in a square-shaped area of 1 km^2 (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 ($\mu g/m^3$).

Through the AERMAP software, which is the preprocessor of the AERMOD model; by creating 1,000 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 impacts 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 SKHKKY Annex-2 Table 2.2, according to the modeling study, average daily pollutants in the region (STV) and annual (LTV) GLC has been identified. STV, LTV, short-term and long-term limits are defined as follows in relation to atmospheric pollutants in the Regulation on the Control of Industrial Air Pollution (RCIAP):

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

As a result of these comparisons, the impacts of emissions to the atmosphere on air quality were determined.

Maximum GLC values, STV and LTV and UVS limit values obtained as a result of modeling studies are given in Table 5-20 and Table 5-21 .

Table 5-20 PM_{10} Values of Land Preparation and Construction Phase

Pollutant	Period	Model Results		RCIAP Limit Values (µg/m³)	WHO Ambient Air Quality Guideline Values (µg/m³)
		Max GLC Values (µg/m³)	Limt Value Exceedence Number		
Particulate Matter (PM 10)	24 Hours	22.89	-	50	50
	Annual	13.81	-	40	20

Table 5-21 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)	5.72	-	210

Maps showing the 24-hour and annual PM_{10} concentration contours obtained as a result of modeling studies are given in Figure 5-17 and Figure 5-18 , respectively.

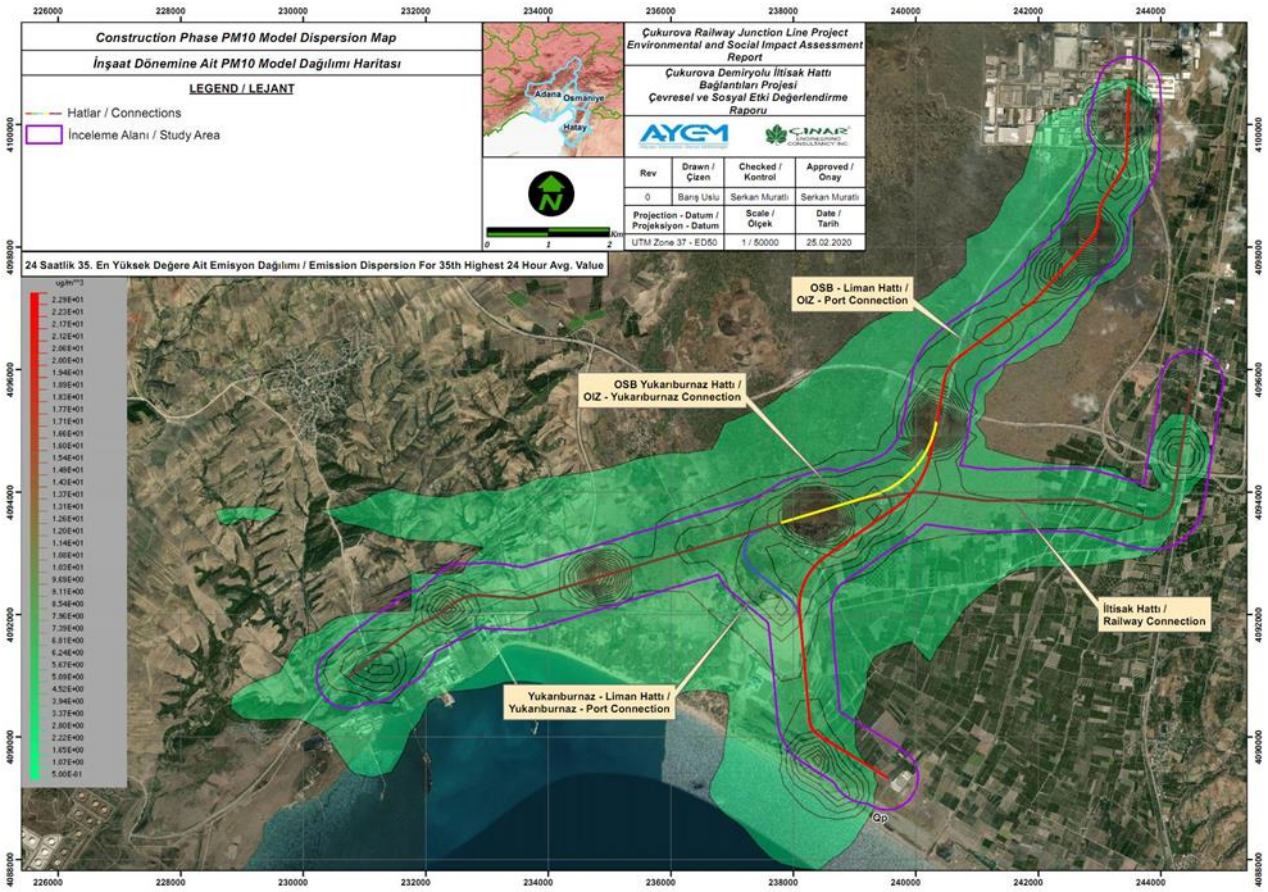

Figure 5-17 24-Hour PM_{10} Concentration Contours

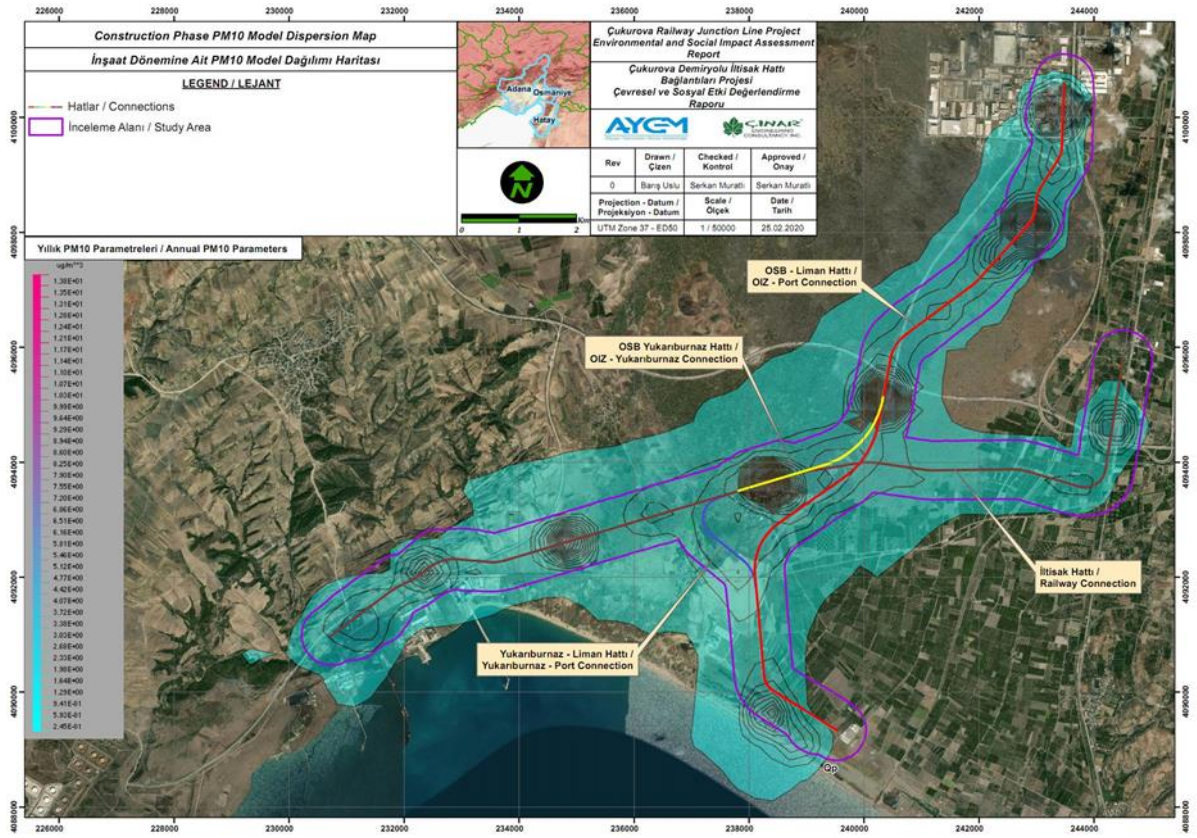

Figure 5-18 Annual PM_{10} Concentration Contours

During the baseline studies, measurements of PM_{10} and settled dust are as follows:

Table 5-22 PM10 and Settled Dust Values of Land Preparation and Construction Phase in Receptor Points

Nokta	PM_{10} (µg/m^3)	Settled Dust (µg/m^3)
Turunçlu-2	0.48	0.05
Yukarıburnaz	2.3	0.38
Aşağıburnaz	0.24	0.08
Sirincir	0.09	0.09
Kurtpınar	0.08	0.01

As of 2019, the limit value of PM_{10} 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 PM_{10} 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 PM_{10} 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.

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 equipments to be used during land preparation and construction phase as number of equipment planned to be used is very low. Therefore this impact is considered as negligible.

5.4.2.2. Operation Phase

Air & Greenhouse Gas Emissions

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.

5.4.3. Impact Significance, Mitigation Measures and Residual Impacts

Assessment of the impacts depends on the sensitivity of the recipients and the overall impact 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 impact 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 magnitude of impact is defined as "low" in construction phase and “negligible” in operation phase.

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

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, 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.

5.4.3.1. Greenhouse Gas Emissions

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

construction phase in accordance with the internationally recognized methodologies. In addition, the following measures will be applied:

- Construction activities will be carried out in line with 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 GDII will provide trainings to the operators/drivers that cover practices for reducing unnecessary equipment idling time and unnecessary operator moves/behaviours 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.
- GDII 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 and analysis of alternatives will be conducted.

Table 5-23 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	Revesibility	Duration	Frequency	Overall Magnitude				
Decrease in Air Quality	Land preparation and construction	Turunçlu-2	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor	In order to minimize the dust and impacts that may occur soil stripping, cut and fill during the land preparation and construction phase of the project; 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. 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. 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
		Yukarıburnaz	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
		Aşağıburnaz	Local	Negligible	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		Negligible
		Sirincir	Local	Medium	Short Term Reversible	Short-term	Continuous	Low	Medium	Minor		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:

- Dörtyol-Erzin Plan Hydrogeology Survey Report (1974)
- 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 Yumurtalık 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);
- World Bank Group General Environmental, Health and Safety (EHS) Guidelines on Environmental Wastewater and Ambient Water Quality - Indicative Values for Treated Sanitary Sewage Discharges;
- Surface Water Quality Regulation (SWQR), Inland Surface Waters Quality Criteria – Turkish Ministry of Forestry and Water Affairs, 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 140-180 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;

180 people x 191.33 L/day-capita[38]= 34.44 m^3/day

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 periods will be purchased from the nearest settlements and utility water will be supplied by tankers.

Wastewater Generation

It is planned to employ 180 people during the land preparation and construction phase, and the amount of domestic wastewater to be generated is calculated as 34.44 m^3/day on the assumption that a person's daily water use requirement 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 tanks 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 protocols to be made with the local public authorities that have wastewater treatment plants in place. Through construction of the connection line from the existing TCDD Erzin Station to the Toros Adana Yumurtalik Free Zone (TAYSEB), Erzin Domestic Wastewater Treatment Plant with the design capacity of 5,842 m^3/day[39] operated by Hatay Water and Sewerage Authority (HATSU) and/or Yumurtalık Domestic Wastewater Treatment Plant under the responsibility of Adana Water and Sewerage Authority (ASKİ) may be utilized upon establishment of the necessary protocols with Adana and Hatay Metropolitan Municipalities. During construction of the OIZ - Port Line between Osmaniye Organized Industrial Zone (OIZ) and the new port located in the Yukarıburnaz Neighborhood as well as the other two connection lines, the Osmaniye OIZ Industrial Wastewater Treatment Plant with the design capacity of 3,600 m^3/day[40] operated by the Osmaniye OIZ Directorate and Erzin Domestic Wastewater Treatment Plant may be used after establishment of the necessary protocols with the Osmaniye OIZ Directorate and Hatay Metropolitan Municipality.

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

Impacts on Surface Water Flow

The list of river crossing are given in Chapter 4.4.1. At these crossings, there are drying channels, streams and many seasonal flow stream, and if the surface waters are not crossed with suitable planned engineering structures and techniques during the construction phase, destruction may occur at surface waters and their surroundings. For this purpose, the engineering structures given in Table 5-24 are designed at the crossings.

Table 5-24 List of Engineering Structures for River Crossings

38 (TÜİK) 2018 According to Turkey Municipality Water Statistics; Drinking and utility water requirement per person has been determined as 191.33L/capita-day for average of Adana, Hatay and Osmaniye Provinces

39 http://www.hatsu.gov.tr/icerik.php?bolum=24&no=1432

40 https://webdosya.csb.gov.tr/db/ced/icerikler/osman-ye_2018_-cdr_son-20190828111313.pdf

Line	Section KM:	Crossing	Type of Engineering Structure
Connection Line	3+240	Drrying Channel	Bridge
	3+909	Seasonal and permanent streams	Box culvert 2.00 x 2.00
	4+232		Box culvert 3.00 x 3.00
	4+879, 5+057, 5+230, 5+672		Box culvert 2.00 x 2.00
	6+054		Box culvert 2.00 x 2.50
	7+865		Box culvert 4.00 x 4.00
	8+418		Box culvert 2.00 x 2.50
	9+297, 9+544		Box culvert 3.00 x 3.00
	10+767, 11+531, 11+849, 12+232, 12+293, 12+384, 12+612, 12+765, 13+705, 13+854		Box culvert 2.00 x 2.00
	14+557		Box culvert 3.00 x 3.00
	15+172, 15+851, 16+177		Box culvert 2.00 x 2.00
OSB-Port Line	0+662	Seasonal and permanent streams	Box culvert 2.00 x 2.50
	1+190		Box culvert 2.50 x 2.50
	1+553, 2+134		Box culvert 2.00 x 2.00
	2+511		Box culvert 2.50 x 2.50
	3+387, 4+842, 7+828		Box culvert 2.00 x 2.00
	8+871		Box culvert 4.00 x 4.00
	9+817		Box culvert 2.00 x 2.50
	10+372		Bridge
	11+647, 12+336, 12+872		Box culvert 2.00 x 2.00
Yukarıburnaz-Port Line	0+584	Seasonal and permanent streams	Box culvert 3.00 x 3.00
	1+460		Bridge

Source: GDII, 2019

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.

Impacts on Irrigation Project Areas

There are many irrigation main canals, backup channels and tertiary channels, drying channels, drainage channels, operating maintenance ways in Aşağı Ceyhan Aslantaş 3rd Stage Erzin Dörtyol Irrigation Area operated by DSI 6th Regional Directorate, where the project routes pass.

If proper engineering strucutres are not built in the crossing of the engineering structures belonging to this irrigation area, this may lead to the deterioration of these engineering structures and flooding.

Impacts on Groundwater

The construction activities on railway routes and station locations will not involve any deep excavation activity that may cause any significant impact on the groundwater resources. Construction of bridge, underpass and overpass foundations may result in interaction with groundwater. However, the area on which the foundations are to be erected will be limited, thus no significant impact would occur on the quality and quantity of groundwater. Similarly, no new quarry and borrow sites are planned to be created in the vicinity of the Project site. If not controlled immediately, accidental spills of hazardous materials such as fuel, oils, lubricants and cement may reach to the groundwater table where overburden is shallow which may result in contaminated aquifers. In addition, in case of a need, proper blasting design and management is essential to avoid any impact on groundwater resources that may be caused by potential nitrate and ammonia residues sourced from blasting operations.

As stated in the official letter of DSİ 6th Regional Directorate dated 14.11.2018 and numbered 38292074-611.99-782653, Delihalil basalts on the project routes were declared as "Burnaz Spring Group Groundwater Reserve and Protection Area" published in the Official Gazette dated 03.06.2011 and numbered 27953. The sections of the project routes that intersect with the protected area are given in Table 5-25 (See Figure 4-16).

Table 5-25 Burnaz Spring Group Protection Areas Intersection Points of Project Routes

Line	Section KM:	Protection Status
OIZ-Port Line	0+000 - 0+814	2. Degree Protected Area
	0+814 - 9+625	1. Degree Protected Area
	9+790 - 10+575	Strict Protection Area
Connection Line	4+275 - 11+150	1. Degree Protected Area
OIZ-Yukarıburnaz Line	0+000 - 2+314.692 (entire line)	1. Degree Protected Area
Yukarıburnaz-Port Line	0+000 - 0+900	1. Degree Protected Area
	1+436 - 1+865	Strict Protection Area

Source: OSİB, 2012.

In addition, as stated in the official letter of DSİ 6th Regional Directorate dated 14.11.2018 and numbered 38292074-611.99-782653, It is stated that the project route between KM: 8+000 - 9+000 overlaps with the borehole that provides drinking water to Yumurtalik.

5.5.2.2. Operation Phase

Water Use and Wastewater Generation

Drinking and potable water will be needed at the stations for staff and visitors. In addition, water to be used by staff and visitors will lead to domestic wastewater generation. The GDII will estimate the number of operational staff and visitors in the later stages.

Domestic wastewater to be generated will be collected in septic tanks to be built at the stations and will be transmitted to the nearest wastewater treatment plants with the sewage trucks of the relevant authorities. Through construction of the connection line from the existing TCDD Erzin Station to the Toros Adana Yumurtalik Free Zone (TAYSEB), Erzin Domestic Wastewater Treatment Plant with the design capacity of 5,842 m3/day operated

by Hatay Water and Sewerage Authority (HATSU) and/or Yumurtalık Domestic Wastewater Treatment Plant under the responsibility of Adana Water and Sewerage Authority (ASKİ) may be utilized upon establishment of the necessary protocols with Adana and Hatay Metropolitan Municipalities. During construction of the OIZ - Port Line between Osmaniye Organized Industrial Zone (OIZ) and the new port located in the Yukarıburnaz Neighborhood as well as the other two connection lines, the Osmaniye OIZ Industrial Wastewater Treatment Plant with the design capacity of 3,600 m3/day operated by the Osmaniye OIZ Directorate and Erzin Domestic Wastewater Treatment Plant may be used after establishment of the necessary protocols with the Osmaniye OIZ Directorate and Hatay Metropolitan 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. Rail car maintenance and refurbishment typically involves a high-pressure water wash which may contain residues from transported materials, paint, oil and grease, and other contaminants. Caustic solutions are often used to remove grease and dirt from axles and other metal parts. Acids and caustics may also be used for rust removal. Locomotive coolants are usually water-based with corrosion inhibitor additives.

The World Bank Group Environmental, Health and Safety Guidelines for Railways (2007) recommends the measures listed below to prevent, minimize, or control wastewater effluents generated in the rail car maintenance areas:

- Ultrafiltration will be used to extend the life of washing solutions for aqueous parts or alternatives to water cleaning (e.g. dry cleaning by wire brush or bake oven) will be used;
- Discharge of industrial wastes to septic systems, drain fields, dry wells, cesspools, pits, or separate storm drains or sewers will be prevented;
- The wastewater from the service bays and the floor drains in maintenance areas will be kept out of the storm drains and will be collected separately;
- The effluents from the service bays and the floor drains in maintenance areas will be pretreated to reduce contaminant concentrations before collection in septic tanks. Pretreatment systems typically consist of oil / water separators, biological and chemical treatment, and activated carbon systems.

Impacts on Surface Water and Groundwater

The impacts on surface waters defined in Chapter 5.5.2.1 for land preparation and construction phase will persist during operation phase. Surface and groundwater will not be used during the project operation phase.

5.5.3. Impact Significance, Mitigation Measures and Residual Impacts

The impacts of the project on surface water resources and irrigation project sites during the land preparation, construction and operation phases of the project will be managed through the implementation of mitigation measures and the measures to be taken in accordance with the provisions specified in the legal regulations. These mitigation measures were determined within the scope of the significance assessment matrix according to the components of magnitude of impact (geographic scope, magnitude, reversibility, duration and frequency) for the receiving environment and the receptor sensitivity.

According to the declared provisions of the "Burnaz Spring Group Groundwater Reserve and Protection Area", consent of DSİ 6th Regional Directorate have to be taken for the sections of the project routes that fall within the strict protection area and 1st degree protection area and the section that overlaps with "Yumurtalik Drinking Water Well" of ASKI prior to construction activities.

In line with the geological-geotechnical survey studies carried out within the scope of the project, the opinions received from DSI and expert judgement, the mitigation measures and the assessments regarding the residual impacts were determined and presented in detail in Table 5-26 .

Table 5-26 Potential Impacts on Water Resources, 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	Revesibility	Duration	Frequency	Overall Magnitude				
Wastewater Generation	Land Preparation and Construction	Construction Area	Restricted	Low	Short-term reversible	Short-term	Intermittent	Low	Medium	Minor	Since there is no wastewater (sewage) system in the field of activity and its immediate surroundings, wastewater generated due to land preparation and construction activities will be deposited in septic tank that will be impervious, in accordance with “Regulation on Pit Opening Where Sewer System Construction is not Applicable” being published in Official Gazette No.13783 dated 19.03.1971. When the pits are filled, wastewater will be removed by sewage trucks, and disposal will be provided within the scope of the protocol to be made with the municipality that has a wastewater infrastructure system.	Negligible
Wastewater Generation	Operation	Stations	Local	Low	Medium-term reversible	Medium-term	Intermittent	Medium	Medium	Moderate	Since there is no wastewater (sewage) system in the field of activity and its immediate surroundings, wastewater generated due to operation 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.	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	Revesibility	Duration	Frequency	Overall Magnitude				
Impact on surface water flow/hydrological regime of the rivers to be crossed	Land Preparation and Construction and Operation	Surface water resources (Rivers/streams to be crossed)	Wide	Medium	Irreversible / Longt-term reversible	Long-term	Intermittent	Medium	Medium	Moderate	During the construction phase, surface waters will be crossed with appropriately designed art structures and techniques. In the event that it is necessary to provide road crossings on the flows and dry streams in the project site and adjacent or rehabilitation of existing bridges, the necessary projects will be made in line with the principles of 'Disaster Regulations for Highway Roadway Engineering Structures', and a hydraulic conformity opinion will be obtained from the 6th Regional Directorate. It will be built in accordance with the principles. All works related to streams will be done within the knowledge of DSI, and construction works will be carried out under the knowledge and supervision of Hatay DSİ 63. Branch Directorate, Osmaniye DSİ 64. Branch Directorate and DSİ ACO (Ceyhan) Branch Directorate. Within the scope of the project, drainage measures (concrete underground drainage, head ditch) to be used for the control of surface waters and groundwater to ensure the stability of the cuts and fillings to be produced along the routes and to remove them from the fill body will be provided. All wastes that may arise from the project activities, excavation materials to be stored periodically / temporarily, and fuel, oil, oil, cement etc. that may be accidental. The pouring of hazardous materials into the irrigation channel with seasonal / continuous flowing streams where the project routes intersect will be taken under control immediately and surface waters will be protected against pollution. In order to monitor the water quality of the surface waters in the project study area, periodically at least 2 times a year (rainy and dry periods), the water sources will be evaluated at the points to be determined by taking into consideration the locations of the pollutant sources in the land preparation-construction and operation periods	Minor
Impact on irrigation project areas	Land Preparation and Construction and Operation	Irrigation Project Areas	Wide	Medium	Medium-term reversible	Long-term	Intermittent	Medium	Medium	Moderate	All works related to the irrigation project site over which the project routes pass and the transitions of the engineering structures belonging to this area will be carried out within the knowledge of DSI, and crossing projects will be prepared and approved by DSI. All works in the construction works of the crossing projects approved by DSI will be carried out under the knowledge and supervision of Hatay DSİ 63. Branch Directorate, Osmaniye DSİ 64. Branch Directorate and DSİ ACO (Ceyhan) Branch Directorate.	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	Revesibility	Duration	Frequency	Overall Magnitude				
Impact on groundwater	Land Preparation and Construction and Operation	Burnaz Spring Group Groundwater Reserve and Protection Area and other groundwater resources	Local	Medium	Medium-term reversible	Short-term	Intermittent	Medium	High	Moderate	According to the declared provisions of the "Burnaz Spring Group Groundwater Reserve and Protection Area", consent of DSİ 6th Regional Directorate have to be taken for the sections of the project routes that fall within the strict protection area and 1st degree protection area and the section that overlaps with "Yumurtalik Drinking Water Well" of ASKI by design review stage. In the unlikely event of failure to receive such a permit/consent by then, the route will be modified during the design review stage to avoid the strict and 1st degree protected zones. Within the scope of the project, drainage measures (concrete underground drainage, head ditch) to be used for the control of surface waters and groundwater to ensure the stability of the cuts and fillings to be produced along the routes and to remove them from the fill body will be provided. While determining the locations of temporary fuel or oil storage areas, the locations of water resources will be taken into consideration and dangerous material spills / leaks such as fuel, oil, oil, cement etc. will be taken under control immediately. In order to monitor the water quality from the resources in the study area and groundwater wells, periodically at least 2 times a year (rainy and dry periods), the groundwater samples will be monitored by taking the groundwater samples at the points to be determined by considering the locations of possible pollution sources. Proper implementation of the Emergency Preparedness and Response Plan that covers management of hazardous and chemical substances and Pollution Prevention Plan.	Moderate

5.6. Resource and Waste Management

5.6.1. Methodology and Project Standards

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 operation phase, procurement of materials would be required for the maintenance and repair works to be conducted on the railway and associated structures.

Daily activities of the personnel will result in the production of various types of non-hazardous and hazardous wastes during the construction and operation phases of the Project. Similarly, maintenance of the railway and the associated structures and the users of the railway will result in waste generation during the operation phase.

The methodology to be followed to assess potential impacts associated with waste generation and the standards that will apply to the management of wastes are provided below. Based on these, related impacts are identified and measures on par with the significance of these impacts are set.

5.6.1.1. Methodology

For the assessment of Project's use of materials and management of wastes, both qualitative and quantitative approaches have been adopted in the ESIA. Technical information on the excavation and fill amounts, construction material requirements, quarries and material borrow sites to be used to meet these requirements and number of personnel that will cause waste generation as a result of daily activities have been provided by GDII.

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

- World Bank Environmental and Social Standards ESS1: Assessment and Management of Environmental and Social Risks and Impacts,
- World Bank Environmental and Social Standards ESS3: Resource Efficiency and Pollution Prevention and Management,
- the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines on Environmental Waste Management,
- the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for Construction and Decommissioning,
- the World Bank Group Environmental, Health and Safety Guidelines for Railways,
- the World Bank Group Environmental, Health and Safety Guidelines for Construction Materials Extraction,
- 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
- Waste statistics published by Turkstat (2018), and
- Information on waste disposal sites and their capacities published in the internet sites of the municipalities along the Project route.

Potential impacts and risks have been identified in consideration of typical impacts/risks associated with a project of Project's scale and type. 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

The key national legislation regarding the management of wastes in Turkey is the Regulation on Waste Management. In addition to this, there are other regulations in place for the management of specific waste types. These include waste streams from excavations, construction and, demolitions, waste oils, packaging wastes, waste batteries and accumulators, medical wastes, waste electrical and electronic materials, and waste tires. The full list of national waste legislation that the Project will comply with is provided in Chapter 2 of this ESIA Report. Key standards or requirements defined in the national legislation regarding the management of wastes are summarized in table below.

Table 5-27 Key Standards/Requirements Defined in the National Waste Management Regulations

National Regulation	Standards/Requirements
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 (municipal, recyclables, hazardous, etc.) stored in separate containers Hazardous wastes stored in a designated temporary storage area Closed containers used to store hazardous wastes; containers kept in good, sound and tight condition and placed on an impermeable surface (e.g. concrete) Labels put on hazardous waste containers to identify type of the waste, amount of the waste and date of storage Records of wastes generated kept at the 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 done with the municipalities or licensed companies for recovery, recycling, final disposal
Regulation on Control of Packaging Wastes	Packaging wastes stored temporarily at a designated place separate from other wastes and chemicals Recyclable wastes delivered to licensed recycling companies
Regulation on the Control of Waste Oils	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 the Control of Excavation Soil, Construction and Demolition Waste	Store topsoil at a designated storage area separately from the coarse/excavated materials and implement necessary measures during the storage period to ensure that it can be reused in rehabilitation or landscaping activities

At the international level, the main applicable standard for the Project's potential materials and waste related impacts is World Bank Environmental and Social Standards ESS3: Resource Efficiency and Pollution Prevention and Management, which requires;

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

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

5.6.2. Impact Assessment

In general, wastes need to be properly managed to avoid/minimize potential impacts on community health and safety and environment and unbalanced loads on local waste management facilities (i.e. landfills). Assessment of impacts and measures to be taken for the minimization of resources use and management of wastes is provided below for different phases of the Project.

5.6.2.1. Land Preparation and Construction Phase

Wastes anticipated to be generated during the land preparation and construction phase include; municipal solid waste including the recyclable (packaging) waste, excavation waste (i.e. the portion of excavation material that will not be reused on site for cut and fill works), construction waste, wood and timber scraps, and hazardous waste such as waste oils, waste vegetable oils, end-of-life tires, waste batteries and accumulators, waste electric and electronic equipment, and medical waste. Even though the number of workforce and construction machinery and equipment to be involved in the construction will be high and significant volumes of earthworks will take place, the Project will avoid and/or minimize impacts due to waste generation by complying with the requirement of national legislation and applying international standards on waste management.

Excavation and Construction Waste

During the construction phase of the Project, amount of material to be excavated from the main route and access road construction site is estimated to be 1,515,190.75 m^3. The Project will aim to maximize the use of excavated material to ensure resource efficiency, minimize amount of material to be extracted from material borrow sites and reduce associated costs. Excavated material having sufficient quality for fill operations will be reused in the construction works. According to the current design and results of the preliminary geotechnical studies, a major part (more than 88%) of the excavated materials are foreseen to be reused in fill operations, where the remaining will need to be disposed of at the storage sites as excavated material.

The Contractor Company will determine the storage areas with sufficient capacity to store all excavated material. When sufficient storage areas are identified, the Project will not have an additional impact on existing local excavation waste disposal infrastructure capacities.

In addition to excavation waste, some of the temporary structures, junk materials and some other materials such as excess, unusable concrete will constitute construction waste. Recyclable waste like cement bags, metal scraps, packaging and wooden crates, etc. will be

segregated from other wastes and stored temporarily on the site for eventual recycling process. Licensed companies will be contracted to remove the recyclable waste from the construction sites.

Municipal Solid Waste (Non-hazardous)

During the construction phase, a total of 180 personnel is planned to be employed at the Project. In consideration of these peak personnel numbers and assuming that the daily municipal waste generation rate will be 1.16 kg per person, amount of waste estimated to be generated at the Project sites has been calculated. The approximate amount of total municipal waste to be generated daily has been calculated as 0.21 tons.

According to the Environmental Indicators published by the Ministry of Environment and Urbanization, 30% of generated municipal waste (by weight) would consist of packaging waste (i.e. recyclable waste) (Ministry of Environment and Urbanization, 2015). Therefore, the daily packaging waste that will be generated would be approximately 62.64 kg.

Adana Metropolitan Municipality, which is located on the project route, has tendered the planning and projecting of the Integrated Solid Waste Disposal Facility in 2008 and Adana Integrated Solid Waste Disposal Facility started its operations in the beginning of 2011 as a result of rehabilitation works in the area used as wild storage area for many years. As mentioned in Adana Province 2018 Environmental Status Report, disposal, composting and regular storage of domestic solid wastes, commercial and institutional domestic solid wastes and disposal of medical wastes from hospital, treatment and preventive health services are provided. In Adana Province, 90% of domestic waste is disposed with regular storage method. Mentioned II. Class landfill facility is located in Saricam District of Adana Province. The facility has a total area of 110 ha and approximately 25 ha of this constitutes the structure of the facility. 60 ha of the total area is reserved for landfill. Although 1,134,608 m^3 of the facility with a total storage capacity of 7,175,888 m^3 has been filled, the remaining 6,041,280 m^3 is expected to be filled by 2041. Adana Metropolitan Municipality Integrated Solid Waste Disposal Facility brings 2,000 tons of domestic solid waste per day, collected from residential, commercial and institutions in all districts of Adana province (total 15 district municipalities). Domestic solid wastes in Çukurova, Sarıçam and Yüreğir District Municipalities are brought to the solid waste disposal facility integrated with semi-trailer trucks belonging to Adana Metropolitan Municipality and domestic wastes brought to transfer stations from Adana Metropolitan Municipality (Adana Çevre ve Şehircilik İl Müdürlüğü, 2019).

As mentioned in the 2018 Environmental Status Report of Hatay Province, one of the provinces on the project route, the amount of waste generated within the borders of 6 districts (İskenderun, Arsuz, Payas, Dörtyol, Belen, Erzin) of 15 districts of Hatay province is approximately 534 tons per day. These wastes are disposed in the Solid Waste Landfill, which is the responsibility of the Gulf Solid Waste Association in Düğünyurdu (Hatay Valiliği Çevre ve Şehircilik İl Müdürlüğü, 2019).

The management of solid wastes in Osmaniye Province on the project route is carried out by Osmaniye Solid Waste Disposal and Infrastructure Services Local Administrations Association. Solid wastes are stored in Municipal Waste and Non-Hazardous Waste Regular Storage facility located in the central district of the province. An average of 200 tons of domestic solid waste is brought to the facility daily (Osmaniye Valiliği Çevre ve Şehircilik İl Müdürlüğü, 2019).

The amount of approximately 0.21 tons of solid waste to be generated by the Project activities per day corresponds to approximately 0.0077% of the daily total solid waste reception capacities (about 2,734 tons) of solid waste disposal facilities located in Adana and Hatay Metropolitan Municipalities and Osmaniye Municipality. 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 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.

It should also be noted that, any amount of landfilled domestic waste has a potential to contribute to GHG emissions from the landfills. However, as the Project related landfill impact is assessed to be negligible; and since Adana province landfills are already using energy generation systems utilizing biogas, the GHG emission impact is also considered to be negligible.

Hazardous and Special Wastes

During the land preparation and construction phase of the Project, various hazardous wastes will be generated as a result of the activities/works involving use of fuels, chemicals, paints, oils, solvents, etc. If not managed properly, hazardous wastes may result in soil, surface water and groundwater contamination, as well as health and safety issues for the local communities and the Project personnel.

The following hazardous and specials wastes are anticipated to be generated as a result of the land preparation and construction activities. It should be noted that the earthworks will constitute the major part of the land preparation and construction phase and the amount of chemicals/hazardous substances to be used for the construction works are anticipated to be limited:

- Waste and materials (PPEs, rugs, clothes, etc.) contaminated with hazardous substances such as lubricants hydraulic fluids or fuels,
- The operation and maintenance of construction equipment and machinery requiring the use, storage and transfer of varying quantities of fuels and oils/lubricants,
- Solvents and paints to be used in construction activities,
- Herbicides and pesticides to be used in landscaping activities,
- Vegetable oils, batteries, electrical/electronic equipment, cables, fluorescent lamps, medical supplies to be consumed by Project personnel.
- Scrap metals and materials that contact with fuels, hazardous substances/chemicals, etc. at the workshops, laboratories, concrete plants, fuel stations, etc.,
- Waste tires and accumulators of the construction machinery.

Hazardous and special wastes need to be properly managed to avoid significant impacts on both environmental receptors and human health. The Project will fully comply with the national waste legislation and apply international waste management standards in line with a Waste Management Plan based on the waste hierarchy, thus no significant impact is anticipated due to waste generation during the land preparation and construction phase of the Project.

5.6.2.2. Operation Phase

During the operation phase, maintenance of project components including railway connection lines, stations and underpasses, overpasses and bridges and their use by staff and visitors will result in waste generation. Therefore, waste management will focus on recyclable waste and solid waste management. However, hazardous waste generated during

maintenance activities should also be managed properly. Generation of the following types of wastes is anticipated during the operation phase:

- Solid waste generated at railway connection lines, stations and underpasses, overpasses and bridges and their use by staff and visitors,
- Railway litter (including illegally dumped non-hazardous waste),
- Sediment and sludge removed from storm water drainage systems, and
- Vegetation waste such as vegetation trimmings and mowed grass (non-hazardous).

No intensive waste generation is expected during the operation phase. All waste management activities will be carried out in accordance with the "Waste Management Regulation" dated 02.04.2015 and numbered 29314.

Municipal Solid Waste (Non-hazardous)

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.

In addition, visual control and periodic collection of wastes will be ensured along the railway routes, separation of these wastes according to their recyclability status, and the separation of wastes will be stored in separate containers and disposed in accordance with the Waste Management Regulation.

Hazardous and Special Waste

The limited amount of hazardous and special waste to be generated during this phase will include the following:

- Maintenance related hazardous waste (waste oils from maintenance vehicles, paint containers, hydraulic oils, packaging materials, PPEs, filters, and other material contaminated with hazardous substances, etc.),
- Removed paint materials,
- Illegally dumped hazardous waste (hazardousness to be identified by analysis),
- Landscape and vegetation related waste (herbicide and pesticide containers).

Maintenance related waste

In the operation phase, there will be waste generated from the maintenance and repair of the trains. Maintenance-repair wastes can be generally listed as follows:

Ballast Screening: In this activitiy, which is repeated every 5 years on average, waste generation (substance without ballast properties) is estimated.

Superstructure Renewal: Wastes that will arise from concrete sleepers (concrete blocks on which rails sit) as a result of superstructure renewal activities performed every 30 years on average.

Infrastructure Renewal: It is the work to be carried out in extraordinary situations during the operation of the railway lines, and its frequency cannot be estimated.

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

- Metal waste (rivets, screws, sheet-machine parts, washers, locks, etc.),

- Dust seals, electrical cables, polyethylene and polypropylene parts,
- Cab glasses and wagon woods, loading sleepers,
- Waste engine and gear oils,
- Welding and paint burrs,
- Oily cloth, gloves, etc..

The maintenance / repair work on the railway lines will be carried out at large intervals or in one-off situations.

5.6.3. Impact Significance, Mitigation Measures and Residual Impacts

As mentioned in Chapter 5.6.1.2, the international standard to be taken into account regarding the potential impacts of material use and waste generation during the construction and operation phases of the Project is World Bank Environmental and Social Standards (ESS) ESS 3: Resource Efficiency and Pollution Prevention and Management and this standard requires;

- With the development and implementation of technically and financially feasible and cost-impactive measures to improve the project's impactiveness in using energy, water consumption, as well as other resources and material inputs,
- Prevention of hazardous and non-hazardous waste generation; reduction of waste generation where it cannot be prevented; appropriate disposal for the environment, including the safe recovery and recycling of wastes for human health and the environment and, finally, the proper control of emissions and wastes from waste handling.

Likewise, the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines on Environmental Waste Management (April 30, 2007) also requires establishment of a waste management hierarchy that takes into account the prevention, reduction, reuse, recycling and finally disposal.

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.

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

A Waste Management Plan will be developed covering 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 significanve for identified impacts, proposed mitigation measures and residual impacts are detailed below.

Material Use

Aggregate Material will be needed during the construction phase of the Project. Thus; if construction contractor decides to operate its own quarries and borrow sites, firstly it will be necessary to conduct an environmental assessment that covers;

- 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 must 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 5-28 Resource and Waste Management Related Impacts, Mitigation Measures to be Taken and Residual Impacts

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Revesibility	Duration	Frequency	Overall Magnitude				
Potential impacts that may be sourced due to storage of excess excavated materials	Land preparation and construction	• Environmental resources (soil, surface water, groundwater) • Ecological receptors • Community Health and Safety	Restricted	Medium	Medium-term reverseible	Medium-term	Continous	Medium	Medium	Moderate	• Maximize the amount of excavation use in fill works. • Store the excess/unsuitable excavated materials at designated storage sites located within the construction corridor and having sufficient capacity. • Ensure that all excavation activities are implemented in line with the cut and fill program to minimise excavation waste.	Minor
Potential impacts of wastes (municipal solid wastes, recyclables, hazardous and special wastes), if not managed properly	Land preparation and construction	• Environmental resources (soil, surface water, groundwater) • Ecological receptors • Community health and safety • Project personnel's health and safety	Wide	Medium	Medium-term reverseible	Medium-term	Continous	Medium	Medium	Moderate	• Develop and implement the Project-specific Waste Management Plan • Comply with the requirements of applicable waste management regulations for the management of all wastes generated as a result of Project activities, • Segregate wastes (i.e. hazardous/non-hazardous, recyclable/non-recyclable) and store them temporarily in designated storage areas Ensure that the waste storage areas meet the standards specified by related legislation: • Provide adequate and appropriate storage areas. • Ensure container types, labelling, classifying, etc., in the storage areas are in in line with Project standards. • Use reinforced concrete or similar impermeable materials such as epoxy on the floors of storage areas to ensure soils and groundwater resources are protected from potential contamination. • Provide adequate ventilation in case storage of volatile wastes is required. • Provide adequate drainage to collect any leakage. • Apply physical access restrictions at waste storage areas through use of gates and fences; allow only authorized persons in storage areas. • Put cautionary signage and boards with name and contact number of authorised personnel at the storage areas • Keep absorbents, firefighting equipment, etc. ready at a close location for immediate response in case of an emergency such as spills and fires. • Ensure by means of trainings and stipulations that wastes are not dumped at locations other than areas specifically designated for this purpose • Provide basic waste management trainings (e.g. waste reduction, general waste management and housekeeping) to all personnel and repeat periodically. • Under no circumstances, dispose of or bury waste on site. • Mark waste explosives and used explosive canisters as explosive waste and store separately in storage areas designated for this purpose, where only authorized personnel will be allowed to conduct works; these wastes will also be transported by firms with relevant licenses. • Ensure contractors' and their subcontractors' full compliance with Project Standards and implementation of the Waste Management Plan and the measures identified by this ESIA.	Minor
	Operation	• Environmental resources (soil, surface water, groundwater) • Ecological receptors • Community health and safety • Project personnel's health and safety	Wide	Medium	Medium-term reverseible	Medium-term	Continous	Medium	Medium	Moderate	• Develop and implement the Project-specific Waste Management Plan. • Conduct visual checks along the railway route to identify illegally dumped waste and litter; collect these wastes periodically, identify theiir characteristics (hazardous or nonhazardous) by analysis to be conducted in line with related legislation, ensure segregation based on recyclability; store the segregated litter in separate containers and dispose of the wastes in line with relevant Turkish waste management regulations. • Use lead free paints for maintenance activities. • Collect the garbage that will be generated at the stations from the collection areas to be placed in the station and forwarding them to the landfill and solid waste storage facilities of the relevant Municipalities.	Minor
Additional load on region's waste management facilities (e.g. landfills, recovery / recycling facilities etc.)	Land preparation and construction, operation	Regional waste management infrastructure	Wide	Low	Irreversible	Long-term	Continuous	Medium	Low	Minor	• Construct and use excavated material storage sites of sufficient number and capacity and store all the excavated materials at designated storage sites located within the construction corridor and having sufficient capacity • Ensure related waste disposal agreements done with the municipalities and licensed recovery/disposal firms.	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 Cukurova Region and Iskenderun Bay Railway Connection 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 and PS6. 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 5.1 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) and World Bank Group Environmental, Health and Safety (EHS) 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 impactive 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 PS6.

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 impactiveness 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 5-29 .

Table 5-29 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.

Annex	Description
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 5-30 .

Table 5-30 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 5-31 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 5-31 Appendices 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 5-32 .

Table 5-32 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 5-19 .

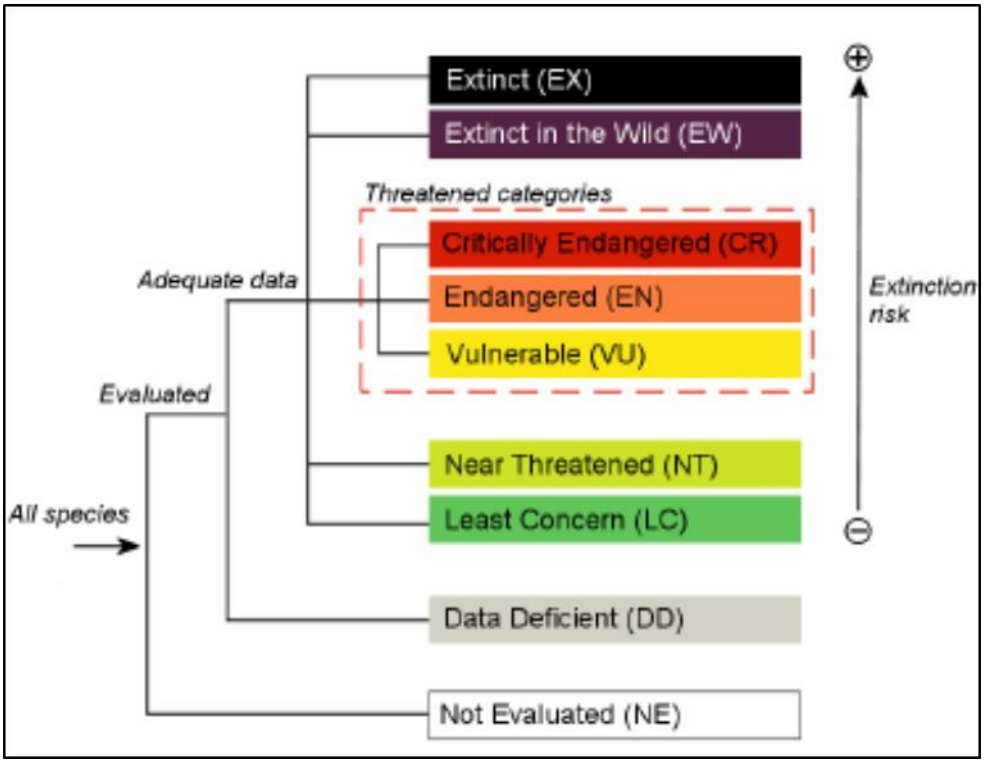

Figure 5-19 Structure of the IUCN Red List Categories

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 Cukurova Region and Iskenderun Bay Railway Connection Project on biodiversity, the framework for the mitigation hierarchy implemented in line with ESS6 and PS6 to reach no net loss, and lastly sensitivity criteria developed for biodiversity receptors that are subject to the site-specific impact assessment are detailed. 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 Impact**

   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 impact the two impacts bring about. Populations of flora species will be directly impacted, while fauna species' habitat use capabilities will be reduced.

When distribution of a particular population is divided by a railway, part of the habitat is lost, and the rest might be destructed. The small isolated patches that are formed as a result of fragmentation may not have sufficient capacity to maintain viable populations. Activities to be realized during the land preparation and construction phase may present physical barriers limiting animals' movement between areas where they feed and have access to water, and their breeding sites.

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.

The World Bank Group Environmental, Health, and Safety Guidelines for Railways (2007), proposes the following measures to be implemented to minimize impacts of railway construction on biodiversity:

- Avoid fragmentation or destruction of critical habitats;
- When rail crossings of watercourses are unavoidable, maintain water flow and fish access by utilizing appropriate methods;
- Minimize the clearing of riparian vegetation during construction;
- Avoid construction activities during the breeding season and other sensitive seasons or times of day, especially where critically endangered or endangered species are concerned;
- Avoid the introduction of invasive species during reinstatement activities, preferably through the use of native plant species

Potential environmental impacts associated with the land preparation and construction phase of the Project, might also disturb flora and 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 and dune heath habitats, and the *Echinops dumanii, Astragalus antiochianus* and *Acanthodactylus schreiberi* populations they hold. Land preparation and construction activities will be limited to pre-designated working areas avoiding any potential impact on critical habitat. In natural habitats, where impacts cannot be avoided, temporary impacts resulting from land preparation and construction activities will be controlled in line with the best practices and risks on biodiversity will be minimized. Changes in biodiversity features will be monitored in line with the provisions of ESS6 and PS6, where monitoring results will

be used to develop additional measures and management strategies through implementation of an 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 5.1.

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 (the World Bank Group, 2007).

The World Bank Group (2007) recommends the following measures to be taken to prevent and control impacts from right-of-way vegetation maintenance:

- Within the scope of an integrated vegetation management,
    - the track areas should be kept completely clear of vegetation, and
    - from the edge of the track area to the boundary of the right-of-way, vegetation should be structured with smaller plants near the line and larger trees further away from the line to provide habitats for a wide variety of plants and animals,
- Native species should be planted, and invasive plant species removed,
- Railways should be designed and maintained to discourage plant growth in the track area (e.g. providing lateral barriers to plant migration and ensuring rapid drainage of the track area),
- Biological, mechanical, and thermal vegetation control measures should be used where practical, and use of chemical herbicides on the bank beyond the transition area should be avoided (approx. 5 meters from the track),
- Maintenance clearing in riparian areas should be avoided or minimized.

In line with the World Bank Group Environmental, Health, and Safety Guidelines for Railways, herbicides for the Project will be used following the manual on pesticides prepared by the World Health Organization (WHO) and 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 impact of the railways that start off during the land preparation and construction phase, continues through the operation and maintenance phases. Although limited when compared to impacts of highways, animal mortality due to collision, electrocution, wire strikes and rail embankment are the most obvious impacts of operation-phase impacts (Dorsey et al., 2015). Collision is a significant risk factor for mammals and birds, while smaller animals have been reported to die due to embankment (Budzic ve Budzic, 2014).

For those animals that approach the railways to use the newly formed habitats, it is possible to lower the mortality risk by taking measures to limit their passages. Fencing, sound signals/barriers, chemical repellents, lights and reflectors, and physical barriers such as trees and noise barriers, can be impactive in lowering mortality rates. These measures, however, also carry the risk of increasing the barrier impact. To prevent such measures to enhance the barrier impact, physical barriers and fences should not be placed randomly along the right-of-way. Instead, appropriate locations where collision risk is higher should be determined prior to construction. When fencing is used, it is also crucial to provide escapes.

Structures like bridges and culverts that can be part of the Project design, can also serve as wildlife passages, although their original purposes might be different. In some cases, it is possible to transform these structures into wildlife passages, or design new ones for wildlife. Significant locations for animal passages and adequacy of planned structures should be determined based on habitat use of fauna features, which will be identified prior to construction. 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 and PS6, 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 4.6. 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.

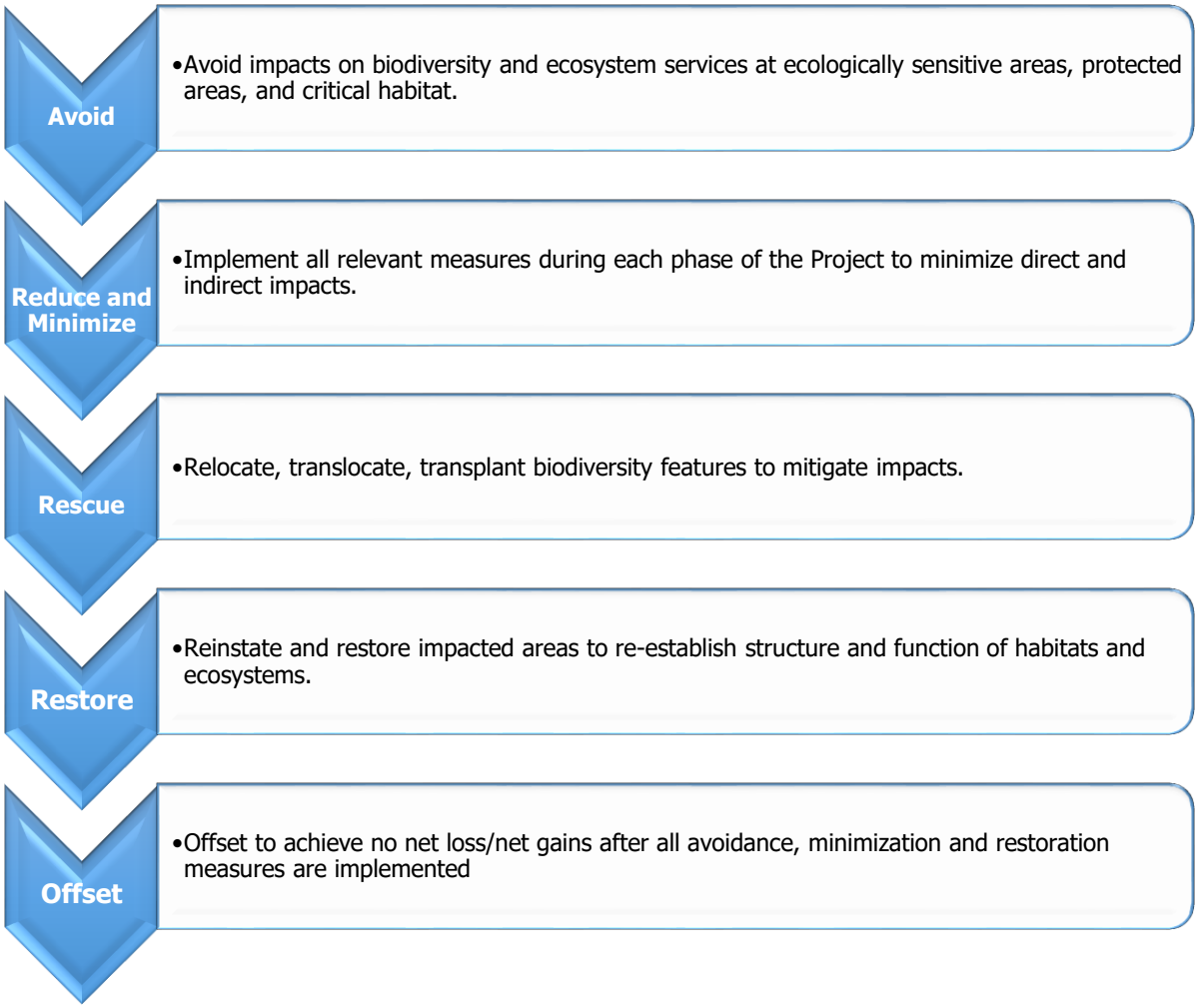

Figure 5-20 The Mitigation Hierarchy

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 5-33 .

Table 5-33 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	Regional endemic species and/or those that are listed	Habitats Directive Annex II/IV species and/or species

Sensitivity	Biodiversity Receptors		
	Habitats	Flora	Fauna
	Directive that are of regional significance that can recover in medium-term (5-10 years)	as CR, EN, VU, NT according to the Red Data Book of Turkish Plants	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 5-34 . 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 5-34 Biodiversity Receptor Sensitivity

Biodiversity Receptor	Sensitivity Level
Critical Habitat	
B1.4: Coastal stable dune grassland (grey dunes)	High
B1.5: Coastal dune heaths	
Alopecurus adanensis	
Sternbergia pulchella	
Natural Habitats	
C1.2: Permanent mesotrophic lakes, ponds and pools	Moderate
C3.2: Water-fringing reedbeds and tall helophytes other than canes	Low
D5.1: Reedbeds normally without free-standing water	
F5.2: Maquis	
F6.2: Eastern garrigues	
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 Cukurova Region and Iskenderun Bay Railway Connection Project was undertaken according to the methodology presented in Chapter 5.1. Accordingly, magnitude of each impact was estimated as a factor of the foreseen geographic extent, duration, and frequency of the impact.

The grey dune and dune heath habitats, as well as *Echinops dumanii, Astragalus antiochianus* and *Acanthodactylus schreiberi* populations they support, all of which trigger critical habitat, will not be impacted due to foreseen Project activities. In line with the provisions of ESS6 and PS6, following the mitigation hierarchy, potential impacts of the Project on critical habitat have been avoided.

Biodiversity Study Area defined for the Project is about 3,300 hectares. About 1,300 hectares of this area consists of natural habitats. Plantation areas and citrus fruit gardens cover a total of 780 hectares. Natural habitats on the Project route, which will be directly impacted, correspond to 52 hectares, which is about 4% of the natural habitat extent along the Project route. “F6.2: Eastern garrigues” habitat has the largest extent within the Biodiversity Study Area, covering of about 1140 hectares. It is estimated that 4.4% of the habitat will be directly impacted by the Project activities. Project-related impacts on the most sensitive habitat after the grey dunes and dune heaths; the water-dependent 1C1.2: Permanent mesotrophic lakes, ponds and pools” will also be avoided.

In the assessment of Project-related potential impacts on biodiversity receptors addressed in the ESIA Report, the mitigation hierarchy presented in Figure 5-20 has been implemented in line with the ESS6 and PS6. Definition of impacts, factors defined by the impact assessment methodology, related mitigation measures and significance of residual impacts are presented in Table 5-35 . Mitigation measures defined in the ESIA will be further developed based on data to be obtained from additional field work to be conducted prior to the finalization of the detailed design, 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 5-35 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 and dune heath habitats, as well as *Echinops dumanii*, *Astragalus antiochianus* and *Acanthodactylus schreiberi* populations they support, and also on the mesotrophic lake habitat will be avoided in line with the related environmental management plans (waste management, pollution prevention). The known location of the *Alopecurus adanensis* will be confirmed through pre-construction surveys prior to the finalization of the detailed design. If populations are identified in different areas, necessary measures will be implemented within the scope of the Biodiversity Management Plan. Potential indirect impacts on the known population will be avoided. Seeds of the species will be collected and preserved at the gene bank to ensure conservation of its populations. If appropriate, these seeds can be propagated at later stages of the project. Expert judgement suggests that propagation efforts would yield successful outcomes. 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.	-
		Critical habitat: Coastal dune heaths (B1.5)	-	-	-	-	-	-	High	No impact (Avoided)		-
		Alopecurus adanensis population	-	-	-	-	-	-	High	No impact (Avoided)		
		Natural habitats: Ponds (C1.2)	-	-	-	-	-	-	Moderate	No impact (Avoided)		-
		Sternbergia pulchella population	Limited	High	Irreversible	Long-term	One-off	High	High	Major	*Sterbergia pulchella* population on the Project route consists of 100 individuals, which corresponds to about 20% of its known population in Turkey. Its presence at different locations will be researched during pre-construction surveys to be conducted prior to the finalization of the detailed design. Seeds of the identified individuals will be collected and the species' cluster will be translocated under the supervision of field experts so that the population can be rescued. Status of translocation will be monitored throughout the land preparation and construction phase within the scope of the Biodiversity Monitoring and Evaluation Program. Based on monitoring results, in case there are residual impacts on the population, offset strategies are required to be developed following the mitigation hierarchy.	Unknown
		Natural habitats: Reedbeds (C3.2)(D5.1), maquis (F5.2), Eastern garrigues (F6.2)	Limited	Low	Irreversible	Long-term	One-off	Medium	Low	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 reedbed habitats will be minimized. There will be no tree cutting/vegetation clearance other than in areas required for the Project. 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.	Minor
		Fauna species of high conservation concern	Limited	High	Irreversible	Long-term	One-off	Medium	Medium	Moderate	Nesting areas for fauna species will be identified through pre-construction surveys, and experts will be consulted if nests are to be displaced. Surveys targeting bird species will be conducted prior to the finalization of the detailed design during migration and breeding seasons to provide further information on habitat use, breeding status and flight routes of target species. 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. The 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 prior to the finalization of the detailed design in an appropriate season, from April through June, to gather additional informationon on species (especially on those that are of high conservation concern) and habitat	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude						Receptor Sensitivity	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											composition of the Biodiversity Study Area.. 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, 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	Mnor	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	Minor	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	Minor	Natural vegetation will be conserved to the best possible extent during land preparation, and native species will be used in restoration after completion of the construction phase. Vehicles and equipment entering the site will be checked for invasive alien species. If identified, necessary measures will be taken in line with the Project standards to eradicate the species. Instead of using herbicides, which would destroy the natural vegetation and enable introduction of invasive alien species, different vegetation management methods will be considered as appropriate spatially and temporally. During the land preparation and construction phase biodiversity monitoring studies, potential for presence of invasive alien species in the area will also be monitored.	Negligible
Habitat loss / fragmentation	Operation	Natural habitats	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.	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude						Receptor Sensitivity	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											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.	
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.	Minor
Indirect impacts (dust, air emissions, noise, waste, and impacts on water and soil quality)	Operation	Natural habitats Flora and fauna species of high conservation concern	Limited	Low	Reversible	Medium-term	Intermittent	Medium	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.).	Minor
Invasive alien species	Operation	Natural habitats Flora and fauna species of high conservation concern	Local	Low	Reversible	Medium-term	Intermittent	Low	Moderate	Minor	To avoid development of alien species along the railway route, natural plants will be used in restoration, and regular maintenance will continue throughout the operation phase. To take necessary measures against the risk of invasive alien species being transferred by the trains, there will be periodical controls and if identified, necessary measures will be taken in line with the Project standards to avoid spread of invasive alien species. During the operation phase biodiversity monitoring studies, potential for presence of invasive alien species in the area will also be monitored.	Negligible

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 for the Project has been conducted in five different phases which are;

- Desktop Study
- Field Research
- Risk Assessment
- Impact Assessment
- Reporting

Desktop Study

Publications on archaeological, ethnographic and intangible cultural heritage related to the field of study and its immediate surroundings have been compiled in order to determine the cultural heritage potential of the project construction and the impact areas. Existence of archaeological or cultural heritage which has already been recorded in the project construction areas and the project impact areas has been researched. Resources used during 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[41].

Field Research

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 09.01.2020 and 16.01.2020 by REGIO Cultural Heritage Field Team[42].

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

[41] Decision No 1180, decision no 2237 and decision no 4456 of the Directorate of Karabük Regional Preservation Board of Cultural Assets.

[42] Senior Archaeologist H. Uğur DAĞ, Senior Archaeologist Kılıçhan SEVMEN, Senior Archaeologist Serkan AKDEMİR, Senior Archaeologist Seray AYAZ

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 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 1). 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). During all these works, the "Archaeological Baseline Table" (Annex 1), which were prepared by the research team, were filled separately for each site and all information related to the observations made in every site were recorded in this document. 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 military 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.

Field Study for Intangible Cultural Heritage

Field studies for intangible cultural heritage were carried out by conducting face-to-face interviews in settlements in the immediate vicinity of the project. 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, 37 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.

Archaeological Potential Modeling

As mentioned above, the field studies were conducted as field walking as much as possible within the 100 m impact corridor of the project. However, the vegetation on the surface of the project route and especially the upper soil cover created by the soil brought from the other orchards located in the project area between Ceyhan and Osmaniye 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 5-36).

Table 5-36 Archaeological Potential Modelling Area and Km Intervals

Section Code	Line Name	Start KM	End KM
Section-1	OIZ-Port Line	0+000	0+966
	OIZ-Port Line	0+966	2+045
	OIZ-Port Line	2+045	3+170
	OIZ-Port Line	3+170	4+192
	OIZ-Port Line	4+192	5+263
	OIZ-Port Line	5+263	6+415
	OIZ-Port Line	6+415	7+840
Section-2	Connection Line	0+000	0+990
	Connection Line	0+990	1+948
Section-3	Connection Line	1+948	3+171
	Connection Line	3+171	4+237
	Connection Line	4+237	5+438
	Connection Line	5+438	6+360
Section-4	Connection Line - OIZ-Yukarıburnaz Line	6+360 1+700	7+416 2+020
	Connection Line- OIZ-Yukarıburnaz Line	7+416 2+020	8+583 3+200
	Connection Line	8+583	9+596
Section-5	OIZ-Port Line	7+993	8+940
	OIZ-Port Line	8+940	9+981
	OIZ-Port Line	9+981	10+630
Section-6	Yukarıburnaz-Port Line	0+376	1+576
	Yukarıburnaz-Port Line-OIZ-Port Line	1+576 10+635	2+200 11+377
	OIZ-Port Line	11+377	12+420
	OIZ-Port Line	12+420	13+316

Section Code	Line Name	Start KM	End KM
	OIZ-Port Line	13+316	14+300
Section-7	Connection Line	9+596	10+626
	Connection Line	10+626	11+700
	Connection Line	11+700	12+786
	Connection Line	12+786	13+821
	Connection Line	13+821	14+930
	Connection Line	14+930	15+860
	Connection Line	15+860	16+770
Section-8	Connection Line	16+770	17+821
	Connection Line	17+821	18+006
	Connection Line	18+006	19+952
	Connection Line	19+952	20+780
Section-9	Connection Line	20+780	21+924
	Connection Line	21+924	23+000
	Connection Line	23+000	23+500

With the modeling study and the modeling maps (Annex-7) 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 impact during evaluation, while negative weighted values were determined as negative impact. 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 5-37).

Table 5-37 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
	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 Environmental and Social Standard 8: Cultural Heritage
- 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 impacts on tangible and intangible cultural heritage assets in the area. Some mitigation measures are proposed to minimise these impacts. 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 5-38).

Table 5-38 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.
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.

Grading	Archaeology	Built Heritage or Historic Urban Landscape
		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 study area 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 activities (m^2) and the size of the area to be negatively affected by project activies (m^2) (Table 5-39).

Table 5-39 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 5-40).

Table 5-40 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 IMPACT 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

The assessment made based on the criteria stated above are given in Table 5-40.

5.8.3. Impact Significance, Mitigation Measures, and Residual Impacts

As a result of the study in which the impact of the project to the cultural heritage was investigated, it has been determined that there are 3 registered areas and 3 unregistered archaeological / potential archaeological sites.

Issus Ancient Waterway and Ancient City of Issus belonging to Roman Period, which are registered and taken under protection by the law numbered 2863 are located within the boundaries of the project. These areas will be negatively affected by the project construction activities.

Today, the "Issus Ancient Waterway" is a well-preserved archaeological culture asset in its original form. As the result of the studies, it has been identified that the mentioned cultural asset will be negatively affected from the construction activities of the project in 4 different locations[43]. For this reason, the OIZ-Port Line route should be revised in a way that it will not damage the ancient waterway. If such a revision is not possible, the route should be re-planned with viaducts in the sections where the route cuts the ancient waterway in order to avoid destruction of the ancient structure. From the design phase of the project, for any kind of project planning, project revision and similar applications to be made in and around the ancient waterway, the Hatay Cultural Heritage Conservation Regional Board should be consulted, and the decisions to be taken by the conservation board should be followed at all stages of the project as dictated by Law No. 2863.

[43] OIZ-Port Line intersects with Issus Ancient Waterway in 4 different sections. The mileage of these sections is as follows: 2 + 150 - 2 + 500, 2 + 950 - 3 + 140, 3 + 600 - 3 + 920 and 4 + 865 - 5 + 350.

The other registered site that is affected by the project activities is the Ancient City of Issus. 0 + 000- 0 + 470 kilometer points of the Connection line pass through the borders of the ancient city. This part also includes existing Erzin Station (Station Building-Logistics Directorate building), which is a registered cultural asset. For this reason, in this part of the project, it is recommended that the project be revised to remain outside the boundaries of the ancient city of Issus. If it is not possible to avoid the site, in all phases of the project such as project design and project revision around Ancient City of Issus and Erzin Station, the Hatay Cultural Heritage Conservation Regional Board should be consulted, and the decisions to be taken by the conservation board should be followed at all stages of the project as dictated by the Law No. 2863. In addition, the vibration and sound waves of the railway to be constructed during both construction and operation phases may damage other remains, especially the aqueducts of Ancient City of Issus, over time. Considering this risk, it is recommended to design "sound barriers" in the section mentioned during the design phase of the project in a way not to disturb the visual landscape, and to incorporate these sound barriers into the railway project, and to construct the railway by designing the material that will prevent vibration as much as possible.

In addition to the registered areas mentioned above, it was identified that there are 1 archaeological site (Çatakpınarı) and 2 potential archaeological sites within the study area. Official identification and registration of these areas have not yet been carried out by the Adana Cultural Heritage Preservation Regional Board. Therefore, in accordance with the 4th article of the Law numbered 2863[44], all the data related to the areas should be shared with the Adana Cultural Heritage Preservation Regional Board and construction activities should be planned and carried out in accordance with the official decision of the board. In addition to the decisions of the Board, it is highly recommended that all construction works in these areas and its surroundings to be carried out under the supervision of an archaeologist.

The areas of the project route that are located within the construction site, and that may be directly affected by the project activities are presented in Table 5-41 in detail together with possible negative impact of the construction activities on these areas. As the result of the assessment, locations of potential archaeological and cultural assets are given by km points in Table 5-41 . In the table the areas labelled with "very high, high or medium risk" are regarded to be areas along the project route where the probability of encountering chance find is high.

[44] Obligation to inform

Table 5-41 Cultural Heritage Impact Assessment Table

EVALUATION OF IMPACTS 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 (m^2)	Size of the Area in which the Construction Activity Affects the Cultural Heritage Area (m^2)	Rate of Impact (%)	Scale and Severity of Change / Impact	General Impact	The Value of Cultural Heritage
1	CHA005	The Ancient City of Issus 1st Degree Archaeological Site	Hatay	Erzin/Yeşilkent	Registered	0	2795056.31	51953.49605	1.86	No Change	Low Impact	High
2	CHA005	Issus Ancient Waterway	Hatay	Erzin/Turunçlu	Registered	0	1132496.27	105693.4238	9.33	No Change	Low Impact	High
3	CHA005	Erzin Station Complex	Hatay	Erzin	Registered	0			0	No Change	Low Impact	High
4	CHA005	Potential Archaeological Area 1	Adana	Ceyhan/Kurtpınar	Unregistered	0	5571.76	698.778264	12.54	No Change	Neutral Impact	Medium
5	CHA005	Potential Archaeological Area 2	Adana	Ceyhan/Kurtpınar	Unregistered	0	27606.55	1416.818066	5.13	No Change	Neutral Impact	Medium
6	CHA005	Çatakpınar Archaeological Area	Adana	Ceyhan/Kurtpınar	Unregistered	0	32286.08	3592.57	11.13	No Change	Neutral Impact	Medium

As a result of field surveys and archaeological excavations in the study area, 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 mentioned in the report[45]. For this reason, an "Archaeological Potential Modeling Study" was also conducted for the project route (Table *5-36*). Model Maps for Estimating Archaeological Potential related to this modeling study was prepared and presented in Annex-7. The probability of archaeological or immovable cultural heritage assets calculated according to the results of these evaluations is given in Table 5-42 on the basis of kilometer points. The areas identified as “Very High, High and Medium Risk” in the table constitute the sections of the project route that are “likely to encounter chance finds”.

Table 5-42 Risk Levels of the Areas where Archaeological Potential Modelling was conducted

Section Code	Line Name	Start KM	End KM	Risk Level
Section-1	OIZ-Port Line	0+000	0+966	Low
	OIZ-Port Line	0+966	2+045	Very High
	OIZ-Port Line	2+045	3+170	Very High
	OIZ-Port Line	3+170	4+192	Very High
	OIZ-Port Line	4+192	5+263	Very High
	OIZ-Port Line	5+263	6+415	Very High
	OIZ-Port Line	6+415	7+840	Low
Section-2	Connection Line	0+000	0+990	Very High
	Connection Line	0+990	1+948	Very High
Section-3	Connection Line	1+948	3+171	Medium
	Connection Line	3+171	4+237	Medium
	Connection Line	4+237	5+438	Low
	Connection Line	5+438	6+360	Low
Section-4	Connection Line - OIZ-Yukarıburnaz Line	6+360 1+700	7+416 2+020	Low
	Connection Line- OIZ-Yukarıburnaz Line	7+416 2+020	8+583 3+200	Low
	Connection Line	8+583	9+596	High

[45] Chance Find

Section Code	Line Name	Start KM	End KM	Risk Level
Section-5	OIZ-Port Line	7+993	8+940	Medium
	OIZ-Port Line	8+940	9+981	High
	OIZ-Port Line	9+981	10+630	High
Section-6	Yukarıburnaz-Port Line	0+376	1+576	High
	Yukarıburnaz-Port Line-OIZ-Port Line	1+576 10+635	2+200 11+377	Very High
	OIZ-Port Line	11+377	12+420	Very High
	OIZ-Port Line	12+420	13+316	Very High
	OIZ-Port Line	13+316	14+300	High
Section-7	Connection Line	9+596	10+626	High
	Connection Line	10+626	11+700	Very High
	Connection Line	11+700	12+786	Very High
	Connection Line	12+786	13+821	Very High
	Connection Line	13+821	14+930	Very High
	Connection Line	14+930	15+860	High
	Connection Line	15+860	16+770	Very High
Section-8	Connection Line	16+770	17+821	Very High
	Connection Line	17+821	18+006	Very High
	Connection Line	18+006	19+952	Very High
	Connection Line	19+952	20+780	Very High
Section-9	Connection Line	20+780	21+924	High
	Connection Line	21+924	23+000	High
	Connection Line	23+000	23+500	High

For the reasons stated above, the prepared "Cultural Heritage Management Plan" and the "Chance Find Procedure" shall be updated by GDII and all contractors in accordance with studies to be implemented in the scope of the final design studies and the mitigation measures required by the Ministry of Culture and Tourism on the potentially affected cultural heritage sites through official opinions. The updated Cultural Heritage Management Plan and

Chance Find Procedures will reflect the organizational structure of the GDII and the in order to be used during the project construction activities and any activity requiring intervention to the ground within the project route and its impact area. These 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 Procedure" 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 social impact assessmentr study conducted to determine social impacts of the project. Determining the scope of the ESIA primarily involves identifying settlements that are expected to be affected by the project. Within the scope of scoping phase, the scope of the Project components in the construction and operation phases;

- Requiring physical and economic resettlement through housing, workplace, agricultural land and garden expropriation,
- Common areas such as pasture and forest are affected and
- Noise, vibration, dust, traffic, etc. of the project. Settlements that will be exposed to environmental impacts have been identified.

A methodology based on obtaining data from different sources has been applied to reveal the socio-economic characteristics of the settlements located near the railway route and stations and to evaluate the potential socio-economic impacts of the Project, especially in the region and in the near settlements. The quantitative and qualitative data sources of the study are:

- Turkey Statistical Institute (TUIK) and the Address Based Population Registration System (ABPRS) indicators,
- Corporate activity reports,
- Official information from stakeholder institutions and organizations,
- Consultations with the powers of the stakeholder institutions and organizations,
- Interviews with village headmen,
- Village Focus Group Meetings (OGT),
- Household surveys (HHA).

Data collection was performed as; (1) desk study, (2) official correspondence and (3) field study. Field study was carried out between 14-17 January 2020 within the scope of study. Prior to the field study, surveyors were trained on data collection tools and the Project. Some photographs from the field study are attached (See Annex-5).

During the meetings with the headmen, general information about the settlements was tried to be obtained. Settlement interview in general; 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 questions aiming to learn the views of muhtars about the project (See Annex- 2 Settlement questionnaire)

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; demographic profile of the

households, infrastructure and housing status, income generating activities, land availability, access to services such as education, health, problems in the region, and questions aiming to learn their views on the project (See Annex-3 Household survey).

With focus group meetings (OGT), which is one of the qualitative research techniques, were held with different interest groups in the region to get information and opinions with group dynamics. In these meetings; (1) expectations about the positive or negative impacts of the project on social services and infrastructure, (2) expectations of the project on the economy of the settlement, positive or negative impacts on Employment and Livelihoods, (3) on the positive or negative impacts of the project on the quality of life in the settlement. The expectations and (4) the subjects that are wanted to be informed about the project were discussed (See Annex-4 Focus Group Meeting questionnaire). The data obtained from the focus group meetings are evaluated in the impact assessment chapter.

In-depth interviews were held with stakeholders, who may be directly or indirectly affected by the project, to receive their opinions and suggestions, which are key to assessing social impacts. These; (1) local institutions and organizations (Public institutions and non-governmental organizations), (2) Organized Industrial Zone (OIZ) administrations that will be affected by the project, (3) affiliated workplace officials. The semi-structured question guidelines used in the in-depth interviews are presented in the appendix).

Several data was obtained from different sources about the socio-economic status of the region by using all the data collection techniques mentioned above. Table 5-43 summarizes the collected data on socio-economic current situation.

Table 5-43 Baseline Condition Data Sources

	Collected Data	Sources
Land use	Land use, land types (private, treasury, forest, pasture etc.)	Mukhtar meetings, TurkStat, Stakeholder meetings
Demography	Population density, population growth, population pyramids by gender / age, migration movements, average household size, population distribution in settlements	Mukhtar meetings, TurkStat
Health	Current health services in the settlements, number of beds, access to public health services, mortality rates	Mukhtar meetings, TurkStat, OGT
Education	Education opportunities in settlements, number of schools, students enrolled in primary, secondary and higher education institutions, literacy rates and education levels, access to school	Mukhtar meetings, TurkStat, OGT
Infrastructure	Access to water resources and sewerage, access to roads (existing roads, railways), access to electricity (quality of service), mobile coverage (communication), residential facilities	Mukhtar meetings, TurkStat, OGT
Economy	Employment data, labor force participation, sector-based economic data allocation (agriculture, service, industry, etc.),	TURKSTAT, Mukhtar interviews, Household

	Collected Data	Sources
	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.	surveys, OGT, Stakeholder interviews
Vulnerable groups	Access to social services, the poor, the elderly, people with disabilities, women-owned households, people without land, people who do not have homes for formal land / livelihoods for the land, ethnic minorities, communities dependent on natural resources, refugees (if any)	Mukhtar interviews, Household surveys
Intangible cultural heritage	Cultural heritage, assets, structures in the project area	Mukhtar interviews, Stakeholder interviews

Sampling Strategy

The study area was determined based on the scope of expected socio-economic impacts. Settlements where the lands with a distance of 3 km are connected to the components of the project have been examined within the scope of SIA. This scope includes the area where socio-economic and environmental impacts from land acquisition, construction and operation are expected to be seen directly. There are 1 district center (Erzin) and 6 villages (Turunçlu, Sarımazı, Yukarıburnaz, Aşağıburnaz, Yeşiltepe, Büyüktüysız) in the study area.

Populations of the settlements in the study area were taken through the TURKSTAT ADNKS system, and the approximate number of households in the neighborhoods was calculated using the average household size data of the provinces. A total of 116 households sampling with 90% reliability level and ± 0.09 error margin were calculated over the calculation currently used in the statistical sampling literature. While the total number remained constant, the number of surveys to be carried out in villages with more potential for impact on land acquisition and daily life has been increased purposefully. In this way, it was tried to increase the chance of representation of potential impacts. 113 valid questionnaires were analyzed. This number is sufficient since quantitative data is supported by qualitative character OGTs performed with men, women and young people in settlements with more intense potential.

Table 5-44 Sampling by Settlements

Province/District	Settlement	Population*	Total Number of Household**	Percentage	Impact of Land Acquisition	Impacts on Livelihodd	Number of HHA	Number of OGT	Number of Mukhtar Interview
Adana / Ceyhan	Sarımazı	3,568	964	30.0	Yüksek	Orta	31	1	1
Hatay / Erzin	Turunçlu	562	146	4.0	Yüksek	Orta	16	1	1
	Aşağıburnaz	280	72	2.0	Orta	Yüksek	8	1	1
	Yeşiltepe	1,267	329	10.0	Düşük	Düşük	16	0	1
	Yukarıburnaz	596	155	5.0	Orta	Yüksek	16	2	1
Osmaniye/ Toprakkale	Büyüktüysüz	4,169	1,142	35.0	Düşük	Düşük	10	0	1
Toplam		11,372	3,220	100.0	-	-	113	5	7

Data sources other than residential areas were also used to calculate the socio-economic impacts of the HIA study. Accordingly, the institutions, organizations and businesses that are visited within the scope of assessment and interviewed with their officials are as follows:

- Three businesses that will be affected by physical displacement:
  - Süper Enerji Madencilik A.Ş.
  - Toros Tarım Sanayi ve Ticaret A.Ş.
  - Kron Filtre Sanayi ve Ticaret A.Ş. (Parcel No. 113/3)
- OIZ & Free Zone Managements:
  - Osmaniye OIZ
  - Yumurtalık Free Zone
- District level institutions and organizations[46]:
  - Erzin District Directorate of Agriculture

[46] Both governmental and non-governmental organizations have a positive outlook regarding the project that has been expected for many years. For this reason, firstly, the representatives of the institutions and organizations that can evaluate the impacts of the project that may require measures were discussed. These were mostly negotiations about the agricultural areas in AoI in Erzin. Ceyhan (Adana) and Toprakkale (Osmaniye) stakeholder meetings were held in the RAP field study.

- Erzin Chamber of Industry and Trade
- Erzin Chamber of Agriculture
- Erzin Irrigation Cooperative

In the following chapters, in the light of the information obtained from the data sources, both the baseline situation of the socio-economic environment will be revealed and the potential impacts of the project will be analyzed. In the survey conducted with the households, which are the primary data source, 113 people between 19 and 87 ages were interviewed face to face. The distribution of these persons by age is presented in the table.

Table 5-45 Distribution of Interviewees by Age

Age Group	N	%
19-25	12	10.6
26-40	26	23.0
41-65	64	56.6
65+	11	9.7
Total	113	100.0

The distribution of the interviewees by gender shows that the rate of males is 82% and the rate of females is 18%. Distribution of interviewees according to their education levels is presented in the below table.

Table 5-46 Distribution of Interviewees by Education Level

Education Level	N	%
Illiterate	4	3.5
Literate Only	1	0.9
Primary School Abandoned	1	0.9
Primary School Graduate	58	51.3
Middle School Graduate	10	8.8
High School Abandoned	24	21.2
High School Graduate	11	9.7
Junior College Student	1	0.9
Junior College Graduate	1	0.9
University Graduate	2	1.8
Total	113	100.0

Source: Socio-Economic Household Survey, 2020

Considering the occupation distribution of the same sample, it is seen that 15% farming and 22% retirement responses were received. The highest occupation in the sample is workmanship (25%) and it is seen that women are housewives.

Table 5-47 Distribution of Interviewees by Occupation

Occupation	N	%
Farmer	18	15.9
Tradesman	9	8.0
Retired	25	22.1
Daily/seasonal worker	1	.9
Worker	28	24.8
Unemployed	13	11.5
Civil servant	3	2.7
Housewife	16	14.2
Total	113	100.0

Source: Socio-Economic Household Survey, 2020

The number of households with at least one unemployed member is 37. Of the households where at least one person works, one in 58, two in 15, three in 2, four in 1 person work and generating income.

Among the respondents, 51 people stated that they were not aware of the project, while 62 people stated that they had heard about the project before. Persons who already had information expressed their sources of information as Family members, Mukhtars, Municipality, Tosyalı Holding officials and workers working in the Tosyalı Holding. One person stated that he learned from internet news and one person learned from a meeting held by Tosyalı Holding.

Mukhtar interviews, in which information about the settlement area were obtained, were made with the muhtars who had previously made appointments, and Yeşiltepe and Büyüktüysüz interviews were conducted with members.

The evaluations of 14 women and 21 men regarding the project impacts were taken with the OGTs in the relatively intense settlements. OGT was carried out with the men who were farmers, shippers and industrial workers in Aşağıburnaz and Yukarıburnaz settlements. The total number of participants between the ages of 25 and 72 is 14. The names of male individuals whose participation was registered with signature are presented in the participant lists (See Annex-4). Another OGT was built with young men in Sarımazı. Among the young people who are welders, soldiers, workers in the rural service sector, there are secondary school, high school and university graduates. The participation of young men between the ages of 18 and 23 is registered with a signature, and their name and contact information are presented in the participant list.

With the two OGTs conducted with women in Turunçlu and Yukarıburnaz, the impact expectations of 14 women on the project were learned. While 85% of women between the ages of 22 and 74 are housewives, one of the two women who are high school and university

graduates work and the other is looking for a job. Except for a 22-year-old participant, the participation of all married women was registered with signature and name and contact information were presented in the participant lists.

Data Analysis

After the control of the questionnaires applied in the household surveys 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 analysis was conducted.

Impact Assessment

The benefical and adverse, permanent and temporary, short-term and long-term impacts and impact groups of the Project, how and at what level were determined by assessment of collected primary and secondary data, qualitative and quantitative data. Suggestions have been developed for the identified impacts and impact groups that will increase the positive impacts and ensure that they will benefit more people. Suggestions have been prepared to avoid or to minimize the adverse impacts or and the number of people to be affected and to compensate for the negative impacts.

The assessment has adopted the impact assessment method used for the broader ESIA and the severity of the impacts has been determined based on the sensitivity of the receptors and the overall magnitude of the Project impact on that particular recipient. The magnitude of the impact is determined by using qualitative methods, predominantly on expert judgment, when quantitative data is not avaiable.

In accordance with these provisions, a number of criteria were used together in this study to reveal the impact significance. With these criteria, impacts are classified as major, moderate, minor, or negligible. The criteria and evaluation levels are:

- Impact Direction: beneficial-adverse
- Impact Magnitude: low-medium-high
- Receptor Sensitivity: low-medium-high
- Geographi extent: local, regional-national
- Duration: long term-short term
- Frequency: one off-intermittent-continous
- Reversibility: Irreversible, long-term reversible, short-term reversible

Limitations

The limitation of the study was the thight schedule of social impact assessment and RAP studies and starting these studies before the land acquisition process begins. While the studies are continuing, the field study has been completed in a healthy manner after gathering necessary data from GDII. However, there is still the possibility of changes in the proposed project locations. This may require additional studies and specific investigations.

In the asset inventory provided by GDII, it seems that two existing factories will be affected due to the station planned to be built in Osmaniye OIZ, but since it was informed that the station location will be changed by avoiding these, no interviews were made with the managers of these two businesses (Essel San. Tic. A.Ş. and Kron Industry and Trade Inc.).

5.9.1.2. Project 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 26 states that all relevant environmental and social risks and impacts as the result of the project should be covered in the assessment, including 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.

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

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.

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. Impactive 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

Railway projects can have both positive and negative socio-economic imapcts. While improvements in transportation infrastructure contribute to the economic potential of the region and create new business opportunities, permanent or temporary negative impacts can be expected on various groups and communities in neighboring settlements both during the construction and operation phases of the project. In such projects, negative impacts can be expected in some areas. The most important of these is the livelihood losses due to land acquisition. Examples include agricultural land losses, pasture land losses or access barriers, loss of livelihood strategies based on utilization of public lands, loss of immovable property values such as structures, changes in businesses or access barriers to businesses.

The labor influx due to the project may have an impact on the population and social structure. With the change in social infrastructure, it can create transformative impacts on daily life, and adverse impacts on quality of life can be expected due to discomfort, noise, air emissions and traffic associated with construction. It is possible to encounter possible

negative impacts on community health and safety. Public health and safety problems during land preparation and construction phase are possible community tensions that may arise due to traffic safety, risk of infectious diseases, excavation management and construction related activities. In this section, suggestions for mitigation measures will be developed within the framework of investigations for expected domains. In the development of these suggestions, a participatory approach is determined and the opinions and suggestions of all stakeholders are taken into consideration. More detailed expert judgements on the project's potential impacts due to noise, air emissions, water use and interaction with water resources and waste generation are presented earlier in this report.

While assessing the socio-economic impacts of the project, the impacts related to the land preparation and construction phase were assessed to include the land acquisition process, the preparation of the construction sites and the commencement of construction activities, and the long-term impacts of the operation phase were discussed later. Assessment of permanent impacts related to land acquisition within a strategic planning are included in the RAP in more detail.

5.9.2.1. Population and Social Life

Population projections for the project area are presented under the title of Socio-Economic Environment. In this Chapter, the expected impacts on the population in the vicinity of the project area will be assessed.

Land Preparation and Construction Phase

The main impact expected on the population during the land preparation and construction phase is the population increase caused by the workers employed during the construction activity. This impact provides economic mobility while putting pressure on infrastructure and resources.

The socio-cultural impacts of population growth resulting from personnel employed in construction activities have the potential for social conflict.

The fact that geography is a cosmopolitan region where individuals of different cultural backgrounds live together increases the possibility of encountering a culturally hospitable approach. The community's hospitable approach has emerged in OGTs in affected villages. Stating that they do not expect any socio-cultural conflict with the workers coming from outside, the participants did not express any concern about the workers coming from outside.

In Yukariburnaz, where construction activities approached the residential areas the most, the women stated that they did not expect much problems, and mentioned the possibility of increased theft. While the men of the same village stated that their doors are open to the workers coming from outside and that they do not expect a social problem, they also emphasized that new workers have a commercial potential. However, their main concern is that if the number of workers coming from outside is high, they will not be able to find employment in such a nearby project.

Women in Turunclu, on the other hand, stated that the workers coming from outside would not bother themselves, they would be more likely to deal with their spouses (men) and that they could use the village coffee, and they did not have a concern for social conflict.

In the meeting with young men in Sarımazı, it was learned that they do not have any concern in terms of social conflivt with external workers. The young people think that the communication that will occur with the outside workers shopping from the village will make a positive contribution to both the economy of the village and social harmony.

In the focus group meeting with Aşağıburnaz village men, some questions need to be answered. Village men do not have any expectations from the project in terms of employment or commercial mobility. On the other hand, they do not see foreign workers as a potential for social conflict. However, the roads to be used during the construction activities and whether the project will restrict the access to the lands used by the community have a decisive impact on these thoughts. If these concerns are resolved, there is no possibility of social negativity about the workers coming to the region.

There are negative experiences of the inhabitants of Aşağıburnaz village in some past projects. These; It can be summarized as the division of lands due to the highway project, the lack of employment opportunities in the projects and the positive impact of the project on the villages. These experiences cause them to take a cautious approach. However, since these experiences do not include the title of conflict with external workers, it cannot be said that they have a negative expectation regarding this issue.

The inhabitants of the village of Aşağıburnaz talked about the beach and the coastal road they used to swim, wondering if this area was used within the scope of the project. There is no social facility like a coffeehouse in the village, but it is stated that it is important in the social life of the beach.

All these issues can be examined in more detail with the clarification of the locations of the construction sites and the roads to be used in the construction process.

Gender-based violence (GBV) and sexual harassment and abuse (SHA) issues become important due to population growth. 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.

Operation Phase

In the operation phase of the project, there will be an indirect impact on the population. The Project which will provide port connection to Osmaniye OIZ, Yumurtalik Free Zone, Erzin station, provides advantages for industrial investments. The project, which is expected to attract industrial investment in the region, is expected to attract workers and professional groups in the long term.

Mitigation 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. The fact that workers coming to the region from outside have similar cultural characteristics will facilitate the construction activities by creating a harmonious environment. LMP is committed to employing the local workforce within the scope of the project. It is known that there are problems with finding qualified workers from the region in jobs that require expertise.

As presented in detail in the SEP, a grievance mechanism to be used by both employees and local households will be in place at all stages of the construction phase; This mechanism can be used to resolve any disputes. Proper operation of the mechanism will create a sense of trust in the solution of problems in employees and local communities, reducing the likelihood of conflict preference as a solution.

It is recommended that workers are informed about social relations in the orientation process. It is useful to provide information on local culture, impactive and nonviolent communication in information activities. At the same time, informing the employees about

the project's environmental and social policies and mitigation measures contributes to the establishment of the right communication in encounters with local communities.

It is recommended to prioritize local businesses in the acquisition of goods and services to increase the local benefits and impression of the project.

Physical arrangements also have an impact on preventing social problems. It is important to make arrangements in Yukariburnaz village, where the project activities will be felt closely, to allow the people of the village to move to pasture and agricultural lands, and to take measures that do not prevent the residents of the coastal road in Aşağıburnaz village. In the figure below, it is seen that the road used by the villagers to the shore is cut by the railway connection line.

Figure 5-21 Coast and Coastal Road used by Local People

In order to avoid social problems, sensitivity should be shown in choosing construction sites and determining the roads to be used in the construction process. It is recommended that village roads should not be used by heavy tonnage vehicles.

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)[47] who will work at site.
- The CLO(s) will be informed and trained if necessary about GBV/SHA issues.
- In the training of Project workers, in addition to the socio-cultural characteristics and nonviolence, the issue of GBV will be included in the agenda. Worker training should include the following information:

[47] The roles and responsibilities of the personnel are detailed in the SEP and RAP.

- Definition of violence against women in national and international documents,
- Types of violence (physical, sexual, economic, emotional),
- Legal enforcements.

- 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.
- Cooperation should be made with Erzin Seasonal Agricultural Workers Solidarity Association to inform seasonal agricultural workers.

5.9.2.2. Impacted Land and Other Assets, Economic and Physical Displacement

This chapter consists of three main titles like other chapters. These are; (1) land preparation and construction phase, (2) operational phase, (3) mitigation measures. Temporary and permanent displacement issues will be examined under the first title, as they relate to land acquisition at the land preparation stage. These issues are as listed below.

- Land loss
- Loss of immovable assets on land
- Economic and physical displacement issues in terms of agricultural activity
- Economic and physical displacement issues in terms of industrial activities

Land Preparation and Construction Phase

The most important activity of the land preparation stage is the expropriation of the private lands to which the railway line will pass, and the acquisition of public lands by allocation. When the necessary information is received, the expropriation method, which law it is based on, and the dates of expropriation and public benefit decisions will be presented. Land and immovable property losses due to land acquisition are discussed in more detail in the RAP.

Although the railway routes were determined considering mininmum adverse impacts on agricultural lands either positioning the routes at the edges of the lands or using treasure lands, agricultural land use could be partially minimized on the railway line between Osmaniye OIZ and Erzin Port. The fact that some agricultural lands, two workplaces and the passage of Yukarıburnaz pasture to the Erzin Port – Yumurtalık Free Zone line requires a more detailed examination of socio-economic impacts. Because this component of the project causes some situations that are considered within the scope of WB ESS5.

Table 5-48 Land Acquisition Issues to Be Evaluated in terms of International Standards

WB ESS5	Land Acquisition Subject
Land loss	Loss of agricultural land in the Erzin-Dörtyol plain (It is in the status of protected plain)

Loss of immovable assets on land	Damage to trees Damage to irrigation channels
Economic and physical displacement issues in terms of agricultural/industrial activities	Division of agricultural land
	Restriction of access to agricultural lands
	Restriction of access to pastures
	Status of informal users of public lands
	Loss of income of households engaged in agricultural activities
	Physical displacement of Süper Enerji and the parking area of Toros Tarım
	Prevention of transportation activities in industrial sites due to construction works

The parcels that will be used within the scope of the project will be permanently and partially acquired. The affected parcel numbers and features are presented in detail in the RAP.

Considering the distribution of the responses given to the questions about the positive and negative impacts expected in the household surveys, it is seen that 50% of the Yukarıburnaz villagers are concerned about the damage of their crops and trees, while 57% of the Aşağıburnaz people have the same concern. 25% of the inhabitants of Yukarıburnaz are concerned about the access to agricultural land, while Aşağıburnaz villagers do not have such negative expectations.

Table 5-49 Expected Negative Impacts regarding Land Acquisition in HHA Study

Settlement	Access to land will be restricted	Damage to land	Damage on crops and trees	Damage to pasture land / Loss of pasture land	Adverse impacts on livelihood caused by expropriation
Yukarıburnaz	4	4	8	3	3
	25.0%	25.0%	50.0%	18.8%	18.8%
Aşağıburnaz	0	2	4	2	2
	0.0%	28.6%	57.1%	28.6%	28.6%
Yeşiltepe	2	2	6	2	1
	12.5%	12.5%	37.5%	12.5%	6.3%
Sarımazı	5	8	10	2	6
	16.1%	25.8%	32.3%	6.5%	19.4%
Turunçlu	3	1	6	3	3
	18.8%	6.3%	37.5%	18.8%	18.8%
Büyüktüysüz	1	3	5	5	2
	10.0%	30.0%	50.0%	50.0%	20.0%
Total	**21**	**25**	**45**	**22**	**21**

Source: Socio-Economic Household Survey, 2020

The concerns of Yeşiltepe, Sarımazı and Turunçlu residents regarding land acquisition are low. 50% of the household representatives of Büyüktuyüz are concerned about pasture and meadows, and 50% are concerned about the damage of crops and trees. However, agricultural areas and pastures will not be used within the scope of the project within the boundaries of Büyüktüyisüz. It was thought that the source of this concern may be negative experiences in the construction of OIZ.

Land loss of landowners

For the landowners, in the case of partial acquisition of the lands as in this project, the total land assets and basic livelihoods of the owners are important. A 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.

Agricultural land use could be avoided on the railway line which will descend from Osmaniye OSB to Erzin port. This situation was welcomed during the HIA meetings in the region. It was learned that a highway project descending to the port has a plan that progresses without dividing the agricultural lands, such as the railway connection line project, but was later

changed to pass through the agricultural lands. This project was a trial and was left unfinished.

Figure 5-22 Views of Incomplete highway project, which divided the agricultural lands

Loss of immovable assets on land

The loss of land in this region also causes some loss of values on the soil. Irrigation channels, which were built by DSI with large budgets, are the leading ones. During the interview with the head of Erzin Irrigation Cooperative Mustafa Vural, information about water and irrigation systems were obtained. Stating that the citrus production in the region is made with 99% drip irrigation system, the chairman stated that they are concerned about the damage of the irrigation channels built by DSI. It is stated that a disruption in irrigation canals may affect the wider area. To protect irrigation systems and water wells, the project proposed plotters to seek opinions from relevant stakeholders.

While the engineers working in the Erzin Agricultural District Directorate stated that the project does not have the potential to create large agricultural losses, it drew attention to some impacts on the parcel basis. At the beginning of these are irrigation channels. It was stated that the project route may prevent maintenance and repair activities of DSI in irrigation canals and avoiding these agricultural lands will provide cost-cutting benefits to the state.

The head of the Erzin Chamber of Agriculture stated that the agricultural infrastructure and roads will be damaged along with the agricultural lands due to the planned route. He reminded that DSI has invested heavily in the pressurized drip irrigation system in the region. He suggested that the project choose a more economical route.

Division and partial expropriation of lands for landowners

The division and partial expropriation of the land reduces the value of the land and creates a negative impact on the owners.

Economic and physical displacement for users

Economic and physical displacement are mainly related to unplanned change in people's existing residences and income sources. Displacement issues, which we will consider within the scope of this project, can create temporary and permanent impacts. These impacts identified within the framework of the study, which are discussed in more detail within the scope of RAP, are presented in table below.

Table 5-50 Temporary and Permanent Impacts on Income Sources

Subject	Temporary Impact	Permanent Impact	Affected People	Approximate Number of Household Expected to Be Affected
Loss of private land used for agricultural activity	-	Users' loss of income	• Owner users • Shareholder users • Users (tenant, partner, etc.)	50-60
Loss of immovable assets on private land	-			50-60
Loss of public land used in income generating activities	-	Informal users lose revenue (they may permanently stop earning income from the entire land)	• Illegal users	30-40
Loss of assets on public lands	-			30-40
Division of private agricultural land	Difficulty in accessing to the rest of the divided lands due to construction activities	Transportation to the opposite side of the divided agricultural lands due to the railway line	• Owner users • Shareholder users • Users (tenant, partner, etc.)	30-40
Division of public agricultural land	Due to construction activities, illegal users have difficulty in accessing the rest of the divided lands.	Due to the railway line constructed, illegal access of users to the opposite side of the divided agricultural land	• Illegal users	20-30
Division of pasture	Difficulty in accessing to the rest of the pastures divided due to construction activities	Access to the opposite side of the pastures divided due to the railway line	• Livestock farmers • Shepherd	5-6
Restriction of acccess to private agricultural lands	Cost increase due to restriction of access from villages to lands during construction phase	Increase in costs due to preventing transitions from villages to lands during operation phase	• Owner users • Shareholder users • Users (tenant, partner, etc.)	10-20
Restriction of acccess to public agricultural lands	Cost increase for illegal users due to restriction of access from villages to lands due to construction activities	Illegal users increase costs due to preventing transitions from villages to lands due to the railway	• Illegal users	10-20

Subject	Temporary Impact	Permanent Impact	Affected People	Approximate Number of Household Expected to Be Affected
Restriction of acccess to pastures	Restriction of access from villages to pastures with animals due to construction activities and increased costs	Prevention of passage from villages to pastures with animals due to the railway and increased cost	• Livestock farmers • Shepherd	5-6
Building a station in Adana Yumurtalik Free Zone	Prevention of transportation activities in TAYSEB region and increase of costs	-	• Toros Tarım management employees • Industrialists within TAYSEB • TAYSEB management • Transportation companies waiting for loading and unloading queues and individual trucks and truckers at Torosport Ceyhan Port • Domestic and foreign companies using the port	200-300
	Displacement costs of the parking area of Toros Tarım A.Ş.	-	• Toros Tarım management • TAYSEB management	100-200
	Displacement costs of Süper Enerji Coal Storage and Processing Plant	Increase in transportation costs for employees	• Süper Enerji management and employees • Companies receiving services from Süper Energy • Companies and dsitributors buying processed goods from Süper Enerji and their customers	30-50

Loss of private land and assets used for agricultural activity

Expropriation costs are calculated by taking into consideration the annual net income amounts in the use of the private lands within the scope of the project. In this way, the owner users may not lose while transferring their rights to the state without losing income. However, if the person who receives income from the land is a shareholder or only user (tenant, partner, etc.), the amount of loss increases. Therefore, importance and priority should be given to users within the scope of RAP.

Stating that the project is expected with widespread acceptance and desire, the head of the Erzin Irrigation Cooperative stated that the victims of land without any title should be considered for both the people of the region and the project owners.

The most significant assets to be lost are fruit trees and crops on the affected lands. Allowing the farmers to harvest the field crops before construction activities is very crucial to reduce the impact.[48]

Loss of public land and assets on income generating activities

Public lands are used in local residents both in agricultural activities and livestock activities. If these lands are used within the scope of the project, these people will also experience economic losses. Within the scope of RAP, users of public lands should also be taken into consideration.

The most significant assets to be lost are fruit trees and crops on the affected lands. Allowing the farmers to harvest the field crops before construction activities is very crucial to reduce the impact.

Restriction of access roads from villages to agricultural lands and pastures

Access of the local communities to agricultural lands or pastures can be interrupted in two ways due to the project activities; (1) temporarily due to construction works; (2) permanently due to the railway line. Anxiety and suggestions related to the subject were taken in OGTs in Yukariburnaz village, where the impact is expected.

Table 5-51 The concerns and suggestions of Yukariburnaz residents about transition to agricultural lands and pastures

Group	Concern	Recommendation
Yukarıburnaz women	Since the station is installed in the village pasture and passage area, the passages become dangerous and animals can be crushed.	Security measures should be taken. Animals should not be able to enter the train track even when they are alone. They think that experts will know what kind of precautions can be taken.
Yukarıburnaz men	The station prevents passage to the village pasture.	Underpass or level crossings that allow passage with animals should be done frequently. Because pastures can be reached in more than one way.
	The agricultural lands are towards the beach (in the village of Asaburnburnaz).	The roads to which there has been transferred must be open.
		If employment opportunities are provided, the number of people engaged in these activities will decrease.

Source: Focus Group Discussions, 2020

In the household survey conducted in Yukarıburnaz, 4 people stated that there will be a problem in access to agricultural lands.

[48] This loss will also occur on the lands that will be used temporarily for other Project components such as access roads etc.

These concerns and suggestions are related to the special location of Yukariburnaz village within the scope of the project. Village residents have shown the locations of agricultural lands and pastures on the map.

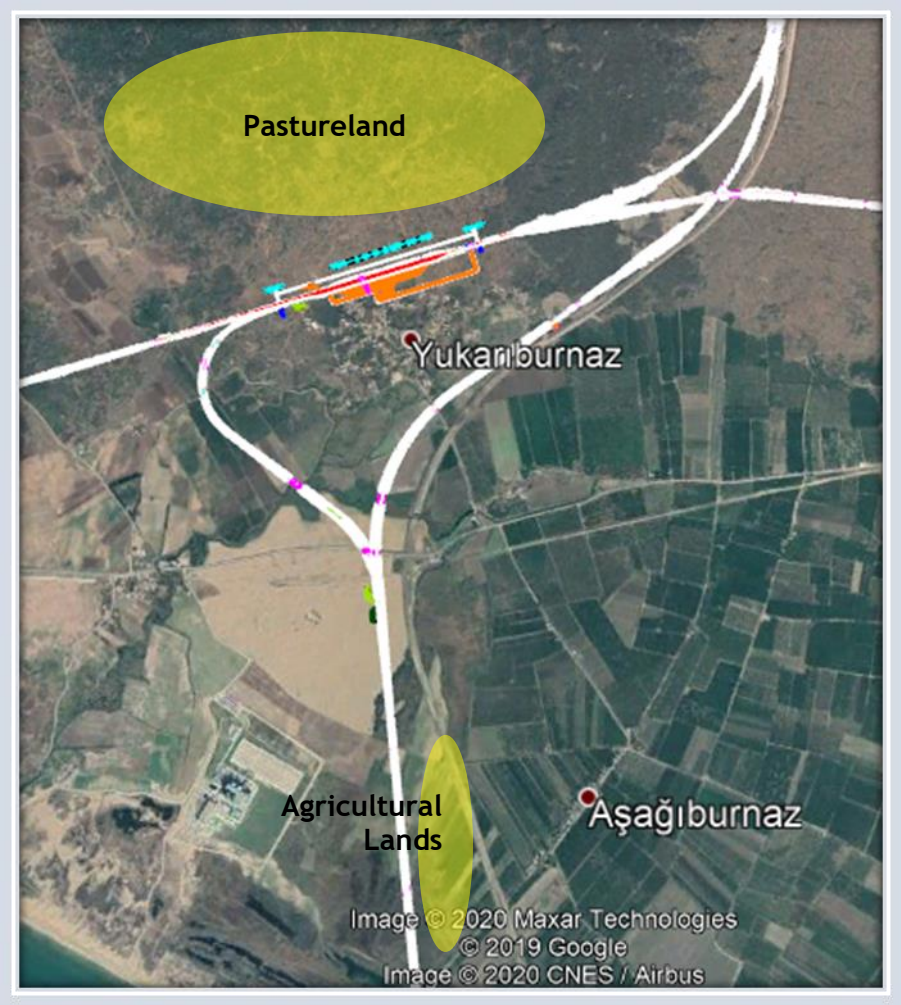

Figure 5-23 Agricultural lands and places of pastures used by Yukarıburnaz villagers

Both cases were examined within the scope of RAP and necessary measures will be developed.

Division of agriculture lands and pastures

The division of agricultural land is another issue that has a negative impact on income sources. Here, besides some land loss, there may be an obstacle to land users from one side to the other. This could be both a temporary construction problem and a permanent railroad route problem. Both cases should be handled within the scope of RAP and if any, loss losses should be calculated by calculating income losses.

While the engineers working in the Erzin Agricultural District Directorate stated that the project does not have the potential to create large agricultural losses, it drew attention to some impacts on the parcel basis. These issues include the increase of costs by creating transportation barriers during agricultural harvesting and the division of agricultural lands.

Physical Displacement of Süper Enerji Coal Storage and Processing Plant

There are businesses that are subject to displacement that land acquisition also affects outside of agricultural activity. One of them is Süper Enerji Coal Depot and Processing Plant Inc., located at the place where the station in Yumurtalik Free Zone will be built.

Interview was made with the Operation Manager, who has been working in the company for 17 years. The company is located in an area of 56 acres performing the packaging of the coal by sea to Turkey from abroad and distributing market activities,. There are five branches throughout Turkey.

Figure 5-24 Süper Enerji Coal Processing Plant

Operations manager stated that they knew about the Project during the drilling works, they knew that the ground was deemed appropriate, but they did not know the details of the line and station plans.

The Operations manager was also asked questions about the moving plans that were displaced due to the project. However, the Operations Manager, who has learned that they have no such plans since they have not been officially informed, may think that there may be danger of closure. Because some of the criteria must be together for their business to continue as it is today. These criteria can be listed as follows:

- It is necessary to be close to the port,
- It is necessary to be close to highway connection roads,
- It is necessary to be away from the residential area.

If these criteria do not meet, company activity will need to change shape. For example, the type of transport will have to change. The operations manager stated that the shipping type would change if they were displaced, which would require a number of new expenses.

In addition, there may be some job losses due to the cessation of activity during the move. It is learned that approximately 100 vehicles enter and exit for transportation to the facility daily (2500 vehicles per month). The expected approximate cost is expressed as $ 130,000.00.

In case of loss of work due to the railway station of Süper Enerji, its customers, dealers, TAYSEB and Torosport Ceyhan Port businesses, which are the customers of the company, the truck / truck owners and drivers who carry transportation will be affected. It is thought that customers may start working with other companies if the shipment stops.

Stating that the railroad project could create new opportunities for them if it did not cause displacement and costs, the business manager expressed some concerns and suggestions. It is important to operate stakeholder engagement processes and consider these issues:

- There is Kirkuk-Yumurtalik Crude Oil Pipeline of BOTAŞ[49] passing through the public land near the train station. He thinks that a train station cannot be built near this line.
- It was asked why the public land between the train station will be located and the Yumurtalik Free Zone highway connection is not used for the station. This question should be considered as an alternative place proposal (see *Figure* 5-25).

[49] Kirkuk-Yumurtalik Crude Oil Pipeline (Iraq - Turkey Crude Oil Pipeline) was built in order to transport the crude oil produced in Kirkuk field and other fields of Iraq to the Ceyhan (Yumurtalık) Marine Terminal within the framework of the Crude Oil Pipeline Agreement between the Republic of Turkey and the Republic of Iraq signed on 27 August 1973. BOTAŞ is the owner of the part of pipeline that is in the territory of the Republic of Turkey and also is the operator of that part of pipeline (Republic of Turkey Ministry of Energy and Natural Resources, tarih yok).

Figure 5-25 Alternative location: Public land between the place where the train station will be built (Süper Enerji) and the Yumurtalik Free Zone Highway Connection

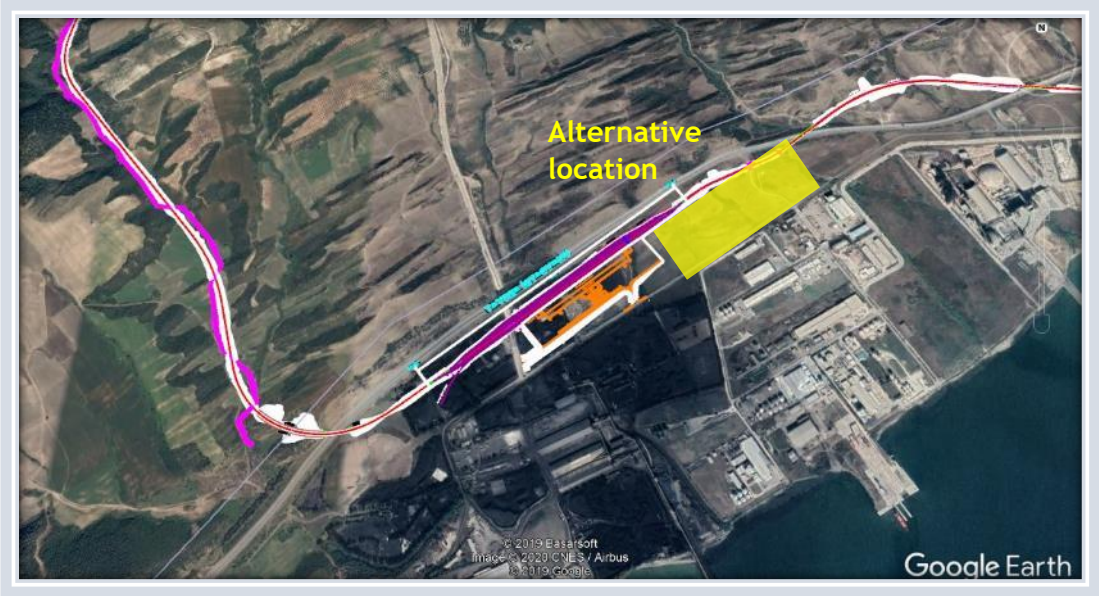

Figure 5-26 Alternative location satellite image: Public land between the place where the train station will be built (Süper Enerji) and the Yumurtalik Free Zone Highway Connection

- The operations manager requests information from the authorities on the location, schedule and capacity of the project.
- They do not want to be victimized in terms of job loss due to displacement, cessation of activity, having to move away from the field of activity, and new expenses.

Displacement of Toros Tarım A.Ş. Park Area

The parking area of Toros Tarım, which performs fertilizer transportation, is planned to be used for the construction of the Free Zone train station to be built within the scope of the project. In the meeting held with Nezir Bey and related managers, engineers, information was obtained about the features of this park area and its place in the commercial activities of the company.

Figure 5-27 The location of the parking area of Toros Tarım

Apart from Toros Tarım, the park area, which is the waiting area of trucks and trucks that carry out the transportation activities of other industrial establishments in the Adana Yumurtalik Free Zone, operates at 26.7 decares of land. However, it is expected that the need for road transport will decrease slightly by providing railway connection. Nevertheless, it has been stated that there will be a need for road transport vehicles between industrial transmissions and the railway. Vehicles waiting for the loading order in the park area carry products such as coal, grain and fuel oil. There is one office in the field.

Figure 5-28 Views of Toros Tarım Parking Area

The authorities stated that 800 to 1000 vehicle movements take place daily at the parking area, and the owners stated that they serve approximately 750 trucks living in nearby settlements. The officials, who stated that if their customers named Süper Enerji are displaced, an income loss of approximately $ 1.5 million will occur and this means that there is a 3% job loss for Toros. The company, which plans to renew the park area, has suspended these plans due to the railway connection project.

The characteristics of a suitable parking area were discussed with the authorities, who thought that the whole region would have difficulties in finding an alternative parking area due to its parcel and planned. A suitable parking area can be located either in the empty public land between the Free Zone highway connection road and Süper Enerji or in the lands reserved for Ceyhan Mega Petrochemical Industrial Zone and Ceyhan OIZ.

Figure 5-29 Industrial Zones Planned to be Built

View of the area that is more suitable to be used for the station. It is located between the Free Zone highway connection road and Süper Enerji. If this area is used for the station, there is no need for the resettlement of Toros Tarım's parking area and Süper Enerji.

In the meeting, it was stated that the railway connection project will provide them with great advantages in the long term and it is expected to compensate for the problems in the near future.

Figure 5-30 Views from free zone highway connection

Cumulative Impacts

The project area and its immediate vicinity include important sites for industry, tourism, commerce and agriculture. Difficulties in combined development of these areas are discussed in some detail under the title "Local Economy, Livelihood and Employment" in the Socio-Economic Environment section. Çukurova Region and the Erzin-Dörtyol basin where the project area is located include the very fertile agricultural lands. Agricultural potentials of the basin is again discussed under the section mentioned above. This section also contains information about the development of the region in terms of its being more inclined to industry rather than the agriculture. This inclination is important and we drove attention to the sources of cumulative impact on the land acquisition process.

The shifting the balance of development from agriculture to industry causes on the increase of investments on infrastructure in certain regions. This situation also increases the intensity and the scope of the cumulative impacts. Proposed Organised Industrial Zone testifies the industrial development which is one of the subjects of this report with a particular emphasis on the Cumulative Impact Assessment. This aspect is investigated under a separate heading. The rail network in question is going to serve this industrial zone.

All these investments require a substantial infrastructure programme. Therefore the same area will be subject to different projects processing in tandem. The other projects that would have impact on the agricultural areas of the region include; construction of roads and highways, various energy projects, pipeline projects, industrial zone projects and port developments. The PAPs whose land affected by all these developments are also paid a special attention in the RAP.

Operation Phase

All displacement issues related to land acquisition are covered in the previous chapter as the subject of the "Land Preparation and Construction" phase. There is no displacement issue based on land acquisition during the operation phase of the project.

Economic impacts are expected during the operation phase, such as industrial development, reducing agricultural activities in the long term, and rail transport getting ahead of the road. These issues will be discussed under the heading “Local Economy, Livelihoods and Employment”.

Mitigation Measures

Land acquisition of the project will be in accordance with national laws and in the event of gaps between WB ESS5, the necessary measures to close these gaps will be determined within the scope of the RAP. 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 technical reasons, some agricultural lands, a workplace and a park area in the Yumurtalik Free Zone remained within the project area.

The project is not exempted from the Council of Ministers' 2016 Decision on the Determination of Some Plains as a Great Plain Protection Area as of the date of planning. The date of introduction of Erzin-Dörtyol plain into this scope is 08.01.2018. So, it is necessary to answer the questions of the stakeholders about why the route to be used within the scope of the project is not drawn in a way that affects less agricultural land. If possible, the use of plots in the Erzin-Dörtyol plain should be avoided.

The question of why a different route (for example, see the yellow ring instead of the area within the orange ring in Figure 5-31) is frequently asked in the area, in order not to damage both fertile agricultural lands and irrigation systems. The technical response of this question should be shared with stakeholders.

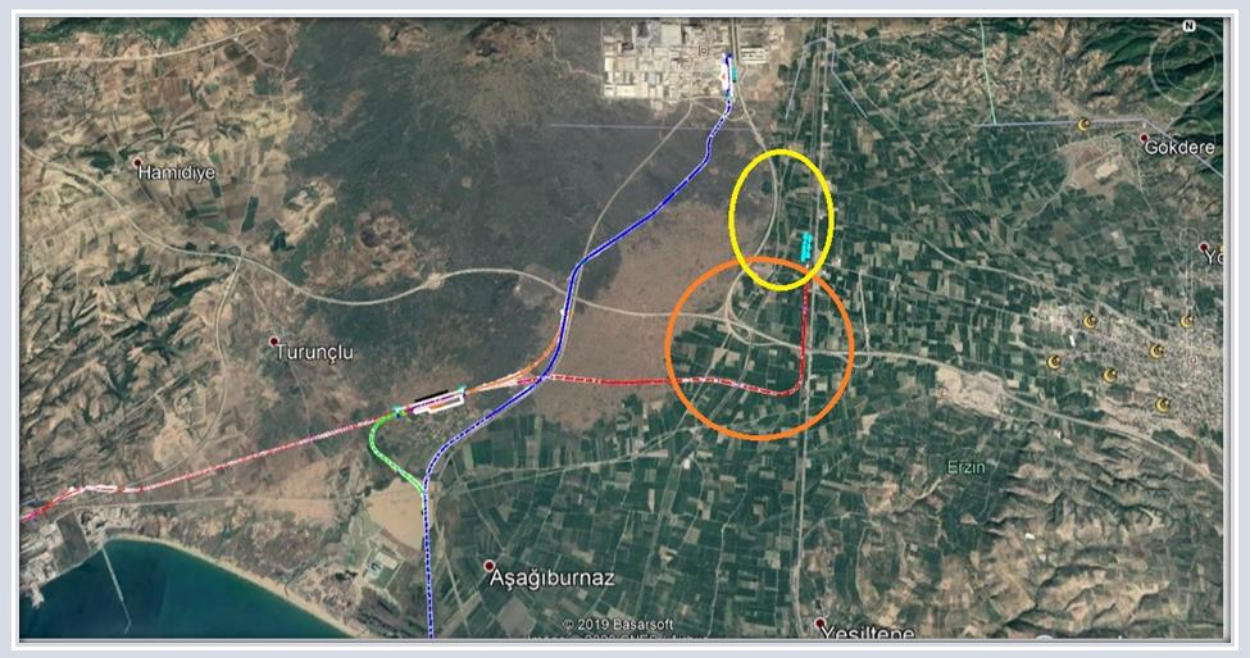

Figure 5-31 Alternative route proposal encountered in the field study (planned: orange ring, recommended: yellow ring)

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. These forms of compensation will be planned within the scope of RAP.

In the impacts on income sources, (1) land owners, (2) land users and beneficiaries are defined as beneficiaries. Under the RAP, measures to prevent loss of income will be offered for both groups. The expropriation value to be paid to the landowners must be in place of replacement, including additional costs. Users of the land may be operating formally or informally. Both situations create rights.

It has been learned that people who have not received the title of their lands for many years have engaged in agricultural activities in the region. In a land acquisition methodology of WB standards, income losses on such groups should be avoided. Identifying such persons, examining income sources, measuring income losses and identifying their rights ownership will be within the scope of RAP.

Livestock activities are intense in the region. Impacts on public pasture lands reserved for these activities will also have an impact on livelihoods. For this reason, these areas should also be taken into consideration in compensating losses and will therefore be covered by RAP.

Permanent limitation of both the connections between the villages and the lands used and the possibilities of access from one part of the divided land to another may result in additional costs. Since the railway is an overground line, blocking the crossings between villages and lands can cause people to follow longer distances in order to access the lands or pastures which may lead to spending more time to access and increasing diesel costs. To prevent this, safe and appropriate crossing points should be determined in consultation with stakeholders.

Consultations within the scope of the SEP and the sound operation of the grievance mechanism are also of great importance in the good management of the impacts on land, other assets, and hence the economic structure.

Moving expenses of displaced workplaces should be examined within the scope of the RAP. Due to the fact that the region has been plotted for industrial investments, a nearby location where Süper Enerji can be found has not been determined. However, the costs will increase as the company moves away from the region will change the type of transportation. The company is requesting official information from the authorities. They have demands to be relocated to nearby areas. A consultative land acquisition process should be initiated and the questions above of the company representative should be answered.

On the other hand, there are concerns that coal activities in the region have a negative impact on agricultural yield. If there is potential for such an impact, shifting the enterprise to agricultural lands can have negative consequences.

It is thought that the parking area reserved for trucks and trucks belonging to Toros Tarım, which provides transportation services to the industrial establishments of TAYSEB Yumurtalik Free Zone and that loads and unloads from Torosport Ceyhan Port, can be located in a new place in the region. It may be possible to shift the parking area to the areas reserved for OIZs. This issue will be examined in more detail within the scope of the RAP.

The highway route (see the yellow line in Figure 5-32), which is divided by agricultural areas, is similar to the part of the railway connection route descending to the port. For this reason, residents of the region stated that they are concerned about the change of the railway route through a project revision and passing through the parcels in question. After the field study, an overhaul was made as expected by the villagers. Thus, more agricultural land is affected.

For this reason, the impact of the project on fruit trees and income sources has been reassessed and changed from "moderate" to "high".

There are many infrastructure investments that support industrial development in the region. In the land acquisition process, cumulative impacts that may arise from these projects should be taken into account as the RAP study examined these impacts in detail.

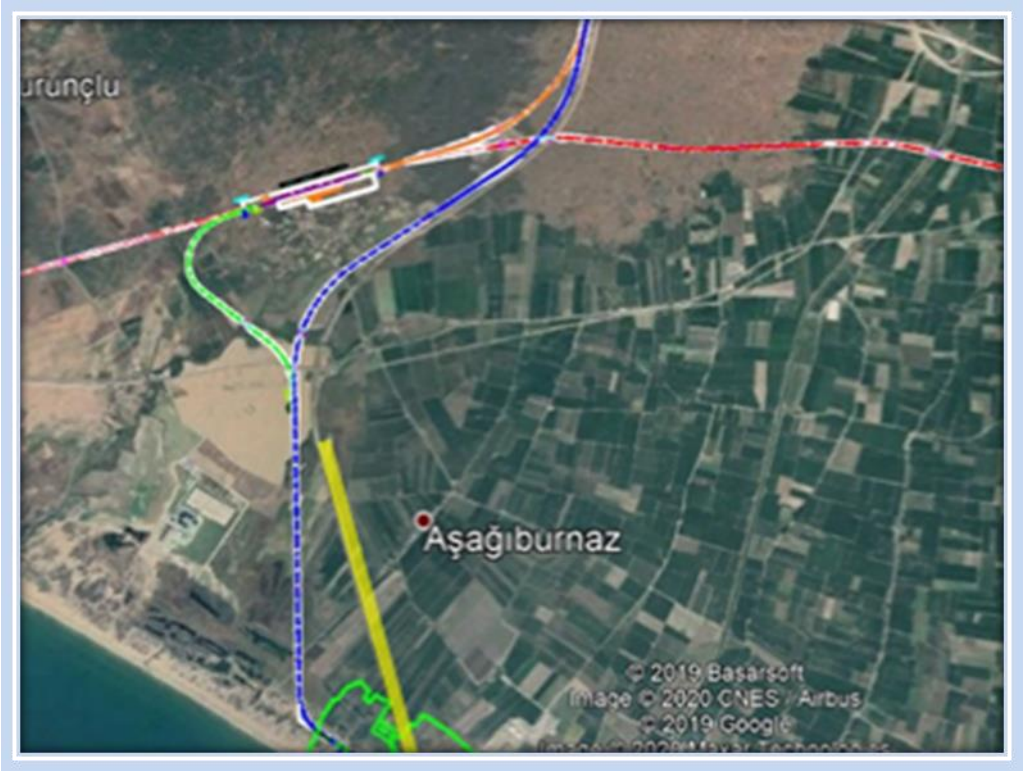

Figure 5-32 The location of the motorway project, halfway through the railwa connection line and dividing the agricultural lands (yellow line)

5.9.2.3. Local Economy, Livelihood Sources and Employment

This section 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 extend to the general population from the parcel owners.

Land Preparation and Construction Phase

Specific impacts on the land preparation and construction phase of the project on the local economy and livelihoods were discussed in the previous chapter on the affected lands. Especially long-term impacts from land acquisition reveal transformative and transformative impacts on local economy and livelihoods. Basic changes that land preparation and construction activities will create with cumulative impacts;

- The contraction of agricultural activity areas, the increase of agricultural costs and turning to new livelihoods.
- The narrowing of the areas where the livestock activities will be carried out, the increase of the feed costs of the livestock activities and the turning towards new livelihoods.

Land preparation and construction phase has some other impacts on local economy and livelihoods. One of them is the positive impacts arising from the purchase of the goods and

services needed during the construction. Economic impacts arising from the spending on goods and services by construction workers who will have increased income to spend and the ability to spend more money in the local economy also emerge as indirect positive impacts.

Speaking of the affected lands and workplaces, temporary changes in transportation routes were mentioned. Even short-term route changes may affect business potential and increase costs. When disturbing factors such as dust and noise are added, it is possible to mention the temporary negative impact of the construction activity.

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. The expectations of the local people in this direction are intense. However, the low level of education allows semi-skilled and unskilled labor to be provided from the region. However, the low population makes it difficult to obtain the elements from the region with the features that are desired to be low.

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. Direct impacts may be related to changing roads and routes due to railway activity, which concerns and suggestions are presented in the previous chapter.

Road Transportation

Providing rail transport in industry will directly affect road transport activities. The transportation is carried out both by large companies and by trucks that the local residents acquire with their own means.

In the villages visited within the scope of the study, households carrying out individual transportation business were encountered with their trucks. They were asked if they were worried about job loss due to the railway project. Villagers think that road transport will be affected due to the railway, but the negative impact will turn positive as the business potential in the region will increase thanks to the project. Stating that small and individual transportation activities are for short distances, various stakeholders (shippers and OIZ administrations) stated that the routes will continue and the transportation will continue.

- Between industrial enterprises and the railway station,
- Between the railway station and the port.

It was stated that the transportation vehicles owned by the local people are suitable for short distances and therefore they will not suffer economic damage in the new system.

Industry priority economic development

The project area and its surroundings are an important center due to the combination of geographical conditions suitable for industry, tourism and agriculture. There are several difficulties in developing these fields of activity together. It is noteworthy that in the stakeholder meetings, the trend of development is from agriculture to industry. The needle of expectations and demands is also in this direction. However, it is seen that the productive agricultural potential of the region is to be protected as much as possible. Therefore, efforts are made to keep industrial investments harmful to agricultural activities away from the region.

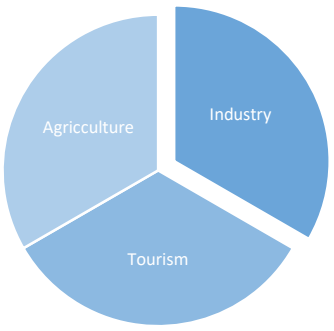

Figure 5-33 Areas where the project site has economic potential

At the beginning of these, there are struggles against thermal power plants. For example, a thermal power plant whose activity has been discontinued is frequently mentioned. It was found that this success in favor of agriculture prevented many dormant thermal power plant projects.

Erzin Chamber of Industry and Commerce officials are of the opinion that industrial investments will prevent agricultural activity and develop the region economically. The railway line connecting the project to industry and commerce in Turkey is expected to make a great contribution. Industrial-oriented investments, such as the energy specialization zone, are expected to prevent investments in agriculture. The advantage of the region in terms of industry is that it attracts investors by providing transportation opportunities such as good road connection, international Port and railway. The development of the industry will create employment and increase the welfare of the people of the region.

According to Chamber official Lütfi Bey, while these developments are taking place, the value of the region continues to be preserved in terms of agriculture and tourism. Within the scope of the project, the region to be connected to the railway will be an industrial basin where all kinds of activities without chimney will be shown. Iron and steel processing and production activities will not be carried out. For this reason, it can be said that an industry pacified with agriculture is tried to be developed.

Erzin Agriculture and Forestry District Authorities were asked to evaluate the industrial developments supported by the railway project in terms of agricultural production. Stating that they do not expect a negative impact on agricultural activities if the developing industry in the region is chimneyless and filter applications are not neglected, the authorities emphasized that greenhouse activities are also developing in the region in line with the industry.

OIZs planned to be established are an indicator of industrial development. The existing and planned industrial zones in the project area:

- Ceyhan OIZ
- Erzin OIZ
- Ceyhan mega petrochemical industry zone
- Osmaniye OIZ
- Yumurtalık Fre Zone

The railway connection line project will serve all these industrial zones.

Possible impacts of the project on the local economy are discussed in consultations with the local community. The project is expected to have some positive and negative impacts on (1)

welfare level and trade, (2) the values of homes, land and fields, (3) available livelihoods, and (4) employment opportunities and wages. These impacts are; commercial revival expectations, employment prospects, changes in livelihoods, road transport and farming activities are expected to be damaged. Statements used on the subject in FGDs regarding the impacts of the project on village economy, employment and livelihoods can be seen in Table 5-52 .

Table 5-52 Project Impacts on Village Economy, Employment and Livelihoods

	Welfare level and income	House, lands and agricultural fields	Existing income sources	Employment opportunities and fees
Yukarıburnaz women	Villagers have their own means of transport. As the business potential increases, the shipping business will also increase. It is expected that the level of welfare will increase with employment opportunities, the value of the village, the development of infrastructure.	If it damages houses, roads and lands, it will have a negative effect. Animal grazing activity can be prevented because the place where the station will be built is village pasture. Railway line and station prevent passage to pasture for grazing. Trains can hit animals. Precautions should be taken for this. Since there is no agricultural land on the side where the station will be built, the impact on agricultural activity will be low. As it is very close to the village, it is worried that it will harm the homes and human health.	They want the development of industrial opportunities to focus on this field instead of agricultural activity. New generations, in particular, are reluctant to pursue agricultural activity. Generally, the peasants work as a coal factory and fertilizer for transportation. As the trains will carry loads, it may cause truck drivers to lose their jobs. According to one of the women: The majority of people in this village do small jobs in different areas. Although they attempted fishing, they had to quit fishing because small fishing activity is not allowed. The majority of the village is dealing with transportation by withdrawing from agriculture. However, when the train is built, there will be a risk of people losing their jobs in the village.	There is an expectation that job opportunities will increase. They expect priority in employment because the greatest impact is on their own village.
Yukarıburnaz men	They believe that the project will have a positive impact on welfare levels.	They are concerned about the station's damage to the homes. They think that their access to both agricultural lands and pastures will be prevented. The villagers demanded that passages, where animals can pass, were made at appropriate places.	Villagers also do transportation business, but have difficulties in competing with large shipping companies. They do not think that rail transportation will reduce their own business because they expect an increase in business volume.	They have an expectation of employment. Some believe that employment opportunities will increase. Fees will increase.
Turunçlu women	A short-term positive effect is expected on welfare level and income based on the construction period. Some participants believe that the welfare level of the village will increase in the long term and with the increase of such projects.	Negative impacts are expected on village land. Negative effects are expected both in the form of land loss and in terms of preventing access to the lands. It is thought that some people will be very willing to sell their land, and some will not want it. It is foreseen	The direction of change in existing livelihoods will shift to workmanship	They have the expectation and demand to give priority to nearby villages during the recruitment of workers at the construction phase or in the factories to be established later.

	Welfare level and income	House, lands and agricultural fields	Existing income sources	Employment opportunities and fees
		that there may be problems during expropriation due to unwilling people.		
Sarımazı young men	The effect on the level of welfare is only positive through paid work. Instead of bringing workers from outside, there is a demand to recruit workers from nearby villages to compensate for land losses.	Fields can be valued. Cultivated areas can be damaged.	They do not expect much impact, positive or negative	It is thought that employment opportunities will increase. Thanks to the project, the hopes of having a job will increase. There is an expectation of providing internship opportunities to students.
Aşağıburnaz men	There is no benefit to the commercial enterprises in the village because they have the experience of bringing workers from outside, accommodating them in a certain place and not letting them into the villages.	No expectation of impact. If the roads inside the village are used during the construction phase, an effect can be expected. There is a request for information about road routes.	There is no expectation of impact from the project, but they think that the developing industry in the region has damaged citrus production and product. There is a request for information regarding the effects of the project on citrus production.	There is no benefit to the employment in the village because they bring workers from outside and do not give priority to the villages.

According to the household surveys, three responses in a negative and positive direction are directed towards local economy, livelihoods and employment. In addition, 74 people stated that they agree that the project will contribute to the national economy.

Specifically, 21 people stated that the project will have a negative impact on the local economy and that this is related to land losses due to land acquisition. 77 people in the sample of 113 stated that the project will have a positive effect on economic development, while 82 said that they expected a positive effect on local business and employment effects (Table 5-55).

Table 5-53 Positive and negative impacts expected on the local economy in HHA study

Settlement	Local economy, livelihoods and anticipated negative impact on employment	Local economy, livelihoods and positive impact prospects for employment	
	Number and rate of those who say that their livelihoods are negatively affected due to expropriation	Number and rate of those who say they will contribute to the economic development of the region	Number and rate of those who say they provide local jobs and employment
Yukarıburnaz	3	11	13
	18.8%	68.8%	81.2%
Aşağıburnaz	2	4	4
	28.6%	57.1%	57.1%
Yeşiltepe	1	10	10
	6.3%	66.7%	66.7%
Sarımazı	6	25	30
	19.4%	80.6%	96.8%
Turunçlu	3	10	9
	18.8%	66.7%	60.0%
Büyüktüysüz	2	7	7
	20.0%	87.5%	87.5%
Total	**21**	**77**	**82**

Source: Socio-Economic Household Survey, 2020

The rate of negative expectations on the local economy on the basis of settlements is low (the highest 28.6% in Asagiburnaz). The proportion of those who chose positive expectation statements was higher than 80% in Yukarıburnaz, Sarımazı and Büyüktüysüz, and the lowest was observed as the retention of more than 50% of the settlements (Table 5-55).

Agricultural value of Erzin-Dörtyol plain

The institutional stakeholders interviewed within the scope of the study stated that the Project was beneficial for the Erzin economy and emphasized the importance of not harming agricultural lands. We have included the evaluations regarding the use of fertile soil during land acquisition in the previous section. It is also worth mentioning the agricultural potential affected during the transition of the basic economic activity from agriculture to industry.

The head of the Chamber of Agriculture stated that agricultural activities, which were better off in the past, decreased over time and lost productivity. He stated that the project is related to industry and that it does not have a positive impact on agriculture, and that when agricultural lands are avoided, there will be no negative impact. More detailed assessments of land acquisition are discussed in the previous topic. Here, the place of the Erzin-Dörtyol plain, which has received the status of an agricultural region that should be protected by the decision of the Council of Ministers, in the local economy should be mentioned.

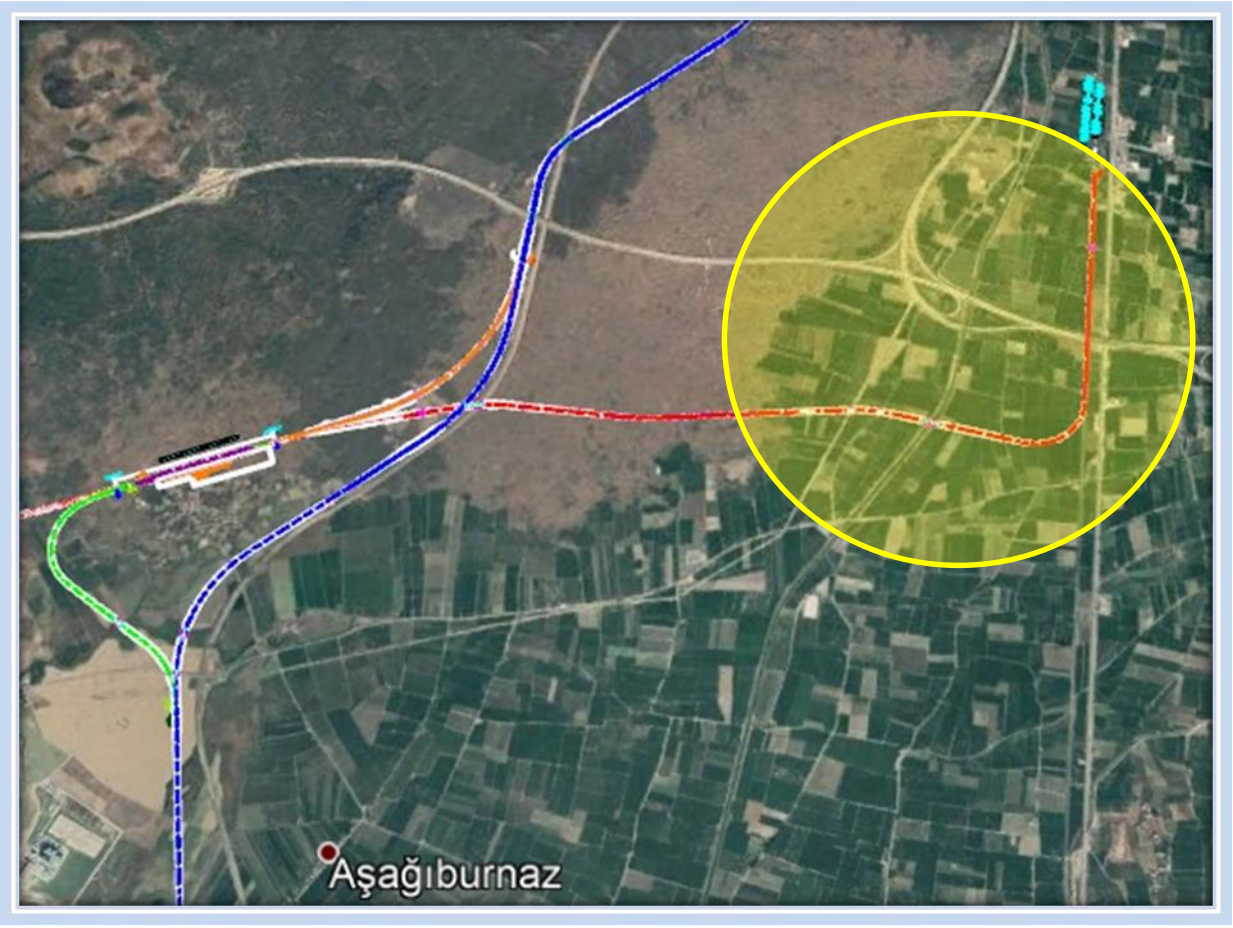

Figure 5-34 Agricultural lands that are learned from the address of Yeşilkent and where the owners and users live in the center of Erzin

Within the scope of the works carried out with the aim of protecting agricultural lands at the end of 2016, 141 plains in 49 provinces have been declared as conservation areas and it has been decided to preserve them as 'agricultural sites' in all operations. With the Decision Regarding the Determination of Some Plains as Great Plain Protection Areas, it was tried to prevent the destruction of agricultural plains as a result of misuse and misuse. The operations to be carried out on the plains, where soil loss and land degradation, which have high agricultural production potential, such as erosion, pollution, misuse or misuse, have developed rapidly, are subject to permission. The Minister of State of the period stated that

"With this decision taken in accordance with the Law on Soil Conservation and Land Use, these areas will no longer be allowed to be used out of agriculture". Soil, climate, topography, ecological features and potential of agricultural production were taken into consideration in the definition of large plains.

With the decision of the Council of Ministers numbered 2018/11338 in 2018, Erzin-Dörtyol plain was added among the "Great plain protection areas" (See Annex-8.7 Decision of the Council of Ministers, where the Erzin-Dörtyol Plain was declared as the Great Plain Protection Area).

Figure 5-35 Views of Products from Erzin-Dörtyol Plain

It was stated that the decision of the Council of Ministers will continue to be valid for the approved planned areas within the boundaries of the large plains taken under protection and for the areas that have been granted non-agricultural use as per the relevant legislation. The Project will be subject to permission because there was no approved project before the decision in question.

The head of the Chamber of Agriculture stated that the Erzin Plain was full of citrus gardens due to the fact that it could remain green for 12 months, and that the activity of the thermal power plant was stopped due to the lawsuit filed by the Erzin Environmental Protection Association due to the decision of the Council of Ministers. It is noteworthy that there is a sensitivity in this regard in the region.

Mitigation Measures

The economic development momentum in the region seems to have shifted from agriculture to industry. The common expectation among stakeholders is to ensure this development, but also to protect agricultural activity as much as possible. For this reason, an industrial development pending with agriculture is expected in the region. The project is welcomed in this sense and has no potential for negative impact.

The Erzin-Dörtyol plain was declared as the Great Plain Protection Area on 08.01.2018 by the Decision of the Council of Ministers. Therefore, it is necessary to get official permission from Hatay Agriculture and Forestry Provincial Directorate and to respond the questions of stakeholders about why the planned route is not designed in a way that affects less agricultural land.

In order to ensure minimum negative impact and maximum positive impact on the local economy, it is important that the consultations and the grievance mechanism within the scope of the SEP are properly operated.

5.9.2.4. Infrastructure Status and Social Services

Land Preparation and Construction Phase

As a result of the land preparation and construction activities of the project, some impacts are expected on the transportation infrastructure. The first of these concerns the roads closed and the changing routes. These changes may have negative effects on economic activities and daily life. Especially barriers may arise in accessing health and education services and workplaces. It is recommended that these obstacles be made by offering alternative routes for a short time. In addition, road closures and route changes should be announced with local media and corporate announcements.

The effects 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 wear faster. This change observed by the locals may cause discomfort. For this reason, damage to the roads must be eliminated and wear 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. In such cases, compensation for damages should be stipulated in the contracts between the employer and subcontractors.

Construction activities may temporarily disrupt infrastructure services such as water, electricity and the Internet. In order to minimize the socio-economic effects of such interruptions, it is important to make a plan that avoids interruptions as much as possible and to announce planned interruptions to stakeholders through local media and corporate announcements. In the event of sudden and long-term cross-section, compensation practices should be developed at the community level. These may be in the form of supporting other needs of the village (Social facility construction, road repair, etc.).

In case of support at the community level, it would be a good alternative to create an internship opportunity in OGT with Sarımazı village young men.

During the construction phase of the project, OGT's were asked about the effects of (1) the school and education system, (2) infrastructure services such as electricity, water, internet, (3) municipal services such as garbage, wastewater and sewage. While negative expectations created demand for security measures, positive expectations were linked to economic development. Impact expectations on school and education were related to transport safety. Responses from the local people in OGTs can be seen in the table.

Table 5-54 Concerns on the infrastructure impacts of the project

Group	School and education	Electricty, water, internet etc.	Waste, wastewater and sewerage	Recommendations
Yukarıburnaz women	During construction, earthmoving trucks will affect the school road as they pass. It can be dangerous on the children's detour.	No impact	Since there is no sewerage infrastructure, there may be problems arising from population growth.	• Security measures should be taken. • Sewerage infrastructure should be developed.
Yukarıburnaz men	We do not expect a negative effect.	We do not expect a negative effect, we expect a positive effect.	We do not expect a negative effect.	• If there is no negative impact on our infrastructure, we expect the project to have positive effects.
Turunçlu women	Trucks can be harmful to children if they pass through the village. The school is next to the main road. Dust and pollution from excavation trucks. They should not use the road of the village.	There may be electrical interruptions. Electricity was gone when other factories were set up. Our electricity was given there to produce energy. There may be the same problem. When electricity goes out, water goes away. Since the internet is also related to electricity, it is cut off.	There is no sewage, the project has no effect.	• We worry about children. If necessary, make another way! Do not pass the earthmoving truck without taking security measures and reviewing the rules. • No power cut.
Sarımazı young men	There may be internship opportunities for those of high school and university age.	No impact	No impact	• There may be internship opportunities for those of high school and university age
Aşağıburnaz men	No positive or negative impact is expected depending on which roads will be used for construction.	No positive or negative impact is expected depending on which roads will be used for construction.	No impact	• Construction vehicles should not pass through the village. • We would appreciate if the project has any benefit, but we have no such beliefs because of our previous experience.

Source: Focus Group Discussions, 2020

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 and trucks in road traffic.

Mitigation Measures

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 abrasive effect on roads. In order to prevent such effects 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. can be damaged due to construction activities. Damaged assets should also be compensated. These situations should be stipulated in subcontractor contracts.

In order to minimize the socio-economic effects 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. . In the event of sudden and long-term cross-section, compensation practices should be developed at the community level. These may be in the form of supporting other needs of the village (such as social facility construction, road repair, closed public transport stop supply). In case of support at the community level, it would be a good alternative to create an internship opportunity in OGT with Sarımazı village young men.

5.9.2.5. Community Health and Safety

Land Preparation and Construction Phase

Public health and safety problems during land preparation and construction phase are possible community tensions that may arise due to traffic safety, risk of infectious diseases, excavation management and construction related activities.

Construction will increase truck and construction vehicle traffic in the Project area, so a Traffic Management Plan will be prepared and implemented. This plan should address concerns about the safety of life and property of residents and their children, and concerns about the safety of animals. Features There is an expectation of controlled and safe use in residential areas. If possible, it is requested that the inner and inner roads should not be used for the construction activity.

> *"Excavation trucks can be dangerous for children if they pass through the village and go fast. The child may come out suddenly. Excavers use it very fast. We also have truck drivers in our village, but they are very slow and very careful in the village. Let them build a road from the outside for construction. They should not use the*

place where the child service goes. The shuttle travels through the village, so trucks don't pass through the village. (Yukariburnaz village women).

Besides, 36.6% of people participated in household survey who resides in project-affected settlements have expectations on the Project to negative affect the community health and safety.

The impacts on community health and safety during the land preparation and construction and operation phases of the project are discussed in detail in the "Community Health and Safety" Chapter of this ESIA report. Community health and safety issues associated with noise and air quality are also discussed in the Chapters "Noise" and "Air Quality and Greenhouse Gases", respectively.

Operation Phase

During the operation phase, it is possible that the built railway route will prevent some crossings that already exist and are used by the local people. For this reason, measures should be taken to prevent passage from unsafe places. In particular, measures are required to prevent stray sheep and goats from entering the train tracks.

Some roads used by Yukarıburnaz and Aşağıburnaz villages will be cut by the railway line. We mentioned this as an obstacle in terms of income generating activities and daily life. The importance of the issue in terms of public health requires safe planning of the transitions and the line. Possible impacts associated with traffic and pedestrian safety, and measures to avoid significant impacts, including emergency preparedness and response, are discussed in detail in the "Community Health and Safety" Chapter.

Mitigation Measures

The use of access roads should be planned in a way that does not jeopardize the travel safety of shuttle vehicles in villages with bussed training, and traffic measures (warning signs, speed limits, and information about settlements and schools for the periods when large and dangerous goods will be transported) should be taken. These issues will be detailed in the "Community Health and Safety" Chapter of the ESIA with the Traffic Management Plan.

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 operation 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.

Occupational health and safety measures should be taken at the construction sites and construction activities.

Contruction Impacts Management Plan and Pollution Prevention Plan should be implemented, taking waste management and health controls into consideration. It is important to restore the construction sites after the construction phase and remove them without leaving any harmful substances.

Necessary measures should be taken for the safety of maintenance and repair activities, teams and local people.

The grievance mechanism should be actively and efficiently operated.

5.9.2.6. Vulnerable Groups

Some groups that are more likely to experience these effects more intensely and have relatively low capacity to reach mitigation measures and stakeholder participation opportunities are vulnerable groups of the project. Considering all types of effects during the land preparation, construction and operation phases, the special situation of vulnerable individuals and the reduction of extra impacts arising from these situations are the subject of this title.

The households that receive in-kind / cash support from the Social Assistance and Support Foundation, who are very poor and in need of help from others, are defined as a vulnerable group in the project. Another group of similar characteristics is landless peasants. The additional impacts on these two groups and the measures to minimise these impacts are presented in Table 5-55.

Table 5-55 Possible negative impacts on poor individuals and landless peasants and mitigation measures

Impact Subject	Potential Adverse Impact	Type of Impact	Mitigation Measure
Population and social life	None	-	-
Acquisition of private lands	More than 10% loss on livelihoods of poor households who are users	High, medium-term, revesible	Development of income sources
Acquisition of public lands	More than 10% loss on income sources of poor households that are illegal users	High, medium-term, revesible	Development of income sources
	Restriction of income sources of poor individuals who are beneficiaries of public lands	Medium, medium-term, reversible	Considering rights holdings within the scope of the RAP
Local economy, livelihoods and employment	Inability to access employment opportunities	High, long-term, reversible	Considering SYDV records while providing employment within the scope of the project
Infrastructure status and social services	Reinforcement of existing infrastructure problems and social work problems in their homes	Medium, short-term, reversible	Considering SYDV records while providing employment within the scope of the project
Community health and safety	Relatively high probability of being affected by pollution	High, medium-term, revesible	Implementation of management plans

Persons with physical or mental disabilities have been identified as a vulnerable group in the project. Elderly individuals are another vulnerable group in terms of need for care. The additional impacts on these two groups and the measures to eliminate these impacts are presented in Table 5-56.

Table 5-56 Possible negative impats on disabled and elderly individuals and mitigation measures

Impact Subject	Potential Adverse Impact	Type of Impact	Mitigation Measure
Population and social life	Communication problems with construction workers may occur	High, short-term, reversible	Providing employment at the settlement Informing external workers about social relations with disabled and elderly individuals in the orientation process
Acquisition of private lands	They can be affected as landowners	High, long-term, reversible	Inclusion in consultations in the land acquisition process personally or with the help of a representative
Acquisition of public lands	They can be affected as beneficiaries of public lands	Medium, medium-term, reversible	Considering rights holdings within the scope of the RAP
Local economy, livelihoods and employment	Individuals with disabilities may not have access to employment opportunities.	Medium, long-term, reversible	Allocation of shares to the employment of disabled people under the project
Infrastructure status and social services	Preventing access to healthcare services that are needed more than other individuals	Low, short-term, reversible	Implementation of traffic management measures Taking measures to communicate with disabled and elderly individuals in stakeholder engagement
	Not being able to adapt to the deterioration and changes in the infrastructure due to physical obstacles	High, long-term, reversible	Observing the physical needs of disabled and elderly individuals
Community health and safety	Not being able to adapt to the deterioration and changes in the infrastructure due to physical barriers	High, long-term, reversible	Using visual and audio alerts together

Persons whose lands were previously affected by other infrastructure or investment projects in the region constitute another group that is defined as vulnerable in this project. The identification and definition of these groups as rights holders is the subject of the RAP.

Illiterate individuals and Syrian refugees are groups that may have problems in communication. For this reason, in all security measures and stakeholder engagement practices, unprinted, based on visual expressions, containing formal and illustrated expressions and voice methods should be used. Arabic should be used when necessary.

During the field studies, there were no seasonal agricultural workers working in agricultural activity. The situation of this group is handled within the scope of the RAP. According to the received information from mukhtars, approximately 5,000 seasonal agricultural workers come to Erzin-Dörtyol Plain for working in citrus cutting between October and January. While

agricultural workers mostly came from Eastern provinces in the past, some of them are Syrian in recent years. Those who come as seasonal agricultural workers stay in tents around the villages. The narrowing of agricultural lands may reduces the potential of seasonal agricultural works during both construction and operation phases of the Project. The income losses cannot be calculated because the workers change every year. Erzin Seasonal Agricultural Workers Solidarity Association should be cooperated with to be supported at the community level.

5.9.3. Impact Significance, Mitigation Measures and Residual Impacts

5.9.3.1. Adverse Impacts

A total of 315 responses were received from 112 household representatives (one person could not answer this question) regarding the adverse impacts of the project. 14% of the negative responses constitute the expectation about the damage of the crops and trees in the lands; 40% of the sample agrees with this statement. 15% of the responses express dust and 16% express the noise expectation for both construction and operation phases, those with these negative expectations make up more than 40% of the sample. Two negative expectations, which constitute 7% of the responses, are about the barrier of passage to agricultural lands and damage to pastures, about 20% of the sample stated that they have these two expectations (Table 5-58).

Table 5-57 Expressions of negative impact expectations in HHA

Adverse Impacts	Responses		Person Percentage (%)
	N	%	
Restriction of access to lands	21	6.7%	18.8%
Damaged / unusable lands	25	7.9%	22.3%
Damaged crops and trees in lands	45	14.3%	40.2%
Damage and loss of pasture lands	22	7.0%	19.6%
Impacts on livelihood due to expropriation.	21	6.7%	18.8%
Dust emission	48	15.2%	42.9%
Noise	50	15.9%	44.6%
Increase in traffic accident risks	13	4.1%	11.6%
Impacts on human and animal health	41	13.0%	36.6%
Other	7	2.2%	6.3%
No adverse impact	22	7.0%	19.6%
Total	**315**	**100.0**	**281.3%**

Source: Socio-Economic Household Survey, 2020

Negative impacts on OGTs, where free response and group interaction and qualitative data were collected, are related to farming activities, daily life and safety concerns. It is generally accepted that these impacts will be compensated by both the employment opportunity that will arise during the construction phase and the business potential development that will occur with the long-term industrial development. A summary of the adverse impacts provided with consensus in OGTs is presented in Table 5-58.

Negative impact expectations arising in other stakeholder consultations can be listed as follows:

- Loss and division of fertile farmland
- Loss of valuable citrus trees and DSI irrigation system
- Damage to the drip irrigation system
- Damage to water resources
- Informal users of agricultural lands
- Seasonal workers
- Short-term barriers to transportation activities in TAYSEB
- Displacement costs of the parking area of Toros Tarım A.Ş.
- Problems with the Süper Enerji Coal Storage and Processing Facility displacement;
    - not being able to find place,
    - getting away from port,
    - the workplace stops the activity completely or for a while,
    - moving expenses,
    - job loss,
    - worker grievances.

Table 5-58 Consensus adverse impacts in terms of different demographic groups (Source: Focus Group Meetings, 2020)

FGD group	Adverse impacts on population and social life	Adverse impacts on infrastructure and social services	Adverse impacts on community health and safety	Adverse impacts related with land acquisitions	Adverse impacts on local economy and income sources
Yukarıburnaz women	The possibility of theft	Impact of population growth due to undeveloped sewage infrastructure	Impact of construction vehicles on traffic safety It can be dangerous for children going to school.	Transitions can be difficult and dangerous as the station is installed in the village pasture and passage area.	Transporters' jobs can be affected.
Yukarıburnaz men	Conflict due to the lack of employment opportunities in case of high number of foreign workers	not expected	not expected	The station will prevent passage to village pastures and farmland. There is concern that the houses will be damaged.	Employment opportunity is thought to eliminate negative effects
Turunçlu women	Since there will be those who do not want to lose agricultural land, there may be a conflict at the expropriation stage.	There may be a power failure due to the energy system shortage.	Vehicles are dangerous for children if they pass through the village.	We will have affected lands. Transition to the land will be prevented.	Agricultural activity will be damaged and labor will increase. Negative effects can be eliminated through employment opportunities.
Sarımazı young men	not expected	not expected	not expected	Crops can be damaged.	Instead of bringing workers from outside to compensate for land losses, they can recruit workers from nearby villages.
Aşağıburnaz men	If the construction vehicles will pass through the village and the road to the beaches of the villagers will be blocked, if the land will be divided, the potential for conflict may occur.	Construction vehicles can damage the infrastructure if they pass through the village.	Construction vehicles are dangerous if they pass through the village.	If the railway route reaches the halfway highway, a loss of soil will occur.	If coal is transported, it will damage the quality of life of its dust and agricultural products. Industrial development harms citrus production.

It is the ultimate aim of this chapter to provide mitigation measures by evaluating all the negative impacts identified in this chapter prepared with a participatory understanding in terms of their magnitude, sensitivity of their recipients, geographical scope, duration, probability and reducibility.

Accordingly, impacts related to land losses and transition barriers will inevitably be experienced. These are the impacts that can be reduced by appropriate replacement costs and project arrangements to which less agricultural land will be affected. However, the decrease in land assets will cause a shift away from farming activities with cumulative effects. It is the common idea of stakeholders that this divergence will be compensated by industrial development, where local economy, livelihoods and employment will be improved. There are many infrastructure investments that support industrial development in the region. In the land acquisition process, their cumulative impacts should be taken into account. The RAP examined these impacts.

Damage to irrigation systems and water resources in the affected lands creates indirect effects on wider irrigated lands, expanding the impact area and pulling it to the regional level.

Barriers to crossings to the lands can be reduced in terms of both construction and operation phases if necessary measures are taken. Deed land losses can be reduced with an understanding of entitlement to WB standards. A detailed planning based on this understanding is presented in the RAP.

Direct, indirect and conditional effects on the local economy will be seen together. While direct impacts are related to land losses, indirect and conditional impacts can be reduced by both the employment opportunities to be provided during the construction phase and the business potential that will arise in the long term.

Table 5-59 Assessment of socio-economic 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	Revesibility	Duration	Frequency	Overall Magnitude			
Loss of lands with title	Land Preparation and Construction	Land owner and shareholders	Wide	Medium	Irreversible / long-term reversible	Long-term	One-off	Medium	**Unknown***	**Moderate**	**Minor**
Loss of lands without title	Land Preparation and Construction	Land owners without title	Local	Unknown*	Irreversible / long-term reversible	Long-term	One-off	Medium	**High**	**Major**	**Minor**
Loss of pasture lands	Land Preparation and Construction	Animal grazers	Restricted	Low	Irreversible / long-term reversible	Long-term	One-off	Medium	**Medium**	**Moderate**	**Minor**
Restriction of access to pastures and agricultural lands	Land Preparation and Construction	Users of pasture lands	Restricted	Medium	Short-term reversible	Short-term	Continuous	Medium	**High**	**Moderate**	**Negligible**
	Operation		Restricted	Medium	Short-term reversible	Long-term	Continuous	Medium	**High**	**Moderate**	**Negligible**
Damage on crops and trees on lands	Land Preparation and Construction	Owners and users	Restricted	Medium	Irreversible / long-term reversible	Long-term	One-off	High	**Medium**	**Major**	**Minor**
Damage on irrigation systesms and water resources	Land Preparation and Construction	Users	Local	Medium	Irreversible / long-term reversible	Long-term	One-off	High	**Medium**	**Major**	**Moderate**
Physical displacement and loss of house/building and other assets	Land Preparation and Construction	Household that will loose house/building and other assets	Restricted	Low	Irreversible / long-term reversible	Short-term	One-off	Medium	**High**	**Major**	**Minor**
Physical displacement of businesses	Land Preparation and Construction	Business owners, workers	Local	Medium	Short-term reversible	Short-term	One-off	Medium	**Medium**	**Moderate**	**Minor**
	Operation	Business owners, workers and Local Community	Local	Medium	Irreversible	Long-term	Continuous	Medium	**Medium**	**Moderate (beneficial)**	**Major (beneficial)**
Impacts on Employment opportunities and fees	Land Preparation and Construction	Local Community engaged with industry and trade	Local	Medium	Short-term reversible	Short-term	Intermittent	Medium	**Medium**	**Moderate (beneficial)**	**Major (beneficial)**

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	Revesibility	Duration	Frequency	Overall Magnitude			
	Operation (Cumulative)		Local	Medium	Irreversible	Long-term	Continuous	Medium	**Medium**	**Major (beneficial)**	**Major (beneficial)**
Impacts on Local economy and income sources based on land	Land Preparation and Construction	Local Community engaged with agricultural and livestock activities	Local	Low	Short-term reversible	Short-term	Intermittent	Low	**Medium**	**Moderate**	**Minor**
	Operation		Local	Low	Irreversible	Long-term	Continuous	Medium	**Medium**	**Moderate**	**Minor**
Impacts on Population and social life	Land Preparation and Construction	Local Community and workers	Restricted	Low	Short-term reversible	Short-term	Intermittent	Low	Medium	**Minor**	**Negligible**
	Operation		Local	Low	Irreversible	Long-term	Continuous	Low	Medium	**Minor**	**Negligible**
Impacts on infrastrcuture and social services	Land Preparation and Construction	Local Community	Local	Medium	Short-term reversible	Short-term	Intermittent	Medium	**Medium**	**Minor**	**Negligible**
	Operation		Local	Medium	Irreversible	Long-term	Intermittent	Medium	**Medium**	**Moderate**	**Major (beneficial)**
Impacts on community health and safety	Land Preparation and Construction	Local Community	Restricted	Medium	Short-term reversible	Short-term	Intermittent	Medium	**Medium**	**Moderate (beneficial)**	**Major (beneficial)**
	Operation		Restricted	Medium	Short-term reversible	Long-term	Intermittent	Medium	**Medium**	**Moderate**	**Minor**
Impacts on Vulnerable Groups	Land Preparation and Construction	Local Community	Local	Medium	Short-term reversible	Short-term	Intermittent	Medium	**High**	**Moderate**	**Minor**
	Operation		Local	Medium	Short-term reversible	Long-term	Continuous	High	**High**	**Major**	**Moderate**

* Assessed in the scope of the RAP.

Mitigation measures for the negative impacts are presented in above sections of Chapter 5.9. A summary of the determined mitigation measures are presented below:

Mitigation Measures for Impacts on Population and Social Life	• Employment opportunities should be provided to local communities. • The fact that workers coming to the region from outside have similar cultural characteristics will facilitate the construction activities by creating a harmonious environment. • The complaint mechanism being active prevents the occurrence of social problems and facilitates solutions. • It is recommended that workers are informed about social relations in the orientation process. • It is recommended to prioritize local businesses in the acquisition of goods and services to increase the local benefits and impressions of the project. • Prevention of daily and economic lives of nearby settlements should be avoided. • In order to prevent social problems, sensitivity should be shown in the selection of construction sites and the determination of the roads to be used in the construction process. • Informing and awareness raising activities on GBV and SHA should be carried out with women and workers as suggested in this report.
Mitigation Measures for Impacts on Affected Lands and Other Assets, Physical and Economic Displacement	• The land acquisition of the project will be in accordance with national laws and in the event of gaps between WB ESS5, the necessary measures to close these gaps will be determined within the scope of RAP. • If changes are made to the project, resettlement should be avoided. • If possible, the use of plots in the Erzin-Dörtyol plain, which is under protection by the decision of the Council of Ministers, should be avoided. • Opinions about land acquisition should be obtained from institutions such as Agriculture District Directorate and DSI. • Care should be taken not to damage the irrigation system. • The technical reasons for the efficient agricultural lands and citrus gardens to be used within the scope of the project should be presented in stakeholder engagement practices. • Attention should be given to the use of private lands, also when using public lands used by the Community. • Barriers to access to land should not be created. Additional costs must be covered. • In order to manage the impacts on lands and other assets in a good way, it is important that the consultations and the grievance mechanism within the scope of the SEP are properly operated. • Moving expenses of displaced workplaces should be eliminated as presented within the RAP. A consultative land acquisition process should be initiated and the questions above of the company representative should be answered. • There are many infrastructure investments that support industrial development in the region. In the land acquisition process, their cumulative effects should be taken into account. The RAP study examined these impacts.
Mitigation Measures for Impacts on Local Economy, Income Sources and Employment	• It is necessary to answer the questions of stakeholders about why the route to be used within the project is not drawn in a way that affects less agricultural land. • The share allocated to the nearby settlements and the local people from the job opportunities to be created within the scope of the project should be kept as high as possible.

	• In order to ensure minimum negative impact and maximum positive impact on the local economy, it is important that the consultations and the grievance mechanism within the scope of the SEP are properly operated.
Mitigation Measures for Impacts on Infrastructure and Social Services	• It is a necessity of a positive stakeholder engagement to create alternative routes to short-term road closure and to reduce the economic negative effects of route changes and to announce these changes with local media and corporate announcements. • 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. • Corrosive effect of the construction phase on roads should be eliminated. • In the event that construction activities cause physical damages, the requirement for compensation should be stipulated in subcontractor contracts. • Construction activities should be hampered by disrupting infrastructure services. • Local infrastructure and corporate announcements should be made in cases where infrastructure service interruptions are planned. • In the event of a sudden and long-term cross-section, compensation practices should be developed at the community level.
Mitigation Measures for Impacts on Community Health and Safety	• The use of access roads should be planned in a way that does not jeopardize the travel safety of the service vehicles in villages with bussed training and traffic measures should be taken for mandatory encounters. • "Community Health and Safety" chapter of the ESIA and the Traffic Management Plan should be considered. • As well as the traffic safety measures during the construction phase, the necessary renovations in the traffic signs should be made quickly by the local authorities during the operational phase. • Passages should be structured to allow safe passage of people and animals. • In addition to adding warning signs, the railway near the villages will be covered by fences if technically feasible to prevent children and stray animals from entering into the railway lines. • Occupational health and safety measures should be taken in construction sites and construction activity areas. • Construction Impacts Management Plan should be implemented. • The grievance mechanism should be actively and efficiently operated.
Mitigation Measures for Impacts on Vulnerable People	• Income sources should be developed and employment should be ensured. • Measures to address communication problems should be taken. • It should be kept in mind that they will need health services more. • Measures should be taken for their physical adaptations. • The contraction in agricultural areas reduces the potential of seasonal agricultural workers during both construction and operation. Cooperation with the Erzin Seasonal Agricultural Workers Solidarity Association to be supported at the community level.

5.9.3.1. Beneficial Impacts

The project is expected to change the economic activity area in the region directly and indirectly, to replace the lost opportunities, to benefit the development of the region, thereby accelerating development in the fields of infrastructure and social services. All these expectations increased the intensity of the positive impact assessments in the data collected in the field study.

A total of 291 responses were received from 113 household representatives regarding the positive effects of the project. Local employment opportunities are expected to account for 82% of the positive responses, with 76% of my examples having this expectation. 26.5% of the positive impact responses are related to regional economic development and more than 70% of the sample has this opinion. While the proportion of people who have the idea that this development will have national effects is 68.5%, 47 people stated that there will be a positive impact on the transportation infrastructure.

Table 5-60 Positive impact expectations of household representatives

Responses on Beneficial Impacts	Responses		Person Percentage (%)
	N	%	
Contributes to the economic development of the region	77	26.5%	71.3%
Contributes to the development of the country	74	25.4%	68.5%
Provides local employment	82	28.2%	75.9%
Transportation infrastructure improves	47	16.2%	43.5%
Those who think they will not have a positive contribution and those who state that they do not know whether they will have a positive contribution or not.	11	3.8%	10.2%
Total	**291**	**100.0%**	**269.4%**

Source: Socio-Economic Household Survey, 2020

10% of HHA respondents stated that they did not expect a positive effect from the project or had no idea about it. Positive expectations of OGT participants are directly proportional to employment expectations. More generally, it is thought that there will be an improvement in the economy and infrastructure. A summary of the thoughts on positive effects is presented in Table 5-61.

Table 5-61 Consensus positive effects for different demographic groups

OGT group	Beneficial impacts on population and social life	Beneficial impacts on infrastructure and social services	Beneficial impacts on local economy and wellfare	Beneficial impcats on employment and fees
Yukarıburnaz women	No expectation of positive effects	No expectation of positive effects	Local employment potential will increase. The industry will develop.	Employment opportunities are expected.
Yukarıburnaz men	There will be trade with external workers.	Infrastructure will improve.	Local level of welfare will increase. Job potential will increase for movers.	Employment opportunities and wages are expected to increase.

OGT group	Beneficial impacts on population and social life	Beneficial impacts on infrastructure and social services	Beneficial impacts on local economy and wellfare	Beneficial impcats on employment and fees
Turunçlu women	They come to coffee.	No expectation of positive effects	There are short-term or long-term positive impact expectations on welfare level and income.	There is an expectation that priority will be given to nearby villages during the recruitment of workers at the construction phase or at the factories to be established later.
Sarımazı young men	If external workers shop from the village, they contribute positively to both the village economy and social cohesion.	There may be internship opportunities for those of high school and university age.	The effect on the level of welfare is only positive through paid work. There is an expectation of providing students with internship opportunities. There is an idea that there may be an increase in land values.	It is thought that employment opportunities will increase and thus negative effects based on soil loss will be reduced.
Aşağıburnaz men	No expectation of positive effects	No expectation of positive effects	No expectation of positive effects	No hope of employment

Source: Focus Group Discussions, 2020

The positive impact expectations arising in other stakeholder consultations can be listed as follows:

- Revival in the regional economy, increased investments
- Becoming an important industrial zone, relieving the industrial boredom in the Marmara Region.
- Increase in welfare level, employment opportunities and wages
- Value increase in land
- Development in industrial infrastructure
- Imports and exports increase
- Increasing future trade relations with countries such as Syria and Iran
- Qualified population growth

It is possible to gather all these positive impacts in two groups. The impacts of the project serving regional development, along with other projects already planned, are primary impacts. It has been determined that there is a great belief in the region about the impacts expected to spread from the economic field to other areas of life. Secondary impacts are the positive impacts to be achieved through an implementation strategy compatible with the ESIA, RAP and other additional documents and plans prepared for compliance with international standards. The main implementation that will increase the positive impacts and reduce the negative impacts should be:

- Implementation of the entitelement matrix in land acquisition to be revealed in the RAP,

- Adopting an employment policy that prioritizes nearby settlements and local people,
- Implementation of all plans prepared based on WB standards.

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 which 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 the Turkish Law and ESS2 requirements as Turkey is a party of the ILO Conventions.

The recommendations presented in this chapter 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:

- **Direcet 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 servicesrelated 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

5.10.2.1. Land Preparation and Construction Phase

The risks of the project during the land preparation and construction phase are discussed in detail in the LMP. The construction of such projects includes the following activities:

- Earthworks
- Mapping geodesy and topographic works
- Construction of the superstructure of the railway layers
- Rail compression, rail welding, rail tensing, rail lubrication, rail grinding, rail system assembly works;
- Construction of the superstructure of the highway layers (lower floor, base layers, asphalt fields)
- Construction of the Station (all rough and fine construction works of stations)
- Electrification and Signaling Works

Occupational health and safety issues that may occur in these works may be caused by: Heavy equipment use, travel and fall hazards, exposure to physical, chemical and biological hazards, noise, dust, falling objects, smoke and oils, risks from using tools and machinery.

People under the age of 18 will not be employed by the Project, as construction activities will involve dangerous work.

Issues requiring occupational health and safety measures and training are:

- Exposure to chemicals
- Welding hazards (Aluminum Termite welding fume emissions, burns and radiation)
- Excavation work, earthwork hazards
- Vibration of heavy construction equipment
- Dust, Noise
- Traffic Accidents
- Lifting heavy materials
- Construction iron accidents
- Ergonomic hazards during construction
- Environmental hazards (insects, wasps etc.)
- Power cuts and arc failure burns
- Electric works
- Burn

Based on experience with construction projects in Turkey, overtime working hours is considered as a potential workforce risk. This risk is covered in the LMP.

5.10.2.2. 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 betweenTurkish Law and ESS2 requirements as Turkey is a party of the ILO Conventions.

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.

The accommodation sites of the workers 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 LMP. In all implementation, the following principles are essential:

- Equitable treatment of employees, non-discrimination and equal opportunity,
- To maintain and improve the employee-management relationship,
- Providing services for the needs of women workers, if any,
- To ensure compliance with the national employment and labor laws,
- To protect sensitive 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 AYGM
- All incidents shall be recorded in the approved incident reporting system, and be analyzed to a level commensurate with the actual consequence or potential risk rating, whichever is higher
- Contractor is committed to return workers to meaningful and productive employment at the earliest possible time
- Contractor employees will undergo a medical assessment to ensure they are medically fit to perform their role before commencing the works and these controls will be repeated annually
- Contractor must ensure that health assessments are carried out in respect of all personnel who engage in specific tasks with the potential for occupational exposure
- 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

During the operation phase, to prevent any type of incident, significant occupational health and safety measures have to 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 immediately 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.

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
- the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for Construction and Decommissioning (April 30, 2007),
- the World Bank Group Environmental, Health, and Safety (EHS) Guidelines for Railways (April 30, 2007),
- Tuskish Statistical Institute (TÜİK) website and related ststistics (www.tuik.gov.tr)
- TCDD General Directorate statistics,
- General Directorate og Highways (KGM) website and related ststistics and maps(www.kgm.gov.tr)
- General Directorate of Security Affairs Department of Traffic Services (trafik.gov.tr)

Assessment of potential community health and safety risks and impacts of the Project has been done in consideration of the existing local conditions, measures that will be inherently taken in accordance with the requirement of the national legislation, and benefit from the

expert knowledge and experience of typical sectoral risks associated with the construction. International standards and guidelines have also been taken into consideration to develop additional measures for the management of community health and safety aspects. The assessment has been based on professional expert udgment 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
- Traffic and Road Safety
- Community Exposure to Health Problems,
- Hazardous Materials Management and Safety
- Emergency Preparedness and Response
- Security Personnel

In the assessment of impact significance, magnitude factors have been determined based on expert judgement. For the assessments related to community health and safety, the receptor sensitivity level has always been assumed as high when the safety of local communities is of concern. Sensitivity level has been assumed as moderate for other types impacts such as infrastructure, local healthcare capacity, etc.

5.11.1.2. 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 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

As stated in the World Bank Group Environmental, Health, and Safety (EHS) Guidelines for Railways, community health and safety impacts that may occur during railway construction, rehabilitation and maintenance phases are common with impacts that may occur in construction projects of major infrastructures and large industrial facilities. These impacts include, inter alia, dust, noise and vibration from construction machinery and equipment, and infectious diseases that may be caused by personnel temporarily employed during land preparation and construction. The impacts mentioned here are also specified in the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for Construction and Decommissioning, listed below:

- General Site Hazards,
- Disease Prevention,
- Traffic Safety

These impacts are explained in more detail in ESS4: Community Health and Safety, and are given below.

Hazardous Material Management and Safety

Hazardous substances foreseen to be used in the land preparation and construction phases of the project are railway oils, powdered silica, fuels, solvents and paints, as listed in Chapter 3.3.1.3.

Emergency Preparedness and Response

Potential emergencies that may occur during the land preparation and construction phases of the project include site-specific risks from natural hazards such as floods, earthquakes and landslides. Emergency situations such as this should be handled appropriately and in a timely manner, taking into account the elements specified in the Emergency Preparedness and Response Plan.

In addition, earthquake risk, landslide risk and potential structural stability risks are evaluated in Chapter 5.2,

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.

Traffic and Road Safety

The Project will involve a number of construction vehicles and equipment in the land preparation and construction phase. Even though the activities will be mainly conducted within Project's construction corridor, off-site traffic load is expected particularly from the transportation of construction materials from the quarries/borrow pits and local suppliers. Interchanges, underpass or overpass structures will need to be constructed to avoid any permanent traffic interruption and to aprevent risks on the community health and safety. In this respect, the following situations/activities, which may result in increased traffic accident risk for the temporary construction period, will require well planned and strictly implemented traffic management practices:

- Heavy machinery conducting earthworks and construction activities along the Project's construction corridor in the vicinity of settlements.
- Personnel transport vehicles transporting workers from construction camp sites to related Project construction sites.
- Material transport vehicles transporting required materials from the quarries and borrow pits and other industrial areas (e.g. supply of concrete, steel).

- Vehicles transporting the waste generated at construction sites (i.e. excavated materials, recyclable waste, etc.) to the related reuse/disposal sites

Pedestrians and bicyclists are at greatest risk of serious injury from collisions with moving vehicles. In addition, children are regarded as the most vulnerable group in terms of pedestrian safety. 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 construction corridor, camp, quarry and borrow pits, access roads, underpasses and overpasses that will be constructed, would be the most vulnerable persons to Project's risks associated with construction traffic. Avoiding the passage of construction traffic through the settlements, training of the truck drivers and operators of construction machinery/equipment would be required to prevent/minimize construction traffic-related risks and impacts on local communities and users of the existing roads.

Since the construction activities are predicted to increase the traffic in the project area, a Traffic Management Plan will be prepared and implemented. This plan should respond to concerns about the safety of life and property of residents and their children and concerns about the safety of animals.

Security Personnel

Relations of the Project security personnel and the local communities present risks in terms of social conduct and conflict since the security personnel have a certain degree of authority, which may be misinterpreted in case related personnel 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.

5.11.2.2. Operation Phase

As stated in the World Bank Group Environmental, Health, and Safety (EHS) Guidelines for Railways, the public health and safety impacts that can be seen during the operating phase of railways are as follows:

- General railway operational security,
- Transport of dangerous goods,
- Level crossing security,
- Pedestrian safety.

During the operational phase, the most important danger that may result in serious injury or death in railway operations is seen as the train colliding on the railway, colliding with vehicles on the road or derailing. One of the risks arising from the railway operation is the transportation of dangerous substances. The leakage of these substances during the transportation of dangerous goods poses a risk around the railway line. In addition, level crossings are areas at high risk on railways. This risk can be eliminated if the road traffic can be stopped temporarily during the train passage. Among other things, issues such as intrusion in railway facilities, power lines and equipment can also pose risks.

Emergency Preparedness and Response

Among the emergencies that may occur during the operation phase are the ones that may occur at the stations or emergencies that may occur on the railway route and result in accidents. Therefore, specific measures and management procedures for such events need to be developed within the operational phase Emergency Preparedness and Response Plan.

Emergency Preparedness

Preparedness involves actions designed to save lives and minimize damage. It is planning and training prior to a rail disaster for appropriate response when an emergency occurs.

Emergency Response

Emergency response begins as soon as a rail emergency is identified or reported. When it is notified of a rail emergency they will immediately make notifications per TCDD protocols.

Moreover, it should be remembered that emergency response for railway accidents may require a comprehensive approach in which many institutions should take part.

It is known that railway accidents mainly include[50]:

- Collisions of trains
- Derailments of trains
- Level-crossing accidents
- Accidents to persons
- Fires in rolling stock
- Other accidents

These accidents can affect people, nonetheless, it is known that major fatalities are in question for unauthorised persons (Figure 5-36).

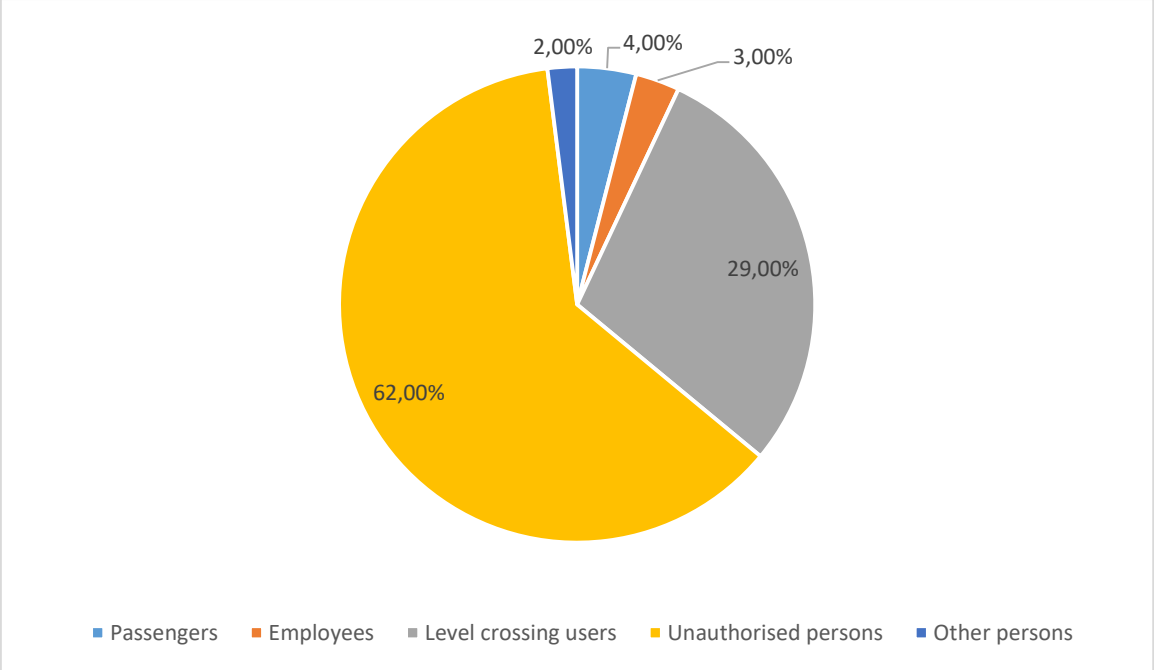

Figure 5-36 Relative share of fatalities per victim category among all fatalities (2010-2012)

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 needs to be followed if a railway emergency is faced:

[50]Eurepean Railway Agency, 2014, *Railway Safety Performance In The European Union*

- The first responder on scene makes a preliminary assessment and notifies relevant authorities (Fire Department, police etc.) with all information available.
- The first arriving Fire Officer becomes the Incident Commander and will command and direct all emergency response actions until relieved 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.

5.11.3. Impact Significance, Mitigation Measures, and Residual Impacts

In the World Bank Group General Environmental, Health, and Safety (EHS) Guidelines for Construction and Decommissioning, the above mentioned effects and strategies for reducing these impacts can be listed as follows:

- General Site Hazards;
    - Restricting access to the site with institutional and administrative controls, in areas with high-risk structures, through fences, signs and explanations to local communities, taking into account the conditions in the site.
    - In areas where it is not possible to prevent entrance to the site, measures such as closing small gaps, keeping dangerous goods in locked warehouses and eliminating dangerous conditions,
- Disease Prevention (Community Exposure to Health Problems);
    - Prevention of disease risk by means of providing health awareness training, promoting individual protection, conducting vaccination programs to reduce the risk of infection in local communities, and providing other health services,
    - Providing treatment in the field or local health facilities, providing access to medical services for all employees,
    - To develop cooperation with local institutions in order to ensure the access of workers, their families and the society to health services,
- Traffic and Road Safety;
    - Providing periodic maintenance and safety of the vehicles used,
    - To prevent pedestrians from coming into contact with construction vehicles,
    - Cooperation with local institutions to ensure traffic signs, visibility and general safety of roads,
    - To provide coordination with emergency response teams in order to provide appropriate first aid in case of accident,
    - Reducing the transportation distance by meeting the materials used with local production as much as possible,
    - To prevent construction traffic from passing through settlements as much as possible,
    - Preparation and implementation of Stakeholder Engagement Plan.

In addition, for the land preparation and construction phases of the project, the contractor and related subcontractors, who will carry out the construction activities, floods, storms and hoses, sabotage, accidents, work accidents, spills and leaks, machinery and equipment failures, gas leakage and explosions, collapse of structures. An Emergency Preparedness and Response Plan has been prepared to cover first aid, evacuation and emergency contacts. In addition, during the operational phase of the project, TCDD will continue to operate the emergency procedures it is currently carrying out. The Emergency Preparedness and Response Plan prepared and to be executed will include the following elements:

- Administration (policy, purpose, distribution, definitions, etc.)
- Organization of emergency areas (command centers, medical stations, etc.)
- Roles and responsibilities
- Communication systems

- Emergency response procedures
- Emergency resources
- Training and updating
- Checklists (role and action list and equipment checklist)
- Business continuity and contingency

The Emergency Preparedness and Response Plan covers both on-site and off-site measures. Besides, the notification and communication systems to be established for workers, the Project 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 are also covered as part of the Emergency Preparedness and Response Plan to be implemented:

- Local communities will be notified by using appropriate tools (e.g. telephone call lists, vehicle mounted speakers) in case of emergencies arising from the Project work/construction sites may pose risk on them.
- Cooperation will be 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 stated in the World Bank Group Environmental, Health, and Safety (EHS) Guidelines for Railways, the recommended risk management activities for risks identified for railways during operation phase are as follows:

- General Railway Operation Safety;
    - Implementing railway operational safety procedures, such as a Positive Train Control (PTC) system, aimed at reducing the likelihood of train collisions,
    - If the PTC system is not considered practical, automatic rail trusses are found, in places where manual trusses are available, when the train passes from the main line to the side road in the absence of signaling, and when it returns to its normal position on the main line, reporting and transmitting this information to all employees and train officers on the train,
    - To regularly inspect and maintain railway lines and facilities in order to operate in accordance with national and international railway line safety and standards,
    - Implementing a general safety management program equivalent to internationally recognized railway safety programs,
- Transport of Dangerous Goods;
    - A suitable system must be established for the proper separation, acceptance and transportation of dangerous substances. As these materials can be provided by third parties, the separation and acceptance process must comply with international standards applicable to packaging, marking and labeling of containers, as well as certificates and notices from the shipper.
    - The use of cistern wagons and other wagons meeting the national and international standards (eg thermal protection and puncture strength)

suitable for the cargo carried and the preventive maintenance program should be implemented.

- Spill / Leak Prevention and Control Plan and Emergency Preparedness and Response Plan should be prepared based on the analysis of hazards, including the nature, consequence and probability of accidents. Based on the result of the hazard analysis, measures and control methods, including the following, should be applied.
  - Managing and timing dangerous goods transport to minimize risk to society (for example, restricting the transport of dangerous goods on some roads),
  - Limiting train speed in developed areas of the city,
  - Establishment of protective barriers and other technical measures in sensitive areas (eg water resources and settlements),
  - Transfer of emergency preparedness and response information to potentially affected communities (eg emergency notification systems and evacuation procedures)
  - To provide security awareness training, to prevent unauthorized access and to reduce risks during storage and transportation in order to implement the Hazardous Material Safety Plan and ensure personnel safety.

- Level Crossing Safety
  - Using bridges or tunnels instead of level crossings (removing gates can also improve train performance because most gates have low speed limits to minimize the risk of road traffic.)
  - Regular inspection / maintenance to ensure automatic doors installation and proper operation in all level crossings,
- Pedestrian Safety;
  - Putting clear warning signs at the entry points (eg stations and level crossings),
  - Installation of fences or other barriers at the ends of the station and other areas and preventing unauthorized access to the rails,
  - Providing trainings about not entering the area without permission, especially for local youth,
  - Providing regular information on road safety/ traffic and awareness raising activities to local communities especially schools, neighboring villagers including women before construction,
  - Ensuring that the specified route is safe, clearly determined and easy to use,
  - Establishment of closed-circuit security cameras and monitoring systems (CCTV) to monitor railway stations, and an emergency announcement system to prevent violations in other areas where intruders are frequent.

Table 5-62 Community Health and Safety Impact Significance, Mitigation Measures and Residual Impacts

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	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	Implement the Traffic Management Plan, Implement the Stakeholder Engagement Plan, Investigate all construction areas and construction access routes for potential community interaction (with a particular attention to schools, children parks, etc.) with Project construction phase traffic. Based on results, develop and implement site specific measures (i.e. improve signage, visibility) and driver/operator trainings prior to initiation of any construction work, Implement access 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, 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
		Communities Along the Routes Vehicles Along the Routes	Wide	Medium	Short-term reversible or irreversible (depending on the consequence of impact, such as accident related injuries or deaths)	Short term	Intermittent	Medium	High	Moderate		Minor
Emergency Preparedness and Response	Land preparation and construction	Local Communities Project employees	Local	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,	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											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.	
	Operation	Local Communities Users of Railway and Connection	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	One-off/rare	High	High	Major	Implementing a site specific Emergency Preparedness and Response Plan, Controlling the project route for unauthorized people, Cooperation with related authorities (for emergency prevention and during emergencies), If a railway emergency occurs: • The first responder on scene makes a preliminary assessment and notifies relevant authorities (Fire Department, police etc.) with all information available. • The first arriving Fire Officer becomes the Incident Commander and will command and direct all emergency response actions. • The Incident Commander assesses the need for additional resources. • Together 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 not to move property and debris associated with the wreckage unless there is imminent danger of items being destroyed, or unless they inhibit access to passenger rescue. • The health service officers are responsible for the identification, movement and/or removal of the dead bodies. • In the event a body has been moved prior to the health service officers' approval, personnel moving the body shall make careful note of the location and condition of the body. • The Ministry of Interior Disaster and Emergency Management (AFAD), Police Department, Fire brigade, TCDD, and other officials shall contact the Mayor. The TCDD will be in constant communication with the Command Post.	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,	Negligible

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											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.	
Community exposure to health problems	Land preparation and construction	Local Communities Project employees	Wide	Low	Short term Reversible or Irreversible (depending on the consequence of impact, such as accident related injuries or deaths)	Short-term	Intermittent	Medium	Medium	Moderate	Ensure compliance with Workers' accommodation: processes and standards for accommodation; including clean and safe areas that ensure the minimum space requirements, air-conditioning and ventilation that is appropriate for the existing climatic conditions to avoid spread of disease among the Project workforce, Provide trainings on healthcare and general hygiene cleanliness to all personnel, Conduct periodic medical checks for personnel, provide vaccination and/or develop other mitigating measures when required, Develop and implement appropriate waste and wastewater management plans, Implement health related awareness raising activities covering local communities.	Minor
General railway operation safety	Operation	Local Communities	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	Implementing railway operational safety procedures, such as a Positive Train Control (PTC) system, aimed at reducing the likelihood of train collisions, If the PTC system is not considered practical, automatic rail trusses are found, in places where manual trusses are available, when the train passes from the main line to the side road in the absence of signaling, and when it returns to its normal position on the main line, reporting and transmitting this information to all employees and train officers on the train, To regularly inspect and maintain railway lines and facilities in order to operate in accordance with national and international railway line safety and standards, Implementing a general safety management program equivalent to internationally recognized railway safety programs.	Minor
Level crossings safety	Operation	Local Communities	Restricted	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	Using bridges or tunnels instead of level crossings (removing gates can also improve train performance because most gates have low speed limits to minimize the risk of road traffic), Regular inspection / maintenance to ensure automatic doors installation and proper operation in all level crossings.	Minor
Pedestrian safety	Operation	Local Communities	Restricted	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	Putting clear and clear warning signs at the entry points (eg stations and level crossings), Installation of fences or other barriers at the ends of the station and other areas and preventing unauthorized access to the rails, Providing trainings about not entering the area without permission, especially for local youth, Providing regular information on road safety/ traffic and awareness raising activities to local communities especially schools, neighboring villagers including women before construction,	Minor

Impact Description	Project Phase	Receptor	Impact Magnitude						Sensitivity/ Value of Resource/ Receptor	Impact Significance (prior to mitigation or with existing mitigation)	Proposed Mitigation Measures	Residual Impact Significance
			Extent	Magnitude	Reversibility	Duration	Frequency	Overall Magnitude				
											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.	

5.12. Cumulative Impact Assessment

The previous chapters of this ESIA have included assessments on the potential impacts of the Project. As the Project is a major infrastructure project which is located in a region where other infrastructure projects are in operation, under construction or in evaluation/planning stages, potential cumulative environmental and social impacts of the Project on the Valued Environmental and Social Component (VESCs), together with other existing or future developments have been given particular importance and assessed in this Chapter.

5.12.1. Methodology and Project Standards

The Cumulative Environmental and Social Impact Assessment study to be conducted for the Project will follow the methodologies specified by relevant international guidelines. Being one of the most recent and comprehensive documents, the Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (IFC, August 2013) is the primary document for the methodology to be applied in this chapter, while the following additional key documents will also be resorted:

- Cumulative Impacts Assessment and Management Guidance published by International Association for Impact Assessment (IAIA) (Canter L., and William R., 2009; http://www.iaia.org/);
- European Commission's (EC) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (May, 1999);
- Cumulative Impacts Assessment Practitioners Guide prepared by the Cumulative Impacts Assessment Working Group (Hegmann, G. C. Cockling, R. Creasey, S. Dupuis, Kennedy, L. Kingsley, W. Rodd, H. Spaling and D. Stalker; February and AXYS Environmental Consulting Ltd. for the Canadian Environmental Assessment Agency (1999).
- World Banks Sample Guidelines on Cumulative Environmental Impact Assessment for Hydropower Projects in Turkey published under the Energy Sector Management Assistance Program (ESMAP, 2012).

IFC defines cumulative impacts as "those that result from the successive, incremental, and/or combined impacts of an action, project, or activity (collectively referred as "developments") when added to other existing, planned, and/or reasonably anticipated future ones. Multiple and successive environmental and social impacts from existing developments, combined with the potential incremental impacts resulting from proposed and/or anticipated future developments, may result in significant cumulative impacts that would not be expected in the case of a stand-alone development (IFC, August 2013) (Figure 5-37).

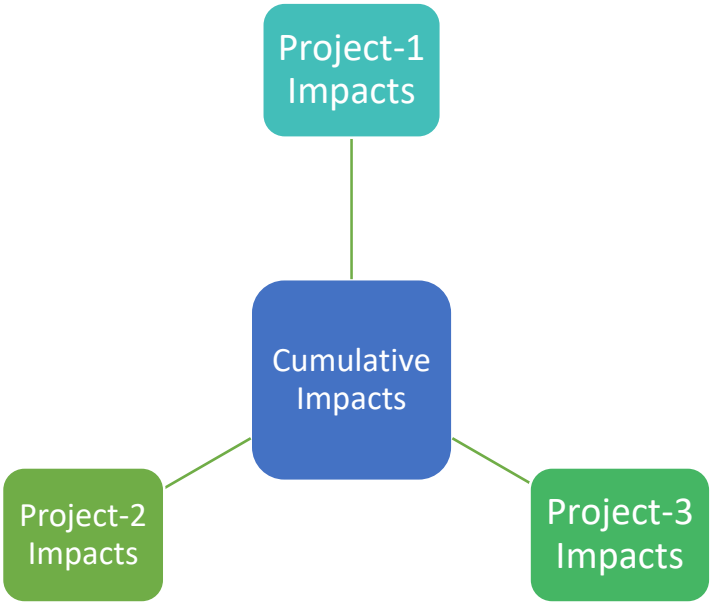

Figure 5-37 Illustration of Cumulative Impacts

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 impacts 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 Project ESIA studies, is illustrated below.

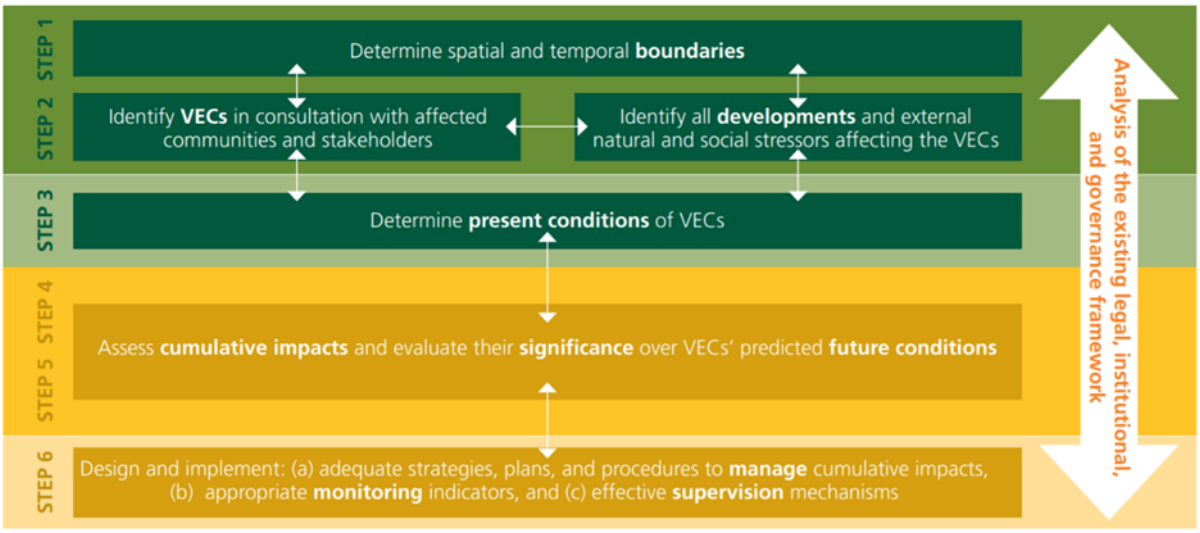

Figure 5-38 Six-Step CIA Approach

Source: IFC, August 2013

Steps to be followed in scope of the CIA study for the Project are listed below:

- Step 1: Scoping Phase I – VESCs, Spatial and Temporal Boundaries
- Step 2: Scoping Phase II – Other Activities and Environmental Drivers
- Step 3: Establish Information on Baseline Status of VESCs
- Step 4: Assess Cumulative Impacts on VESCs
- Step 5: Assess Significance of Predicted Cumulative Impacts
- Step 6: Management of Cumulative Impacts

5.12.2. Cumulative Impact Assessment

5.12.2.1. Step 1: Scoping Phase I – VESCs, Spatial and Temporal Boundaries

In the first step of the CIA study, initially VESCs will be identified in consideration of the environmental and social assessments performed in the above chapters of the ESIA Report. Afterwards, spatial boundaries and spatial boundaries of the assessment (as the CIA Study Area) will be established. Details of the Step 1 assessments are provided in the following chapter.

Valued Environmental and Social Components (VESCs)

The good CIA practice suggests that the CIA studies are conducted with a focus on the environmentally or socially important natural resources, ecosystems or human values, which are in this report referred to as Valued Environmental and Social Components (VESCs) and may include the following:

- Physical features,
- Social conditions, or
- Cultural aspects

This approach entails the CIA studies to be looked at "from the VESCs point of view", instead of a Project centered perspective as this is the case in the ESIA studies and allows assessment of combined (i.e., cumulative) impacts of various projects/activities on each VESC.

In line with the good CIA perspectives as explained above, the CIA study for the Project will focus on the impacts on the selected VESCs that are to be affected by the Project activities.

In other words, any VESC that would be affected by other projects/activities, but not the Project, will not be assessed in the scope of the CIA.

In consideration of the findings of the baseline and impact assessment studies conducted for the Project, valued environmental and social components to be considered in the CIA have been selected as presented in the table below.

Table 5-63 Selected VESCs for the Project within the CIA Study

Environmental/Social Subject	Valued Environmental/Social Components	Specific VESCs
Biodiversity and Natural Resources	Legally Protected Areas	- Osmaniye Zorkun Wildlife Development Area (11.2 km away) - Ciftmazi Nature Park (14.1 km away) - Yumurtalık Lagoon Nature Conservation Area, National Park, Ramsar Site (30.6 km away)
	Key Biodiversity Areas	- Burnaz Kumsalı (Dunes) KBA
	Species that meet Key Biodiversity Area criteria	- *Acanthodactylus schreiberi*
	Regional endemic and Critically Endangered (CR) species according to IUCN criteria	- *Echinops dumanii;* - *Astragalus antiochianus*
	Irrigation Project Areas	- Aşağı Ceyhan Aslantaş 3. Stage Erzin Dörtyol Irrigation Project Area
	Groundwater Resources	- Burnaz Spring Group Groundwater Reserve and Protection Area
Land Use	Agricultural Areas	- 1. Class Arable Lands
Air emissions and Noise	Air quality and noise levels in settlements along the route	- Yukarıburnaz - Aşağıburnaz - Sirincir - Turunçlu
Cultural Heritage	Registered Archaeological sites	- Issus Ancient City 1st Degree Archaeological Site - Issus Ancient Waterway - Existing Erzin Station
Social and Economic Environment	Land and assets	- Settlements having land and assets within the construction corridor
	Economy	- Agricultural activities - Industrial activities and employment - Tourism
	Wellfare	- 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 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 (e.g., impaired health of a fish's downstream migration when subjected to several cascading hydropower plants) (IFC, August 2013).

For the determination of spatial boundaries of the CIA study, an iterative process has been applied. In this scope, first, a larger region covering all major transportation projects were investigated covering a desk based review of relevant readily available and public data sources. As a result of the investigation, the cumulative impacts from existing Osmaniye Organized Industrial Zone (OIZ), Yumurtalik Free Zone and Toprakkale - Iskenderun Railway, Erzin OIZ, which is under construction, and Ceyhan OIZ, Ceyhan Energy Specific OIZ and Erzin Port, which are in the planning phase, were assesed.

5.12.2.2. Step 2: Scoping Phase II – Other Activities and Environmental Drivers

Environmental drivers refer to natural drivers and other stressors, such as fires, droughts, floods, predator interactions, human migration, new settlements, etc. that may exert an influence on the VESCs. For example, the fire regime in forested areas is a major driver that shapes social, ecological and economic systems (IFC, August 2013).

Acquisition of lands on railway connection lines routes will be carried out mainly by GDII in accordance with the applicable national laws and regulations, and necessary measures will be taken to close the gaps between national legislation and World Bank ESS-5. Especially long-term impacts from land acquisition reveal transformative impacts on local economy and livelihoods. Basic changes that land preparation and construction activities will create with cumulative impacts are;

- Narrowing of the agricultural activities, increasing agricultural costs and searchin for new livelihoods,
- The loss of lands where livestock activities are carried out, the increase of the feed costs of the livestock activities and searching for new livelihoods.

The decrease in land assets will lead to leaving from farming activity with cumulative impacts. It is the common idea of stakeholders that this divergence will be compensated by industrial development, where local economy, livelihoods and employment will be improved. On the other hand, some stakeholders who stated that they do not expect a negative impact on agricultural activities if the developing industry in the region is chimney-free and necessary stack gas treatment requirements are not neglected, emphasized that greenhouse activities are also developing in the region in line with the industry.

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 VESCs

Information on the baseline status of the VESCs will be mainly based on the information gathered for each environmental and social subject in scope of the ESIA study. Thus, relevant information on the baseline status for VESCs are presented in the related chapters of this ESIA Report.

5.12.2.4. Step 4: Assess Cumulative Impacts on VESCs

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 this Project.

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 5-64 .

Table 5-64 Criteria for Magnitude of Cumulative Impact Potential

Magnitude of Cumulative Impact Potential	Criteria
Negligible	The VEC is affected only by the this Project
Low	The VEC is affected by this Project and 1 other project
Medium	The VEC is affected by this Project and 2 other projects
High	The VEC is affected by this Project and 3 or more projects

The potential impacts of the Project on the social and economic environment have been assesed above, and the negative and positive cumulative impacts on the VESCs are assessed in the table below. In the assessment below, the nationally protected areas are not included in the evaluation, as they are out of the study area. It is also assumed that the impacts of the nearby projects which are in operation or under construction (Erzin OIZ, Osmaniye Organized Industrial Zone (OIZ), TAYSEB - Toros Adana Yumurtalik Free Zone and Toprakkale - Iskenderun Railway) on the environmental noise level and air quality already assessed during the baseline studies.

Table 5-65 Cumulative Impacts on VESCs

Environmental and Social Factor	VESCs	Specified VESCs	*Çukurova Region and İskenderun Bay Railway Connection Project*	*Existing Osmaniye OIZ*	*Existing TAYSEB - Toros Adana Yumurtalık Free Zone*	*Existing Toprakkale - İskenderun Railway*	*Erzin OIZ Under Construction*	*Ceyhan OIZ In Planning*	*Ceyhan Energy Specific OIZ In Planning*	*Erzin Port In Planning*
Biodiversity and Natural Resources	Key Biodiversity Areas	Burnaz Kumsalı (Dunes) KBA	Minor							Major
	Species that meet Key Biodiversity Area criteria	*Acanthodactylus schreiberi*	Minor							Major
	Regional endemic and Critically Endangered (CR) species according to IUCN criteria	*Echinops dumanii; Astragalus antiochianus*	Minor							Major
	Irrigation Project Areas	Aşağı Ceyhan Aslantaş 3. Stage Erzin Dörtyol Irrigation Project Area	Minor							Major
	Groundwater Resources	Burnaz Spring Group Groundwater Reserve and Protection Area	Major	Moderate						
Land Use	Agricultural Areas	1. Class Arable Lands	Moderate							
Air emissions	Air quality in settlements along the route	Turunçlu-2	Negligible							
		Yukarıburnaz	Negligible							
		Aşağıburnaz	Negligible							
		Sirincir	Negligible							
Noise	Noise levels in settlements along the route	Turunçlu-2	Moderate							
		Yukarıburnaz	Minor							
		Aşağıburnaz	Negligible							
		Sirincir	Negligible							
Cultural Heritage	Registered Archaeological sites	Ancient City of Issus	Major							
		Issus Ancient Waterway	Major							
		Historical Erzin Train Station Complex	Major							
Social and Economic Environment	Land and assets	Settlements having land and assets within the construction corridor	Moderate							
	Economy	Agricultural activities	Moderate							
		Livestock activities	Moderate							
		Industrial activities								
		Tourism	Moderate							
	Wellfare	Access to healthcare, education, commercial facilities								
		Air pollutants and noise	Minor							

5.12.2.5. Step 5 and Step 6: Assess Significance of Predicted Cumulative Impacts and Manage 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.[51]

Table 5-66 Criteria for the Determination of Significance of Cumulative Impacts

Significance	Impact
Severe	Impacts that the decision-maker must take into account as the receptor/resource is irretrievably compromised.
Major	Impacts that may become key decision –making issue.
Moderate	Impacts that are unlikely to become issues on whether the project design should be selected, but where future work may be needed to improve on current performance.
Minor	Impacts that are locally significant.
Insignificant	Impacts that are beyond the current forecasting ability or are within the ability of the resource to absorb such change.

In this regard, the importance of cumulative effects on VESCs are as follows;

Table 5-67 Significance of Cumulative Impacts on Identified VESCs

VESC	Significance	Descrciption
Biodiversity and Natural Resources	Moderate	It has been determined that the project routes intersect with the "Absolute, 1st and 2nd Degree Protection Areas" belonging to the "Burnaz Spring Group Groundwater Reserve and Protection Area" and the Connection line instersects with the ASKI's borehole that provides drinking water to the Yumurtalik district. According to the provisions of "Announcement of Reserves and Protected Area", only the activities of borehole drilling for the purpose of providing drinking water, installation of energy transmission lines to provide power to these boreholes and the activities for the protection of drinking water resources are allowed in the Strictly Protection Area. In addition, it is stated that construction of buildings, material extraction and the storage and disposal of solid or liquid waste and residues are not allowed in the 1st Degree Protection Area. According to the declared provisions of the "Burnaz Resource Group Groundwater Reserve and Protection Area", the sections of the project routes that fall within the Strictly Protection Area and

[51] UK Highways Agency 205/08: Design Manual for Roads and Bridges; http://www.standardsforhighways. co.uk /ha/standards/dmrb/

VESC	Significance	Descrciption
		1st Degree Protection Area and the sections that intersects with the "Yumurtalik Drinking Water Well" of ASKI should be revised inline with the official opinion of DSI 6th Regional Directorate.
Land use	Moderate	Land acquisition on railway connection lines routes will be carried out mainly by GDII in accordance with the applicable national laws and regulations and necessary measures will be taken to close these gaps between national legislation requirements and the World Bank ESS-5. Especially long-term impacts from land acquisition reveal transformative impacts on local economy and livelihoods.
Air emissions and noise	Minor	-
Cultural Heritage	Major	Major impact is expected on the identified areas.
Socio-economic environment	Minor	The decrease in land assets will lead to leaving farming activity with cumulative impacts. It is the common idea of stakeholders that this divergence will be compensated by industrial development, where local economy, livelihoods and employment will be improved. On the other hand, some stakeholders who stated that they do not expect a negative impact on agricultural activities if the developing industry in the region is chimney-free and necessary stack gas treatment requirements are not neglected, emphasized that greenhouse activities are also developing in the region in line with the industry. Therefore, a Minor impact is expected on the socio-economic environment.

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 VESCs).
- Collaborative protection and enhancement in other regional cumulative impact management strategies.
- Collaborative engagement in other regional cumulative impact management strategies.
- Participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts.

Overall management for the cumulative impacts will be the responsibility of 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 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 Description File, 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,
- Location of the existing and planned highways,
- Wind erosion,
- Agricultural and irrigation fields,
- Areas under the jurisdiction of the state,
- Maintenance and operational difficulties,
- Environmental impacts,
- Construction costs,
- Proximity to the present load bearing areas,
- The fact that the planned line will end with the main line.

After all, the current route/layout of the Project is the best available one due to the above mentioned facts about the nature of the railway structures. Accordingly, there are no other route/layout options defined for the railway lines within the scope of the feasibility studies carried out for the Project and the environmental and social impacts of the only alternative have been elaborated under Chapter 5.

Nevertheless, at the scoping phase of the ESIA studies, it was identified that the OIZ - Port connection line and Erzin Port Station as part of the Project were planned to situated on the dune habitat. The General Directorate of Infrastructure Investments (GDII) was informed about the conservation priorities for Burnaz Dunes and *Acanthodactylus schreiberi*. In line with the mitigation hierarchy, the line and station location was revised as demonstrated in Figure 6-1 so that they do not situated on the dune habitat and thus does not result in any Project-related direct impacts on the dune habitats and species populations they support.

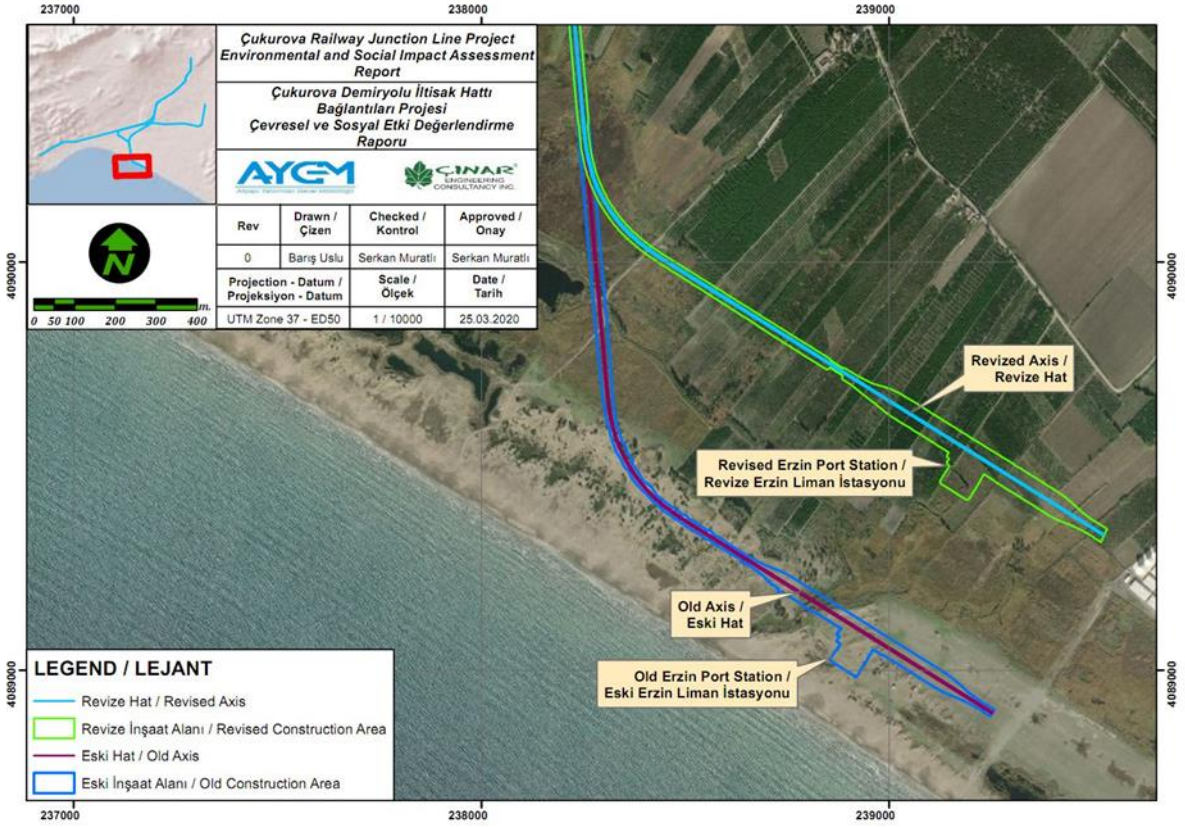

Figure 6-1 Revised the OIZ - Port Connection Line & Erzin Port Station as part of the Project

Besides, Station-1 which is planned to be in the north of Yukarıburnaz on the connection line between the existing Erzin Station and TAYSEB Station (Station-2) was coinciding with a number of households within the Project route shared by the GDII. As the direct symmetrical opposite location of the original Yukarıburnaz Station over the railway line wasn't occupied by any households/establishments, the location of Station-1 was revolved around the railway line to its direct symmetrical opposite location (Figure 6-2).

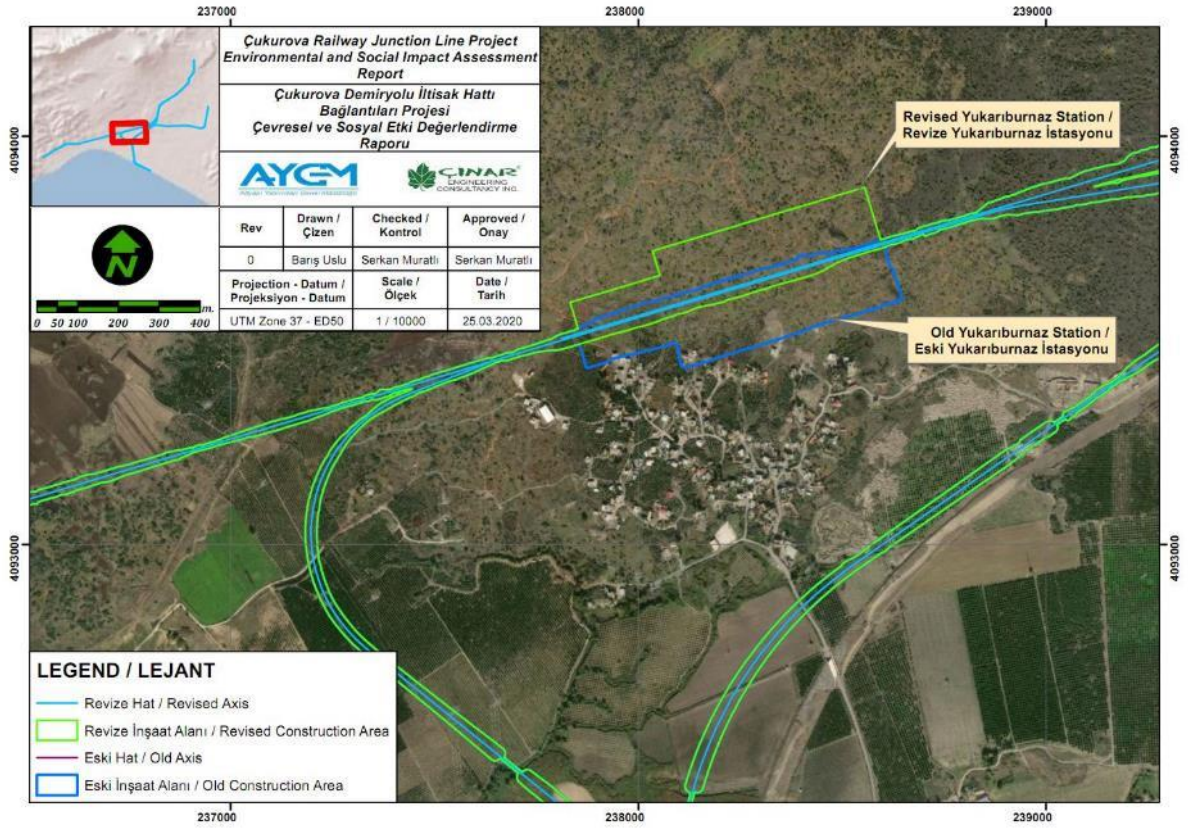

Figure 6-2 Revised Location of Yukarıburnaz Station

Moreover, Station-3 which is planned to be in Osmaniye Organized Industrial Zone (OIZ) on the OIZ - Port connection line was coinciding with a section of an industrial facility as per the Project route shared by the GDII. Accordingly, Station-3 was revised in order not to overlap with any industrial establishments as can be seen in Figure 6-3.

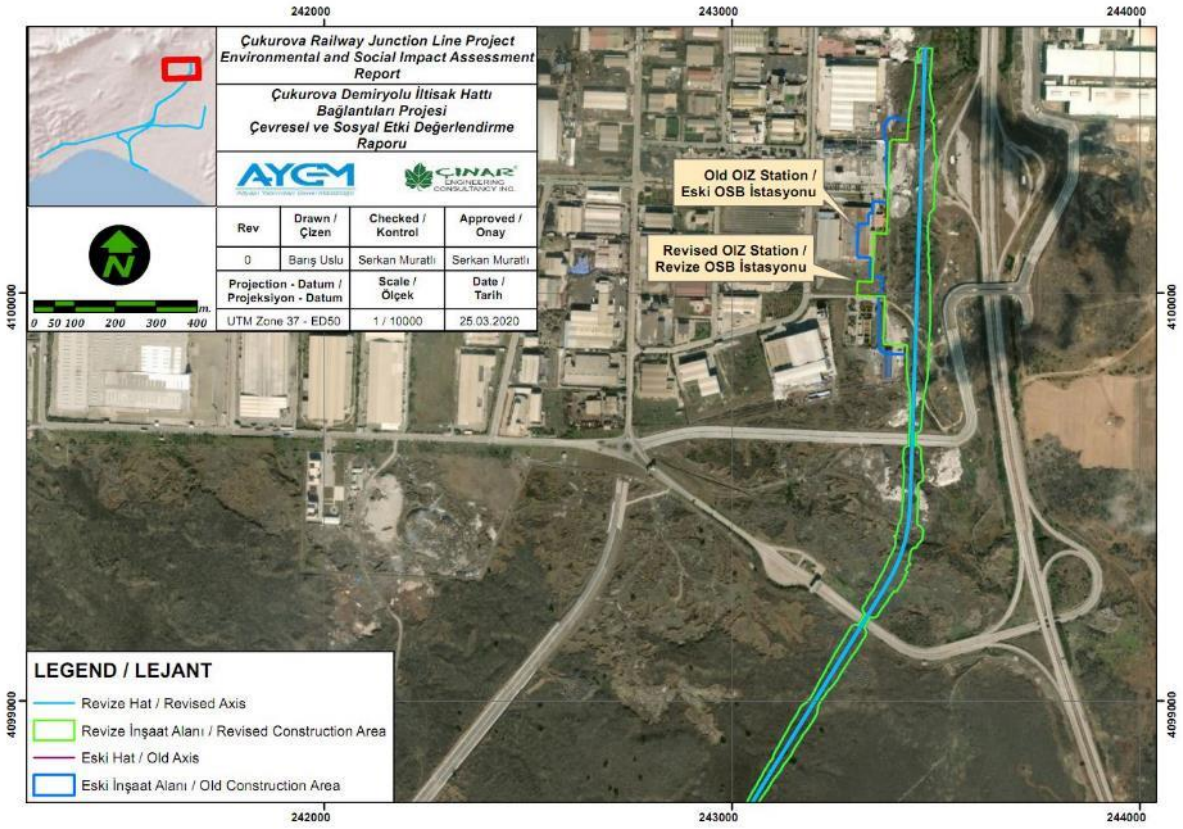

Figure 6-3 Relocation of Osmaniye Organized Industrial Zone Station

6.2. 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, Cukurova 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).

6.3. Quarries and Material Borrow Sites

Within the scope of the Project, the borrow pits were surveyed for determining the natural materials to be used in construction of the railway lines (infrastructure, superstructure, engineering structures, concrete works, etc.). In the Geological-Geotechnical Survey Report prepared for the Project, 2 quarries and 1 borrow pit were specified and evaluated for use. However, as stated in Section 5.5.2.1 of this Report, the specified borrow pit remains within the 1st degree protection area on the "Burnaz Spring Group Groundwater Reserve and Protection Area" where construction materials extraction activities are not allowed. Therefore, the alternatives to the material borrow site should be identified by the Design and Supervision Consultant prior to construction.

6.4. Construction Camp Sites

As indicated in the For the Improving Rail Connectivity Project in Turkey, the camp sites formerly utilized by the Directorate General of Highways are planned to be used during the construction phase. Nevertheless, the footprints of the camp sites are yet to be identified based on the results of the additional studies to be undertaken at the final design stage. Therefore, any alternatives to the camp sites haven't been defined yet.

6.5. Optimization of Engineering Structures

Bridge, underpass and box culverts were placed by the Project designer at the required locations along the railway routes considering the Project standards, hydraulic conditions, ground conditions, etc. The lists of the large engineering structures, box culverts and station locations were prepared and presented in the Geological-Geotechnical Survey Report for the Project.

As elaborated under Section 5.8.3, Issus Ancient Waterway and Ancient City of Issus belonging to Roman Period, which are registered and taken under protection by the law numbered 2863 are located within the boundaries of the Project. Issus Ancient Waterway will be negatively affected from the construction activities of the project in 4 different locations[52]. For this reason, the OIZ-Port Line route should be revised in a way that it will not damage the ancient waterway. If such a revision is not possible, the route should be replanned with viaducts in the sections where the route cuts the ancient waterway in order to avoid destruction of the ancient structure. From the design phase of the project, for any kind of project planning, project revision and similar applications to be made in and around the ancient waterway, the Hatay Cultural Heritage Conservation Regional Board should be consulted, and the decisions to be taken by the conservation board should be followed at all stages of the project as dictated by Law No. 2863.

The other registered site that is affected by the project activities is the Ancient City of Issus. 0 + 000 - 0 + 470 kilometer points of the Connection line pass through the borders of the ancient city. This part also includes the existing Erzin Station (Station Building-Logistics Directorate building), which is a registered cultural asset. For this reason, in this part of the project, it is recommended that the project be revised to remain outside the boundaries of the ancient city of Issus. If it is not possible to avoid the site, in all phases of the project such as project design and project revision around Ancient City of Issus and Erzin Station,

[52] OIZ-Port Line intersects with Issus Ancient Waterway in 4 different sections. The mileage of these sections is as follows: 2 + 150 - 2 + 500, 2 + 950 - 3 + 140, 3 + 600 - 3 + 920 and 4 + 865 - 5 + 350.

the Hatay Cultural Heritage Conservation Regional Board should be consulted, and the decisions to be taken by the conservation board should be followed at all stages of the project as dictated by the Law No. 2863. In addition, the vibration and sound waves of the railway to be constructed during both construction and operation phases may damage other remains, especially the aqueducts of Ancient City of Issus, over time. Considering this risk, it is recommended to design "sound barriers" in the section mentioned during the design phase of the project in a way not to disturb the visual landscape, and to incorporate these sound barriers into the railway project, and to construct the railway by designing the material that will prevent vibration as much as possible.

The design of the engineering structures should be carried out taken into consideration also the extreme weather events in the region stated in Chapter 4.4.3.

6.6. No Project Alternative

Within the scope of the feasibility studies carried out for the Project, the operations analysis and cost-benefit analysis in case the Project is not implemented were performed and the results were compared with the scenario in which the Project is implemented.

In the "no Project" scenario, it was assumed that trucks will perform freight-transportation operations via highways between the existing Erzin Station and TAYSEB Station as well as between Osmaniye OIZ and Erzin Port. Along with distance and travel times during road use, fuel consumption, truck fleet's requirements, operator costs, operation and maintenance costs of trucks were evaluated. Considering the stated costs, the following benefits will be acquired when the project is implemented:

- 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 freigt 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 impacts on safety 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 exenses
- Train crew expensed
- Operating expenses due to train employees
- Operation-maintenance expenses

The followings are considered for No Project Sceaniro;

- 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.

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 avoiding and minimizing potential adverse impacts, establishing relevant operational and management measures, and the numerous beneficial impacts of the project, it was determined that the no-project scenario is not feasible.

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
14.01.2020	Hatay / Erzin / Aşağıburnaz 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.
15.01.2020	Adana/ Ceyhan / Kurtpınar 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.
15.01.2020	Adana/ Ceyhan / Sarımazı 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.
15.01.2020	Süper Enerji Coal Storage Facility	Facility Manager	General description and scope of the project, business area, employment and capacity of the facility, proposed impacts of the Project
15.01.2020	Toros Agriculture Industry and Trade	Process and Planning Manager, Operating Manager, Marketing Manager	General description and scope of the project, business area, employment and capacity of the facility, proposed impacts of the Project
16.01.2020	Hatay / Erzin / Turunçlu Village Council	Mukhtar, community members	General description and information about the project, planned project activities and timeframe, land requirements, potential

Date	Venue	Participants	Scope of Meeting
			impacts on local communities have been provided to Project-affected parties.
16.01.2020	Hatay / Erzin / Yeşiltepe Village 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.
16.01.2020	Hatay/ Erzin / Yukarıburnaz Village 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.
16.01.2020	Erzin Chamber of Industry and Trade	Institution authorities	Industry and trade capacity of Erzin district, potential impacts of the Project on industry and trade activities
16.01.2020	Erzin Yeşilkent Irrigation Cooperative	Deputy Manager	Agricultural potential of Erzin-Dörtyol plain, potential impacts of the Project on water resources and irrigation systems
17.01.2020	Osmaniye / Toprakkale / Büyüktüysüz Village 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.
17.01.2020	Toros Adana Yumurtalık Free Zone	Operating Manager, Marketing and Sales Manager	General description and scope of the project, business area, employment and capacity of the facility, proposed impacts of the Project
17.01.2020	Osmaniye OIZ	Engineer and Technical Personnel	General description and scope of the project, business area, employment and capacity of the facility, proposed impacts of the Project
17.01.2020	Erzin District Directorate of Agriculture and Forestry	Deputy Manager of the Institution and personnel	Agricultural statistics of Erzin region, agricultural potential of Erzin-Dörtyol plain,

Date	Venue	Participants	Scope of Meeting
			proposed impacts of the Project on agricultural lands
17.01.2020	Erzin Chamber of Agriculture	Head of the Chamber	Agricultural statistics of Erzin region, agricultural potential of Erzin-Dörtyol plain, proposed impacts of the Project on agricultural lands
11.02.2020	Adana / Ceyhan / Sarımazı 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.
11.02.2020	Hatay / Erzin / Turunçlu 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.
12.02.2020	Hatay / Erzin / Yukarıburnaz Village Coffeehouse	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.
13.02.2020	Hatay / Erzin / Yeşiltepe Village Coffeehouse	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.

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 feedbacks received from the stakeholders during the disclosure process are presented in detail in the SEP and RAP documents, with reference to the relevant sections of the RAP and ESIA 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. It is found out that most of the questions / complaints have been raised about the Project revision made in Erzin Port station. Apart from this topic, the RAP and ESIA field studies have shown that the public views on the Project are mostly positive.

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. As defined in Roles and Responsibilities Section of the SEP, a 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://GDII.uab.gov.tr/dunya-bankasi-turkiye-de-demiryolu-lojistigini-gelistirme-projesi)

The steps to be followed during the grievance management are detailed in the SEP.

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ANNEX 1 LIST OF THE INDIVIDUALS/ORGANIZATIONS 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 İş ve Çalışma Koşulları 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 SETTLEMENT SURVEY QUESTIONNAIRE

ÇUKUROVA REGION AND ISKENDERUN BAY RAILWAY CONNECTION PROJECT

AFFECTED SETTLEMENT MUKHTAR SURVEY

SURVEY DESCRIPTION

Çukurova Region and Iskenderun Bay Railway Connection Project, is carried out by the Ministry of Transport and Infrastructure, General Directorate of Infrastructure Investments.

The project will be carried out within the borders of Ceyhan district of Adana province, Erzin district of Hatay province and Toprakkale district of Osmaniye province and includes 36 km of railway line, expansion of one existing station and construction of four stations. 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 to be provided will help to better understand the region where the Project is located and will contribute to the decision-making process.

The information you provide shall be used only for this project. Your name and any information you share with us shall be kept confidential.

Thank you for your participation and sparing your time.

Date:	
Province:	
District:	
Village/Neighborhood:	
Mukhtar Name:	
Mukhtar Contact Information	

A. <u>POPULATION AND DEMOGRAPHY</u>

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 rank them by importance;

Economic Activity	Importance		
	1	2	3
Agriculture			
Animal Husbandry			
Forestry			
Beekeeping			
Salaried employee			
Seasonal labor (construction, etc.)			
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 working 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 them 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 price of 1 decare of irrigated land in good condition (i.e., accessible, non-sloping, arable agricultural land)?

K.2. How much is 1 decare of irrigated land in good condition?

K.3. What is the average price of 1 decare of dry land in good condition (i.e., accessible, non-sloping, qualified agricultural land)?

K.4. How much lira is 1 decare of dry land in good condition?

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 they are used?

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 issues that can help you the most in improving your livelihoods? (Starting from 1 in order of importance, up to 5 options)

Issues	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

N.1. Are you aware of the project? If yes, where did you get this information?

N.2. Are there other Projects in or around your region? If yes, which one/ones?

N.3. If yes, can you share your experiences about these other projects?

N.4. Do you have any questions about this project? What are they?

	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_____		
_____		

N.5. What are the issues that you want to add about the project?

ANNEX 3 SAMPLE HOUSEHOLD SURVEY QUESTIONNAIRE

ÇUKUROVA REGION AND ISKENDERUN BAY RAILWAY CONNECTIONS PROJECT

SOCIO-ECONOMIC SURVEY FOR THE AFFECTED LAND OWNERS AND USERS

SURVEY DESCRIPTION

Çukurova Region and Iskenderun Bay Railway Connections Project, is carried out by the Ministry of Transport and Infrastructure, General Directorate of Infrastructure Investments.

The project will be carried out within the borders of Ceyhan district of Adana province, Erzin district of Hatay province and Toprakkale district of Osmaniye province and includes 36 km of railway line, expansion of one existing station and construction of four stations. The affected lands will be expropriated temporarily or permanently according to the requirements of the Project components.

This interview is conducted to collect information about the demographic and socio-economic conditions of landowners and users affected by the Project, to record their feedback on the project and to prepare the RAP (Resettlement Action Plan) report. The information to be provided will help to better understand the region where the Project is located and will contribute to the decision-making process.

The information you provide shall be used only for this project. Your name and any information you share with us shall be kept confidential.

Thank you for your participation and sparing your time.

INSTRUCTIONS FOR SURVEYOR

This survey shall be applied on land owner (or someone from landowner home who can give information) or the person who is not land owner but uses the land. Land registration number and the list of land owners have been submitted to you.

If the person whom you meet is not land owner, does not know the land owner or does not use the land, please explicitly state this in the interview form, thank this person and then end the interview.

While recording the answers, please write every number as it is. All questions must be answered; if it is not answered, it must be marked fit to this situation.

In case that the person whom the interview is conducted refuses to answer the question, this situation must be stated with its reason.

SURVEYOR INFORMATION	
SURVEYOR:	
DATE:	DATE:
DISTRICT:	DISTRICT:

PRELIMINARY INFORMATION FORM FOR THE LAND (*To fill this section, data of parcel database and also information obtained from interviewed land owner or the user of the land shall be used.)*	
Province	Province
District	District
Village / Quarter / Location	Village / Quarter / Location
Total Area of Parcel	Total Area of Parcel
Name of Parcel Owner	Name of Parcel Owner
Parcel Rate	Parcel Rate
Number of Parcel Owners Names of Parcel Users *(Please write the name in the section with corresponding category)*	Number of Parcel Owners Names of Parcel Users *(Please write the name in the section with corresponding category)*
Quality of the land (available for irrigated farming, available for dry farming, vineyard/orchard, pasture etc.)	Quality of the land (available for irrigated farming, available for dry farming, vineyard/orchard, pasture etc.)
Is the parcel mortgaged?	Is the parcel mortgaged?
Is the parcel subjected to the land consolidation?	Is the parcel subjected to the land consolidation?

INFORMATION ABOUT THE PERSON ANSWERING THE SURVEY	
Name-Surname of the Person Answering the Survey	
Gender	(1) Male ……. (2) Female ……
Phone Number the Person Answering the Survey	
(……) 1	The interview was carried out with the owner of the land affected by the Project.
(……) 2	The interview was carried out with one of close family members.
(……) 3	The interview was carried out with the land user who paid for the land. How many years has the land been used? ……
(……) 4	The interview was carried out with the land user who did not pay for the land. How many years has the land been used? ……
Residence Situation:	(1) Permanently ☐
	(2) Periodically ☐ **Province-District of Residence** .....
	03 Rarely ☐ **Province-District of Residence** ..... (only during Eid, etc.)
	(4) Not reside here ☐ **Province-District of Residence** .....

	Country .....
If the survey was rejected or the interview was not completed, please write below the reason.	

A. HOUSEHOLD INFORMATION

A1. RANK NO	A2. Could you list the people living in your home below	A3. Degree of kinship with the person whom the interview is conducted?	A4. Gender	A5. Age?	A6. Marital Status?	A7. Educational Status (Persons aged 4 and older, individuals except students)	A8. Student if available	A9. Educational status (Primary school, secondary school, high school), (for persons aged 4 and older)	A10. Work status? (MORE THAN ONE OPTION CAN BE MARKED. IF IT IS NOT PROPER TO YOU PLEASE PUT HYPHEN (-) (For persons aged 15 and older)	A11. Social Security Status	A12. Disability Status
NO	(HOUSEHOLD MEMBERS Who generally live at home but have not been present at home for a while shall be included.)			(Please write current age)	01 MARRIED 02 SINGLE 03 WIDOW 04 DIVORCED 05 UNDER 18 YEARS OLD	01 NOT LITERATE 02 LITERATE 03 LEFT PRIMARY SCHOOL GRADUATION 04 PRIMARY SCHOOL 05 SECONDAY SCHOOL	STUDENTSHIP STATUS 10 PRESCHOOL 11 PRIMARY SCHOOL 12 SECONDAY SCHOOL 13 HIGH SCHOOL 14 COLLEGE /	01 NORMAL 02 MOBILE 03 BOARDING (REGIONAL BOARDING SCHOOL) 04 BOARDING (HOME/RELATIVES) 05 NOT GO TO THE	01 FARMER 02 CRAFTSMAN/MERCHANT/SELF-EMPLOYED 03 OFFICER 04 WORKER 05 DAILY/SEASONAL WORKER İŞÇİ (BUILDING, AGRICULTURE, ETC)	01 NOT PRESENT 02 SOCIAL SECURITY INSTITUTION 03 GENERAL HEALTH INSURANCE 04 GREEN CARD	01 NOT DISABLED 02 PHYSICALLY DISABLED 03 MENTALLY DISABLED 04 CHRONIC PATIENT, HAS HEALTH

						06 VOCATIONAL HIGH SCHOOL 07 HIGH SCHOOL 08 COLLEGE 09 UNIVERSITY 10 I DO NOT KNOW. 11 NOT VALID	UNIVERSITY 15 OTHER 16 NOT STUDENT	SCHOOL	06 HOUSEWIFE 07 RETIRED 08 STUDENT 09 UNEMPLOYED 10 OLD AGE/DISABILITY PENSION 11 OTHER……	05 PRIVATE INSURANCE 06 OTHER...	PROBLEMS 05 AGED PERSON IN NEED OF CARE
1											
2											
3											
4											
5											
6											

7											
8											
9											
10											
	A.13. TOTAL number of people=										

A. HOME AND INFRASTRUCTURE

B1. Does your home belong to you?

1 ( ) Yes, it belongs to us only
2 ( ) It is shared but we use it
3 ( ) No, it belongs to our close relatives and we live there without paying rent
4 ( ) No, we are lessee
5 ( ) Other……

B2. How many square meter (m2) is your home?: ……m2

B3. How many rooms are there in your house have? (Including saloon, excluding kitchen, bathroom) ..... Room(s)

B4. What is the source of potable water in the house?

(1) City water supply
(2) Water reservoir
(3) Well water
(4) Spring water
(5) Artesian water, water pump
(6) Other……..

B5. Is potable water source adequate? If it is not, why not?

(1) Yes
(2) No, because……..

B6. What kind of energy source do you use for heating? *(Please rank by the most frequently used and priority.)*

(1) Wood
(2) Coal
(3) Electricity
(4) Bottled Gas
(5) Cow dung
(6) Other……..

B7. Do you have any other house and/or shop except the home where you currently live/use? *(If not, please go to question B9)*

(1) Yes – hous e Its location……..
(2) Yes – shop Its location……
(3) No

B8. For what purpose is your other property (house-shop) used?

(1) Permanently (Using it by herself/himself)
(2) Investment (Leasing it)
(3) Summer or winter house (Using it by herself/himself)
(4) Other…….

B9. If you build a house similar to your current house, how much will it cost?

(1) …….……..……TL

(2) I do not know

B. ANIMAL HUSBANDRY

C1. Do you have an animal?

(1) Yes

(2) No *(If no, please go to Section D)*

C2. Which animal (s) do you feed? What are their numbers?

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?

(1) Yes ..... (if yes,..... m^2)

(2) No

C4. What material is your barn made of?.....

C5. When (in which year) was your barn built?.....

C6. Where do you feed your animals? (Multiple answers can be received)

	Please mark	**In which periods?** (Season can be specified such as summer-winter)
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	( )	

C7. *(If the animals are grazing)* Is the grazing area you use sufficient?

(1) Yes

(2) No

C8. What do you do with the products you get from animal husbandry?

	We consume ourselves at home	Usually we consume it at home, we sell it if there is excess	We sell to manufacturer, trader, factory etc.	We sell in the market
Milk				
Cheese				
Butter				
Egg				
Honey and honey products (propolis etc.)				
Other (Please explain)				

C. AGRICULTURE

D1. Are there any lands that you use or own?

(01) Yes
(02) No *(If no, Please go to Section E)*

D2. Please state your land property (Property which you have shared or with certificate of ownership)

Type	**Currently existing decare** (If there is no land, please write 0)	**If any, decare purchased/expropriated under Road, OIZ or station projects**
1. Vineyard		
2. Garden		
3. Farm	**Dry** (Decare): **Irrigated**(Decare): **Total**(Decare):	**Dry** (Decare): **Irrigated**(Decare): **Total**(Decare):
4. Orchard (including fruit trees)		

5. Wood land *(*Poplar tree etc. *trees without fruit*		
6.Other		
7. Total		
8. Do not have any land property		

D3. Is there any other land that you do not have certificate of ownership but use? (If no, please write 0)

	Current dry (decare)	**Current irrigated (decare)**	**Current Total (decare)**	**If any, decare purchased/expropriated by Filyos Industrial Zone Project**		
				Dry (Decare)	**Irrigated (Decare)**	**Total (Decare)**
Leased Public land						
Public land used without leasing						
Private land , leased						
Private land, not leased (belonging to a relative, neighbour etc.)						
Total						

D4. How do you use your land? *(If there is more than one land, mark it by stating which land it is.)*

(1) We plant it
(2) Vacant
(3) We lease it (If it is, name of the tenant ……..)
(4) Sharecropping (If so, name of the sharecropper ……)
(5) We are performing animal husbandry feed animals
(6) We left the land, we do not know what happened to it
(7) We provided it to be planted by casual workers, we buy the product (If so, where do workers come from? ……)
(8) Other shareholders are planting

(9) Other (Please specify……..)

D5. What is your irrigation source?

(1) Well, …… quantity
(2) River/Stream/Creek/Pool
(3) Irrigation channel
(4) City water
(5) Other (Please specify……..)
(6) Not irrigating

D6. Is the irrigation water source adequate?

(1) Yes
(2) No

D7. If there is a tree on the land, state the type of tree and the number of trees owned.

Type of tree	How many trees are there on the current land? (If there is none, write 0)	If there is, how many were there in land purchased/expropriated by Çukurova Railway Project
1. Hazelnut		
2. Walnut		
3. Fig		
4. Pear		
5. Sweet Cherry		
6. Apple		
7. Pear		
8. Plum		
9. Chestnut		
10. Mulberry		
11. Mandarin		
12. Orange		
13. Olive		
14. Grapefruit		
15. Apricot		
16. Pomegranate		
17. Peach		
18. Cherry		
19. Grape		
20. Damson Plum		
21. Quince		
22. Poplar		

23.	Willow		
24.	Cedar / spruce or other forest trees		
25.	Chestnut		
26.	Peach		
27.	Other		

D8. What agricultural products do you grow on all your land (which you own and use)? (how many decares)

Name of the product		**Present on the current land (How many decares)**	**How many products are planted in the Parcels that will be expropriated for the Çukurova Railway project?**
1.	Wheat		
2.	Barley		
3.	Sugar beet		
4.	Beans		
5.	Chickpea		
6.	Rice		
7.	Kale		
8.	Pistachio		
9.	Melon/watermelon		
10.	Tomato		
11.	Corn		
12.	Sunflower		
13.	Clover		
14.	Vetch		
15.	Sainfoin		
16.	Eggplant		
17.	Leek		
18.	Pepper		
19.	Parsley		
20.	Lettuce		
21.	Radish		
22.	Cucumber		
23.	Spinach		
24.	Onion		
25.	Oatmeal		
26.	Soybean		
27.	Peanut		
28.	Beans		
29.	Carrot		
30.	Japanese plum		

31.	Medlar		
32.	Cauliflower		
33.	Scallion		
34.	Potato		
35.	*Other (Please write on the lines below)*		

D9. Which products that you planted yield the most income?

D10. How many times do you plant your land in one full year?

D11. Do you fallow your land?

(1) Yes ……. (2) No …….

D12. Do you have a bearer tree or yielding tree? (Olive, Walnut, Poplar Tree, etc.)?

(1) Yes

(2) No *(If no, please go to question D14)*

D13. What are the types of your income generating trees?

Type of tree	Number	Type of tree	Number
1. Hazelnut		11. Orange	
2. Walnut		12. Lemon	
3. Fig		13. Olive	
4. Sweet cherry		14. Alder	
5. Apple		15. Apricot	
6. Pear		16. Pomegranate	
7. Plum		17. Peach	
8. Chestnut		18. Cherry	
9. Mulberry		19. Grape	
10. Mandarin		20. Poplar	

D14. Do you or any of your family members have any of the following assets?

Assets Owned by Family	**Number (If none, 0)**
(1) Automobile	
(2) Truck	
(3) Minibus	
(4) Tractor	
(5) Combine Harvester	

(6) Bus	
(7)....	

D. EXPENSES

E1. Could you indicate what subjects you spend most in a month? *(According to the order of priority, it will be listed as 1, 2, 3, 4, and if possible, a percentage distribution will be taken.)*

		Priority	PERCENTAGE (%)
1.	Kitchen expenses		
2.	Heating expenses (natural gas, coal, bottled gas etc.)		
3.	Electricity expenses		
4.	Clothing / transportation / health etc. personal needs		
5.	Education expenses		
6.	Debt payment (credit card, personal loan etc.)		
7.	Vacation or entertainment expenses		
8.	Monopoly products spend		
9.	Agricultural activity expenses fertilizer, diesel oil, water, electricity etc.)		
10.	Livestock costs (feed, veterinary care, medicine etc.)		
11.	Sending money to a close household member / relative		
12.	Purchase of foreign currency, gold or stock		
13.	Other ……		
14.	Other ……		

E. INCOMES

F1. What kind of incomes does your family have? What are the house incomes?
(Please mark in order of importance, write if quantity can be specified).

Income Sources	1 (Primary source of income)	Annual amount (average)	2 (Side income)	Annual amount (average)	3 (Side income)	Annual amount (average)
1. Income of paid employment (employee)						
2. Income of salaried employment (Civil servant)						
3. Income of artisan/craftsman/trade						
4. Retirees						
5. Periodic/seasonal workers						
6. Agricultural income (Field crops)						
7. Agricultural income (fruit, vineyard cultivation, etc.)						
8. Animal husbandry income (animal sale)						
9. Animal production (Egg, milk, cheese, etc.)						
10. Rental income (House, parcel of land, shop, land)						
11.( )Widow /( )Orphan/( )Disability/( ) Old-age Pension						
12. Unemployment pay						
13. Working Program for Benefit of Society						
14. Other *(Please specify……)*						

F2. Do you sell animal?

(1) Yes
(2) No

F3. Could you write the number of animals that you have sold in a year? *(If s/he sells animals and it is not listed among the income sources in F1, then go back anc mark them among sources of income)*

Type	Number of animals sold in a year	Type	Number of animals sold in a year
1.Sheep		8.Bullock	
2.Goat		9.Chicken	
3.Ram		10.Rooster	
4.Lamb		11.Turkey	
5.Veal		12.Goose	
6.Calf		13.Other……	
7.Cow			

F4. How much did you earn last month / year from animal sales or animal products?
(1) …….. TL ***(If none, write "0")***
(2) I don't know

F5. How much did you earn from all your agricultural production over the past year (on all land you own)?
(1) …….. TL
(2) I don't know
(3) Does not generate income, produces for household needs

F6. Is your village close to the forest?
a. Yes
b. No (*Please go to Section G*)

F7. Do you use the forest for any purpose? (Please read all the categories and tick the ones answered yes by the participant)

1. We collect the wood we use for heating from the forest	
2. We collect mushroom/spices/herbs for our own use	
3. We collect mushroom/spices/herbs to sell	
4. We work as paid workers in the forest	
5. We pasture our animals.	

6. We do not use the forest	

SELF PERCEPTION

G1. In which level do you meet basic requirements of your home?

01 Easy
02 Medium
03 Hard
04 I do not want to answer

G2. What do you think of your economic status compared to the previous year??

01 Same
02 Worse
03 Better
04 I don't know

THE MOST IMPORTANT PROBLEMS OF THE RESIDENCE

H1. What do you think are the most important problems of the village / neighborhood? *(If there is no problem, please go to the next question)*

Problems (Multiple options can be selected)	**Write 1,2,3 in order of importance.**
1. Unemployment	
2. Economy (financial difficulty, low income)	
3. Deficient/inadequate infrastructure(electricity/sewer system)	
4. Irrigation	
5. Access to the city	
6. Access to the land	
7. Education services	
8. Health services	
9. Communication (internet, mobile phone network)	
10. Garbage	
11. Social facilities (football field, etc.)	
12. Insufficient shelter conditions / heating conditions	
13. Unrest due to relatives and neighbors	
14. Inadequacy of pasture/highland	
15. Inadequacy of farms	
16. Inadequate potable water infrastructure	
17. Security	
18. Other…	

İ. ENHANCING OF SOURCES OF LIVING

İ1. What are the issues which will be more useful to you in enhancing sources of living? *(Read them all, Maximum 5 options, starting with 1 in the order of priority)*

Issues	Priority
01 Bovine breeding	
02 Ovine breeding	
03 Apiculture (Bee hive and materials)	
04 Animal husbandry inputs (Cheep feed, etc., veterinary services)	
05 Animal facilities (barn building/modification)	
06 Greenhouse cultivation	
07 Field crops inputs (cheap seed, drug, fertilizer, etc.)	
08 The need of agricultural machinery and equipment	
09 Fruit growing/Gardening	
10 Cooperation (Type.....)	
11 Vocational assistance courses (Please specify.....)	
12 Business start-up support, cheap credit support for existing businesses	
13 Other.....	

j. INFORMATION ABOUT THE PROJECT

J1. Do you know about the Çukurova Region and Iskenderun Bay Railway Connections Project? (Additional Information: It is between Osmaniye OIZ, Erzin Port, Erzin Station and Yumurtalık Free Zone)

(1) …….. No, I do not know (Please briefly inform about the project before moving on to the next question, the explanation in the survey entry can be used)
(2) …….. Yes I know-Where did you hear/ Who did you get information? (Multiple responses can be circled)

01 Family Members
02 Mukhtar
03 Municipality
04 Visits, meetings of company representatives
05 Workers from the firm
06 TV/Radio
07 İnternet
08 Newspaper
09 Brochure
10 District Governorship /Governorate
11Other……

j2. Has your land been purchased or expropriated for a railway, OIZ or station project?

01 ……. Yes; How much land? ……. decare
02 ……...No

J3. Has any immovable property, which your family has purchased or used, been purchased or expropriated for any other project or projects before?

01 ……. If yes, which property?
02 ……. No

J4. What do you want to learn about land acquisition? (More than one answer can be given.)

K. APPROACH TO THE PROJECT

K1. What would be the positive impacts of the project in your opinion? *(Scale 1-5 in order of importance)*

Issues	**Priority**
01 Contributes to the economic development of the region	
02 Contributes to the development of the country	
03 Provides local employment	
04 Transport infrastructure improves	
05 Other…….	

K2. What would be the negative impacts of the project in your opinion? *(Scale 1-5 in order of importance)*

Issues	**Priority**
01 Our access to land is prevented	
02 Land becomes damaged / unusable	
03 The crops and trees in the land are damaged	
04 Rangelands and meadows are damaged / decreases affecting households economically	
05 Livelihoods are negatively affected due to expropriation	
06 Dust is generated/increased	

07 Noise is generated/increased	
08 Traffic accident risks increase	
09 Human, community and animal health are negatively affected	
10 Other…….	

K3. What do you think can be done to reduce negative effects? *(Starting from 1 in order of priority)*

Issues	**Priority**
1. Activities (agriculture-animal husbandry) providing income to come in the residential areas	
2. Generating solutions to provide access to land	
3. Calculation of expropriation compensations to meet losses	
4. 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)	
8. Road modification / construction (village-village, village-city, neighborhood-neighborhood, neighborhood-district, etc.)	
9. School construction, development of educational infrastructure	
10. Improving health services, increasing health services	
11. Construction of social facilities used for common purposes (wedding hall, carpet pitch, etc.)	
12. Other……	

L. LOCAL EMPLOYMENT

L1. Is there anyone who can work or want to work in the project at your home?

L2. Are there anyone in your household working in OIZs?

a. Yes……..People…….. How long has she/he been working? (Month)……

b. No

L3. Are there anyone in your household who have been working on the Project for the past year and are now unemployed?

1 Yes……..People…….. How long has she/he worked? (Month)……
2 No

M. INFORMATION ABOUT THE COMMON LAND AFFECTED BY THE PROJECT

M1. Do you have any information about the village / neighborhood common land affected by the project?

(1) Yes
(2) No
(3) I don't know

M2. How do you use the village / neighborhood common land (if any) (treasury, pasture, forest, etc.) affected by the project? (Multiple options can be selected) SHOWN ON THE MAP

(1) We pasture our animals together with other villagers
(2) We plant it by ourselves
(3) We collect meadow, grass
(4) We use with the intend of highland
(5) We collect products of trees (fruit tree, etc.)
(6) Other……..
(7) We do not use

M3. Is there any tree, which can provide income and you use on the land affected by the project?

1 No
2 If yes;

Type of Tree	Number

3 I don't know

M4. Is there any outbuilding (shed, well, wall, tandoori, barn, etc.) which you use on the land affected by the project?

(1) No
(2) If yes;

Outbuilding	Quantity	Area(m^2)	Certificate of ownership status

(3) I don't know

M5. Do common lands affected by the project contribute to the house incomes? How? If available, what is its estimated annual income?

1 Yes ; .....TL
2 No

M6. What are the biggest changes (positive/negative) that may occur in your status regarding common lands will be affected by the project?

ANNEX 4 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 5 FIELD STUDY PHOTOS

No	Photograph	Location & Date	Description
1		Aşağıburnaz Erzin Hatay 14.01.2020	A view from the HH Survey study
2		Aşağıburnaz Erzin Hatay 14.01.2020	A view from FGD with Aşağıburnaz men

No	Photograph	Location & Date	Description
3		Aşağıburnaz Erzin Hatay 14.01.2020	A view from the HH Survey study

No	Photograph	Location & Date	Description
4		Aşağıburnaz Erzin Hatay 14.01.2020	A view from Mukhtar interview

No	Photograph	Location & Date	Description
5		Kurtpınar Ceyhan Adana 15.01.2020	A view from the HH Survey study
6		Turunçu Erzin Hatay 16.01.2020	A view from FGD with Turunçlu women

No	Photograph	Location & Date	Description
7		Erzin Dörtyol Hatay 17.01.2020	Erzin Train Station to be expanded in the scope of Project
8		Erzin Dörtyol Hatay 17.01.2020	A view from the orchards on the route of the line that will depart from the existing Erzin Train Station.

No	Photograph	Location & Date	Description
9		Erzin Dörtyol Hatay 17.01.2020	A view from the orchards on the route of the line that will depart from the existing Erzin Train Station.
10		Turunçu Erzin Hatay 16.01.2020	A view from HH survey study

No	Photograph	Location & Date	Description
11		Turunçu Erzin Hatay 16.01.2020	A view from Turunçlu
12		Turunçu Erzin Hatay 16.01.2020	A view from Turunçlu

No	Photograph	Location & Date	Description
13		Turunçu Erzin Hatay 16.01.2020	A view from Turunçlu
14		Yukarıburnaz Erzin Hatay 16.01.2020	A view from FGD with men

No	Photograph	Location & Date	Description
15		Yukarıburnaz Erzin Hatay 16.01.2020	A view from FGD with men
16		Yukarıburnaz Erzin Hatay 16.01.2020	A view from Yukarıburnaz

No	Photograph	Location & Date	Description
17		Sarımazı Adana Ceyhan 15.01.2020	A view from FGD
18		Sarımazı Adana Ceyhan 15.01.2020	A view from HH survey study

No	Photograph	Location & Date	Description
19		Sarımazı Adana Ceyhan 15.01.2020	A view from Sarımazı

No	Photograph	Location & Date	Description
20		Sarımazı Adana Ceyhan 15.01.2020	A view from Sarımazı

No	Photograph	Location & Date	Description
21		Sarımazı Adana Ceyhan 15.01.2020	A view from HH survey study

No	Photograph	Location & Date	Description
22		Adana Ceyhan Yumurtalık 15.01.2020	Adana Yumurtalık Free Zone entrance (TAYSEB)

No	Photograph	Location & Date	Description
23		Adana Ceyhan Yumurtalık 15.01.2020	Yumurtalik Free Zone, highway connection road

No	Photograph	Location & Date	Description
24		Adana Ceyhan Yumurtalık 15.01.2020	A view from TAYSEB parking area of Toros Tarım which is planned to be relocated within the scope of the project

No	Photograph	Location & Date	Description
25		Adana Ceyhan Yumurtalık 15.01.2020	A view from Entrance of TAYSEB parking area of Toros Tarım which is planned to be relocated within the scope of the project Hut and structures.

ANNEX 6 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 Corridor (100m.)	Approximate Distance to Expropriation Border (m)	Approximate Distance (km)	Archaeological Test Excavation	Geophysical Survey	Archaeological Salvage Excavation	Technical Documentation	Restoration	Removal to Another Place	Archaeological Monitoring	Physical Intervention Should be Avoided	Ceramic Sherds	Architectural Remains	Other (Bone, Stone Tool, etc.)	
1	Issos Ancient City 1. Degree Archaeological Site	Hatay	Erzin/Yeşilkent	x		x	x	0	0+000 - 0+470 (Railway Route)							x	x	x	x	x	The archaeological site is located in Section-1; between 0 + 000- 0 + 470 kilometer points of the branch line pass through the borders of the ancient city. This part also includes "Erzin Station Complex (Station Building-Logistics Directorate building), which is a registered cultural asset. For this reason, in this part of the project, it is primarily recommended that the project be revised to remain outside the boundaries of the ancient city of Issus. If it is not possible to avoid the site, in all phases of the project such as project design and project revision around Issus Ancient City and Erzin Station Complex, the Hatay Cultural Heritage Conservation Regional Board should be consulted, and the decisions to be taken by the conservation board should be

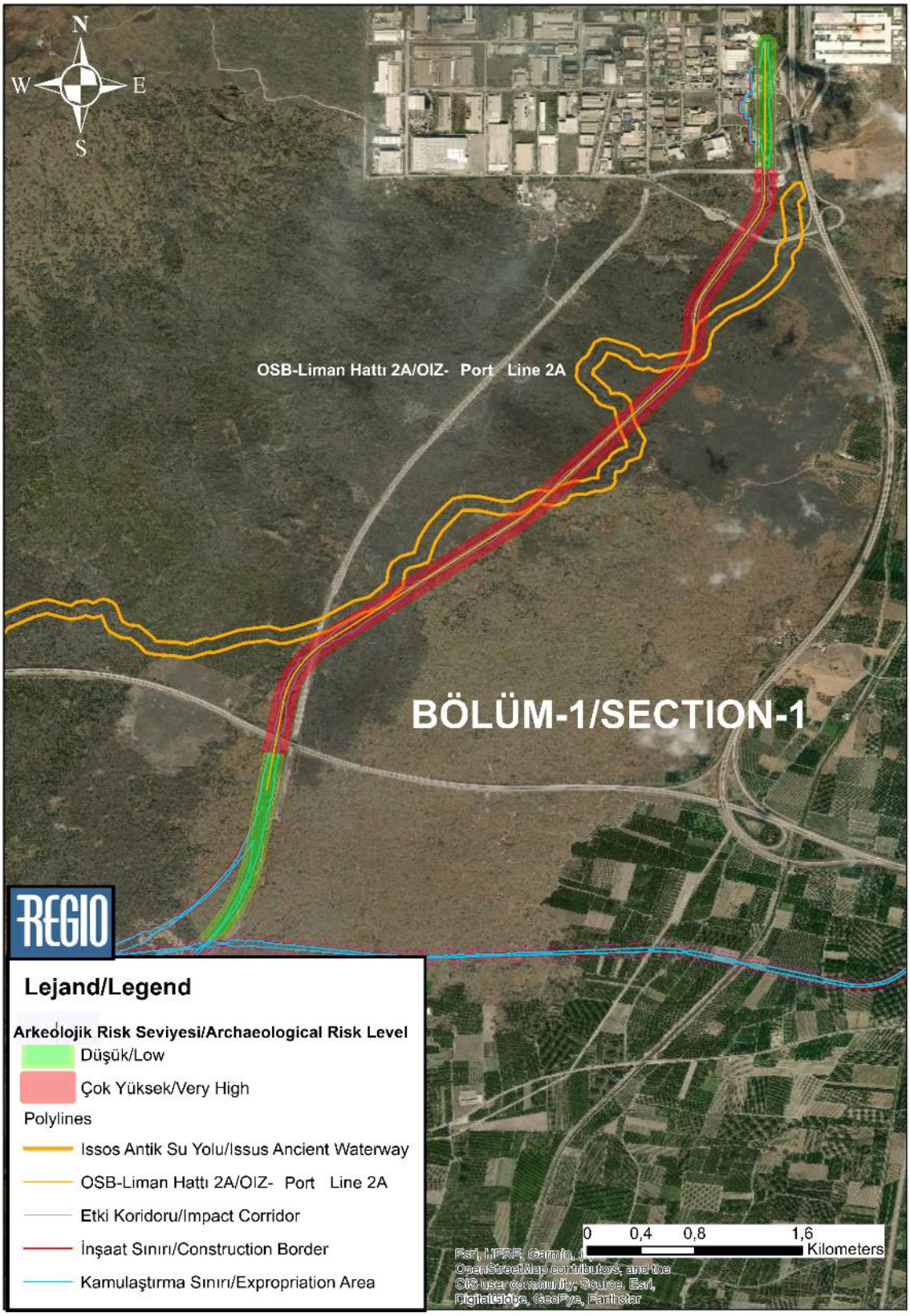
LOCATION OF SITES				DATA RESOURCES		LOCATION OF SITES IN WITHIN THE PROJECT AREA				PROPOSED MITIGATION MEASURES								TYPE OF THE ARCHAEOLOGICAL TRACES/SURFACE FINDINGS			EXPLANATIONS
No	Site Name	Province	District/Village	Ministry of Culture and Tourism	Field Survey	Within Expropriation Border	Within Impact Corridor (100m.)	Approximate Distance to Expropriation Border (m)	Approximate Distance (km)	Archaeological Test Excavation	Geophysical Survey	Archaeological Salvage Excavation	Technical Documentation	Restoration	Removal to Another Place	Archaeological Monitoring	Physical Intervention Should be Avoided	Ceramic Sherds	Architectural Remains	Other (Bone, Stone Tool, etc.)	
2	Erzin Train Station	Hatay	Erzin	x		x	x	0	0+000 (Railway Route)				x	x		x	x		x		followed at all stages of the project as dictated by the Law No. 2863. In addition, the vibration and sound waves of the railway to be constructed during both construction and operation phases may damage other remains, especially the aqueducts of Ancient City of Issus, over time. Considering this risk, it is recommended to design “sound barriers” in the section mentioned during the design phase of the project in a way not to disturb the visual landscape, and to incorporate these sound barriers into the railway project, and to construct the train line by designing the material that will prevent vibration as much as possible.

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 Corridor (100m.)	Approximate Distance to Expropriation Border (m)	Approximate Distance (km)	Archaeological Test Excavation	Geophysical Survey	Archaeological Salvage Excavation	Technical Documentation	Restoration	Removal to Another Place	Archaeological Monitoring	Physical Intervention Should be Avoided	Ceramic Sherds	Architectural Remains	Other (Bone, Stone Tool, etc.)	
3	İssos Ancient Waterway	Hatay	Erzin/Turunçlu	x		x	x	0	1+000 - 5+300 (OIZ Port Line)				x	x		x	x		x		Issus Ancient Waterway" in Section-1 is a well-preserved archaeological culture asset in its original form. As the result of the studies, it has been identified that the mentioned cultural asset will be negatively affected from the construction activities of the project in 4 different locations . For this reason, it is recommended that the Çukurova Railway – OIZ Port Line route to be revised in a way that it will not destroy the ancient waterway. If such a revision is not possible, it is recommended to re-plan the route with viaducts in the sections where the railway route cuts the ancient waterway in order to avoid destruction of the ancient structure. From the design phase of the project, for any kind of project planning, project revision and similar applications to be made in and around the ancient waterway, the Hatay Cultural Heritage Conservation Regional Board should be consulted, and the decisions to be taken by the conservation board should be followed at all stages of the project as dictated by Law No. 2863.

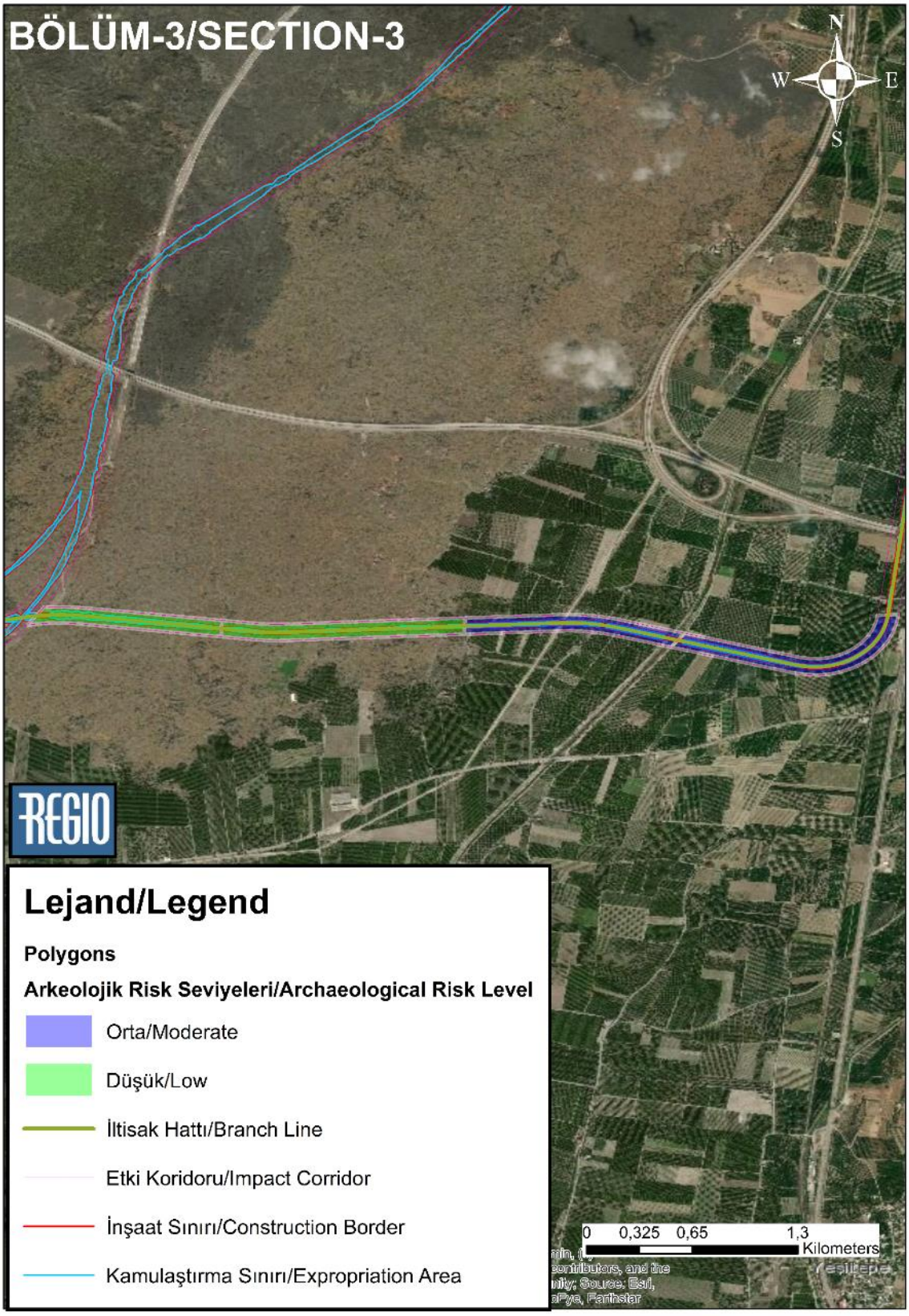
LOCATION OF SITES				DATA RESOURCES		LOCATION OF SITES IN WITHIN THE PROJECT AREA				PROPOSED MITIGATION MEASURES								TYPE OF THE ARCHAEOLOGICAL TRACES/SURFACE FINDINGS			EXPLANATIONS
No	Site Name	Province	District/Village	Ministry of Culture and Tourism	Field Survey	Within Expropriation Border	Within Impact Corridor (100m.)	Approximate Distance to Expropriation Border (m)	Approximate Distance (km)	Archaeological Test Excavation	Geophysical Survey	Archaeological Salvage Excavation	Technical Documentation	Restoration	Removal to Another Place	Archaeological Monitoring	Physical Intervention Should be Avoided	Ceramic Sherds	Architectural Remains	Other (Bone, Stone Tool, etc.)	
4	Potential Archaeological Area 1	Adana	Ceyhan/Kurtpınar		x		x	8	17+550 - 17+670 (Railway Route)							x	x	x			it was identified that there are 1 archaeological site (Çatakpınarı) and 2 potential archaeological sites within the impact corridor. Official identification and registration of these areas have not yet been carried out by the Adana Cultural Heritage Preservation Regional Board. Therefore, in accordance with the 4th article of the Law numbered 2863 , all the data related to the areas should be shared with the Adana Cultural Heritage Preservation Regional Board and construction activities should be planned and carried out in accordance with the official decision of the board. In addition to the decisions of the Board, it is highly recommended that all construction works in these areas and its surroundings to be carried out under
5	Potential Archaeological Area 2	Adana	Ceyhan/Kurtpınar		x		x	4	16+400 - 16+600 (Railway Route)							x	x	x			

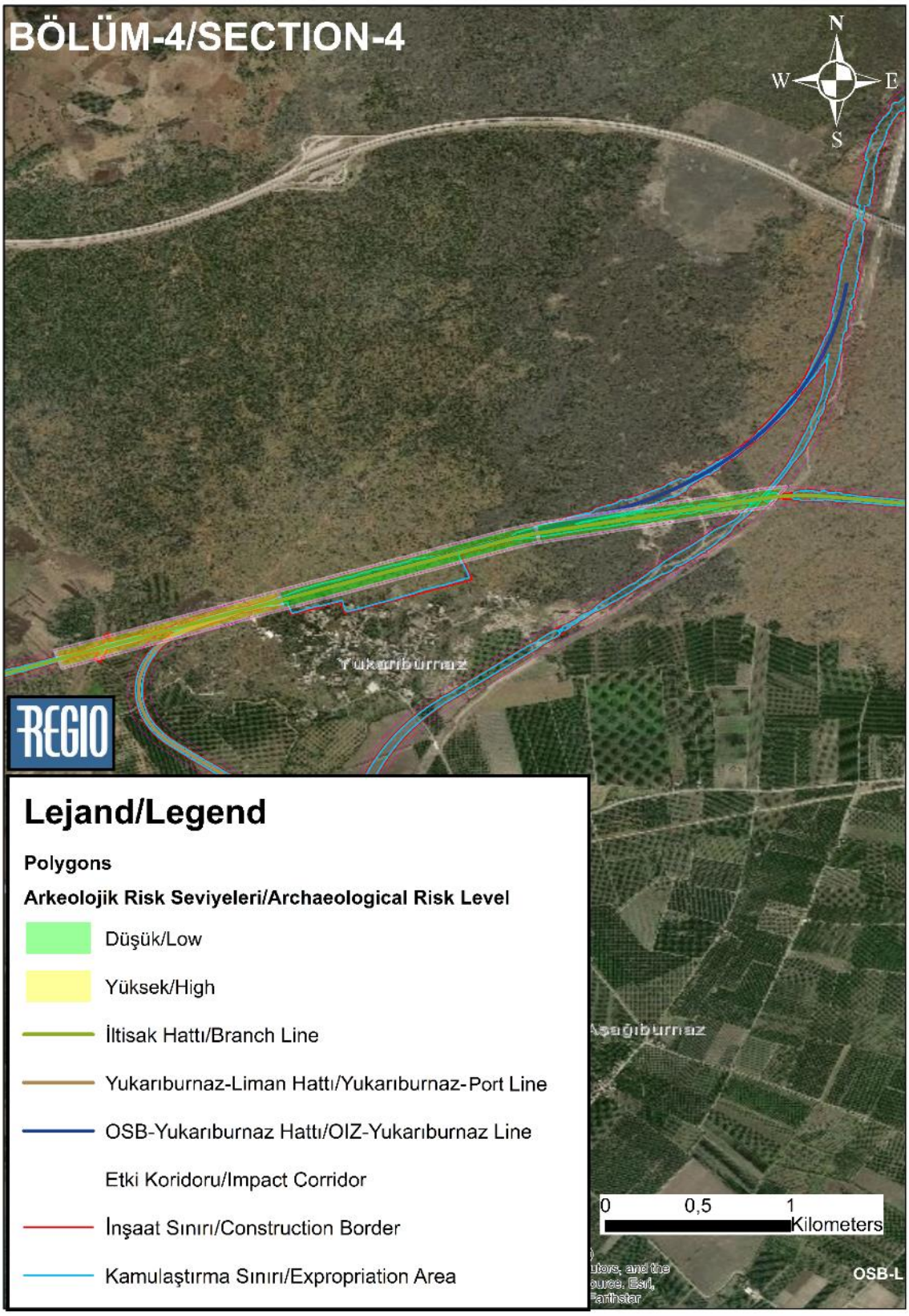
LOCATION OF SITES				DATA RESOURCES		LOCATION OF SITES IN WITHIN THE PROJECT AREA				PROPOSED MITIGATION MEASURES								TYPE OF THE ARCHAEOLOGICAL TRACES/SURFACE FINDINGS			EXPLANATIONS
No	Site Name	Province	District/Village	Ministry of Culture and Tourism	Field Survey	Within Expropriation Border	Within Impact Corridor (100m.)	Approximate Distance to Expropriation Border (m)	Approximate Distance (km)	Archaeological Test Excavation	Geophysical Survey	Archaeological Salvage Excavation	Technical Documentation	Restoration	Removal to Another Place	Archaeological Monitoring	Physical Intervention Should be Avoided	Ceramic Sherds	Architectural Remains	Other (Bone, Stone Tool, etc.)	
6	Çatakpınar Archaeological Site	Adana	Ceyhan/Kurtpınar		x		x	4	19+010 - 19+210 (Railway Route)							x	x	x	x		the supervision of an archaeologist.

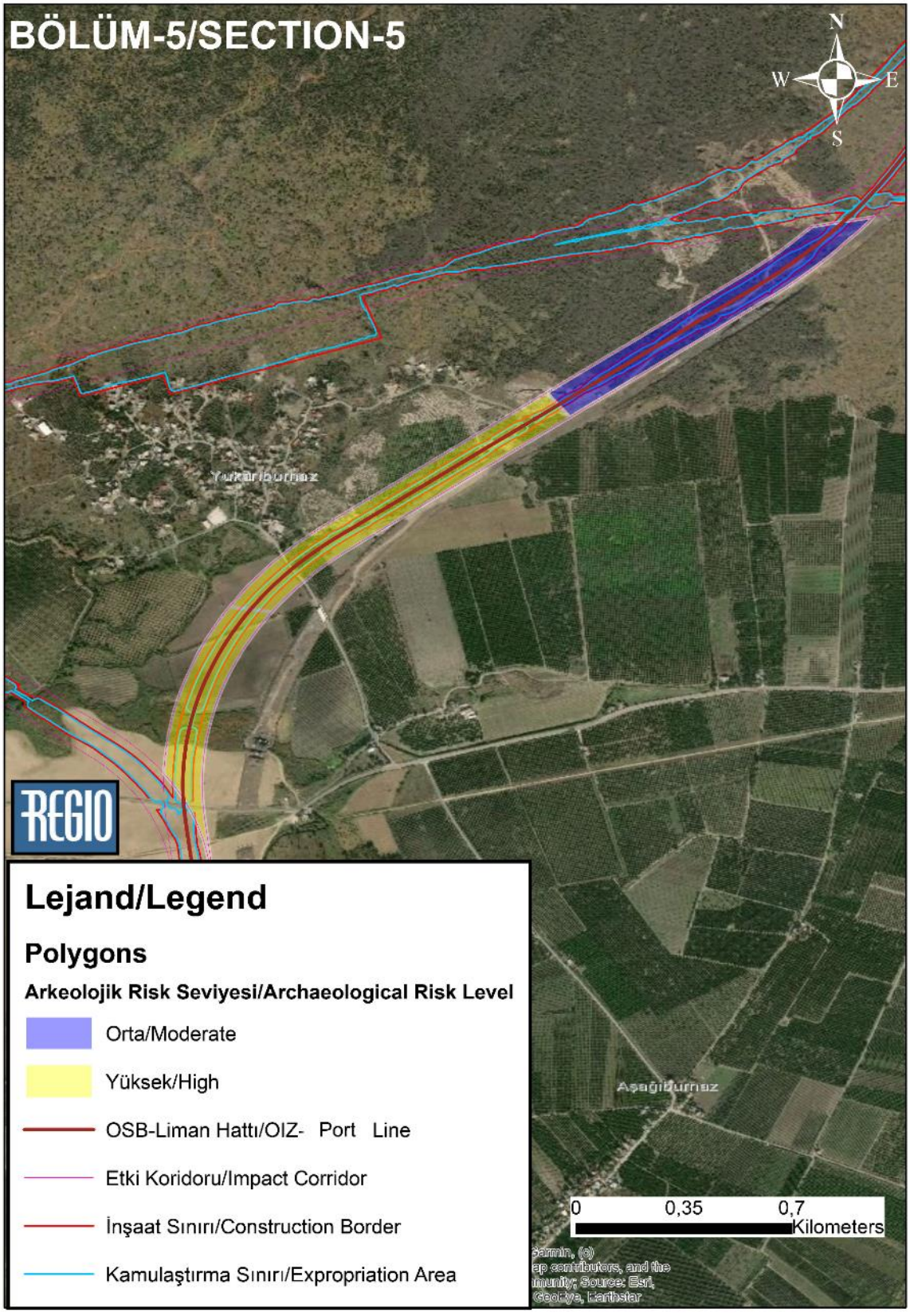
ANNEX 7 ARCHAEOLOGICAL POTENTIAL MODELING MAPS

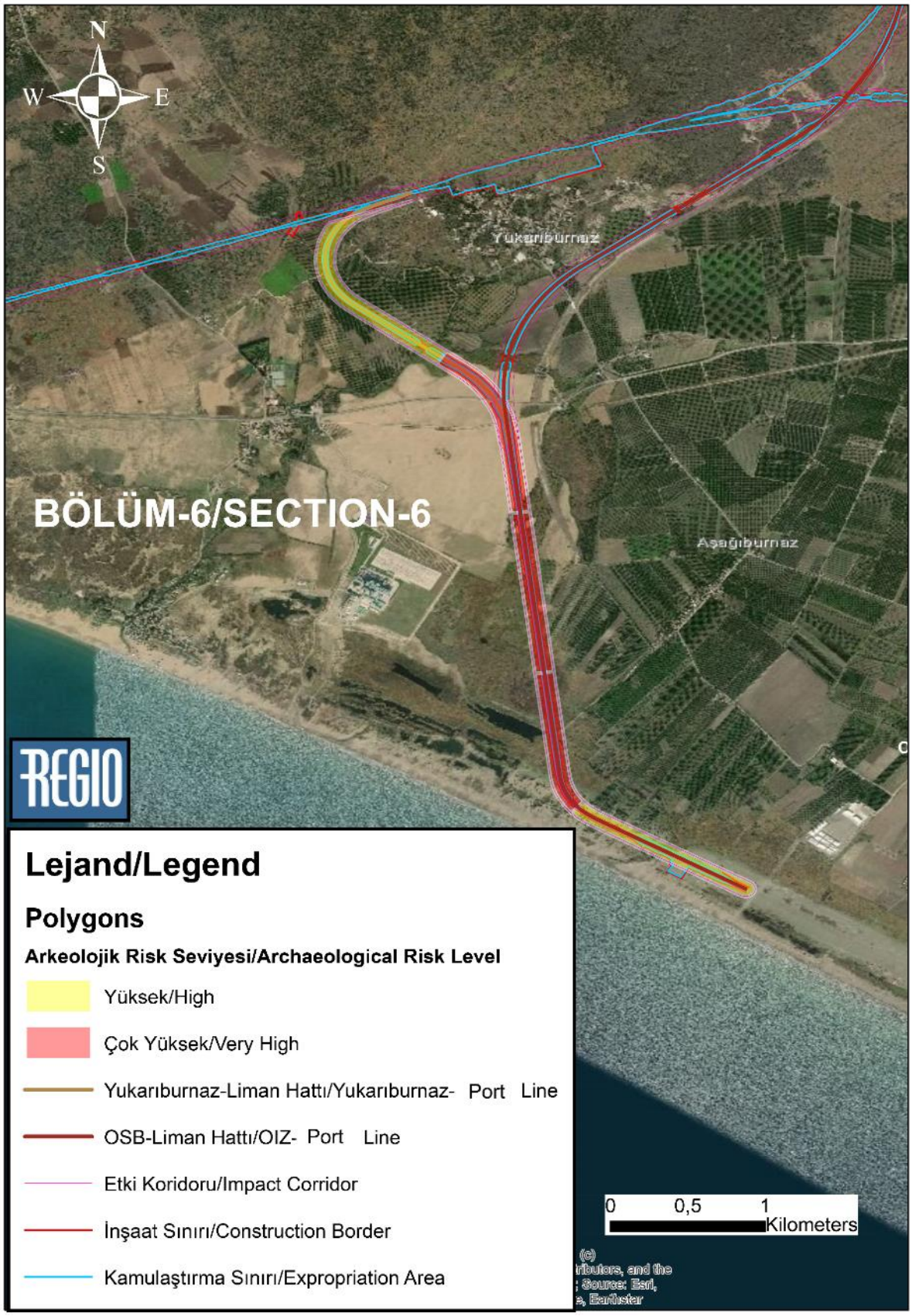



BÖLÜM-2/SECTION-2
N
W
E
S
İssos Antik Kenti/Issus Ancient City-Epipheneia
Erzin Tren İstasyonu/ Erzin Railway Station
0
1
2
3
4
5
6
REGIO
Lejand/Legend
Arkeolojik Risk Seviyesi/Archaeological Risk Level
Çok Yüksek/Very High
Issos Antik Kenti/Issus Ancient City-Epipheneia
Erzin Tren İstasyon/Erzin Railway Station
İltisak Hattı/Branch Line
Etki Koridoru/Impact Corridor
İnşaat Sınırı/Construction Border
Kamulaştırma Sınırı/Expropriation Area
0 0,225 0,45 0,9
Kilometers


BÖLÜM-3/SECTION-3
N
W
E
S
REGIO
Lejand/Legend
Polygons
Arkeolojik Risk Seviyeleri/Archaeological Risk Level
Orta/Moderate
Düşük/Low
İltisak Hattı/Branch Line
Etki Koridoru/Impact Corridor
İnşaat Sınırı/Construction Border
Kamulaştırma Sınırı/Expropriation Area
0 0,325 0,65 1,3
Kilometers


BÖLÜM-4/SECTION-4
N
W
E
S
Yukarıburnaz
REGIO
Lejand/Legend
Polygons
Arkeolojik Risk Seviyeleri/Archaeological Risk Level
Düşük/Low
Yüksek/High
İltisak Hattı/Branch Line
Yukarıburnaz-Liman Hattı/Yukarıburnaz-Port Line
OSB-Yukarıburnaz Hattı/OIZ-Yukarıburnaz Line
Etki Koridoru/Impact Corridor
İnşaat Sınırı/Construction Border
Kamulaştırma Sınırı/Expropriation Area
Aşağıburnaz
0
0,5
1
Kilometers
OSB-L


BÖLÜM-5/SECTION-5
N
W
E
S
Yukarıburnaz
REGIO
Lejand/Legend
Polygons
Arkeolojik Risk Seviyesi/Archaeological Risk Level
Orta/Moderate
Yüksek/High
OSB-Liman Hattı/OIZ- Port Line
Etki Koridoru/Impact Corridor
İnşaat Sınırı/Construction Border
Kamulaştırma Sınırı/Expropriation Area
Aşağıburnaz
0
0,35
0,7
Kilometers


N
W
E
S
Yukarıburnaz
BÖLÜM-6/SECTION-6
Aşağıburnaz
REGIO
Lejand/Legend
Polygons
Arkeolojik Risk Seviyesi/Archaeological Risk Level
Yüksek/High
Çok Yüksek/Very High
Yukarıburnaz-Liman Hattı/Yukarıburnaz- Port Line
OSB-Liman Hattı/OIZ- Port Line
Etki Koridoru/Impact Corridor
İnşaat Sınırı/Construction Border
Kamulaştırma Sınırı/Expropriation Area
0 0,5 1
Kilometers


BÖLÜM-7/SECTION-7
N
W
E
S
REGIO
Lejand/Legend
Polygons
Arkeolojik Risk Seviyeleri/Archaeological Risk Level
Yüksek/High
Çok Yüksek/Very High
Çok Yüksek/Very High
Potansiyel Arkeolojik Alan-2/Potential Archaeological Site-2
İltisak Hattı/Branch Line
Etki Koridoru/Impact Corridor
İnşaat Sınırı/Construction Border
Kamulaştırma Sınırı/Expropriation Area
0 0,75 1,5
Kilometers