CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (ESIA)

CLIENT:

Ceyhan Polipropilen Üretim A.Ş
Portakal Çiçeği Sokak No:33 Yukarı Ayrancı
Çankaya - Ankara / Türkiye
☎: +90 (312) 840 10 00
🖷: +90 (312) 442 58 16

FEBRUARY 2022

ANKARA

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The ESIA report is supported by the following annexes:

Annex A:	Official Letters
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Annex C:	Environmental and Social Management Plan (ESMP)
Annex D:	Stakeholder Engagement Activities
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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER-1)

FEBRUARY 2023

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Version	Revision	Date	Prepared By	Quality Management By	Checked By		Approved By
Draft	A.0	March 2021	Yasemin Çelikel (2U1K)	Esra Okumuşoğlu (2U1K)	Günal Özenirler (2U1K)		Elif Doğru (RINA)
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Final Draft	B.0	February 2023	D. Emre Kaya (2U1K)	Esra Okumuşoğlu (2U1K)	Günal Özenirler (2U1K)		Ilya Gulakov (RINA)

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PROJECT NO: 21/003

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Çankaya - Ankara / Türkiye
☎: +90 (312) 840 10 00
🖷: +90 (312) 442 58 16

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ABBREVIATIONS

Ceyhan PDH-PP Project / Project	Ceyhan Propane Dehydrogenation - Polypropylene Production Facility
Ceyhan Petrokimya A.Ş. or Management Company	Ceyhan Petrokimya Endüstri Bölgesi Yönetim A.Ş.
Ceyhan PP A.Ş. or Project Company	Ceyhan Polipropilen Üretim A.Ş.
CESCE	The Spanish Export Credit Agency
CPIR	Ceyhan Petrochemical Industrial Region
CPIR Port	Raw Material Supply, Storage and Port Facility Project
DFC	U.S. International Development Finance Corporation
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EU	European Union
FIs	Financial Institutions
IFC	International Finance Corporation
LPG	Liquefied Petroleum Gas
MOEUCC	Ministry of Environment, Urbanization and Climate Change
MoIT	Ministry of Industry and Technology
PDH	Propane De-Hydrogenation
PP	Polypropylene
PR	Performance Requirements
PS	Performance Standards
RHDHV-TR	HaskoningDHV TR Engineering Inc.
RINA	RINA Tech UK Ltd.
SPV	Special Purpose Vehicle
Terminal Facility	Jetty and Propane Storage Facility
UKEF	UK Export Finance

1 INTRODUCTION

1.1 Background and Objective

An Environmental and Social Impact Assessment (ESIA) study is being conducted for the Ceyhan Propane Dehydrogenation (PDH) - Polypropylene Production (PP) Facility ("Ceyhan PDH-PP Project" or "the Project"), located in Ceyhan district of Adana province in the south of Turkey.

Ceyhan Petrochemical Industrial Region (CPIR), where the Project is planned to be constructed, is designated as an industrial zone with the Council Decision No. 2007/12632 (number/date: 26673/17.10.2007). Thereafter, Ceyhan Petrokimya Endüstri Bölgesi Yönetim A.Ş. (Ceyhan Petrokimya A.Ş. or Management Company) has been appointed as the management company for CPIR with an official letter from the Ministry of Industry and Technology (MoIT) dated 21.03.2019 (no. 387). The first investment within the CPIR will be the PDH-PP Facility. Ceyhan Petrokimya A.Ş have proposed to provide infrastructure needs and raw material for the petrochemical facilities to be established in the CPIR, "Raw Material Supply, Storage and Port Facility Project (CPIR Port)".

CPIR Port Project will also have a separate Terminal Facility comprising a jetty, a propane storage tank and relevant auxiliary facilities, in order to provide raw material for the Project. The Terminal Facility will be constructed and operated by a third-party supplier company, which will be formed under Rönesans Holding umbrella and will solely work for the Project. Due to that reason, the Terminal Facility is considered as an associated facility in accordance to the IFC PS1 and therefore, its environmental and social impacts are assessed together with the impacts of the Project. All projects, facilities, and activities, which have relation to the Project, are summarized and assessed in terms of IFC PS1 requirement on term of "associated facility" in Section 2.

The location of the Project Area is illustrated in Figure 1-1 while the Project Area and its boundaries are shown in Figure 1-2.

BOX - Project Area

The Project Area mainly covers the area required for Project Units (PDH-PP Plant and auxiliary facilities) and other facilities used for construction works such as Mobilization Area and Temporary Excavated Material Storage areas. Additionally, potential locations that can be used during the construction works are also included within the scope of the Project Area. After completion of the construction works, temporary used areas such as Mobilization Area, Temporary Excavated Storage Areas will be reinstated and provided to the CPIR Management Company for further management.

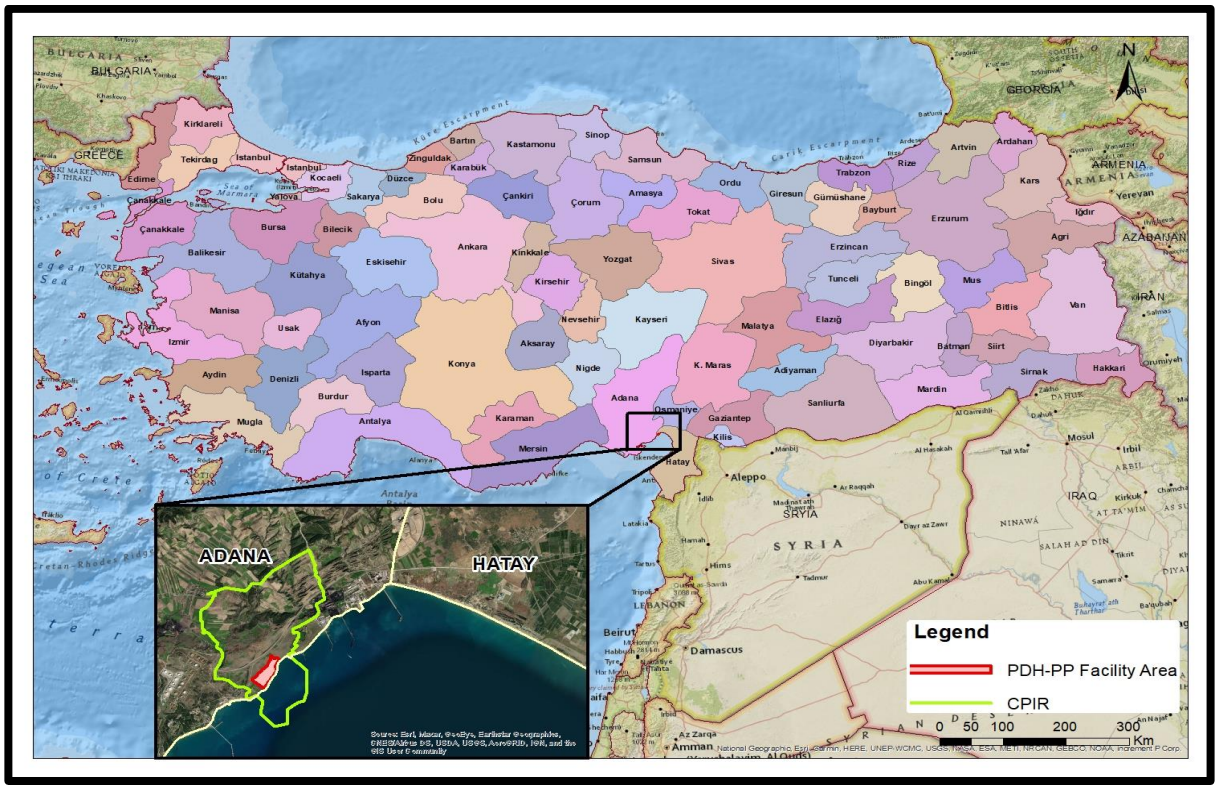

Figure 1-1. Illustration of the location of Adana province in Turkey and location of the Project Area within Adana province

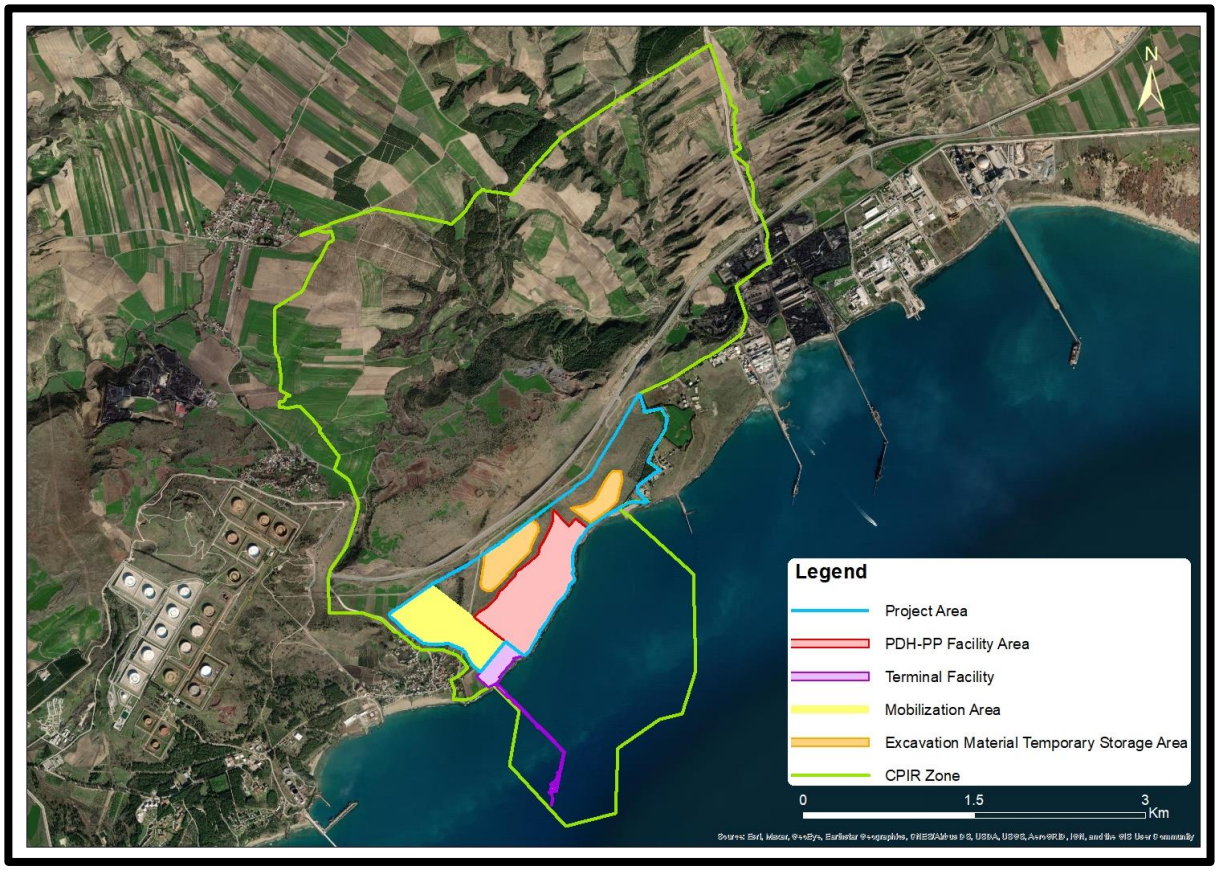

Figure 1-2. Project Area and its boundaries

The investment decision for the Project was made by a partnership formed by Rönesans Ceyhan Petrokimya Endüstriyel Yatırım A.Ş. (51%), Ceyhan Petrokimya Endüstri ve Ticaret A.Ş. (15%) and Sonatrach Petroleum Investment Corporation BV (34%). These companies established a Special Purpose Vehicle (SPV) named Ceyhan Polipropilen Üretim A.Ş. (Ceyhan PP A.Ş. or Project Company) responsible construction and operation of the Project. Every partner within Ceyhan PP A.Ş. shall offer their unique expertise for the development of the Project. With this intention, RNS Ceyhan Petrokimya Endüstriyel Yatırım A.Ş will provide their contribution on construction and engineering with the support of Sonatrach Petroleum Investment Corporation BV who have a strong background in long term reliable and high-quality raw material supply.

1.2 Project Overview

In line with Turkey's 2023 strategy, the government aims to increase the gross domestic product; therefore, increasing industrial production capacity is deemed as a significant factor that contributes to this aim. As part of this strategy, there are a number of initiatives including the establishment of the CPIR (also referred to as Ceyhan Energy Specialized Industrial Zone) with the primary aim of attracting potential investors.

Ceyhan PDH-PP Project, which is planned to be located within the greater CPIR area, is being developed to produce polypropylene as part of the CPIR in Ceyhan district of Adana province at the south of Turkey along the Mediterranean shore. Polypropylene has the second biggest share of national plastic raw material demand. It is anticipated by the Project Company that the Project will meet 20% of Turkey's polypropylene demand. The overall demand in Turkey exceeds the production capacity of the existing petrochemical industries; therefore, the demand is mostly supplied by imports (approximately 95% as of 2021. CPIR will become "a petrochemical production hub". It is anticipated that the development of the CPIR will significantly decrease import dependency. In the current situation, the only local producer is PETKİM having a capacity of 144,000 tons and corresponding 5% of the consumption as per 2021.

As part of the CIPR, Ceyhan PDH-PP Project is aiming to create added value by:

- substituting imports with national production to contribute to Turkey's current account deficit regarding polypropylene;
- creating qualitative employment;
- contributing to the development of Turkey's plastics industry;
- contributing to Turkey's development as a petrochemical hub.

Need for the Project

Polypropylene belongs to polyolefin family of polymers. Polypropylene is known as a lightweight, versatile polymer with excellent chemical resistance along with relatively high rigidity and a high melting point compared with other polymers such as polyethylene. Polypropylene has many applications in food, furniture, cosmetics, industry, medicine & health sectors with many usage areas such as flexible packaging, textile industry and diapers to high-clarity films, medical applications, appliances and household items (houseware, furniture, household and food containers, toys, dog kennels) as well as in the automotive industry. Polypropylene competes with polyethylene and polystyrene and also other non-polymer main application of polypropylene, including household containers like storage totes, thin-wall injection molding for cups, rigid packaging products for food, and large pails. At the company level, LyondellBasell, Braskem, Reliance Industries, SABIC, and ExxonMobil are the top five producers of polypropylene; the top 15 producers represent 40% of the total capacity in the World.

PDH process is a catalytic process which converts propane into propylene and hydrogen. Polymerisation of propylene to produce polypropylene is the second stage of the process.

Polypropylene is 100% recyclable material; battery cables and automobile battery cases are the examples of the recyclable polypropylene. Since polypropylene is a recyclable/reusable material, the Project also aims to contribute to the environmentally friendly plastic production.

Currently, there are planned and established PDH-PP plants worldwide. In Turkey, there are some planned polypropylene PP production facilities in addition to the PETKİM Facility. Facilities in Turkey are given in Table 1-1.

Table 1-1. Planned and Established PP Facilities in Turkey

Facility/Company	Process	Capacity	County
PETKİM	PP Plant	144,000 ton/ year	İzmir/Turkey
CFS Petrokimya Sanayi A.Ş. (Toros Tarım/Tekfen Holding)[1]	Polypropylene Production Plant	500,000 ton/year	Mersin/Turkey

[1]Although the "EIA positive decision" was taken for the Project in 2020, the Council of State suspended the execution of the EIA positive decision in 2021. There is uncertainty regarding the future of the project in planning stage.

1.3 Polypropylene

Polypropylene (PP) is a thermoplastic polymer with a wide range of uses, ranging from parts used in the automotive industry to textile products or food packaging. PP obtained by polymerizing the monomer propylene is extremely resistant to chemical solvents (acids and bases) as well as physical impacts (i.e. pressure). As a result of these resistant characteristics, PP is widely used in the production of tubes of cosmetic products, bottles, air filters, plastic shelves, garden furniture and sterile materials in the medical sector. PP has good dimensional

stability under high temperature and humidity conditions and can provide good electrical insulation.

Disposal and Recycling of PP

Plastic (including PP) wastes can be divided into two classes according to the sources they are produced. These can be named as post-use wastes and process wastes. Process wastes are the wastes generated during production in plastic production processes. These wastes constitute approximately 10% of the total amount of plastic waste. Post-use wastes are the wastes that produced after the use of plastics or plastic products. Urban plastic waste including waste plastic bottles or bags can be given as an example.

The widespread use of plastic types means that both process wastes arising from production and post-use wastes occupy the vast majority of storage areas. According to Eurostat data, 15.4 million tons of plastic packaging waste was generated across Europe in 2019.Common methods for the disposal of these packaging wastes are shown in Figure 1-4.

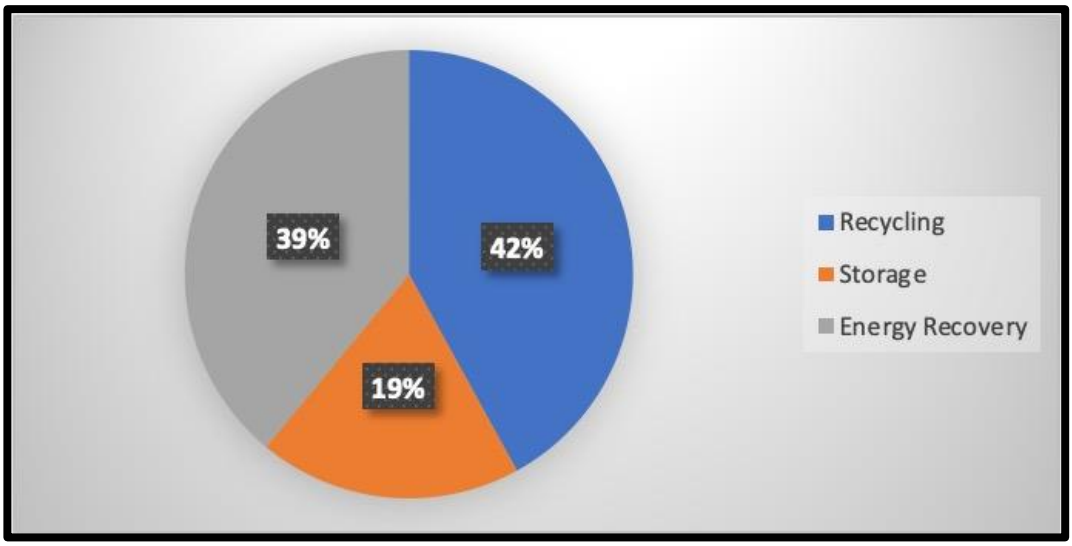

Figure 1-3. Disposal of Plastic Packaging Wastes in Europe

Recent studies show that although there has been 92% progress in the recovery of plastic waste between 2006 and 2019, solid waste landfills in Europe are still filled with 3.3 million tons of plastic from packaging waste alone each year. This situation directly reveals the problems related to the disposal of plastic waste and there are difficulties in solid waste management. Since plastic wastes occupy a lot of space in terms of volume, they also pose a problem for solid waste landfill areas. Their chemical content also makes them inconvenient to be on the nature.

According to the data of the Turkish Statistical Institute, 43% of plastic waste is disposed to landfills, 14% is used in energy recovery and 35% is used in mechanical recycling in 2018.

In terms of processes, recycling of plastics can be expressed in three categories. Such as:

- **Primary Methods**: Re-introducing the waste into the processing line heating cycle to increase plastic waste recovery, Mechanical recycling (secondary methods): Reprocessing by mechanical recycling means by mixing waste plastic with unused polymers, generally aiming to reduce the cost; and
- **Chemical (tertiary) methods**: With methods in which a chemical change in the polymer structure is carried out by chemical and/or thermochemical means.
- **Energy recovery:** It is the recovery of steam, heat and electricity from plastic waste as a result of combustion (Mastellone, 1999).

All the mentioned methods have their own product categories, advantages and disadvantages. High energy requirement of these processes are the main disadvantages of the recycling of plastics. Therefore, an effort to self-sufficiently recycle the accumulated waste from plastics for the solid waste market to reduce dependence on the oil industry; it is very important for a sustainable environment. Considering that plastic types are petroleum-derived products, this situation increases its importance even more. Such a system, where wastes can meet their own energy needs, is seen as a very profitable energy recovery method.

Mechanical recycling of polypropylene

Plastic packaging waste and how to best handle it has turned into a huge topic of discussion as of late. There is mounting concern in regard to finding sustainable systems and solutions for plastics. The most effective solution for this would be to turn plastic waste back into new packaging materials. The most commonly used method of achieving this is through mechanical recycling. The process includes collection, sorting, washing, and grinding of the materials into flakes is the last step. There are, however, a number of limitations to mechanical recycling.

Chemical recycling of polypropylene

Chemical recycling offers many advantages as a long term solution for recycling plastic waste. In the pyrolysis technology, plastic waste is turned into a secondary raw material known as pyrolysis oil. Virgin-quality polymers can then be made from this oil. There has been much of progress made in developing pyrolysis for plastic waste and stands as one of the best options for maximum recovery. Polypropylene can be repurposed to create:

- Dishware;
- Gardening materials;
- Clothing and industrial fibers;
- Containers;
- Coffee bags;
- Speed bumps; and
- Storage racks and bins.

In 2013, the FDA approved recycled polypropylene as food-safe. PP has a high melting point which means it can withstand high temps (such as microwaving) and doesn't react to liquids, acids or bases so it's safe to store a range of food and liquid types.

1.4 ESIA Requirements

Ceyhan PP A.Ş. is seeking finance from international commercial banks with involvement of Export Credit Agencies ("ECAs") providing insurance and DFC (U.S. International Development Finance Corporation), referred together as "FIs". One of the requirements of the FIs for granting loans and providing insurance is environmental and social impact assessment ("ESIA") and due diligence to be compliant with international environmental and social standards. Those standards include Equator Principles IV (dated July 2020), IFC's Performance Standards (PSs) on Environmental and Social Sustainability (dated January 2012) and EBRD's Performance Requirements (PRs) (dated April 2019), IFC Environmental, Health and Safety (EHS) General Guidelines, IFC EHS Guidelines for Large Volume Petroleum-based Organic Chemicals Manufacturing, IFC EHS Guidelines for Petroleum-based Polymers Manufacturing and other relevant international guidelines, as well as national legislation.

To meet the requirements of FIs, Ceyhan PP A.Ş. has commissioned RINA Tech UK Limited ("RINA") to prepare an ESIA study that will identify the environmental and social impacts of the Project in accordance with international standards. RINA conducted the ESIA study in collaboration with the local contractor 2U1K MÜHENDISLIK VE DANIŞMANLIK A.Ş. ("2U1K"), providing guidance to conducting the ESIA study and ensuring that the documents meet international requirements.

The purpose of the ESIA study is to describe the Project, identify the environmental and social impacts that will or may occur as a result of the Project and determine appropriate mitigation measures that can be taken to avoid and/or minimize the adverse impacts and maximize benefits. This document represents the Final Draft ESIA report which has been prepared in line with the FIs' as well as National requirements, which are detailed in *Chapter 3: Institutional and Regulatory Framework* and *Chapter 4: Scope and Methodology of the ESIA*. The applicable national laws and regulations have been also specified in a regulatory framework document provided in Annex B, including a brief overview of key European Union (EU) Directives relevant to the Project.

The mitigation measures proposed by the ESIA study are included in an accompanying ESMP. The ESMP is presented in Annex C.

1.5 Key Steps in the ESIA Process

ESIA is a systematic process that predicts and evaluates the impacts of a project on various aspects of the physical, biological, cultural and socioeconomic environment. This is followed by the identification of appropriate mitigation measures to avoid, reduce, remedy, offset or

compensate for adverse impacts relevant to the nature and scale of the project. The key steps of the ESIA process are presented in Figure 1-4.

Information about the key steps outlined below is described in *Chapter 4: Scope and Methodology of the ESIA*.

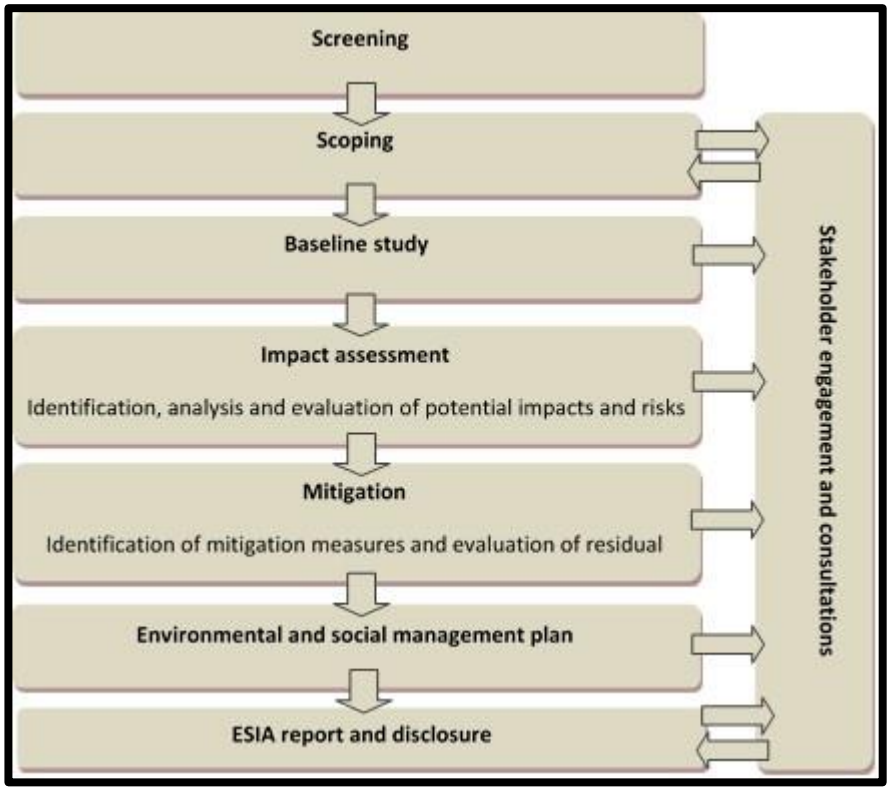

Figure 1-4. ESIA process

1.6 Current Status of the Project at ESIA Stage

The ESIA study is mainly based on the Front-end Engineering Design (FEED) dated 30 April 2020. At present, the detailed design of the Project is ongoing and available information regarding detailed design (August 2022) included in the current ESIA Study. In this respect, information on Project design presented in this ESIA report is limited by the information made available to the ESIA team by Ceyhan PP A.Ş. Significant changes in the design are not expected; on the other and, if changes occur during the ESIA process, these will be reviewed and assessed by Ceyhan PP A.Ş. and additional relevant mitigation measures may need to be identified and implemented as necessary if the impacts will differ from those identified in this ESIA Report.

1.7 Outline of the ESIA Report

The remaining chapters of the ESIA report are as follows:

Chapter 2:	Project Description
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Chapter 4:	Scope and Methodology
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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER 2)

FEBRUARY 2023

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Portakal Çiçeği Sokak No:33 Yukarı Ayrancı
Çankaya - Ankara / Türkiye
☎: +90 (312) 840 10 00
🖷: +90 (312) 442 58 16

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ABBREVIATIONS

Adana ASKİ	Adana Water and Sewerage Administration
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
BOG	Boil off gas
BOTAŞ	Turkish Petroleum Pipeline Company
BTC	Baku-Tbilisi-Ceyhan Crude Oil Pipeline
CCR	Continuous Catalyst Regeneration
CDS	Closed drain systems
Ceyhan PDH-PP Project / Project	Ceyhan Propane Dehydrogenation - Polypropylene Production Facility and Jetty Project
Ceyhan Petrokimya A.Ş. or Management Company	Ceyhan Petrokimya Endüstri Bölgesi Yönetim A.Ş.
Ceyhan PP A.Ş. or Project Company	Ceyhan Polipropilen Üretim A.Ş.
CPIR	Ceyhan Petrochemical Industrial Region or Ceyhan Energy Specialized Industrial Zone
CPIR Port	Raw Material Supply, Storage and Port Facility Project
DSI	State Hydraulic Works
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
EU	European Union
FEED	Front-end Engineering Design
FGS	Fire and Gas System
HAZOP	Hazard and operability study
HSE	Health, Safety and Environment
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Finance Corporation
IFI	International Financial Institutions
LP	Low pressure
LPG	Liquefied Petroleum Gas
MEG	Mono Ethylene Glycol
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MoIT	Ministry of Industry and Technology
NFPA	National Fire Protection Association
NOS	Non-oily sewer system
OIZ	Organized Industrial Zone
OWS	Oily water sewer
PET	Polyethylene terephthalate

POCS	Possibly oily contaminated sewer
PVC	Polyvinyl Chloride
RINA	RINA Consulting Mühendislik Ltd. Şti.
RO	Reverse Osmosis
SAP	Super Absorbent Polymer
SASA	Sasa Polyester Sanayi A.Ş.
SPV	Special Purpose Vehicle
SS	Sanitary sewer system
TAYSEB	Toros Adana Yumurtalık Free Zone Founder and Operator Co.
Terminal Facility	Propane Storage and Jetty
VOC	Volatile Organic Carbon
WWTP	Wastewater Treatment Plant
2U1K	2U1K Mühendislik ve Danışmanlık A.Ş.

2 PROJECT DESCRIPTION

2.1 Project Components

The Project includes the development, construction and operation of the following structures and infrastructure. The proposed complex shall consist of a Propane De-Hydrogenation Unit (PDH) which utilizes propane as feedstock for conversion into propylene through De-Hydrogenation route. The generated propylene from the PDH unit will be used in a Polypropylene unit (PP) to produce the end product.

- PDH Plant and PP Plant;
- Utilities;
  - Raw Water Unit;
  - Cooling Water Unit;
  - Drinking and Service Water Unit;
  - Instrument and Plant Air Supply Unit;
  - Nitrogen Generation Unit;
  - Fuel Gas Supply System;
  - Wastewater Collection, Treatment System and marine discharge line for treated wastewater;
  - NVIRO System;
  - Propylene Storage Unit;
  - Flare System;
  - Polypropylene (PP) Storage;
  - Steam, Condensate, Boiler Feed Water and demineralized Water Production;
- Drainage System;
- Ancillary Buildings (administration, laboratory, fire station, control building etc.).

The process scheme of the PDH and PP Plants is presented in Figure 2-1 below, and pre-final layout of the Project components is shown in Figure 2-2. Three-dimensional view of the PDH-PP Plant is given in Figure 2-3.

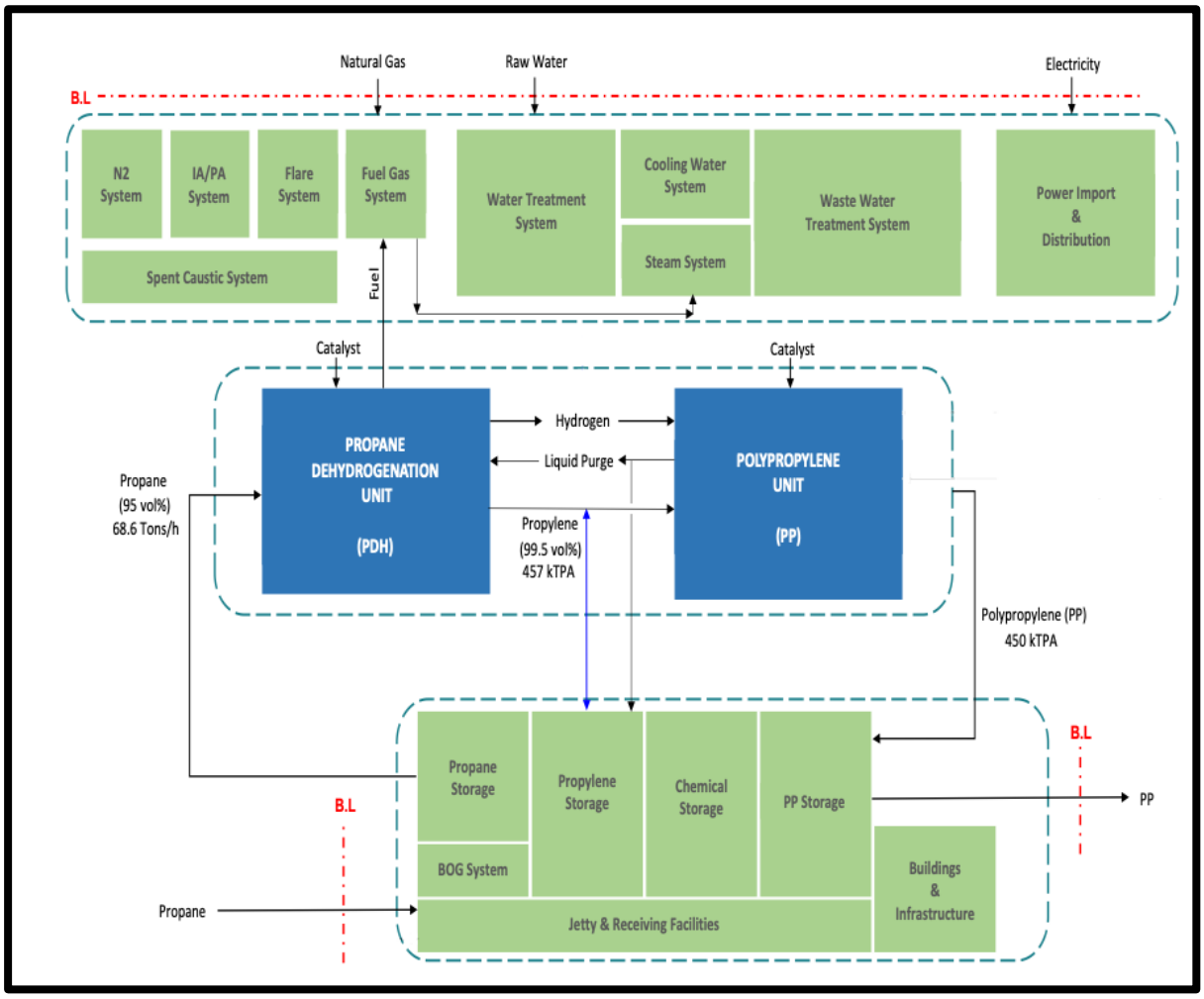


Figure 2-1. Process scheme of PDH and PP Units (B.L: boundary)

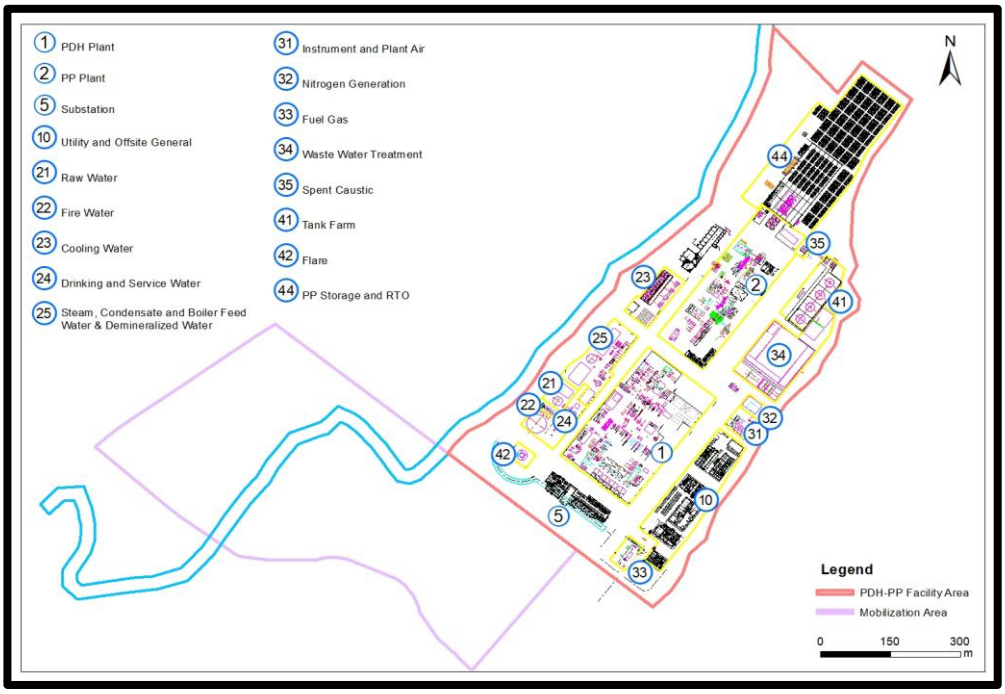


Figure 2-2. Layout of the components of the Project

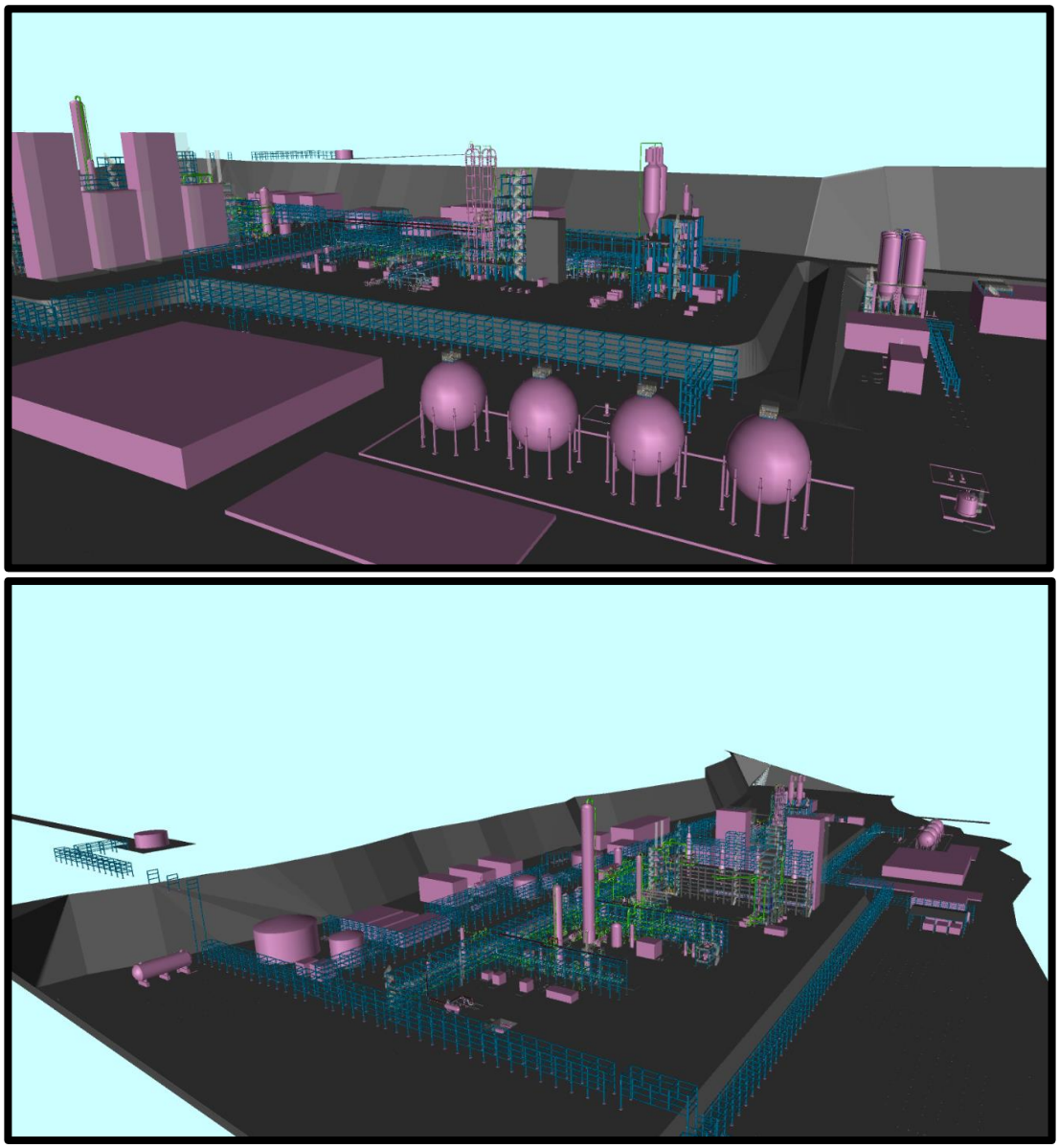


Figure 2-3. 3D-view of the Project components/units

2.1.1 PDH Plant

The first step in the process is the conversion of liquefied propane into propylene in the PDH plant (*UoP Honeywell PDH C3-Oleflex™ Process Unit)*. In this catalytic process, propane is used as raw material and is converted into propylene, while hydrogen is produced as by-product. The PDH-PP Plant will process 556,000 tons of propane to produce approximately 472,500 tons of homo-polymer annually.

The Oleflex is a process for the catalytic dehydrogenation of propane to propylene using continuous catalyst regeneration (CCR). Propane feed is treated to remove basic nitrogen and metals, dried, mixed with recycled propane and fed to a depropanizer column in the fractionation section to remove butanes and heavier components. The system incorporates a

series of internal recirculation streams; such as, heat exchange, fuel recovery, tail gas reuse, catalyst circulation etc.

The unit has a production capacity of 59.98 metric ton/h (479,850 metric ton/year considering 8,000 hours of yearly operation) and includes “Huels Selective Hydrogenation Process” Unit for dehydrogenation of propane. Apart from the hydrogen cycle between the PDH and PP plant units and requirement in the propylene production process, no hydrogen outlet is anticipated in the PDH-PP plant. In the current design, hydrogen will be used as fuel in the production process. The 3-D view and process flow of the PDH plant are shown in Figure 2-4.

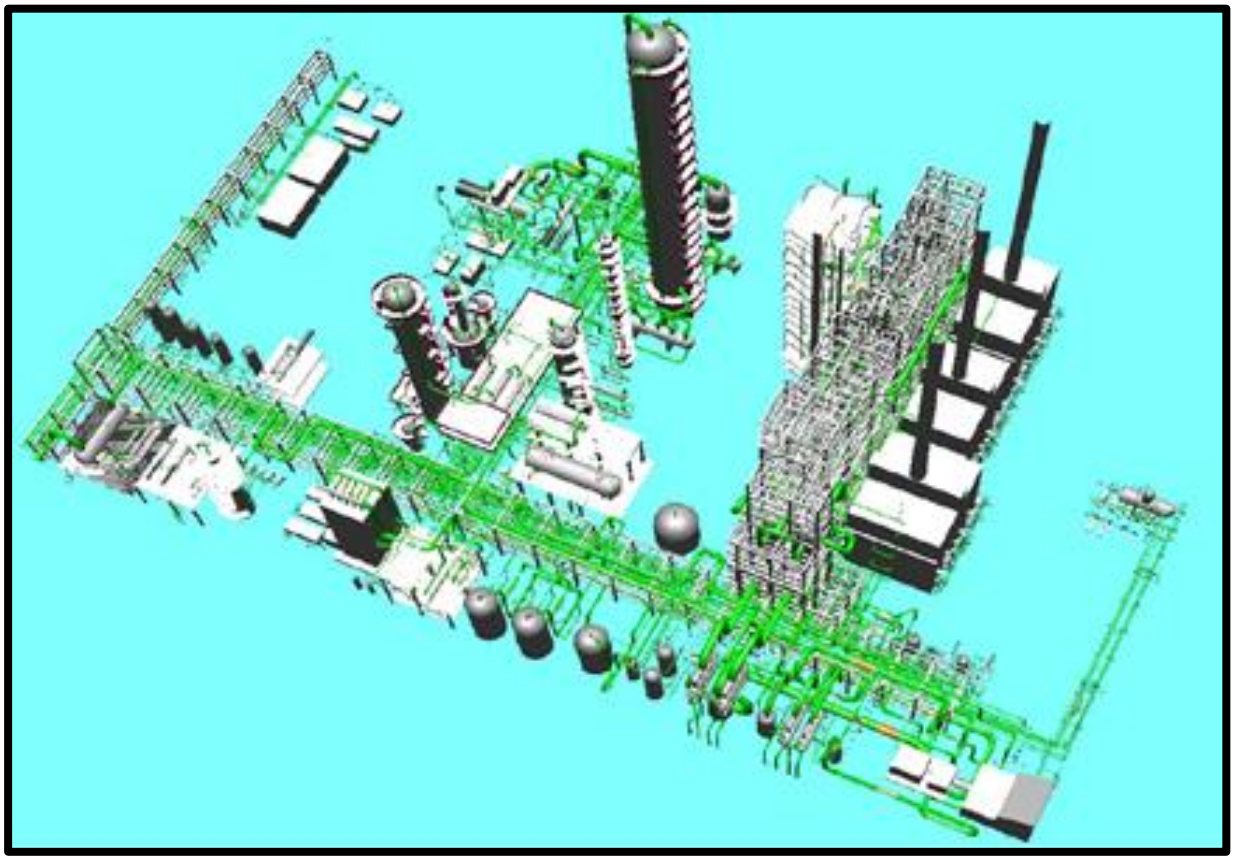


Figure 2-4. 3-D view of PDH Plant

PDH Plant contains three main sections:

1. Reactor Section;
2. Fractionation Section; and
3. CCR Regeneration.

The Reactor Section comprises, so called, Primary Proses Operations and Secondary Process Operations. The Primary Process Operations consist of four reactors and four fired heaters (1 charge heater and 3 interheaters). The Secondary Process Operations consist of Solvent Recovery Column; Regenerant Gas Scrubber; PSA and Hydrogen Booster Compressors.

The fired heaters provide high temperature conditions required for the endothermic reactions in Oleflex process that occur under low pressure and high temperature conditions. Following the reactors, the processed gases are cooled, compressed and passed through adsorbents in order to remove trace impurities from the reactor effluent stream. The effluent stream will then be routed to Separation System where hydrocarbons are condensed and pumped to the Fractionation Section. Propane, introduced into the Reactor Section, is mixed with a high hydrogen containing stream in the Separation System. The stream containing high hydrogen is named as “Recycle Gas.” Mixing the propane feed with Recycle Gas and heat exchanging the resulting stream versus reactor effluent results in a vapor stream leaving the Separation System. The vapor stream of propane and Recycle Gas is referred to as “Combined Feed”.

The secondary process operations in the Reactor Section consist of multiple ancillary process operations that take place in solvent recovery column, regenerant gas scrubber and hydrogen purification system and hydrogen booster compressors.

Fractionation Section improves purity of the Propane Feed and the stream from the Reactor Section. The impurities that may cause coke formation or degrade catalyst performance are removed by the use of resin or adsorbents in this section.

The continuous operation of the Oleflex Process is supported by the CCR Regeneration Section, where catalysts are recovered through the continuous incineration of the coke to reactivate, restabilize and recover the selective feature of catalysts used in the process.

2.1.2 PP Plant

In the second step (i.e. PP), propylene is polymerized to produce polypropylene. Polypropylene production (*Lyondell Spheripol Process Unit*) is planned to be in homo-polymer form; therefore, ethylene is not planned to be used in production at current state of design. This unit has a production capacity of 59.062 metric ton/h (472,500 metric ton/year considering 8,000 hours of yearly operation). The 3-D view and process flow of the PP plant is shown in Figure 2-5 and Figure 2-6, respectively. Figure 2-6 shows process flow of Spheripol process unit including raw & auxiliary materials, utilities to be used during the process as well as effluents, utilities, recoveries and products.

The Spheripol process comprises mainly three steps:

1. Catalyst Pre-Contacting and Reactors;
2. Degassing and Propylene Recycle, Steaming and Drying; and
3. Extrusion and Pelletising.

The Spheripol process is a bulk slurry process. Catalyst slurry is activated by mixing with TEAL (liquid Triethylaluminium) and liquid donor in the Catalyst Pre-Contact tank. Active catalyst slurry mixed with the cold (10°C) propylene stream is fed to the Pre-polymerization Reactor. Cooling water recycle system is used at the Pre-Polymerization reactor to dissipate the heat generated by exothermic polymerization reaction. After pre-polymerization main polymerization reaction that produce homopolymer takes place in tubular loop reactors.

In the Spheripol process the catalyst, liquid propylene and hydrogen are continuously fed into the loop reactor for molecular weight control. The bulk polymerization typically occurs in two tubular loop reactors filled with liquid propylene reactors. Effluent slurry from the loop reactors is transferred to the Degassing and Propylene Recycle and Steaming and Drying Sections for homopolymer production. Remaining water content in polymer is removed in the Drying Unit by the use of hot, dry nitrogen feed. The finishing section consists of highly efficient liquid propylene vaporization operations at very high polypropylene concentrations, separation of the unconverted monomers, and complete recycling of the monomers back to the reactor by Extrusion and Pelletising units[1].

The PP process will also include the following units; refrigeration unit, low pressure steam condensate recovery, nitrogen compression, mineral oil system, waste oil treatment.

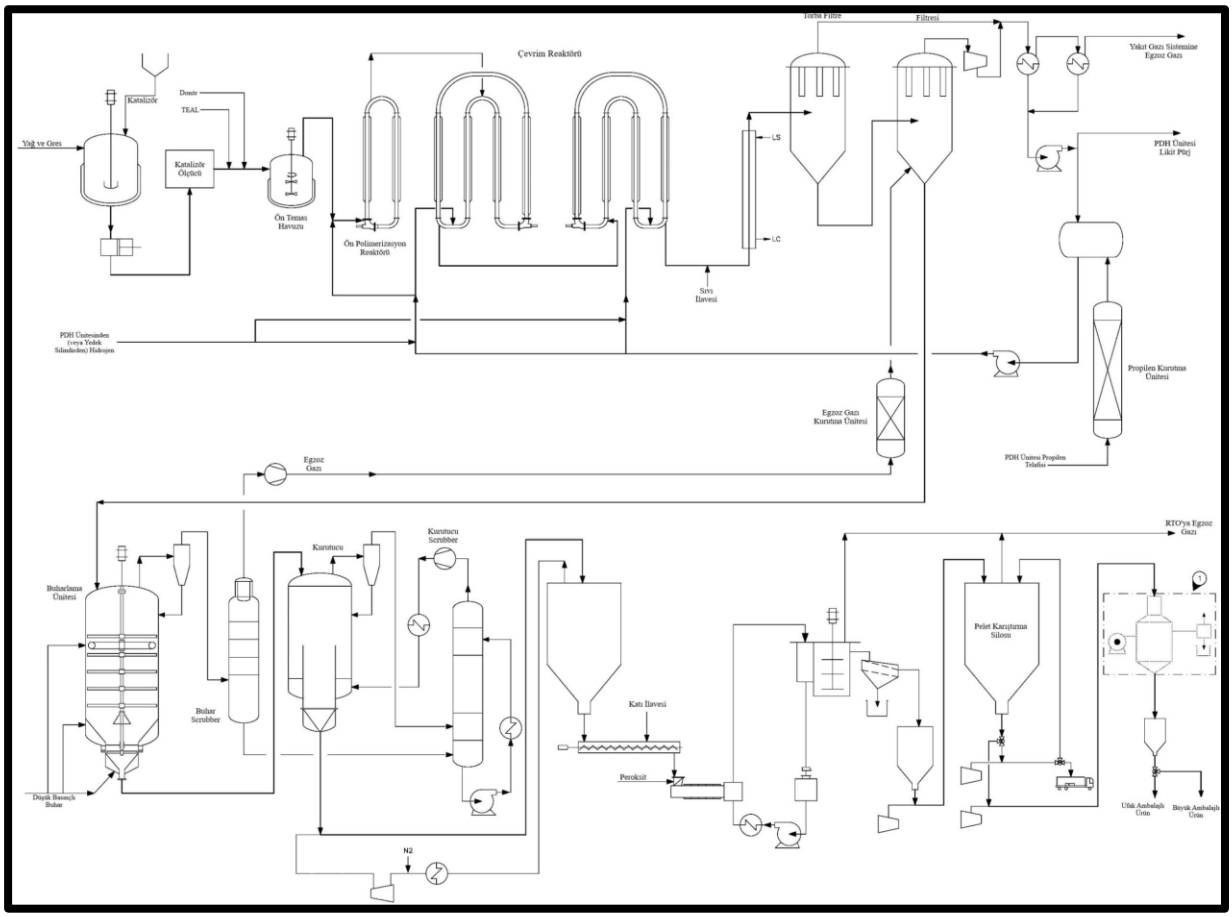
A fully equipped PP product storage and handling facility will be installed at the Project site. PP pellet storage and handling facility will have sufficient design capacity for maintenance and failure of the facility. PP polymers are stored in intermediate silos by means of pneumatic haulage. The silos will be equipped with bag type filters. The pneumatic transport will be made via closed loop transfer system. The transfer system receives the polymer from dryer through feeding hopper and rotary feeds and sends it to the intermediate silos through pneumatic transport. PP polymer powder and additives are homogenized, extruded and granulated by an under-water pelletizer in the extruder. Pellets and water stream leaving the underwater pelletizer are normally conveyed to the dryer. Water is separated from the pellets first by gravity and then by centrifugal force. Dried pellets are conveyed by gravity to the vibrating screen which separates fines and coarse from pellets. Coarse and fines are sent to off-spec collector and finished PP pellets from the extrusion unit are collected by means of a pneumatic haulage. Pelletized product homogenization is carried out in six homogenization silos and each of these silos have a capacity of 1000 m^3.

[1] https://www.lyondellbasell.com/globalassets/products-technology/technology/spheripol-brochure.pdf

NVIRO system is designed to receive 1889 kg/h of Vent gas from CCR, 22440 kg/h of vent gas from Pellet dryer and 21747 kg/h of vent gas from Blending Silos. 3308 kg/h (26438 Tons/y) of CO_2 is expected to be part of NVIRO emissions.

Three-dimensional view of PP unit is given in Figure 2-5 and process flow diagram is presented in Figure 2-6.

Figure 2-5. 3-D view of PP Plant



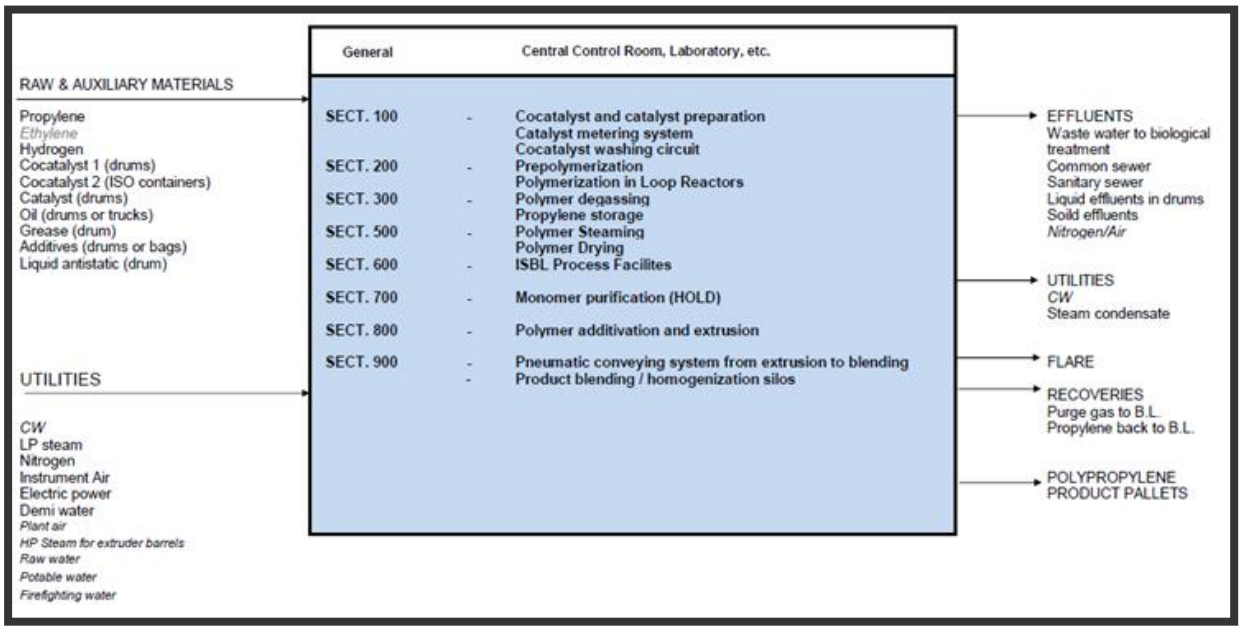


Figure 2-6. Process Flow (PP Plant, Spheripol)

Flare

One flare will be installed within the PDH-PP Facility called as “main flare” that collects fugitive emissions from PDH and PP Plants. The main flare for the PDH plant that also receives fugitive emissions from propylene tanks is positioned close to the northern boundary of the Facility premises. The flare is 176 m long (154 m above ground level and 22 m from mean sea level) and has a diameter of 1.51 m.

The principle objective of the flare system is i) to collect discharge from hydrocarbon relief systems, ii) combust the relief vapors safely via flare riser stack, iii) vaporize the relief liquids to vapor phase before combustion when needed and iv) provide smokeless flaring. The flare loads for main flare are 1,224 ton/h.

The design of the flare has been made in accordance with the American Petroleum Institute (API) Standard 521 on Guide for Pressure-Relieving and Depressuring Systems. The Project Company has issued a “Flare Radiation and Flameout Dispersion Study Report” in order to:

- predict the radiation and gas concentration levels at the boundary of the sterile area (i.e. protection zone), or at the bottom of a flare stack in cases where there is no sterile area, which are generated by operation of the flare system;
- assess whether predicted radiation and concentration levels exceed the flare design criteria;
- propose appropriate remedial design measures when any breach is identified.

The report estimates the impact of radiation and gas dispersion from the new flare stacks of the Project. For personal health and safety, the flare stack is designed in order not to make excessive radiation level or hazardous ambient condition on the ground at any operating cases. The Flare stack height is selected as such the maximum radiation exposure level does not exceed 4.73 kW/m^2 outside the sterile area at 2 m aboveground considering personal exposure. Accordingly, the sterile area radius is selected as 50 m for the main flare only.

Site Drainage and Wastewater Treatment

Project Company has prepared two documents; namely, “Drainage and Wastewater Gathering Philosophy” dated 12 June 2020 and “Specification for Drainage” 23 April 2020 specifically for Ceyhan PDH-PP Facility. The types of wastewater to be generated on site, collection mechanisms, drainage systems, limitations for collection, drainage and treatment of the defined types of wastewater, treatment options, provisions and mitigations are explicitly explained in these documents.

Accordingly, the following drainage systems will be established on site; non-oily sewer system (NOS), possibly oily contaminated sewer (POCS), oily water sewer (OWS) and sanitary sewer system (SS). All wastewater drainage streams will be collected and directed separately to the abovementioned systems (i.e. NOS, POCS, OWS and SS). Moreover, there will also be closed

drain systems (CDS) on site, in which products from the lines and pieces of equipment are collected in dedicated drums. Drainage scheme is shown in Figure 2-7.

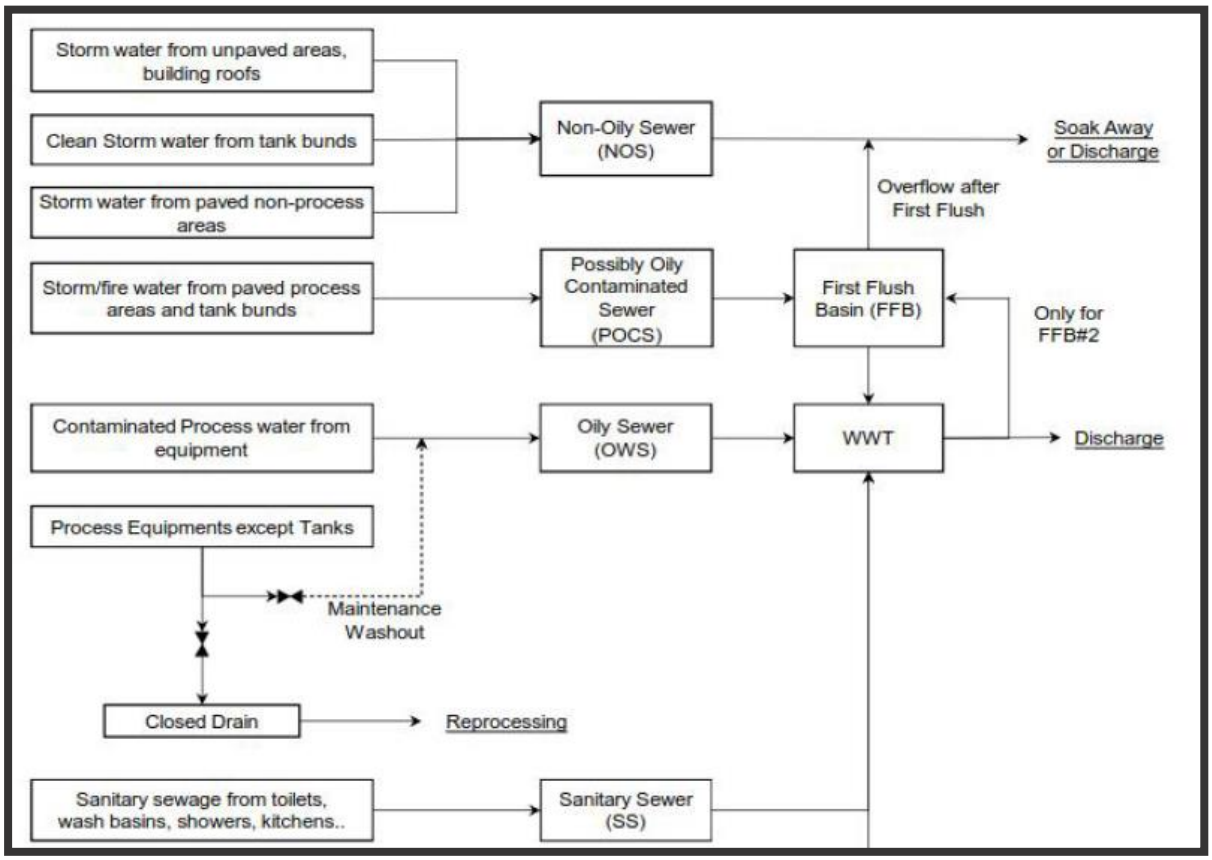


Figure 2-7. Drainage system scheme

As can be seen from Figure 2-7, all wastewater to be collected from the drainage systems except non-oily sewer system (i.e. clean stormwater) will be sent to the treatment units/plant in the Facility. The types of wastewater to be collected separately in each drainage system and disposal mechanisms are explained in *Chapter 8: Material Resources and Waste Management*.

A package wastewater treatment plant (WWTP) will be installed in the Project site with a capacity of 209 m^3/h. The WWTP will be designed to treat oil-contaminated wastewater and other contaminated wastewater streams originating from process, utility and offsite units in order to meet the regulatory limits. The WWTP will consist of oil separation unit, equalization basin, coagulation and dissolved air flotation, biological treatment unit, sludge dewatering unit, filtering facility (using sand and activated carbon), treated wastewater pond and required chemical dosing system. The treated stream will be sent to treated wastewater pond and if the wastewater quality meets the national regulatory limits then discharged to the sea via effluent pumps.

Cooling Water System

The cooling water system will produce sufficient cooled, treated water for the process, utility and offsite units. An “Optimization of Cooling Water System Including Make-Up Study” document was prepared by the Project Company specific for this Project dated 15 May 2020. Options were evaluated in order to find the optimum configuration of the cooling water system to be established in the Project. Three options were assessed; i) sea water once-through system, ii) open loop cooling water system (recirculating type), iii) indirect sea water cooling system. As a result of the economic assessment and qualitative analysis, open loop cooling water system is selected due to lowest CAPEX and lowest OPEX on a yearly basis. The advantages and disadvantages of the recirculating type of cooling water system are presented in Table 2-1.

Table 2-1. Advantages and disadvantages of recirculating type cooling water system

Advantage	Disadvantage
• No Titanium Plate & frame exchangers, CAPEX saving • No sea water intake / outfall and sea water pumps, CAPEX Saving • Less frequent maintenance compared with plate and frame exchangers • Future expansion cost and pre-investment is relatively low.	• Large make up water is required, high OPEX • Chemical treatment is required • Drift / plume from cooling tower (negative perception) • Increased effluent treatment facilities (frequent cleaning)

The equipment to be operative in cooling water system will be cooling tower, cooling water pumps, cooling water chemical dosing package, cooling water side stream filter package. The total design capacity of the cooling water system will be 19,700 ton/h (10,987 ton/h for PDH unit; 7,092 ton/h for PP unit; and 1,621 ton/h for utilities and offsite units).

The water balance in the recirculating type cooling water system is summarized in Table 2-2.

Table 2-2. Main technical calculations in terms of water balance for recirculating type cooling water system

Specification	Value	Unit
Circulating cooling water	22,500	m^3/h
Required make-up water* for cooling water loss	479	m^3/h
Cooling water pump brake horsepower	4,800	kW
Number of cooling water pumps	4	-
Number of cooling towers	1	-
Electrical power for cooling towers	980	kW
Total estimated required electrical power	5,780	kW

*Water make-up for losses will be result from cooling tower operation and cooling tower blowdown by service water.

Raw, Drinking and Service Water Storage

The raw water unit will be an independent system and require raw water feed, electrical power and instrument air (clean supply of air that is free of contaminates such as moisture or particulates). Raw (untreated natural water) water, which will be supplied from outside the Project site, will be treated to provide service water of suitable quality via Raw Water Treatment Package and Biocide Injection Package. The equipment to be operative in raw water unit will be raw water tank, raw water pumps, raw water treatment package and biocide injection package. The design capacity of the raw water unit will be 600 m^3/h, which is determined based on the maximum raw water consumption of the facility. Raw water will be chlorinated to prevent algae formation and will be stored in raw water storage tank. Following the filtration of raw water to remove suspended solids and fine particles, treated raw water will be sent to service water tank for further treatment.

Drinking and service water system will provide service water, drinking water and safety shower water for process, utility and offsite units. The drinking and service water system will also be capable of operating independently and require raw water, electrical power and instrument air. Treated raw water (coming from raw water unit) to be stored in service water storage tank will then be distributed to the process, utility and offsite units. The drinking water systems will process service water to produce drinking water. The equipment to be operative in the drinking and service water system will be service water and drinking water tanks and pumps, fire water transfer pumps, water seal make-up pumps, drinking water treatment package. Total design capacity of the service water system will be 599,030 L/h. The breakdown of the service water consumption for the major units is shown in Table 2-3. The design capacity of drinking water system is 3.1 ton/h considering the maximum drinking water consumption (based on 200 operators with drinking water demand of 200 L/day/person and a total of two safety showers).

Table 2-3. Service water consumption

Units	Service Water Consumption (L/h)
Cooling water make-up	191,630
Demineralized water system	354,700
Drinking water treatment	3,300
Utility Station (Process water)	11,700
Direct discharges to WWTP from above units	40,000
Recycled Water from Polisher and Drinking Water Treatment system	-2,800
Total	**599,030**

* the amounts of water consumption are not certain at this stage and can change according to design solutions.

Steam, Condensate, Boiler Feed Water & Demineralized Water

The demineralized water system will be an independent system and require reverse osmosis (RO) water system, electrical power, chemicals and instrument air. The demineralized water system will include a RO package, polishing package, demineralized water storage and

distribution facilities. The system also consists of boiler feed water, steam generation and distribution, condensate collection and treatment.

The boiler feed water system will be an independent system and require demineralized water, electrical power, chemicals and steam and condensate. There will be two utility boilers. The steam and condensate system will be an independent system and require boiler feed water, electrical power, chemicals, fuel gas and instrument air. There will be dedicated steam collection systems in PDH, PP, tank farm and utility to recover and collect condensate. Additionally, there will be an air system (including two compressors) to supply instrument air and plant air for the hose station.

Fuel System Unit

Fuel gas will be used in PDH heaters, flare and utility boilers. Off-gas generated from PDH unit is directly sent to the PDH heaters and the excess from both PDH and PP unit is collected and redistributed as low-pressure fuel gas to the users. In response to any deficit in the fuel gas balance, natural gas import facility is designed with appropriate flexibility and operating range.

In addition to the fuel gas system, diesel storage vessel and transfer pump are provided in the Fuel System Unit in order to transfer diesel to the emergency diesel generator.

Ancillary Buildings

The ancillary buildings in the Project site will include administration building, laboratory, fire station, control building, canteen, medical building, workshop and warehouse.

2.2 Design Standards of the Project Components

The design of the Project components will meet, among others, the American, British, International Electrotechnical Commission (IEC), as well as Institute of Electrical and Electronics Engineers Standards Association (IEEE Std.) standards in addition to European Norms/Standards and EU Directives at a minimum presented in Table 2-4.

Table 2-4. Selected design standards

Standard/Directive Number	Document Name
API 670	Machinery Protection Systems
American Society for Testing and Materials (ASTM) G51	Standard Test Method for Measuring pH of soil for use in Corrosion Testing
ASTM G57	Standard Test Method for Field Measurement of Soil Resistivity using Wenner Four Electrode Method
ASTM G187	Standard Test Method for Measurement of Soil Resistivity using Two Electrode Soil Box Method
EN 12464-1	Light and Lighting – Lighting of Workplaces – Part 1: Indoor Work Places
EN 12665	Light and Lighting – Basic Terms and Criteria for Specifying Lighting Requirements
EN 13201 Series	Road Lighting
IEC TS 62351 Series	Power Systems Management and Associated Information Exchange – Data and Communication Security
IEEE Std. 1100	Recommended Practice for Powering and Grounding Electronic Equipment

Standard/Directive Number	Document Name
IEEE Std. 1115	Recommended Practice for Sizing Nickel- Cadmium Batteries for Stationary Applications
IEEE C62.41 Series	Recommended Practice on Surge Voltages in Low Voltage A.C. Power Circuits
European Directive	
93/68/EC	CE Marking
93/465/EC	Conformity Assessment Procedures and CE Marking Rules
94/9/EC	ATEX 95 Equipment Directive
98/37/EC	Machinery Directive
99/92/EC	ATEX 137 Workplace Directive
2001/59/EC	General Product Safety Directive
2004/108/EC	Electromagnetic Compatibility
2006/95/EC	Low Voltage Directive
Industry Codes of Practice, Recommendations and Guides	
API 505	Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, and Zone 2
EI IP-MCSP-P1	Model Code of Practice for the Petroleum Industry Part 1: Electrical Safety Code
EI IP-MCSP-P15	Model Code of Practice Part 15: Area Classification Code for Installations Handling Flammable Liquids
EI IP-MCSP-P21	Model Code of Safe Practice Part 21: Guidelines for the Control of Hazards Arising from Static Electricity
ENA Engineering Recommendation G5 / 4-1	Planning Levels for Harmonic Voltage Distortion and the Connection of Non-Linear Equipment to Transmission Systems and Distribution Networks in the UK
CIBSE Lighting Guide 1	Industrial Lighting
CIBSE Lighting Guide 4	Sports
CIBSE Lighting Guide 6	The Outdoor Environment
CIBSE Lighting Guide 7	Office Lighting
CIBSE Lighting Guide 12	Emergency Lighting

2.2.1 Infrastructure

The Project will be constructed on green-field land, while the main inputs to be used are electricity and natural gas, which will be supplied from national grid and main supply line, respectively.

During the operation phase, there will be water usages related to general domestic uses (food processing, toilets etc.), which will be limited with the operational workforce and operational use in addition to raw water to be provided for production of service water of suitable quality. Raw water will be supplied from outside the Project site. The project site is located in the CPIR. Providing all such required infrastructure for the Project are under the responsibility of the Management Company within the scope and boundaries of CPIR. The Project Company is also in contact with the Management Company. In that respect, the Management Company has issued an official letter dated 12.08.2020 stating that the required 106 MW electricity, 14,400 m^3/day raw water and 11,085 Nm^3/h natural gas will be supplied by the Management Company. The services such as water, natural gas and electricity supply, telecommunication as well as road connections, which are under the responsibility of the CPIR Management Company, are considered as the third party activities (Section 2.2) to be considered as part of cumulative impact assessment.

2.2.2 Fire and Gas Safety

A “Fire Protection Philosophy” and “Design Specification for Fire and Gas System” document have been prepared by the Project Company dated 23 April 2020 and 24 April 2020, respectively for Ceyhan PDH-PP Facility. The “Design Specification for Fire and Gas System” document includes the minimum requirements, codes and standards to be followed for the design and procurement of the Fire and Gas System (FGS) in Ceyhan PDH-PP Plant. FGS will be a dedicated system for fire and gas detection and will have protection functions, which provide personnel warning and allows immediate response to minimize damage caused by any emergency situation. FGS will include fire and gas systems in main control building, satellite instrument house and marine operating building; fire and gas detection and alarm devices for plant areas; and interface to building fire alarm control panels. The Facility will also be equipped with flammable gas detectors, toxic gas detectors, oxygen detectors, heat detectors, flame detectors, smoke detectors and manual alarm call point.

The firewater demand has been calculated as about 1,900 m^3/h in case of a fire at the LPG sphere tank farm; 200-600 m^3/h for buildings; 700 m^3/h for Jetty area. There will be a dedicated firewater storage tank which will be designed in accordance with National Fire Protection Association (NFPA) 22. A fire station will be suitably positioned at a non-hazardous location but at the same time close to the process area.

2.2.3 Terminal Facility

At the initial phase of the Project, Terminal facility regarding propane storage and jetty was designed as the part of the Project. After the FEED design, the Project Company decided to separate the Terminal Facility from the Project as a different investment project with a different investor group. On the other hand, the design and operation philosophy of the Terminal Facility is still same with initial design. In this respect:

- Terminal Facility will solely work for the Project;
- Operation of the Terminal Facility is fully integrated to the Project;
- Common services such as water supply, wastewater treatment, power supply, natural gas supply, emergency response etc. will also be integrated with the Project.

Propane, which will be used as raw material in PDH-PP process, will be brought to the Project by marine transportation through a terminal facility comprising propane storage tank and a jetty. As given in the first paragraph, the terminal facility will be constructed and operated by third party supplier company, which will be formed under Rönesans Holding umbrella with a different partner named as Ceyhan Terminal Hizmetleri, which is as a joint venture between Rönesans and Stolthaven Terminals.

The imported propane, which will be shipped with marine tankers will be discharged from vessel via jetty and send to a storage tank with a nominal capacity of 106,561 m^3 (net volume is 93,700 m^3). The propane storage is optimized by taking into consideration the ship

movements, capacity of the terminal facility and raw material prices. In this respect, 30 days storage capacity is considered as sufficient for operation of the Project.

The jetty will be composed of unloading platforms and pipe rack, which is designed as two levels. The pipe rack from the loading platform to the causeway will be designed as 6 m wide and will be organized in two levels. There is a low pressure (LP) flare, positioned adjacent to the propane tanks.

It is noteworthy that there will be a boil off gas (BOG) from the propane storage tank which will be recovered through propane BOG condensing system.

The Jetty will have a total length of 1.2 km. The marine part (jetty) will be composed of the following units:

- Two Propane unloading arms;
- Propane Metering Station;
- Marine Operating Building;
- Piperack and access road and Trestle and gangway tower;
- One Propane Tank (double wall full containment tank with outer concrete wall inner metal wall and top entry for pump out);
- Propane in tank pumps and motor;
- Propane heater;
- Propane BOG Package;
- Tank LP Flare System and KO Drum;
- Interconnecting piping from Propane Tank Farm to Jetty Unloading area;
- Firefighting equipment;
- Drainage system.
- Fuel Gas System
- Instrument Air System
- Cryogenic Liquid Nitrogen Package
- Jetty Drain Drum/Heater

A pipe rack will be conveying the materials from the Jetty to the storage units of the Project in the terrestrial part. Pipe rack, which will be installed from the loading platform up to causeway, will be constructed in two levels as follows:

<u>At Level 1:</u>

- One set of 2 propane pipelines for ship unloading;
- Firewater/Utilities Lines.

<u>At Level 2:</u>

- Cable Tray.

The layout of the terminal facility is given below Figure 2-8.

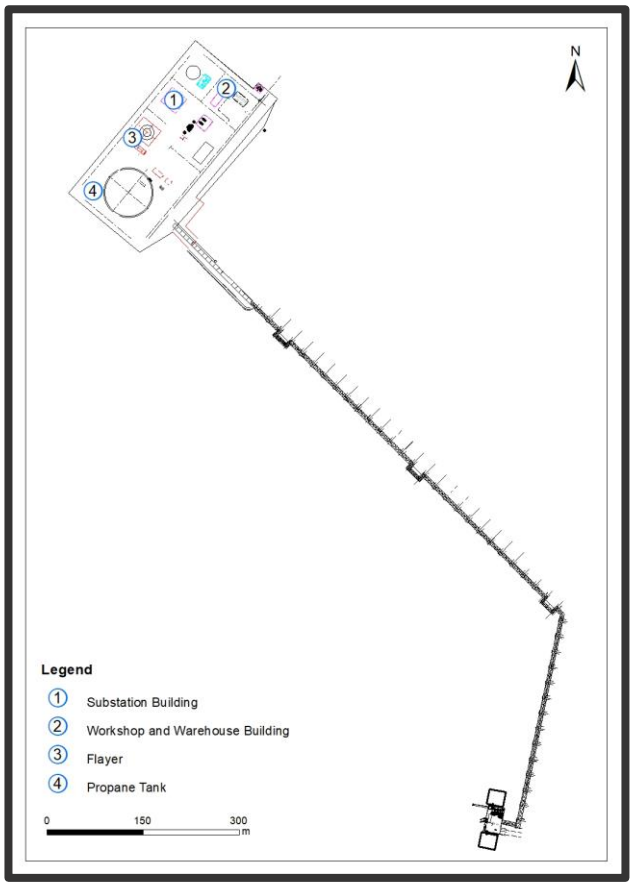


Figure 2-8. Layout of Terminal Facility

Propane from propane vessel will be unloaded via one propane unloading arm and sent to propane storage tank through the unloading line. There will be propane metering station located on jetty platform. Following the unloading of propane, the unloading arm will be purged with nitrogen. Any remaining material in the unloading line and manifold will be drained into the jetty drain drum. Additionally, there will be an electric heater in the Jetty to vaporize any fluid.

The Propane Storage Tank will be connected to LP flare, which is located adjacent to the propane tanks. The LP Flare will be 54 m long (42 m from aboveground and 12 m from mean sea level) and has a diameter of 0.33 m. Similar to the main flare proposed in PDH-PP Facility, the design of the flare has been made in accordance with the American Petroleum Institute (API) Standard 521 on Guide for Pressure-Relieving and Depressuring Systems. LP Flare is also included in the “Flare Radiation and Flameout Dispersion Study Report”. The flare loads for LP flare are 72.5 ton/h.

Raw water and drinking water for the Terminal Facility will be supplied from the Project. Same as water supply, wastewater treatment and discharge are also provided by PDH-PP Facility.

2.3 Overview of the Project, Associated Facilities and Third Party Activities

Implementation of the Project requires interaction with other projects in the region besides the existing facilities and activities. Among these projects, the Ceyhan Petrochemical Industry Region (CPIR) has an important role in terms of site selection and implementation of the project. In addition, the Terminal Facility regarding propane storage tank and jetty, which was previously included in the scope of the project but later turned into a separate investment, is also required to provide Propane, the raw material for the project.

CPIR Management Company is responsible for providing all infrastructure services for the construction and operation period as well as providing the necessary land. In this context, responsibility of sustaining the transportation, natural gas, electricity and water needs required for the realization of the Project rests with the CPIR Management Company. Water supply is one of the most important constraints in the Project Site. CPIR Management Company has contacted with State Hydraulic Works (DSI) in this regard. As a result of this contact, CPIR Management Company has involved a water transmission line project to supply the water needed by the Cukurova Region. Within the scope of this project, water will be provided from Aslantaş Dam to different industrial establishments located in the Cukurova Region.

Within the scope of the CPIR, there is also a port project. Except the Terminal Unit, the Project has no direct connection with the port project. On the other hand, the port project provides a significant benefit, especially in terms of the disposal of excavation wastes that will arise from the Project.

The region in which the project site located is considered to be significantly developed in terms of industrial infrastructures. Materials required for the construction of the Project will be easily provided from the existing facilities in the region. At the same time, the region is also developed in terms of transportation infrastructure. In addition, as part of Turkey-Rail Logistics Improvement Project developed by TCDD, new railway and logistics center projects are planned to meet transportation and logistics needs in the region. The key projects, facilities and activities related to the Project are presented in Figure 2-9 and their relations with the Project are summarized in Table 2-5. At the same time, the evaluations of these projects in terms of associated facility criteria within the scope of IFC PS1 are presented in

Table 2-6.

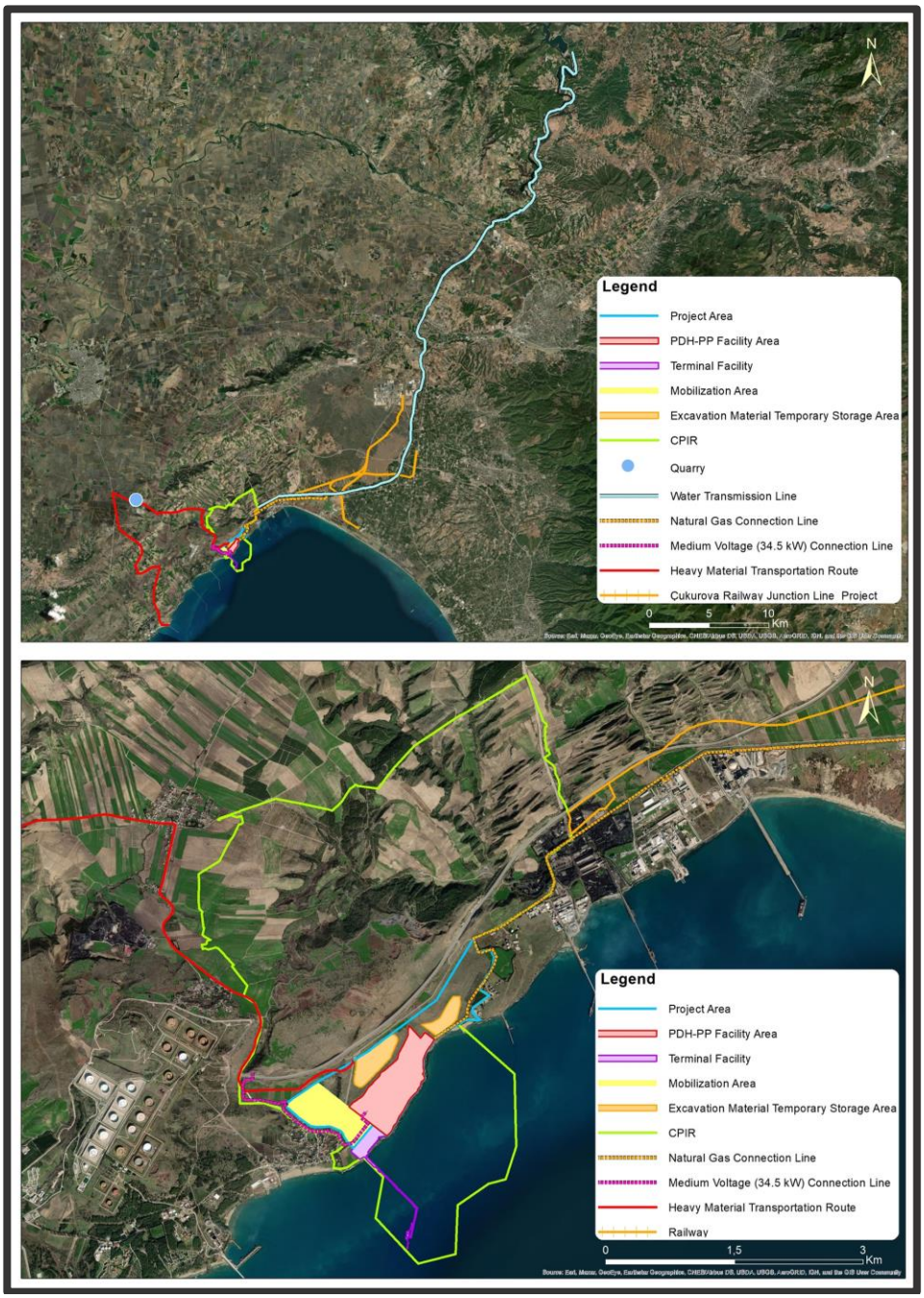


Figure 2-9. Location of Key Projects, Facilities and Activities

Table 2-5. Summary of Key Projects and Their Relevance to the Project

Project/Facility/Activity	Description	Relevance to the PDH-PP Project		General Key Remarks
		Construction	Operation	
Projects				
Ceyhan Petrochemical Industrial Region (CPIR)	CPIR was designated as an industrial zone in 2007 with the Council Decision No. 2007/12632. Ceyhan Petrokimya A.Ş. has been appointed as the Management Company for CPIR in 2019.	Providing land parcel. Providing Construction License. Liaison for the supply of electricity and domestic water required for construction works.	Responsible to provide infrastructure and superstructure needs as well as common services, including: - electricity; - natural gas connection, water supply; - site access, - domestic waste disposal; - identification of the connection point for treated wastewater discharge; - General zone security[1].	**Land Acquisition** After establishment of the zone, land acquisition process was started in 2007 by the Ministry of Industry and Technology (MoIT). Major part of the zone is formed by public lands (forests and pasture lands). Private agricultural fields and 15 residential houses are also located in the zone. The land acquisition process is conducted by MoIT. CPIR Management Company have no direct influence on Land Acquisition Process. See *Chapter 14: Socioeconomics* and Land Acquisition Gap Analysis Report for more detail. At present, CPIR Port Project is carried out by the CPIR Management Company. As the design characteristics, the jetty and back storage facilities, which serve for propane supply of the Project, are a part of the port project. The Jetty and propane storage facility will be operated by Terminal Hizmetleri A.Ş. **Services** All infrastructure services for the CPIR will be performed by CPIR Management Company. In this respect, the services such as electricity, natural gas, raw water, telecommunication, security, and road connection, etc. will be provided up to agreed battery limit[2] (mainly adjacent to PDH-PP Project area border) by CPIR Management Company. Raw water required in CPIR will be provided from a water transmission line planned for several industrial zones[3] as well facilities in the region. According to the protocol signed between Adana Metropolitan Municipality, DSI and industrial zone managements including CPIR management, design and construction of the Water Transmission Line will be performed and supervised by DSI. After construction of the Water Transmission Line, it is transferred to Adana Metropolitan Municipality for the

Project/Facility/Activity	Description	Relevance to the PDH-PP Project		General Key Remarks
		Construction	Operation	
				operation. Water supplied via water transmission line will be stored in water tanks build for the CPIR. After that water will be distributed within the CPIR by water distribution network.
CPIR Raw Material Supply Storage and Port Project (CPIR Port Project)	Project is developed by a private company formed in Rönesans Holding. The Raw Material Supply, Storage and Port Facility Project are designed to handle 1,600,000 TEU containers, 15,900,000 tons of liquid cargo, 10,000,000 tons of dry cargo, and 1,000,000 tons of bulk cargo annually. It is planned to create backyard areas in the port area for the handling and storage of the cargoes. Raw Material Supply, Storage and Port Facility project will be implemented in stages. The investment and operation of the stages and/or facilities will be carried out by different companies under the control of the Ministry of Industry and Technology and the CPIR Managing Company.	Excavated material produced from the PDH-PP site will be used for backfilling required for the CPIR Port Project.	Fugitive air emissions, and employment are other operational interfaces with the PDH-PP Project.	**Land Acquisition** Land will be provided by CPIR management. Land acquisition process is covered in the CPIR establishment. **Construction** National EIA of the CPIR Port Project indicates that high amount of backfilling material required for the port construction. In that respect, CPIR Management aims to use excavated material produced form the basement construction of the PDH-PP Project. For this reason, CPIR Port Management contacted with PDH-PP SPV to use of excavated material. As the best practice implementation of source protection and reuse, excavated material will be provided to CPIR Port Management. All construction activities as well as required permits and consents related to construction and backfilling of the port will be performed and secured by CPIR Port Management. **Operation** Operation of the CPIR Port will be carried out by a different operator. Timing of the project has not been defined yet.
Ceyhan PDH-PP Facility (The Project)	The Project aims to supply Polypropylene for national markets to decrease import dependency. Propane will be used for production of Polypropylene. The Project will be the first investment in CPIR.	All activities during construction and commissioning phase, including: • Site preparation for construction works including site levelling	Operational activities, including: • Obtaining operation license including environmental permit;	**Land Acquisition** The Land will be provided by CPIR Management. Therefore, the Project has no direct influence on the land acquisition process. Except two houses, which are located at the area dedicated for construction accommodation camp and material storage area, the Project is located on public land.

Project/Facility/Activity	Description	Relevance to the PDH-PP Project		General Key Remarks
		Construction	Operation	
	Special Purpose Vehicle (SPV) company named Ceyhan Polipropilen Üretim A.Ş is the investor of the Project. SPV is comprised by Rönesans Ceyhan Petrokimya Endüstriyel Yatırım A.Ş. (51%), Ceyhan Petrokimya Endüstri ve Ticaret A.Ş. (15%) and Sonatrach Petroleum Investment Corporation BV (34%).	All mitigation measures defined in ESIA Report for excavation, transportation and storage works provided in ESMMP and all other relevant management plans will be applied for conducting the named activities for the Project. • Stakeholder engagement during construction works; • Implementation of Environmental and Social Management System including plans and procedures regarding construction works; • Implementation of supply and construction plans and procedures; • Transportation of construction materials; • Formation of Construction Accommodation Camps; • Hiring construction workforce; • Basement construction; • Assembling the units; • Obtaining license required for pre operation; • Commissioning of the Units.	• Supply and transportation of the material required for the operation; • Hiring the operational workforce; • Implementation of Environmental and Social Management System including plans and procedures related to operation; • Transportation of raw materials and transportation of products. • Wastewater treatment and discharge to the location defined by the CPIR Management Company.	Due to the topographical condition of the Project area, there was no opportunity to acquire other land plots and leave those two houses unaffected. **Process** Propane will be used for the Project polypropylene production. At the same time, Propane will be fuel source for the Project. Natural gas will only be used at start-up for preheating purposes. During polypropylene production, hydrogen produced in polymerization will be the major energy source, which brings and important energy recovery and efficiency increase of the Project. The design of the Project guaranties related requirements is stipulated by National Laws and Regulations. The design of the Project guaranties sector related requirements is stipulated by EU BAT-BREF documents. The design of the Project guaranties sector related requirements is stipulated by World Bank/IFC Guidelines.
Terminal Facility (Jetty and Propane Storage Facility)	The Propane planned to be used in the Project will be supplied by marine transport. Propane shipped by the sea will be offloaded from tankers via jetty and transferred to storage tanks to be built on land.	Same construction contractor, which constructs the PDH-PP Plant Project, will construct the Terminal Facility. To the extent possible, implementation of the mitigation measures identified	Supply of Propane to the PDH-PP Facility.	**Land Acquisition** Same as the PDH-PP Plant, the land will be provided by CPIR management. Therefore, the Project has no direct influence on land acquisition process related to the Terminal Facility. Land acquisition associated with the terminal triggers physical and economic displacement (see *Chapter 14:*

Project/Facility/Activity	Description	Relevance to the PDH-PP Project		General Key Remarks
		Construction	Operation	
	Terminal Facility comprising the jetty, propane storage tank and other ancillary facilities will be constructed and operated by another private investor group formed by Rönesans Holding and a new partner. Jetty and Propane Storage Facility are designed as a part of the CPIR Port and Raw Material Storage Project.	during ESIA Process of the PDH-PP Facility (the Terminal Facility is classified as associated facilities as per the IFC PS 1)		*Socioeconomics* and Land Acquisition Gap Analysis Report for more detail). **Design** Design of Terminal Facility is performed as part of the same package as for the PDH-PP Plant, though as part of this package each functional unit/facility has its own design documentation. It is Consultant's understanding that the Terminal Facility project will also seek for international finance, and that all design consideration of the Terminal Facility will correspond with requirements of the EU BAT-BREFF Documentation, as well as with World Bank/IFC requirements and guidelines. Operation of the Jetty in the Terminal Facility will be in line with Marpol Convention requirements. In that respect, ships which transport the propane are to be equipped with wastewater and waste management systems, as well as with emergency response equipment's against marine pollution in accordance to the Marpol Convention. For this reason, the ships that are certified according to the relevant annexes of the Marpol Convention will berth to the Jetty for Propane off-load. Certificates for potential cargo ships planned to be used during operation. Jetty will be equipped with emergency response system including spill response kits and sea water cleaning equipment's. Terminal Facility will not receive ballast of bilge waters form ships. **Operation** Operation of the Terminal Facility will be carried out by a different operator. Terminal Facility will operate solely for the PDH-PP Project. Maximum two ships a month are expected for raw material transportation.
Water Transmission Line Project	Project developed by DSI to supply water demand of the Industrial zones established in the Region. These zones are:	No interface with the Project construction activities.	Water demand of the Project will be supplied from this source.	PDH-PP Project has no direct influence on the Water Transmission Line project, which is developed by the State Hydraulic Works company (DSI). The CPIR Management

Project/Facility/Activity	Description	Relevance to the PDH-PP Project		General Key Remarks
		Construction	Operation	
	• CPIR; • Erzin OIZ/Erzin OIZ 2. Stage; • Ceyhan OIZ/Ceyhan OSB 2. Stage; • SASA Polyester Petrochemical Integrated Production Facility; • Adana Chemical OIZ; and • EMBA Electricity Production Company etc. Water sourced form Aslantaş Dam and transferred via approximately 60 km water transmission line. Annual water demand of the CPIR is about 12.6 hm^3		Water supply for the Project is under responsibility of the CPIR Management Company.	Company supports DSI to accelerate implementation (design and construction) of the water supply project. Investment and construction of the Water Transmission Line will be conducted by the State Hydraulic Works, and delivered to Adana Metropolitan Municipality (Adana Water and Sewage Works - ASKİ). ASKİ will operate the Water Transmission Line, and cost recovery will be done through water pricing. In the "Ceyhan Basin Master Plan Report" approved by the General Directorate of State Hydraulic Works in 2017, the operation studies of Aslantaş Dam were carried out and evaluated in detail in terms of water budget. Under the heading of "*3.8.3.21 Aslantaş Dam Operation Study of the Climate and Water Resources Section" of the related report, it is stated that "Calculations have been made for the drinking water that can be supplied to Osmaniye and its surroundings for irrigation and drinking water needs. According to these studies, it has been observed that in the foreseeable full development situation, approximately 188 hm^3/year water can be supplied to Osmaniye Province and its surroundings".* The report concludes that 12.6 hm^3/year water demand of the CPIR will have no impact on water sourced from Aslantaş Dam.
Cukurova Region and Iskenderun Bay Railway Connection Sub-Project (Railway Project)	Cukurova Region and Iskenderun Bay Railway Connection Sub-Project aims to make the transportation of raw materials and products economical by making infrastructure connection between the industrial areas located in Cukurova Region. The railway connection line will connect the existing and planned industrial zones in Cukurova Region such as Osmaniye OIZ, Ceyhan OIZ and CPIR to the existing Toprakkale - Iskenderun railway line at the existing Erzin Station.	The project is located outside of the CPIR and the project is still in planning phase. If construction of the Railway Project is started during Construction Phase of the Project, cumulative impacts are expected mainly related to transportation (i.e. traffic) and construction camps (i.e. labour relations, positive or negative pressure on local economy etc.)	During operation phase, completion of the Railway Project will provide advantage to the project in terms of economical as well as environmentally friendly access to the national and international market.	The Railway project is funded by World Bank and environmental and social assessments have been performed in accordance with the new Environmental and Social Framework (ESF) of the Bank. With this intention Environmental and Social Impact Assessment (ESIA) studies of the Railway Project was completed in 2020. ESIA Report together with Resettlement Action Plan of the Railway Project are in place. According to the ESIA Report, the project was started in 2021 and was expected to be completed in 2023. On the other hand, construction works are not started yet. Existing available information indicates that project is still in planning phase. Therefore, exact timeline of the Railway Project is not known.

Project/Facility/Activity	Description	Relevance to the PDH-PP Project		General Key Remarks
		Construction	Operation	
	There will be a logistic centre connected to the Railway Project near to the CPIR at northeast of the Project Site. The Railway Project is World Bank funded project and it will be constructed and operated by Turkish National Railroad Authority (TCDD).			Project is a regional transportation project and it will be constructed and operated by a different investor. Consequently project is considered as third party project considered in cumulative impact assessment.
Project Facilities				
Mobilization Area	Mobilization Area comprises Construction Camp (including offices, dormitory, canteen, activity hall, warehouse, utility center, education hall etc.) as well as construction material temporary storage area. Mobilization area will be located adjacent to the Project site to the west. Size of the area is approximately 339,000 m^2	Mobilization area will only be used during construction works. Construction camp located in the Mobilization Area will serve for maximum 4,500 personnel during construction works. Construction Camp will include: • Offices; • Dormitories; • Heating Center; • Emergency Power Generators; • Prayer Room; • Fire Department; • Health Center; • Training Center; • Canteen; • Kitchen; • Cafeteria; • Open Social Area.	Mobilization area will not be used during operation of the project. Mobilization area will be decommissioned and reinstated after completion of the construction works and the area will be provided to the CPIR Management Company for further management.	As the current construction planning same EPC Contractor will construct the Project and Terminal Facility. Due to that reason the Mobilization Area including all construction camp facilities will also be used for construction of the Terminal Facility.
Access Roads (connecting the Project to the CPIR facilities)	Project area is directly connected to the national road network via existing highway connected to Adana – Gaziantep Motorway from the northeast.	During the construction works no additional road is required for site access.	Same as construction phase. No additional road is required for site access.	Management company is responsible for the arrangement of the connection roads in and out of the CPIR. Therefore, all road arrangements required for operation phase will be done by the Management Company.

Project/Facility/Activity	Description	Relevance to the PDH-PP Project		General Key Remarks
		Construction	Operation	
	Additionally, regional roads between settlements are also provide site access to the Project site.			A small road provides a shortcut between Incirli-Erzin Road and Incirli Quarter is located in the Mobilization Area. This road will be blocked during construction works. Main connection road of the İncirli Quarter, which provides access to the village from the northwest will be still in operation during construction works.
Power (electricity) Supply (connecting the Project to the CPIR facilities)	Electricity will be supplied by Management Company.	During construction works required power will be supplied from existing medium voltage substation located north of the Project site. Power generators will also be used in the Mobilization area for emergency case requirements.	During operation phase electric power mainly supplied from CPIR Network, which will be connected to national grid. Power generators will also be used in during operation phase for emergency case requirements.	CPIR Management have a connection agreement with TEİAŞ (Governmental authority operating the national grid. According to the agreement, CPIR electricity network will be connected to the national grid via exiting 154kV high voltage power line crossing the CPIR. Therefore, there will be no additional high voltage power line required outside of the CPIR. The Project will be connected to the CPIR electricity network through a medium voltage (34.5 kV) power line constructed in the CPIR. The line will be constructed along the existing road located inside the CPIR.
Natural Gas (connecting the Project to the CPIR facilities)	Natural gas connection will be supplied by Management Company.	During main part construction phase natural gas will not be used. On the other hand, during commissioning phase, which is considered as the final stage of the construction phase, natural gas is required.	During operation phase natural gas will be supplied by the Management Company.	CPIR Management is planning to supply natural gas from the existing natural gas line used by neighbouring facility Toros Gübre. CPIR natural gas network will be fed from this line. There will be no additional line outside of the CPIR.
Water Supply (connecting the Project to the CPIR facilities)	Water supply is under responsibility of the Management Company.	During construction phase water will be supplied from existing line used by tankers.	Operation phase water will be supplied from CPIR Water network.	According to the existing construction planning, water required for construction works will be supplied by tankers. CPIR Management will provide water during construction and operation phase. CPIR Management already contacted with DSI about water supply for the CPIR. DSI is working on the Water Transmission Line Project designed as common project for other zone and facilities located in the region covering Ceyhan District of Adana and Erzin District of Osmaniye provinces.
Quarries, Borrow Pits and Concrete Batching Plants	Existing facilities which are already operating in the region will be used as material source	No Quarry, Borrow Area or Concreate Batching Plant will be constructed or operated for the construction works.	No quarry, borrow pit or concrete batching plant is required for operation phase.	Existing facilities, which are in operation and have relevant permits will be used as supplier. These facilities are considered as third-party supplier within the project.

Project/Facility/Activity	Description	Relevance to the PDH-PP Project		General Key Remarks
		Construction	Operation	
Activities				
Transportation	Main Roads connected to the project site will be used for transportation. Terminal facility, which will have a jetty and propane storage tank, will be used for marine transportation.	During construction phase, land transportation is mainly used for supply of construction materials and transportation of personnel. Marine transportation is mainly planed for supply of heavy items.	During Operation Phase, propane that will be used as raw material will be supplied with marine transportation. Produced Poly Propylene (PP) will be sent to the market via land transportation. Services mainly used for transportation of the operational personnel. It also assessed that operational personnel will also use mass-transport system such as busses and trains.	Project site has advantage in terms of land transportation. CPIR directly connected to the Adana-Gaziantep Motorway via existing highway.
Transportation of Heavy Items	İskenderun and Sanko Harbours are two potential locations for import of the heavy items required for the construction works.	Heavy items such as: • Propylene-Propane Splitter 1,585.4 tones; • Deethanizer Stripper 806.7 tones; • Loop Reactor 521.0 tones; • Reactor 524 tones; will be transferred to the construction site.	During operation phase, regular transportation of the heavy items is not planed.	A route survey report regarding transportation heavy items from Sanko Port has been prepared. Total distance of the route is 28.5 km and fallows the single line regional roads. As a result of the study 63 point on the route are defined as locations that require special arrangement and/or repairment. The report concludes that: • Beach landing option at the Project site is not considered as safe due to shallow bathymetry and wave conditions, which have negative impact on stability of cargo inside the barge; • A jetty is required to anchor the barge and minimum 5m of depth to discharge the units; • Sanko port is suitable for unloading of the “Propylene-Propane Splitter”; • Sanko Port authority does not recommend unloading of the cargoes from December to April, due to meteorological condition; • During transportation of the cargos at some locations cable lines (i.e. Electric, Communication and etc.) should be shutdown, lift up or dismantled; • 4 bridges can be passed by flyover bridges;

Project/Facility/Activity	Description	Relevance to the PDH-PP Project		General Key Remarks
		Construction	Operation	
				• Two curve locations are defined as most critical in terms of road transportation and requires repairment and/or construction.
Accommodation	Accommodation is required for construction workers.	During construction phase, most of the workers will be accommodated at site.	During operation phase there will be no accommodation at the Project site.	Total of 12 buildings (3 storey) each having a capacity of 390 beds will be constructed for Construction Phase.

[1] General security of the CPIR is under the responsibility of the CPIR Management Company. On the other hand, inside the Project area, the security services are provided by the SPV.

[2] Battery Limit is the border line, where the responsibility of the CPIR Management Company starts for infrastructure services. For each service, different battery limit is defined (e.g. for electricity nearest medium voltage transformation unit, for natural gas, nearest RMS etc.).

[3] There are several Planned Industrial Zones in Ceyhan Basin mainly covers Adana and Osmaniye Provinces. According to the Ceyhan Basin Master Plan Report (2017), water requirement of these zones can be provided from Aslantaş Dam. At present, CPIR, Erzin OIZ/Erzin OIZ 2. Stage, Ceyhan OIZ/Ceyhan OSB 2. Stage, SASA Polyester Petrochemical Integrated Production Facility, Adana Chemical OIZ; and EMBA Electricity Production Company are main industry zones or facilities which are subject of protocol agreed by DSI and Adana Metropolitan Municipality.

[4] In CPIR, there are several different buffer distances defined as health protection zone by Adana Province Health Directorate. Health protection buffer zone distances varies between 10 m to 50 m along the CPIR border depending on the location of settlements and other industrial activities. The distance defined as health protection buffer zone close to Incirlik Quarter is 50 m. Buffer zones are provided in 1/5000 scaled master plan and 1/1000 master implementation plans.

Table 2-6. Assessment of Facilities for Compliance with Association Criteria of the IFC PS1

Facility / Activity	Integration with the Project	Association criteria of the IFC			Status
		Financed as Part of the Project	Would be constructed or expanded had the Project not been implemented	Needed for the Project viability	
1. CPIR					
1.1. CPIR (Establishment of the zone)	Yes, Land will be provided by CPIR Management	No	Yes	Yes	Third party facilities / activities Assessment of cumulative impact.
1.2. CPIR Infrastructure	Yes, in terms of use of power, water and wastewater utility networks	No	Yes	Yes	Third party facilities / activities Assessment of cumulative impact
2. PDH-PP Project					
2.1. PDH and PP Production Plants	Yes	Yes	No	Yes	A part of the Project
2.2. Raw Water Unit	Yes	Yes	No	Yes	A part of the Project
2.3. Cooling Water Unit	Yes	Yes	No	Yes	A part of the Project
2.4. Drinking and Service Water Unit	Yes	Yes	No	Yes	A part of the Project
2.5. Instrument and Plant Air Supply Unit	Yes	Yes	No	Yes	A part of the Project
2.6. Nitrogen Generation Unit	Yes	Yes	No	Yes	A part of the Project
2.7. Fuel Gas Supply System	Yes	Yes	No	Yes	A part of the Project
2.8. Wastewater Collection and Treatment System	Yes	Yes	No	Yes	A part of the Project
2.9. NVIRO System	Yes	Yes	No	Yes	A part of the Project
2.10. Propylene Storage Unit	Yes	Yes	No	Yes	A part of the Project
2.11. Flare System	Yes	Yes	No	Yes	A part of the Project
2.12. Polypropylene (PP) Storage	Yes	Yes	No	Yes	A part of the Project
2.13. Steam, Condensate, Boiler Facilities	Yes	Yes	No	Yes	A part of the Project
2.14. Accommodation of Construction Workforce Facilities (Mobilization Area)	Yes	Yes	No	Yes	A part of the Project
2.15 Transportation of Construction Materials and Other Project Traffic Activities	Yes	Yes	No	Yes	A part of the Project

Facility / Activity	Integration with the Project	Association criteria of the IFC			Status
		Financed as Part of the Project	Would be constructed or expanded had the Project not been implemented	Needed for the Project viability	
2.16 Access Roads	Yes	Yes	No	Yes	A part of the Project
3. Terminal Facility					
3.1. Jetty	Yes Raw Material Propane Off-load	No	No	Yes	Associated facilities/ activities
3.2. Propane Storage Facility	Yes Raw Material Propane Storage	No	No	Yes	Associated facilities/ activities
3.4. Accommodation of Construction Workforce (for the Terminal Facility)	Yes	No	No	Yes	Associated facilities/ activities
3.5 Transportation of Construction Materials and Other Traffic Activities (for the Terminal Facility)	Yes	No	No	Yes	Associated facilities/ activities
3.6. Access roads for terminal facility (Same roads will be used with the project)	Yes	No	No	Yes	Associated facilities/ activities
4. CPIR Raw Material Supply Storage and Port Project (CPIR Port Project)					
4.1. Port Facilities (Other than the Terminal Facility)	No	No	Yes	No	Third party facilities /activities Assessment of cumulative impact
4.2. Storage Facilities (Other than the Terminal Facility)	No	No	Yes	No	Third party facilities /activities Assessment of cumulative impact
5. Water Transmission Line Project					
5.1. Water Transmission Line	No	No	Yes	Yes	Third party facilities / activities Assessment of cumulative impact.
5.2. Above Ground Installations (i.e. Pumping Stations, reservoirs, pressure reduction station etc.)	No	No	Yes	Yes	Third party facilities / activities Assessment of cumulative impact.

Facility / Activity	Integration with the Project	Association criteria of the IFC			Status
		Financed as Part of the Project	Would be constructed or expanded had the Project not been implemented	Needed for the Project viability	
6. Cukurova Region and Iskenderun Bay Railway Connection Sub-Project					
6.1. Railway connection line	No	No	Yes	No	Third party facilities / activities Assessment of cumulative impact.
6.2. Logistic Centres	No	No	Yes	No	Third party facilities / activities Assessment of cumulative impact.
7. Other Facilities					
7.1. Water Supply	No	No	Yes	Yes	Third party facilities / activities Assessment of cumulative impact
7.2. Power Supply	No	No	Yes	Yes	Third party facilities / activities Assessment of cumulative impact
7.3. Natural Gas Supply	No	No	Yes	Yes	Third party facilities / activities Assessment of cumulative impact
7.4. Quarries, Borrow Pits and Concrete Batching Plants	No	No	Yes	Yes	Third party facilities / activities Assessment of cumulative impact

2.4 Project Alternatives

2.4.1 'No Project' Scenario

The 'no project' scenario considers the situation of not developing the Project. If the Project is not realized, there will be no new investment for polypropylene production; and thereby import dependency will significantly increase due to the increasing national demand.

The most important problem in the petrochemical industry of Turkey is, in spite of rapidly rising domestic demand, domestic production remains extremely low because of very limited investment. This, on the one hand, negatively affects the competitiveness of the sector against its competitors both within the country and around the world, while on the other hand, causes the added value of the petrochemistry sector, which is very high, to remain abroad[2]. Polypropylene production in Turkey between the years of 2013 and 2017 decreased by 8.4% on average per year. As such, the highest imports were made in polyethylene and polypropylene in terms of quantity and value in 2020. Imports from both of these raw materials accounted for 56% quantity and 53% value among the total plastic raw material imports[2]. It is anticipated that the development of the CPIR will significantly decrease import dependency. Given the importance of local production of plastic raw materials, particularly polypropylene, the Project needs to be implemented to secure local production to eventually meet 15% of the Country's polypropylene demand. Detailed social and economic analysis of petrochemical sector is given in *Chapter 14: Socio-Economy*.

2.4.2 Project Design Alternatives

Different design alternatives were evaluated for the Project. The current Project layout given in Figure 2.1 has been selected after taking into account environmental and social considerations in addition to technical aspects. The environmental and social considerations are summarized as follows:

- The layout of the Project was changed so that the cultural heritage area stays outside the Project Area, since cultural assets are taken into account during the Project design. In addition, minimizing the land use is one of the considerations during the change of the Project Layout;
- Oleflex technology, which is the most energy efficient technology and has the lowest level of GHG emission, was determined to be chosen for the Project. In addition, the hydrogen that will be produced during the process will be used as fuel in the facility;
- Locating the Project units as close to the Raw Material Supply, Storage and Port Facility Project (CPIR Port) components as possible;

[2] Türk Plastik Sanayicileri Araştırma Geliştirme ve Eğitim Vakfı, Turkish Plastic Industry Monitoring Report, 2020.

- Preserving the ancient water pathway and its protection zone by keeping its path outside the Project site boundaries as much as possible;
- Protection of the nearby communities from potential adverse impacts of the flare and other components of the Project such as propane tank and pipelines;
- In accordance with the strategy of Lenders and the mission of the Project Company, energy needs will be met from renewable energy sources as much as possible, and the carbon emission level will be kept at minimum levels throughout the Project.

Alternatives for the Terminal Facility

Different alternatives were considered for the Terminal Facility which includes jetty development. The technical criteria for the determination of the design basis of the jetty are summarised below:

- Meteorological conditions;
- Geological structure;
- Oceanographic and hydrographic conditions;
- Land allocation;
- Procurement and storage demand of the Project;
- Marine traffic and ship simulation studies;
- Physical conditions of the coastline.

2.4.3 Project Site Alternatives

The Project can be considered as an industrial development project and for such a large-scale project, the selection of the site is crucial. The fact that the project site is suitable for maritime transportation and that it is in a central location in terms of domestic shipments, especially to the Middle East countries, are the prominent factors in choosing a location for the facility. In addition to these factors, the evaluated regions are developing in terms of petrochemical industry, the potential of the facility to cooperate with the sub-industries in the free zone and the exemption of the facilities in the free zone from taxes and fees will also be the gains of the investor.

Two alternative sites have been determined for the Project. These candidate sites are presented in Figure 2-10 and given as:

- Alternative Site 1 – Erzin;
- Alternative Site 2 – Ceyhan.

Alternative Site 1 – Erzin

Alternative site 1 is located in Adana Ceyhan Yumurtalık Free Trade Zone within the borders of Erzin district of Hatay province. The region is developing in terms of petrochemical industry, and the potential of the facility to cooperate with the sub-industries in the free zone and the exemption of the facilities in the free zone from taxes and fees will also be the gains of the investor.

The land use pattern of the vicinity of the alternative site includes agricultural lands and urban development area. The closest settlements are Aşağıburnaz, Yukarıburnaz, Turunçlu, Sarımazı, Kurtpınar to the site boundaries. The distances of these settlements to the site vary between 1 and 5 km, which is close to the settlements. In the environmental plan, the coastal part of the site is determined as a public beach. Although it is not actively used, it is planned to be used in the future. There are archaeological structures found previously in the project area.

Alternative site 1 is proximate to the polypropylene consumers, which are concentrated in the south-eastern region of Turkey and the site is easily accessible by the existing road infrastructure.

There are many water sources nearby for production and maintenance purpose use. Swampy areas due to the height of the groundwater level exists within the site. Since the sea water is shallow on the coastline, the water depth is not sufficient for the jetty. Therefore, if this site is selected, the jetty length will increase.

Burnaz Dune which is a key biodiversity area (KBA) is located within the boundaries of the project site. The area meets the KBA criteria as it is the only known habitat in Turkey of the Iskenderun lizard (Acanthodactylus schreiberi), which lives only in the coastal dunes and slightly inland dunes in Cyprus, Syria, Lebanon, Israel, and Turkey.

Alternative 2 – Ceyhan

Alternative site 2 is located near the Turkish Petroleum Pipeline Company (BOTAŞ) Ceyhan Oil Terminal to the southwest; BOTAŞ Port Authority to the west; Toros Agri Industry (a fertilizer production facility) and Adana Ceyhan Yumurtalık Free Trade Zone (including a cement plant) are located to the east. Isken Sugözü Energy Plant (coal terminal and a coal packaging plant) is also located approximately 9 km to the west of the Project site. There are also planned organized industrial zones (OIZ) in the vicinity of the Project site i.e., Ceyhan OIZ and Erzin OIZ.

The land use pattern to the north and northwest of the Project site includes agricultural lands and urban development area. The closest settlements are Kurtpınarı Neighbourhood to the southwest and northwest and Sarımazı Neighbourhood to the northeast of the Project site

boundaries. Currently there are no plans to exchange materials (e.g., by-products, wastes etc.) with the surrounding facilities.

Since the sea water is not shallow on the coastline, the water depth is sufficient for the jetty. There are no continuous or seasonal freshwater sources such as streams, rivers, lakes, and ponds in the Project area. No key biodiversity area (KBA) is found within the boundaries of the project site. There are archaeological structures found previously in the project area.

Same as the Alternative 1, the Alternative 2 is also located close to the polypropylene consumers, which are concentrated in the south-eastern region of Turkey. Additionally, site is easily accessible by the existing road infrastructure.

Based on the alternatives analysis performed as part of that ESIA, Alternative 2 is selected as a preferred option selected for the location of the plant. The preferred option had the least number of significant constraints.

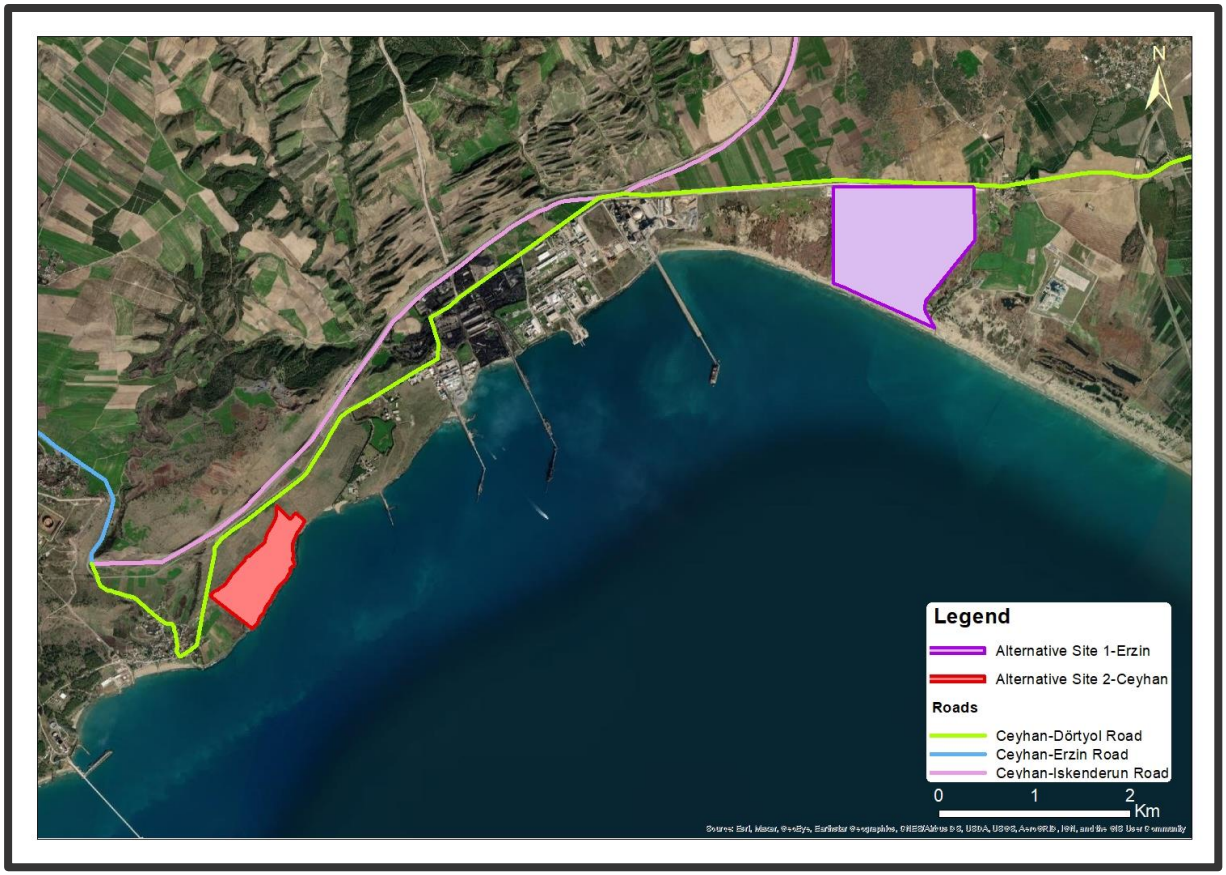


Figure 2-10. Location of Alternative Site 1 and 2

Assessment Methodology

The main objective of the Project Site Alternatives study is to examine the alternative sites with respect to the bio-physical and socio-cultural criteria. In this context, a series of criteria was analyzed for each site, and a comparative matrix outlining the findings was prepared to aid the site selection process.

Environmental components and criteria to be investigated can be listed as follows:

- Water resources;
- Climatic factors and air quality;
- Soil resources and quality;
- General geology and physical ground conditions;
- Minerals and other energy resources;
- Ecological characteristics and biodiversity (habitats as well as important flora and fauna species);
- Coastal waters and coastal features;
- Marine ecology;
- Protected and environmentally sensitive areas;
- Landscape resources;
- Land uses and planned developments and potential changes in land use;
- Land tenure;
- Archaeological, historic and cultural heritage;
- Sensitivity to noise and vibration;
- Population and community identity;
- Local economy and social conditions (demography, employment etc.);
- Infrastructure capacity (particularly sewage and waste disposal and water supply); and
- Public utilities and facilities susceptible to interference.
- The inter-relationships between these factors were also being examined.

Each alternative is evaluated according to these thirteen topics and the significant constraints that can cause negative impacts on the Project are identified. In addition, the impact levels associated with these significant constraints are classified and presented in Table 2-7. In the light of these criteria and within the constraints set by the assessment, Alternative Site 2-Ceyhan is considered to be more suitable for the Project.

Table 2-7. Site Evaluation Table

Criteria	Alternative 1 - Erzin	Alternative 2 - Ceyhan
Ecological Characteristics		
Terrestrial Ecology • Habitat Composition • Biodiversity • Endemic Species	-(1)	+

Criteria	Alternative 1 - Erzin	Alternative 2 - Ceyhan
Aquatic Ecology • Habitat Composition • Biodiversity • Endemic Species	+	+
Marine Ecology • Primary Production • Aquatic Products • Biodiversity • Endemic Species	-(2)	-(2)
Protected Areas • National Parks • Natural Parks • Natural Sites • Wildlife Improvement Area	+	+
Physical Characteristics		
Land Use • General Land Use Patterns • Master Plan Decisions • Potential Changes • Land Ownership	+	+
Coastal Characteristics • Coastal Ecology • Coastal Dunes	-(3)	+
Cultural Heritage • Archaeological Sites • Registered Assets • Landscape	-(5)	-(4)
Water Resources • Wetlands • Surface Water • Groundwater	-(6)	+
Air Quality • Climate • Point Sources	-(7)	+
Meteorology, oceanography and hydrography	+	+
Bathymetry	-(8)	+

No	Remarks
1	Burnaz Dune which is a key biodiversity area (KBA) is located within the boundaries of the project site. The area meets the KBA criteria as it is the only known habitat in Turkey of the Iskenderun lizard (Acanthodactylus schreiberi), which lives only in the coastal dunes and slightly inland dunes in Cyprus, Syria, Lebanon, Israel, and Turkey (Figure 2-11).
2	Iskenderun Gulf have been reported to be important nesting areas for the critically endangered marine turtles “Green turtle (*Chelonia mydas*)” and “Loggerhead turtle (*Caretta caretta*)”.
3	The coastal part of the Project Site, which is approximately 200 m long up to the Iskenderun Bay, consists of sand dunes in a natural beach (Figure 2-12).
4	One branch of the ancient water pathway is considered to be the Kurtpınar Ancient Water Pathway crosses with the site Figure 2-12.

Criteria		Alternative 1 - Erzin	Alternative 2 - Ceyhan
5	Approximately 200 meters west of the area border, there are “Untitled Ruins” registered as a 1st Degree Archaeological Site by Adana Cultural and Natural Heritage Preservation Regional Board. It has been foreseen those archaeological remains will be encountered within the boundaries of the site **Figure 2-12**.		
6	It has been observed that the groundwater level of the Project Site is high, and groundwater surfaced in areas where the ground elevation is low. Observations made in the field show that the groundwater level is at an average depth of 2 m from the ground. The parts at low elevations between the sand dunes are swampy, especially in winter and spring, due to the height of the ground water.		
7	In addition to the industries in the AYSB, where the Project Site is located, the Eastern coast of the Iskenderun Gulf, which covers the Erzin and Iskenderun Districts, mainly includes iron and steel and energy production facilities.		
8	Alternative site is located adjacent to the northeast shore of the Iskenderun Bay, where the bathymetry is very shallow and requires long jetty distances (in general longer than 2 km) in order to reach desired approaching depths for marine tankers (usually deeper than 12 m). Otherwise dredging is required for the jetty operation.		

+ : No significant constraint
- : Significant constraint

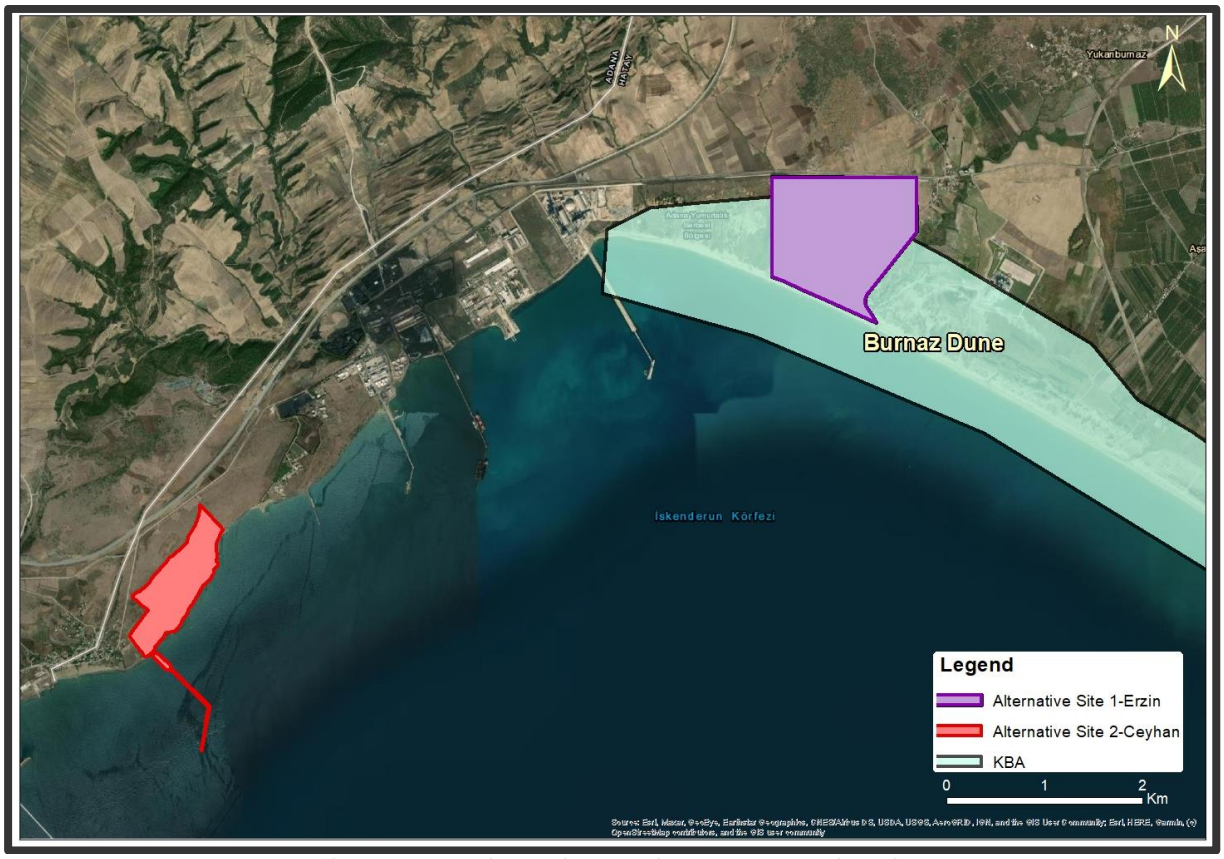


Figure 2-11. Alternatives and Burnaz Dune (KBA)

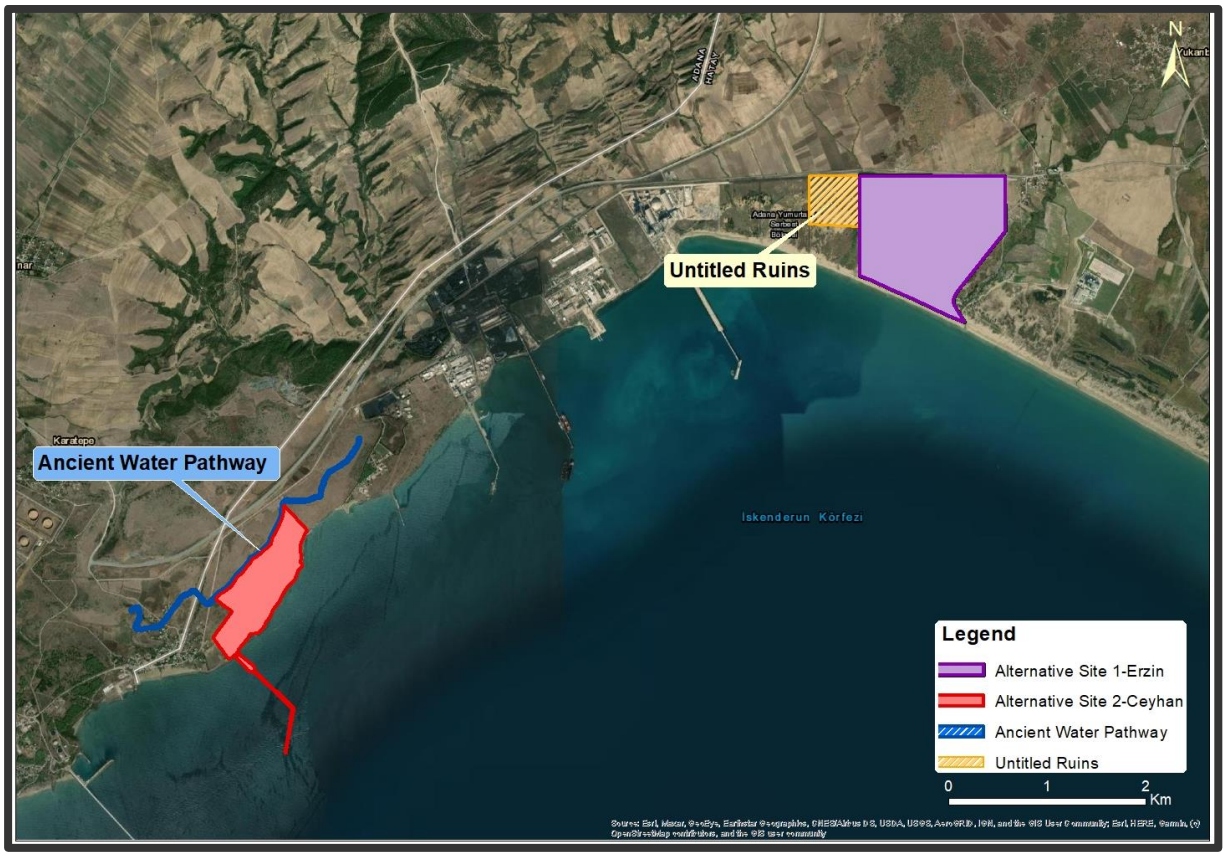


Figure 2-12. Alternatives and Archeological Site.

2.4.4 Temporary Facility Sites and Jetty Location Alternatives within The Project Area

According to the construction planning documents, Mobilization Area and temporary storage areas will be used during construction of the Project.

Mobilization Area

Due to the interdependency of two projects, construction planning of both PDH-PP and Terminal Facility was planned in parallel, and construction works for both of them will be performed simultaneously. The closest location to both PDH-PP and Terminal Facility has been selected within the Project area for the Mobilization Area. Other alternatives were not considered due to logistics reasons and evaluation of alternatives for locations of terminal facility, PDH-PP, and jetty has indirectly provided evaluation of the mobilization area. The Mobilization Area within the Project area is shown in the Figure 2-13. Therefore, alternatives for the Mobilization Area have been considered together with alternatives for the Project site described above.

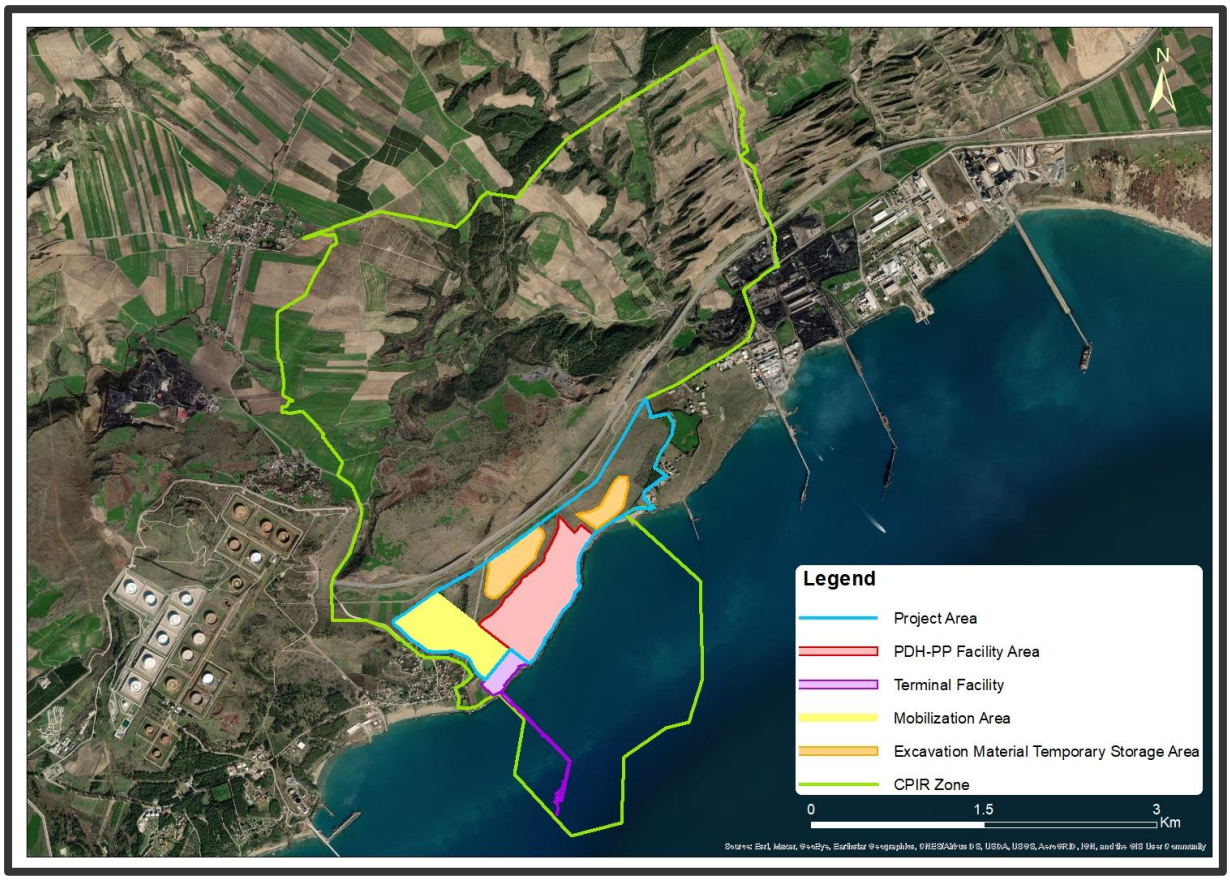


Figure 2-13. Temporary Facilities within the Project Area

Excavation Material Temporary Storage Areas

As a result of the correspondence with the municipality, the suggested locations for the Excavation Material Temporary Storage Areas were selected, and evaluation of alternatives was not carried out. Excavation Material Temporary Storage Areas within the Project area are shown in the Figure 2-13.

Jetty Location (Terminal Facility)

Since the PDH-PP Project and Terminal Facility are to be built together, the alternative analysis for the Project Area and the jetty was carried out together. Oceanography and bathymetry evaluation were also made to determine the jetty location. Considering the risk of maneuvering according to national legal requirements, the location of the jetty has been transferred 250 meters to the west (Figure 2-14). Characteristics of the jetty were not affected by the change of location.

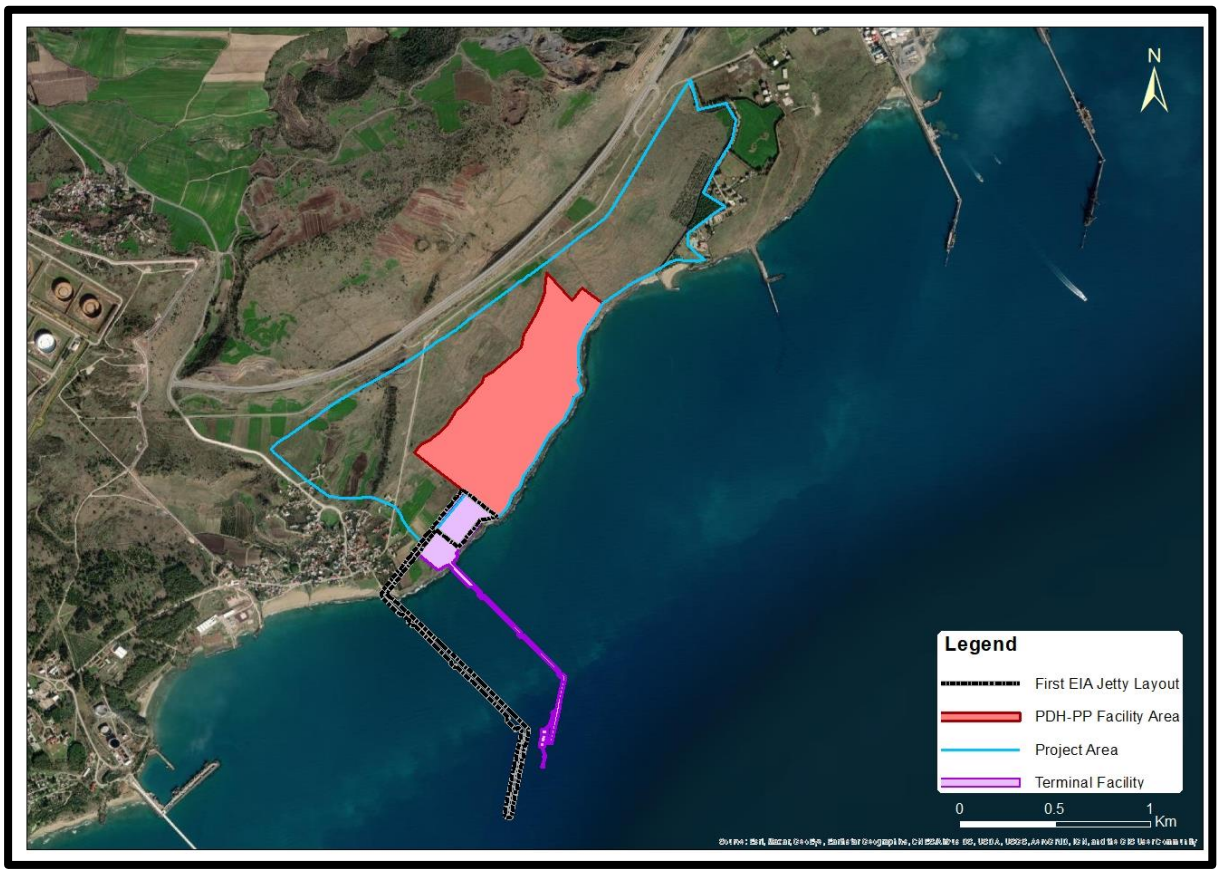


Figure 2-14. Former and Current Jetty Location

2.4.5 Technology Selection

The main aim of the Project is to produce polypropylene by using propane as raw material. The production process will consist of two main stages; namely, PDH and PP. The most commonly used methods to produce polypropylene are the followings:

- **Hydrocarbon slurry or suspension**: Consists of using a liquid inert hydrocarbon diluent in the reactor;
- **Bulk (or bulk slurry):** Uses liquid propylene instead of liquid inert hydrocarbon;
- **Gas phase:** Uses gaseous propylene in contact with solid catalyst;
- **Hybrid:** Combination of the bulk slurry and gas phase.

The process alternatives have been evaluated by the Project Company and the selection was made in terms of technical specifications, implementation approach, trade capacity and financial properties of the alternatives.

- Technical Evaluation: Process requirements such as plot area, equipment data, design features, licensor deliverables, hydrogen purification, heat recovery, latest technology developments were evaluated during the selection of the design. Also, performances of the processes (production capacity, product quality, catalyst consumption, raw material and utility consumption, product transition time, flare load, catalyst integrity) were considered. During the evaluation of the alternatives the criteria stated below were considered:
  - OPEX and CAPEX comparison;
  - TIC comparison for PDH;
  - Improvements in Technologies;
  - Company Background;
  - PDP scope/duration, supervision and training scopes;
  - Product yields;
  - Product range;
  - Product qualities / guarantee values;
  - Flexibility on the quality of propylene, % purity C_3S;
  - Ratio feedstock / Product (propane / propylene), Start of run (SOR)- End of run (EOR);
  - Flexibility of the process with regards to the optimization of air / cooling water;
  - Cooling water options;
  - Unit turndown ratio;
  - Catalyst lifetime and consumption;
  - Utility consumption;
  - On-stream factor;
  - Potential synergies of PDH and PP plant;
  - Intrinsic ability to produce hydrogen;
  - By-products;
  - Unit maintenance (complexity and shutdown frequency);
  - Ability to respond to a propane supply interruption (without daily storage);
  - Ability to operate the C3 splitter, when the rest of the PDH being stopped;
  - Ability to operate the PDH, when the cold section being stopped.

Moreover, environmental performance of the process such as resource efficiency, emissions, waste, wastewater items were assessed as part of process performance.

- Commercial and financial evaluations: During commercial evaluation of the alternatives, licensor services were considered; such as, content of PDH-PP package, remuneration rates for support services, rates for support on commissioning and start-up, training charges, any requirements for purchasing equipment from Licensor and access to future developments/pilot test. Also, payment timing, payment methodology, taxes, guarantee conditions and liabilities were evaluated.

  Financial evaluation of the alternatives was conducted in two categories: capital cost and operating cost of the Project. For the capital cost, license and engineering fee, cost of proprietary equipment, initial fill of catalysts, chemicals, additives, absorbents and other required material were considered. For operating cost, utility, catalyst and chemicals and maintenance costs were evaluated.

The following technology providers have been selected as a result of the assessment of alternatives through evaluation of abovementioned technical, financial and commercial criteria.

- UoP Honeywell PDH C3-Oleflex™ Process Unit;
- Lyondell Spheripol Process Unit.

The UoP Honeywell has been awarded 42 out of 53 dehydrogenation Projects worldwide since 2011. There are a total of 16 commissioned facilities operating with C3 Oleflex Process worldwide.

When the features of this Project are evaluated, the Oleflex features are more suitable than the other technologies in terms of its:

i) continuous operation;
ii) high feedstock utilization;
iii) catalyst change without shutdown; and
iv) ease of operation.

The PDH C3-Oleflex Process is also advantageous in terms of its small environmental footprint due to:

- low energy use;
- low CO2, NOx, SOx, Volatile Organic Carbon (VOC) emissions and water usage; and
- fully recyclable platinum-based catalyst and non-toxic catalyst system helping to minimise its impact on the environment[3].

[3]https://www.honeywellprocess.com/en-US/online_campaigns/CyberSecuritySummit/Pages/Doc/8.%208013B_Oleflex_Kuwait_Summit_Saber_09_16.pdf

Additionally, platinum in the catalyst can be recovered and reused which avoid impacts and costs associated with its disposal. The independent reactor and regeneration design of the Oleflex technology helps maximise operating flexibility and onstream reliability.

The other well-known technology is the Lyondell Basell Spheripol Process technology more than 20 million tonnes of Spheripol process capacity licensed worldwide[4]. The technology is advantageous given that i) no undesired by-products is resulting from the reaction and ii) leading resource consumption, monomer efficiency and emissions.

2.5 City Planning Surrounding of the Project Site

There are zoning plans with different scales that cover the Project site as described in detail in *Chapter 5: Land Use and Zoning*. The Project site is an integral part of CPIR area; therefore the area is shown as *Industrial Area* in the zoning plans. Within the "Investigation and Explanation Report" of the Adana Ceyhan Energy Specialized Industrial Zone 1/5,000 scaled zoning plan and 1/1,000 implementation zoning plan, the Project site is shown as *Industrial and Storage Area*[5]. The Project site has an inclined topography; the elevation difference ranges from sea level to 85 m. The shoreline of the Project site extends along the rocky coast for approximately 1.5 km. The Project site was devoid of any previous industrial development. Towards the north of the Project site there are forestation and forest areas at approximately 1.5 km distance. The closest settlements are Kurtpınarı Neighbourhood to the northwest at approximately 3.5 km distance (1,900 inhabitants) composing of İncirli (to the southwest of the Project site at approximately 400[6] m) and Karatepe (to the northwest of the Project site at approximately 2.2 km); Kurtkulağı Neighborhood to the northwest at approximately 6.5 km (1,300 inhabitants) and Sarımazı Neighbourhood to the northeast at approximately 6.5 km (5,500 inhabitants) distance to the Project site boundaries.

When location of the Project Site was determined first, there was an ancient water pathway protection zone within the Project premises crossing the Project site from northeast to southwest. However, in order to minimize the direct impact of the Project, the layout of the Project was changed and this water channel was excluded from the Project site. Detailed information related to the ancient water pathway is provided in Chapter 13: Cultural Heritage.

There is a planned railway crossing through the Ceyhan Energy Specialized Industrial Zone (from east of the Industrial Zone site and continuing to the north end) and also crossing from the north of the Project site, providing connection to Industrial Facilities - Yumurtalık Free Zone Industrial center and terminals in the Çukurova Region and İskenderun Bay which will be

[4] https://www.lyondellbasell.com/globalassets/products-technology/technology/spheripol-brochure.pdf
[5] http://www.adana.gov.tr/yikob/ceyhan-enerji-ihtisas-eb-imar-plani-onayinin-duyurusu
[6] The distance is estimated by considering length between the PDH-PP Plant boundary and nearest settlement close to CPIR boundary. At present, there are houses, which were acquired by Ministry of Industry and Technology during land acquisition phase performed previously, in the mobilization area and health protection zone of the CPIR. These houses are still in use by residents of the İncirli Quarter. These houses and residents are covered by the ESIA Process.

developed under the responsibility of Directorate of Infrastructure Investments, Ministry of Transport and Infrastructure.

The Project site is located in the vicinity of the major industrial settings; its neighbours BOTAŞ Ceyhan Marine Oil Terminal which is the terminus for Baku-Tbilisi-Ceyhan Crude Oil Pipeline (BTC) Project to the southwest and Toros Agri-Industry to the northeast. To the southwest of the BOTAŞ Ceyhan Marine Oil Terminal, a coal fired thermal power plant (İsken Sugözü Thermal Power Plant) is located which is approximately 9 km to the southwest of the Project site. Moreover, Yumurtalık Free Trade Zone is located to the northeast of Toros Agri-Industry located at approximately 3.5 km to the Project site.

The Yumurtalık Free Trade Zone is operated by Toros Adana Yumurtalık Free Zone Founder and Operator Co. (TAYSEB), a Tekfen Group company, with "Build, Operate, Transfer[7]" model for 30 years. It provides port services by the neighbouring Torosport Ceyhan Terminal. The Port is owned by Toros Agri Industry and Trade Co., Inc., a Tekfen Group company, and it is one of the Turkey's largest bulk and general cargo ports. The Free Trade Zone mainly includes manufacturing plants including chemicals, petrochemicals, iron and steel, food and animal feed, shipyards and cement factories (Sönmez Cement Facility, coal processing facilities i.e. Super Enerji, Bamak Kömür, İnterkarbon İthal Kömür).

Zoning plan process for the marine section (CPIR Port including the Jetty) has been finalized and the plan is provided in the *Chapter 5: Land Use and Zoning*.

2.6 Construction Stage

2.6.1 Overview

Planning of the construction works of the Project is finalized in June 2022, and early works regarding site preparation, geotechnical studies and excavation works has been started in August 2022. As it is given in the Chapter 1, PDH-PP Facility and Terminal Facility (The Project and associated facility) is divided in two separate investment projects constructed by two separate investors (two SPVs). On the other hand, due to the dependency of two projects, the Project Company and SPV of the Terminal Facility agreed to construct both projects with same Engineering Procurement and Construction (EPC) Contractor. Due to these reasons, construction planning of both projects was planned in parallel, and construction works of the Project and associated facility will be performed simultaneously. According to the construction planning of EPC Contractor, same Mobilization area including with all units and temporary storage areas will be used for construction of the Project associated facility. By considering

[7] Build-Operate-and-Transfer model is a contractual arrangement whereby the Private Party undertakes to finance, design, construct under a turnkey risk basis, operate and maintain an Infrastructure project for a specified period after which period the project facilities are transferred to the Granting Authority usually without payment of any compensation. The Private Party has the right to collect contract or market based tariffs or fees from the users of the infrastructure project to recover its investment and operating and maintenance expenses for the project.

this construction planning and associated project condition of the Terminal Facility, construction impacts of both projects are collectively assessed in the ESIA Process.

This ESIA study is based on the construction schedule, both the Project and for the Terminal Facility, provided by the EPC Contractor and further illustrated in Table 2-8. The Phase-1 Early Site Works period of the Project will last 6 months. The Main EPC Works period of the Project will last for 38 months (including engineering, procurement and commissioning activities); whereas the Project Company will be responsible for the operation of the Project for 49 years. The following key activities are planned as part of the Project:

Table 2-8. Tentative Project schedule

Phase	Works	Duration
Early Works	1. Detail Engineering (Process, and Procurement Engineering)	May 2021 - October 2022
	2. Site Preparation works	July 2022 - October 2022
Main EPC Works	1. Detail Engineering (Process, HSE, Civil, Structure, Architecture, Mechanical, Piping, Electrical, Instrument Engineering)	March 2023 - October 2024
	2. Procurement (Mechanical, Piping, Electrical, Instrument, Structural Steel, Fire-fighting, HVAC)	April 2023 - February 2025
	4. Construction and Pre-commissioning Works	March 2023 - December 2025
	5. Terminal Facility	March 2023 - April 2026
	6. Commissioning of Terminal Facility	February 2026 - April 2026
Operation	Operation	Following 49 years

The construction work is proposed to be 24 hours per day in shifts and 7 days a week. Construction activities will usually be conducted at daytime, however, when it is necessary, the activities will be conducted also at night-time during construction phase of the Project. The construction site facilities (including offices, dormitory, canteen, activity hall, warehouse, utility center, education hall etc.) will be located outside the Project Area to the northeast to be used temporarily during construction phase of the Project. The mobilization area will be designed to host 4,500 workers and will have a total footprint of 193,319 m^2. The types of construction site facilities are given in Table 2-9 and the layout of construction site facilities is illustrated in Figure 2-15.

Table 2-9. Types of mobilization buildings

Building Type	Area (m^2)	Remarks
Heating center	600	-
Generator area	100	-
Dormitories	790 (each)	A total of 12 buildings (3 storey) each having a capacity of 390 beds
Prayer room	450	1 storey
Fire department	230	-
Social area	-	Also used as emergency assembly area
Doctor’s office	230	-
Training center	-	2 storey

Building Type	Area (m^2)	Remarks
Camp Chief's Office	-	-
Canteen	152	1 storey
Cafeteria	-	2 buildings each having a capacity of 750 seats
Kitchen	-	
Office buildings	-	Designated for EPC-C personnel (100 persons) and subcontractors (125 persons)

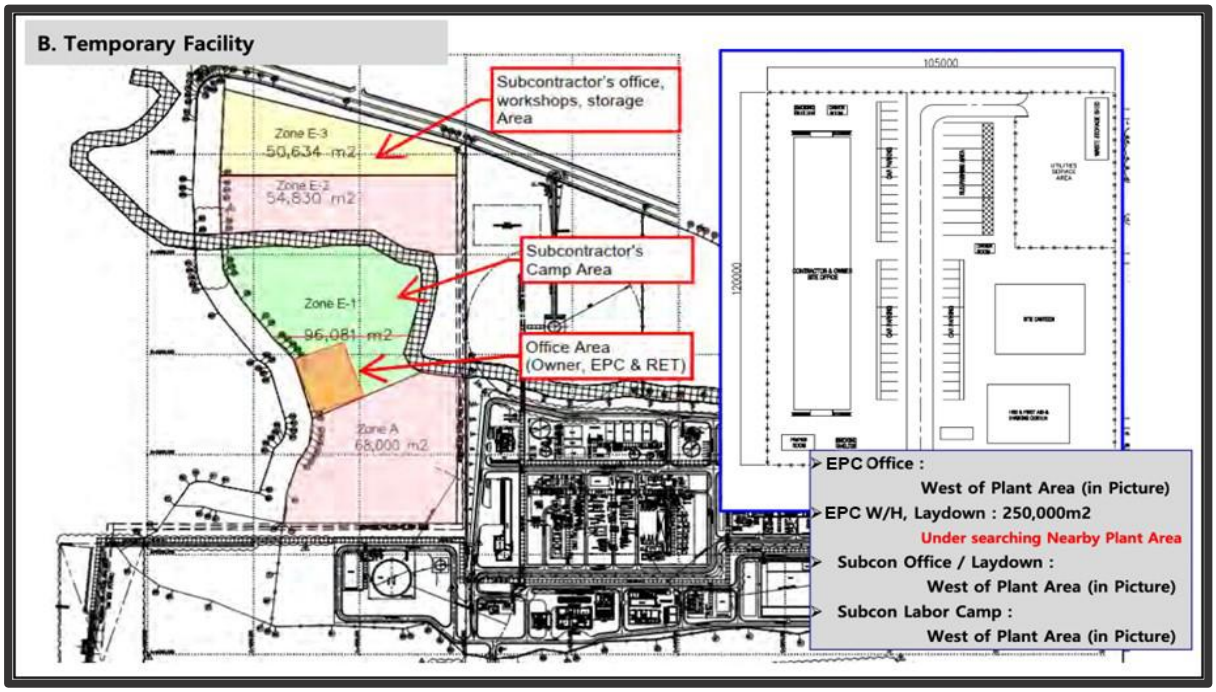


Figure 2-15. Layout of construction site facilities

All construction site facilities shall be constructed in accordance with the specifications and regulations of the Turkish and IFI Environmental, Health and Safety (EHS) standards. The Project Company shall ensure that accommodation of workers and provision of basic services to workers are managed in line with the guidance note on worker's accommodation published by International Finance Corporation (IFC) and European Bank for Reconstruction and Development (EBRD) (Worker's Accommodation: Processes and Standards). The construction area will be enclosed with fences. There will be entrance and exit gates with security guard to control vehicles getting into the construction site. Maximum driving speed in the construction site will be set as 10 km/h.

2.6.2 Construction Management

As it is explained above Project and associated facility will be constructed simultaneously by same EPC Contractor. Two SPVs which are the investor of the Project and associated facility will form an Environmental and Social Management Committee to maintain a mechanism for reporting and decision making during the realization of the Project and associated facility. This committee will be formed by:

- **EHSS Manager (SPV):** Responsible for managing infrastructure and superstructure projects regarding environmental, health and safety governance issues and member of the E&S Committee on behalf of the Employer;
- **Human Resources/Labor Manager (SPV):** Responsible for managing all matters relating to human resources management for the Employer. Responsible for employee relations, communication with employer and EPC Contractor workforce representatives / committees and co-ordination of the workforce grievance mechanism together with the Human Resources Lead;
- **CLO (SPV):** Responsible for reporting and supervising EPC Contractor's CLO on social activities, stakeholder engagement and grievance management and consultation on land acquisition, providing affected communities with information on the timing of key activities, and identifying and responding to grievances;
- **Project Director (EPC):** Responsible for overseeing the construction of the Project, including planning and delivery. They will be suitably competent and have a strong understanding of construction best practice. The Project Director is accountable for overall HSE performance and making the human and financial resources available to ensure compliance with HSE requirements of the Contract. The Project Director will be responsible for coordinating the internal management response of the EPC Contractor to a major emergency. The Project Director will also be responsible for appointing First Aid competent person(s) on site, as well as a team responsible for site security;
- **HS Manager (EPC):** responsible for the implementation of health and safety practices during construction. Project HS Manager will be suitably competent and have a strong understanding of health and safety best practice including the Project HSS Requirements. HS Manager will have the authority to suspend works when necessary, and allocate all resources, personnel and equipment required to take any corrective actions;
- **Human Resources/Labor Manager (EPC**): Responsible for managing all matters relating to human resources management for the EPC Contractor. Responsible for employee relations, communication with workforce representatives / committees and co-ordination of the workforce grievance mechanism together with the Human Resources Lead;
- **CLO (EPC):** Responsible for reporting and supervising social activities on site, stakeholder engagement and grievance management and consultation on land acquisition, providing affected communities with information on the timing of key activities, and identifying and responding to grievances;
- **Environmental Manager (EPC):** responsible for the implementation of environmental practices during construction. Project Environmental Manager will be suitably competent and have a strong understanding of environmental best practice including the Project environmental requirements;

- **Biologist/Ecologist (EPC):** will provide biodiversity support in advance of, and throughout construction, including pre-construction surveys. This role will focus on ensuring required ecological mitigation is appropriately undertaken and measures are maintained throughout construction, in accordance with the ESMP and BAP. The specialist will be suitably competent and have ecological knowledge. The position may be outsourced;
- **Archaeologist (EPC):** Responsible for overseeing all matters related to archaeology during construction, including implementing the chance finds procedure. The position may be outsourced;
- **EHSS Manager (Terminal SPV):** Responsible for managing infrastructure and superstructure projects regarding environmental and social governance issues and member of the E&S Committee on behalf of the Employer;
- **Human Resources/Labor Manager (Terminal SPV):** Responsible for managing all matters relating to human resources management for the Employer. Responsible for employee relations, communication with employer and EPC Contractor workforce representatives / committees and co-ordination of the workforce grievance mechanism together with the Human Resources Lead;
- **CLO (Terminal SPV):** Responsible for reporting and supervising EPC Contractor's CLO on social activities, stakeholder engagement and grievance management and consultation on land acquisition, providing affected communities with information on the timing of key activities, and identifying and responding to grievances;
- **EHS Manager (PMC):** Responsible for control of EPC Contractor's EHS responsibilities and commitments during construction and member of the E&S Committee on behalf of the Employer.

During the construction works most of the works required for the construction of the project are delegated to the EPC Contractor. Project Company mainly responsible for the facilitation of the Environmental Social Management System which will be developed in line with the ESIA Requirements as well as Lenders standards and guidelines. Project Company will also employ a Project Management Company (PMC) in order to control EPC's Environmental, Health and Safety performance in accordance to the ESIA, ESMP and other relevant plans and procedures defined within the ESMS. CPIR Management as also important role to supply sources such as water, natural gas, power in addition to the infrastructures and superstructures (i.e. roads, etc.). Overall organization chart developed for the management of the project provided in Figure 2-16 below

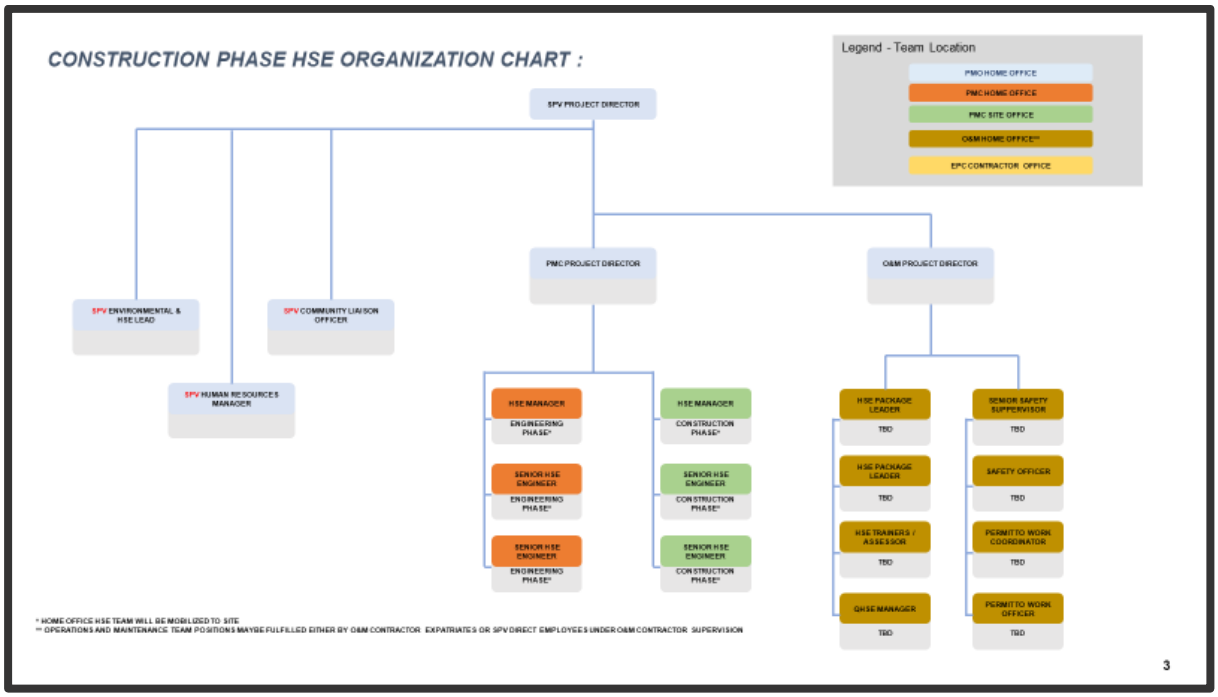


Figure 2-16. Overall Organization Chart regarding Project Management.

Responsibilities of the EPC Contractor given below, and details of the Environmental and Social Management System is provided in Chapter 17.

EPC Contractor: During the construction activities, all Environmental and Social requirements to which the project is subject will be planned and implemented in all works/services to be performed by the EPC Contractor's project team, subcontractors and major suppliers within the supply chain. The followings are the EPC Contractor commitments to be fulfilled and continuously improved:

- Comply with ESAP provisions;
- Take overall responsibility for construction execution of the Project with respect to applicable national and international standards;
- Ensure the allocation of sufficient resources (personnel, materials and equipment) are consistent with achieving the objectives and requirements for the implementation of their commitments within the ESMP;
- Assign clear responsibilities and expectations with respect to implementing the EPC Contractor's responsibilities and commitments within the ESMP;
- Employ Community Relations/Liaison Officer to manage, review and monitor a social program to meet Project requirements, including commitment within the ESMP;
- Employ Environmental Manager to manage, review and monitor the environmental program to meet Project requirements, including commitment within the ESMP;

- Employ Health and Safety Manager to manage, review and monitor the occupational health and safety program to meet Project requirements, including commitment within the ESMP;
- Employ Human Resources/Labor Manager to manage, review and monitor the human resources programs to meet Project requirements, including commitment within the ESMP;
- Prepare site specific implementation plans that meet the requirements of and support the implementation of this ESMP;
- Promote and implement the ESMP by incorporating the appropriate provisions into Project policies, plans and procedures;
- Identify environmental and social risks as part of its planning processes and through implementation of appropriate mitigation measures and communicating these to its workforce;
- Establish self-verification of its own compliance by maintaining a system to manage environment and social aspects and impacts in line with ESIA requirements;
- Perform environmental and social monitoring activities prescribed within the national EIA Study and ESIA;
- Establish an HSE programme of internal reporting that includes incident reporting and investigation, system to record observations, non-conformance and actions that includes ESMP performance indicators;
- Provide training to Project and subcontractor staff in their responsibilities with respect to compliance with the HSE programme;
- Report environmental and social performance to Employer in line with agreed KPIs on periodical basis in a commonly agreed format including E&S obligations breaches and material incidents, report incidents for the whole Project;
- Ensure stakeholder engagement and grievances related to construction activities are managed in line with the agreed Project SEP, it should be also noted that Contractor has also a role in the grievance mechanism such as recording, following up of the grievances at the site via its community liaison officers and informing Employer. Some of the grievances need to be resolved at the site by EPC Contractor and some may need involvement of Employer;
- Develop awareness campaign on the Project SEP and Grievance Mechanism and address accordingly any grievances received that are related to construction activities; and
- Participate in ESMP Implementation Group.

2.6.3 General Construction Methodology

The construction works to be carried out within the scope of the project basically consist of four stages as stated below:

- Field preparation works;
- Civil works;
- Steel structures;
- Mechanical installation, piping, electrical installation, and instrumentation.

Although these studies will be carried out sequentially, considering the size of the project and the differences in the process units, the stages other than the site preparation phase may overlap each other. For example, while the steel fabrication of a building whose reinforced concrete works are completed, the reinforced concrete works of another unit can be sustained. This situation reveals that the risks foreseen within each study affect another study area. Therefore, EHS Management practices in the field are of great importance. The ESMS to be established and the EHS Management to be created accordingly will be designed, implemented, and monitored with the utmost care to address all these risks.

Site preparation works include the construction of the mobilization area and facilities such as the camp site, workshops and offices in this area, as well as the construction of structures such as the retaining wall required for excavation and ground safety. A summary of the work to be done within the scope of site preparation is presented in Figure 2-17. Site preparation works are handled together as they will be carried out jointly for the project and related facilities and will be done by the same EPC Contractor.

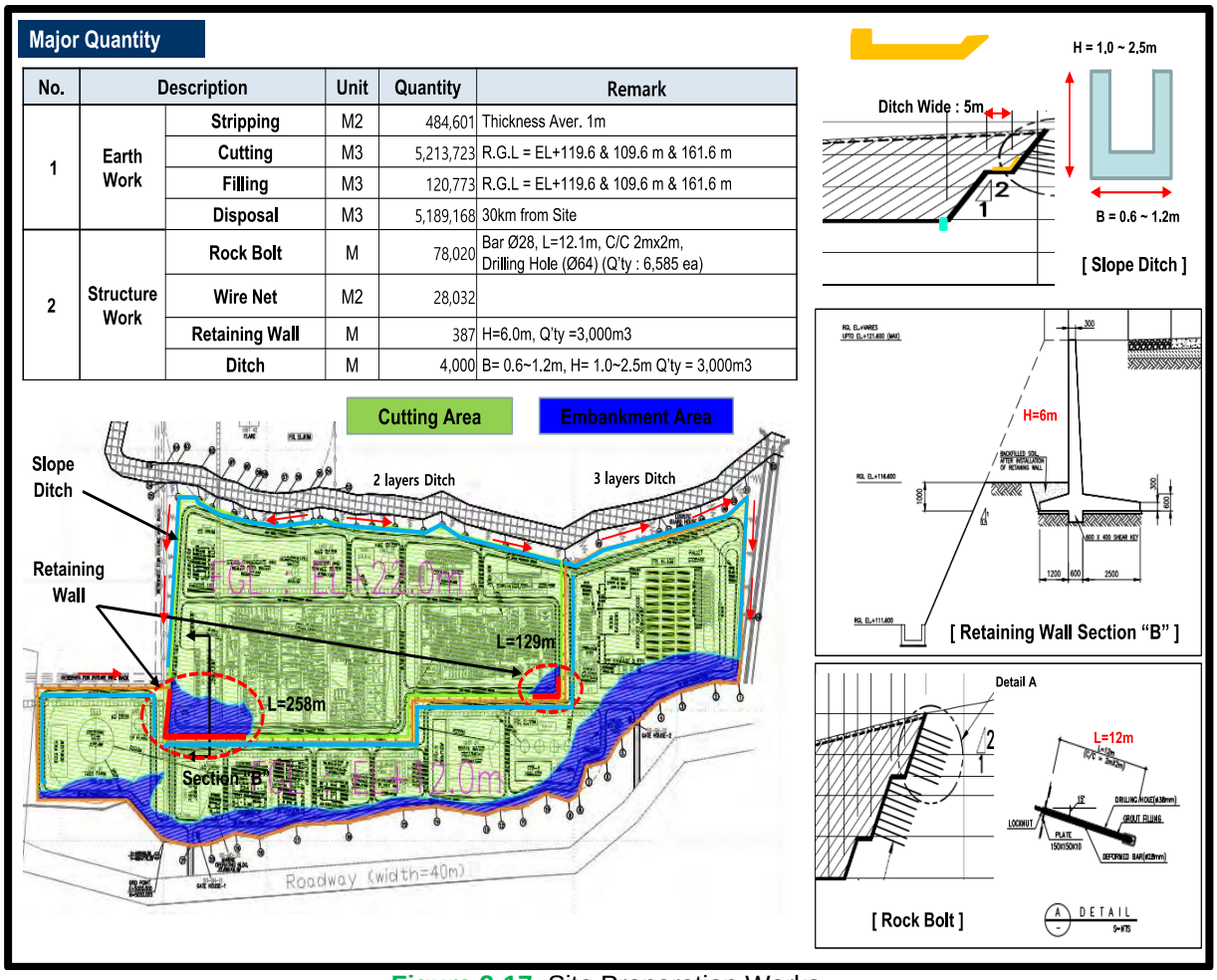


Figure 2-17. Site Preparation Works

Field Preparation Works

Topsoil stripping and excavation works can be considered as the main stage of the site preparation works. Blasting has been proposed as the method of excavation works and a detailed study have been carried out for the blasting by experts from İstanbul University Department of Mine Engineering in 2021. Within the scope of the detailed study, sensitive receptors such as settlements and ancient waterway were taken into consideration. Potential impacts regarding vibration, airblast and flyrock onto sensitive receptors has been assessed and blasting design is chosen to avoid or minimize these impacts. Proposed blasting design secure vibration less than 25 mm/s at the ancient waterway, which is the closest sensitive receptor. Since this value fades very quickly considering the ground condition in the Project site, it has been calculated that it will remain below the value of 5 mm/s, which a person can only feel in the nearest residential building. Blasting design also considers lower airblast value than benchmark value of 133 (6 Hz) defined in US Federal Regulation on Use of Explosives. Furthermore, controlled blasting is suggested to minimize the risk of flyrock and its impact distance.

According to the blast design, the field is divided into three blast intensity/depth zones. A relatively shallow depth (35 m) will be applied in the mid-level blast zone. At the general and large-scale blasting zones, the depth range will increase as more intense detonators will be used. The blast zoning of the site for the blast design is given in Figure 2-18.

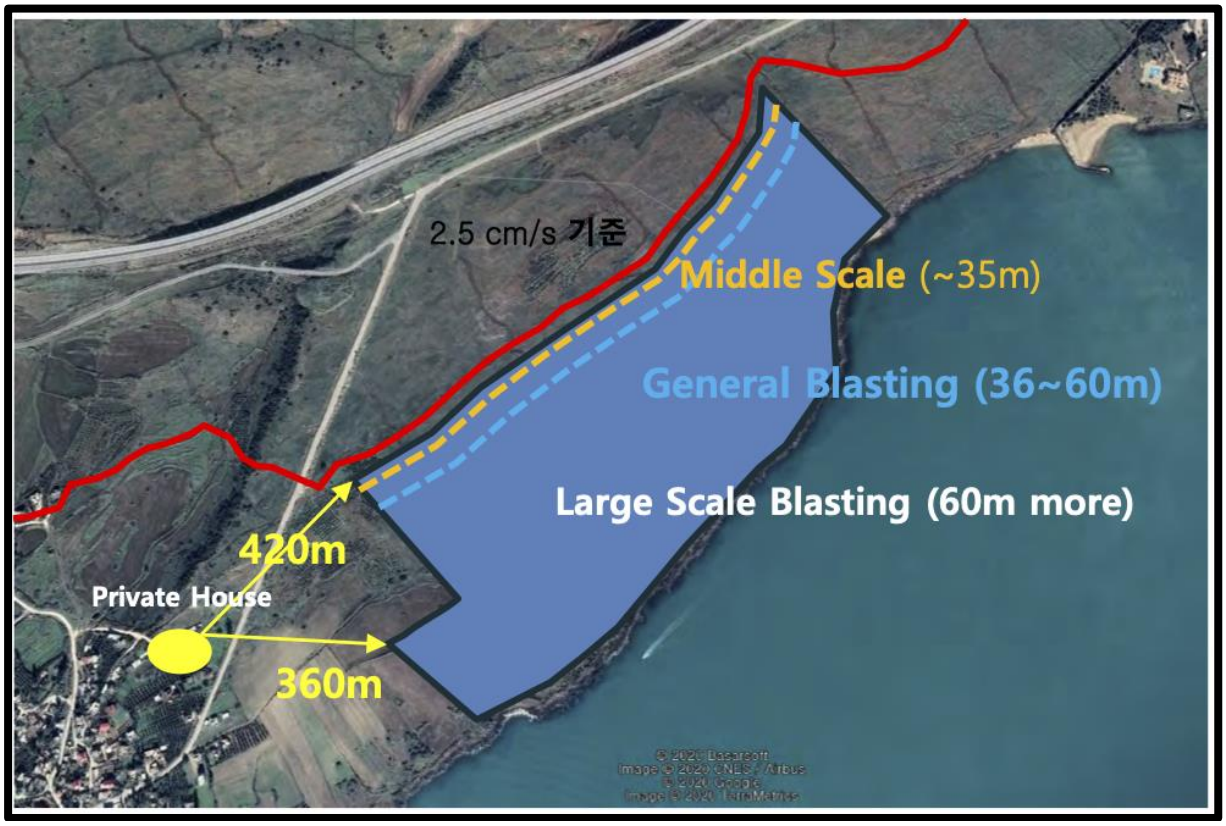


Figure 2-18. Blasting Zones

At the end of the excavation works, a two-stage floor structure will be created for the placement of the project units on the site (see Figure 2-19). Topsoil and excavation wastes that will be generated during the site preparation will be temporarily stored on the site, and some of them will be used for site arrangement and filling works.

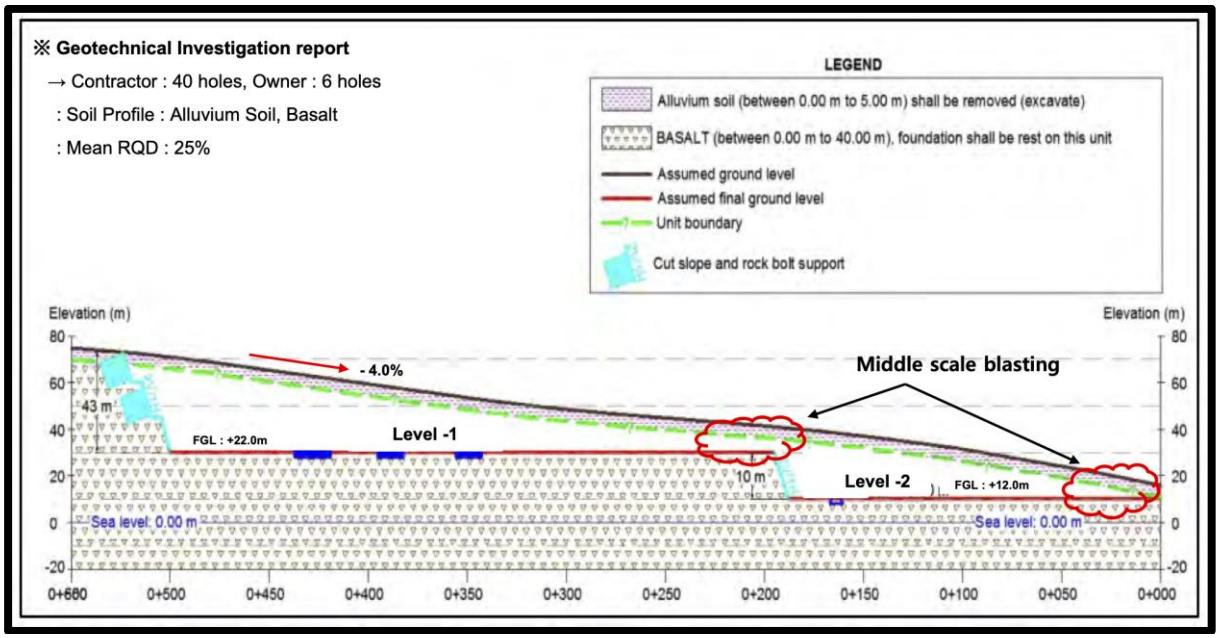


Figure 2-19. Cross-sectional View of the Project Site after Excavation Works

Civil Works

Civil works include the construction of scaffolding jetty and jetty connection structures, as well as the construction of necessary structures for process units and auxiliary units. At the same time, excavation of the foundation rock will be carried out at this stage. Concrete required for the construction of reinforced concrete structures will be supplied from ready-mixed concrete producers located near the project site. No concrete production facility will be established within the scope of the project. Construction works covers:

- Construction of roads for the temporary site (See Figure 2-20);
- Rock Excavation (See Figure 2-21);
- Providing concrete (See Figure 2-22);
- Construction of the CW UG Pipeline connecting the Cooling Tower and Process units (See Figure 2-23);
- Construction of main reinforced concrete structures (See Figure 2-24 and Figure 2-25); and
- Piling for construction of the jetty.

In addition, preliminary design and construction method studies were carried out for special structures such as high-rise buildings, special passages and cooling towers. Examples of these studies are presented in Figure 2-26 and Figure 2-27.

Jetty Construction

Steel piles will be used for the construction of the jetty. Piling and upper-dec construction will be performed with marine barges. Steel Piles and other constructed modules at onshore will be loaded to the barges and will be used jetty construction. Illustrations regarding jetty construction are provided in Figure 2-28 and Figure 2-29.

The authority to make official announcements regarding the works to be carried out in the field is the responsibility of the General Directorate of Coastal Safety. In this context, the General Directorate of Coastal Safety will be informed about the works to be carried out at sea and the General Directorate will announce the construction area in the NAVTEX system. At the same time, the Project Company CLO will inform local fishermen about the construction works. The area around the study area will be determined with the help of buoys, and safe passage of boats and ships using the sea route near the coast will be ensured. Barges to be used for construction will also be illuminated and necessary precautions will be taken for night traffic. The barges will be berthed to safe harbors on the coast, especially in bad weather conditions. Piles will also be illuminated, especially at the ends, until the construction of the jetty is completed.

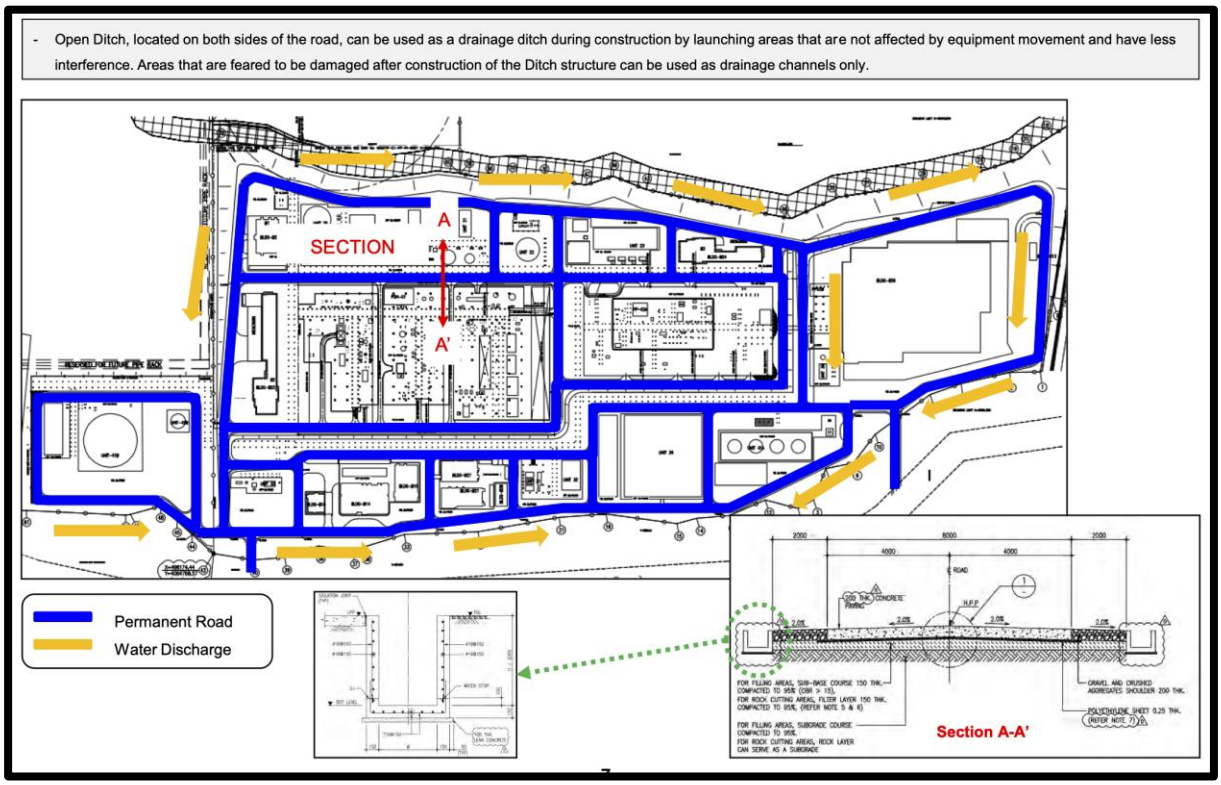


Figure 2-20. Temporary Roads

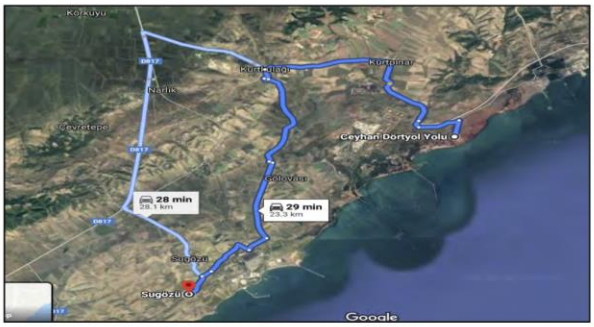
- RQD 25 percent of the ground is soft rock, excavated with the Excavator (With Breaker), and loaded to loader.
- It is necessary to prepare spare equipment and driver at all times to prevent air delays during the break-up operation after mobilizing the equipment./replacement of parts, etc. after mobilizing equipment.

Project Month			ED + 10M	ED + 11M	ED + 12M	ED + 13M	ED + 14M	ED + 15M	ED + 16M
Quantity (M3)			19,855	27,796	39,709	43,680	39,709	17,869	9,927
Description	**Capacity**	**Productivity**	**Equipment Mob.**						
Excavator (With Breaker)	1.0 M3	100 M3/Day	8	11	16	17	16	7	4
Wheel Loader	3.3 M3	591 M3/Day	2	2	3	3	3	2	1
Dump Truck	20 M3	72 M3/Day	11	15	22	24	22	10	6



Figure 2-21. Rock Excavation

- There are three existing BPs located in an area about 15 to 30 kilometers away from the site, and BP will be established in early 2021 at an additional 5 kilometers away. Each batch capacity is between 100 and 120 M3/Hr and can be supplied up to 14,300 M3 per month based on production of 550 M3/Day (50% work efficiency).





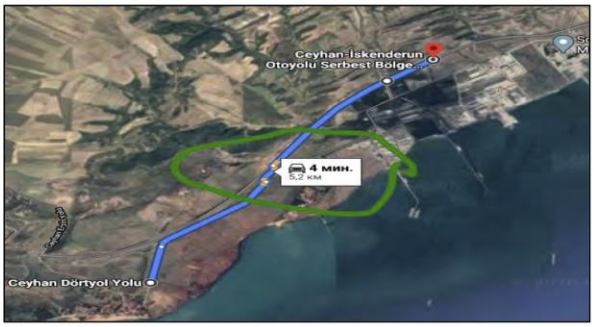


Figure 2-22. Potential Ready-mix Concrete Producers close to the Project Site

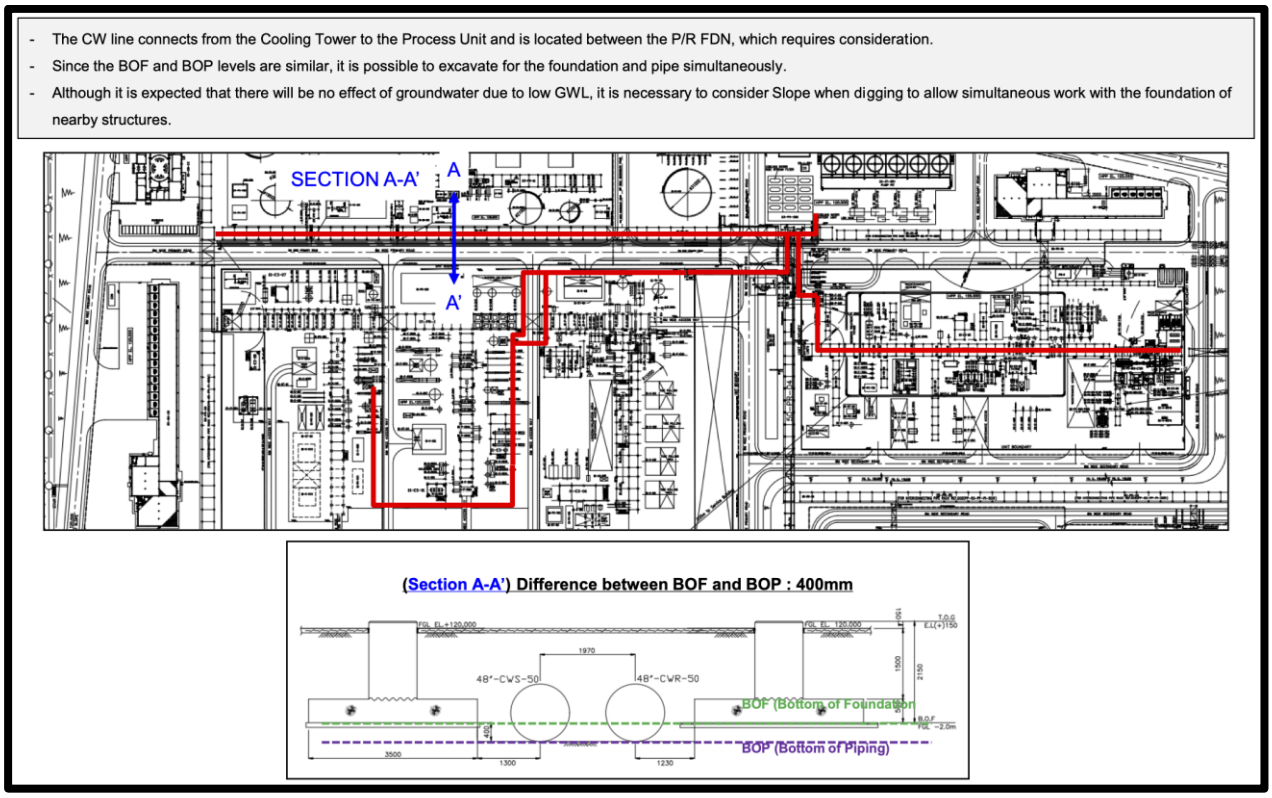
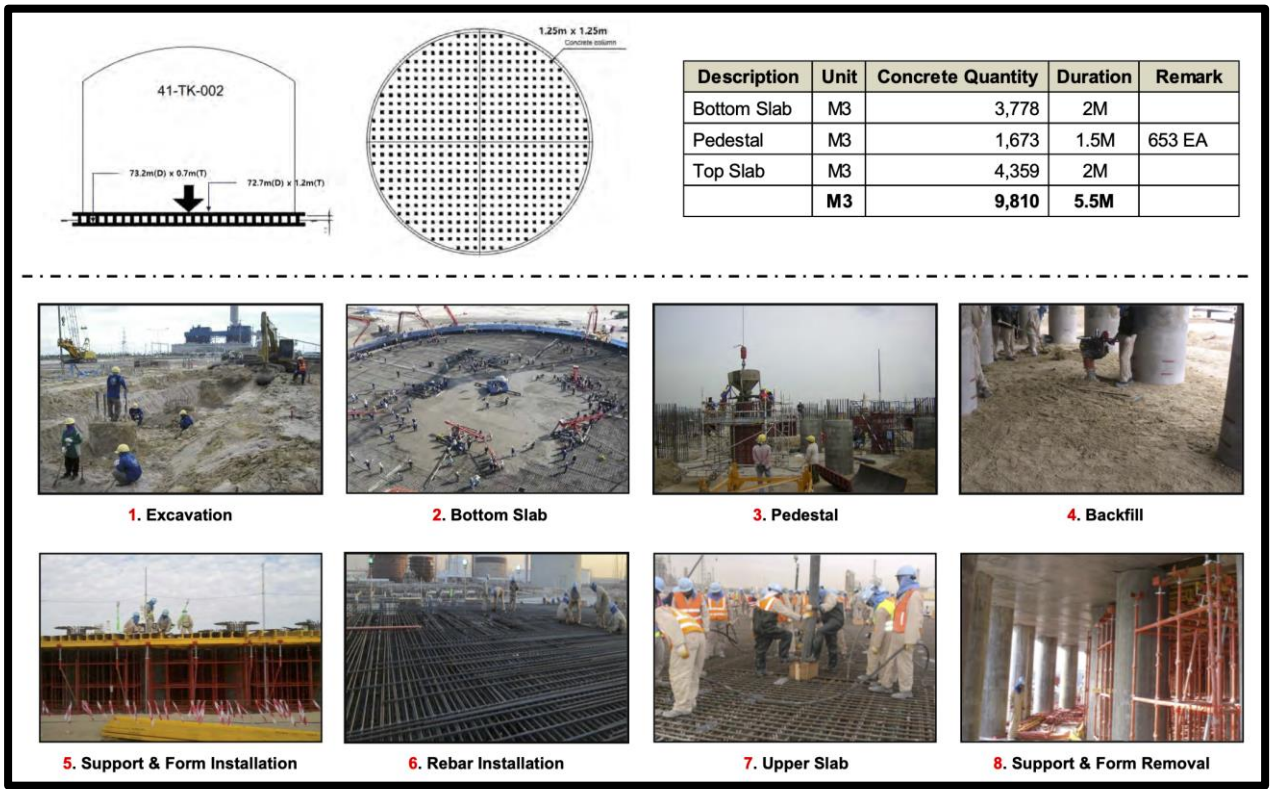


Figure 2-23. Construction of Cooling-Water (CW) Under Ground (UG) Pipeline



Description	Unit	Concrete Quantity	Duration	Remark
Bottom Slab	M3	3,778	2M	
Pedestal	M3	1,673	1.5M	653 EA
Top Slab	M3	4,359	2M	
	M3	**9,810**	**5.5M**	

Figure 2-24. Construction of Tank Foundation

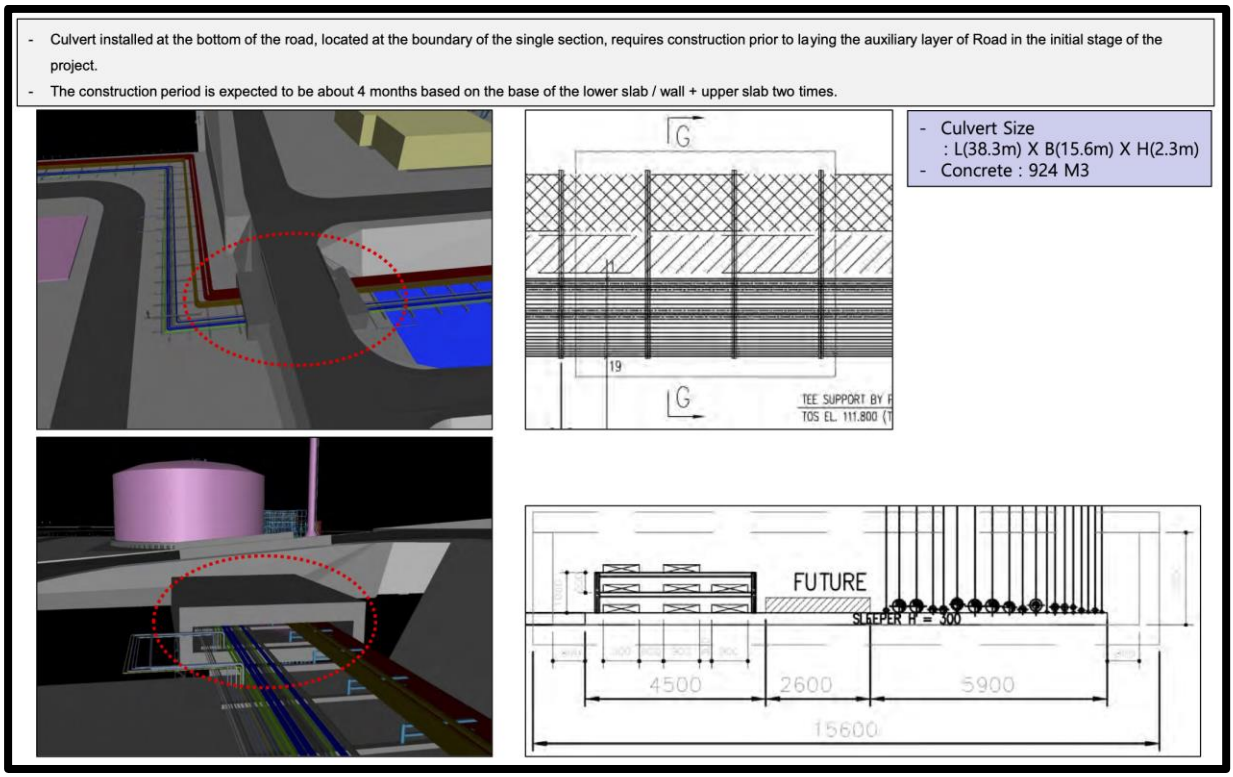
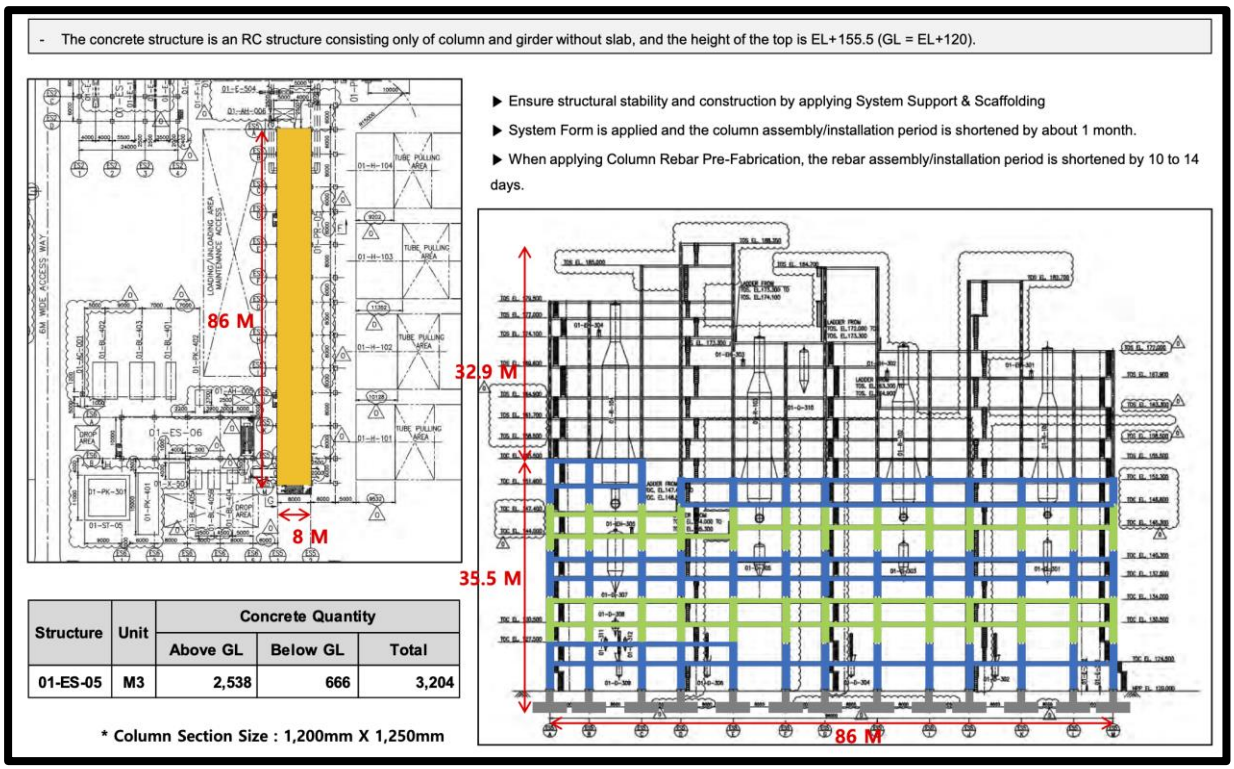


Figure 2-25. Culvert Design and Construction



Structure	Unit	Concrete Quantity		
		Above GL	Below GL	Total
01-ES-05	M3	2,538	666	3,204

Figure 2-26. Construction of Elevated Structure-1

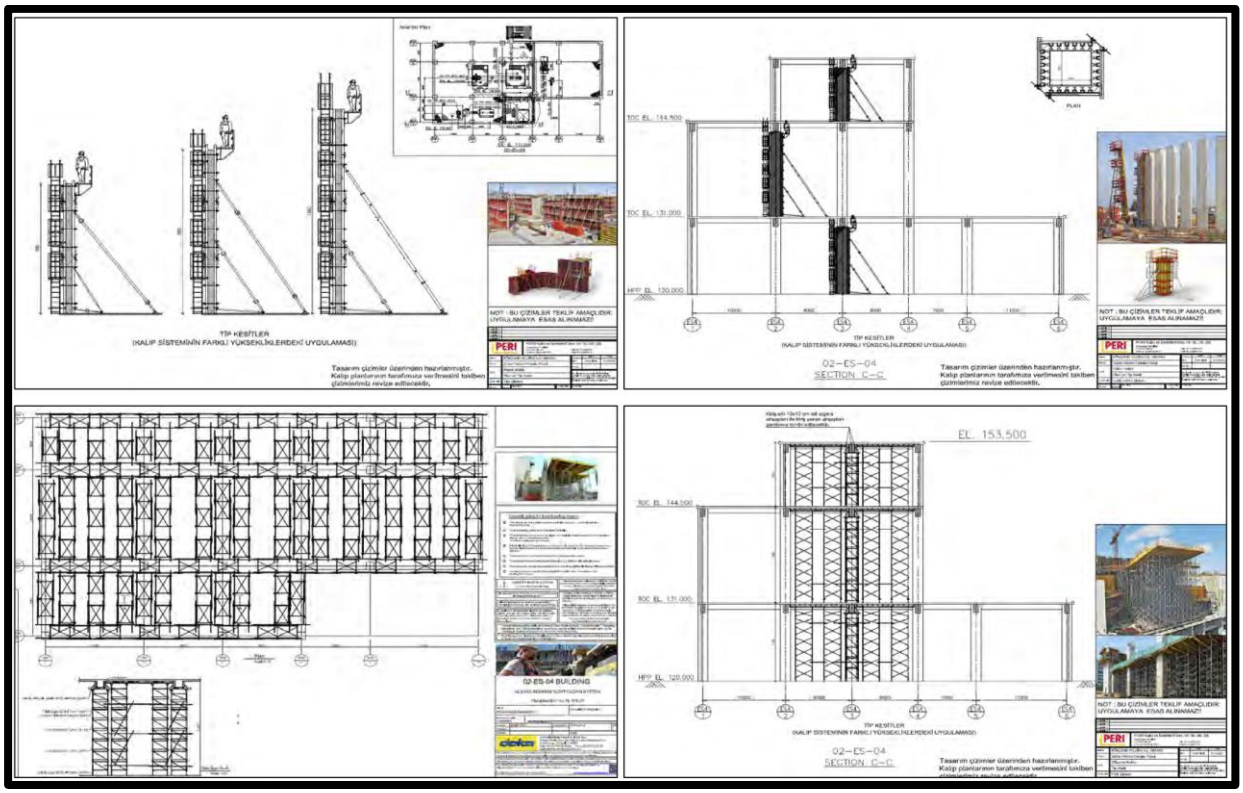


Figure 2-27. Construction of Elevated Structure-2

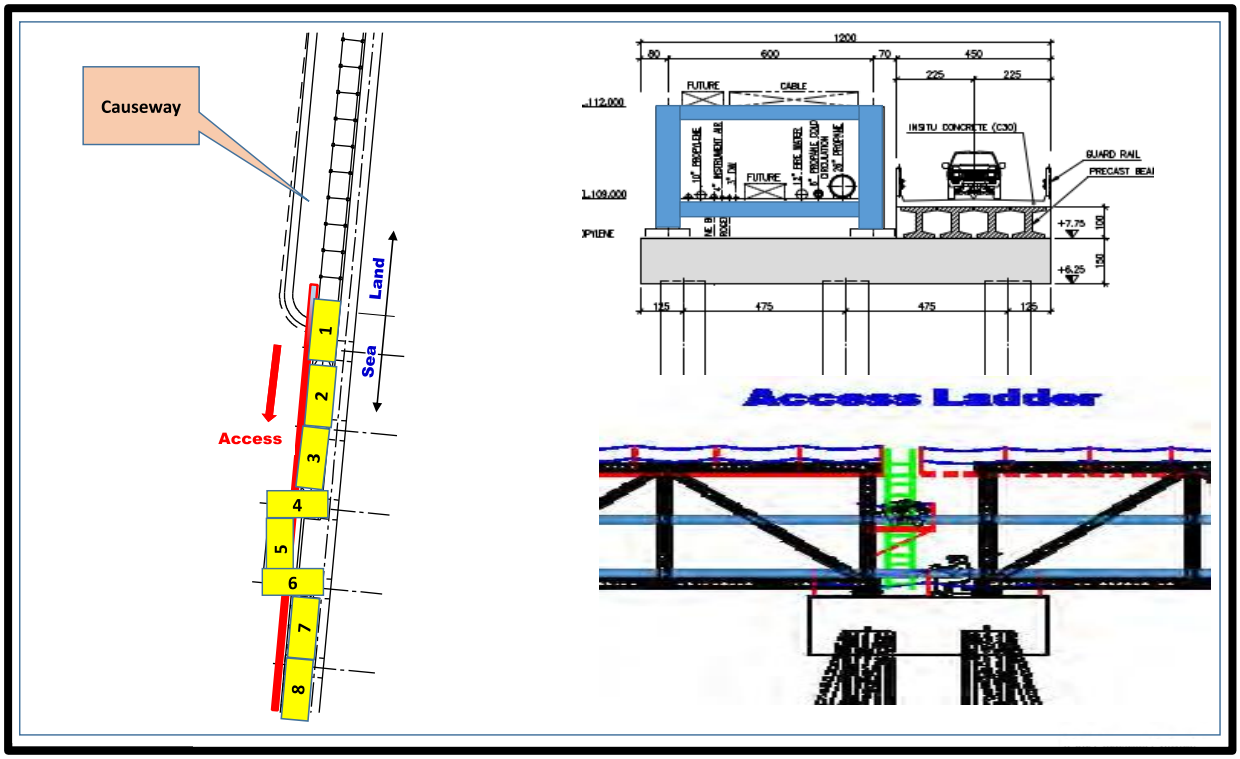


Figure 2-28. Construction of Sequence of Jetty

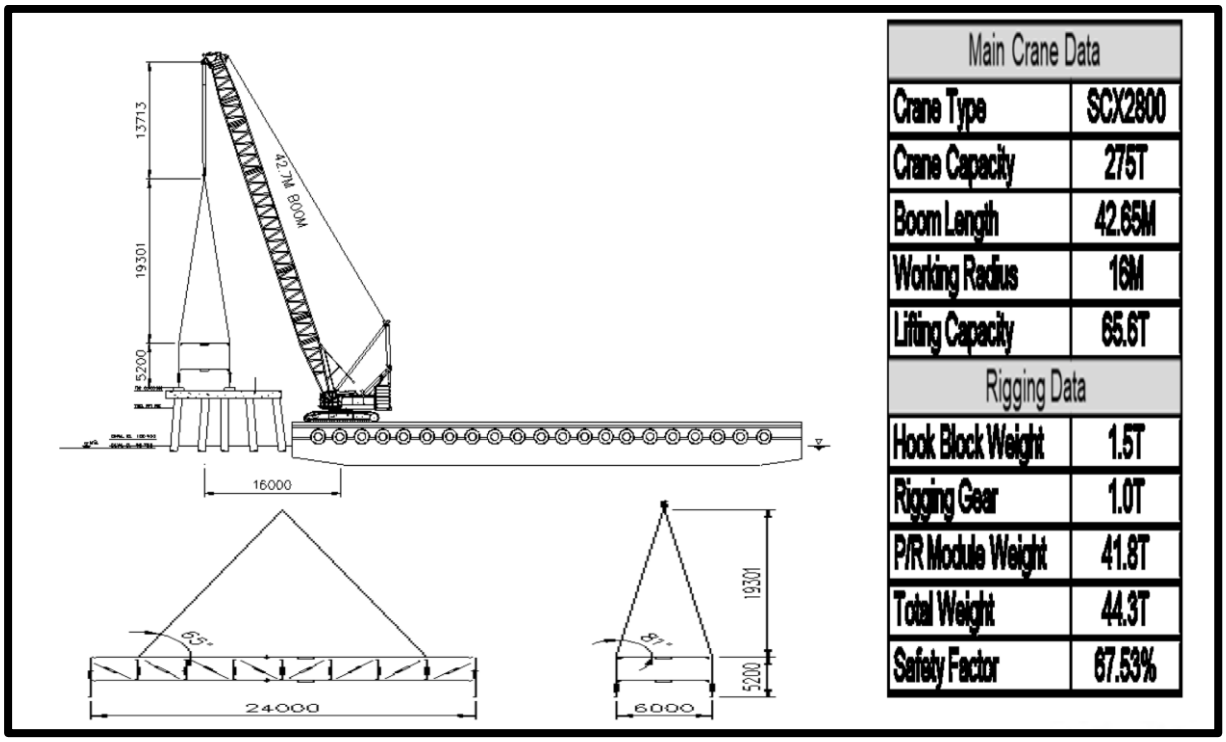


Figure 2-29. Construction of Jetty

Steel Structures

Construction of steel structures covers:

- Erection of Piperack Structures;
- Erection of Main Piperack Structures;
- Erection of Sub-Piperack Structures;
- Support Structure assembly; and
- Construction of shelters.

Construction of these structures mainly regards erection or assembling of the steel materials such as pipes and pipe supports between process units or buildings, support structures for elevated units and shelters for open work areas. Construction of these structures mostly require special construction methods. The Methods of Statements regarding special constructions are prepared before construction works and subject to approval of construction controller on behalf of the Project Company.

Mechanical installation, piping, electrical installation, and instrumentation.

Mechanical installation, piping, electrical installation, and instrumentation is the final stage of the construction works before commissioning phase. This stage can be considered as the most challenging stage as the construction of the elevated units, which are mostly requires lifting of the heavy items. Therefore, there will be several specific method statements regarding carrying of the heavy items, lifting of heavy items and assembling the units. These specific method

statements also includes all HSE arrangements and mitigations related to the construction. Some samples regarding transport of heavy items and assembling of the PP Splitter is given in Figure 2-30 and Figure 2-31, respectively.

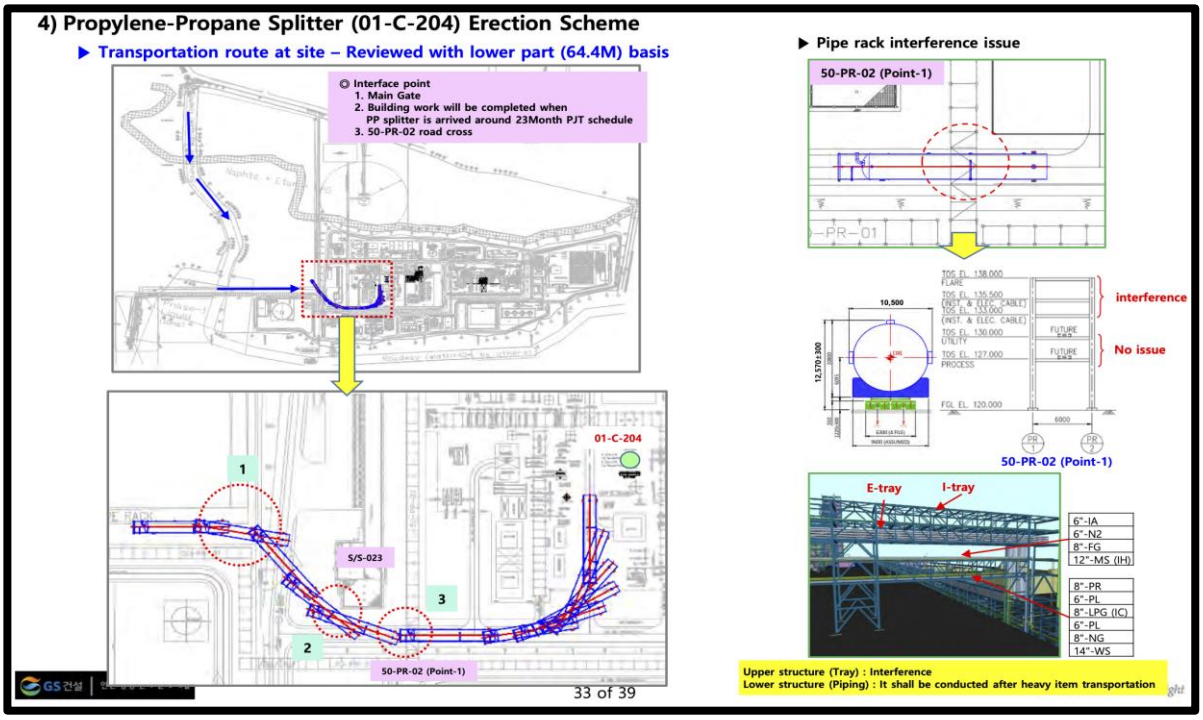


Figure 2-30. Transportation of PP Splitter

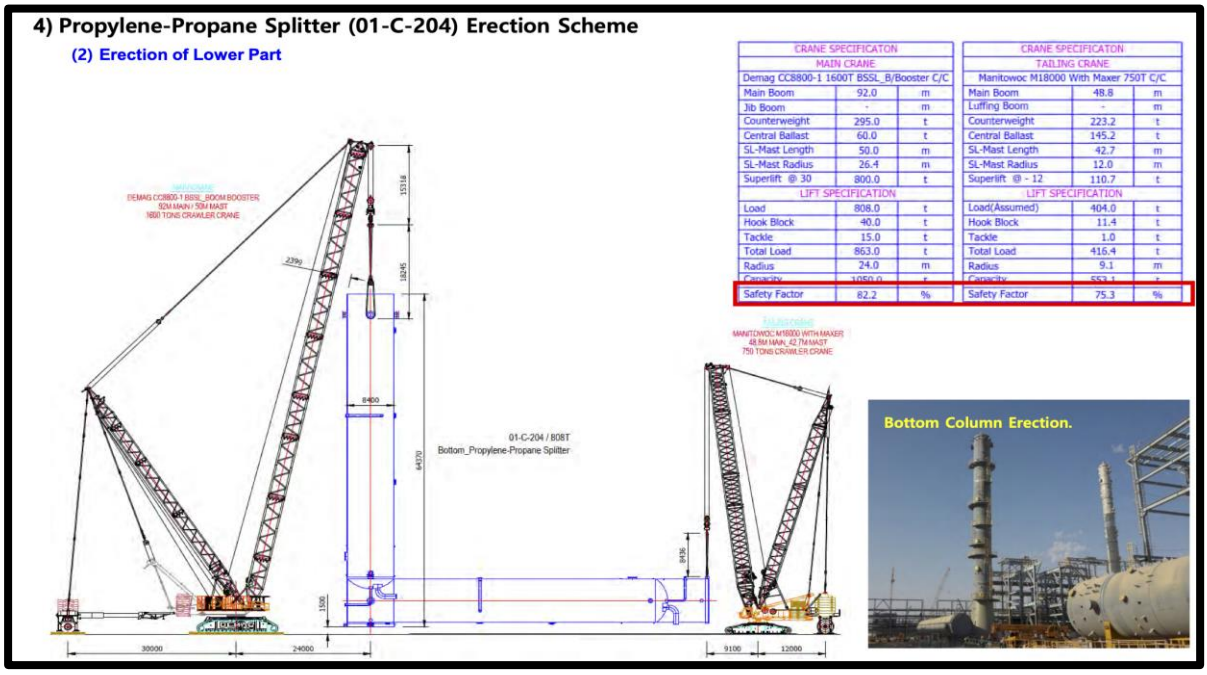


Figure 2-31. Erection of PP Splitter

2.6.4 Construction Equipment

The types and quantities of construction equipment with respect to various construction works for terrestrial and marine parts of the Project are detailed in Table 2-10.

Table 2-10. Construction equipment deployment for terrestrial part

Machinery	Capacity	Description	Quantity
Tower Crane	1,000 – 1,500 ton	Equipment Erection	1
Crawler	600 - 800 ton	Equipment Erection	1
Crawler	300 - 400 ton	Equipment Erection	2
Crawler	160 - 250 ton	Equipment Erection	2
Mobile Telescopic	150 - 200 ton	Pipe Fab. & Erection	5
Mobile Telescopic	60 - 100 ton	Pipe Fab. & Erection	12
Mobile Telescopic	25 - 50 ton	Pipe Fab. & Erection	10
Tower Crane	10 ton	Furnaces& Boiler	4
Trailer	10 - 60 ton	Transport	15
Boom Truck	10 ton	Transport	8
Forklift	5 ton	Pipe prefab, Civil & Steel Str.	5
Manlift	40 mt	Piping&steel str.	15

2.6.5 Construction materials/quantities

It is anticipated that approximately 14,000 m^2 of membrane coating (1.5 mm bitumen/membrane) and 1,450 m^3 tons of grout-based cement will be needed for the Project and onshore units of the Terminal Facility (i.e. propane tank, metering station, LP Flare operation building etc.) during construction works. As reported by the Project Company, there will not be any concrete batching plant to be established on the Project site. The ready-mixed concrete will be supplied from local sources. The amount of substances to be used during construction and mechanical works are presented in Table 2-11. The construction material required for the Project will be transported to the site via existing roads from selected suppliers. No borrow areas or quarries will be operated for the Project and Terminal Facility.

Table 2-11. Chemical list for mechanical works

Description	Amount	Unit
Epoxy Thinner	4,800	L
Polyurethane Thinner	1,600	L
Epoxy paint	60,000	L
Radiographic Inspection (Pipe - RT)	49,000	film
Epoxy grout	60	m^3
Cement-based grout	500	m^3

As necessary, onsite temporary laydown areas for imported materials will be appropriately selected to avoid potential disturbance and run-off. Appropriate management practices for these materials will need to be adopted, as discussed in *Chapter 8: Material Resources and Waste Management*.

Jetty Construction

The Jetty, which is planned as the in the Terminal Facility, is the offshore structure. Jetty will be consisted of two main parts, which are:

- earth filled causeway provides connection between onshore and jetty; and
- jetty section constructed on piles.

The amount of materials to be used during construction of the jetty and causeway presented in Table 2-12.

Table 2-12. Amount of substances to be used during construction of jetty and causeway

Units	Substances	Amount	Unit
Jetty	Steel for piles	1658.7	tones
	Concrete for pile cap	52	m^3
	Concrete for pile plugs	98.2	m^3
	Concrete for cross beams	649.2	m^3
	Concrete for long beams	551.6	m^3
	Steel for pipe rack	944	tones
	Concrete for road	498.54	m^3
	Rock sockets	10	-
Causeway	Rock for quarry run	~524134.9	m^3
	Rock size 60-300	141198.4	m^3
	Rock size 300-1000	103699.6	m^3
	Concrete for cubes	19207.4	m^3
	Steel for piperack	1032.5	tones
	Concrete for roadway	1246.35	m^3

Appropriate management practices for these materials will need to be adopted, as discussed in *Chapter 8: Material Resources and Waste Management*.

2.6.6 Excavated Soils to be Disposed

Excavation is the major site preparation activity. It is estimated that approximately 4,457,000 m^3 excavation materials will be produced. Blasting will be used during excavation works, and a special study was performed for the design of blasting and its potential impacts. These impacts are discussed related ESIA Chapters; in Chapter 9 impact on air quality and Chapter 10 impact of noise and vibration, respectively. Some part of the excavated material will be used as backfilling material (100,000 m^3) on the Project site. As the construction planning prepared for the Feed Phase, remaining 4,357,000 m^3 of the excavated material was planned to be disposed at licensed disposal sites operated by Adana Metropolitan Municipality. Storage of the excavated material at licensed disposal sites were evaluated in the National EIA of the Project, and relevant consent has already been provided from Adana Metropolitan

Municipality. In parallel, CPIR Port Management contacted with the Project Company, in order to use the excavated material for backfilling of the CPIR Port Project that requires huge amount of material from other sources. Backfilling material for CPIR Port Project will be supplied from existing operation quarries and from the excavated material that will be revealed as a result of the excavations to be carried out within the boundaries of the Ceyhan Industrial Zone. This implementation is considered as a best practice in terms of resource efficiency. Therefore, excavated material is planned to be used as filling material at marine section of the CPIR Port Project. For this implementation, all related permits and consents will be provided by CPIR Management Company, and back filling will be performed under the responsibility of the CPIR Management Company.

Depending on the characterization of the excavation material, it is assumed that approximately 500,000 m^3 additional material will be provided from licensed borrow pits. Excavation activities are planned to start by July 2022 as part of Early Works and after the Financial Closure, Phase-2 of the project (Main Construction Works) will commence, and excavation activities will continue until the first quarter of 2023.

The excavation plan showing the locations and amounts of the excavation within the Project site, as well as alternatively proposed disposal sites by Adana Metropolitan Municipality is discussed in *Chapter 8: Material Resources and Waste Management*. According to the information obtained from the representatives of the Directorate of Environmental Protection and Control, Waste Management (Adana Metropolitan Municipality) during the social survey conducted within the scope of the ESIA study on 10-12nd February 2020, the Municipality will assess and propose suitable excavation waste disposal areas if there is a requirement from the industrial facilities in the region.

Jetty Construction

As the current design no dredging activity is planned for the jetty construction as a part of the Terminal Facility.

2.6.7 Traffic and Access Management

Land Traffic

The Project site is located to the south of the E90 Motorway (i.e. Adana-Şanlıurfa Road) and to the southwest of the E91 Motorway (i.e. Ceyhan-Iskenderun Road). There are two main junctions allowing access to the Project site, which are Ceyhan Junction to the northwest and Free Trade Zone Junction to the northeast of the Project site. There are a number of alternatives to access the Project site as can be seen in Figure 2-32.

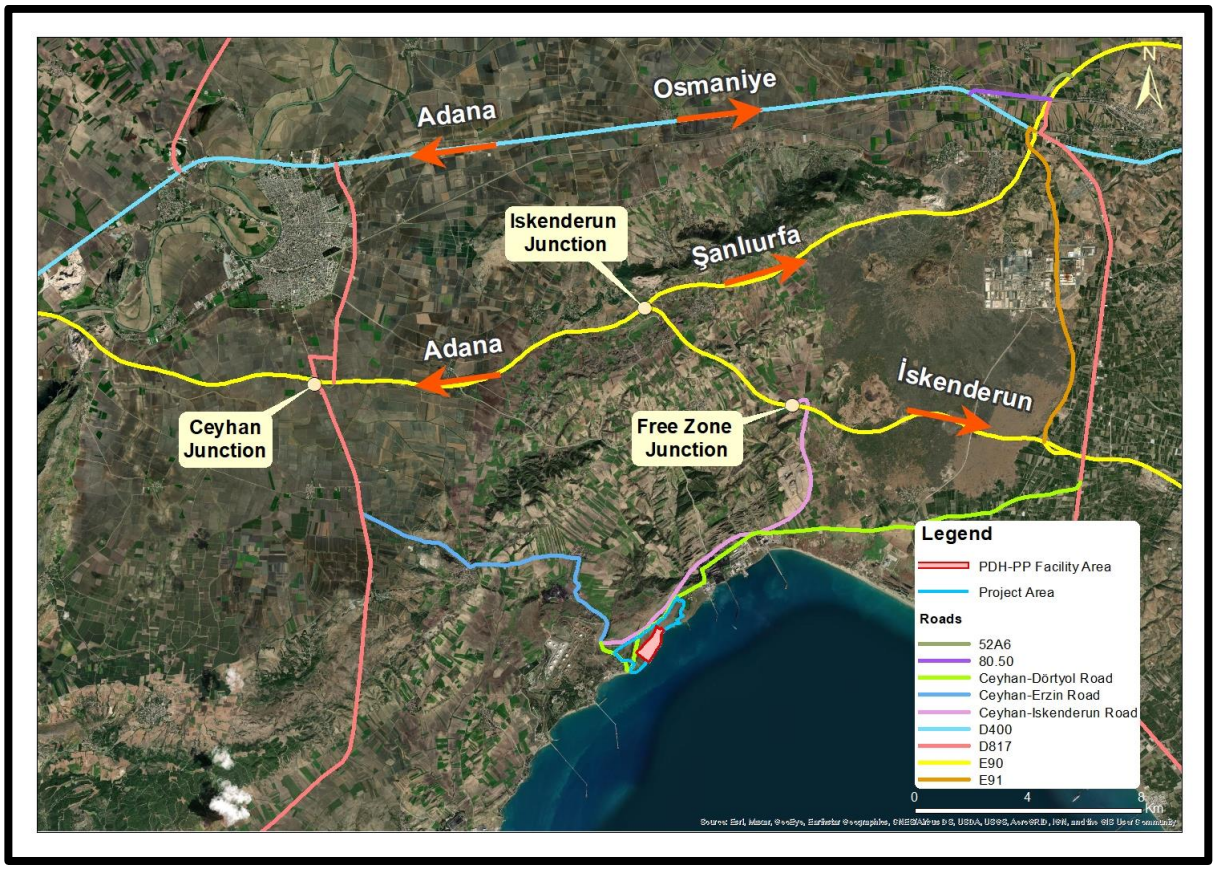


Figure 2-32. Road network around the Project site

A Traffic Assessment Study has been conducted and a relevant report was issued. The details of construction traffic transport routes and the outcomes of this study are discussed in more detail in *Chapter 11: Traffic Impact*.

The average daily number of vehicles to be used during construction phase of the Project and associated facilities are 60 trucks, 15 trailers, 4 lorries and 100 cars. The excavation and filling works will be required to be undertaken for 7-8 months. It is concluded in the Traffic Study that the capacity of the transportation network is sufficient to carry traffic load caused by the construction activities of the Project during peak hours. It is reported by the Project Company that the construction activities of the Project and CPIR will be parallel. As a result of the assessment made by traffic consultants, the road network around the Project site, which has adequate capacity to carry current traffic load, will also be sufficient for future traffic load to be generated by the Project.

Locations of the gates to be used during the construction phase of the Project to allow construction personnel to enter to the Project Area are presented in Figure 2-33.

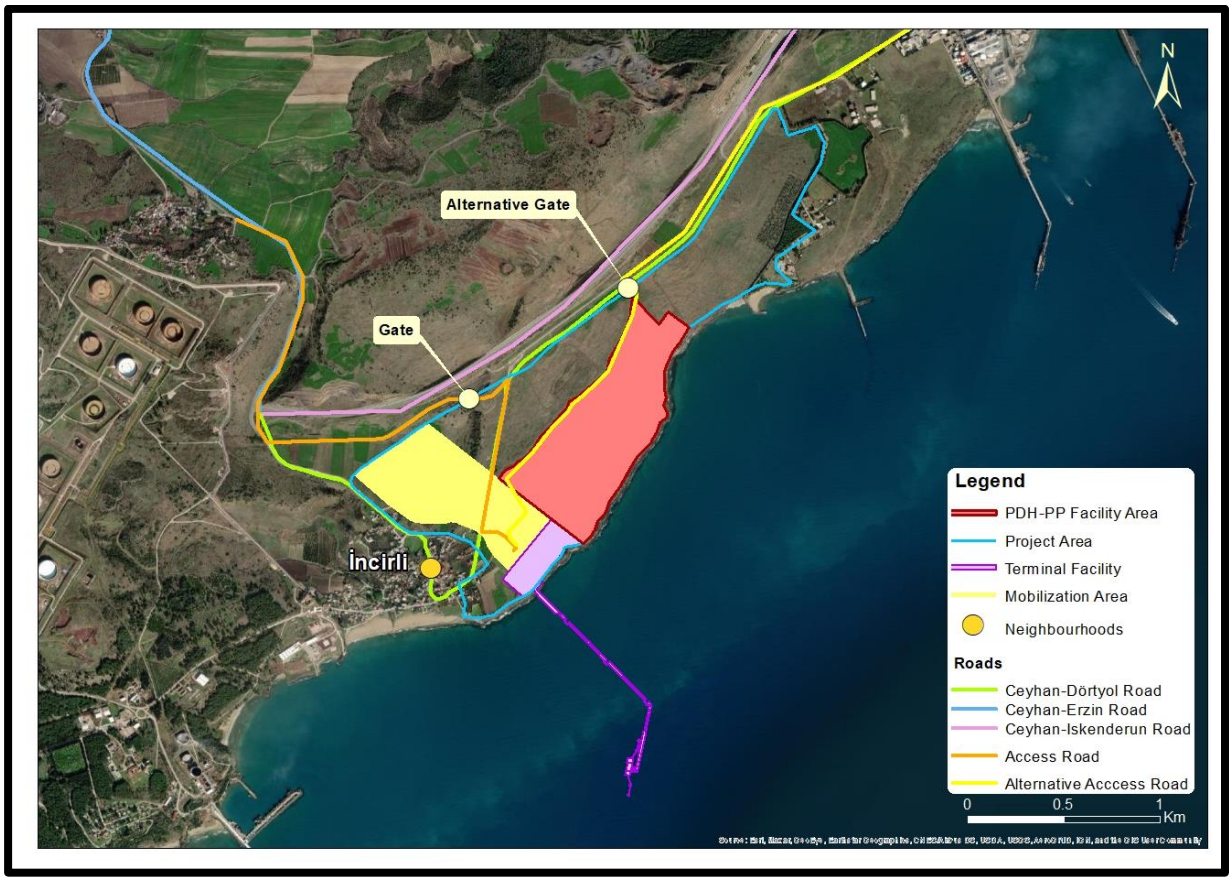


Figure 2-33. Road network near the Project Area, and Project Entrance Gate (Construction)

Locations of gates to be used during the operation phase of the Project to allow operation personnel to enter to the Project Area are presented in Figure 2-34.

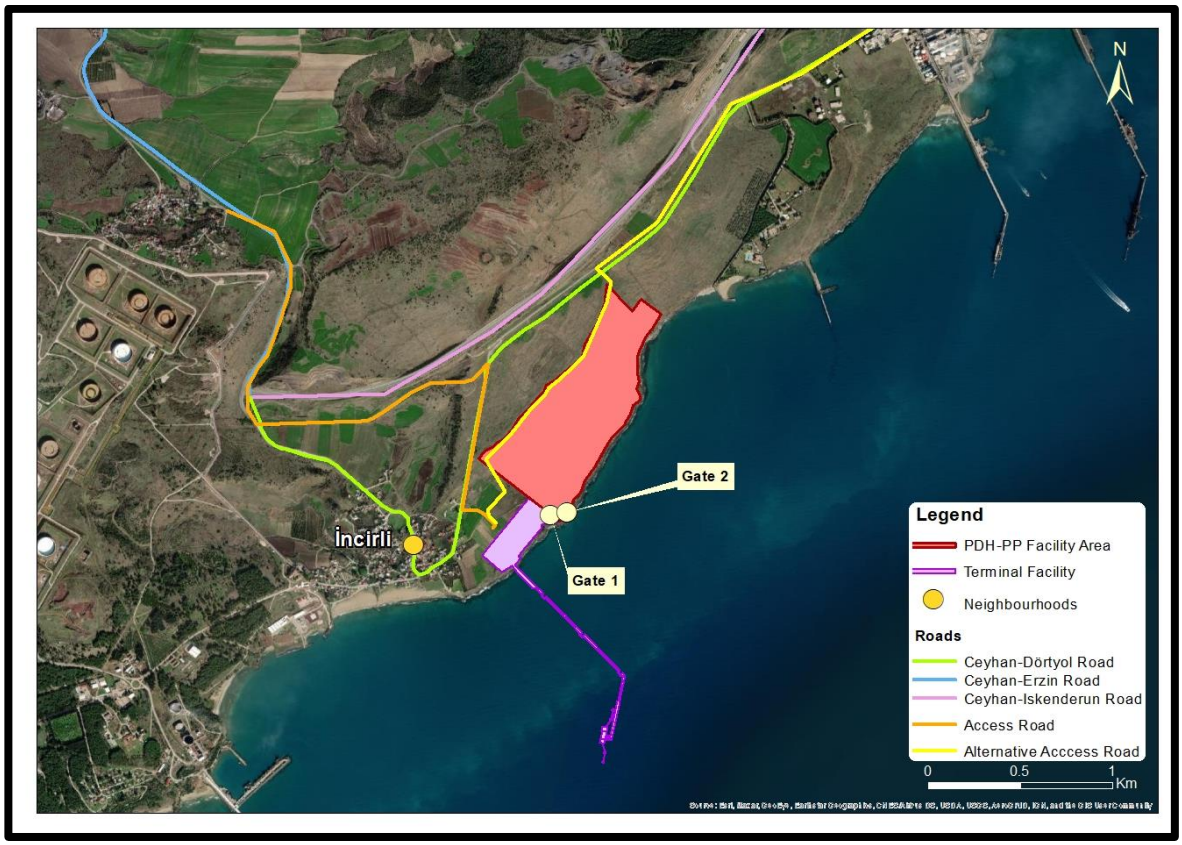


Figure 2-34. Road network near the Project Area and Project Entrance Gates (operation)

Marine Traffic

During construction works, construction material or equipment's will not be directly transferred to the site via marine vessels. Therefore, there will be no temporary or permanent marine structures such as unloading platform, quay or pier will be constructed. During jetty construction catamaran barges or platforms can be used for piling purpose.

Transportation Heavy Items

Four major units used in the Project are required special transportation arrangement in order to transfer to the Project Site. These units and their dimensions regarding length (L), height (H), width (W) and Weight are given in Table 2-13. Marine transportation is planned for transfer of these items first to the nearest port with custom. After that these items are planned to be carried to the Project Site with land roads. For this purpose, the Project Company performed a special study in order to evaluate land transport options. According to the study, Sanko Port located 10 km southwest of the Project Site is identified as suitable location for unloading of the units. Road distance between Sanko Port and the Project Site is about 28.2 km, and mainly follows single line road between settlements. Results of the study and suggested mitigations are included in Chapter 11.

Table 2-13. Heavy Items that Require Special Transport Arrangements

Description	Length (m)	Width (m)	Height (m)	Weight (t)
PROPYLENE-PROPANE SPLITTER	113,30	10,5	10,80	1585,4
DEETHANIZER STRIPPER	69,6	7,2	7,3	806,7
LOOP REACTOR	55,0	8,0	2,3	521,0
REACTOR	35,7	9,8	10,3	524,0

2.6.8 Workforce

Estimated number of employees for construction phase of the Project and associated facilities is 4,500 at peak. Direct and indirect workforce distribution for the project is given in Figure 2-35 and Figure 2-36 below. Location of the Mobilization area is shown on Figures 2-10 and 2-14.

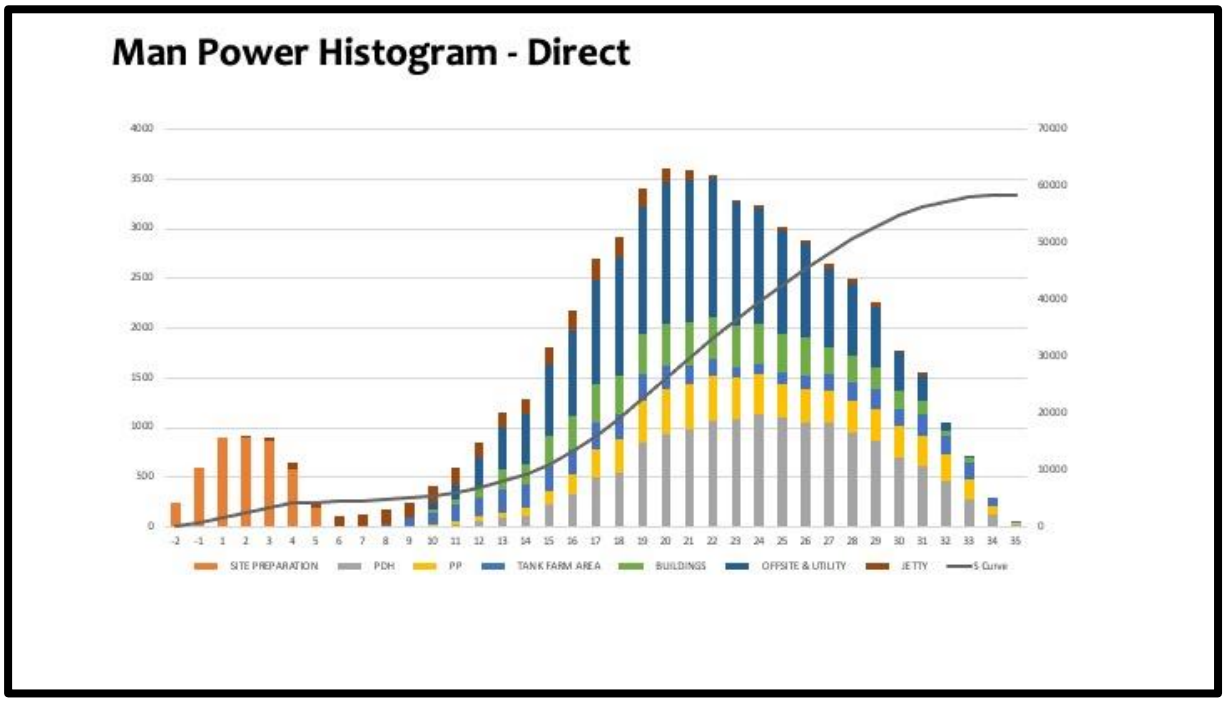


Figure 2-35. Man Power Histogram for Direct Employment

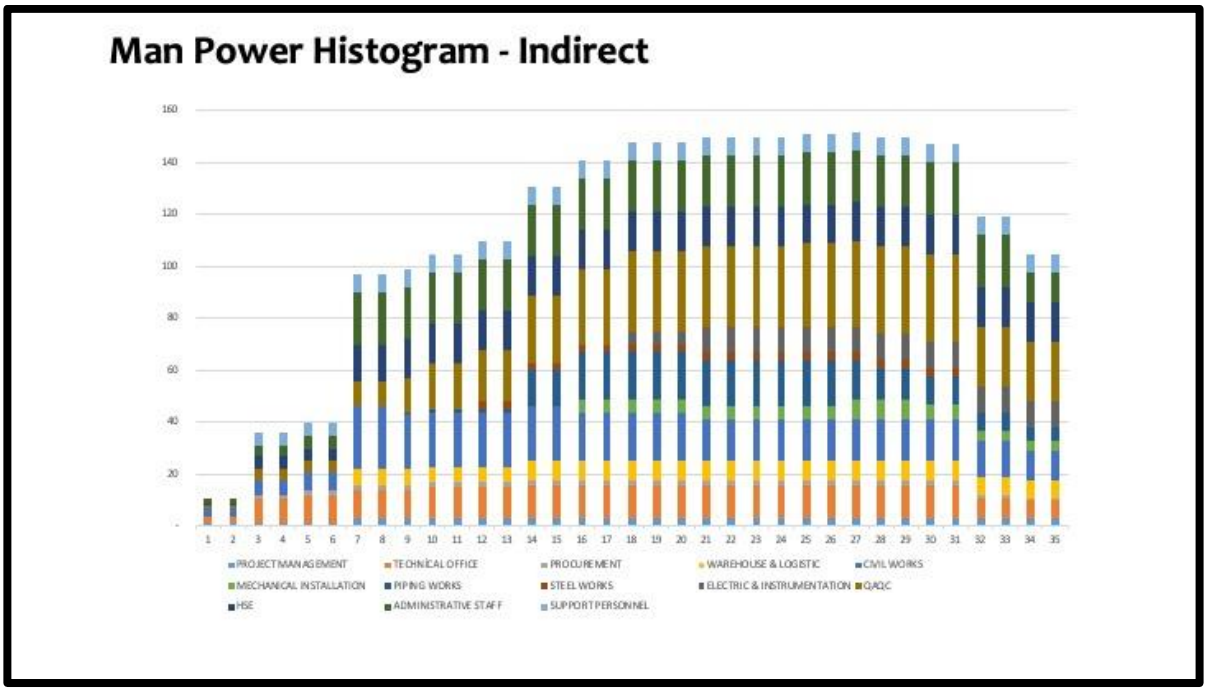


Figure 2-36. Man Power Histogram for Indirect Employment

2.7 Operation Stage

2.7.1 Responsibilities and Organizational Management

Core personnel working for two SPV's which are investor of the Project and associated facilities will continue during Operation Phase of the project. The key personnel provided by EPC contractor and PMC will be replaced with personnel of the Operation and Maintenance Companies (O&MC) responsible for the operation of the Project and associated facilities. These are:

- **EHS Manager (O&M Company):** Responsible for managing infrastructure and superstructure projects regarding environmental and social governance issues and member of the E&S Committee on behalf of the Employer;
- **Human Resources/Labor Manager (O&M Company):** Responsible for managing all matters relating to human resources management for the Employer. Responsible for employee relations, communication with employer and EPC Contractor workforce representatives / committees and co-ordination of the workforce grievance mechanism together with the Human Resources Lead;
- **CLO (O&M Company):** Responsible for reporting on social activities, stakeholder engagement and grievance management and consultation on land acquisition, providing affected communities with information on the timing of key activities, and identifying and responding to grievances.

2.7.2 Traffic and Access Management

Land Traffic

As it is described in construction section, existing road network connected to the Project Site is well established and sufficient for the Operation Phase. Besides, in order to assess the existing baseline conditions and future conditions in detail, Project Company. has assigned a traffic consultant to undertake a traffic assessment study. As a result of the study, the capacity of the road network is found adequate both for current and future conditions of the Project and associated facility. The details of impact assessment on traffic are given in Chapter 11.

Marine Traffic

Propane, the main raw material used for Poly-propylene production, will be transferred to the Project Site via marine tankers. It is estimated that two (2) tankers in a month will be sufficient to sustain planned production. In general, two tankers in a month will not cause a significant increase in terms of marine traffic in Gulf of Iskenderun. On the other hand, maneuvering required for approaching to the jetty is assessed as a risky operation by considering closeness to the existing jetties such as BOTAŞ jetty used for crude oil transport. Due to that reason, a risk assessment and modelling study regarding vessel manoeuvring was performed for the jetty proposed in the Terminal Facility as well as for the CPIR Port Project. The study was performed by Maritime Faculty of Dokuz Eylül University. Several scenarios were applied for safe manoeuvring of vessels. Due to the reason that the Jetty subject is considered as associated facility; the assessment and the results of the selected scenarios have also been evaluated in the ESIA Process. The details of the Adana Ceyhan Port Preliminary Modelling Report including risk assessment and modelling regarding vessel manoeuvring for CPIR Port Project are discussed in *Chapter 11:*

2.7.3 Security

CPIR Management Company is mainly responsible for the security of the entire CPIR. Since the region is determined as a strategic region, CPIR will be determined as a high security region in accordance with the regulation. Depending on this situation, it may be possible to create a special security zone around the offshore structures. At the same time, it will be possible to prevent the boats making coastal sailing from passing under and near the jetty. Possible impacts due to this situation are discussed in Chapter 14, Chapter 15 and Annex M covering the Human Rights Impact Assessment of the ESIA Report. Similarly, since it is very possible to use armed security for the protection of the region, the impact has been evaluated in the relevant sections. Security, including the project area boundary, will be the responsibility of the Project Company.

2.7.4 Operational Employment

Total number of workforce to be employed during operation phase of the Project is 321 for both terrestrial and marine sections of the Project. This number includes personnel to be employed by the Project Company and its subcontractors.

2.8 Project Design and BAT-BREF Requirements

The Turkish Ministry of Environment, Urbanization and Climate Change and its related departments started their work on harmonization with the IPPC Directive (2008/1/EC) in 2012. However, although some titles such as large combustion plants directive have been added to the relevant legislation, full harmonization has not been achieved. Study on BAT/BREF implementation and sectoral transition has not been carried out until 2020 in addition to the sector-specific studies regarding BAT/BREF applications. At the current stage, as of 2020, studies on BAT/BREF implementation and the harmonization processes of the sectors have started, and it is planned to complete and implement the National Action Plan in 2023. Consequently, there is no detailed BAT/BREF program regarding the implementation method and schedule for the Chemical Industry in which the Project is involved. However, the Project has foreseen to meet the requirements for BAT/BREF implementations.

General legal framework related to implementation of the Best Available Techniques (BAT) are given as:

- ✓ Integrated pollution prevention and control (IPPC) (OJ EU of January 29, 2008 L 24/8), Directive 2008/1/EC of the European Parliament and of the Council of January 15, 2008;
- ✓ Industrial emissions (integrated pollution prevention and control) OJ EU L334/17, Directive (IED) 2010/75/EU of the European Parliament and of the Council of November 24, 2010; (Revision expected in 2022)
- ✓ Establishing BAT conclusions under Directive 2010/75/EU of the European Parliament and of the Council, for the production of large volume organic chemicals (notified under document C(2017) 7469), Commission Implementing Decision (EU) 2017/2117 of November 21, 2017;
- ✓ Establishing BAT conclusions under Directive 2010/75/EU of the European Parliament and of the Council, for common waste water and waste gas treatment/management systems in the chemical sector, Commission Implementing Decision (EU) 2016/902 of May 30, 2016; and
- ✓ Establishing BAT conclusions under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants (notified under document No. C (2017) 5225), Commission Implementing Decision (EU) 2017/1442 of July 31, 2017.

The legal framework given above indicates that the complex facilities which have integrated units require design considerations based on solutions recognized as best available techniques or should achieve similar production parameters. The main reference documents related to the BAT for propylene and polypropylene production units are:

- Reference Document on BAT in the Large Volume Organic Chemical Industry, December 2017;
- Commission Implementing Decision (EU) 2017/2117 of 21 November 2017 establishing BAT conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for the production of large volume organic chemicals (notified under document C (2017) 7469), hereinafter the LVOC BAT Conclusions;
- The reference document “Best available techniques in the production of polymers”, August 2007;
- BAT Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector, June 2016;
- Commission Implementing Decision (EU) 2016/902 of 30 May 2016 establishing BAT conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for common waste water and waste gas treatment/management systems in the chemical sector, hereinafter referred to as the CWW BAT conclusions;
- Reference document “BAT for general monitoring principles” approved by the European Commission in July 2003 and the draft of June 2017 (Monitoring of emissions to air and water Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control); and
- Reference document “BAT for emissions from storage”, July 2006.

Summary tables regarding the requirements and BAT guidelines contained in each reference document are provided in Annex P. Starting from the project efficiency, design of the project regards at most latest technology or equipment’s regarding environmental control. EU BAT-BREF Requirements and related design solutions for the project are summarized in Table 2-14 below.

Table 2-14. BAT-BREF Requirements and Design Solutions of The Project

General BAT Requirements	Design Solutions of the Project
Implementation of environmental management, e.g. EN ISO 14001: 2015 or EMAS.	Environmental Management policy and Integrated Environmental Management System will be developed for the Project.
Reduction of non-point emissions owing to advanced equipment design, including: ○ use of valves with bellows or double gasket or equally effective equipment. Valves with bellows are recommended in particular for use with highly toxic substances;	In accordance with the requirements of the Project BAT recommendations must be implemented. This also applies to applicable equipment design solutions, including double gaskets and liquid barriers (pumps and compressors), leaktight valves for all utilities present in the unit, minimization of the number of flanges designed on the basis of licensor's requirements, closed sampling systems, hydrocarbon

General BAT Requirements	Design Solutions of the Project
○ magnetic-driven or cased pumps or pumps with double gaskets and liquid barrier; ○ magnetic-driven or cased compressors or compressors incorporating double gaskets and liquid barrier; ○ magnetic-driven agitators or cased agitators with double gaskets and liquid barrier; ○ minimization of the number of flanges (joints); ○ effective sealing; ○ closed sampling systems; ○ discharge of contaminated wastewater in closed systems; and ○ collection of discharges.	discharge system with a flare, separated drainage systems and closed drainage systems for chemicals. In addition, in accordance with the implemented licensor's technology and technical solutions, the PP production unit will be leaktight and equipped with a waste gas recovery system for the recovery of monomer and propylene from the waste gas streams discharged from the polymer degassing system. The waste gases from the monomer polishing section (offgas) will be directed to the fuel gas system along with off gas from PDH unit. The system of water supply and wastewater drainage will ensure strict control over these streams, enabling optimization of their use. The CEYHAN Project includes a wastewater treatment unit.
Assessment and measurement of unorganized losses in order to classify components in terms of type, operation and process conditions, so as to identify elements that demonstrate the greatest potential for unorganized loss.	The technological process will be continuously monitored in order to quickly identify and eliminate possible irregularities. A program based on precise calculations of the number of flanged connections, automatic valves, mechanical seals on rotating devices will be used to estimate unorganized emissions.
Establishment and operation of a program for monitoring and maintenance of equipment and/or detection and removal of leaks based on the component and maintenance database combined with assessment and measurement of unorganized loss.	It is planned to build a modern unit, consisting exclusively of new equipment. The unit will be subject to safety and major industrial accident prevention procedures applicable at the plant, and will be regularly reviewed and evaluated in terms of technical condition. The technological process will be continuously monitored in order to quickly identify and eliminate possible irregularities. Monitoring during plant operation to be according to BAT requirements
Reduction of dust emission by combining the following techniques: ○ dense phase transfer is more effective in preventing dust emissions than transferring the diluted phase; ○ velocity reduction in diluted phase transfer systems to the lowest possible values; ○ reduction of dust generation in transfer lines through surface treatment and appropriate pipe alignment; ○ use of cyclones and/or filters in air outlets from dedusting equipment; use of fabric filter systems is more efficient, especially in the case of fine dust; and ○ use of water scrubbers.	Polypropylene from the reaction system is transported in a hermetic system; the carrier gas comprises hydrocarbons that are the reaction environment. In the hydrocarbon (monomer) recovery system, a system of filters shall be used to protect the ingress of dust into the monomer recovery system. Polypropylene powder is transported by gravity to the extrusion system through a cell feeder. Additives used during extrusion of polypropylene are discharged at stations equipped with a dust filtration system. Dust formed during granulation of polypropylene is captured in the transport water tank from where, through the system of mesh filters, it is separated from water. A dust recovery system using a cyclone/dust separator will be used on the system for granulate pneumatic transport to the logistics platform.
Minimize the air emissions; ○ to reduce emissions of CO and residual substances to the air from process furnaces/heaters; ○ to reduce NOx emissions to the air from process furnaces/heaters; ○ to prevent or reduce dust emissions to the air from process furnaces/heaters; ○ to prevent or reduce SO_2 emissions to the air from process furnaces/heaters; ○ to reduce emissions to the air of ammonia used in selective catalytic	- As part of the propane dehydrogenation unit, for process furnace operation, it is envisaged, i.a., to control the process by measuring the amount of oxygen and CO in fuel gas and control of the air-fuel ratio; - Process furnaces will be fed with residual (fuel) gas with addition of natural gas (if the residual gas stream is not sufficient). As part of the propane dehydrogenation unit for the operation of process furnaces, it is envisaged to use ultra- low NOx emission burners; - Process furnaces will be fed with residual (fuel) gas with addition of natural gas (if the residual gas stream is not sufficient). According to BAT 5, the use of filters is not

General BAT Requirements	Design Solutions of the Project
reduction (SCR) or selective non-catalytic reduction (SNCR) to reduce NOx emissions	applicable if combustion involves only gaseous fuels. Therefore, this requirement does not apply to the Project; - Process furnaces will be fed with residual (fuel) gas with addition of natural gas (if the residual gas stream is not sufficient). - **Not Applicable.** The Project has no NH3 sources
Minimization of unit start and shutdown sequences in order to avoid peak emissions and reduce overall consumption (e.g. energy and monomer per ton of product).	The Project is to have a continuous operation, minimizing units start and shutdown sequences. The operation of the unit will be monitored continuously in order to reduce the risk of emergency situations and stopping the unit. In the case of process disturbances, the polymerization reaction will be deactivated or slowed down using the polymerization interruption system. A propylene storage system (4 Propylene spheres) is included to ensure continuity of production of the PP unit in the case of a short-term shutdown of the PDH unit. For critical equipment, redundancy has been used where possible, while in other cases high reliability indicators of the equipment have been determined.
Protection of the reactor's contents in case of emergency shutdown (e.g. through the use of shutdown systems).	Reactor protection system is defined according to Licensor design, including all the interlock system and the correct operation procedures to avoid any shutdown. Firefighting system and gas/fire detectors are implemented in the plant for safety watching
Return of contaminated material to the process or using it as fuel	Streams recovered within the PDH separation system is used for fuel gas in the reactor heaters. Polymer not fulfilling the specifications is re-processed
Prevention of water pollution by appropriate design and selection of pipe materials to facilitate inspection and repair, wastewater collection systems in new units and upgraded systems have, e.g.: ○ pipes and pumps placed above the ground; ○ pipes placed in the channels available for inspection and repair.	The Project will comply to the requirements for Prevention of water pollution defined in the Reference Document on Best Available Techniques in the Production of Polymers, August 2007 by appropriate design, as: - Process effluent and drainage or sewerage systems within the plant are made from corrosion resistant materials and designed to prevent leaks to reduce the risk of loss from underground pipelines; - To facilitate inspection and repair, effluent water collection systems at new plants and retrofitted systems are either; • pipes and pumps placed above ground • pipes placed in ducts accessible for inspection and repair. - Measures for water pollution prevention include separate effluent collection systems for; • contaminated process effluent water, • potentially contaminated water from leaks and other sources, including cooling water and surface run-off from process plant areas, etc. • uncontaminated water.
Use of separate waste water collection systems for: ○ contaminated process waste water ○ potentially contaminated water from leaks and other sources, including cooling water and surface drainage water from process unit areas; etc. ○ uncontaminated water.	The Project will be provided with separate wastewater collection systems. These will be: clean rainwater drainage network, oily water drainage network (included potentially contaminated rainwater) , chemical wastewater drainage network. All wastwater generated in process waste water is pre-treated by means of oil separation and removal of solids, and will then be directed to the waste water system. The wastewater treatment plant (WWT) consists of two systems:

General BAT Requirements	Design Solutions of the Project
	- oily wastewater oil separation system; - storage of clean and de-oiled wastewater; - wastewater treatment system.
Treatment of purging air streams from the vents of degassing silos and reactors by one or more of the following techniques: o recycling; o thermal oxidation; o catalytic oxidation; o adsorption; o combustion in flares (only in the case of continuous flows).	NVIRO system will be implemented in the Project for the treatment of the purge air which could carry VOCs SPHERIPOL Process by LyondellBasell requires the use of peroxide.
Application of combustion systems in flares to treat discontinuous emissions from the reactor system. Combustion in flares of discontinuous emissions from reactors is the best available technique unit only if these emissions cannot be returned to the process or used as fuel.	Flare system is implemented in the project to handle emergency reliefs or over-pressure situations during upsets
Use, where possible, of power and steam from the cogeneration system. Cogeneration is usually installed when the unit consumes the generated steam or where an outlet for the generated steam is available. The electricity generated may be consumed by the system or sent outside.	Steam is produced in the PDH unit (heat integration) using the flue gas from Charge Heater and inter-heaters. Steam is used both PDH as PP plant. No power is generated from steam
Reaction heat recovery by generation of low pressure steam in the process or systems when internal or external consumers of low pressure steam exist.	Steam is produced in the PDH unit (heat integration) using the flue gas from Charge Heater and inter-heaters. Steam is used both PDH as PP plant. No power is generated from steam
Reuse of potential waste from the polymer production unit.	All polypropylene products created in the PP unit will constitute a commercial product that can be re-used as a raw material outside the plant. PP strands and polypucks from extruder section can be milled and sent through 3rd parties compounders to be re-used as raw material for compounding grades. Offspec PP pellets can be either internally recycled in the blending process or sold to external compounders as raw material.
Use of wastewater buffer upstream of the waste water treatment plant to achieve a constant quality of waste water. This applies to all wastewater generating processes such as PVC and ESBR.	Wastewater treatment plant is implemented in the project to handle and treat contaminated water from the units: Intermediate pits and tanks are included in the project for wastewater treatment.
Efficient waste water treatment. Waste water may be treated in a central unit or in a unit intended for special activities. Depending on the quality of waste water, additional specialized pretreatment is required.	Waste water treatment plant is implemented in the project to handle and treat contaminated water from the units: Intermediate pits and tanks are included in the project for wastewater treatment.
BAT for polyolefin production	
Recovery of monomers from piston compressors in LDPE processes to: o return them to the process; and/or o send them to the thermal oxidizer.	Not applicable. It refers to LDPE processes. The planned development project concerns propylene production (PP)
Collection of waste gases from extruders. The waste gases from the extrusion section (rear extruder gasket) in LDPE production have a high VOC content. By suction of vapours from	Not applicable. It refers to LDPE processes. The planned development project concerns propylene production (PP)

General BAT Requirements	Design Solutions of the Project
the extrusion section, monomer emissions are reduced. The removal efficiency is > 90%.	
Reduction of emissions from finishing and storage section Reduction of emissions from finishing and LDPE storage processes by: ○ maintaining a low pressure separating vessel (LPS) at minimum pressure; and/or ○ selection of solvent; ○ extrusion with degassing of volatile compounds; or ○ treatment of purging air from degassing silos.	Not applicable. It refers to LDPE processes. The planned development project concerns propylene production (PP)
Reduction of emissions from finishing and storage sections Reduction of finishing and storage emissions in low pressure suspension processes by use of closed loop nitrogen purging systems and optimization of stripping process. By optimization of stripping, monomer content in polyolefins produced using low pressure technologies (PP, HDPE) is reduced to less than 25% and recycling of monomers from stripping process. Instead of combustion in a flare, monomers are returned to the production process. Approx. 10 kg of monomers per ton of product may be recycled; and solvent condensation and solvent selection.	Process design by Licensor (SPHERIPOL) minimize the emissions of HC from the polymer using low gas pressure separation system and a steamer to carry the monomers and recover them in the process. Final Gas streams are processed in the N-VIRO System (by UOP)
Reduction of emissions from finishing and storage sections Reduction of finishing and storage emissions in gaseous phase processes (LLDPE, HDPE, and PP) by: ○ use in closed loop nitrogen flushing systems; and ○ selection of solvents and comonomer (LLDPE only).	Monomers are recovered in the process based in the Process Licensor technology (SPHERIPOL)for the PP plant
Reduction of emissions from finishing and storage sections Reduction of finishing and storage emissions in LLDPE solution processes by: ○ solvent condensation and/or ○ selection of solvent, and ○ extrusion with degassing of volatile compounds or ○ treatment of cleaned air from degassing silos.	Monomers are recovered in the process before entering in the extruder. In the extruder is released a minimum quantity of gas avoiding emissions in final storages and sending this gas stream to the vent gas system (previous low pressure degassing and steaming)
Operating the reactor at the highest possible polymer concentration. By increasing polymer concentration in the reactor, the overall energy efficiency of the production process is optimized.	Reaction process according to Licensor technology (LyondellBasell, two reactors in series with a prepoly reactor (liquid and slurry phases) optimizing the energy efficiency
Use of closed loop cooling systems	The heat of reaction of the loops is removed by circulating water in the reactors jackets. This is a semi-closed system with integration with the Cooling system of the Complex

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER-3)

FEBRUARY 2023

ANKARA

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

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CLIENT:

Ceyhan Polipropilen Üretim A.Ş
Portakal Çiçeği Sokak No:33 Yukarı Ayrancı
Çankaya - Ankara / Türkiye
☎: +90 (312) 840 10 00
🖷: +90 (312) 442 58 16

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ABBREVIATIONS

BAT	Best Available Technique
BREF	Best Available Techniques Reference Document
Ceyhan PDH-PP Facility	Ceyhan Propane Dehydrogenation - Poly-propylene Production Facility
Ceyhan Petrokimya A.Ş. or Management Company	Ceyhan Petrokimya Endüstri Bölgesi Yönetim A.Ş.
Ceyhan PP A.Ş. or Project Company	Ceyhan Polipropilen Üretim A.Ş.
CLRTAP	Convention on Long-range Transboundary Air Pollution
CPIR	Ceyhan Petrochemical Industrial Region or Ceyhan Energy Specialized Industrial Zone
DSI	State Hydraulic Works
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, Health and Safety
EHSS	Environmental, Health and Safety, Social
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EU	European Union
IFC	International Finance Corporation
MoAF	Ministry of Agriculture and Forestry
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MoIT	Ministry of Industry and Technology
MoLSS	Ministry of Labour and Social Security
MoTI	Ministry of Transportation and Infrastructure
PR	Performance Requirements
PS	Performance Standards
Terminal Facility	Jetty and Propane Storage Tank

3 INSTITUTIONAL AND REGULATORY FRAMEWORK

This chapter summarizes the institutional and regulatory framework within which the Project will be developed.

3.1 Turkish Institutional Framework

The key central, provincial and local governmental authorities relevant to the development and implementation of the Project are described in this section.

3.1.1 Central Government

The main ministries with an interest in the Project are as follows:

- Ministry of Industry and Technology;
- Ministry of Transportation and Infrastructure;
- Ministry of Environment, Urbanization and Climate Change;
- Ministry of Agriculture and Forestry;
- Ministry of Labour and Social Security.

Ministry of Industry and Technology (MoIT)

Ceyhan Petrochemical Industrial Region (CPIR) was designated as industrial zone with the Council Decision No. 2007/12632 (number/date: 26673/17.10.2007). Thereafter, Ceyhan Petrokimya Endüstri Bölgesi Yönetim A.Ş. (Ceyhan Petrokimya A.Ş. or Management Company) has been appointed as the management company for CPIR with official letter of MoIT dated 21.03.2019 (no. 387). The first investment within the CPIR will be the Ceyhan Propane Dehydrogenation - Poly-propylene Production Facility (Ceyhan PDH-PP Facility); as such for the allocation of the Project Site to Ceyhan Polipropilen Üretim A.Ş. (Ceyhan PP A.Ş.) to develop a poly-propylene production facility, Ceyhan Petrokimya A.Ş. requested approval from the General Directorate of Industrial Zones, MoIT on 05.11.2019 in line with the Article 3/A of the Law on Industrial Region (No. 4737); “Ministry gives the necessary decision for the site allocation to the investors to be selected by the Management Companies in accordance with the provisions stated in this Regulation”. As stated in the official letter from the General Directorate of Industrial Region, MoIT (date/number: 07.11.2019/ 29966012-452.05), allocation of the Project site to Ceyhan PP A.Ş. has been found suitable, relevant preliminary permit will be given to Ceyhan PP A.Ş. once the subdivision of land is completed and approved by MoIT.

MoIT is responsible identifying the procedures and guidelines related to all kinds of zoning plans and parcellation plan within the Industrial Zones according to the Law on Industrial Region (No. 4737).

Ministry of Transportation and Infrastructure (MoTI)

MoTI is considered relevant for especially the marine developments of the Project in terms of marine trade, shoreline structures and construction; as such *General Directorate of Marine* and *General Directorate of Shipyard and Shoreline Structures* are relevant authorities within the Ministry.

Ministry of Environment, Urbanization and Climate Change (MoEUCC)

MoEUCC is the relevant authority for the Project in terms of environmental permits and auditing. MoEUCC is composed of several directorates, including the following related with the scope of the Project and the Environmental and Social Impact Assessment (ESIA) Study;

- *General Directorate of Environmental Impact Assessment (EIA), Permitting and Auditing* organizes the procedures of EIA and follow-up in coordination with Governorship structures at the local level;
- *General Directorate of Environmental Management* is the primary authority in environmental protection and monitoring procedures, holding the authority for assessment, supervision, and sanctioning in coordination with Governorship structures at the local level;
- *General Directorate of Spatial Planning* identifies the procedures and guidelines related to environmental management plans in all scales; approves these plans and ensures that the plans are applied and monitored;
- *Provincial Environment, Urbanization and Climate Change Directorates* represent the Ministry within each Governorship and form part of the Provincial Administration. They act in accordance with the Ministry's and the Governorship's activities with regard to environmental issues.

Ministry of Agriculture and Forestry (MoAF)

MoAF is a relevant authority for the Project particularly in terms of nature conservation. The MoAF is made up of directorates including *General Directorate of Nature Protection and Natural Parks*, *General Directorate of Water Management* and *General Directorate of Combating Desertification and Erosion*. The Ministry has several affiliated institutions which include *General Directorate of State Hydraulic Works* (DSI), *General Directorate of Forestry*, *General Directorate of Meteorology* and *Turkish Water Institute*. The Ministry is responsible of:

- determining policies on protection, improvement, operation, rehabilitation and maintenance of forest areas; combating desertification and erosion; reforestation and pasture improvement on forestry;
- determining policies regarding nature conservation and designation of protected areas; to protect, manage, improve, operate (or having them operated) national parks, nature

parks, nature monuments, nature reserve area, wetlands, biological diversity and to protect wildlife;

- determining policies on conservation and sustainable use of water resources;
- determining policies and strategies related with monitoring meteorological events and taking relevant measures.

Ministry of Labour and Social Security (MoLSS)

MoLSS is a relevant authority for the Project in terms of occupational health and safety of the workers during construction phase and personnel during operation phase. Under the organization of Ministry, there are several divisions which are responsible from occupational health and safety including:

- *General Directorate of Occupational Health and Safety* defines standards of health and safety and coordinates all aspects associated with occupational health and safety;
- *Counselling and Inspection Directorate* functions through its labour inspectors, monitoring all activities related to health and safety at the workplace and reporting to the Ministry;
- *Regional Labour Directorates* are ministerial agencies at regional level, conducting monitoring and enforcement of labour law, particularly occupational health and safety.

3.1.2 Provincial Administration (Adana Province)

The highest authority at the provincial level is the Governor, who is directly responsible to the Ministry of Internal Affairs. Governors represent central government (i.e. the Council of Ministers) at the provincial level. Provincial directorates represent their respective ministries at provincial level and form the Provincial Administration under the authority of the Governor. Moreover, Mayor of the Metropolitan Municipality is the head of the municipal organization representing the metropolitan municipality in the provincial level.

3.1.3 Local Administration (Ceyhan District)

Mayors and Headmen are the heads of urban (over 2,000 inhabitants) and rural (under 2,000 inhabitants) settlements, respectively. A Mayor is the head of the municipal organization (Municipal Assembly and Municipal Council) and represents the municipality. In urban areas each neighbourhood also has a Headman. Both Mayor and Headmen are elected officials.

3.2 Turkish Regulatory Framework

3.2.1 Turkish Legal Framework

The legal framework in Turkey is governed by the Turkish hierarchy of norms, which defines the different categories of Parliamentary Act and controls legal precedence in cases of any conflict.

All parliamentary acts have to comply with Constitutional provisions and the constitutionality of these acts can only be contested at the Constitutional Court (*Anayasa Mahkemesi*). Parliamentary Acts are made up of Code Law (*Kanun*), Decree Law (*Kanun Hükmünde Kararname*) and Presidential Decree (*Cumhurbaşkanlığı Kararnamesi*). Code Law forms the backbone of the Turkish legal system and is the fundamental reference point for all courts. Decree Laws are legislation prepared by the Council of Ministers and Presidential Decree are legislation issued by the President.

Public administrative bodies, such as Ministries, are responsible for the execution of Parliamentary Acts and as such have the authority to develop secondary legislation to ensure implementation of these Acts. Secondary law includes:

- By-laws (*Tüzük*): Ministries (and in practice the Council of Ministers) are entitled to issue by-laws. These regulatory acts are examined by the Council of State (*Danistay*) before they are issued;
- Regulations (*Yönetmelik*): These are issued by Ministries as well as other public bodies with authority of execution. Regulations have to be in compliance with the relevant decrees. Even though they occupy a lower grade than Decrees in the hierarchy of norms, they are usually substituted for Decrees and tend to form the bulk of Turkish legislative documents;
- Circular orders (*Genelge*) and Communiques (*Tebliğ*): These are legislative documents issued by administrative bodies to ensure implementation of parliamentary acts. They are considered minor legislation, though prominent in certain fields.

3.2.2 Applicable Turkish Environmental, Health, Safety and Social Legislation

The key provisions of Environmental, Health, Safety and Social (EHSS) legislation considered relevant to the Project are summarized in Table 1 of Annex B in tabular format. The key permit requirements for the Project are indicated in the table along with the relevant provisions.

The national legislation that is applicable to the Project is presented below in Table 3-1:

Table 3-1. National Legislation

ASPECT	LEGISLATION
General	• *Environmental Law (No: 2872)* (Official Gazette date/no: 11.08.1983/18132) • *Forest Law (No: 6831)* (Official Gazette date/no: 08.09.1956/9402) • *Law on Pastures (No: 4342)* (Official Gazette date/no: 28.02.1988/23272) • *Law on Industrial Region (No. 4737)* (Official Gazette date/no: 19.01.2002/24645) • *Expropriation Law (No. 2942)* (Official Gazette date/no: 8.11.1983/18215) • *Coastal Law (No. 3621)* (Official Gazette date/no: 17.4.1990/20495) • *Public Health Law (No. 1593)* (Official Gazette date/no: 06.05.1930/1489) • *Zoning Law (No. 3194)* (Official Gazette date/no: 09.05.1985/18749) • *Law on Ports (No: 618)* (Official Gazette date/no: 20.04.1925/95) • *Law on Soil Preservation and Land Use (No: 5403)* (Official Gazette date/no: 19.07.2005/25880) • *Decree No. 7/16349 of the Council of Ministers on the Law on Ports* (Official Gazette date/no: 25.09.1978/16415) • *Regulation on Industrial Zones* (Official Gazette date/no: 6.8.2019/30854) • *Coastal Law Implementation Regulation (No. 3621)* (Official Gazette date/no: 3.8.1990/20594) • *Environmental Impact Assessment Regulation* (Official Gazette date/no: 29.07.2022 / 31907) • *Environmental Audit Regulation* (Official Gazette date/no: 12.06.2021/31509) • *Regulation on Environmental Management Services* (Official Gazette date/no: 30.07.2019/30847) • *Regulation on Environmental Permits and Licenses* (Official Gazette date/no: 10.09.2014/29115) • *Regulation on Workplace Opening and Working Permission* (Official Gazette date/no: 10.08.2005/25902) • *Regulation on Subcontractors* (Official Gazette date/no: 27.09.2008/27010) • *Regulation on Forbidden Military Zones and Security Zones* (Official Gazette date/no: 30.4.1983/18033) • *Regulation for Taking, Operating and Controlling Sand, Pebble Stone and Other Similar Materials* (Official Gazette date/no: 08.12.2007/26724) • *Technical Safety and Environment Regulation on Construction and Operation of BOTAŞ Crude Oil and Natural Gas Pipeline* (Official Gazette date/no: 4.7.2014/29050) • *Building Earthquake Regulation of Turkey* (Official Gazette date/no: 13.08.2021/31567)
Water Quality	• *Law on Groundwater (No. 167)* (Official Gazette date/no: 23.12.1960/10688)

ASPECT	LEGISLATION
	• *Law on Aquaculture (No. 1380)* (Official Gazette date/no: 04.04.1971/13799) • *Regulation on Aquaculture* (Official Gazette date/no: 10.3.1995/22223) • *Water Pollution Control Regulation* (Official Gazette date/no: 31.12.2004/25687) • *Regulation on Protection of Groundwater against Pollution and Deterioration* (Official Gazette date/no: 07.04.2012/28257) • *Regulation on Control of Pollution Caused by Hazardous Substances in Aquatic Environment* (Official Gazette date/no: 26.11.2005/26005) • *Regulation on Surface Water Quality* (Official Gazette date/no: 30.11.2012/28483) • *Regulation on Management of Quality of Bathing Waters* (Official Gazette date/no: 25.09.2019/30899) • *Regulation Concerning Water Intended for Human Consumption* (Official Gazette date/no:17.02.2005/25730) • *Communique on Administrative Procedures Regarding Water Pollution* (Official Gazette date/no: 10.10.2009/27372) • *Circular on River Beds and Floods (Circular No. 2006/27)* (Official Gazette date/no: 09.09.2006/26284) • *Regulation on Sea and Inland Waters Hydrographic Survey* (Official Gazette date/no: 09.08.2016/29796) • *Communique on Insurance Tariff and Instruction on Obligatory Financial Liability for Sea Pollution of Coastal Facilities* (Official Gazette date/no: 25.04.2018/30402)
Waste and Wastewater Management	• *Waste Management Regulation* (Official Gazette date/no: 02.04.2015/29314) • *Regulation on Waste Incineration* (Official Gazette date/no: 06.10.2010/27721) • *Regulation on Controlled Waste Storage* (Official Gazette Date/no: 26.03.2010/27533) • *Regulation on Control of Excavated Soil, Construction and Demolition Wastes* (Official Gazette date/no: 18.03.2004/25406 • *Medical Waste Control Regulation* (Official Gazette date/no: 25.01.2017/29959) • *Waste Oil Management Regulation* (Official Gazette date/no: 21.12.2019/30985) • *Packaging Waste Control Regulation* (Official Gazette date/no: 26.06.2021/31523) • *Regulation on Control of Waste Batteries and Accumulators* (Official Gazette date/no: 31.08.2004/25569) • *Regulation on Control of End of Life Tires* (Official Gazette date/no: 25.11.2006/26357) • *Regulation on Control of Waste Vegetable Oils* (Official Gazette date/no: 06.06.2015/29378) • *Regulation on Control of Waste Electrical and Electronic Equipment* (Official Gazette date/no: 22.05.2012/28300) • *Regulation on Reception of Wastes from Ships and Waste Control* (Official Gazette date/no: 26.12.2004/25682) • *Circular (2020/19) on Reception of Wastes from Ships* (Date: 08.07.2020) • *Zero Waste Regulation* (Official Gazette date/no: 12.07.2019/30829)

ASPECT	LEGISLATION
Air Quality	• *Industrial Sourced Air Pollution Control Regulation* (Official Gazette date/no: 03.07.2009/27277) • *Air Quality Assessment and Management Regulation* (Official Gazette date/no: 06.06.2008/26898) • *Regulation on the Control of Odorous Emissions* (Official Gazette date/no: 19.07.2013/28712) • *Regulation on Control of Exhaust Gas Emissions* (Official Gazette date/no: 11.03.2017/30004) • *Regulation on Reduction of Sulphur Ratio in Some Types of Fuel Oil* (Official Gazette date/no: 06.10.2009/27368) • *Regulation on Ozone Depleting Substances* (Official Gazette date/no:07.04.2017/30031) • *Regulation for the Follow-up of the Greenhouse Gas Emissions* (Official Gazette date/no:17.05.2014/29003) • *Notification on Monitoring and Reporting of the Greenhouse Gas Emissions* (Official Gazette date/no: 22.07.2014/29068)
Soil Contamination	• *Regulation on Soil Pollution Control and Point-Source Contaminated Sites* (Official Gazette date/no: 08.06.2010/27605)
Noise and Vibration	• *Regulation on the Assessment and Management of Environmental Noise* (Official Gazette date/no: 30.11.2022/32029) • *Regulation on Environmental Noise Generation due to Equipment Used in Open Space* (Official Gazette date/no: 30.12.2006/26392)
Chemicals Management and Hazardous Materials	• *Regulation on Safety Data Sheets for Hazardous Substances and Mixtures* (Official Gazette date/no: 13.12.2014/29204) • *Regulation on Registration, Evaluation, Permitting and Restrictions of Chemicals* (Official Gazette date/no: 23.06.2017/30105) • *Regulation on the Persistent Organic Pollutants* (Official Gazette Date/Number: 14.11.2018/30595) • *Regulation on the Classification, Labelling and Packaging of Hazardous Substances and Mixtures* (Official Gazette Date/Number: 11.12.2013/28848) • *Regulation on Road Transportation of Dangerous Goods* (Official Gazette date/no: 18.06.2022 / 31870) • *Communiqué on Recycling of Certain Non-hazardous Wastes* (Official Gazette date/no: 17.06.2011/27967) • *Regulation on Fluorinated Greenhouse Gases* (Official Gazette Date/No: 29.06.2022/ 31881) • *Communiqué on Road Transportation of Wastes* (Official Gazette date/no: 20.03.2015/29301)
Cultural Heritage	• *Law on Preservation of the Cultural and Natural Assets (No: 2863)* (Official Gazette date/no: 23.07.1983/18113) • *Regulation on Research, Drilling and Excavation of Cultural and Natural Assets* (Official Gazette date/no: 10.08.1984/18485)
Protected Areas and Ecology	• *Law on Olive Improvement and Grafting of Wild Species (No. 3573)* (Official Gazette date/no: 7.2.1939/4126) • *Law on Terrestrial Hunting (No: 4915)* (Official Gazette date/no: 11.07.2003/25165) • *Law no 2873 on National Parks* (Official Gazette date/no: 09.08.1983/18132)

ASPECT	LEGISLATION
	• *Regulation on Protection of Wetlands* (Official Gazette date/no: 04.04.2014/28962) • *Regulation on Wildlife Protection and Wildlife Development Areas* (Official Gazette date/no: 08.11.2004/25637)
Energy Management	• *Regulation on Energy Efficiency in Buildings* (Official Gazette date/no: 05.12.2008/27075) • *Regulation on Monitoring Greenhouse Gas Emissions* (Official Gazette Date/No: 17.05.2014/29003) • *Communique on Monitoring and Reporting of the Greenhouse Gas Emissions* (Official Gazette Date/No: 22.07.2014/29068) • *Regulation on Electric Power Installations* (Official Gazette date/no: 30.11.2000/24246)
Emergency Response	• *Law Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances (No. 5312)* (Official Gazette date/no: 11.03.2005/25752) • *Implementation Regulation on Law Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances* (Official Gazette date/no: 21.10.2006/26326) • *Regulation on Prevention of Major Industrial Accidents and Mitigation of Resulting Impacts* (Official Gazette Date/No: 02.03.2019/30702) • *Regulation on the Protection from Sabotage* (Official Gazette date/no: 28.12.1988/20033) • *Communiqué Concerning the Major Accident Scenario Document to be issued for Major Industrial Accidents* (Official Gazette date/no: 30.06.2020/31171)
Occupational Health and Safety	• *Occupational Health and Safety Law (No: 6331)* (Official Gazette date/no: 30.06.2012/28339) • *Occupational Health and Safety Risk Assessment Regulation* (Official Gazette date/no: 29.12.2012/28512) • *Regulation on the Provisions of Occupational Health and Safety Training of* Employees (Official Gazette date/no: 15.05.2013/28648) • *Regulation on Occupational Health and Safety Services* (Official Gazette date/no: 29.12.2012/28512) • *Communiqué on Danger Class Lists Related to Occupational Health and Safety* (Official Gazette date/no: 26.12.2012/28509) • *Regulation on Duties, Authority, Responsibilities and Trainings of Occupational Health and Safety Specialists* (Official Gazette date/no: 29.12.2012/28512) • *Regulation on the Occupational Health and Safety Committees* (Official Gazette date/no: 18.01.2013/28532) • *Regulation on the Health and Safety Measures to be taken in Workplace Buildings and Additions* (Official Gazette date/no: 17.07.2013/28710) • *Regulation on Health and Safety at Construction Works* (Official Gazette date/no: 05.10.2013/28786) • *Regulation on the Tasks, Authority, Responsibility and Education of On-Site Doctor and Other Health Personnel* (Official Gazette date/no: 20.07.2013/28713) • *Regulation on Health and Safety Requirements in the Use of Work Equipment*

ASPECT	LEGISLATION
	(Official Gazette date/no: 25.04.2013/28628) • *Regulation on Manual Handling* (Official Gazette date/no: 24.07.2013/28717) • *Regulation on Protection of Buildings from Fire* (Official Gazette date/no: 19.12.2007/26735) • *Regulation on the Emergency Cases in Workplaces* (Official Gazette date/no: 18.06.2013/28681) • *Regulation on the Use of Personal Protective Equipment in Workplaces* (Official Gazette date/no: 02.07.2013/28695) • *Regulation on Safety and Health Signs* (Official Gazette date/no: 11.09.2013/28762) • *First Aid Regulation* (Official Gazette date/no: 29.07.2015/29429) • *Regulation on the Protection of the Workers against Risks Relevant to Noise* (Official Gazette date/no: 28.07.2013/28721) • *Regulation on the Protection of the Workers against Vibration Risks* (Official Gazette date/no: 22.08.2013/28743) • *Regulation on the Control of Dust Emissions* (Official Gazette date/no:05.11.2013/28812) • *Regulation on Occupational Health and Safety in Temporary or Fixed Term* Employment (Official Gazette date/no: 23.08.2013/28744) • *Regulation on Health and Safety Measures in Works with Chemical Substances* (Official Gazette date/no: 12.08.2013/28733) • *Regulation on Protection of Workers from Dangers of Explosive Environments* (Official Gazette date/no: 30.04.2013/28633) • *Regulation on Machinery Safety* (Official Gazette date/no: 03.03.2009/27158) • *Regulation on Occupational Training of the Employee to Work in Dangerous and Very Dangerous Class Workplace* (Official Gazette date/no:13.07.2013/28706) • *Law on the Protection of Life and Property at Sea (No. 4922)* (Official Gazette date/no: 14.6.1946/6333)
Labour and Working Conditions	• *Labour Law (No: 4857)* (Official Gazette date/no: 10.06.2003/25134) • *Regulation on Working Duration Related to Labour Law* (Official Gazette date/no: 06.04.2004/25425) • *Regulation on Excess Work and Work in Excess Periods on Labour Law* (Official Gazette date/no: 06.04.2004/25425) • *Regulation on Special Principles in Works Carried out by Employing Workers in Shifts* (Official Gazette date/no: 07.04.2004/25426) • *Regulation on the Minimum Wage* (Official Gazette date/no: 01.08.2004/25540) • *Regulation on Suspension of Work in Workplaces* (Official Gazette date/no: 30.03.2013/28603) • *Regulation on Health and Safety Measurements Related to Carcinogens and Mutagens at Work* (Official Gazette date/no: 06.08.2013/28730) • *Regulation on the Works in Which Workers Shall Work Maximum Seven and Half Hours or Less in a Day in Terms of Health Rules* (Official Gazette date/no: 16.07.2013/28709) • *Regulation on the Procedures and Principles for the Employment of Children and Young Persons*

ASPECT	LEGISLATION
	(Official Gazette date/no: 06.04.2004/25425)

3.3 International Requirements

3.3.1 Overview

The ESIA has been prepared in accordance with recognized international financing requirements namely the Equator Principles, International Finance Corporation (IFC) Performance Standards (PSs) and European Bank for Reconstruction and Development (EBRD) Performance Requirements (PRs) as listed below:

Equator Principles IV (dated July 2020)

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

IFC Performance Standards (dated January 2012)

PS 1: Assessment and Management of Environmental and Social Risks and Impacts
PS 2: Labour and Working Conditions
PS 3: Resource Efficiency and Pollution Prevention
PS 4: Community Health, Safety and Security
PS 5: Land Acquisition and Involuntary Resettlement
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
PS 7: Indigenous Peoples
PS 8: Cultural Heritage

EBRD Performance Requirements (dated April 2019)

PR 1: Assessment and Management of Environmental and Social Risks and Impacts
PR 2: Labour and Working Conditions
PR 3: Resource Efficiency and Pollution Prevention and Control
PR 4: Health, Safety and Security
PR 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
PR 7: Indigenous Peoples
PR 8: Cultural Heritage
PR 9: Financing Intermediaries
PR 10: Information Disclosure and Stakeholder Engagement

IFC PS 1, EBRD PR 1 and Equator Principles IV establish the importance of (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them (EBRD through PR 10 and Equator Principles IV, Principle 5); and (iii) the client's management of environmental and social performance throughout the life of the project. IFC PS/ EBRD PR 2 through 8 provide guidance on particular topic areas that maybe relevant to an assessment, such as biodiversity conservation, climate-related standards, resettlement or cultural heritage issues. The applicable IFC PSs and EBRD PRs are discussed in *Chapter 4: Scope and Methodology of the ESIA and Stakeholder Engagement.*

In addition to the IFC PSs, EBRD PRs and Equator Principles IV, the ESIA will also take into account the IFC Environmental, Health and Safety (EHS) General Guidelines, IFC EHS Guidelines for Large Volume Petroleum-based Organic Chemicals Manufacturing, IFC EHS Guidelines for Petroleum-based Polymers Manufacturing, EBRD Sub-sectoral Environmental and Social Guidelines for Manufacture of Chemicals, EBRD's Access to Information Policy (2019) and relevant European Union (EU) Directives and other relevant international guidelines. Moreover, relevant Best Available Techniques Reference Document (BREF) and Best Available Techniques (BAT) documents will be identified to define actions which guarantee that the Project will respect BREFs and BAT Conclusions once in operation and remain compliant with these. In order to achieve this, a high-level BAT assessment will be undertaken.

Furthermore, EBRD PRs require projects to comply with the relevant EU environmental requirements in addition to the applicable national laws and regulations. The list of EU Directives that may be relevant to the Project is given in Section 3.3.2.

3.3.2 Key Legislation in European Union and International Reference Documents

Key Legislation in European Union and International Reference Documents that are relevant to the Project are presented below:

General Provisions/Programmes

- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment
  (Official Journal/Date: L124/16.4.2014; Entry into force: 25.01.2014);
- Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
  (Official Journal/Date: L334/17.12.2010; Entry into force: 06.01.2011);

- Directive 2015/2193 of the European Parliament and of the Council of 25 November 2015 Limitation of emissions of certain pollutants into the air from medium combustion plants
  (Official Journal/Date: L313/28.11.2015; Entry into force: 18.12.2015);
- Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information
  (Official Journal: L41, 14.02.2003; Entry into force: 14.02.2003);
- Directive 2008/68/EC of the European Parliament and of the Council of 24 September 2008 on the inland transport of dangerous goods
  (Official Journal: L260/13, 30.09.2008; Entry into force: 20.10.2008);
- Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC Text with EEA relevance
  (Official Journal: L197/13, 4.7.2012; Entry into force: 24.7.2012).

Water Protection and Management

- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
  (Official Journal/Date: L327/22.12.2000; Entry into force: 22.12.2000; last amended on 20.11.2014);
- Council Directive 91/271/EEC of 21 May 1991 concerning urban wastewater treatment
  (Official Journal/Date: L135/30.05.1991; Entry into force: 19.06.1991; last amended on 01.01.2014);
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December of 2006 on the protection of groundwater against pollution and deterioration
  (Official Journal/Date: L372/19 27.12.2006; last amended on 11.07.2014).

Monitoring of Atmospheric Pollution

- Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
  (Official Journal/Date: L152/11.06.2008; Entry into force: 11.06.2008; last amended on 18.09.2015);
- Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air
  (Official Journal/Date: L23/26.01.2005; Entry into force: 15.02.2005; last amended on 18.09.2015).

Prevention of Noise Pollution

- Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise
  (Official Journal/Date: L189/18.07.2002; Entry into force: 18.07.2002; last amended on 26.07.2019).

Conservation of Wild Fauna and Flora

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
  (Official Journal/Date: L206/22.7.1992; Entry into force: 10.6.1992; last amended on 01.07.2013);
- Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (Official Journal/Date: L20/26.1.2010; Entry into force: 26.1.2010; last amended on 26/06/2019).

Waste Management

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
  (Official Journal/Date: L312/22.11.2008; Entry into force: 12.12.2008; last amended on 05.07.2018).

BAT

- Commission Implementing Decision (EU) 2016/902 of 30 May 2016 establishing BAT conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for common wastewater and waste gas treatment/ management systems in the chemical sector;
- Commission Implementing Decision (EU) 2017/1442 of 31 July 2017 establishing BAT conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants.

BREF

- Best Available Techniques Reference Document for Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector (2016);
- Reference Document on Best Available Techniques on the Production of Polymers (August 2007);
- Reference Document on Best Available Techniques on Emissions from Storage (July 2006);

- Reference Document on Best Available Techniques on Energy Efficiency (February 2009);
- Reference Document on the application of the Best Available Techniques to Industrial Cooling Systems (December 2001).

The Republic of Turkey has either ratified or signed various international conventions on the protection of environment and sustainable development. Project related international conventions are listed below:

Air Quality

- United Nations Economic Commission for Europe Convention on Long-range Transboundary Air Pollution (CLRTAP) (Geneva, 1979) (Ratification date: 18 April 1983);
- United Nations Framework Convention on Climate Change (1992) (Ratification date: 24 May 2004);
- Kyoto Protocol to United Nations Framework Convention on Climate Change (1997) (Ratification date: 26 August 2009);
- Convention for the Protection of the Ozone Layer (Vienna, 1985) (Ratification date: 20 September 1991);
- Montreal Protocol on Substances that Deplete the Ozone Layer (1987) (Ratification date: 19 December 1991).

Biological Diversity

- Convention on Biological Diversity (Rio, 1992) (Ratification date: 27 December 1996);
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979) (Ratification date: 20 February 1984);
- International Convention for the Protection of Birds (Paris, 1950) (Ratification date: 14 June 1967).

Cultural Heritage

- European Convention on the Protection of the Archaeological Heritage (Valletta Agreement, 1992) (Ratification date: 05 August 1999);
- Convention concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972) (Ratification date: 14 February 1983).

Marine Pollution Prevention

- International Convention for the Prevention of Pollution from Ships (MARPOL-73 Convention), as modified by the Protocol (MARPOL-78 Protocol) (1983) (Ratification date: 24 June 1990);

  Annexes to the MARPOL; Annex I, Annex II and Annex V (Ratification date: 24 June 1990); Annex III and Annex IV (Ratification date: 14 January 2015); MARPOL 1997 Protocol – Annex VI (Ratification date: 4 February 2014);

- International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM, 2004) (Ratification date: 14 October 2014);
- International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKERS, 2001) (Ratification date: 26 February 2013);
- International Convention on the Establishment of an International Fund for Compensation of Oil Pollution (FUND 1992) (Ratification date: 17 August 2002);
- The 2003 Protocol to the International Convention on the Establishment of an International Fund for Compensation of Oil Pollution (FUND 2003) (Ratification date: 25 November 2011);
- International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC 1990) (Ratification date: 11 June 2003);
- Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS 2000), (Ratification date: 27 June 2013);
- International Convention on Civil Liability for Oil Pollution Damage (CLC 1992) (Ratification date: 27 July 2001);
- International Convention on Salvage (SALVAGE 1989), (Ratification date: 24 May 2014)**;**
- The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, Barcelona Convention (1976) (Ratification date: 06.04.1981):
  - Dumping Protocol (from ships and aircraft);
  - Prevention and Emergency Protocol (pollution from ships and emergency situations);
  - Land-based Sources and Activities Protocol;
  - Specially Protected Areas and Biological Diversity Protocol;
  - Offshore Protocol (pollution from exploration and exploitation);
  - Hazardous Wastes Protocol;
  - Protocol on Integrated Coastal Zone Management (ICZM).

Transboundary impacts

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, 1989) (Ratification date: 22 June 1994).

Others

- United Nations the Stockholm Convention on Persistent Organic Pollutants, POPs (Stockholm, 2001) (Ratification date: 12 January 2010);
- Energy Charter Treaty (ECT, 1994) (Ratification date: 12 July 2000);
- European Landscape Convention (Florence, 2000) (Ratification date: 10 June 2003).

3.4 Comparison of Turkish and International Environmental Thresholds

The comparison of the Turkish and international environmental thresholds is summarized in Table 3, Table 4, Table 5 and Table 6 of Annex B.

3.5 Permits

Apart from the decision about establishment of CPIR and the allocation of land for the Project, EIA and zoning plan decisions are required for the Project as pre-construction arrangements. After that construction works start with the construction permit and building usage certificate. Since CPIR is designated as a special industrial zone, the building certificate and construction permit are issued by the Provincial Directorate of Industry and Technology, which operates under the Ministry of Industry and Technology. At present, National EIA and Zoning Plan approvals for the Project have been secured. Following the completion of the construction works, a temporary operating permit and then an operating permit will be obtained during operation phase. The Project Company is conducting a study for all permit processes, and the permit list required for the Project are summarized in Table 3-2. In addition, information on the key permits and responsible party who will provide the permit is given in including the details of the permits are summarized in Table 3-3. More detailed information on national legislation and required permits as well as consents are provided in Annex B.

Table 3-2. Summary of the Permits

No.	Permit		Project Company (Employer)	EPC Contractor	Remarks
1	Energy Performance Certificates for buildings	Energy Performance Certificate-Regulation on Energy Performance in Buildings, Clause-25, Number:27075, Date:05.12.2008	S	X	Under EPC Contractor's responsibility
2	Construction License	Construction License-Planned Areas Type Zoning Regulation Clause- 57, Date:02.11.1985, Number:18916		X	Preparation of Relevant Documents and Contracts – Project Company and EPC Contractor.

No.	Permit		Project Company (Employer)	EPC Contractor	Remarks
					Follow-up, license application and permit receipt by EPC Contractor.
3	Industrial Registry Certificate	Industrial Registry Certificate-Industrial Registry Law 6248	X	S	-
4	Zoning Plans Approval (Master plan 1/5000, Zoning implementation plan 1/1000)	Zoning Plan Approval-Zoning Law 3194 (Site Prep will be taken on time)	-	-	Under Ceyhan Petrokimya Yönetim A.Ş. responsibility
5	EIA Positive Certificate	Environmental Impact Assessment Document-Environmental Impact Assessment Regulation Date: 29.07.2022, Number: 31907	X	S	EPC Contractor responsibility defined under the Contract. Project Company utilized FEED as baseline for application
6	Activity Preliminary Information Sheet	Activity Preliminary Information Form-Regulation on Control of Soil Pollution and Point Source Contaminated Sites, Annex-2, Table:2, Date:08.06.2010, Number:27605	Note 1	Note 1	See note 1
7	Temporary Activity Certificate ("preliminary" environmental permit and license)	Temporary Activity Permit-Regulation on Permits and Licenses Required by the Environmental Law, Annex-3B, Number:27214, Date 29.04.2009	Note 1	Note 1	See note 1
8	Approval regarding Emissions from the Provincial Directorate	Provincial Directorate Compliance Letter	Note 1	Note 1	See note 1
9	Wastewater Treatment Facility Project Approval (for operation phase)	Waste Water Treatment Plant Project Approval	Note 1	Note 1	See note 1
10	Other prerequisites: EIA Positive Decision, Building Utilization Permit, Capacity Report, Operation Certificate, Emergency Response Plan (incl. Fire Safety Report), Waste Reception	Other Requirements: Environmental Impact Assessment Positive Certificate, Building Occupancy Permit, Emergency Plan (including Fire Safety Report) and Waste Acceptance Facility Approval Certificate Capacity Report-Industry Registry Law 6248 in accordance with the Regulation on Receiving Waste from Ships and Control of Waste, dated 26.12.2004 and numbered 25682	Note 1	Note 1	See note 1

No.	Permit		Project Company (Employer)	EPC Contractor	Remarks
	Facility Approval				
11	Capacity Report	(To be obtained)	Note 2	Note 2	See note 2
12	Operation Certificate	Regulation on Operating Certificate-Operating Certificate, Date:04.12.2009,Number:27422	X	-	
13	Building Utilization Permit	Building Utilization Permit-Planned Areas Type Zoning Regulation	Note 1	Note 1	See note 1
14	Work Place Opening and Operation License	Business and Operating License - Regulation on Business and Work Licenses,Date:10.08.2005,Number:25902 (GSM permission)	Note 1	Note 1	See note 1
15	Fire Safety Report	Fire Report-Regulation on Fire Protection of Buildings, Item-5,Date:19.12.2007,Number:26735	Note 1	Note 1	See note 1
16	Environmental Permit and License, including:	Environmental Permit and License-Regulation on Permits and Licenses Required by Environmental Law, Annex-3C, Number:27214,Date 29.04.2009	Note 1	Note 1	See note 1
17	Wastewater Discharge Permit	Waste Water Discharge Permit-Water Pollution Control Regulation	Note 1	Note 1	See note 1
18	Hazardous Substances Discharge Permit	Hazardous Substance Discharge Permit-Regulation on Control of Pollution Caused by Hazardous Substances in Water and Its Around	Note 1	Note 1	See note 1
19	Air Emissions Permit	Emission Permit-Industrial Air Pollution Control Regulation	Note 1	Note 1	See note 1
20	Noise Control Permit	Noise Control Permit-Regulation on Evaluation and Management of Environmental Noise	Note 1	Note 1	See note 1
21	Waste Reception License	Waste Acceptance License-Regulation on Receiving Waste from Ships and Control of Wastes	Note 1	Note 1	See note 1
22	Location Selection and Facility Construction Permit	Site Selection and Facility Establishment Permit-Regulation on Opening a Business and Working Licenses, Date:10.08.2005, Number:25902	Note 1	Note 1	See note 1
23	Temporary Hazardous	Temporary Waste Storage Permit-Regulation on Control	Note 1	Note 1	See note 1

No.	Permit		Project Company (Employer)	EPC Contractor	Remarks
	Waste Storage Permit (operation phase)	of Hazardous Wastes (Provincial Directorate)			
24	Waste Management Plan	Waste Management Plan-Regulation on Control of Hazardous Wastes	Note 1	Note 1	See note 1
27	Internal and External Emergency Plans	External and Internal Emergency Plans-Regulation on the Control of Major Industrial Accidents Date: 18.08.2010 Number:27678	Note 1	Note 1	See note 1
25	Seveso Notification	Seveso Statement-Regulation on the Control of Major Industrial Accidents Date: 18.08.2010 Number:27678	Note 1	Note 1	See note 1
26	Safety Report	Safety Report-Regulation on the Control of Major Industrial Accidents Date: 18.08.2010 Number:27678	Note 1	Note 1	See note 1
27	Coastal Facility Emergency Response Plan	Coastal Facility Emergency Plan-Implementation Regulation of the Law on the Principles of Emergency Response and Compensation for Damages in Pollution of the Marine Environment with Oil and Other Harmful Substances, Date:21.10.2006 Number:26326	Note 1	Note 1	See note 1
28	Operation Permit for Coastal Facilities	Operation Permit for Coastal Facilities-Regulation on Procedures and Principles for Granting Operational Permit for Coastal Facilities ISPS Certificate-International Ship and Port Security Certificate	Note 1	Note 1	See note 1
29	ISPS (International Ship and Port Facility Security Code) Certificate and related approvals	NA	Note 1	Note 1	See note 1
30	Construction Inspection Service Contract	NA	Note 1	Note 1	See note 1
31	Chemical Inventory to be registered and submitted to the MoECC (operation phase)	Chemical Inventory-About Inventory and Control of Chemicals Regulation Date: 26.12.2008 Number:27092	Note 1	Note 1	See note 1

No.	Permit		Project Company (Employer)	EPC Contractor	Remarks
32	Greenhouse Gas Emission Reporting (annual)	NA	Note 1	Note 1	See note 1
33	Workplace Notification (operation phase)	Workplace Notice-Labor Law 4857 Clause -3	Note 1	Note 1	See note 1
34	Permit for Use of Wireless Radio, Radio certificate (operation phase)	Permission to Install and Use Radio-Electronic Communications Law 5809 –Clause- 37	Note 1	Note 1	See note 1
35	Private Security Services Permit (operation phase)	Private Security Permit-Law on Private Security Services 5188 Clause-3	Note 1	Note 1	See note 1
36	Submittal of Waste Transportation Forms (following each waste dispatch) (operation phase)	Monthly Sending the Copies of the Prepared Waste Transportation Forms to the Provincial Environment Directorates-Regulation on Control of Hazardous Wastes, Date:14.03.2005,Number:25755	Note 1	Note 1	See note 1
37	Natural Gas Utilization Contract	Natural Gas Utilization Contract	Note 1	Note 1	See note 1
38	License for using radioactive equipment, related hazard status plan (operation phase)	Radioactive Device License-Radiation Safety Regulation, Clause: 50, Date: 24.03.2000,Number:23999	Note 1	Note 1	See note 1
39	Electricity Supply Agreement with Türkiye Elektrik İletim A.Ş (TEİAŞ)	NA	X	NA	NA
40	Right of Construction	Right of Construction	X	S	NA
41	Lease Agreements for the Forestry Land and the Sea Surface	NA	X	-	
42	DLH Project Approval (for jetties)	NA	Note 1	Note 1	See note 1
43	DLH Project Implementation Approval (for jetties)	NA	Note 1	Note 1	See note 1
44	Entrepot Permit (if required)	Antrepo Permit	Note 1	Note 1	See note 1

No.	Permit		Project Company (Employer)	EPC Contractor	Remarks
45	Tie-in connection related permit	NA	Note 2	Note 2	See note 2
46	Raw water related permit	NA	Note 2	Note 2	See note 2

X: Responsibility;
- Submission document and get signature,
- Attendance at meetings with third parties,
- Translation into Turkish.

S: Support;
- Revision of related documents within EPC Contractor's scope of work in accordance with Project Company (EPC Contractor) and authority's comments

NA: Not Applicable;

Notes:
Note 1: Contractor shall be responsible if required for Construction;
Note 2: Not required. If Req'd, all related directly linked for construction to be under EPC Contractor's responsibility.

Table 3-3. Permits and Responsibilities

No.	Activity	Responsibility		Remarks
		Project Company (Employer)	EPC Contractor	
PERMITS REQUIRED PRIOR TO CONSTRUCTION				
P.1 ZONING PLAN				
P.1.1	Zoning Maps (1/1000-1/5000) Offshore & onshore	-		Under Ceyhan Petrokimya Yönetim A.Ş. responsibility
P.2 PARCELLING PLAN				
P.2.1	Parcelling Plan	-		Under Ceyhan Petrokimya Yönetim A.Ş. responsibility
P.3 ENVIRONMENTAL IMPACT PERMITS (NATIONAL EIA)				National EIA Process has been finalized and EIA Positive Certificate is granted. ESIA Process required for the Lenders is ongoing.
P.3.1	National Environmental Impact Assessment Report for the Industrial Facilities	X	S	EPC Contractor is responsible from providing the data generated during FEED for ESIA and national EIA studies.
P.3.2	National Environmental Impact Assessment Report for the Jetty	X	S	EPC Contractor is responsible from providing the data generated during FEED for ESIA and national EIA studies.

No.	Activity	Responsibility		Remarks
		Project Company (Employer)	EPC Contractor	
P.3.3	ESIA	X	S* (ESIA Report attached to Schedule 2 (Project Definition) to the Contract will be responsibility of Contractor)	EPC Contractor is responsible from providing the data generated during FEED for ESIA and EIA studies. ESIA draft report will be attachment to EPC Contract. EPC Contractor will support Project Company through the process of permitting with authorities and lender advisor due diligence as required within Contractor's deliverables and their back-up documents.
P.4- PROJECT APPROVALS REQUIRED FOR CONSTRUCTION PERMIT				Project Company will lead the activity and Contractor to provide all required documentation. EPC Contractor will provide to Project Company Letter of Attorney to follow-up the application. All required contracts, public notary and other fees to be part of EPC Contractor.
P.4.1	Project Approvals Offshore & onshore	S	X	EPC Contractor is responsible by FEED that is base of application. EPC Contactor will provide all required documentation and Project Company will support Contractor.
P.5- USUFRUCT				
P.5.1	Usufruct Agreement Offshore & onshore	X	S	
P.6- CONSTRUCTION PERMIT				Construction permit is the responsibility of EPC Contractor. Project Company will support EPC Contractor.
P.6.1	Construction Permit Offshore & onshore	S	X	All required permits.
P.6.2	Excavation and Blasting (if required) Permit	S	X	Soil disposal fees to part of EPC Contractor.

No.	Activity	Responsibility		Remarks
		Project Company (Employer)	EPC Contractor	
PERMITS REQUIRED DURING CONSTRUCTION				
P.7- CONSTRUCTION UTILITY SUPPLY				EPC Contractor will be responsible for utility supply during construction including the related contracts with authorities. All required contracts and fees to be part of EPC Contractor.
P.7.1	Power, water, etc. connection	S	X	Utility cost during construction will be part of EPC Contractor.
P.8- PROJECT APPROVALS DURING CONSTRUCTION (PAC)				Approvals will be the responsibility of EPC Contractor. Project Company will support EPC Contractor.
P.8.1	Project Approvals Offshore & onshore	S	X	
P.8.2	Third Party Inspection Work Completion Report, work completion certificate	S	X	Third Party Inspection Company (YD Company) fees is a part of EPC Contractor.
P.9- ENVIRONMENTAL PERMITS (before PAC)				
P.9.1	Temporary Waste Storage Permit	S	X	
P.9.2	Industrial Waste Management Plan Approval	S	X	
P.9.3	Annual Waste Declaration Approval	S	X	
P.9.4	Waste Permit	S	X	
P.9.5	Hazardous Material Operation Certificate	S	X	
P.10- OCCUPANCY PERMIT				Approvals will be the responsibility of EPC Contractor. Project Company will support EPC Contractor.
P.10.1	Occupancy Permit Offshore & onshore	S	X	Elevator Use Approval Document, Gas System Properness Letter, Telephone System Properness Letter, Social Security Organization Clearance Letter, Sewer License and Approval, Tax Clearance Document, Occupancy Letter, Property Tax

No.	Activity	Responsibility		Remarks
		Project Company (Employer)	EPC Contractor	
				Clearance Letter, Application Plan, Telecom System Properness Document, Shelter Properness Report, Third Party Inspection Company Work Completion Report, Fire Approval Letter, etc.
OPERATING PHASE				
P.11- OPERATING PERMITS				Project Company is responsible from all of the permits and licenses.
P.11.1	Security Permit Certificate	X	S	
P.12- OPERATING LICENSE				
P.12.1	Operating License Offshore & onshore	X	S	
P.12.2	EPDK (Energy Market Regulatory Authority) - LPG import and processing permit	X		
P.13- ENVIRONMENTAL PERMITS (on/after PAC)				
P.13.1	Temporary Waste Storage Permit	X		Permit based on plant hand-over to Project Company.
P.13.2	Annual Waste Declaration	X		Permit based on plant hand-over to Project Company.
P.13.3	Certificate of Temporary Activity (Waste Water Treatment Facility)	X		Permit based on plant hand-over to Project Company.
P.13.4	Discharge Quality Control (Waste Water Treatment Facility)	X		Permit based on plant hand-over to Project Company.
P.13.5	Industrial Waste Management Plan Approval	X		Permit based on plant hand-over to Project Company.
P.13.6	Hazardous Material Operation Certificate	X		Permit based on plant hand-over to Project Company.
P.13.7	Dust, Noise and discharge permissions	X		Permit based on plant hand-over to Project Company.

Note) Definitions for X & S are as below;
X : Responsibility;
- Submission document and get signature,
- Attendance at meetings with third parties,
- Translation into Turkish.

S : Support;
- Revise of related documents in accordance with Project Company /Contractor and authority's comments,
- Preparation of responses to agency inquiries in English.

3.6 Management of Change

Due to the nature of the work, project changes may occur both during the pre-construction design phase and while the construction works are in progress. This affects the permit processes depending on the changes (especially the project limits and project capacity changes and the changes that may occur in the processes). In this context, it is necessary to work on the local EIA process, plan decisions and other necessary permits before construction regarding the changes made. These studies cover:

- Informing the relevant authorities;
- Carrying out the necessary work if the relevant authorities deem it necessary;
- Accordingly, the renewal of the plan decisions;
- Renewal of building permit, building occupancy certificate and construction permits; and
- Obtaining other relative permits.

To date, changes have been made regarding the project in line with the opinions received from the institutions during the EIA phase and depending on the results of the current situation studies. All of these changes have been shared with the relevant authorities, and all permits, including the EIA Document, have been revised.

There have been changes made in the Project during FEED design and detail design phases. These changes, their impacts on National EIA processes and resolutions are summarized in Table 3-4 given below.

Table 3-4. Project Changes Made During EIA Process

Change	Remark	National EIA	ESIA	Further Action
Position of the jetty is shifted to the northeast.	During the national EIA Process, BOTAŞ Port authority requested the shift of the jetty to northeast to eliminate manoeuvring risks. Due to that reason position of the jetty shifted to northeast.	Jetty and Propane Storage Tank, which is called as Terminal Facility, is covered in the design of CPIR Port Project. Location changes already adopted to new layout of the CPIR Port Project and National EIA Positive Decision is secured.	Jetty is considered as associated facility for the Project, and New location of the jetty is situated within the study area. The ESIA study was conducted to cover this change.	No action is required
Position of the main flare is changed, and the area located northwest of the ancient waterway excluded from the process area.	During both EIA and ESIA baseline studies, an ancient waterway is found in the area covering old process layout. In order to avoid long potential term impact on ancient	Position change of the main flare is adopted to the Project, and National EIA Positive Decision is secured.	Location change is considered as a good practice implementation. New location of the flare is defined in the process area.	No action is required

Change	Remark	National EIA	ESIA	Further Action
	waterway, Project Company decided to exclude the area located northwest of the ancient waterway			
Blasting is planned to be used during excavation work instead of conventional methods	During FEED design, blasting is planned to be used in order to speed up excavation works.	Blasting is mentioned in the National EIA Report as one of the excavation method. As given commitment in the EIA Report, *"Project Company will inform the MoEUCC if blasting is chosen as excavation method, and a specific study regarding blasting design will be performed by the Project Company*". This study has already been performed and provided to relevant authorities.	Potential impacts of the blasting in terms of noise, vibration and air quality are included in the ESIA Process. Additionally, potential impact of blasting on cultural assets such as ancient waterway is already covered in the ESIA	No further action is required.
CPIR Management contact with the Project Company in order to use excavated material for backfilling of the CPIR Port Project	According to the construction methodology, excavated material will be sent to the existing disposal sites operated by the Adana Metropolitan Municipality. During the detailed design phase, CPIR Management contacted with the Project Company to use this material for backfilling of the CPIR Port Project.	CPIR Port Project requires a large amount of backfilling material. According to the National EIA Report of the CPIR Port Project this material will be supplied from existing operation quarries and from the excavated material that will be obtained as a result of the excavations to be carried out within the boundaries of the Ceyhan Industrial Zone. National EIA of the Project covers existing methodology regarding usage of excavated materials, including backfilling of the CPIR Port Project	CPIR Port Project considered as a third party project, which is covered in cumulative impact assessment as part of the ESIA Process.	No further action is required by the Project Company.
Terminal Facility including jetty and	According to the feed design,	According to the licensing	During the initial phase of the ESIA	No further action is required.

Change	Remark	National EIA	ESIA	Further Action
propane tank excluded from investment program of the Project	Terminal Facility was one of the operational part of the Project, and it was covered same investment package with the project. On the other hand, during detailed design phase, the Project Company decided to exclude the Terminal Facility from the investment	perspective, Terminal Facility is covered in the CPIR Port Project, and it was included in the National EIA Decision of the CPIR Port Project. Due to that reason, there will be no change required for the National EIA Decision of the Project.	works, Terminal Facility was considered as one of the main operational unit of the Project. According to the new investment design Terminal Facility is considered as associated facility. Draft ESIA Report is revised according to the new investment design.	

The ESIA is assessed impacts and developed mitigation measures for the Project. Any changes to the design within the Project area will be assessed and it is assumed that re-assessment will not be required if the EPC Contractor complying with the mitigation measures set out in the ESIA. On the other hand, changes beyond the Project area and/or major process changes will require screening and may be subject to assessment, and will require approval from the Project Company, and potentially the Lenders where there are material changes. This process will be set out in the Management of Change Procedure (MCP). The MCP provides a process for determining how the potential environmental and social implications of design changes are assessed. The assessment of any design changes ensures appropriate mitigation is identified and implement to avoid or minimize any adverse effect results from a design change.

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER-4)

FEBRUARY 2023

ANKARA

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Version	Revision	Date	Prepared By	Quality Management By	Checked By		Approved By
Draft	A.0	March 2021	Yasemin Çelikel (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)		Elif Doğru (RINA)
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	A.2	October 2021	Şeyma Geyik (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)		Elif Doğru (RINA)
	A.3	December 2021	Şeyma Geyik (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Buket Mesta (2U1K)	
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PROJECT NO: 21/003

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CLIENT:

Ceyhan Polipropilen Üretim A.Ş
Portakal Çiçeği Sokak No:33 Yukarı Ayrancı
Çankaya - Ankara / Türkiye
☎: +90 (312) 840 10 00
🖷: +90 (312) 442 58 16

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ABBREVIATIONS

Adana ASKİ	Adana Water and Sewerage Administration
AoI	Area of Influence
BOTAŞ	Turkish Petroleum Pipeline Company
BTC	Baku-Tbilisi-Ceyhan Crude Oil Pipeline
Ceyhan PDH-PP Project / Project	Ceyhan Propane Dehydrogenation - Poly-propylene Production Facility Project
Ceyhan PP A.Ş. or Project Company	Ceyhan Polipropilen Üretim A.Ş.
CPIR	Ceyhan Petrochemical Industrial Region or Ceyhan Energy Specialized Industrial Zone
CPIR Port	Raw Material Supply, Storage and Port Facility Project
DSI	State Hydraulic Works
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FEED	Front-End Engineering Design
FGD	Focus group discussion
FIs	Financial Institutions
GHG	Greenhouse Gas
IFC	International Finance Corporation
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MoIT	Ministry of Industry and Technology
NGO	Non-governmental Organization
NTS	Non-technical Summary
OHS	Occupational Health and Safety
OIZ	Organised Industrial Zone
PCM	Public Consultation Meeting
PDoEUCC	Provincial Directorate of Environment, Urbanization and Climate Change
PR	Performance Requirements
PS	Performance Standards
RHDHV-TR	HaskoningDHV TR Engineering Inc.
SEP	Stakeholder Engagement Plan
TSS	Total suspended solids

4 SCOPE AND METHODOLOGY

4.1 Overview

The ESIA assists in ensuring environmentally and socially sound management of the Project during its entire lifetime (construction, operation, decommissioning). The Environmental and Social Impact Assessment presented in this section will be limited to the construction and operation phases only due to the unavailability of sufficient relevant information on the decommissioning phase activities.

The basic approach for the ESIA is adopted for conducting the environmental and social impact study for the proposed project to assess the existing baseline in the AoI, where the components and activities of the project having potential environmental and social impacts. Environmental and Social impact assessments are framed with the prevailing institutional and legislative setup provided in Chapter 3 Legal Framework.

The main approaches for the assessment covers:

1. Identification and analysis of potential positive and negative impacts, direct and indirect impacts, and short-term and long-term impacts likely to result from project implementation;
2. Identification of feasible and cost-effective mitigation measures to avoid or to minimize negative impacts, and to provide technical guidance to the engineering design for the implementation of proposed mitigations.
3. Identify potential opportunities for environmental enhancement;

   Preparation of Environmental and Social Management and Monitoring Plan for effective implementation of environmental mitigation measures at different stages of the project.

4.2 National Environmental Impact Assessment Requirements

In terms of Turkish regulatory requirements, the scope of both terrestrial and marine sections of the Project falls within the scope of the Turkish Environmental Impact Assessment (EIA) Regulation (Official Gazette date/number: 25.11.2014/29186). In the EIA regulation, petrochemical facilities (i.e. terrestrial section) and ports (i.e. marine section) fall under Annex I[1], therefore, the Project is subject to full EIA process. The Final EIA Report for the Polypropylene Production Facility and the EIA Report for the Raw Material Supply, Storage and Port Facility Project (CPIR Port) have been submitted to the Ministry of Environment and Urbanization (MoEU). The EIA Positive Decision for the Ceyhan PDH-PP was given on December 18th, 2020, whereas the EIA Positive Decision for CPIR Port Project was given on

[1] Item 31 – Storage Facilities for Oil, Natural Gas, Petrochemical and Chemical Substances with Capacity of 50,000 m^3 and above, Item 6/a – Production of organic chemicals for terrestrial section and Item 9/b – Water ways, ports and shipyards; Commercial ports, jetties, quays and dolphins suitable for marine vessels with 1,350 DWT weight or above.

September 1st, 2021. The EIA Layout of the PDH-PP provided in the discussed report is presented in Figure 4-1. In the course of the Project development, the boundaries of the PDH-PP have been changed. However, this did not require amendment of the national EIA report and its resubmission to relevant authorities. This ESIA covers the latest configuration of the Project available by the time of the ESIA preparation.

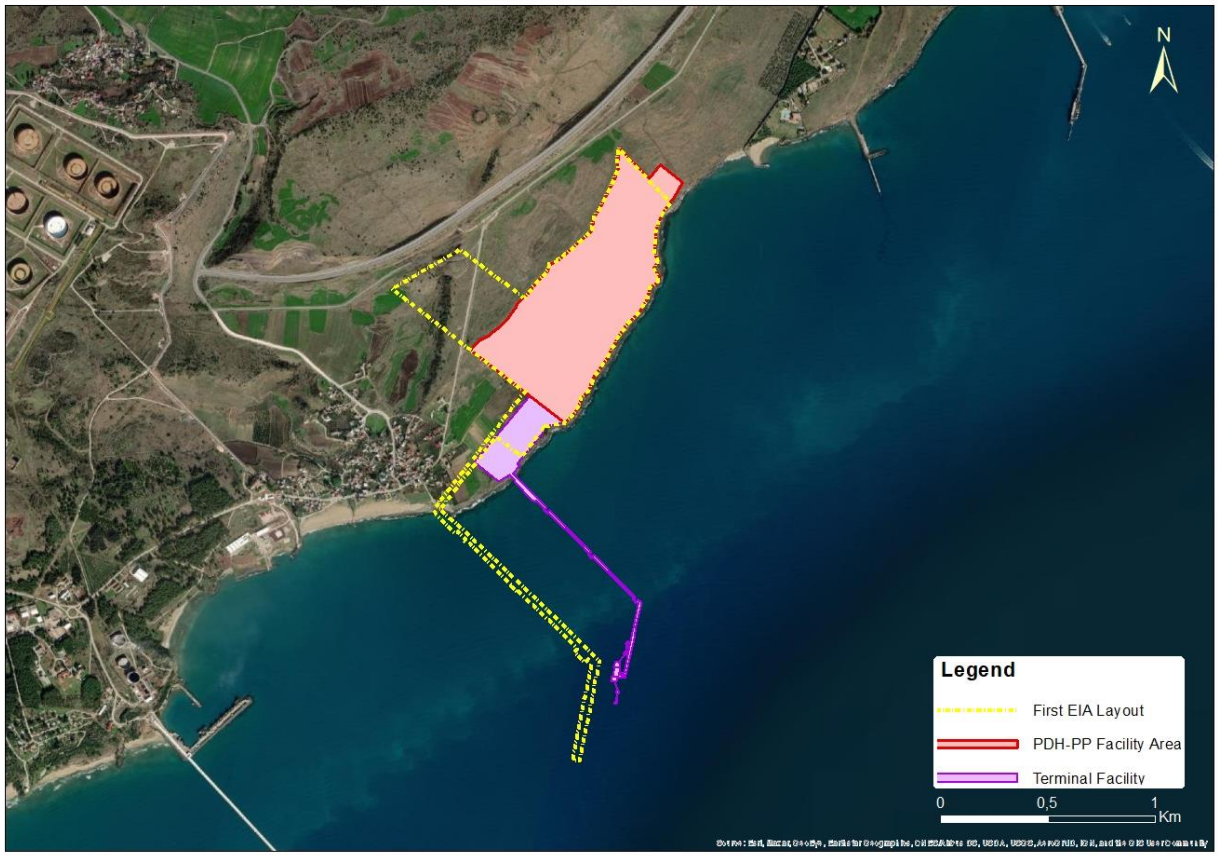

Figure 4-1. First EIA Layout and Final PDH-PP Facility Area

4.3 Scoping of the Impacts

The potential environmental and social impacts of the Project are summarized below:

- The Construction Phase activities, which comprises pre-construction including detailed design and construction phases. In this respect, this phase covers all detailed design and construction activities as well as decommissioning of the temporary construction facilities.

- The Operational Phase considers all operational activities including:

  - Operation of the Project, which may potentially result in impacts such as the generation of noise and vibration, occupational health and safety risks, community health and safety risks as well as killing of crossing animals and generation of various waste streams;

- Maintenance activities of the Project which may potentially result in impacts such as on the occupational health and safety and public safety during the maintenance.

The potential impacts (adverse and positive) of all planned project activities have been identified and the interaction between the project activities in all these phases and the natural, physical environment and social-economic aspects are addressed.

The scoping study has identified potential impacts which are discussed in relation to the topics listed in Table 4.1 below. This study has defined the scope of the ESIA process and indicated issues to be considered, including those described below:

Table 4-1. Potential Impacts Considered for Environmental and Social Impacts

Aspect	Potential Impact	
	Construction Phase	**Operation Phase**
Air quality	During construction works, dust emission is considered as the major potential impact source. The activities that cause dust emissions are: • earth movements; • transport of materials such as sand/gravel/rocks from borrow pits and quarries (if applicable); • transport of excavated soils outside the Project site (if any); • excavations; • blasting; • vehicle movements; • stockpiles; • unpaved surfaces. Construction impacts will also include emissions to the atmosphere from machinery and vehicles (i.e. generators, excavators, bulldozers, trucks, cars).	Potential impacts during operation are related to: • increase in emissions from road and marine traffic; • exhaust gases from production; • emissions from ventilation systems; • fugitive emissions released from storage areas; and • emissions related to power generation.
Greenhouse Gas (GHGs) emissions	GHG emissions of construction work covers: • transportation of materials; • machinery and equipment used for construction works; and • electricity used for construction works.	GHG emissions comprise emissions from operation phase; • emissions from production units (i.e. energy consumption in the PDH process, boilers etc.); • electricity used for production; and • transportation of the raw material and products.
Noise and vibration	Noise and vibration impacts during construction include construction activities: • blasting; • piling; • drilling activity; • construction machinery; and • construction vehicles.	Impacts during operation will be related to; • production units; • power generation; • flare; • jetty operation; and • traffic.
Geology, soil and groundwater	Potential impacts/sources include the following: • Excavation works during construction; • Disturbance of top soil during site clearance;	Potential impacts/sources include the following: • Spills from hazardous chemical and waste storage areas and from fuel and chemical tanks

Aspect	Potential Impact	
	Construction Phase	Operation Phase
	• Spills of oils, fuel or other material during construction activity affecting soil and groundwater quality.	
Marine and coastal hydrology	Potential impacts on marine environment are mostly related to the jetty construction, which is considered as associated facility. On the other hand, wastewater from offices and accommodation units as well as accidental spills and contaminated storm from terrestrial part of the Project and associated facilities are also other impact sources for the marine environment. These impacts and sources include the following: • Potential to affect seawater quality through mismanagement of wastewater discharges from offices and accommodation units; • Spills from contaminated sources; • Impacts of construction of the jetty structure including filling for land connection of the jetty, piling; and • Potential to affect local hydrodynamics in marine environment and impacts on seafloor and sedimentation.	Operational phase impacts and sources are also similar to the construction phase. Potential impacts and sources are: • treated wastewater discharges form the Project; • accidental spills and/or contaminated storm water discharges; • accidental spills form jetty operation; • unauthorized discharges from marine tankers (i.e. bilge water); and • Potential to affect local hydrodynamics in marine environment and impacts on seafloor and sedimentation.
Waste management	There will be waste generation during construction activities that include • Excavated soils (i.e. excavated soils from the levelling of the Project site and Tank Farm situated in Terminal Facility); • Solid wastes (including domestic and packaging wastes); • Construction wastes (such as steel, cables, other types of construction materials); • Hazardous wastes including waste oil, contaminated spare parts i.e. filters, waste solvents, contaminated chemical or oil barrels etc.; • Waste batteries and accumulators; and • Electrical electronical wastes.	Impacts during operation phase consists of impacts related to generation of: • Solid wastes (including domestic and packaging wastes); • Spent catalysts; • Hazardous wastes including waste oil, contaminated spare parts i.e. filters, waste solvents, contaminated chemical or oil barrels etc.; • Waste batteries and accumulators; and • Electrical electronical wastes; etc.
Material resources	Potential impacts/sources include the following: • Use of large quantities of construction materials; • Transportation of construction materials; • Consumption of fuel by vehicles and machinery;	Potential impacts/sources include the following: • Use of propane as raw material; • Use of chemicals required for PP production; • Use of catalyst;

Aspect	Potential Impact	
	Construction Phase	**Operation Phase**
	• Use of electricity during construction works; and • Use of water for construction activities and at camps during construction phase.	• Consumption of natural gas; • Use of electricity; and • Use of water for production and domestic purposes;
Terrestrial and marine ecology	Potential impacts include: • Long term/permanent habitat loss, • Potential for dust dispersion and noise/vibration, • Artificial lighting, which has impact on sea turtle hatchings; and • Impacts on species and habitats resulting from site grading (i.e., excavation/filling). Construction of the jetty, which is the part of associated facility have potential impact on marine environment. These potential impacts are; • Sediment movement during causeway construction and piling; • Artificial lighting, which has impact on sea turtle hatchings; • Noise and vibration during piling; and • Accidental spills form barges and vessels to be used construction of the jetty.	The Project have no direct impact on natural sources. On the other hand: • Air emissions; • Noise; • Artificial lighting, which has impact on sea turtle hatchings; • Treated wastewater discharges; and • Accidental spills, which can be transport to the marine environment by drainage system, can be considered as general impact source on natural environment. Operation of the jetty, which is the part of associated facility have potential impact on marine environment. These potential impacts are; • Accidental spills from propane marine tankers; • Un authorized wastewater discharge from marine tankers (i.e. bilge water etc.); and • Marine tanker manoeuvring (i.e noise, increase in TSS due to sediment movement etc.)
Cultural heritage	The remains of Kurtpınar Ancient Waterway stretch outside of the area located process units and associated facility and parallel to the northeastern boundary of it. On the other hand, mobilization area will be situated at the north and at the south of the Kurtpınar Ancient Waterway. Due to that reason, there will be road overcrossings on the Kurtpınar Ancient Waterway in order to sustain movement between two sites as well as the construction sites including process units and associated facility. By considering the existing potential sites around the Project area, potential impact on unknown cultural assets buried in the ground be expected during site preparation works. In terms of impacts on intangible cultural heritage assets, construction impacts mostly related to;	Road over crosses on the ancient waterway still be required during operation phase. Also potential site arrangement activities can also have impact on Kurtpınarı Ancient Waterway. In terms of impacts on intangible cultural heritage assets, the same potential impacts are expected. These are; • Land take, which can trigger economic transition of the local people and cause potential change in traditional behaviour; • Workforce, relation of local people with high number of workers employed during operation work can also cause cultural impacts; and

Aspect	Potential Impact	
	Construction Phase	**Operation Phase**
	• Land take, which can trigger economic transition of the local people and cause potential change in traditional behaviour; and • Workforce, relation of local people with high number of workers employed during construction work can also cause cultural impacts. Archaeological survey performed by Bodrum Archaeological Museum for the EIA of CPIR Port Project that includes the jetty shows that there is no cultural asset at marine section. Geotechnical studies performed at marine section, which regards side scan sonar and sub bottom profiler, supports that potentiality of a cultural asset such as sink ship or a building structure in or under the sea bottom is very low. Therefore, no impact is expected. However, implementation of the chance find procedure still be the part of the ESMS.	• Additionally, economic benefit of the local people can accelerate sociological changes that can cause negative impact on intangible cultural assets.
Traffic and transport	Material and workforce transportation during construction phase have potential impact on local traffic. Transportation of heavy items have particular importance in terms of traffic impact. No direct marine transfer to the construction site is planned for this items. Nearest port with customs will be used for the transportation.	Propane, the raw material of the PP Production, will be imported through sea shipment to the Project site. It is estimated that at most two marine tankers in a month will be used for propane transportation. Material and workforce transportation during operation phase have potential impact on local traffic
Socio-economic impacts	The Project will create employment opportunities during construction phase and it may positively affect the local economy through the supply of goods and materials. On the other hand, land take and high number of workforce can cause negative socio-economic impacts. These potential impacts may relate to: • Land acquisition, which have direct impact on socio-economic aspect of the local people; • Population influx to the region due to construction of the Project; • Impacts on agricultural production, fisheries, and grazing/beekeeping activities due to project activities (e.g., excavation, blasting, hauling, construction traffic, etc.) during construction phase; and	The Project will create employment opportunities and may positively affect the local economy through the supply of goods and materials. Other potential impacts may relate to: • Population influx to the region due to operation of the Project; • Socio economical change of the local people; and • Impact on ecosystem services such as animal grazing, fishing activity of local fishermen etc.

Aspect	Potential Impact	
	Construction Phase	**Operation Phase**
	• Impact on ecosystem services such as animal grazing, fishing activity of local fishermen etc.	
Labour and Working Conditions	General construction impact related to: • Employment, (i.e. labour relations, lack of contract, working without insurance, unfair condition, unfair remuneration, unlawful employment, forced labour, child Labour etc.); • Discrimination, (i.e. gender discrimination/Gender Based Violence, discrimination due to race, nationality, etc.) • Accommodation, (i.e. unproper living condition, small rooms, lack of wardrobes, or storage cabinets with low capacity, lack of water, in sufficient number of baths, toilets, lack off resting area and bad or little food etc.) • Social conflict within the worker groups. • Working condition at construction site, and general OHS related issues (i.e. working at height, working with machinery, chemical handling etc.) • Raising the worker grievance, (i.e. failure to record complaints, verbal receipt of complaints, culture of silence at work, sexual abuse and harassment).	General operational impact related to: • Employment, (i.e. labour relations, lack of contract, working without insurance, unfair condition, unfair remuneration, unlawful employment, forced labour, child Labour etc.); • Discrimination, (i.e. gender discrimination/Gender Based Violence, discrimination due to race, nationality, etc. • Working condition at operation site, and general OHS related issues (i.e. working at height, working with machinery, chemical handling etc.) • Raising the worker grievance, (i.e. failure to record complaints, verbal receipt of complaints, culture of silence at work, sexual abuse and harassment).
Community health, safety and security	Potential impacts on community health, safety and security include the following: • Dust, noise and vibration generation during construction activities such as earthworks, operation of equipment, vehicles and construction traffic; • Injuries/accidents to people as a result of unauthorized access to the construction site as a result of inadequate security; • Increase in traffic load and associated impacts on road safety and congestion near the Project site.	Potential impacts on community health, safety and security include the following: • Air emissions regarding NOx, SO2 and VOC, noise generation during operation activities. • Injuries/accidents to people as a result of unauthorized access to the operation site as a result of inadequate security. • Increase in traffic load and associated impacts on road safety and congestion near the Project site • Risk of structural failure that will increase in the event of natural hazards such as earthquakes. • Mismanagement of Project waste that contains hazardous material, which may have health risk due to direct contact or exposure. • Fire safety risks.

Aspect	Potential Impact	
	Construction Phase	Operation Phase
Cumulative impacts	The Project site is located in industrial and residential settings. There are a number of existing industrial facilities and planned facilities in the region that may result in cumulative impacts.	

4.4 Key Steps of the ESIA Process

This subsection presents the methodology used to conduct the impact assessment. The overall ESIA approach is illustrated in Figure 4-2. The ESIA Process consists of a multi-stage iterative approach in order to predict and evaluate the potential effects the Project could have on the physical, biological, social and cultural environment. Measures are then identified that the Project will take to avoid, minimize, mitigate or compensate for any adverse impacts; and to enhance positive impacts where possible. Results continue to be revisited and modified as the assessment progresses and as Project effects are monitored.

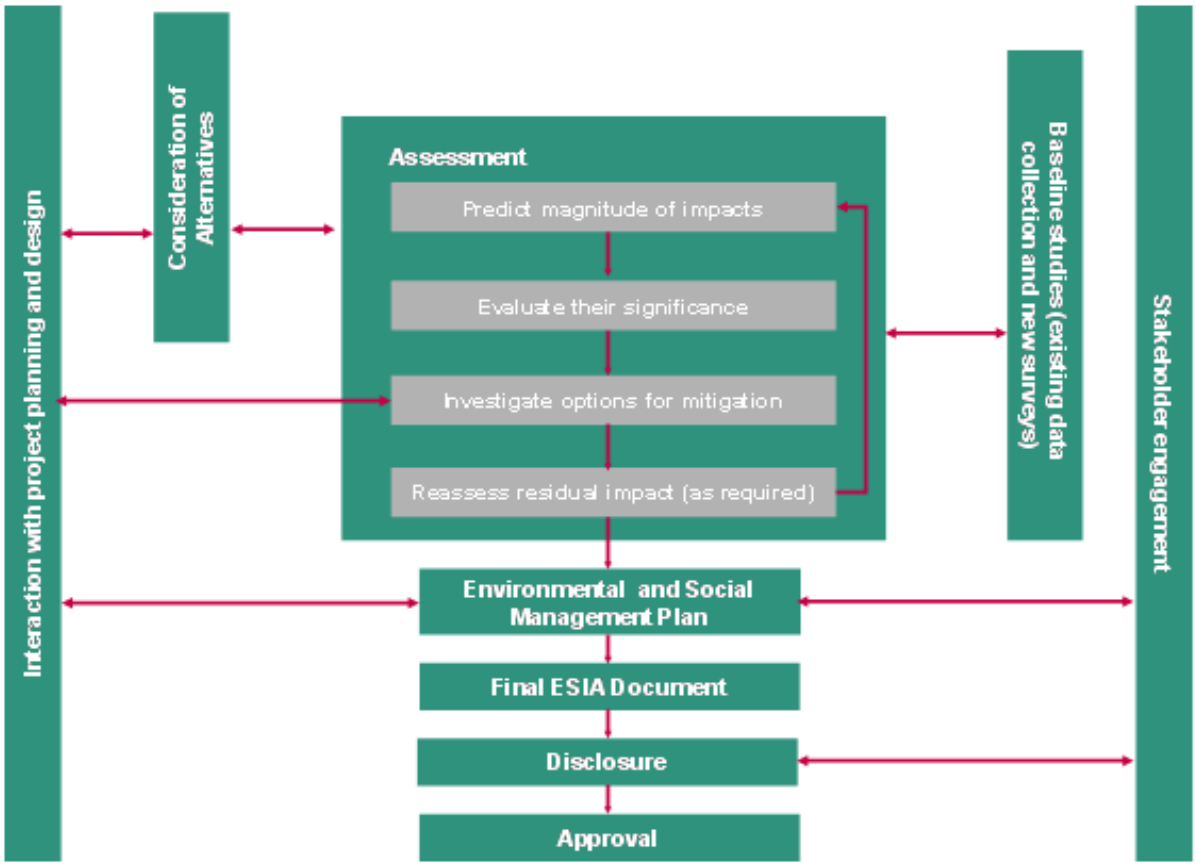

Figure 4-2. ESIA Methodology

4.4.1 Screening

The first step in the ESIA process is the screening stage which determines whether an impact assessment is required to be undertaken for a specific project. As the Project Company is planning to use finance from multinational Financial Institutions (FIs), there is a need to undertake an ESIA study to meet the requirements of the lenders. By considering the IFI's general approach for this type of complex and big industrial investments, which have potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented, the Project is suggested as Category-A Project. With this intention ESIA studies design to sustain the IFI requirements regarding Category A projects.

4.4.2 Scoping

Scoping is a crucial step in an ESIA process that:

- defines the limits of what is included in the ESIA and what it is not necessary to include;
- gives a clear focus which environmental and social issues will be addressed in the ESIA;
- starts the process of understanding regulations and standards and their context for the ESIA;
- provides provisional identification of the impacts;
- provides an indication of what additional baseline information is required and how to get it;
- provisionally describes the assessment methods to be used;
- includes a preliminary identification of alternatives which should be investigated.

Scoping is the stage at which consultations with stakeholders are initiated, which is an important part of the ESIA process. At the initial phase of the Project, ESIA Studies are started without Lenders presence. In this respect, National EIA process was considered for scoping exercise together with general experience of the ESIA Team.

4.4.3 Identification Project's Area of Influence (AoI)

The relevant environmental AoI for the Project can be divided into two main parts. The first part covers the followings:

1. The Project, PDH-PP Facility Units and activities defied as the part of Project in Table 2.6 at the Chapter 2 as well as the areas or activities required for construction works such as mobilization area, temporary top soil and excavated storage sites;
2. Associated Facility, Terminal Facility including jetty and propane storage tank, which will be constructed and operated by another investor. The terminal Facility exclusively operate for the Project to supply raw material propane for the production PP; and
3. The extended AoI of the Project, including access roads, CPIR Port that requests excavated material to use for backfilling purpose.

For the intense and direct impacts associated with the Project activities in construction and operational phases, the immediate vicinity of the Project covering above mentioned items are considered to be a buffer of 1,500[2] m which is the major impact zone of the construction activities. In addition, the following areas compose the second part of the Environmental AoI

[2] The distance between the farthest settlement Karatepe that might be exposed to physical impacts such as dust emissions and noise.

since there can be impacts (e.g., handling of wastes and transportation of the supply materials to the site from a long distance) associated with the activities in relation to the Project:

- Material supply locations[3]; (e.g., quarries, concrete batching plants, and the roads associated with transport of such materials);
- Excess excavated material dumpsites;
- Waste disposal facilities and the roads associated with waste management (e.g., sanitary landfills, waste recycling facilities);

Information about the type of the land use on the construction site of the Project can be also found in Chapter 5 of the ESIA Report. In addition to this discussion, in particular, considering the operational activities' environmental impacts, regarding air emissions are the important factors to determine the AoI. Such impacts are assessed within a distance of 5,000 m.

It should be also noted that the Project Company will not open any new quarry or borrow pit and it commits to use the operational quarries which will be audited with respect to the E&S selection criteria set out in the ESIA, prior to use. Those quarries will be among the ones which possess all needed environmental permit and licenses in addition to the other legal requirements.

The Social AoI has been also identified for the Project due to the nature of social impacts. The Social AoI is described in detail is *Chapter 14:* Socioeconomics.

4.4.4 Baseline Data Collection

The next step of the ESIA process is the collection of data to establish the existing baseline conditions (i.e., conditions in the absence of the proposed development), which the impacts of construction and operation of the Project can be assessed against. In undertaking the ESIA study, information on the current environmental and social baseline conditions was gathered using, among others, the following sources:

- technical reports prepared by the Project Company and its consultants including EIA consultants;
- secondary data sources (published materials and documents, maps by government agencies, research organizations and other relevant organizations);
- review of aerial photographs of the Project site and its surroundings;
- field study results.

[3] The Project Company will not operate any quarry or concrete batching plant since there are enough number of such facilities in the regions with sufficient capacity to supply needed amounts. Thus, EPC will use the existing and licensed quarries and concrete batching plants in the region.

Baseline data collection started during the scoping phase and continued to support the assessment process. Baseline studies and findings are described in the relevant chapters of the ESIA Report.

4.4.5 Method to Assess Environmental and Social Impacts

Impact Types and Definitions

Impacts may occur as positive, negative, direct, indirect and cumulative. Determination of the type of impact is the important step of the assessment process. The determination of the impact type is based on geographical size, sensitivity of receptor, duration, significance and likelihood of the impact. Impact types are provided in Table 4-2.

Table 4-2. Impact Types and Definitions

Impact Type	Definition
Positive	Impacts that make positive changes over the current conditions.
Negative	Impacts that lead to new and undesirable changes over the current conditions.
Direct	Direct impacts occur through direct interaction of an activity with an environmental, social, or economic component.
Indirect	Impacts which are not a direct result of the project, often produced away from or as a result of a complex impact pathway.
Cumulative	Impacts that consist of an impact that is created as a result of the combination of the project evaluated in the current project together with other projects causing related impacts.

Assessment

The impact assessment process predicts and describes impacts that are expected to occur for different phases of the Project. Where possible, impacts are quantified to the extent practicable, which may include size of land affected; increase in noise or air pollution levels above acceptable standards; volume of waste or water discharged, number of households affected, etc. For each impact, its significance is evaluated by defining and evaluating two key aspects:

- The magnitude of the impact; and
- The sensitivity of the feature or receptor that will be impacted.

Impact Magnitude

Impact magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. Magnitude rating tends to reflect a combination of the size of an area that may be affected, the duration over which the aspect may be altered, and the size, degree or scale of that change. In essence, magnitude is a descriptor for the degree of change that is predicted to occur in the resource or receptor.

For positive impacts (which are mostly socio-economic impacts) magnitude is generally categorised as ‘Positive’ unless sufficient information is available to support a more robust

characterisation. For instance, if the number of jobs to be assigned to local community members is confirmed or if the size or value of the contribution to the national, regional or district economy is known then a magnitude rating can be assigned. If not, then the significance rating is assigned based on the sensitivity of the feature impacted by a specific activity or change.

The term ‘magnitude’ therefore encompasses all the characteristics of the predicted impact including:

- Geographic Extent;
- Duration;
- Intensity;
- Frequency; and
- Likelihood (only for unplanned events).

The definitions for characteristics of magnitude used during the impact assessment are summarized in Table 4-3.

In the case of intensity and frequency, these characteristics are not assigned fixed designations, as they are typically numerical measurements (e.g., number of acres affected, number of times per day, etc.).

The terminology and designations are provided to ensure consistency when these characteristics are described in an impact assessment deliverable. However, it is not a requirement that each of these characteristics be discussed for every impact identified.

For unplanned events (e.g., accidental release of hazardous materials) the likelihood of the impact occurring is taken into consideration in deriving the magnitude rating. The likelihood of an impact occurring as a result of an unplanned event is expressed as a probability and is designated using a qualitative scale (or semi-quantitative, where appropriate data are available), according to the attributes described in Table 4-3.

Likelihood is estimated on the basis of experience and/or evidence that such an outcome has previously occurred. It is important to note that likelihood is a measure of the degree to which the unplanned event is expected to occur, not the degree to which an impact or effect is expected to occur as a result of the unplanned event.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is utilised, but the ‘likelihood’ factor is considered, together with the other impact characteristics, when assigning a magnitude designation. There is an inherent challenge in discussing impacts resulting from (planned) Project activities and those resulting from unplanned events. To avoid the need to fully elaborate on an impact resulting from an unplanned event prior to discussing what could be a very low likelihood of occurrence for the unplanned event, this methodology incorporates likelihood into the magnitude designation (i.e., in parallel with consideration of the other impact

characteristics), so that the “likelihood- factored” magnitude can then be considered with the resource/receptor sensitivity/vulnerability/importance in order to assign impact significance. Rather than taking a prescriptive (e.g., matrix) approach to factoring likelihood into the magnitude designation process, it is recommended that this be done based on professional judgment, and assisted by quantitative data (e.g., modelling, frequency charts) where available.

Once the impact characteristics are understood, these characteristics are used (in a manner specific to the resource/receptor in question) to assign each impact a magnitude. In summary, magnitude is a function of the following impact characteristics:

I. Geographical Extent (G);
II. Duration (D);
III. Intensity (I);
IV. Frequency or Likelihood (F or L);
V. Reversibility (R).

Impact Magnitude = (G+D+I+F (or L)) x R

The magnitude can also be defined as the severity of the potential impact. It indicates whether such an impact is irreversible or reversible. If the adverse effect of a project can be mitigated then the magnitude of the impact cannot be considered as very high.

magnitude essentially describes the degree of change that the impact is likely to impart upon the resource/receptor. As in the case of extent and duration, the magnitude designations themselves (i.e., negligible, low, medium, high and very high) are universally used and across resources/receptors, but the definitions for these designations will vary on a resource/receptor basis, as is discussed further below. The universal magnitude designations are:

- Negligible;
- Low;
- Medium;
- High; and
- Very High

The magnitude of impacts takes into account all the various dimensions of a particular impact in order to make a determination as to where the impact falls on the spectrum (in the case of adverse impacts) from negligible to large. Some impacts will result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes can be regarded as essentially having no impact, and should be characterised as having a negligible magnitude.

Table 4-3. Criteria for Determining Impact Significance

Aspect	Score	Definition
Geographic Extent (G) is the area within which the impact occurs.	**1**	**Project Site:** (i.e. the impact is confined within the facilities owned or exclusively controlled by the project)
	2	**Local** (i.e. the impact extends to areas or communities around the project site)
	3	**Regional** (i.e. the impact extends to an area beyond the surroundings of the project site and to regional physical (airshed, watershed, etc) or administrative boundaries)
	4	**National:** (i.e. the impact extends throughout several regions or to the entire country)
	5	**International:** (*i.e the impact is transboundary*)
Duration (D) is the duration of the impact and can vary from short to long terms.	**1**	**Very Short** (<1 Month)
	2	**Short** (1 Month - 1 year)
	3	**Medium** (1-2 years)
	4	**Long** (2-5 years - the impact will cease after the operational life span of the project)
	5	**Very Long** (over 5 Years - no mitigation measure of natural process will reduce the impact after construction)
Intensity (I) is a measure of the physical, economic or social severity of the impact.	**1**	**Negligible**: the impact cannot be easily detected or perceived and is unlikely to cause detectable change in environmental or social components.
	2	**Low**: the impact can be detected or perceived but the effects are unlikely to cause tangible changes in environmental or social components
	3	**Medium**: the impact are well within legal standards or accepted practices and/or are likely to cause tangible changes in environmental or social components.
	4	**High**: the impact is near the limit of legal standards or accepted practices and/or are likely to cause serious impairment of environmental or social components.
	5	**Very high:** the impact may result in exceedances of legal standards or accepted practices and/or is likely to cause very serious to catastrophic damage to environmental or social components.
Frequency (F): is the frequency of the impact (not the activity causing the impact).	**1**	**Single event**
	2	**Infrequent:** a few events evenly or randomly distributed over time
	3	**Recurrent:** numerous events evenly or randomly distributed over time
	4	**Frequent:** a high number of events evenly or randomly distributed over time
	5	**Continuous:** no interruption over time.

Aspect	Score	Definition
Likelihood (L) (unplanned events)	**0**	**Improbable:** The event is extremely unlikely to occur during implementation (construction and operation) of the Project. (Probability; less than 1%).
	1	**Unlikely:** The event is unlikely but may occur at some time during implementation (construction and operation) of the Project. (Probability; less than 5%, greater than 1%)
	3	**Likely:** The event is likely to occur at some time during implementation (construction and operation) of the Project. (Probability; less than 50%, greater than 5%)
	5	**Probable:** The event will occur during implementation (construction and operation) of the Project (i.e., it is essentially inevitable). (Probability; greater than 50%)
Reversibility (R)	**1**	**short term:** if the initial condition of the component can be restored within weeks or months after the cessation of the impact source and/or with restoration activities.
	2	**short/mid-term:** if the initial condition of the component can be restored within a few months to one year after cessation of the impact source and/or with restoration activities.
	3	**mid-term:** if the initial condition of the component can be restored within one to five years after cessation of the impact source and/or with restoration activities.
	4	**long term:** if the initial condition of the component can be restored within five to 25 years after cessation of the impact source and/or the restoration activities.
	5	**Irreversible:** if it is not possible to achieve restoration of the initial conditions.

Sensitivity

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity/vulnerability/importance of the impacted resource/receptor to the type of activity proposed (e.g., habitat clearance, topsoil removal, etc.) or the impact of a Project activity (e.g., dust, noise, water pollution, or induced population influx). This requires a range of physical, biological, cultural or human factors to be taken into account and may also need to include other factors such as legal protection, government policy, stakeholder views and economic value.

Characterisation of sensitivity for a physical or biological resource or receptor (e.g., a water feature or parameter, cliff, vegetation type) will take into account its conservation status and importance (on a local, national and international scale), its vulnerability to disturbance, and its resilience to recover or withstand a specific impact or type of impact. Where the receptor is human or cultural, the value of that social and cultural heritage receptor/s and its vulnerability to the impact is considered, taking into account the receptor's resilience, including ability to adapt to change or use alternatives where available.

As in the case of magnitude, the sensitivity/vulnerability/importance designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The universal sensitivity/vulnerability/importance designations are:

- Low;
- Medium; and
- High.

Receptor sensitivity definitions are provided in Table 4-4.

Table 4-4. Receptor Sensitivity

Receptor Sensitivity (S)[4] describes the ability of the receptor to withstand adverse impacts. It takes into consideration not only activity-impact-receptor pathways, but also social and environmental characteristics of the receptor that might make it more or less resilient to change.	**1**	**Low:** Local community and/or environment is fully equipped/has the tools to manage changes of life quality: • Species and/or population has high capacity to absorb or adapt to change (i.e. has capacity to move away from or adapt to the project impact), and is potentially unaffected or marginally affected; • People being least vulnerable to change or disturbance (i.e. ambient conditions such as air quality are well below applicable legislation and international guidance,); • Individuals who are able to quickly adapt to temporary disruption in their living conditions, livelihood status or a change in the status of public infrastructure.
	3	**Medium:** Local community and/or environment is partially equipped/has the tools to manage changes of life quality. For example: • Internationally threatened species /protected area within the area impacted by the project activities outside of period of high sensitivity or during routine or reliably predictable peak presence; • Species and/or population which has moderate capacity to absorb or adapt to change (i.e. has capacity to move away from or adapt to the project impact), leading to potential temporary but sustainable effect which does not substantially alter character or result in significant loss of ecological functionality; • People being vulnerable to change or disturbance (i.e. ambient conditions such as air quality are below adopted standards; • Negative change in livelihood status, household assets/income or living conditions. Temporary disruption to businesses resulting in a small drop in business revenue; • Increased risk to public health that can be controlled using detailed mitigation measures; and • Disruption to public infrastructure that results in an inconvenience to other users.
	5	**High:** Sensitive local community and/or environment not equipped or prepared to cope with social and environmental impacts such as changes of life quality. For example: • Internationally threatened species /protected area within the area impacted by the project activities during period of high sensitivity (e.g. during breeding, spawning or nesting) and during routine or reliably predictable peak presence; • Species and/or population which has little or no capacity to absorb or adapt to change (i.e. little or no capacity to move away from or adapt to the project impact), leading to potential for substantial change of character and/or loss of ecological functionality; • Most vulnerable groups (i.e. ambient conditions such as air quality are at or above adopted standards; • Individuals with a marginal livelihood, low socio-economic income or poor quality living conditions; • Individuals who are vulnerable due to their age, disability or other reason and who may require special assistance during engagement activities; and • Businesses with a marginal economic existence which are not able to easily adapt to change.

[4] Receptors may be humans, ecological and physical components of the environment. Receptor sensitivity considers how a particular receptor may be more or less susceptible to a given impact. More sensitive receptors may experience a greater degree of change, or have less ability to deal with the change, compared with less sensitive receptors that may be more resilient or adaptable.

Determination of the Overall Impact

For impacts resulting from unplanned events (typically accidents, such as a major oil spill or other event that cannot be reasonably foreseen), the above methodology is applied but likelihood is also considered when assigning the magnitude designation.

The Impact significance is calculated by multiplying the Impact magnitude by the Sensitivity Score:

Impact Significance = Impact magnitude x S

Table 4-5. Description of the Impact Significance

Score of the Impacts		
Value	**Score**	**Definition**
4-25	**Negligible**	An impact of "**Negligible"** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
26 - 75	**Low**	An impact of "**Low"** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.
75 - 150	Medium	An impact of "**Medium"** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.
150 - 250	**High**	An impact of "**High"** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of impact assessment is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.
250 - 500	**Very High**	An impact of "**Very High"** significance after all feasible mitigation measures have been identified and assessed warrants the highest level of attention and concern. As with residual impacts of major significance, the regulators and stakeholders will need to closely evaluate whether the positive impacts of the project outweigh residual negative impacts of very high significance. In many cases residual critical impacts can be considered as a potential fatal flaw of the project.

Development of Mitigation Measures and Enhancement Plans

One of the aims of an Environmental and Social Impact Assessment consists of suggesting mitigation measures in order to limit any potential negative impacts affecting all physical, biological and socioeconomic resources as well as receptors due to Project activities.

Mitigation measures are defined against each significant adverse impact by making use of avoidance, minimization, restoration and remediation as appropriate. Mitigation measures provided in each impact assessment table are also grouped under each project phase such as design, pre-construction, post construction and operation. In general, mitigations suggested for operation phase are directly related to the Project design, in this respect these mitigations are also grouped under design phase.

A hierarchy of mitigation options is considered, with avoidance at the source of the impact as a priority and compensatory measures or offsets to reduce the impact significance as a last resort. The mitigation hierarchy that is utilised in identification of mitigation measures are presented in Table 4-6 below.

Table 4-6. Hierarchy of Options for Mitigation

Options	Explanation
Avoid at Source; Reduce at Source	Avoiding or reducing at source is designing the project so that a feature causing an impact is designed out (e.g., avoiding constraint areas during site selection) or altered (e.g., reduced waste volume).
Abate on Site	This involves adding something to the design to abate the impact (eg, pollution controls).
Abate at Receptor	If an impact cannot be avoided, reduced or abated on-site then measures can be implemented off-site (e.g., noise screening at properties).
Repair or Remedy	Some impacts involve unavoidable damage to a resource. Repair essentially involves restoration and reinstatement type measures.

The aim of the mitigation measures is to prevent or reduce the importance of negative impacts whilst optimizing the feasibility and potential benefits of the Project. Impact mitigation objectives are often established on the basis of legal standards or by referring to best practice. In the absence of any existing benchmarks, objectives specific to the project are established. Mitigation activities are supported with management plans linked to potential impacts, and they include monitoring requirements detailing what will be monitored, the method of monitoring, frequency, and measurable targets. Steps for determination of mitigations in line with “Mitigation Hierarchy” provided below:

- Avoid at Source, Reduce at Source: avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity). For this purpose, Constraint Maps regarding no-go areas and sensitive locations are prepared to serve as a Guiding document for the detailed design as well as Sub-management and monitoring plans;
- Abate on Site: add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping);
- Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site);

- Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures;
- Compensate in Kind, Compensate Through Other Means: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

Taking into account how mitigation will reduce a predicted impact, receptor sensitivity and significance of the after-mitigation impacts, residual impacts are identified. Some mitigation measures may directly address the impact on the predicted receptors, in which, the overall impact after applying the mitigation measures will result in reducing the impact on the sensitive receptors.

Where significant residual impacts or risks remain, further options for mitigation are evaluated and impacts are re-assessed until they are considered to be low and technically and financially feasible for the Project and would be deemed to be within acceptable levels.

The effectiveness of the mitigation measures defined in the ESIA are assessed using expert judgement and the findings from the previous application of the measures to similar projects. The definitions of the mitigation effectiveness are:

- Low: the measures can reduce the impacts by less than 20% of the expected magnitude;
- Medium low. the measures can reduce the impacts by 20% - 40% of the expected magnitude;
- Medium: the measures can reduce the impacts by 40% - 60% of the expected magnitude;
- Medium high: the measures can reduce the impacts by 60% - 80% of the expected magnitude;
- High: the measures can reduce the impacts by more than 80% of the expected magnitude.

The Mitigation effectiveness is measured on a scale 1 – 0.2 (1=minimum effectiveness; 0.2=maximum effectiveness). Residual impacts will be identified by taking into account the mitigation effectiveness.

Residual Impact Assessment

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures.

4.4.6 Cumulative impacts

A number of projects were identified close to the Project site that have the potential to be considered as part of the cumulative impact assessment scope. These projects are listed below.

Key projects, which are related to the Project, included in cumulative impact assessment:

- CPIR Zone;
- CPIR Raw Material Supply Storage and Port Project (CPIR Port Project), except Terminal Facility including jetty and propane tank;
- Water Transmission Line Project developed by State Hydraulic Works (DSI); and
- Cukurova Region and Iskenderun Bay Railway Connection Sub-Project.

Other projects considered in the cumulative impact assessment.

- Existing Facilities:
  - BOTAŞ Ceyhan Marine Oil Terminal;
  - Toros Agri Industry;
  - Yumurtalık Free Trade Zone (Sönmez Cement Facility and Coal Processing Facilities);
  - Sanko Petrochemical Port Facility;
  - Erzin Natural Gas Combined Cycle Power Plant; and
  - İsken Sugözü Thermal Power Plant.
- Ongoing and Planned Developments:
  - BOTAŞ Rehabilitation of Tugboat Port (including dredging) Project;
  - A Capacity Increase and Rehabilitation of Toros Agri Industry Terminal Project;
  - A Coal Washing Plant Development Proposed Within the Premises of Süper Enerji Coal Storage Facility;
  - A Waste Reception Facility in Yumurtalık District to be developed by Gizem Denizcilik Akaryakıt Pazarlama Nakliyat Ticaret Ltd. Şti. (Gizem Denizcilik);
  - A rehabilitation project by Akdeniz Gemi İnşa San. Tic. A.Ş.;
  - Development of Shipyard by TERSAN Tersanecilik Taşımacılık San. ve Tic. A.Ş.;

- A Platform and Pipeline Project by Alkaport Ceyhan Liman İşletmeleri A.Ş.;
- Ceyhan Organised Industrial Zone (OIZ) and Erzin OIZ; and
- Thermal Power Plants to be developed towards the west of the Project site.

4.4.7 Potential Changes in the Project Design

This ESIA is prepared based on the Project information received from the Project Company, and a description of the Project is given in *Chapter 2: Project Description including Alternatives* according to this information. The description of the Project is based on the Front-End Engineering Design (FEED) documents made available to HaskoningDHV TR Engineering Inc. (RHDHV-TR). The detailed design of the Project is currently ongoing. All the units and other aforementioned facilities will be located within the identified Project site and have been considered during the impact assessment. Therefore, it is not expected that the present uncertainties will have a considerable effect on the identified impacts of the Project. However, in order to address the uncertainties, monitoring will be undertaken by the Project Company to understand whether the identified mitigation measures are sufficient or there is a need for refinement of any mitigation measure(s).

4.4.8 Environmental and Social Management Plan (ESMP)

An ESMP has been developed as part of the ESIA study including the description of the mitigation measures for each impact during construction and operation phases of the Project, responsible parties for the implementation of the mitigation measures, the timing, monitoring and audit requirements. The ESMP focuses on the avoidance of impacts, and where this is not possible, presents technically and financially feasible and cost-effective mitigation measures to minimize or reduce potential impacts to acceptable levels. The ESMP of the Project is presented in Annex C of this ESIA report. The ESMP should be kept up to date with any required additional mitigation throughout the Project lifecycle.

Implementation of the ESMP will be accomplished within the framework of a Project specific Environmental and Social Management System (ESMS) to be developed by the Project Company in accordance with the requirements of international standards (i.e., for environment: ISO 14001, IFC PS1, EBRD PR1).

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER-5)

FEBRUARY 2023

ANKARA

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Version	Revision	Date	Prepared By	Quality Management By	Checked By		Approved By
Draft	A.0	March 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Isabelle Kim (RINA)	Elif Doğru (RINA)
	A.1	April 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Isabelle Kim (RINA)	Elif Doğru (RINA)
	A.2	June 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Isabelle Kim (RINA)	Elif Doğru (RINA)
	A.3	October 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Isabelle Kim (RINA)	Elif Doğru (RINA)
	A.4	December 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)		
	A5	August 2022	Leyla Demirçin (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)		Ilya Gulakov (RINA)
	A.6	October 2022	Leyla Demirçin (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)		Ilya Gulakov (RINA)
Final Draft	B.0	February 2023	Leyla Demirçin (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)		Ilya Gulakov (RINA)

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CLIENT:
Ceyhan Polipropilen Üretim A.Ş
Portakal Çiçeği Sokak No:33 Yukarı Ayrancı
Çankaya - Ankara / Türkiye
☎: +90 (312) 840 10 00
🖷: +90 (312) 442 58 16

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ABBREVIATIONS

ALARP	As low as reasonably practicable
BIL	BOTAŞ International
BOTAŞ	Turkish Petroleum Pipeline Company
BTC	Baku-Tbilisi-Ceyhan Crude Oil Pipeline
Ceyhan PDH-PP Project / Project	Ceyhan Propane Dehydrogenation - Polypropylene Production Facility Project
Ceyhan Petrokimya A.Ş. or Management Company	Ceyhan Petrokimya Endüstri Bölgesi Yönetim A.Ş.
Ceyhan PP A.Ş. or Project Company	Ceyhan Polipropilen Üretim A.Ş.
CPIR	Ceyhan Petrochemical Industrial Region
CPIR Port	Raw Material Supply, Storage and Port Facility Project
DWT	Deadweight Ton
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
ESAP	Environmental and Social Action Plan
FGD	Focus Group Discussions
Ilbank	General Directorate of Bank of Provinces
ISMP	Integrated Shoreline Management Plans
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MEG	Mono Ethylene Glycol
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MoIT	Ministry of Industry and Technology
O.G.	Official Gazette
OIZ	Organized Industrial Zone
PAP	Potentially Affected People
PDoAF	Provincial Directorate of Agriculture and Forestry
PDoEU	Provincial Directorate of Environment and Urbanization
PR	Performance Requirements
PTA	Pure Teraphthalic Acid
PVC	Polyvinyl Chloride
SAP	Super Absorbent Polymer
SASA	Sasa Polyester Sanayi A.Ş.
TAYSEB	Toros Adana Yumurtalık Free Zone Founder and Operator Co.
TEU	Twenty-foot equivalent unit
Terminal Facility	Jetty and Prophane Storage Facility
Toroslar EDAŞ	Toroslar Electricity Distribution Inc.
TUBITAK	The Scientific and Technological Research Council of Turkey

5 LAND USE AND ZONING

5.1 Introduction

This chapter describes and discusses the land use and the available regional/local zoning plans for the Project site and Associated Facilities. Potential impacts on local commercial businesses and nearby communities are assessed in *Chapter 14: Socio-economics*. No land take and expropriation will occur in the future related to the Project. The background information and likelihood of impacts are presented and assessed in the following sections.

The below approach is followed in the assessment:

- Identification of baseline land uses within the Project site and its surroundings through site visits and review of aerial photographs;
- Review of local zoning and regional plans applicable the Project site;
- Project impact assessment regarding land use and zoning.

The following information sources were used for the assessment:

- Google Earth Satellite Images;
- 1/100,000 scaled Mersin – Adana Planning Region Environmental Plan No: O35;
- 1/1,000 scaled implementation zoning plan for Adana Ceyhan Energy Specialized Industrial Zone;
- “Investigation and Explanation Report” of the Adana Ceyhan Energy Specialized Industrial Zone 1/5,000 scaled zoning plan and 1/1,000 scaled implementation zoning plan (approved by the authority decision date/number: 12.07.2019/UİP-38413; NİP-38412 and amended with the authority decision date/number: 31.10.2019/UİP-38413,1; NİP-38412,1);
- 1/50,000 scaled İskenderun Bay (Adana-Mersin-Hatay) Integrated Shoreline Plan and Plan notes (approved by the authority decision date: 08.10.2015);
- Draft/proposed zoning plan of the CPIR Port that includes the Jetty that is an Associated Facility of the Project .

The study area for the land use assessment covers the following Project components and their close proximities:

- Project site includes;
    - PDH-PP Production Facility,
    - Mobilization Area: the mobilization area will be used temporarily during the construction phase of the project by renting from the Management Company. After

the completion of the Project construction, the site will be decommissioned and evacuated by the Project Company to its owner,

- Temporary topsoil and overburden deposition areas: the site will be used temporarily for the deposition and management of the topsoil and overburden excavated during the Early Works of the Project. After the use of the topsoil for the Project landscaping activities and the transfer of the overburden material to lisenced disposal site or permitted activity such as beckfilling of CPR Port backfilling, the site will be decommissioned and evacuated by the Project Company to its owner.

- Project Associated Facilities;
  - Jetty Facility: the Jetty area will be constructed as part of the CPIR. Jetty will be used for raw material transfer to the PDH-PP Plant during the operation phase of the Project,
  - Prophane Storage Tank: Prophane storage tank, which will be operate to supply raw material to the project, will be connected to jetty.

The details and locations of the Project components are presented in Chapter 2.

5.2 Legal Context

5.2.1 National and International Standards

The Project will comply with the following national regulations to mitigate the potential impacts of the Project on land use and zoning:

- *Environmental Law (No: 2872)*
  (Official Gazette date/no: 11.08.1983/18132);
- *Forest Law (No: 6831)*
  (Official Gazette date/no: 08.09.1956/9402);
- *Law on Pastures (No: 4342)*
  (Official Gazette date/no: 28.02.1988/23272);
- *Law on Industrial Region (No. 4737)*
  *(*Official Gazette date/no: 19.01.2002/24645);
- *Expropriation Law (No. 2942)*
  (Official Gazette date/no: 8.11.1983/18215);
- *Coastal Law (No. 3621)*
  (Official Gazette date/no: 17.4.1990/20495);
- *Public Health Law (No. 1593)*
  (Official Gazette date/no: 06.05.1930/1489);
- *Zoning Law (No. 3194)*
  (Official Gazette date/no: 09.05.1985/18749;)
- *Law on Ports (No: 618)*

(Official Gazette date/no: 20.04.1925/95);
- *Law on Soil Preservation and Land Use (No: 5403)*
(Official Gazette date/no: 19.07.2005/25880);
- *Decree No. 7/16349 of the Council of Ministers on the Law on Ports*
(Official Gazette date/no: 25.09.1978/16415);
- *Regulation on Industrial Zones*
(Official Gazette date/no: 6.8.2019/30854);
- *Coastal Law Implementation Regulation (No. 3621)*
(Official Gazette date/no: 3.8.1990/20594);
- *Environmental Impact Assessment Regulation*
(Official Gazette date/no: 29.07.2022 /31907);
- *Law on Military Forbidden and Security Zones (No: 2565)*
(Official Gazette date/no: 18.12.1981/17552).

As Turkey is a candidate for accession to the European Union (EU), following key legislation in European Union and International Reference Documents are also considered to be relevant:

- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (Official Journal/Date: L124/16.4.2014; Entry into force: 25.01.2014);
- Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information (Official Journal: L41, 14.02.2003; Entry into force: 14.02.2003).

In addition to the EU Directives, the following European Bank for Reconstruction and Development (EBRD) and International Finance Corporation (IFC) Guidelines will also need to abide with:

- IFC EHS General Guidelines;

Along with the PSs, the IFC produces manuals and guidelines that provide deeper analysis of best practice on key subjects. Of particular relevance to this Project is the IFC's 2007 Manual Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets and World Bank's Involuntary Resettlement Sourcebook: Planning and Implementation in Development Projects and IFC's Handbook for Preparing a Resettlement Action Plan.

The Turkish regulatory framework requirements and the conditions set in the Equator Principles, IFC and EBRD guidance documents provide inherent mitigation measures against the impacts.

5.3 Land Use Pattern

5.3.1 Land Allocation Status of the Project Site and Associated Facilities

The Project and associated facilites are planned to be developed in the premises of the CPIR, which is located in Ceyhan district of Adana province in the south of Turkey along the Mediterranean shore. The Project area is planned to cover a 50 ha area that is designated as the *Industrial and Storage Area* in the "Investigation and Explanation Report" of the Adana Ceyhan Energy Specialized Industrial Zone 1/5,000 scaled zoning plan and 1/1,000 scaled implementation zoning plan.

For the allocation of the Project Site to the Project Company in order to develop a polypropylene production facility, CPIR Management Company requested approval from the General Directorate of Industrial Region, Ministry of Industry and Technology (MoIT) on 05.11.2019 in line with the Article 3/A[1] of the Law on Industrial Region (No. 4737). Preliminary land allocation permit has been revised by General Directore of Ind. Region with the official letter (date/number:18.05.2022/ 3655463). Then according to the Industrial Region Law, General Directore of Ind. Region has sent offical letter to National Real Estate Directorate to establish the usufruct right on behalf of the Project Company (date/number: 07.06.2022/ 3734262).

In addition to the Project, Terminal Facility, which is considered as associated facility, will be developed parallel to the Project. In this respect, facilities and/or areas planned to be temporarily used during construction (i.e., for mobilization and temporary topsoil and excavated material storage areas) or planned to be long-term used during operation (i.e., jetty and prophane storage tank) will be used both for the Project and the Terminal Facility.

The mobilization area will be developed temporarily near to the northeast side of the Project facility area within the CPIR boundaries. The mobilization area that will also include a construction camp site and relevant accommodation facilities planned to be used during construction phase of the Project and will be decommissioned after the construction. The land required for the mobilization area will be rented from the CPIR Management Company. Hence, the mobilization site will not be a part of the process facility area, rental of the mobilization area will be done through a protocol between the Project Company and the CPIR Management Company.

The jetty will be located southwest of the Project site, and it will be constructed within the scope of the CIPR. Jetty construction will be mainly in the sea and will take place parallel to the Project's construction phase. The Jetty Area will be used by the Project for material delivery during the operation phase.

[1] Article 3/A states that, "Ministry gives the necessary decision for the site allocation to the investors to be selected by the Management Companies in accordance with the provisions stated in this Regulation".

The Project site has an inclined topography; the elevation difference ranges from sea level to 55 m. The shoreline of the Project site extends along the rocky coast for approximately 1.5 km. The site is devoid of any previous industrial development. No infrastructure or upper structure is present within the designated site boundaries. There is an ancient waterway protection zone within the Project premises close to the Project Site. The details on the archaeological waterway and its current condition is reported in *Chapter 13: Cultural Heritage*.

All the parcels within the Project site have been expropriated by the MoIT within the scope of the expropriation plan for the future development of the CPIR. The expropriation is done by the MoIT in 2019 in line with the provisions of Article 10 of the Regulation on Industrial Zones, which states that "*the privately-owned immovables within the boundaries of the industrial zone are expropriated by or expropriation is coordinated by MoIT*". The parcels in and around the Project site before and after the expropriation by the MoIT are shown in Figure 5-1.

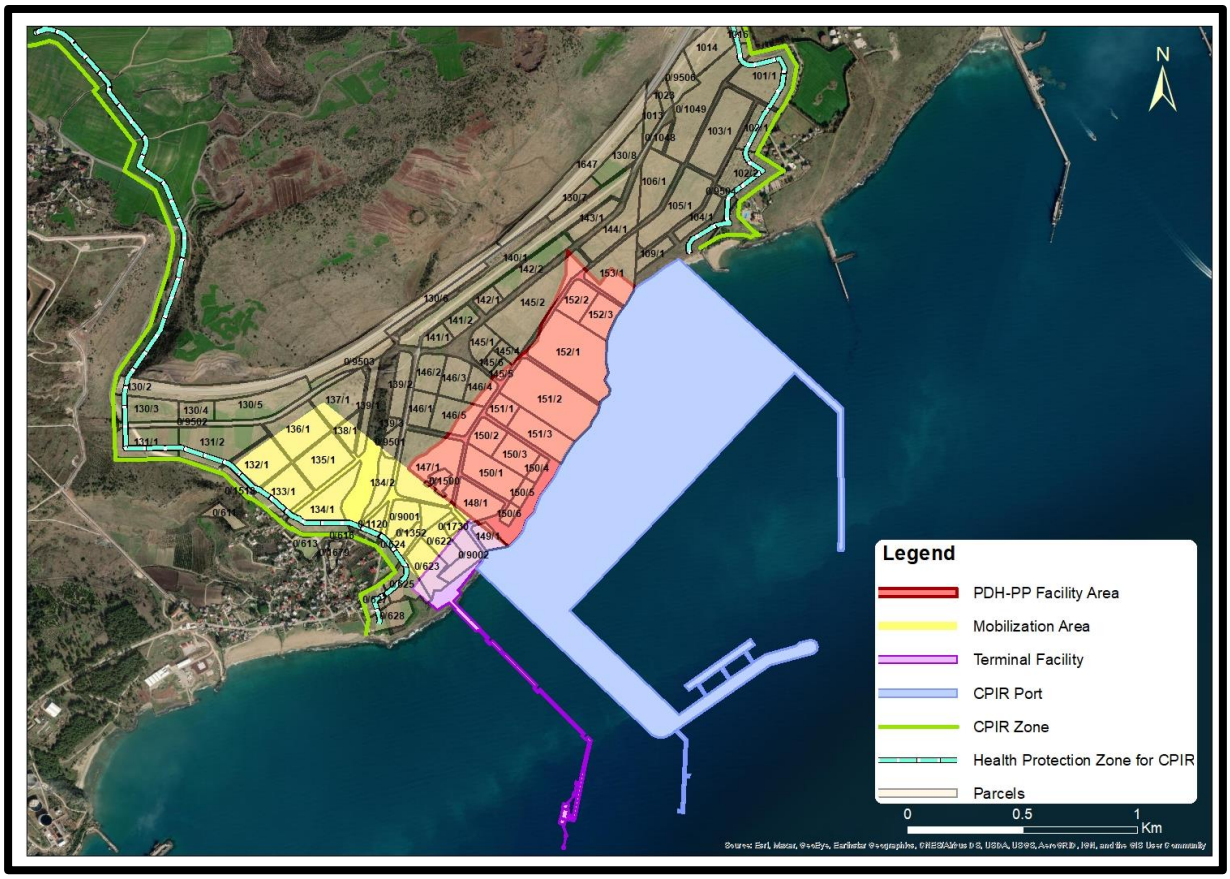

Figure 5-1. The map showing CPIR Expropriation Area in the vicinity of the Project site and the land parcels

5.3.2 Previous Land Expropriation and Current Status of the Expropriation Process in the Project site and Its Surrondings

Ceyhan Energy Specialized Industrial Region has been declared with the Council Decision (O.G. date/number: 17.10.2007/26673). The urgent expropriation of immovables and revisions regarding the borders of the CPIR were decided with Councils Decision on 04.01.2010 (O.G. date/number: 30.01.2010/27478) pursuant to Article 27 of Expropriation Law (No. 2942) and Article 3 and 4/B of Law on Industrial Region (No.4737).

The Medium-Term Program presented with the Presidential Decision (date/number: 20.09.2018/108) declares the decision on the Petrochemical industry clustering and relevant development of the Ceyhan Energy Specialized Industrial Region. The Eleventh Development Plan (2019-2023) prepared by the Presidency of Strategy and Budget (2020)[2] designates Chemical Industry among the priotirised sectors and set forth the development of a large-scale petrochemical facility in the Çukurova Region among the relevant policies and measures. For that purpose, a plan for the initiation of large scale investments in the CPIR to establish integrated production structures including basic petrochemicals is declared in the Development Plan.

Zoning plan proposal including 1/5,000 scaled Zoning Plan and 1/1,000 scaled Zoning Implementation Plan as well as plan notes for CPIR, of which the expropriation processes have been finalised within the scope of Law on Industrial Regions and Regulation on Industrial Region, have been approved by the Ministry of Industry and Technology on 12.07.2019. 1/5,000 scaled Zoning Plan and 1/1,000 scaled Zoning Implementation Plan revision regarding the marine part of the CPIR has been approved by MoIT on 31.10.2019.

After the completion of the expropriation process by the MoIT, the layout of the parcel lots and the parcel lot numbers in the CPIR have been changed. The new parcel lot nos. are 270/1, 266/7, 266/8, 266/3, and 622 for the Project area. However, there are still some areas with ongoing lawsuits against the expropriation decision in the CPIR area. Regarding the Project site, there was only one parcel lot with the former parcel number 622 for which the lawsuit on the expropriation was completed on 06.10.2022 (see Figure 5-2).

2 Presidency of the Republic of Turkey, Presidency of Strategy and Budget, 2020. Eleventh Development Plan (2019-2023), General Directorate of Adminisrtrative Services Division of Knowledge Management and Documentation, Ankara. https://www.sbb.gov.tr/wp-content/uploads/2021/12/Eleventh_Development_Plan_2019-2023.pdf

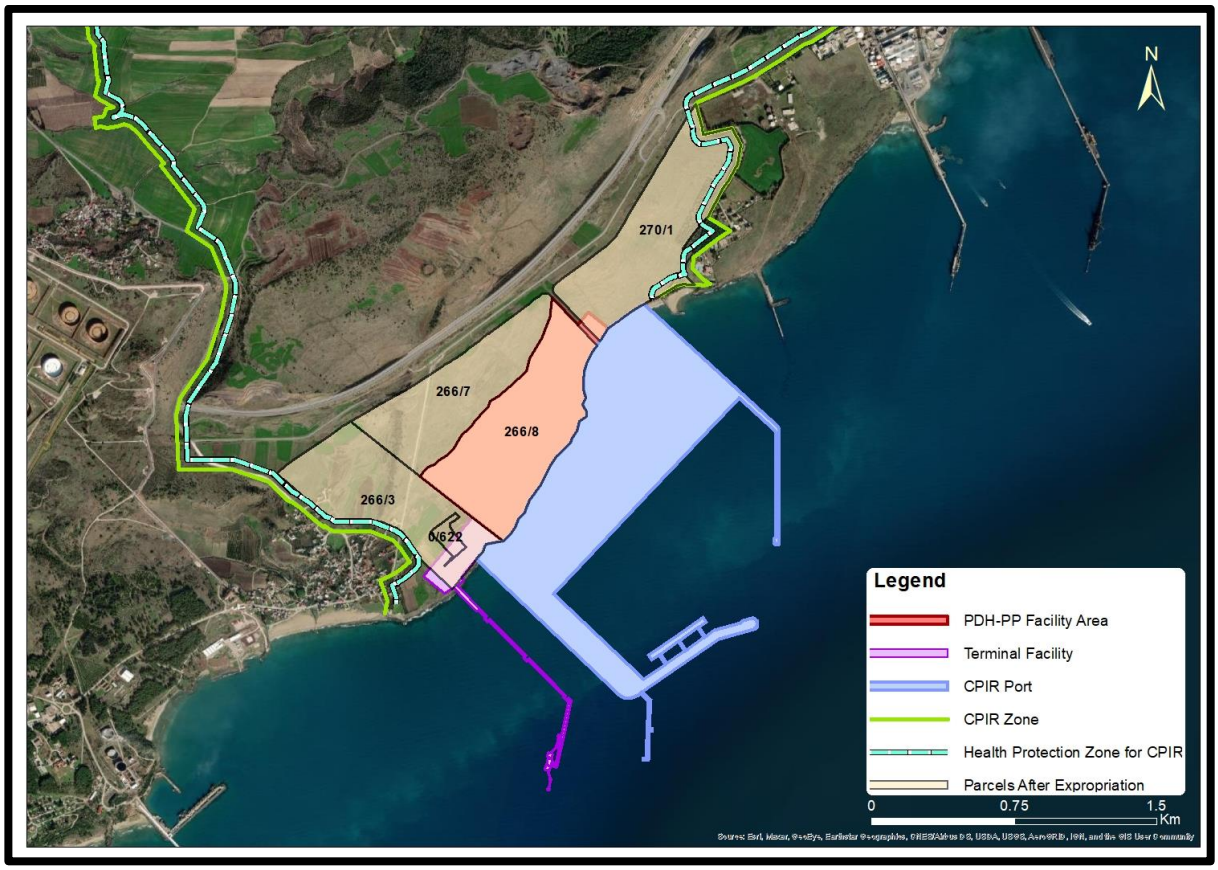

Figure 5-2. The map showing the parcel numbers at the Project site , the land parcel 622

Before 2020, in various parts of the land allocated for CPIR (i.e., land for which expropriation is completed), including the Project site, scattered olive groves with a total area of 37.89 ha were planted. The olive trees are relocated in 2020 from the previously expropriated treasury lands allocated for the CPIR to another site (i.e., Narlioren Neighbourhood) in the same locality upon the decision of the Ceyhan District Governorship. Regarding the olive and citrus trees planted within CPIR area, the official letter by the PDoAF with the date of 08.03.2019 informs about the decision by PDoAF on non-agriculture use permission of the site (see in Annex A) and states that the relocation of the olive groves to another suitable location of the same land is approved by PDoAF pursuant to the Article 20 of the Law No. 3573. It is also stated in the official letter that the PDoAF shall accompany the relocation process.

BOX- Court Case regarding relocarion of the olive grows

The official correspondence by the Ceyhan Governorship, District Directorate of National Real Estate with the CPIR Management Company (Ceyhan Petrokimya Endüstri Bölgesi Yönetim A.Ş.) on the date of 22.02.2020 notifies that the immovables owned by the Treasury have been used mainly to grow olive and citrus trees as well as for planting and seeding activities, by the communities for last two years. Although the necessary official notification regarding the removal of planted assets was made to the relevant people, the relocation process was not performed with the full consent of those affected. Lawsuits were filed regarding the cancellation of the relocation process to be performed on the areas where lemon trees are planted (Cases filed 2018/1031 and 2019/1132 in Konya Regional Administrative Court, 5th Administrative Case Department). The relocation process shall be started as soon as possible with collaboration of Adana Provincial Directorate of Agriculture and Forestry and Adana Department of Forestry as of 21.02.2020 by taking into account the Councils Decision regarding the status of the proposed area as Energy Region and decisions on avoiding uses other than purpose of its use and no right and compensation to be requested regarding moving out from the lands. It is proposed in the official letter that the relocation should be carried out with caution due to the seasonal conditions (i.e. conditions feasible for tree relocation) to a forest area (90 decares) in Narlıören Neighborhood in Yumurtalık District. Reportedly, the PDoAF engaged with the people, whose olive groves are within the Project site premises, for the identification of a potential area to relocate the olive groves. At present, these olive growes are aquired during land acquisition process and relocated to Narlıören Village.

Mobilization area are located on parcel plots for which the expropriation processes are completed by the MoIT. However, there is still some housing on these parcels which are not been evacuated yet. Hence, resettlement of the residents is an issue of the social mitigations within the scope of the Project.

As it can be seen in Figure 5-3, slight portion of the parcel lot with the former parcel number 625 is situated within the Project Area. The total surface area of the parcel lot is 21.6 da. The expropriation process of this parcel lot is completed in 2019. Currently, the area of the former parcel lot (no.625) is located within the new parcel lots with nos. 267-1 and 266-2. In the northwestern part of the parcel lot (within the current parcel lot no. 266/1), approximately 90 m to the southwest of the Project site there are two housings still used by local residents.

Two parcel lots with former parcel lot nos. 133/1 and 1120 are located within the footprint area of the Project's mobilization area which is an Associated Facility of the Project to be used during the construction phase. Parcel lot no.1120 is originally a state treasury land therefore no expropriation was required for the parcel lot. On the other hand, 133/1 was expropriated by

the MoIT in 2019. The total surface areas of parcel lots no. 1120 and 133/1 are 24.6 da and 32 da, respectively. Currently, these two parcel lots are located within the new parcel lots with numbers 266/1 and 266/3. For the realization of the project, due to the location of the Project's Associated Facility, resettlement will be necessary for a house located on parcel lot no.1120 and three housings located on parcel lot no. 133/1.

Two other parcel lots located outside of the Project site are lands with former parcel lot nos. 627 and 628. For both of the parcel lots, the expropriation process is completed in 2019 by MoIT. The former parcel lots with nos. 627 and 628 were located approximately 160 m and 90 m to the southwestern boundary of the Project site. There are still five housings in use by the local residents on parcel lot with former no. 627. Similarly, on the parcel lot with former no. 628 there are still a house and a fish restaurant used by the local residents. The distance to the nearest housings on these parcel lots from the southwestern Project site boundary is approximately 200 m and the distance to the fish restaurant is approximately 300 m. Currently, these lands are located within the parcel lots with nos. 267-1 and 267-2 that are owned by the state treasury.

More detailed information on the expropriation process is provided in the Land Acquisition Gap Analysis Report.

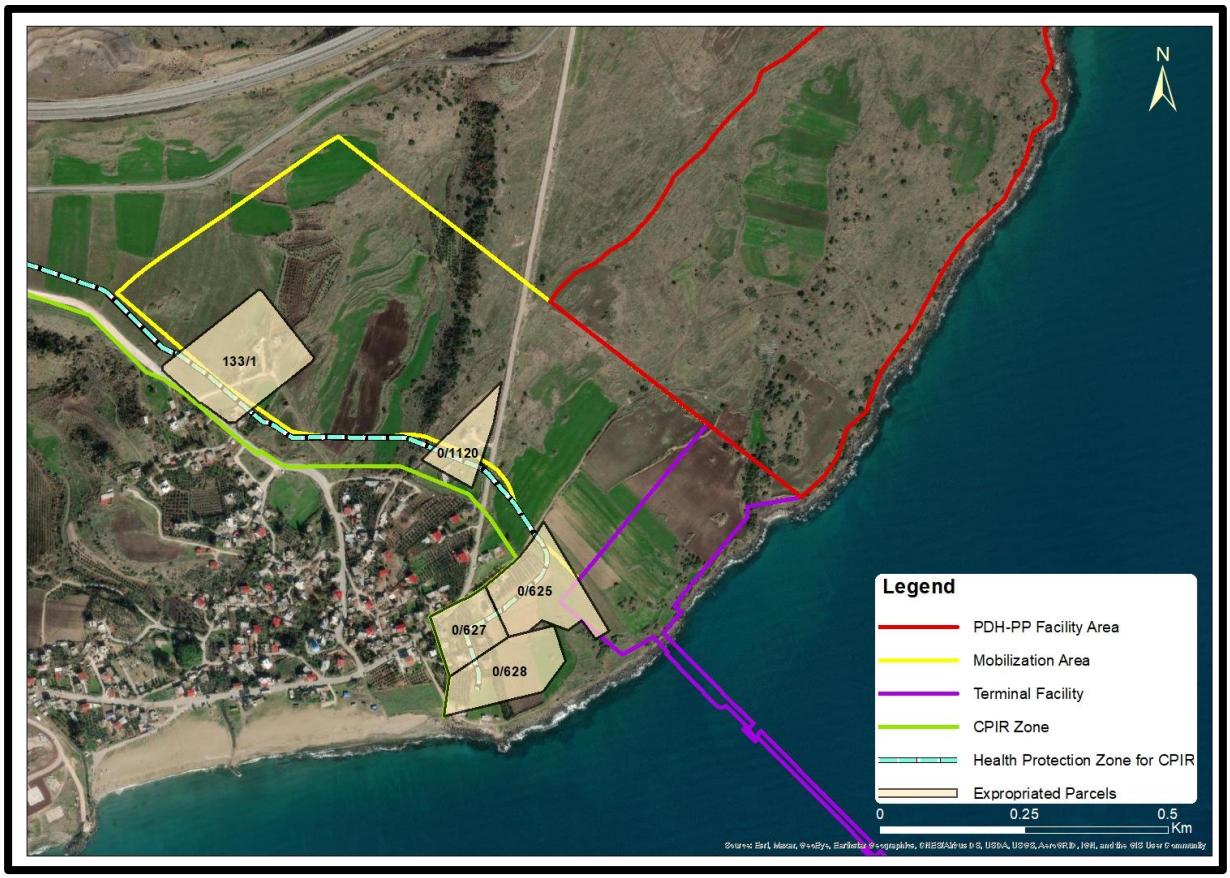

Figure 5-3. The location of the expropriated parcel lots that have residential houses on them

5.3.3 Land Use at the Project Site

As per the consultation with the Provincial Director of the PDoAF and the Ceyhan Municipality, Directorate of Urban Design in April 2022 the Project site and its environs, which are allocated for industrial use as the CIPR area in the upper scale zoning documents, are not suitable for irrigated farming. The lands in the region along the coastal zone are classified as marginal agricultural lands (i.e., lands suitable only for conventional agriculture due to limitations in soil capability or unfavorable agricultural conditions such as stoniness, steepness, and poor drainage characteristics) regarding adequacy to be used for agricultural purposes. The area of the Project is reported not to be used for any agricultural activities other than some limited unpermitted planting of olive and lemon trees for the duration between 2007 and 2010. Furthermore, the part of Iskenderun Bay, where the Project Associated Facility, Jetty is located, is not favorable for industrial fishing, and trawl fishing is restricted.

To identify the baseline change in the land use properties in and in the environs of the Project site, a comparative evaluation of the satellite photos is used. Some illustrative pictures of the Project site are presented in Annex E-I. The previous land use pattern of the Project site and its surroundings (dated 10.11.2006) and the latest view of the Project site and its surroundings (dated 30.09.2019) are obtained from Google Earth as shown in Figure 5-4.

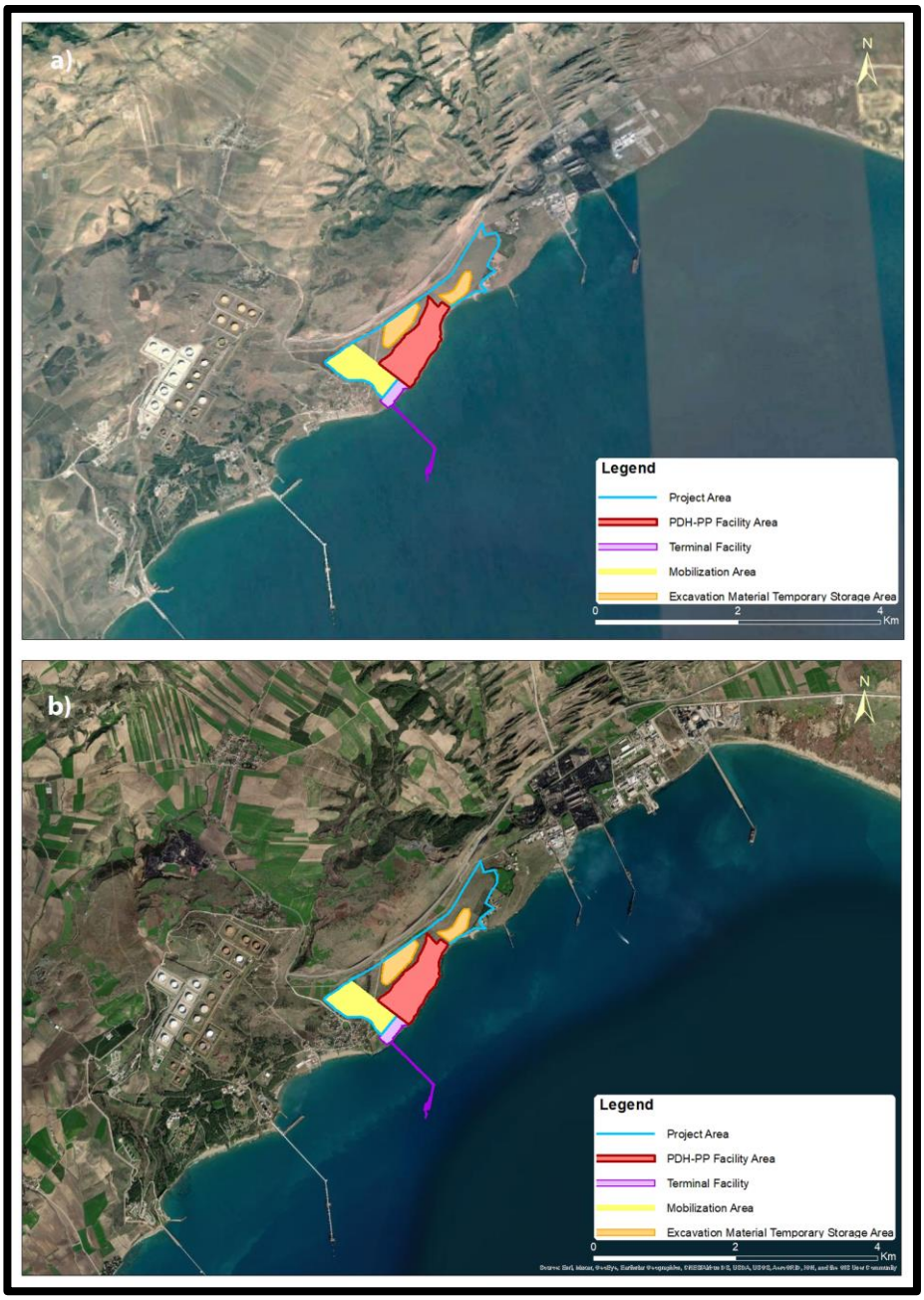

Figure 5-4. Google Earth view of the Project site and its surroundings dated a) November 2006, b) September 2019

When the Google Earth images in Figure 5-4 are compared, it can be seen that:

(i) a few changes are observed within the Project site in terms of increase of agricultural activities and tree planting;

(ii) No significant changes are observed in the vicinity of the Project site, especially to the west of the site (i.e., İncirli locality) ;

(iii) A few prefabricated structures on İncirli beach in 2006 are seem to be removed by 2019.

More detailed information on land use is provided in the Land Acquisition Gap Analysis Report.

The shoreline of the Project site extends along the rocky coast for approximately 1.5 km. The Jetty will be a part of the Raw Material Supply, Storage and Port Facility Project (CPIR Port) Project and will be used as an Associated Facility of the Project for material delivery during the operation phase. As stated in the Environmental Impact Assessment (EIA) Report prepared for CPIR Port Project in August 2020, the 1/1,000 and 1/5,000 scaled proposed zoning plans were prepared for the marine part of the CPIR and the proposal file is to be submitted to Adana Provincial Directorate of Environment, Urbanization and Climate Change (PDoEUCC) for their approval. The 1/1,000 scaled proposed zoning plan is provided below in Section 5.4.2.

5.4 Surrounding Land Use

The surrounding land use was defined by site visits, use of aerial photographs as well as local zoning plans in order to classify and delineate the current land use pattern and identify potential developments. A field survey was conducted within the scope of socio-economic site survey for ground-truthing in order to support the information on surrounding receptors. The information and related pictures are provided in Annex E-I.

The Project site is planned to be within the boundaries of the CPIR area that is under the management of CPIR Management Company. The dominant land use in the surrounding area of the Project site includes industrial facilities, scattered vacant lands, forestation and forest areas located in the CPIR area as well as rural residential areas. Furthermore, there is a fish restaurant (outside the site boundaries) and a number of cottages located to the southwest of the Project site near the shore. The land use in the vicinity of the Project site is illustrated in Figure 5-5 and a closer view including the cottages, fish restaurant and nearby houses are shown in Figure 5-6.

The surrounding land use in the close vicinity of the Project site is described below in more details.

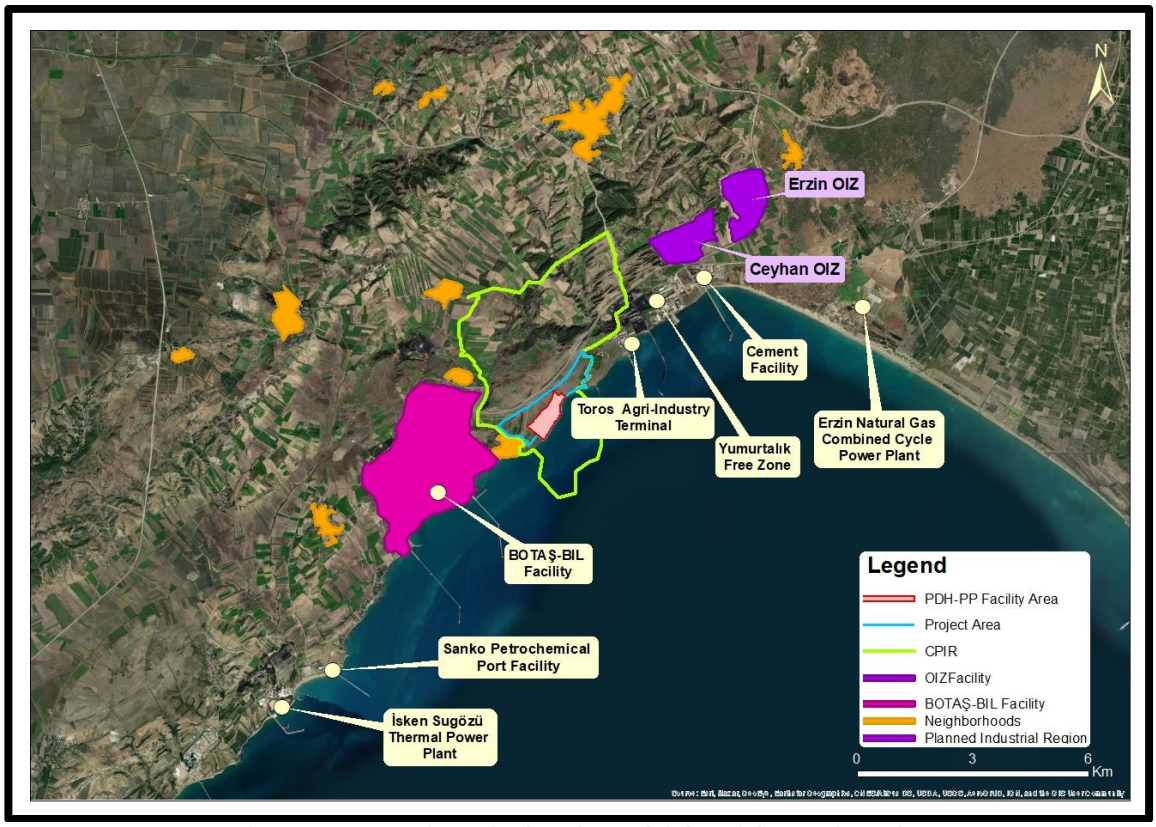

Figure 5-5. Land use in the close vicinity of the Project site

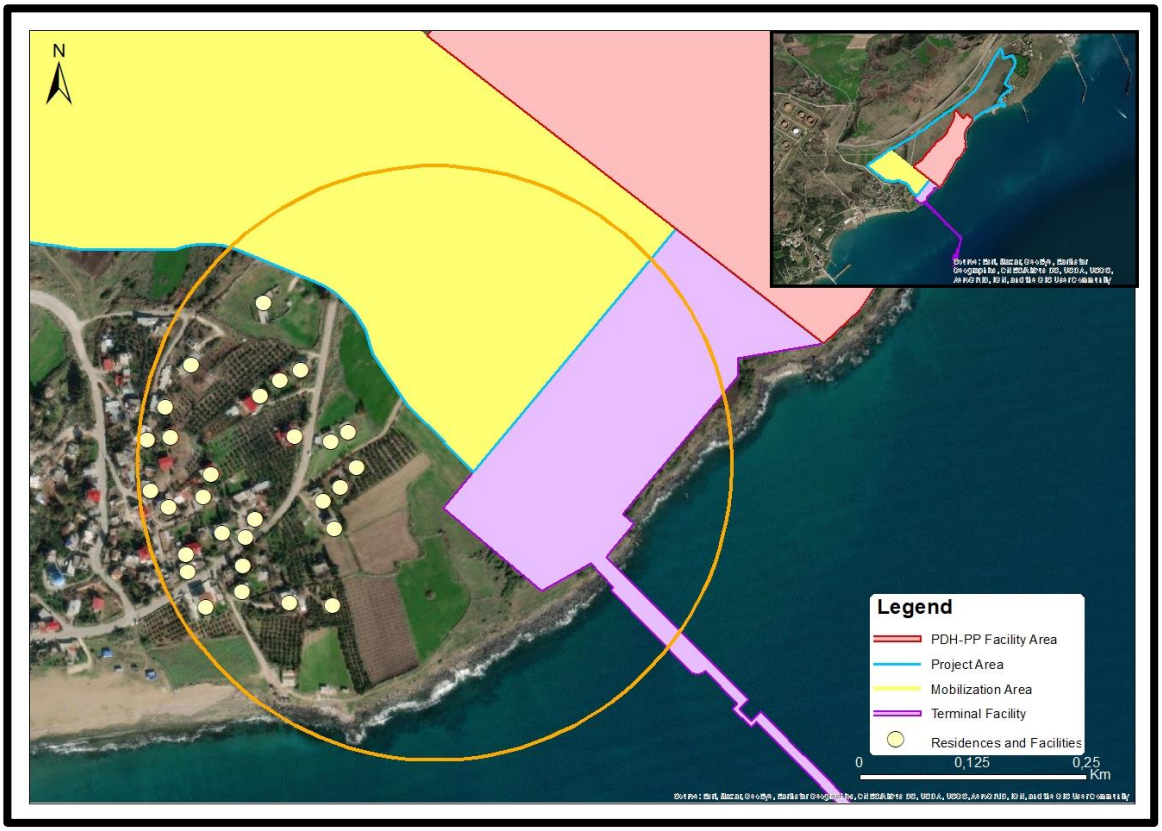

Figure 5-6. Closer view of land use in the close vicinity of the Project site

Ceyhan Petrochemical Industrial Region (CPIR) premises

CPIR is planned to be developed with the primary aim of attracting potential investors within the petrochemical sector (the area is indicated with a green line in Figure 5-5). The Ceyhan PDH-PP Production Project will be one of the first investments to be realised within the boundaries of the CPIR. According to site visits conducted as part of the ESIA process, though the CPIR area is shown as *Industrial and Storage Area and Wastewater Treatment Plant* (Ministry of Industry and Technology, 2019) in the zoning plans, there are forestation and forest areas within the CPIR site boundaries, approximately 1.5 km to the north of the Ceyhan PDH-PP Project site boundaries.

Settlements/Residential Areas

The closest settlement is the Kurtpınarı neighbourhood (1,900 inhabitants) with its two localities: İncirli and Karatepe. The Kurtpınarı neighbourhood centre is located to the northwest at approximately 3.5 km. The İncirli locality is approximately 50 m to the southwest and the Karatepe locality is approximately 2.2 km to the northwest of the Project site boundary. The closest houses in İncirli locality are located at distances ranging from 15-98 m as shown in Figure 5-6.

Kurtkulağı Neighborhood (1,300 inhabitants) is to the northwest at approximately 6.5 km and Sarımazı Neighbourhood (5,500 inhabitants) to the northeast at approximately 6.5 km distance to the Project site boundaries.

Local population and demographics data (for Kurtkulağı, Kurtpınarı, Sarımazı, Gölovası neighbourhoods) collected through Project community level assessments within the scope of socio-economic site surveys on July 5-10, 2021 indicate that there has been a decrease in the population of villages/neighbourhoods in th region over the years due lack of employment opportunities, particularly due to immigration of the young generation to the city centers for jobs.

The findings from social survey conducted as part of the ESIA process at the local neighbourhoods in the vicinity of Project site indicate that most of the local residents (i.e., Kurtkulağı, Kurtpınarı, Sarımazı) are employed in agriculture sector (olive groves, pomegranate and orange trees; wheat, bean etc.) and also conduct daily livestock grazing and beekeeping activities. During early communication (10-12 February 2020) at the scoping stage with local stakeholders, complaints/concerns related to the environmental conditions (e.g., dust, quality of water courses etc.) were reported. The complaints were about the degradation in air and surface water quality due to increased number of industrial facilities in the region which is considered by locals to severely impact the agricultural activities. As informed by the headman of the Kurtkulağı neighbourhood during the interview in July 2021 conducted as part of the ESIA process, farming is a common income activity as majority of the locals are retired. Olive cultivation is also main agricultural activity in Kurtkulağı and Sarımazı neighbourhoods and locals also breed cattle and sheep for income generation. Furthermore Kurtpınarı

headman informed that although olive cultivation is the main agricultural activity in İncirli locality; fishing is also common for household consumption or income generation purposes. Similarly, fishing is recorded as the primary economic activity in Gölovası district according to the information obtained from Gölovası headman. However, both of the headmen informed about the decrease in local fishing due to the industrial facilities nearby and increase in diesel price.

Potential impacts on nearby communities are assessed in *Chapter 14: Socio-economy* and *Chapter 15: Community Health and Safety*.

Furthermore, a fish restaurant, owned by a resident of İncirli neighbourhood, is located adjacent to the southwestern border of the Project site (outside the site boundaries).

Public housings/accommodation

Turkish Petroleum Pipeline Company (BOTAŞ) has approximately 1,000 personnel; whereas, BOTAŞ International (BIL) has approximately 700 personnel including subcontractors. As it was understood during the social survey conducted within the scope of the stakeholder engagement activities, there are public housing facilities (approx. 1,000 residents), a kindergarden and a primary school with 140 students within the Facility premises of BOTAŞ and BIL (to the west of the Project site at approximately 1.8 km). Reportedly, students from the nearby neighbourhoods also attend to the primary school.

Toros Agri Industrial plant has housings which is located to the east of the Project site at 0.7 km of distance. As stated during the face-to-face meeting with Toros Agri officials as part of stakeholder engagement activities, approximately 120 people (in 35 houses) occupies the housings. Additionally, there is a guest house with a capacity of 30 rooms.

Schools

Toros Tarım Primary School is located in Kurtpınarı neighbourhood to the north of the Project site at approximately 3 km distance. Toros Tarım Primary School is located adjacent to the Ceyhan-Erzin Road which provides access between Kurtkulağı neighbourhood and the Project site. Additionally, as mentioned above, there are also a primary school and kindergarten in BOTAŞ Facility/campus (to the west of the Project site at approximately 1.8 km) which serves to both BOTAŞ employees and to the surrounding neighbourhoods. Reportedly the kindergarten and the BOTAŞ primary school are located within the BOTAŞ Facility premises; therefore, they are not directly affected by the road traffic. In terms of community health and safety aspects, the traffic routes and access are explicitly discussed in *Chapter 11: Traffic Safety*.

Industrial Setting/Facilities

The Project site is located in the vicinity of the major industrial setting; it neighbours to BOTAŞ Ceyhan Marine Oil Terminal which is the terminus for Baku-Tbilisi-Ceyhan Crude Oil Pipeline (BTC) Project to the southwest at approximately 1.5 km and Toros Agri-Industry to the east at approximately 2 km distance to Project site boundaries. To the west of the BOTAŞ Ceyhan Marine Oil Terminal, a coal fired thermal power plant (İsken Sugözü Thermal Power Plant) is located which is approximately 9 km to the southwest of the Project site.

Moreover, to the east of Toros Agri-Industry Yumurtalık Free Trade Zone is located to the east of Toros Agri-Industry located at approximately 3.5 km to the Project site. Additionally, there are some coal storage facilities to the northwest approximately 2.5 km away from the Project site.

The Yumurtalık Free Trade Zone is operated by Toros Adana Yumurtalık Free Zone Founder and Operator Co. (TAYSEB), a Tekfen Group company, with “Build, Operate, Transfer” model for 30 years. The neighbouring Torosport Ceyhan Terminal provides port services to the Free Trade Zone. The Port is owned by Toros Agri Industry and Trade Co., Inc., a Tekfen Group company, and it is one of the Turkey’s largest bulk and general cargo ports. The Free Trade Zone mainly includes manufacturing plants including chemicals, petrochemicals, iron and steel, food and animal feed, shipyards and cement factories (Sönmez Cement Facility, coal processing facilities i.e. Super Enerji, Bamak Kömür, İnterkarbon İthal Kömür). Erzin Natural Gas Combined Cycle Power Plant is located at approximately 8.5 km to the east of the Project site.

BOTAŞ Facility/campus contains seven storage tanks in the Facility having a total capacity of 1 million drums located at approximately 1.5 km to the west end of the Project site boundaries. There are also two helipads within the Facility premises (approximately 3.8 km away from the Project site). Additionally, there are two jetties (1,950 m and 2,600 m) belonging to BOTAŞ and BIL and located approximately 1.3 km and 3.2 km away from the closest part of the jetty of the Project, respectively. We have been informed that the beach located within the campus is used by BOTAŞ and BIL personnel and their families residing in public housings (to the west of the Project site at approximately 2.5 km). There is also Turkish Coast Guard Command in the BOTAŞ Campus having a ship permanently anchored in the jetty and an observation tower. A package wastewater treatment plant is installed in the Campus to treat the domestic wastewater.

Toros Agri Industry has two jetties (named as Toros Agri Industry West and East Jetties) which serve for import and export run by national and foreign vessels and located approximately 2.0 and 2.8 km distance to the Project site boundaries, respectively. Toros Agri Industry has separate biological and chemical wastewater treatment plants. Housings has an additional domestic wastewater treatment plant.

There are also planned organized industrial zones (OIZ) in the vicinity of the Project site i.e. Ceyhan OIZ and Erzin OIZ (indicated in purple color in Figure 5-5).

Water course/ River bed

With reference to the Adana Ceyhan Energy Specialized Industrial Zone 1/1,000 Implementation Zoning Plan, there is no watercourse or any dry river bed inside the Project site. However, as seen from the satellite images of the area, there is a river bed along the northeast boundary of the Project site. As stated in the Investigation and Explanation Report of the zoning plan, all activities other than maintaining the canal structure or road maintenance, are prohibited on the indicated river bed. The potential water sources and associated mitigation measures are detailed in *Chapter 7: Hydrology and Hydrogeology*.

Archaeological sites

There are two registered 1st and 3rd degree archaeological sites (indicated green and yellow dot in Figure 5-5) in the CPIR area located to the north and northeast of the Project site. The details on the presence and current condition of the archaeological assets inside and outside of the Project site were assessed and reported in *Chapter 13: Cultural Heritage*.

Ongoing developments

The information on the ongoing developments given in this section is gathered from the published zoning plans and publicly available documents. Accordingly, there is a planned railway crossing which passes through CPIR from east to the north end at a distance of approximately 2 km which will provide connection to Industrial Facilities - Yumurtalık Free Zone Industrial centre and terminals in the Çukurova Region and İskenderun Bay to be developed under the responsibility of Directorate of Infrastructure Investments, Ministry of Transport and Infrastructure.

Additionally, “The Rehabilitation of Tugboat Port (including dredging) Project” is planned to be undertaken within the BOTAŞ Facility premises in Kurtpınarı neighbourhood, Ceyhan District. The Project Introduction File of the Rehabilitation of Tugboat Port Project prepared in line with the provisions of Turkish EIA Regulation, has been published in March 2020.

Moreover, a coal washing plant is proposed to be established within the premises of Süper Enerji Coal Storage Facility which is located to east of the CPIR site. The Project Introduction File of this Project has been published in December 2019. “EIA is not required” decision was given by the Adana Governorship Provincial Directorate of Environment in December 2019.

A waste reception facility will be established in Gölovası neighborhood in Yumurtalık District by Gizem Denizcilik Akaryakıt Pazarlama Nakliyat Ticaret Ltd. Şti. (Gizem Denizcilik) covering a surface area of 5,000 m^2 (located approximately 6 km to the west of the Project site). A Project Introduction File for the proposed waste reception facility has been prepared in line

with the provisions of Turkish EIA Legislation and published in April 2019. Accordingly, waste reception facility will be receiving the following wastes within the scope of the MARPOL 73/78; bilge water, sludge, waste oil (within scope of Annex I of MARPOL), sewage (within scope of Annex IV of MARPOL), and garbage (within scope of Annex V of MARPOL).

“An Integrated Petrochemical Production Plant and Port Project (comprising of Pure Teraphthalic Acid (PTA), Mono Ethylene Glycol (MEG) and also including production of polypropylene, polyethylene, polyvinyl chloride (PVC), super absorbent polymer (SAP), polyethylene terephthalate, 2 ethyl hexanol, acetic acid, acrylic acid, ethylene dichloride and chlorine alkaline)” will be developed by Sasa Polyester Sanayi A.Ş. (SASA), an Erdemoğlu Holding company, in Yumurtalık District located at an approximately 12.7 km distance to the west of the Project site boundaries. The Integrated Petrochemical Production Plant and Port Project covers a surface area of 678 ha. The Draft EIA Report for the Project has been prepared and published on 31.03.2020 (official website of Ministry of Environment, Urbanization and Climate Change (MoEUCC)). In accordance with the 14th article of the EIA Regulation, the EIA positive Decision was given by the MoEUCC on 21.05.2020.

“A Platform and Pipeline Project” will be established by Alkaport Ceyhan Liman İşletmeleri A.Ş. in Sarımazı District, Ceyhan (approximately 3.5 km to the east of the Project site boundaries). The final EIA Report for the Platform and Pipeline Project has been prepared in April 2020 in line with the provisions of Turkish EIA Legislation. In accordance with the 14th article of the EIA Regulation, the EIA positive Decision was given by the MoEUCC on 28.08.2020. Within the scope of the Project, a 2,045 m long pipeline in the marine part and a 1,040 m long pipeline in the terrestrial part will be established. The platform will be established at a 2,045 m distance from the shoreline. The platform and pipeline will be served for the facilities that are operational in Yumurtalık Free Zone namely Aschem Petrokimya, Ak-Taş Dış Ticaret, Likit Kimya and Koruma Klor Alkali Sanayi. The total surface area of the Project in the marine part will be 13,960 m^2. The configuration of the platform was made based on 63,000 Dead Weight Tons (DWT).

A “Capacity Increase and Rehabilitation of Toros Agri Industry Terminal Project” will be established by Toros Agri Industry in Sarımazı District, Ceyhan (approximately 2 km distance to the east of the Project site boundaries). An EIA Application File for the Project has been prepared in September 2019 in line with the provisions of Turkish EIA Legislation. Toros Agri Industry currently has two jetties (named as Toros Agri Industry West and East Jetties) which serve for import and export run by national and foreign vessels and are located approximately 2 km and 2.8 km distances from the Project site boundaries. The proposed capacity increase and rehabilitation project will be applied to the existing jetties of the Toros Agri Industry.

A rehabilitation project will be undertaken for Akdeniz Shipyard by Akdeniz Gemi İnşa San. Tic. A.Ş. in Yumurtalık Free Zone, Sarımazı, Ceyhan (approximately 3.5 km distance to the east of the Project site boundaries). An EIA Application File was prepared for the project in

June 2019 in line with the provisions of Turkish EIA Legislation. Within the scope of the proposed project, the existing jetties will be rehabilitated and a breakwater will be established.

A shipyard will be established by TERSAN Tersanecilik Taşımacılık San. ve Tic. A.Ş. in Yumurtalık Free Zone, Sarımazı, Ceyhan (approximately 3.5 km to the east of the Project site boundaries). A Final EIA Report was prepared for the project in 2016 in line with the provisions of Turkish EIA Legislation. The proposed shipyard project will require a filling area in the marine section and the project will have a 2,045 m long breakwater. At this stage the exact timing of the investment is not clear.

According to the information obtained from the “Investigation and Explanation Report” of the Adana Ceyhan Energy Specialized Industrial Zone 1/5,000 scaled zoning plan and 1/1,000 implementation zoning plan, there are also planned OIZs (i.e., Ceyhan OIZ and Erzin OIZ (indicated in purple in Figure 5-5)) in the vicinity of the Project site. Ceyhan OIZ is planned to be developed on a surface area of 132.37 ha which is located approximately 4.5 km distance to the northeast of the Project site boundaries. The zoning plan related to the development of the planned Ceyhan OIZ was approved on 16.10.2018. Moreover, Erzin OIZ is planned to be developed on a surface area of 148.38 ha and located approximately 6 km distance to the northeast of the Project site boundaries. The revision of the zoning plan related to the development of the planned Erzin OIZ was approved on 04.12.2018. It is stated that the construction and infrastructural developments related to Erzin OIZ have not been started yet.

There are a number of planned thermal power plant developments in the vicinity of the Project site, especially at approximately 5-10 km distance to the west.

The project time schedules, and cumulative impacts with regards to environmental and social aspects together with proposed mitigation measures are further discussed to the extent possible in *Chapter 18: Cumulative Impact Assessment*. Figure 5-7 below illustrates the important receptors around the Project site.

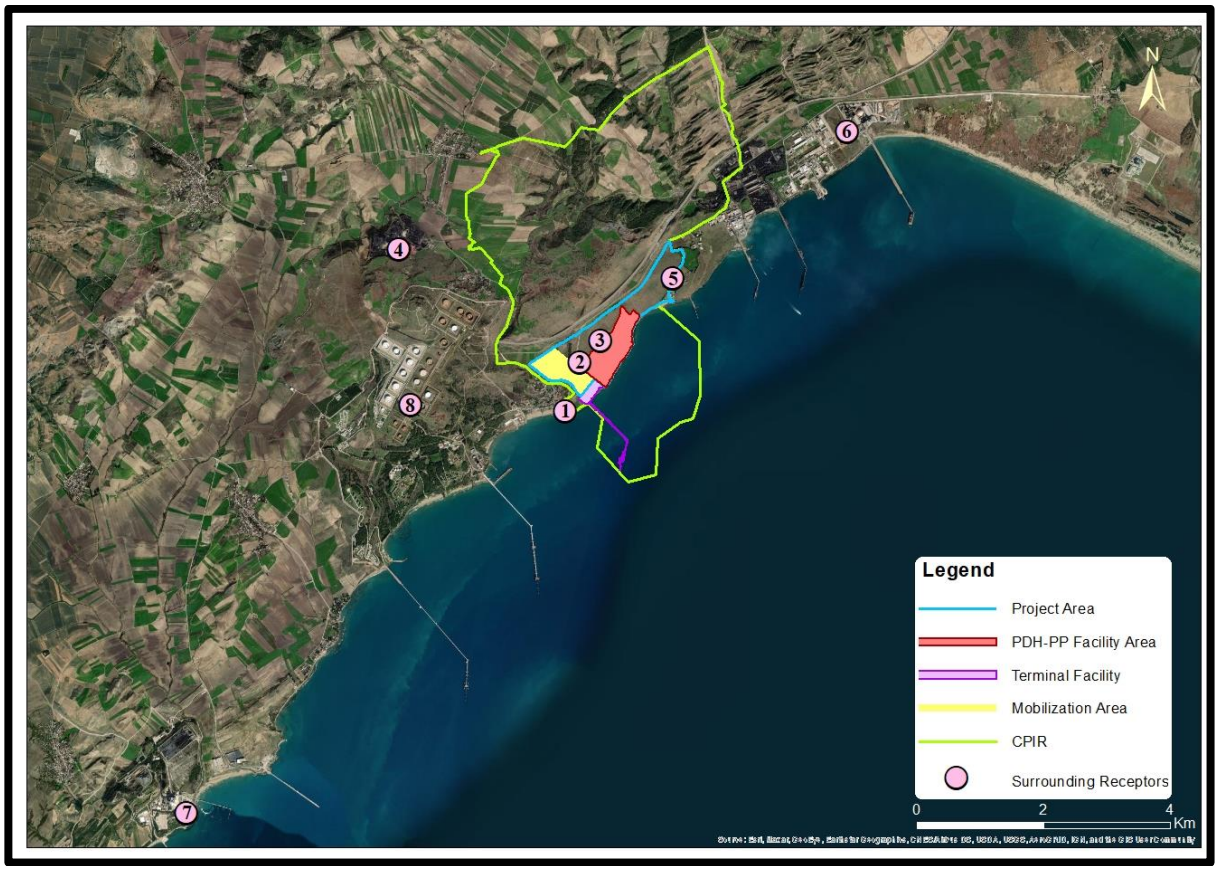

Figure 5-7. Land use map showing important surrounding receptors around the Project site (Refer to the numbers in the map for the relevant pictures in Annex E-I) (1): Fishery restaurant, (2) Ancient water pathway, (3) General view of the Project site, (4) Coal facilities, (5) Toros Agri Industry Social Facilities, (6) Cement factory, (7) Isken Sugözü Thermal Power Plant, (8) BOTAŞ Facility Premises

5.5 Regional Plans and Zoning

There are regional and local plans in relation to the area of the Project site and its Associated Facilities. The 1/100,000 scaled regional Environmental Plans show the current land use as well as the land use designations for future developments. Similarly, the Integrated Shoreline Plans are prepared with a strategic approach for shoreline and facilities along the shoreline. CPIR, and the Ceyhan PDH-PP Project and its Associated Facilities located in the CPIR are within the scope of the “1/100,000 scaled Mersin – Adana Planning Region Environmental Plan No: O35” and “1/50,000 scaled İskenderun Bay (Adana-Mersin-Hatay) Integrated Shoreline Plan”. There are no zoning plans other than 1/5,000 and 1/1,000 scaled plans for the area.

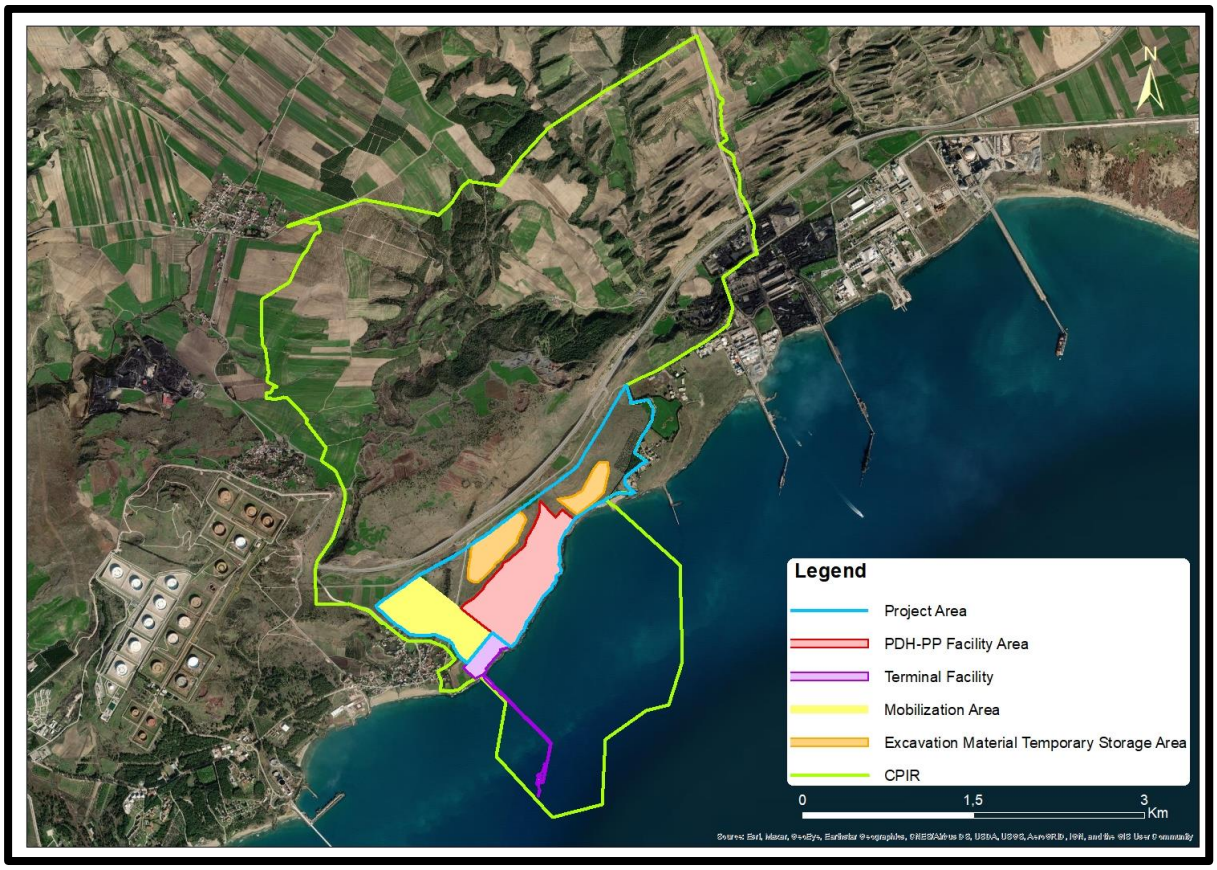

Figure 5-8. Project Site and surrounding

5.5.1 The Project Site

The Project site is within the municipal boundaries of the Ceyhan district. “1/100,000 scaled Mersin – Adana Planning Region Environmental Plan” has been approved by the MoEUCC on 16.09.2013. The Project is within the No: O35 map section of the Environmental Plan with the final revision dated 23.10.2017.

At the municipal level, there are spatial plans for the region that also covers the Project site. The sections of 1/1,000 scaled plans are extracted to show the land classification in and around the Project site as shown in Figure 5-9. The 1/1,000 scaled implementation zoning plan is presented in Annex-E-II. Depending on the Project site boundary changes done during the Detailed Engineering Phase of the Project due to design and project plan optimization the Project Company has applied for a revision of the 1/1,000 scaled plans by MOIT.

According to the 1/5,000 scaled zoning plan and 1/1,000 implementation zoning plan, the Project site is shown as an *Industrial and Storage Area.* The 1/5,000 and 1/1,000 scaled plans were primarily approved on 12.07.2019. Thereafter, the “Investigation and Explanation Report” of the Adana Ceyhan Energy Specialized Industrial Zone 1/5,000 scaled zoning plan and 1/1,000 implementation zoning plan has been revised and approved by the authority on 31.10.2019. The scope of the revision comprises a surface area of 23.59 ha within the 100 m distance from the coastline along the shore of the Industrial Zone. The section (surface area

of 23.59 ha) was identified as “Special Designated Area (i.e., an area which is subject to the provisions of Coastal Law and associated regulations)” pursuant to Coastal Law No: 3621. On the other hand, in the revised plan the 23.59 ha of land was included in the Industrial Zone and also a section was designated as the *Industrial and Storage Area and Wastewater Treatment Plant area.*

The Provisions Notes of the revised plan state that the CPIR has been designated as a “Special Security Zone” with the Presidential Decision date/number: 04.10.2019/1649. The total surface area of the Special Security Zone is 1,168.34 ha. A section of this area (i.e., 327.05 ha) is located in the marine part of the shoreline; whereas, the terrestrial boundaries of the Special Security Zone overlays with CPIR boundaries. Special Security Zones are subject to Law on Military Forbidden and Security Zones No: 2565. Land use tables are presented in the provisions note of the revised plan. Accordingly, the total footprint of the Industrial and Storage Area, Wastewater Treatment Plant, and road/parking area are increased to cover 22,038 ha, 1,519 ha, and 0.035 ha areas, respectively.

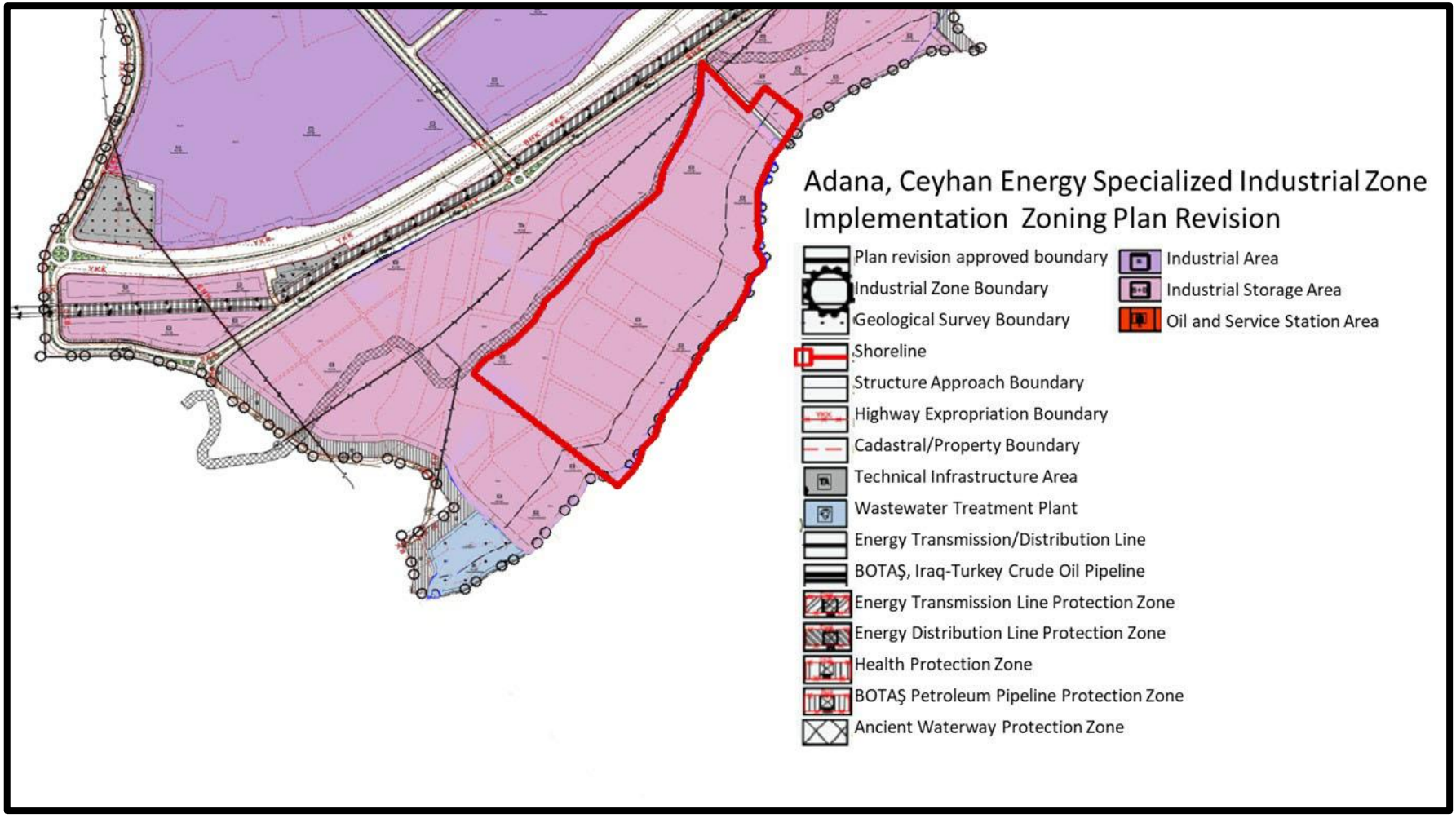

Figure 5-9. A Section of the 1/1,000 scaled zoning plan showing the Project site

According to the 1/5,000 scaled zoning plan and 1/1,000 scaled implementation zoning plan notes;

- As also stated in the official correspondence of the Adana Regional Board Directorate of Cultural Assets Protection dated 24 October 2017 (as given in Annex A), there is an ancient waterway protection zone within the CPIR premises close to the Project site. The details on the presence and current condition of the archaeological waterway are given in *Chapter 13: Cultural Heritage*;
- A railway crossing through the CPIR and running parallel to the northern – northwestern boundary of the Project site is planned to be developed under the responsibility of the Directorate of Infrastructure Investments, Ministry of Transport and Infrastructure. The planned railway will provide a connection to Industrial Facilities - Yumurtalık Free Zone Industrial centre with terminals in the Çukurova Region and İskenderun Bay ;
- Two crude oil pipelines owned by BOTAŞ and BTC are crossing CPIR along the Ceyhan İskenderun Motorway Free Trade Zone Connection Road to the north – northwest of the Project site. Pursuant to the official correspondence by BOTAŞ Petroleum Operations District Management on 17.04.2019 (see Annex A), all the necessary technical, health and safety measures shall be taken within 200 m distance to the pipelines;
- An energy transmission line of 31.5kV crosses through the Project site. The official letter from Toroslar Electricity Distribution Inc. (Toroslar EDAŞ) on 26.04.2019 (see in Annex A), stating that horizontal and vertical safety distances should be regarded. Prior to the development of the Project, the Management Company should ensure that the energy transmission line is displaced as necessary;
- There is only one flowing creek namely “Karanlık Kapı Creek” within the premises of CPIR (outside the Project site) crossing the northern border and flowing to the southeast of the CPIR site. There are a number of dry rivers namely Kurukastal Deresi”, “Meşe Deresi”, “Katranlı Deresi” ve “Sağlankatlı Deresi” that join the Karanlık Kapı Creek outside the Project site. Apart from the dry rivers mentioned above, a dry riverbed extends along the northeast boundary of the Project site. The hydrological potential of the region is presented in detail in *Chapter 7: Hydrology and Hydrogeology*.

The summary of the relevant official correspondence and associated requirements presented in “Investigation and Explanation Report” of the Adana Ceyhan Energy Specialized Industrial Zone 1/5,000 scaled zoning plan and 1/1,000 scaled implementation zoning plan are given below:

- Compliance with the Electrical High Current Facilities Regulation (Official Gazette (O.G.) date/number: 30.11.2000/24246) stating that horizontal and vertical safety distances shall be regarded;

- Compliance with the requirements proposed in the official letter obtained from Provincial Directorate of Health (dated 01.03.2019) related with the health protection zone distances shall be establised;
- Compliance with provisions of the Technical Safety and Environment Regulation on Construction and Operation of BOTAŞ Crude Oil and Natural Gas Pipeline (O.G. date/number: 04.07.2014/29050) related with two crude oil pipelines belonging to BOTAŞ and BTC that are crossing along the Ceyhan İskenderun Motorway Free Trade Zone Connection Road to the north of the Project site shall be followed;
- Compliance with Law on Olive Improvement and Grafting of Wild Species (No. 3573) (O.G. date/no: 7.2.1939/4126) adequte actions will be taken related with the olive groves in the Project site;
- Compliance with Article 3 and 4/B of Regulation on Buildings to be built in Seismic Zones relevant requirements will be followed;
- Compliance with Law on Industrial Zones (O.G. date/number: 09.01.2002/4737) and Article 27 of Expropriation Law No 2942 relevant requirements will be followed;
- Compliance with Article 27 of the Expropriation Law (No: 2942) and Article 3 and 4/B of the Law on Industrial Regions (No: 4737) requirements related with the expropriation in the CPIR will be followed.

Apart from the abovementioned correspondence and requirements; provisions related to the industrial storage areas (i.e., structure approach distances, height, width etc.) are presented in the “Investigation and Explanation Report”.

5.5.2 Associated Facilities

“1/50,000 scaled İskenderun Bay (Adana-Mersin-Hatay) Integrated Shoreline Plan” has been approved by the MoEUCC on 08.10.2015. The Terminal Facility which is an Associated Facility of the Project is within “Ceyhan Yumurtalık Planing Region No: 4”. The region is defined as a 1st degree seismic zone and low-risk zone in terms of ground conditions, tsunami, climate change and sea level rise. A section of the İskenderun Bay (Adana-Mersin-Hatay) Integrated Shoreline Plan is extracted to show the Project site and environs as shown in Figure 5-10.

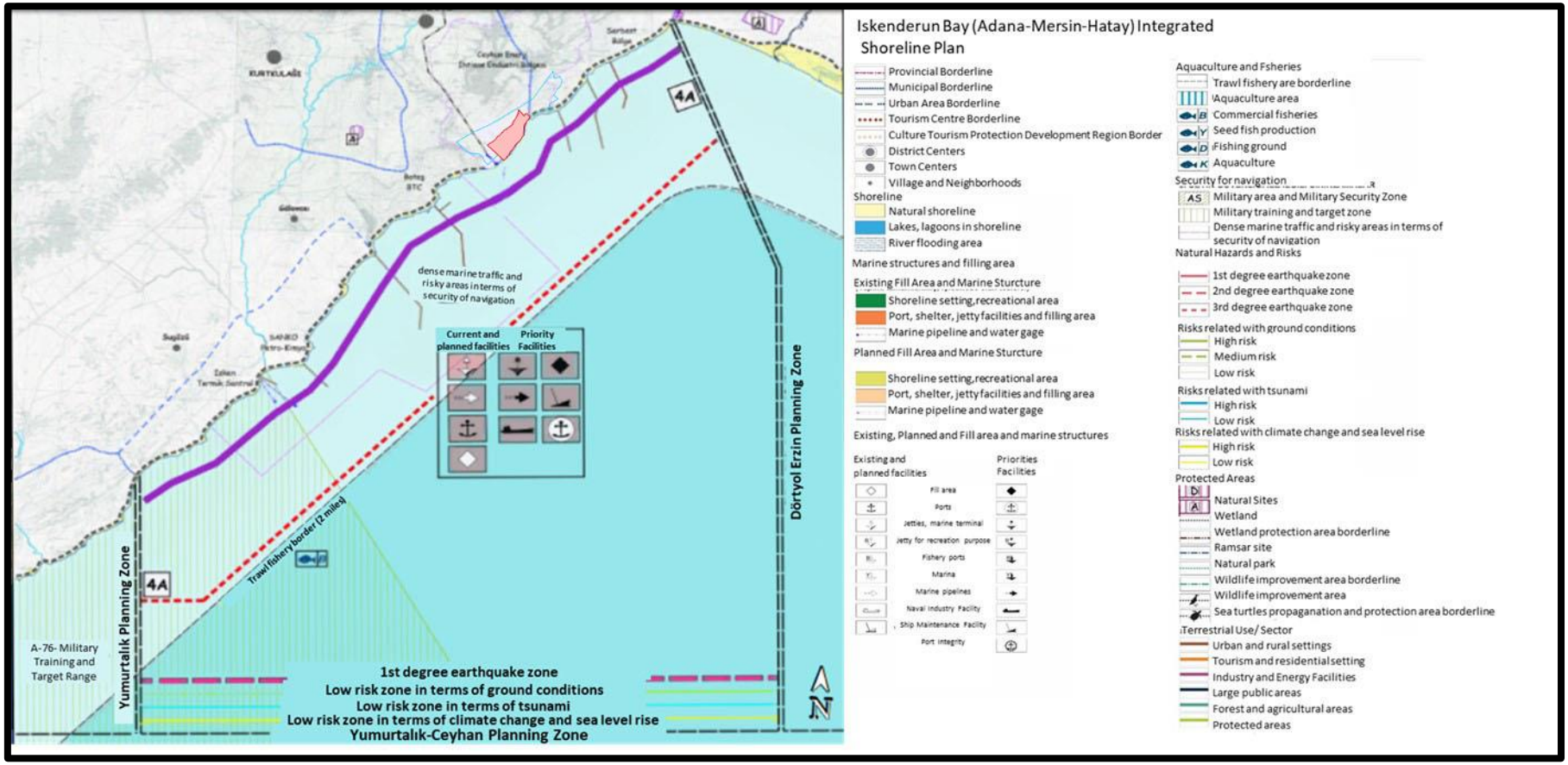

Figure 5-10. Section of 1/50,000 scaled İskenderun Bay (Adana-Mersin-Hatay) Integrated Shoreline Plan for the Project site

As can be seen from Figure 5-10, the the land use allocation for the coastline including the Project site is indicated with a purple line. Accordingly, the area where the Project will be developed is defined as an area for *Industry and Energy Facilities*. The light pink dotted line in the marine section indicates dense marine traffic and risky areas in terms of security of navigation. The black dotted line indicates the trawl fishery boundary (2 miles from the shoreline). There is also a marine underground pipeline and float as indicated with a light purple arrow line where the Project site is located. To the west of the marine section of the Project at approximately 8.5 km, the "A-76- Military Training and Target Range" is indicated with yellow lines.

It was stated in the "Investigation and Explanation Report" of the Adana Ceyhan Energy Specialized Industrial Zone 1/5,000 scaled zoning plan and 1/1,000 scaled implementation zoning plan that, Coastal Law No. 3621 and related regulations shall be followed in sections remaining within the shoreline of the CPIR region. Additionally, the following requirements are listed in the provisions of the 1/50,000 scaled İskenderun Bay (Adana-Mersin-Hatay) Integrated Shoreline Plan Notes:

- (Article 5.3.3.) The provisions set out in the "Principles and Procedures to be followed during the identification of the Facilities of Strategic Importance to be proposed by Public and Private Sector" shall be applied. Moreover, oil refineries, petrochemical facilities with 5,000 barrels/day and above crude oil, 500,000 m^3/day and above natural gas and natural carbon dioxide production facilities, 10,000 m^3 and above oil main and auxiliary storage areas, crude oil pipeline with a diameter of 18 inches and above, main natural gas transmission pipelines with 25 bar and above pressure, natural gas underground storage facilities, fuel oil storage facilities, fuel oil pipeline and carbon dioxide main pipelines, Liquefied Petroleum Gas/ Liquefied Natural Gas (LPG/LNG) storage and gasification facilities as well as jetties with berthing capacity of 10,000 DWT and above ships/vessels as well as port and recycling facilities are considered within the scope of the Facilities with 1st Degree Strategical Importance; therefore, it is mandatory to obtain approval from the Turkish Armed Forces General Staff;
- (Article 5.4.3.) Forest areas and the vegetation cover that provides protection of soill against erosion impacts on the shoreline/coasts shall be effectively preserved;
- Article 5.4.4.) The threatened marine and coastal species shall be protected and maintained;
- (Article 5.4.8.) The provisions of the EIA Regulation shall be followed for the Facilities that are subject to the environmental impact assessment study and site selection processes are finalized;
- (Article 5.4.9.) The potential risks on the environment in terms of natural thresholds which may be created by the jetties (located in planning region and having loading and unloading functions) shall be assessed during the EIA process;

- (Article 5.4.10.) The mitigation measures provided in the Integrated Shoreline Management Plans (ISMP) related with navigation safety shall be taken into consideration during the evaluation process of the jetty applications. The parameters that may pose accident risks in the marine field shall be annually monitored and wave, wind, current effect, number of ships, size of the ships, port/pier size will be taken into consideration;
- (Article 5.4.17.) Sewer system infrastructure and wastewater treatment plant to be established in the shorelines and the areas, that have potential adverse impact on the marine environment, will be constructed with the support of MoEUCC, General Directorate of Bank of Provinces (İlbank) and authorized provincial administrations;
- (Article 5.4.18.) Burning and dumping of solid wastes to the sea is prohibited. Sanitary solid waste landfill sites and disposal facilities will be installed in the shoreline individually or open for joint use by a number of facilities;
- (Article 5.4.19.) Municipal, industrial and agricultural wastes that may have adverse impact on coasts and marine environment shall be properly managed. In this context, projects and applications considering the management of the solid wastes will be prioritized in line with the "National Action Plan regarding Protection of Marine Environment against Pollution" prepared by The Scientific and Technological Research Council of Turkey (TUBITAK) Marmara Research Center;
- (Article 5.4.20.) Urban risk management shall be prepared to take necessary actions in the case of release/spill of potential pollutants due to accidents and emergency events on the shorelines. It is fundamental to preserve the ecology in the shoreline in every stage of the crisis management;
- (Article 5.8.12.1.) A joint management/control mechanism shall be established and implemented by the Ministry of Transport, Maritime Affairs and Communications, local authorities, investors, enterprises and related institutions to control wastes that may be generated in ports, jetties, marine underground pipelines and marine terminals; prevention/actions against accidents; provide safe navigations in the sub regions indicated as 4A, 5C and 6A;
- (Article 5.8.13.) Necessary permits will be given to the new facilities to be established in shoreline in the surroundings of the petrochemical and refinery terminals and facilities, that may pose risks and having dense marine traffic, not to create risks on navigation safety and to be positioned on a certain safety distance from the terminals.

The Project will comply with the relevant legislation specified in plan notes of *Investigation and Explanation Report of the Adana Ceyhan Energy Specialized Industrial Zone 1/5,000 scaled Zoning Plan and 1/1,000 Implementation Zoning plan* and provisions of the *1/50,000 scaled İskenderun Bay (Adana-Mersin-Hatay) Integrated Shoreline Plan*.

As stated in the EIA Report prepared for CPIR Port Project in August 2020, the 1/1,000 and 1/5,000 scaled proposed zoning plans and relevant plan notes were prepared for the marine part of the CPIR and the proposal file was submitted to Adana PDoEUCC for their approval. The 1/1,000 scaled proposed zoning plan is shown in Figure 5-11. The EIA process has been completed, with the positive decision being made by MoEUCC accordingly. Following obtaining of the positive decision, zoning plans have been evaluated by the Ministry of Environment and approved on 28.01.2022.

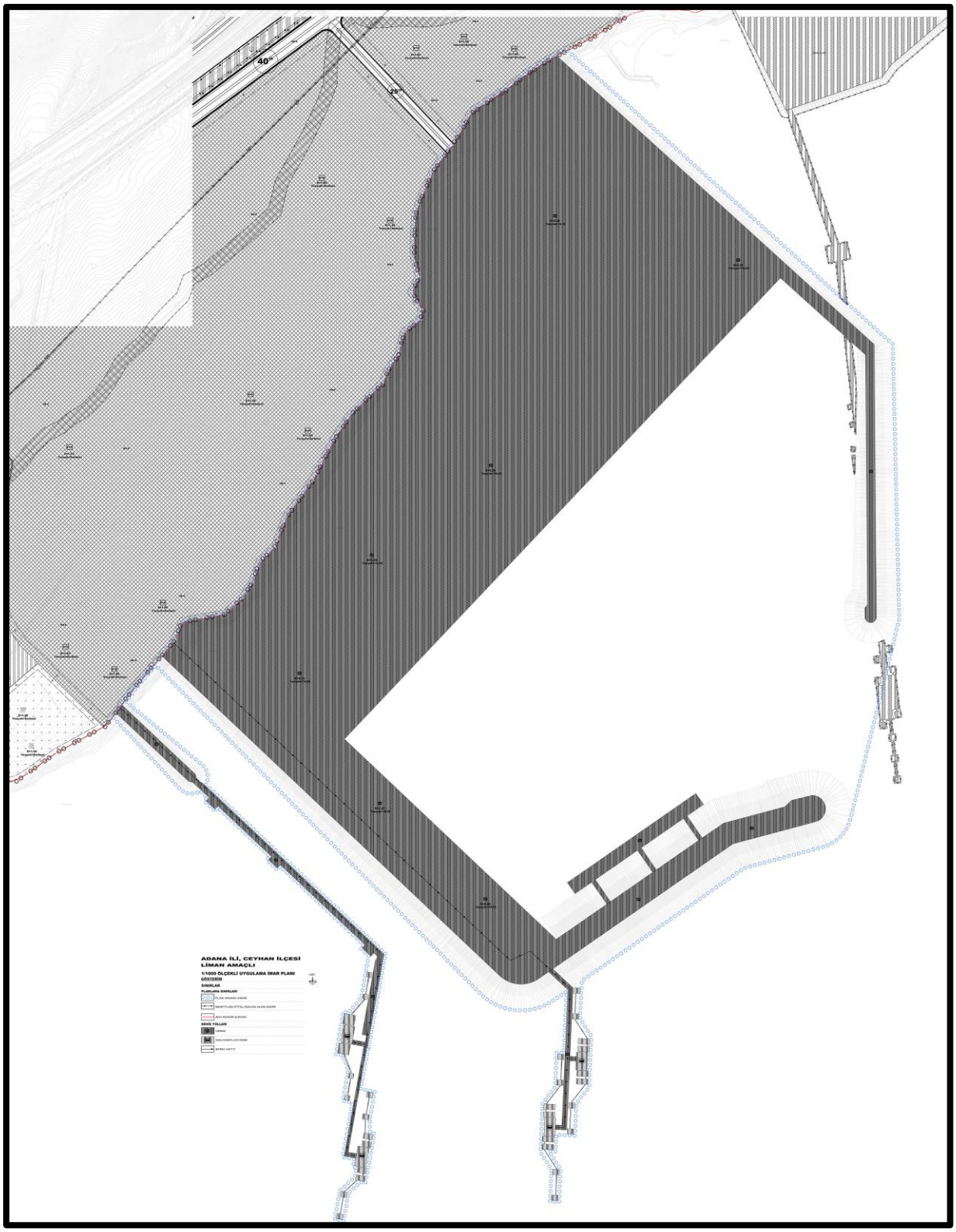

Figure 5-11. Proposed zoning plan for the marine section of the CPIR (CPIR Port)

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT
(CHAPTER-6)

FEBRUARY 2023

ANKARA

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Version	Revision	Date	Prepared By	Quality Management By	Checked By		Approved By
Draft	A.0	March 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Simon Taylor (RINA)	Elif Doğru (RINA)
	A.1	October 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Simon Taylor (RINA)	Elif Doğru (RINA)
	A.2	December 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Buket Mesta (2U1K)	
	A3	August 2022	Buket Mesta (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)		Ilya Gulakov (RINA)
	A.4	October 2022	Buket Mesta (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)		Ilya Gulakov (RINA)
Final Draft	B.0	February	Buket Mesta (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Simon Taylor (RINA)	Ilya Gulakov (RINA)

REVISION CODES: A: DRAFT, B: FINAL DRAFT, C: FINAL

PROJECT NO: 21/003

FEBRUARY 2023

CLIENT:

Ceyhan Polipropilen Üretim A.Ş
Portakal Çiçeği Sokak No:33 Yukarı Ayrancı
Çankaya - Ankara / Türkiye
☎: +90 (312) 840 10 00
🖷: +90 (312) 442 58 16

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ABBREVIATIONS

AFAD	Disaster and Emergency Management Presidency
ALARP	As low as reasonably practicable
bgl	Below ground level
Ceyhan PDH-PP Project / Project	Ceyhan Propane Dehydrogenation - Polypropylene Production Facility and Jetty Project
Ceyhan PP A.Ş. or Project Company	Ceyhan Polipropilen Üretim A.Ş.
CPIR Port	Raw Material Supply, Storage and Port Facility Project
CTD	Conductivity, temperature, and depth
Ed	Elastic modulus
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
FGD	Focus group discussion
IFC	International Finance Corporation
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MTA	The General Directorate of Mineral Research and Exploration
NEHRP	National Earthquake Hazards Reduction Program
O.G.	Official Gazette
OHNO	Office of Navigation, Hydrography and Oceanography
PAH	Polycyclic Aromatic Hydrocarbons
PGA	Peak ground acceleration
RSPC	Regulation on Soil Pollution Control and Point-Source Contaminated Sites
TPH	Total Petroleum Hydrocarbon
SVOC	Semivolatile Organic Compounds
VOC	Volatile Organic Compounds

6 GEOLOGY, SOILS, SEDIMENTS AND CONTAMINATED LAND

6.1 Introduction

The potential impacts of the Ceyhan Propane Dehydrogenation – Polypropylene Production Facility (the Project) and the Project's Associated Facilities regarding terrestrial and marine geology, soils, sediment, and contaminated land are presented in this Chapter. The following issues were assessed:

- Seismic activity risks;
- Contaminated land risks; and
- Soil and sediment impact risk.

This Chapter provides a description of the baseline conditions followed by an impact assessment and related mitigation measures. The following sources of information were used to establish the baseline information:

- Literature survey related to geology and soil characteristics of the Adana Region;
- The General Directorate of Mineral Research and Exploration (MTA) publications;
- Turkey Earthquake Hazard Map, Disaster and Emergency Management Presidency (AFAD, 2019);
- The Report on Disaster Management and Natural Disaster Statistics in Turkey (AFAD, 2018);
- Adana Environmental Status Report (2018) published by the Ministry of Environment and Urbanization (MoEU);
- The Pre-Geological – Geotechnical Study Report of Adana City, Ceyhan District, Kurtpınar Quarter, Ceyhan Petrochemistry Industrial Region PDH-PP Polypropylene Production Facility prepared by Selensu Mühendislik (Selensu, 2018);
- Geotechnical Investigation Report for Ceyhan PDH-PP FEED Project prepared by Selensu Mühendislik (Selensu, 2020);
- Hydrographic and Oceanographic Investigation Report, SRS (ARS, 2020);
- Kandilli Observatory and Earthquake Research Centre, Information Note on Tsunami Risk for Turkey, 2018;
- In-situ samples soil quality analysis results, July 2020; and
- The results of in-situ sediment sampling and quality analysis study conducted by Alka Laboratory within the scope of the Environmental Impact Assessment (EIA) for CPIR Port Project, July 2020.

In addition, data and information regarding circulation and hydrographical properties of the region were gathered from the following published literature:

- Özsoy, E. Hecht, A. Ünlüata, Ü. 1989. Circulation and hydrography of the Levantine Basin. Results of POEM coordinated experiments 1985-1986. Prog. Oceanog., 22, 125-170;
- Özsoy, E. Hecht, A. Ünlüata, Ü. Brenner, S. Sur, H. I. Bishop, J. Latif, M. A. Rozentraub, Z. Oğuz, T. 1993. A synthesis of the Levantine Basin circulation and hydrography, 1985-1990. Deep Sea Res. II, 40(6): 1075- 1119;
- Robinson, A. R. Golnaraghi, M. Leslie, W. G. Artegiani, A. Hecht, A. Lazzoni, E. Michelato, A. Sansone, E. Theocharis, A. and Ünlüata, Ü. 1991. The Eastern Mediterranean general circulation: features, structure and variability. Dynam. of Atm. and Oceans, vol. 15, 215-240; and
- Collins, M. B., and Banner, F. T. 1979. Secchi disc depths, suspensions and circulation, north-eastern Mediterranean Sea. Marine Geology 31(1–2): M39–M46.

The study area for the terrestrial and marine geology, soils, sediment, and contaminated land assessment covered the Project site area and Mobilization Area, the areas of the Project's Associated Facilities (Terminal Facility, temporary topsoil and excavated material deposition area) and their immediate surroundings (both onshore and offshore) extending to the Adana Province.

6.2 Legal Context

6.2.1 National Regulations on Geology, Soils, Sediments and Contaminated Lands

- Regulation on Soil Pollution Control and Point-Source Contaminated Sites (RSPC)" (O.G. Date/Number:08.06.2010/27605);
- Regulation on Environmental Management of Dredging Materials (O.G. Date/Number:14.01.2020/31008);
- Sea and Inland Waters Dredging Regulation (O.G. Date/Number: 09.08.2016 /29796).
- Building Earthquake Regulation of Turkey (O.G. date/no: 18.03.2018/30364);
- Technical Earthquake Regulation on Construction of Coastal and Marine Structures, Railways, Airports (O.G. date/no: 18.08.2007/26617);
- The Regulation on the Control of Major-Accident Hazards Involving Dangerous Substances prepared in line with the EU Directive 2012/18/EU with the date of 04.07.2012 (also known as SEVESO-III Directive) (O.G. date/no: 02.03.2019/30702).

6.2.2 International Regulations on Geology, Soils, Sediments and Contaminated Lands

- International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKERS, 2001) (Ratification date: 26 February 2013);
- International Convention on the Establishment of an International Fund for Compensation of Oil Pollution (FUND 1992) (Ratification date: 17 August 2002);
- The 2003 Protocol to the International Convention on the Establishment of an International Fund for Compensation of Oil Pollution (FUND 2003) (Ratification date: 25 November 2011);
- International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC 1990) (Ratification date: 11 June 2003);
- Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS 2000), (Ratification date: 27 June 2013);
- International Convention on Civil Liability for Oil Pollution Damage (CLC 1992) (Ratification date: 27 July 2001);
- International Convention on Salvage (SALVAGE 1989), (Ratification date: 24 May 2014).

6.3 Baseline Conditions

6.3.1 Terrestrial Geological Features

Regional geology

The Project site is located within the Kurtpınar neighbourhood, Ceyhan district of Adana province. The general geology of south-eastern Adana, which includes the Ceyhan district, and the Project site is illustrated in Figure 6-1. The general stratigraphy of the region is given in Figure 6-2.

Adana province is comprised of mountainous and plain areas; north of the province is mostly mountainous and south of the province is comprised of plain structures. The mountainous terrain starts in the east with the Misis mountains and extends to the north-northeast region. The Ceyhan and Seyhan rivers are two main rivers that provide drainage of the region (Selensu, 2018).

The Adana basin represents the general geology of Adana province; as such it starts with Oligocene-Lower Miocene terrestrial Gildirli and lacustrine Karsantı formations at the base of the tertiary sequence. The transgressive sediments of the Miocene Sea are composed of shallow sea-beach clastics, Kaplankaya, reef Karaisalı, pelagic foraminifera shale-structured Güvenç and turbiditic Cingöz formations. With that, the regressive sediments of the basin form

Kuzgun and Handere formations which consist of shallow sea and terrestrial clastics. In the southern parts of the basin, the Quaternary-aged terrace-caliche formations overlie the Upper Miocene-Pliocene formations.

Selensu (2018) has undertaken a literature study to identify the general geology of the region, which resulted in the following findings. The area is formed in the Taurus belt located between Ecemiş and Yumurtalık faults. Adana's stratigraphy structure and rock type characteristics contain different tectonic contact with different tectonostratigraphic contacts. The Aladağ unit in the region includes shelf type carbonate and clastic rocks deposited in the Devonian-Senonian period. The East Taurus Autochthon reflects a stable shelf feature, which is dominated by shallow, warm, lithoral - sublithoral ambient conditions and vertically oscillating movements until the end of the Cambrian-Lutetian period. The Adana basin, which forms the southern part of the Eastern Taurus Mountains, consists of shallow sea sediments and pelagic sediments deposited in the Paleozoic-Tertiary range. Rock units defined as Misis-Andirin basin were deposited during Cretaceous-Tertiary time interval offering melange and volcano-sedimentary characteristics.

The formations in the survey area are Upper Miocene aged Kızıldere Formation, Lower-Middle Miocene Karataş Formation, and the Quaternary Delihalil Basalt.

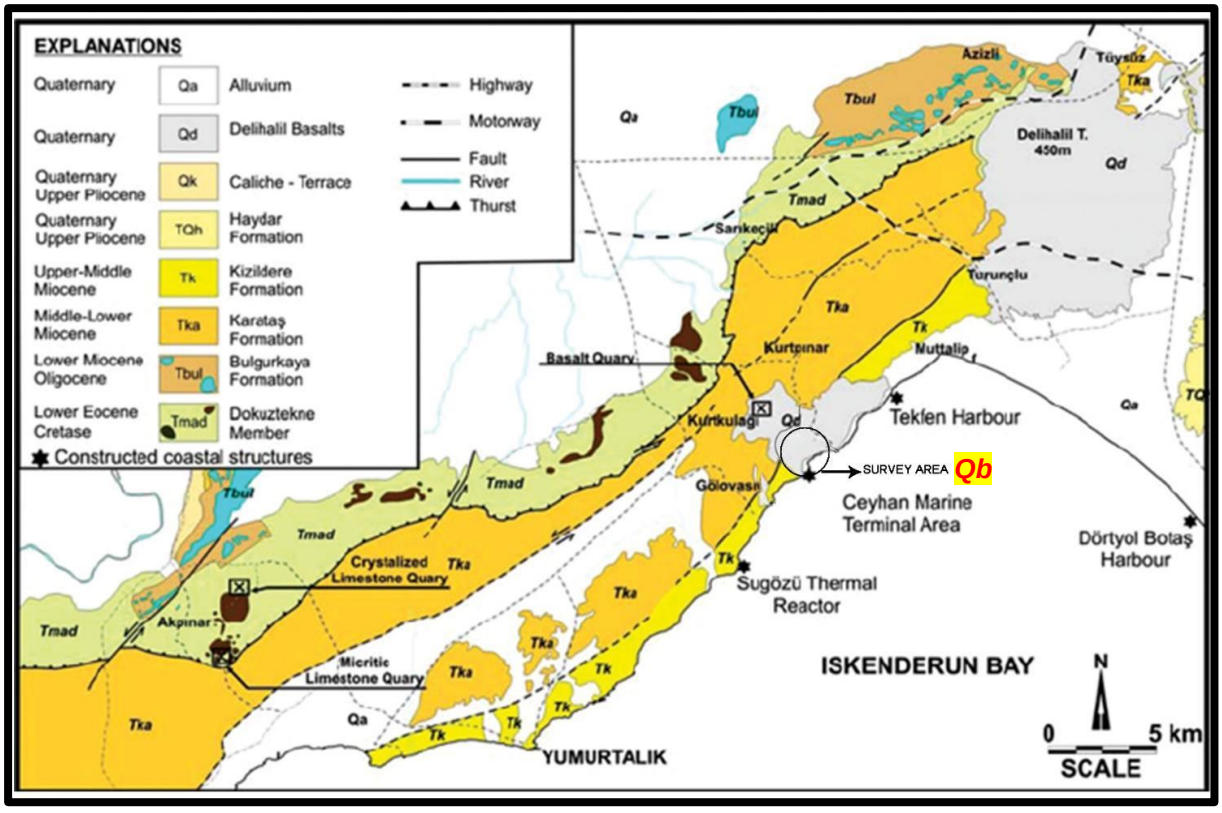


Figure 6-1. Survey Area and Boundaries stratigraphy section (Selensu, 2020)

Dokuztekne Formation

The formation starts with volcano-sedimentary levels at the bottom and continues with clayey limestones and marls at the top. It is seen to the south and west of the Ceyhan district. In general, the formation colour is purple and green. Tuffs and micritic limestones are present in the lower levels; whereas, in the upper levels, Spilitic agglomerates are found. In the upper levels, alternations of sandstone and limestone from which lower volcanic levels are also observed.

- *Andirin Formation*

The formation is mostly common around the Andirin district, and consists of olistostromal levels, limestone blocks of various ages in flysch matrix. The overall appearance depends on the rock type and may be of different colours. Flysch levels are light yellow, creamy and brown, where limestone blocks of different ages can be observed.

- *Karataş Formation*

The formation is represented by sandstone-marl-sandy limestone-mudstone alternations consisting of blocks of various ages and lithologies. Fossils are found in the samples from different levels of Karataş formation which has a thickness of at least 2,500 m and Lower-Middle Miocene age.

- *Kızıldere Formation*

The formation starts with conglomerate and reef limestones at the bottom. The thick layer of marls is dark gray – gray in colour. The rarely seen clayey limestone is light cream coloured, brittle, non-level laminated and abundant in clays. Basalt is also available in intermediate levels. The upper contact of the unit is faulted along the Yumurtalık fault. The age of the unit is given as Upper Miocene.

- *Delihalil Basalt*

Quaternary basalts seen in Yumurtalık, Ceyhan, Osmaniye and Haruniye regions are named as Delihalil formation. The hills of Delihalil Tepe and Üç Tepe are made of piroclastics; volcanic bomb, lapilli and pumice. The lava flows are underlain by yellow coloured loose textured tuffs are present. The Basalt formation is estimated in Quaternary age.

Although the formation does not provide a large spread in the survey area, it has a significant regional distribution as an important example of the basaltic volcanism in the region. Yellow, pink coloured loose textured tuffs underlie the lava flows. Lava flows are very resistant and have traces of current. In the survey area, where compressional tectonics is effective, the basaltic material of the weakness zones formed by the NE-SW oriented secondary fracture-

slit lines flows into the soil surface. Towards the surface, basaltic material outcrops are seen to be cooled down with the materials added through the flow path.

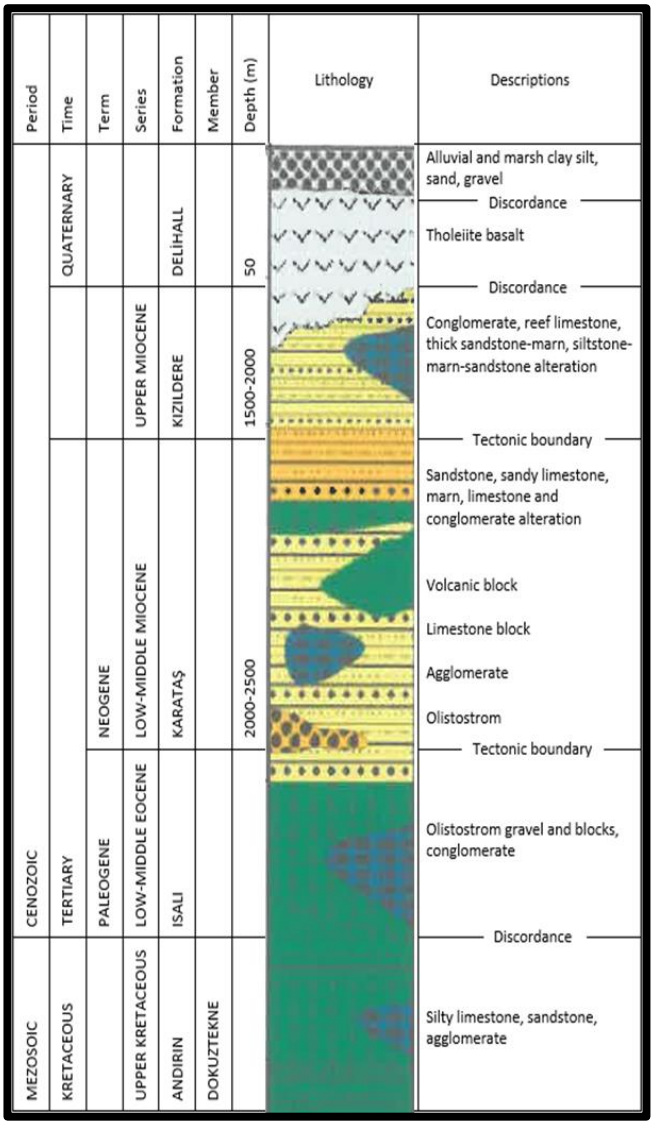


Figure 6-2. Survey area and boundaries stratigraphy section (Source: Selensu, 2018)

Geological features of the Project site

A two-stage geological/geotechnical site investigation was conducted at the Project site.

At the first stage, Selensu Engineering have conducted investigations on five trial pits and forty boreholes between Dec 9th, 2019 - Jan 4th, 2020. For the second stage, Toker Engineering conducted investigations on five trial pits and six boreholes between Mar 3rd 2020 - Mar 16th 2020. Boreholes were drilled to a minimum depth of 10m below ground level (bgl), and a maximum depth of 30 m bgl. As a result of the study, information on the lithological properties of the soils and the variability in the vertical direction, information on groundwater status, and engineering design parameters were obtained. The lithological properties at the drilled

boreholes are given in Table 6-1 and the locations of the boreholes and trial pits are shown in Figure 6-3.

Table 6-1. Lithological properties at the boreholes

Borehole No	Ground Elevation (m)	Depth (m)	Groundwater Level (m bgl)	Lithological property	Formation
BH-1	12.83	10	-	0.00 – 0.10 m Vegetation soil 0.10 – 10.00 m Brown Basalt	Delihalil Basalt
BH-2	14.45	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-3	23.48	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-4	26.11	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-5	18.00	10	-	0.00 – 0.10 m Vegetation soil 0.10 – 10.00 m Brown Basalt	Delihalil Basalt
BH-6	28.80	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-7	18.15	30	16.00	0.00 – 0.25 m Vegetation soil 0.25 – 1.50 m Brown Gravely Clay 1.50 – 30.00 m Light Brown Basalt	Delihalil Basalt
BH-8	23.78	10	-	0.00 – 0.10 m Vegetation soil 0.10 – 0.70 m Brown Medium Plasticity Clay 0.70 – 10.00 m Brown Basalt	Delihalil Basalt
BH-9	36.69	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-10	21.79	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Gravely Clay 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-11	25.42	10.5	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.50 m Brown Basalt	Delihalil Basalt
BH-12	35.05	10	-	0.00 – 0.10 m Vegetation soil 0.10 – 0.70 m Brown Gravel Clay 0.70 – 10.00 m Brown Basalt	Delihalil Basalt
BH-13	30.50	10	-	0.00 – 0.40 m Vegetation soil 0.40 – 1.00 m Brown Gravely Clay 1.00 – 10.00 m Brown Basalt	Delihalil Basalt
BH-14	38.07	10	-	0.00 – 0.10 m Vegetation soil 0.15 – 2.00 m Brown Medium Plasticity Clay 2.00 – 10.00 m Brown Basalt	Delihalil Basalt
BH-15	28.03	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 1.50 m Brown Medium Plasticity Clay with Basalt 1.50 – 10.00 m Brown Basalt	Delihalil Basalt
BH-16	35.67	10	-	0.00 – 0.70 m Vegetation soil 0.70 – 10.00 m Brown Basalt	Delihalil Basalt

Borehole No	Ground Elevation (m)	Depth (m)	Groundwater Level (m bgl)	Lithological property	Formation
BH-17	27.56	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-18	34.39	10.5	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.50 m Brown Basalt	Delihalil Basalt
BH-19	37.19	10	-	0.00 – 0.10 m Vegetation soil 0.10 – 10.00 m Brown Basalt	Delihalil Basalt
BH-20	30.93	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-21	38.02	10	-	0.00 – 0.10 m Vegetation soil 0.10 – 10.00 m Brown Basalt	Delihalil Basalt
BH-22	42.86	10	-	0.00 – 0.30 m Vegetation soil 0.30 – 10.00 m Brown Basalt	Delihalil Basalt
BH-23	41.49	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-24	42.24	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-25	37.87	30	14.88	0.00 – 0.10 m Vegetation soil 0.10 – 1.00 m Brown Medium Gravely Clay 1.00 – 30.00 m Light Brown Basalt	Delihalil Basalt
BH-26	54.39	10	-	0.00 – 0.30 m Vegetation soil 0.30 – 10.00 m Brown Basalt	Delihalil Basalt
BH-27	61.94	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-28	60.46	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-29	42.86	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-30	64.43	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 1.00 m Brown Sandy Gravel 1.00 – 10.00 m Brown Basalt	Delihalil Basalt
BH-31	68.39	10	-	0.00 – 1.00 m Brown Sandy Gravel 1.00 – 10.00 m Brown Basalt	Delihalil Basalt
BH-32	39.80	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-33	73.91	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Light Brown Basalt	Delihalil Basalt
BH-34	51.92	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-35	58.93	30	38.93	0.00 – 0.15 m Vegetation soil 0.15 – 1.50 m Brown Sandy Gravel 1.50 – 3.00 m Brown Basalt with Clay 3.00 – 30.00 m Brown Basalt	Delihalil Basalt
BH-36	62.01	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt

Borehole No	Ground Elevation (m)	Depth (m)	Groundwater Level (m bgl)	Lithological property	Formation
BH-37	58.34	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-38	60.57	10	-	0.00 – 0.15 m Vegetation soil 0.15 – 10.00 m Brown Basalt	Delihalil Basalt
BH-39	75.43	10	-	0.00 – 0.10 m Vegetation soil 0.10 – 10.00 m Light Brown Basalt	Delihalil Basalt
BH-40	68.63	10	-	0.00 – 0.10 m Vegetation soil 0.10 – 10.00 m Brown Basalt	Delihalil Basalt
SK-1	24.89	30	24.50	0.00 – 0.80 m Vegetation soil 0.80 – 4-93 m Clay mixed with gravel 4.93 – 30.00 m Brown Basalt	Delihalil Basalt
SK-2	16.46	30	16.30	0.00 – 0.50 m Vegetation soil 0.50 – 3.60 m Clay mixed with gravel 3,60 – 26.40 m Brown Basalt 26.40 – 30.00 m Clay Stone-Sandstone	Delihalil Basalt
SK-3	36.76	30	29.20	0.00 – 30.00 m Brown Basalt	Delihalil Basalt
SK-4	34.92	30	-	0.00 – 0.40 m Vegetation soil 0.40 – 2.80 m Clay 2.80 – 30.00 m Brown Basalt	Delihalil Basalt
SK-5	30.36	30	-	0.00 – 0.90 m Vegetation soil 0.90 – 30.00 m Brown Basalt	Delihalil Basalt
SK-6	17.56	30	-	0.00 – 1.50 m Vegetation soil 1.50 – 2.50 m Clay mixed with gravel 2.50 –30.00 m Brown Basalt	Delihalil Basalt

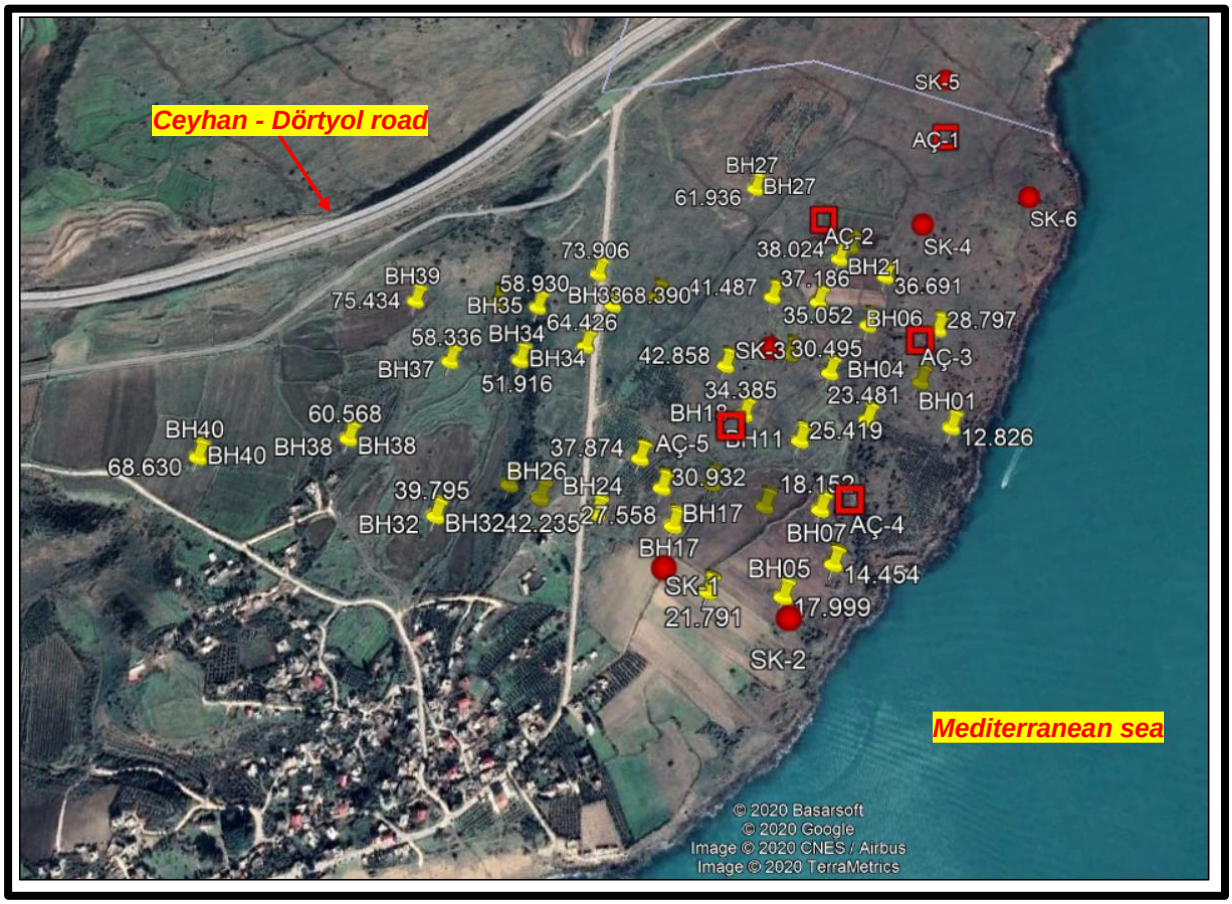


Figure 6-3. Locations of the boreholes

The basic composition of rocks in the region are generally of three types: pyroclastics, gaseous basalts and columnar basalts. Gas hollow levels are generally located in the southern part of the survey area near Incirli locality; as such the drill holes near Incirli revealed gas cavities up to a thickness of 6 m. Different gaseous levels were found during drillings, which proves that multiple volcanic activities have occurred in the region.

Within the scope of the geotechnical investigation study, seismic refraction study was conducted in the survey area at 2 locations in order to obtain static and dynamic parameters of the soil. Accordingly, the following remarks can be listed:

- The survey area mostly consists of “C- very compacted soil or soft rock” class formation with respect to National Earthquake Hazards Reduction Program (NEHRP) – Uniform Building Code; and “B- very compacted sand, clay or very compacted clay” formation in accordance with Eurocode 8 (TS EN 1998-1).
- In line with the Vs / Vs ratio, which indicates the soil condition, the survey area was classified as “Loose”.
- In line with the calculated Poisson ratio, the survey area is in the “porous” class.

- The spectral amplification value in the survey area was found to be in the “A – low hazard level” class. As the amplification value was below 2.0 dominantly in the survey area, the survey area is not considered as posing any risk to settlement.
- Both the maximum shear modulus (Gmax) values and dynamic elastic modulus (Ed) in the survey area indicate that the first layer is “Moderate Durable Soil”, and the second layer is “Durable Soil”.
- In line with the examination of bulk modulus values, the first layer is classified as “Low” and the second layer is classified as “Medium” incompressibility values.
- It is considered that there is no risk of liquefaction in the survey area.
- The area consists of rock units, and there will be no filling (i.e., excavated soil or other artificial filling material stored at past) at the Project site. Hence, there is no risk of uplift or subsidence.

6.3.2 Marine Geological Features

Regional geology

The Jetty which is an Associated Facility of the Project is planned to be with a total length of 1.2 km. The shoreline of the Project site extends along the rocky coast for approximately 1.5 km. As defined by ARS (2020), the Project site is located between the Yumurtalık fault and Amanos mountains in the Toros zone. There is a continuous sequence from lower palaeozoic to upper cretaceous starting from Amanos mountains (in the east) to the west. There are ophiolite overlays and Eocene outcrops (at some locations) in the investigation area. There is also Kızıldere formation covering the features of the Helvetian to Tortonian aged shallow sea facies overlying all those abovementioned layers. Reefal lenses are partially observed in the deposits.

Towards the southwest of the study area, plio-quaternary aged young deposits overlie these formations with the effect of grabenisation. There is lower- middle Miocene aged Karataş formation in lateral and vertical variation containing blocks with various ages and lithologies or nap parts belonging to Andırın formation between the two Miocene sequences. This curved unit offers variations in fauna species as compared to other formations. Rock units defined as the basin of Misis-Andırın were deposited in cretaceous tertiary times and offers characteristics of melange and volcano-sedimentary facies. The topographic and bathymetric map of the eastern Mediterranean section is shown in Figure 6-4.

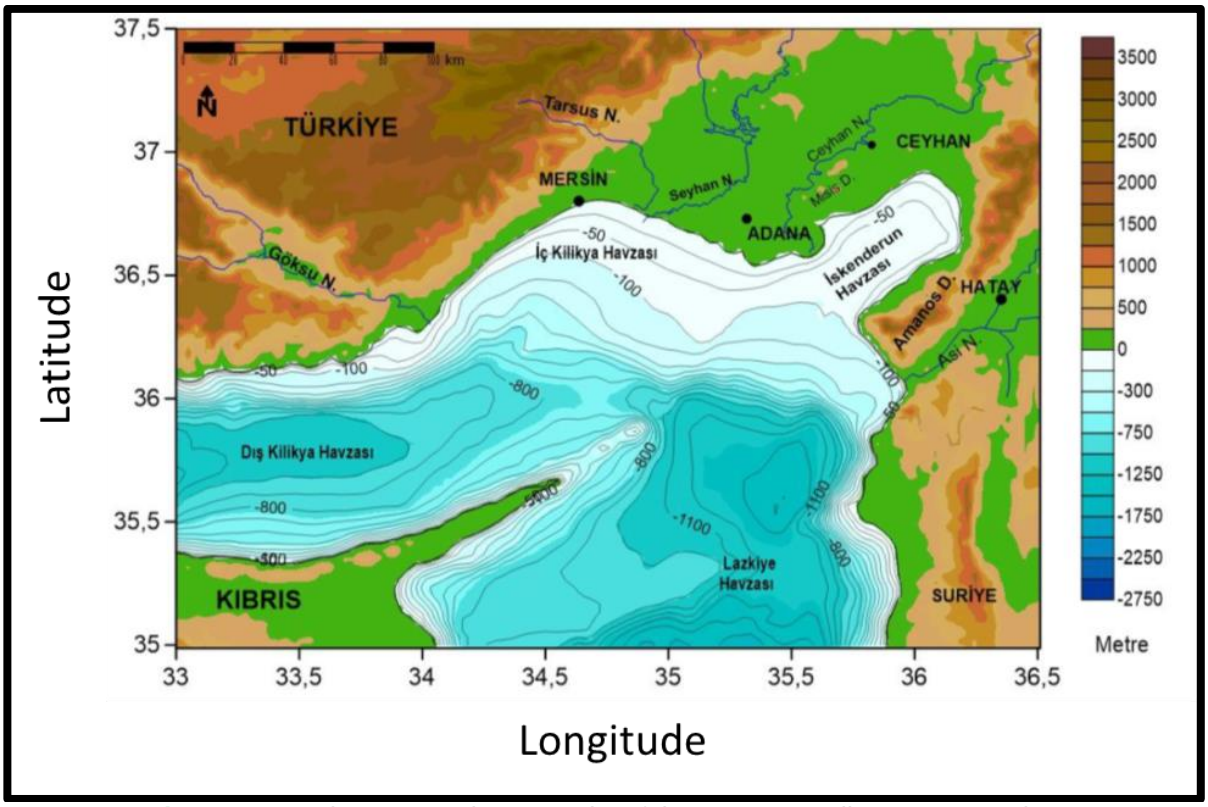


Figure 6-4. Bathymetry and topography of the eastern Mediterranean section

- *Marine Characteristics in the vicinity of the Project site and the Jetty (Associated Facility)*

A Hydrographic and Oceanographic Investigation Study (ARS, 2020) has been performed within the scope of the Ceyhan Petrochemical Industrial Region Port Project between 12 January -18 February 2020. The study was performed in line with the Law on Navigation and Hydrography Services (No. 1738) (Official Gazette (O.G.) date/no: 07.06.1973 /14557) and its implementing regulations and Communique regarding Planning and Implementation of Coastal Structures and Facilities (O.G. date/no: 06.07.2011/27986).

Within the scope of the Hydrographic and Oceanographic Investigation Study, bathymetric measurements, current measurements, conductivity, temperature, and depth (CTD) measurements, Seismic profiling studies, side scan sonar studies, sediment sampling and analysis, and literature review have been performed. A Hydrographic and Oceanographic Investigation Study Report has been prepared and submitted to the Office of Navigation, Hydrography and Oceanography (ONHO) for approval. The study has been approved by ONHO on 14th April 2020.

The bathymetric measurement, current measurements, CTD measurements, side scan sonar studies, sub-bottom profiler, sediment sampling were performed with the Bathy-500 DF (Echosounder), Valeport Model106 Current Meter, AML Base X CTD, Imagenex Yellow Fin, Syqwest Stratabox, Van-veen grab sampler, respectively. The scope of the marine geology studies conducted by ARS (2020) is summarised in Table 6-2.

Table 6-2. Scope of marine geology studies

Analysis / Study	Location	Activities
Bathymetric measurements	Project site	1/1000 scaled Bathymetric measurements and mapping, preparation of Hydrographic Survey Report (12,13,14,29 January; 1,2,3,11,17,18 February 2020)
Current Measurements	Current meter located at 1 meter depth in one location	Measurements were conducted for 5 days, 12 hours a day. The results were graphically analysed (13,14,15,16,17 January 2020)
CTD Measurements	At 6 stations in the Project site	Measurements were conducted at depths from sea surface to the bottom at 1-meter intervals for two consecutive days (14,15 January 2020)
Seismic studies (Sub-bottom profiling)	Project site	Sub-bottom profiling at 29 different lines (i.e., 28 perpendicular and 1 parallel lines to the shoreline) (14,15 January 2020)
Side scan sonar studies	Project site	26 perpendicular lines to the shoreline with 95 – 105 m profile intervals
Sediment sampling and laboratory analyses	At 14 locations in the Project site, sea bottom	The samples were analysed in a geolab ground laboratory and assessment of the distribution (14 January 2020)

- *Coastal Geomorphology and Sediment Transport*

A total of 14 sediment samples, from depths ranging from 4.55 m to 23.54 m, were collected using Vanveen grab sampler in order to identify the sea floor surface sediment characteristics in the investigation area of the vicinities of the Project site and the Jetty site. Sediment samples were analysed and classified in accordance with the SEDCLASS software developed by United States Geological Survey and Flok (1974) triangle diagram. The 1/10,000 scaled sediment dispersion maps were prepared based on the analysis results of the sediment samples and bathymetric results. The locations of sediment samples are shown in Figure 6-5.

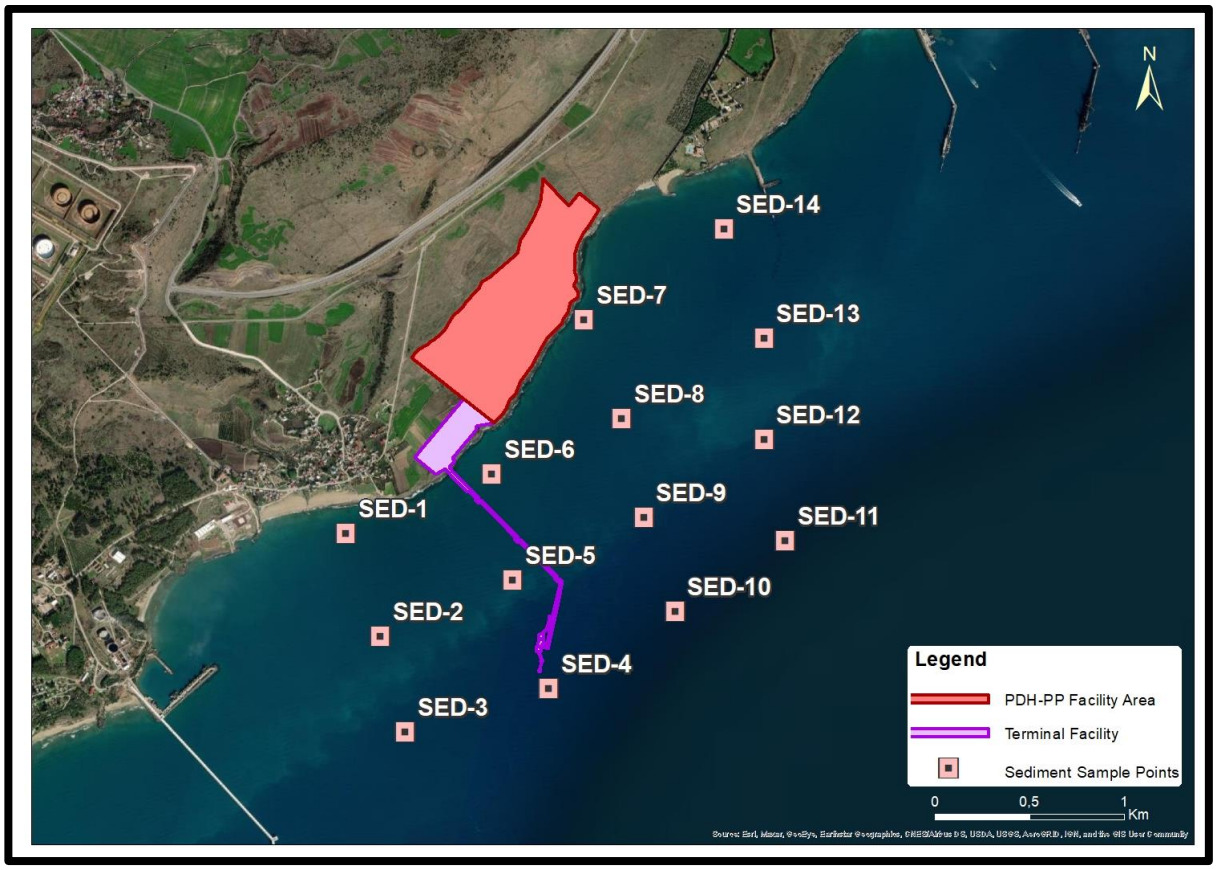


Figure 6-5. Locations of sediment samples (ARS, 2020)

According to the results of the study, it was found that the distribution of sediment type based on the grain size is gravel 0.00%, sand 90.60 – 97.58%, silt 2.42-6.69% and clay 0.00%. Hence, the dominant unit is sand (S) in the investigation area as shown in Figure 6-6. It can be inferred that there is a natural uneven shoreline to the east, and a natural beach and residential areas to the west of the Project site. The effect of the coastal-marine dynamics is also reflected by the distribution of the clastic sediment on the seafloor.

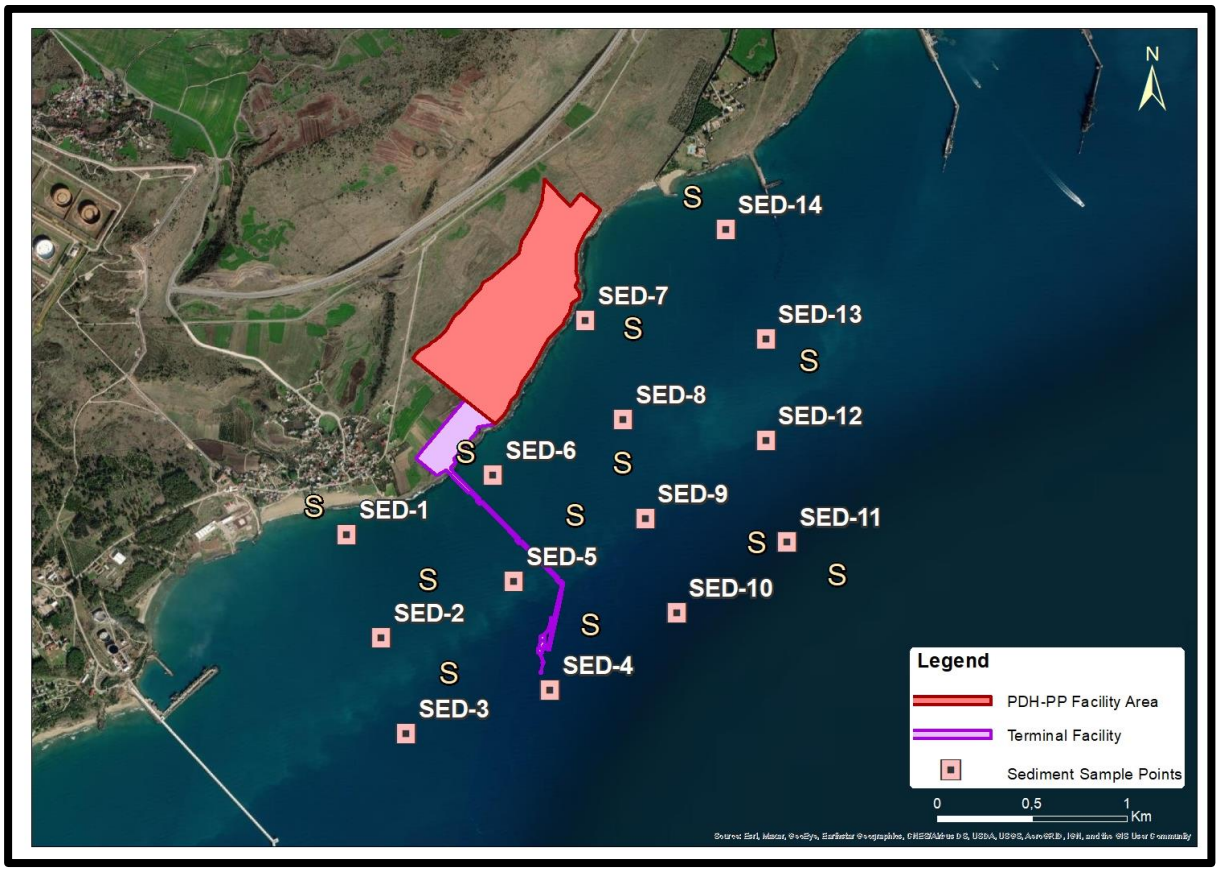


Figure 6-6. Seafloor surface sediment type distribution map (ARS, 2020)

The generated bathymetry map for the region is given in Figure 6-7.

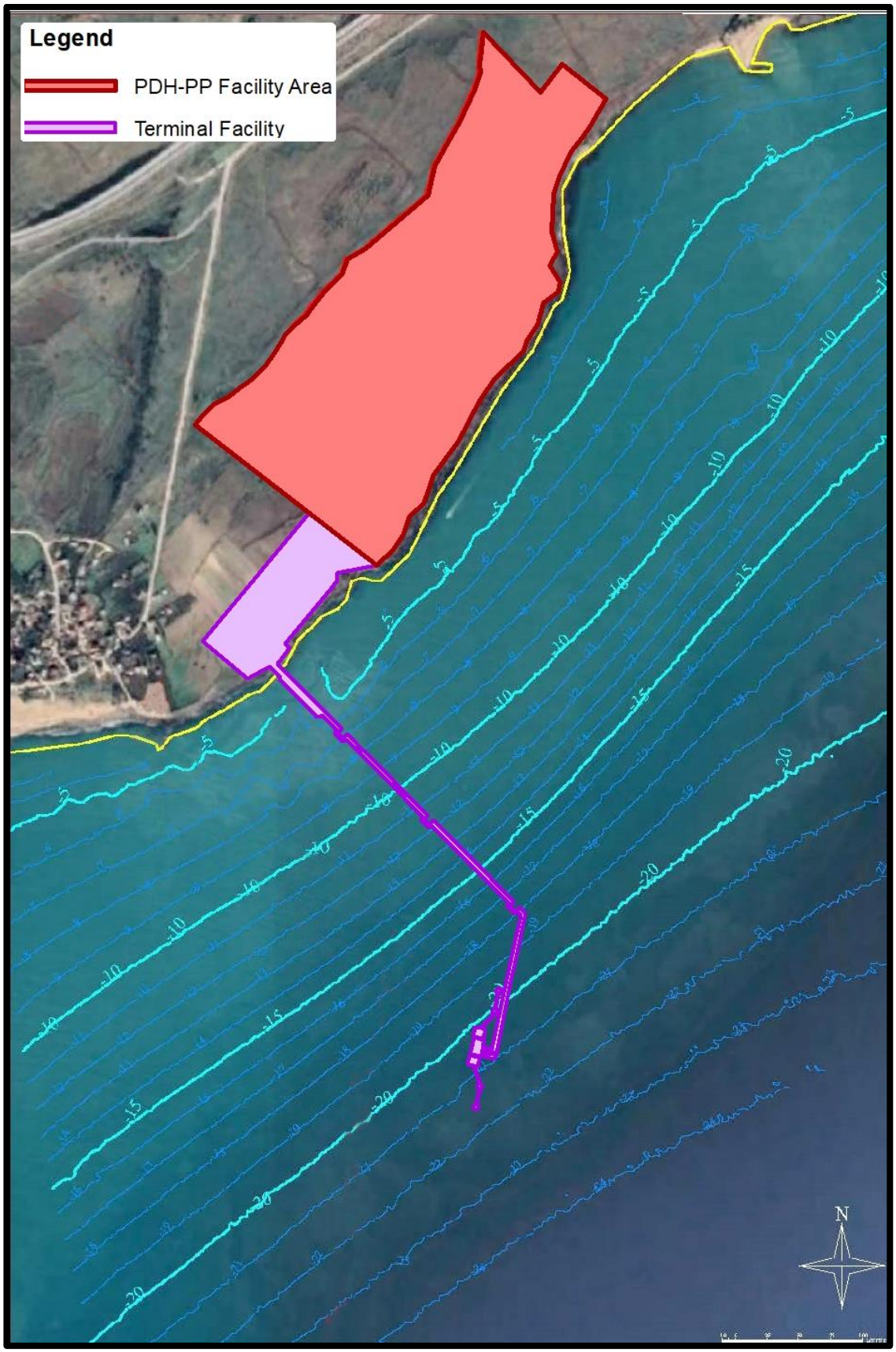


Figure 6-7. Bathymetry map of the vicinities of the Jetty (Associated Facility) (ARS, 2020)

- *Currents*

The Project region is located in the Gulf of Iskenderun, which is a part of the Levantine Sea, located in the far east of the Mediterranean. The Levantine Sea is the 2nd largest part of the Mediterranean Sea, and its borders cover the area east of Rhodes. The deepest points are near Antalya, Cilicia, and Syria coasts in the Latakia region. Depths at these points are 4000, 2500, 1000 and 1500 meters, respectively (Özsoy *et al*. 1989 and 1993).

The most important current affecting the Levantine Sea is the middle Mediterranean current which is formed by the flow to the Mediterranean from the Atlantic Ocean. This flow causes medium-scale currents in the region and creates general dynamic structures (Robinson et al., 1991; Özsoy et al., 1993). General surface currents of the North-East Mediterranean are given in Figure 6-8.

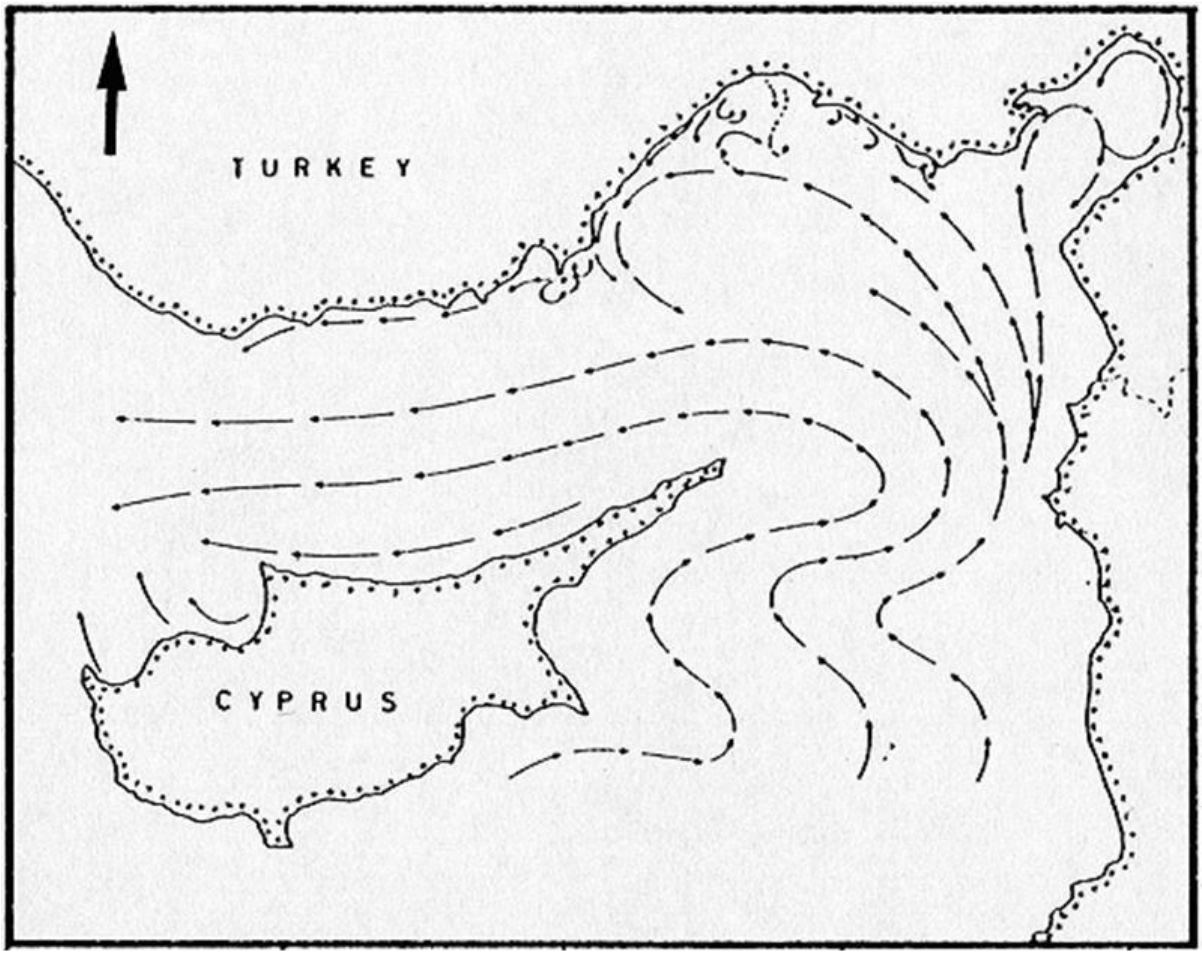


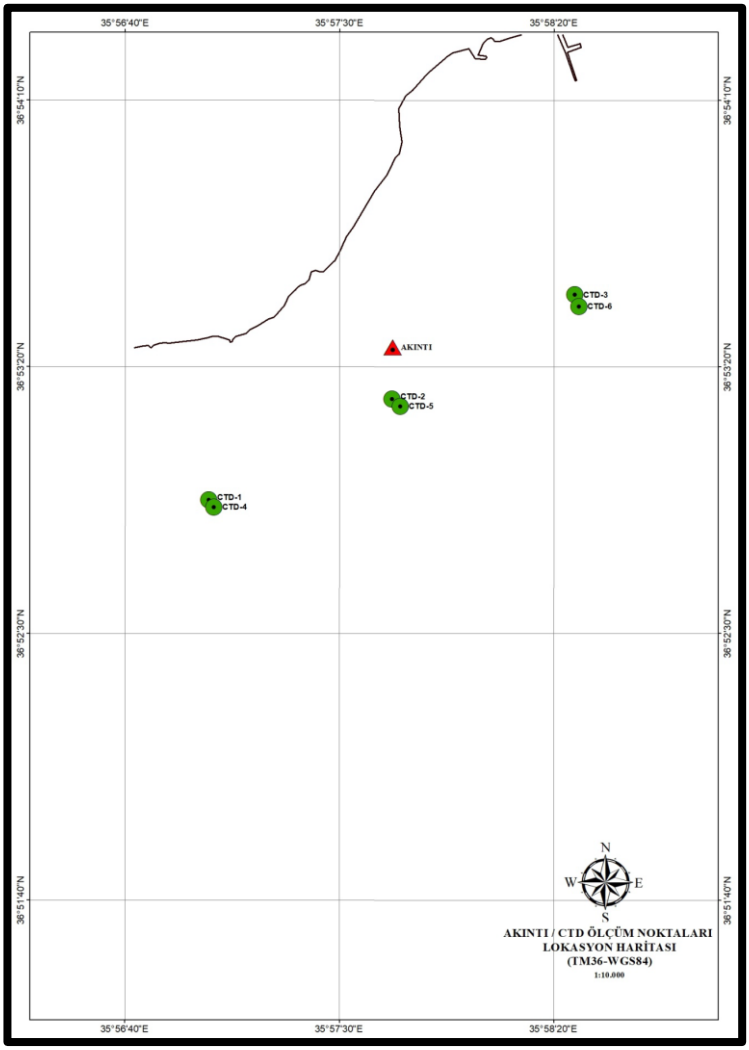
Figure 6-8. Surface Current of North-East Mediterranean (Collins and Banner, 1979)

Surface currents within the Gulf of İskenderun are generally weak with an anticlockwise gyre. The inshore current direction is variable and influenced by local wind patterns, whereby easterly currents dominate in summer and westerly currents occur in winter. These currents are caused by the wind and the extensions of the general current system of the Eastern

Mediterranean entering the Gulf. At the mouth of the Gulf, fluctuations are caused by occasional variations in the current system.

Micro-scale circulations, which are mostly originating from winds, and the main currents of the Eastern Mediterranean can be observed in the Gulf. The wind is the most important factor controlling the sea level in the region. These changes occasionally lead up to 150 cm water level differences, which is considerably higher than the water level differences that are created by the tidal path reaching at most 60 cm (Adana Provincial Environmental Status Report, 2007).

Current measurements were taken on 5 days (13,14,15,16,17 January 2020) at the monitoring station shown in Figure 6-9.



Note: AKINTI: Current Monitoring Station, CTD: Physical parameters- CTD Monitoring Station

Figure 6-9. Current, CTD and Sea Temperature Monitoring Locations (ARS, 2020)

As can be seen from Table 6-5, Figure 6-10 and Figure 6-11, average surface currents at the monitoring point varied from 9.92 to 11.84 cm/s and the effective direction (average direction of current vector) of these currents was predominantly southern with a direction of 146° – 249°. Current measurement results given in Table 6-5 also indicate that the maximum current velocity of 11.84 cm/s was recorded with a direction of 210° (S-SW), and the minimum current velocity was recorded as 9.14 cm/s with a direction of 202° (S-SW).

Table 6-5. Velocity and Direction of Currents (ARS, 2020)

	Day 1		Day 2		Day 3		Day 4		Day 5	
	V (cm/s)	Dir. (deg.)	V (cm/s)	Dir. (deg.)	V (cm/s)	Dir. (deg.)	V (cm/s)	Dir. (deg.)	V (cm/s)	Dir. (deg.)
Min	5.04	145.79	6.07	161.33	8.37	168.72	7.22	182.30	9.08	150.42
Max	15.52	248.79	12.84	239.19	14.75	244.32	15.57	229.41	13.91	239.52
Avg.	9.92	190.71	9.14	201.69	11.84	210.48	11.80	202.08	11.38	196.51

Note: V: velocity (cm/s), Dir: direction (degrees)

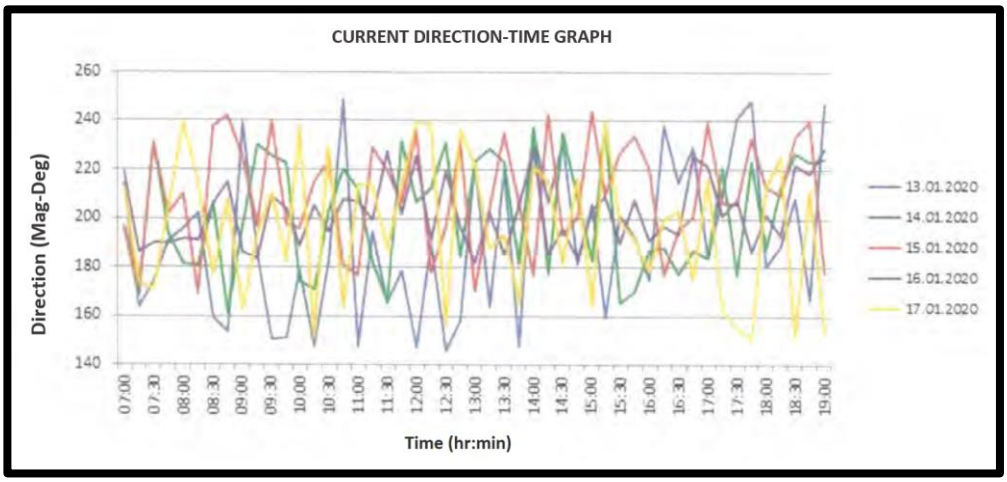


Figure 6-10. Current Directions (ARS, 2020)

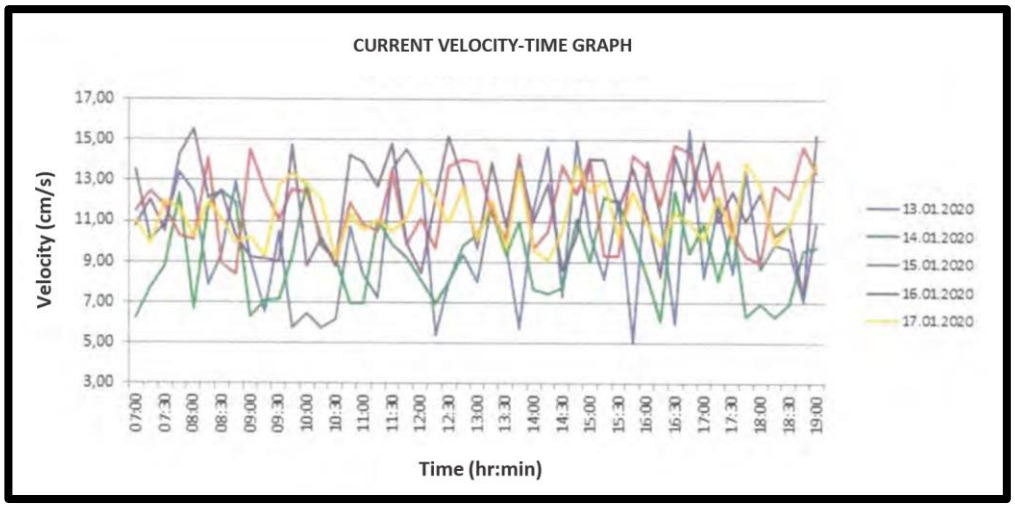


Figure 6-11. Current Velocity (ARS, 2020)

- *CTD Measurements*

Four separate water layers can be observed in the northeast Levantine Sea. Vertically, at the top, just beneath the surface layer, a layer of Atlantic origin is located. The most important and distinguishing feature of this layer is that salinity is lower than in all other layers (38.5-39 ‰). The third layer is the Levantine middle layer (LIW), which has the highest salinity in the region (39.1 ‰ and 15.5 °C). The bottom layer is the deep waters of the eastern Mediterranean. Water in this layer has the lowest salinity and is colder (38.7 ‰ and 13.6 °C) than the LIW above it (Ünlüata, 1986; Özsoy *et al*., 1987, 1993; Theorais *et al*., 1993). Of all four layers, only the bottom layer is rich in nutrients. However, even for the bottom layer nutrient concentrations are still 5 times lower than the concentration in the deep waters of the Atlantic (Salihoğlu *et al*., 1990). The LIW layer is formed by the cooling of surface waters in February and March. As the surface waters cool, the density increase causing the water in this layer to sink down to the water layer with the same density (Özsoy *et al*., 1993). Sinking of the higher layer brings the water rich in nutrients on the surface to the bottom. As a result, the Levantine Sea turns into one of the poorest waterbodies in the world in terms of nutrient content (Özsoy *et al*., 1993). The LIW layer occurs at depths of about 200 to 700 meters and is characterised by high salinity (39.1-39.3 ‰) (Hetch *et al*., 1988; Malonette-Rizzolli *et al*., 1999).

Long-term monitoring at the Gulf of Iskenderun indicates that water temperature drops to 13 - 15 °C during winter and rises to 27 - 29 °C in the summer. Thermocline formation is generally observed in the gulf from spring until the end of the year. The physical parameter measurements verify that the salinity of the gulf waters is around 39 ‰ (Adana Provincial Environmental Status Report (İl Çevre Durum Raporu), 2007).

In-situ monitoring data show that the sea surface temperature (SST) varies between 17.64 °C and 17.77 °C. The measurement at the CTD-6 Station (at a depth of 19.93 meters) indicates the seafloor of 17.36 °C. As a result, it can be said that the sea water temperature decreases with a negative gradient from the sea surface towards the seafloor.

Additionally, according to the measurements, salinity varies between 39.11 ‰ and 39.15 ‰ at the site. These figures indicate that salinity is homogeneous except for a slight variation depending on the water temperature.

It was determined that the density increases slightly towards the seafloor depending on the water temperature. The density varies between 28.50 and 28.52 sigma-t at the surface. Density at the seafloor is measured as 28.66 sigma-t (CTD-6 Station).

Depth profile graphics based on monitoring data from six CTD stations recorded on two different days are shown in Figure 6-12; cross-section profiles are presented in Figure 6-13.

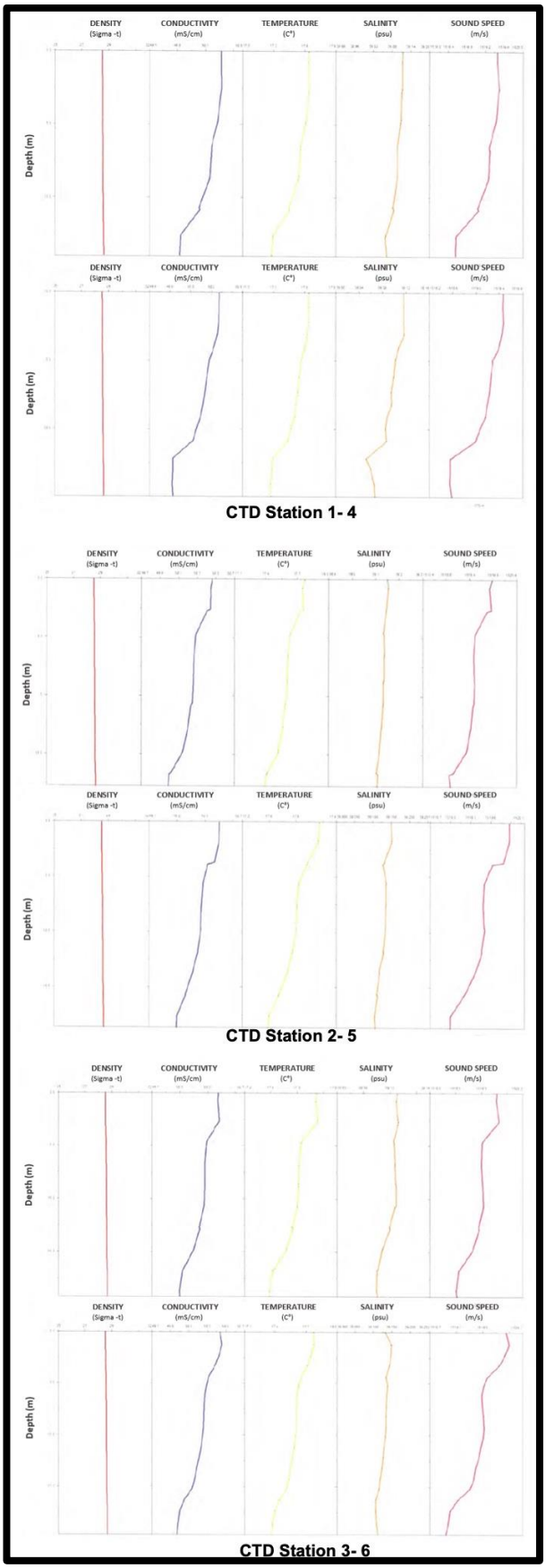


Figure 6-12. Density, Conductivity and Salinity Profiles at CTD Stations (ARS, 2020)

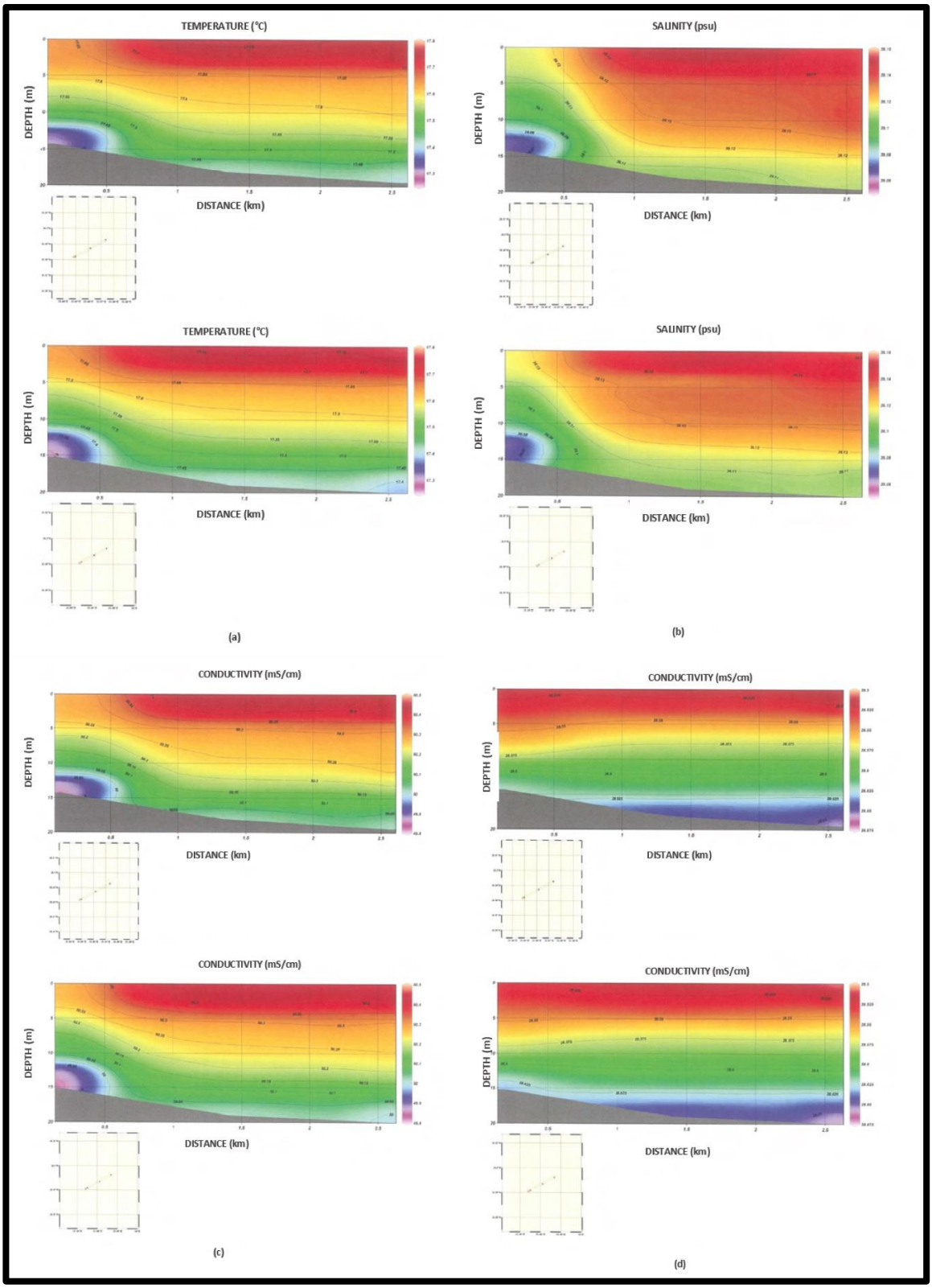


Figure 6-13. Cross-sectional View of CTD Measurements (ARS, 2020)

- *Geophysical Measurements*

Imagenex Yellowfin side scan sonar system has been used in order to identify the seafloor surface characteristics and natural and manmade structures. Total of 26 (perpendicular to the shoreline) side scan sonar profiles with 95-105 m profile interval and 260 kHz frequency has been taken on a 250 m sea surface as illustrated in Figure 6-14. The natural/ manmade structures and surface morphological structures identified inside scan sonar data numbered S7, S19 and S21 are shown in Figure 6-15. According to the side scan sonar study, it can be concluded that seafloor is generally uniform, and there are no manmade structures identified in the investigation area.

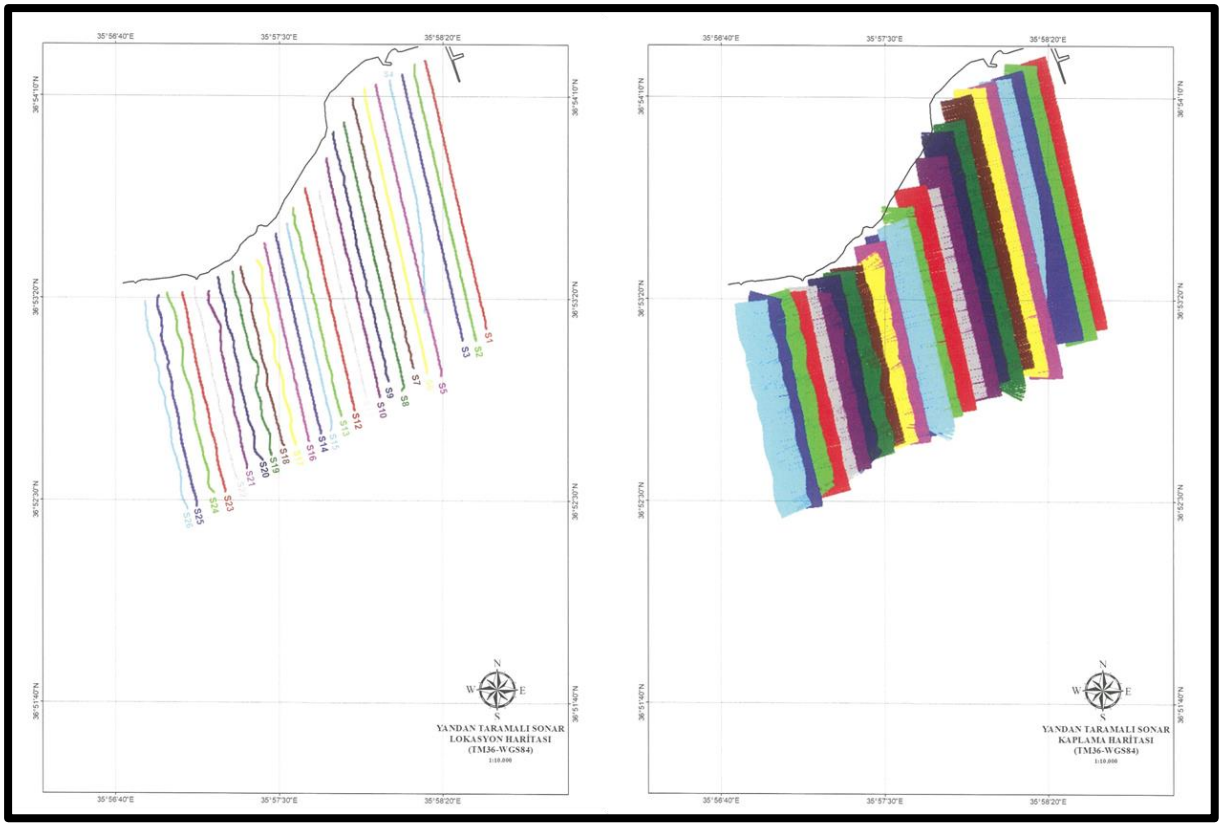


Figure 6-14. Side scan sonar profile maps; lines on the left and profiles on the right (ARS, 2020)

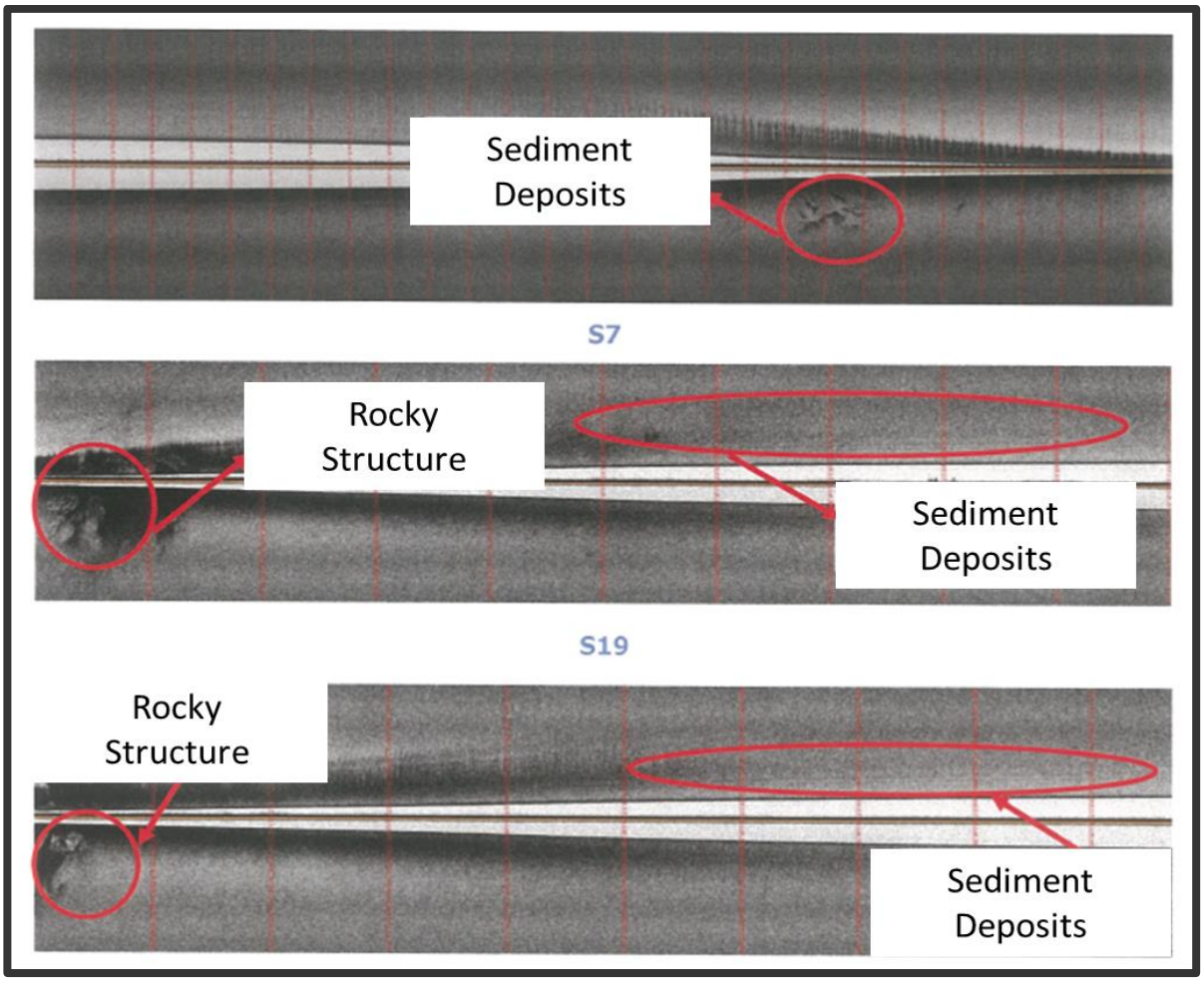


Figure 6-15. S7, S19 and S21 sonar lines

6.3.3 Seismic, Liquefaction and Landslide Risks

Project Site and Vicinities

The Adana province is surrounded by the Ecemiş fault in the west and northwest, which is an active fault. Moreover, East Anatolian Fault is a NE-SW trending fault from Antakya to Karlıova. Adana is located between these two important active fault lines.

Due to the conceptual changes in the seismic design spectrum, Seismic Hazard Map of Turkey was revised more than 20 years ago. The revision included fundamental information for the revision of the design spectrum in the Turkish earthquake code (AFAD, 2014). The new Earthquake Hazard Map of Turkey, which is effective as of January 2019, is presented below. The Map shows the peak ground acceleration (PGA). As can be seen in Figure 6-16, the Project site lies close to areas classified as low to medium hazard classes. According to the Earthquake Hazard Map of Turkey, the Project site has a PGA value of 0.303 g (10% exceedance probability in 50 years period, i.e., 475 years recurrence period). The earthquake hazard map covering the Project site and its close vicinity is shown in Figure 6-17. According to the correlation of the PGA with the Mercalli scale for the classification of the intensity of the

potential earthquakes regarding the perceived intensity the PGA value of 0.303 g corresponds to an earthquake with potential moderate to heavy damage on structures with very strong to severe perceived shaking (USGS, 2016 [1]; Worden et al, 2012[2]).

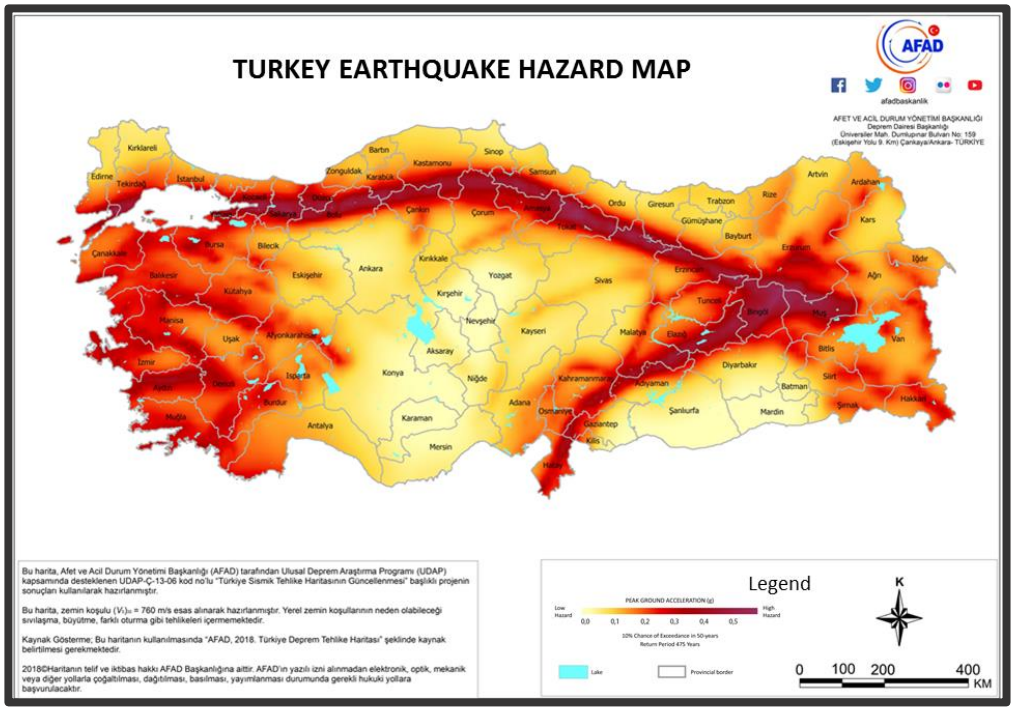


Figure 6-16. Earthquake Hazard Map of Turkey (Ministry of Interior Disaster and Emergency Management Presidency, 2019)

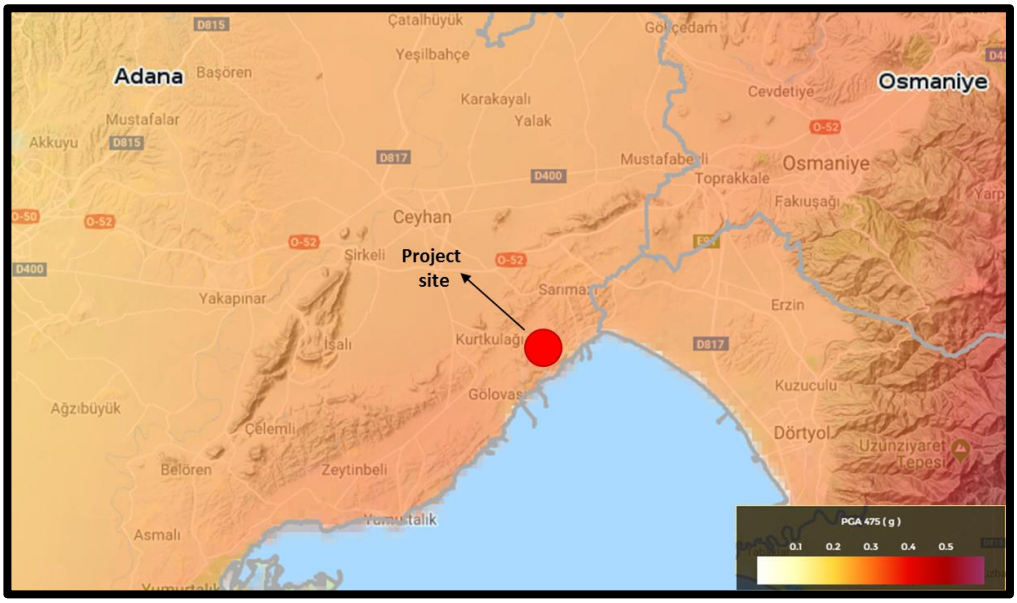


Figure 6-17. Earthquake Hazard Map for Project site and its close vicinity (Ministry of Interior Disaster and Emergency Management Presidency, 2019)

[1] USGS, 2016. ShakeMap Manual. https://earthquake.usgs.gov/data/shakemap/background.php
[2] Worden, C.B., M.C. Gerstenberger, D.A. Rhoades, D.J. and Wald (2012). Probabilistic relationships between ground-motion parameters and Modified Mercalli intensity in California Bull. Seism. Soc. Am. 102(1), 204-221. DOI: https://doi.org/10.1785/0120110156.

In the past, the Ceyhan district suffered a severe earthquake that occurred between Ceyhan and Misis on 27 June 1998. The magnitude of the earthquake was recorded as 6.2 on the Richter scale and 145 people died. In addition to several collapsed structures, the earthquake also caused widespread liquefaction in the Ceyhan River basin. On the other hand, when the soil characteristics in the survey area are evaluated in terms of liquefaction potential, it is concluded that there is no risk of liquefaction in the area. All project units and buildings will be designed in accordance with the requirements of the Building, Earthquake Regulation of Turkey.

In the Spatial and Statistical Distribution of Natural Disasters in the Turkey Report published in 2008 by the Disaster Affairs General Directorate of the Ministry of Public Works and Settlement, the earthquake in 1998 in the Ceyhan district of Adana province is ranked the 10th on the list of cities impacted at most from natural disasters in terms of numbers of disaster-victims. Adana province is ranked as the 5th on the list of cities impacted at most by flood events, regarding the number of disaster-victims and floods observed are considered.

The 1/250,000 scaled active fault map showing the region of the Project site is given in Figure 6-18. Accordingly, Yumurtalık Fault passes along the northern boundary of the Project Site, and Karataş Fault is approximately 4 km to the north of the Project site. In

Figure **6-19**, the earthquakes that occurred in the Adana region between 2007 – 2016 are shown. The magnitude of the majority of the earthquakes was between 1-3 on the Richter scale.

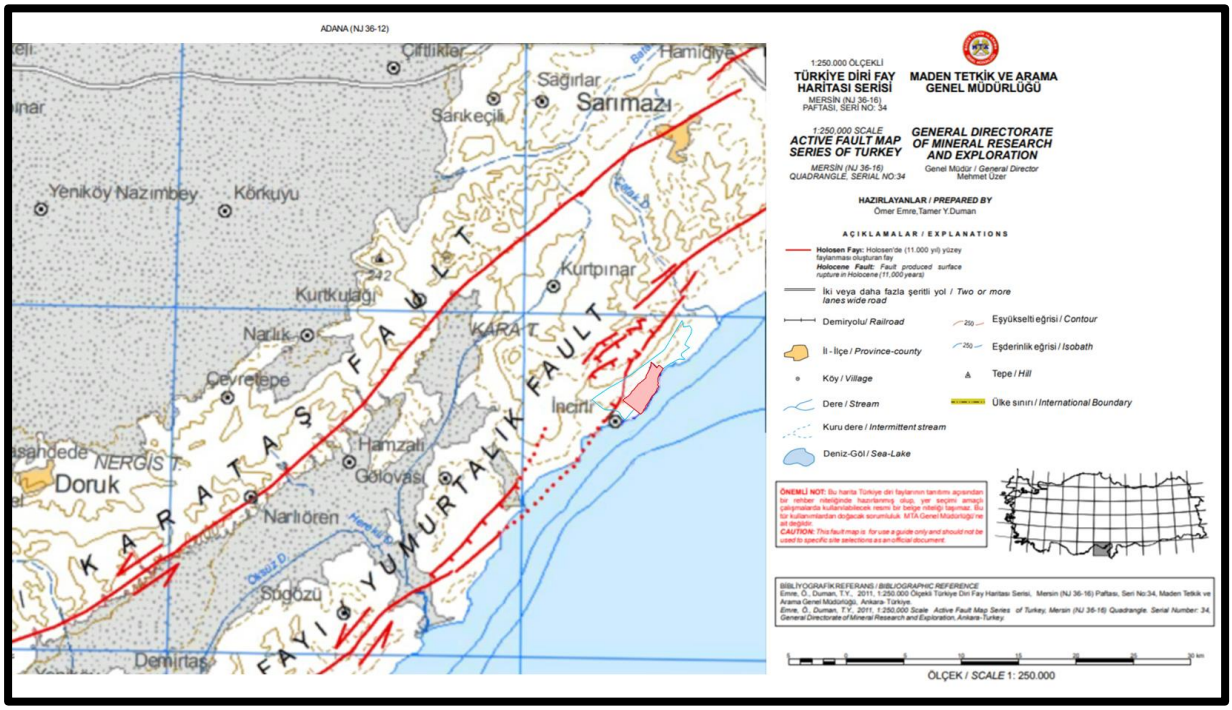


Figure 6-18. Active Fault Map in Adana region

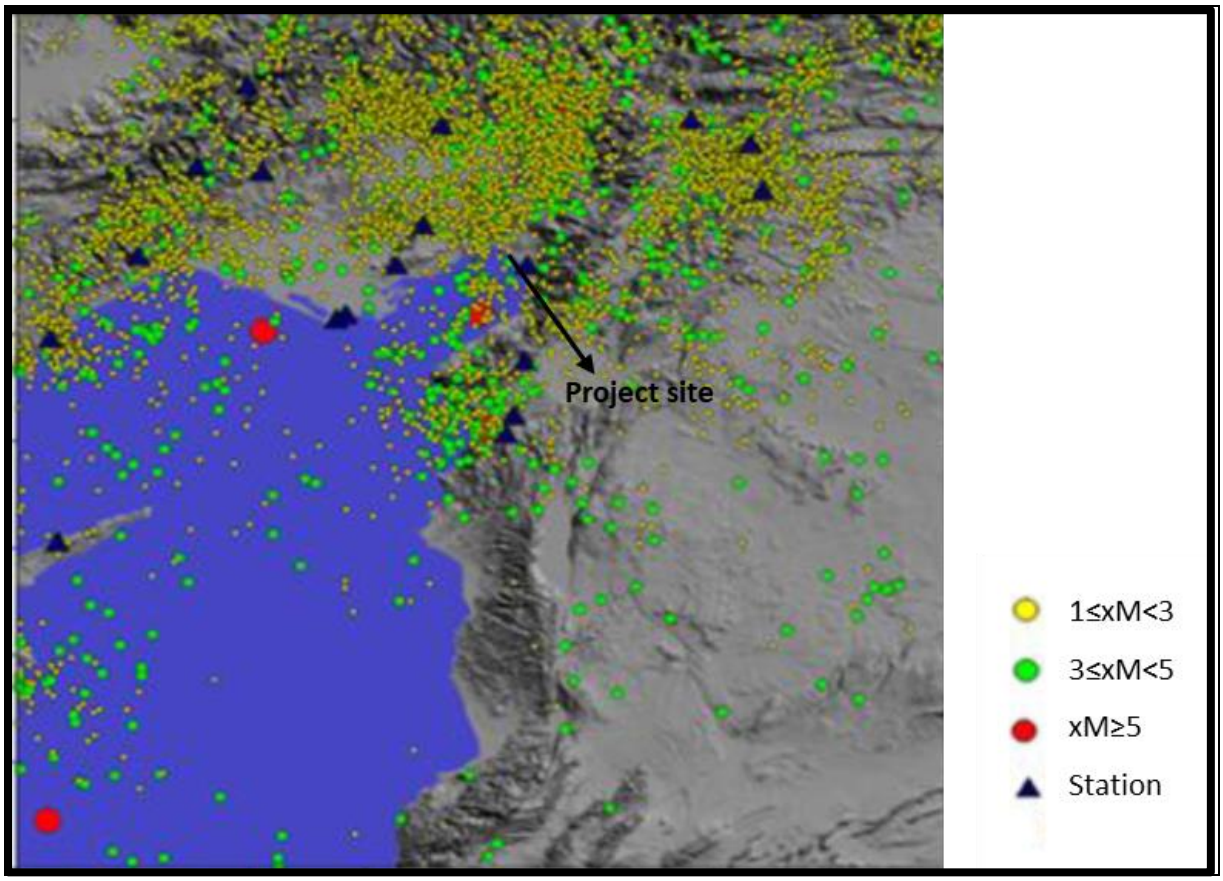


Figure 6-19. Earthquakes occurred between 2007 – 2016 in the Adana region and its proximity[3]

According to the Report on Disaster Management and Natural Disaster Statistics of Turkey, published by the Disaster and Emergency Management Authority in 2018 (as can also be observed in Figure 6-20), several earthquakes were recorded in the Adana province between 1990 – 2017. The magnitudes of these earthquakes were less than 7.0. Figure 6-20 shows statistics related to other natural disasters in Turkey. Between 1950 and 2018, 301 landfall, 202 flood, and 9 avalanche incidents were recorded in Adana province.

[3] Ciftci, C. Seismic Stratigraphic and Seismotectonic Properties of The Cilicia-Adana-Iskenderun Basin Complex, PhD Thesis, Suleyman Demirel University, Isparta, 2018

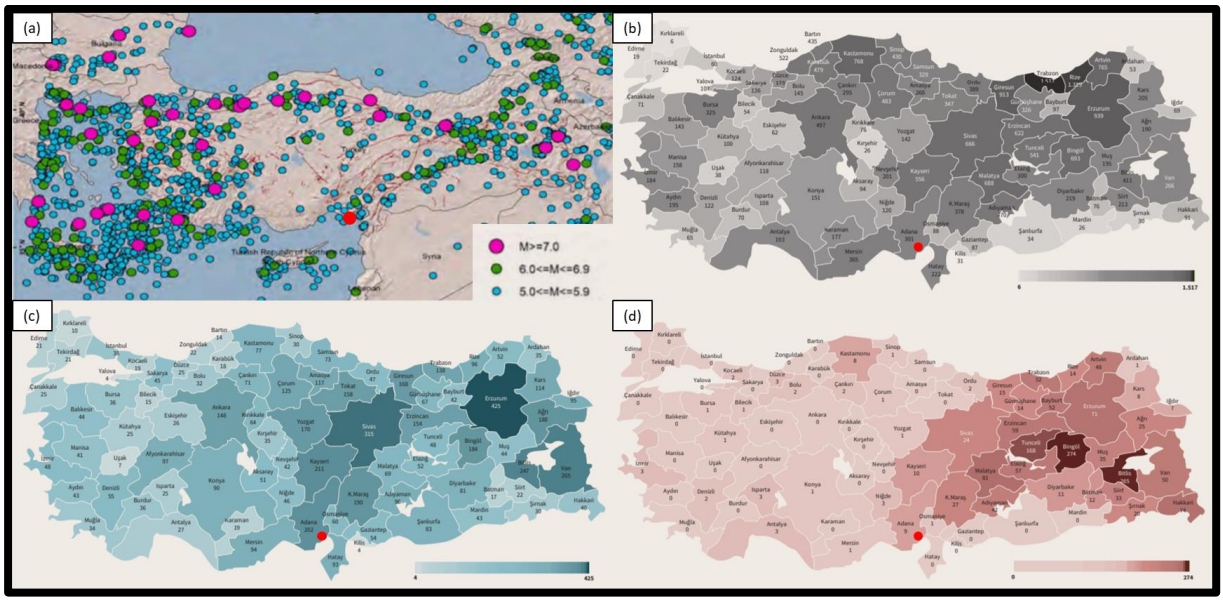


Figure 6-20. Distribution of Disaster Incidents in Turkey (Disaster Management and Natural Disaster Statistics in Turkey Report published by Disaster and Emergency Management Authority, 2018) – Project site is indicated in red (a) Earthquakes between 1990 – 2017; (b) Landfall incidents between 1950 – 2018; (c) Flooding incidents between 1950 – 2018; (d) Avalanche incidents between 1950 – 2018.

Considering the risks of natural disasters, other than earthquakes, it can be concluded that due to its flat topography, disasters such as rockfalls and landslides are not expected within the Project site. Moreover, the region is not located in a 100-year flood risk area of any major rivers. Hence, the flood risk at the site is found to be exceptionally low.

Jetty and Coast

As given in Figure 6-1, the Project area is located in Quaternary Delihalil Basalt and the shoreline of the Project area extends along the rocky coast for approximately 1.5 km. No coastal erosion is anticipated since the coastal area is in the rocky formation.

Tsunami Risk

Tsunamis may be caused by earthquakes, underwater volcanic eruptions, or landslides. However, no landslides or underwater volcanic eruptions have been reported near the project area at Gulf of Iskenderun. There are limited tsunami reports in the Eastern Mediterranean, according to the National Environmental Research Council. It is projected that potential tsunami height in the Eastern Mediterranean is about 10 m for 500-year recurrence time. With this figure, the predicted and practicable counter-design steps are not possible (BTC Project EIA, 2002). On the other hand, the result of study performed by Kandilli Observatory Earthquake Research Institute estimates low tsunami risk with a wave height less than 1 m at northeast Mediterranean coasts including Gulf of Iskenderun (Kandilli Observatory, 2018).

Jetty

A shallow seismic study has been conducted to understand the marine morphology, seismic units, and the presence of active faults by means of a sub-bottom profiler system. The shallow seismic data is collected in a total of 29 lines (i.e., 28 vertical and 1 horizontal line with respect to the shoreline) as shown in Figure 6-21. The theoretical seismic velocity is assumed as 1,700 m/s as seismic velocity values were not available for the Project site. As a result of the study, two different seismic lithological units have been identified in the investigation area which are defined as “A” and “B”. Unit A is the upper layer which is saturated and composed of current sediments. The thickness of unit A varies between 2.5 and 9.5 m. Unit A is followed by unit B at the bottom. Unit B constitutes the bottom layer of unit A and is more rigid compared to unit A. According to the seismic cross sections, the thickness of unit B is at least 5-10 m.

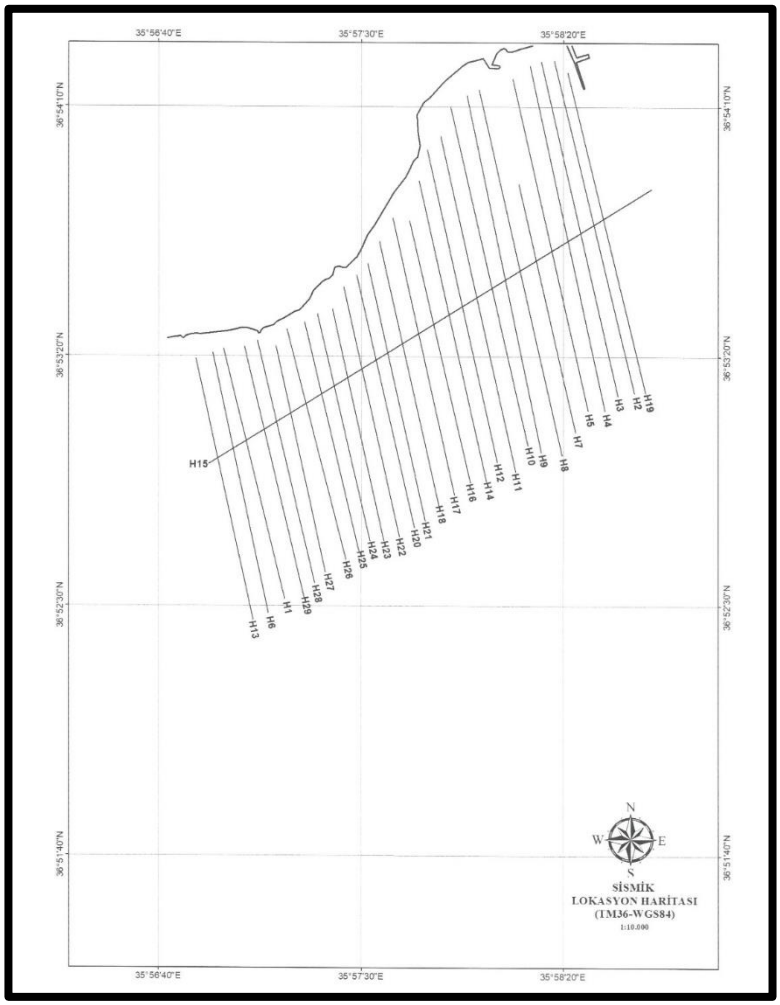


Figure 6-21. Project site seismic location map (ARS, 2020)

6.3.4 Soil Structure and Quality

Potential for Historical Contamination

The Project site is greenfield land and a previous agricultural field with marginal agricultural land properties. The social survey at the local neighbourhoods in the vicinity of Project site indicates that most of the local residents (i.e., Kurtkulağı, Kurtpınarı, Sarımazı) are employed in agriculture sector (olive groves, pomegranate and orange trees; wheat, bean, etc.) and also conduct daily livestock grazing and beekeeping activities. During early communication (10-12 February 2020) at the scoping stage with local stakeholders, complaints/concerns related to the environmental conditions (e.g., dust, quality of water courses etc.) were reported. The complaints were about the degradation in air and surface water quality due to increased number of industrial facilities in the region which is considered by locals to severely impact the agricultural activities.

The Project site has not been used for residential purposes in the past. No industrial activities have been conducted at the Project site.

Soil Quality

A soil quality survey to identify contaminated lands in the area and relevant liabilities was conducted by Artek Mühendislik Çevre Laboratuvarı A.S. (ARTEK) in June 2020. Soil samples were collected on 21 June 2020 at five different locations shown in Figure 6-22. The survey was conducted in accordance with the “Regulation on Soil Pollution Control and Point-Source Contaminated Sites (RSPC)” (O.G. Date/Number:08.06.2010/27605). The sampling locations are described in detail in Table 6-3. In line with the provisions of RSPC soil samples were collected as shallow samples from V-shaped holes with 0-20 cm depth (ARTEK, 2020). According to the survey report, the sample thickness, width and length are 2 cm, 3-4 cm, and 20 cm, respectively (ARTEK, 2020). Based on the first sampling results, a second stage assessment was conducted. The samples were analysed for the land contamination parameters listed in Annex-1 (Generic Pollutant Risk Limits) of RSPC. The analysis results are summarised in Table 6-4.

Figure 6-22. Soil sampling locations

Table 6-3. Description of sampling points

Sampling Point	Description
SP-1	Near the planned PDH Plant
SP-2	Near the planned PP Plant
SP-3	Near the planned tank farm (PP storage)
SP-4	Near the planned tank farm (Propane storage)
SP-5	Outside the Project site to the north

Table 6-4. The analysis results of soil samples

Parameter	Unit	SP-1	SP-2	SP-3	SP-4	SP-5	G. Risk Limits* (mg/kg)	G. Risk Limits** (mg/kg)
Total Organic Halogens (TOX)	mg/kg	<20	37	43.5	43.76	22.26	-	-
Polycyclic Aromatic Hydrocarbons (PAH) Antrasen	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	17203 (b)	-
PAH Asenaften	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	3441 (b)	-
PAH Benz(a)antrasen	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	0.6 €	-
PAH Benzo(a)piren	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	0.06 (e)	-
PAH Benzo(b)fluoranthene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	0.6 (e)	-
PAH Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	6 (e)	-
PAH Beta-Kloronaftalin	mg/kg	<0.021	<0.021	<0.021	<0.021	<0.021	-	-
PAH Dibenz(a,h)antrasen	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	0.06 (e)	-
PAH Floranten	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	2294 (b)	-
PAH Fluoren	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	2294 (b)	-
PAH Indeno(1,2,3-cd)pyrene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	0.6 (e)	-
PAH Krisen	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	62 (e)	-
PAH Naftalen	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	1147 (b)	-
PAH Piren	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	1720 (b)	-
Volatile Organic Compounds (VOC) Trichloroethane	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005		
VOC Benzene	mg/kg	<0.004	<0.004	<0.004	<0.004	<0.004	12 (c,e)	-
VOC Bromoform	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	61 (e)	-
BTEX	mg/kg	<0.055	<0.055	<0.055	<0.055	<0.055	-	-
VOC cis-1,2-dichloroethene	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	7 (c,e)	-
VOC Ethylbenzene	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	7821 (b,c)	-
VOC Chlorobenzene	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	1564 (b,c)	-
VOC Methyl tert-butyl ether (MTBE)	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	355 (c,e)	-
VOC Styrene	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	15643 (b,c)	-
VOC Tetrachloroethane (Tetrachloroethylene)	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	1 (c,e)	-
VOC Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	6257 (b,c)	-

Parameter	Unit	SP-1	SP-2	SP-3	SP-4	SP-5	G. Risk Limits* (mg/kg)	G. Risk Limits** (mg/kg)
VOC Xylene (o,p,m)	mg/kg	<0.006	<0.006	<0.006	<0.006	<0.006	15643 (b,c)	-
VOC 1,1-Dichloroethane (ethylene chloride)	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	15643 (b,c)	-
VOC 1,2-Dichloropropane	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	18 (c,e)	-
VOC 1,2-trans-dichloroethylene	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	1564 (b,c)	-
Semivolatile Organic Compounds (SVOC) Bis(2-chloroethyl)ether	mg/kg	<0.023	<0.023	<0.023	<0.023	<0.023	0.6 (c,e)	-
SVOC Bis(2-chloroethoxy)methane	mg/kg	<0.023	<0.023	<0.023	<0.023	<0.023	183 (b)	-
SVOC Bis(2-ethylexyl)phthalate (117-81-7)	mg/kg	2.62	0.5	0.44	0.39	0.64	35 (e)	-
SVOC Butylbenzyl phthalate	mg/kg	<0.021	<0.021	<0.021	<0.021	<0.021	256 (e)	-
SVOC Carbaryl	mg/kg	<0.019	<0.019	<0.019	<0.019	<0.019	6110 (b)	-
SVOC Carbazole	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	24 (e)	-
SVOC Carbofuran	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	306 (b)	-
SVOC Diethyl phthalate	mg/kg	0.04	0.17	0.144	0.087	0.181	48884 (b)	-
SVOC Dimethyl phythalate	mg/kg	<0.021	<0.021	<0.021	<0.021	<0.021	611049 (b)	-
SVOC Di-n-buthyl phthalate	mg/kg	0.74	1.77	1.54	1.25	2.17	6110 (b)	-
SVOC Di-n-octyl phthalate	mg/kg	0.36	<0.019	<0.019	<0.019	<0.019	2444 (b)	-
SVOC Hexachlorobenzene	mg/kg	<0.023	<0.023	<0.023	<0.023	<0.023	0.3 (e)	-
SVOC Hexachlorobutadien	mg/kg	<0.019	<0.019	<0.019	<0.019	<0.019	6 (e)	-
SVOC Hexachloroethane	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	35 (e)	-
SVOC Nitrobenzene	mg/kg	<0.024	<0.024	<0.024	<0.024	<0.024	39 (b,c)	-
SVOC N-Nitrosodimethylamine	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	0.01 (e)	-
SVOC N-Nitrosodi-n-propylamine	mg/kg	<0.022	<0.022	<0.022	<0.022	<0.022	0.07 (e)	-
SVOC N-Nitrosodiphenylamine	mg/kg	<0.023	<0.023	<0.023	<0.023	<0.023	99 (e)	-
SVOC Pentachlorobenzene	mg/kg	<0.021	<0.021	<0.021	<0.021	<0.021	49 (b)	-
SVOC 2,4-Dinitrotoluene	mg/kg	<0.019	<0.019	<0.019	<0.019	<0.019	122 (b)	-
SVOC 2,6-Dinitrotoluene	mg/kg	<0.022	<0.022	<0.022	<0.022	<0.022	61 (b)	-

Parameter	Unit	SP-1	SP-2	SP-3	SP-4	SP-5	G. Risk Limits* (mg/kg)	G. Risk Limits** (mg/kg)
SVOC 4-Chloroanilline	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	9 (e)	-
Antimony	mg/kg	<2.5	4.65	<2.5	3.2	3.7	31 (b,c)	- (f)
Arsenic	**mg/kg**	**4.8**	**8**	**10.1**	**12.8**	**9.4**	**0.4** (e)	**471 (e)**
Copper	mg/kg	32	34.8	24.3	25.1	37	3129 (b,c)	- (f)
Mercury	mg/kg	0.088	0.115	0.186	0.113	0.123	23 (b,c)	-
Zinc	mg/kg	36.2	56.5	41	44.7	66.7	23464 (b,c)	- (f)
Cadmium	mg/kg	5.8	8.9	5.7	6.9	10.2	70 (b,m)	1124 (e)
Lead	mg/kg	3.2	4.6	7.6	4.86	5.2	400 (n)	- (f)
Nickel	mg/kg	76.6	115.3	80.7	103.2	124.9	1564 (b,c)	- (f)
Selenium	mg/kg	<3.75	<3.75	<3.75	<3.75	<3.75	391 (b,c)	-(f)
Vanadium	mg/kg	45.2	71.8	46.4	57.5	76.25	548 (b,c)	- (f)
Total Petroleum Hydrocarbon (TPH) Aliphatic C5-C8	mg/kg DM	<0.6	<0.6	<0.6	<0.6	<0.6	4693 (b,c)	-
TPH Aliphatic C8>C16	mg/kg DM	<1.6	<1.6	<1.6	<1.6	<1.6	7821 (b,c)	-
TPH Aliphatic C16>C35	mg/kg DM	<2.2	<2.2	<2.2	<2.2	<2.2	156429 (b,c)	-
TPH Aromatic C5-C9	mg/kg DM	<1.4	<1.4	<1.4	<1.4	<1.4	15643 (b,c)	-
TPH Aromatic C9>C16	mg/kg DM	<0.8	<0.8	<0.8	<0.8	<0.8	1564 (b,c)	-
TPH Aromatic C16>C35	mg/kg DM	<2.6	<2.6	<2.6	<2.6	<2.6	2346 (b,c)	-
TPH Aliphatic-Aromatic	mg/kg	<9.2	<9.2	<9.2	<9.2	<9.2	-	-
Chromium 3+	mg/kg	70.6	133.6	96.9	112.3	131.6	117321 (b,c)	- (f)

Generic Risk Limit Values (mg/kg dry soil) identified for pollutants listed in Regulation on Soil Pollution Control and Point-Source Contaminated Sites (Annex 1)
***** Ingestion of soil and dermal exposure
** Inhalation of dust in outdoor air
b) In calculating this value, the hazard index is assumed to be “1”
c) Since there is no skin absorption factor for this pollutant, only ingestion of the soil has been taken into account
d) Soil saturation concentration
e) The risk of cancer was accepted as “10^{-6}” in the calculation of this value.
f) There is no toxicological value for this exposure type.
i) Since the Di and Dw values are not determined for this pollutant, limit values could not be calculated.

According to the soil sampling results:

- Arsenic is noted to exceed the Generic Risk limit values in all collected soil samples. Arsenic levels exceeded the RSPC limit value for “Ingestion of soil and dermal exposure” (0.4 mg/kg) with detections ranging from 4.8 to 12.8 mg/kg (SP-4 being the highest level). It is important to mention, that arsenic is naturally present in soils in Turkey. Arsenic concentrations do not vary significantly across the Project site. Moreover, it is known that the Project site has not been used for industrial purposes in the past. Therefore, it is concluded that arsenic concentration can be attributed to natural geologic and soil properties and the observed high values are not due to any contamination that may have occurred at the site.
- All the other organic and inorganic parameters are found to be below the RSPC generic limit values.

Early Works and Site Preparation Activities at the Project site

After finalization of the EIA Process, and securing EIA Positive decision and required permits, construction activities regarding Early Works have been started before finalization of the ESIA Report. These works include establishment of the Mobilization Area, site preparation and excavation activities. The Early ,Works are also performed in line with the Rönesans existing ESMS system which is adopted initial findings of ESIA baseline studies as well as impact assessment in addition to the National EIA Report.

Site preparation works will continue during Construction Works of the Project. The site preparation within the scope of the Early Works include some of the Soil Works in which topsoil stripping and basement excavation of the Project and associated facilities. The stripped topsoil and the excavated material from the Project site will be temporarily stored at site before use for site arrangement. Excess of the excavated material will be disposed to the licenced disposal sites operated by the Adana Metropolitan Municipality. After disposal of the excavated material, temporary storage areas will be reinstated and will be evacuated to CPIR Management Company at the end of the construction phase. Details of the topsoil stripping and storage conditions are provided in Chapter 8. CPIR Management Company also requested excavated material in order to use for backfilling of the CPIR Port Project. For this purpose, CPIR Management Company is working on the required permits to use the excess material. If the CPIR Management Company provide the permit and consent form relevant authorities, the material will be sued for the backfilling purposes.

6.3.5 Sediment Quality

For the construction of the Jetty project (an Associated Facility), no dredging activities will be conducted; this means that dredging activities are not part of the Project and associated facility.

Within the scope of the Environmental Impact Assessment (EIA) conducted for the CPIR Port Project, a sediment quality investigation was conducted by Alka Laboratory in June 2020 to evaluate the potential historical contamination and relevant liabilities with regard to the applicable regulations. As part of the sampling and analysis study, a total of 16 samples were collected at different locations as shown in Figure 6-23. The results of the study have been assessed according to the “Regulation on Environmental Management of Dredging Materials” (O.G. Date/Number:14.01.2020/31008).

The analysis results for the samples were compared with the lower limit and upper limit values given in Annex-1 of Regulation on Environmental Management of Dredging Materials. The analysis results are summarised in Table 6-5. This analysis not only gives an idea of the quality of the sediments but is used to determine if, and where the dredging materials will be disposed of. According to the results of the study, none of the parameters exceed the lower limit values.

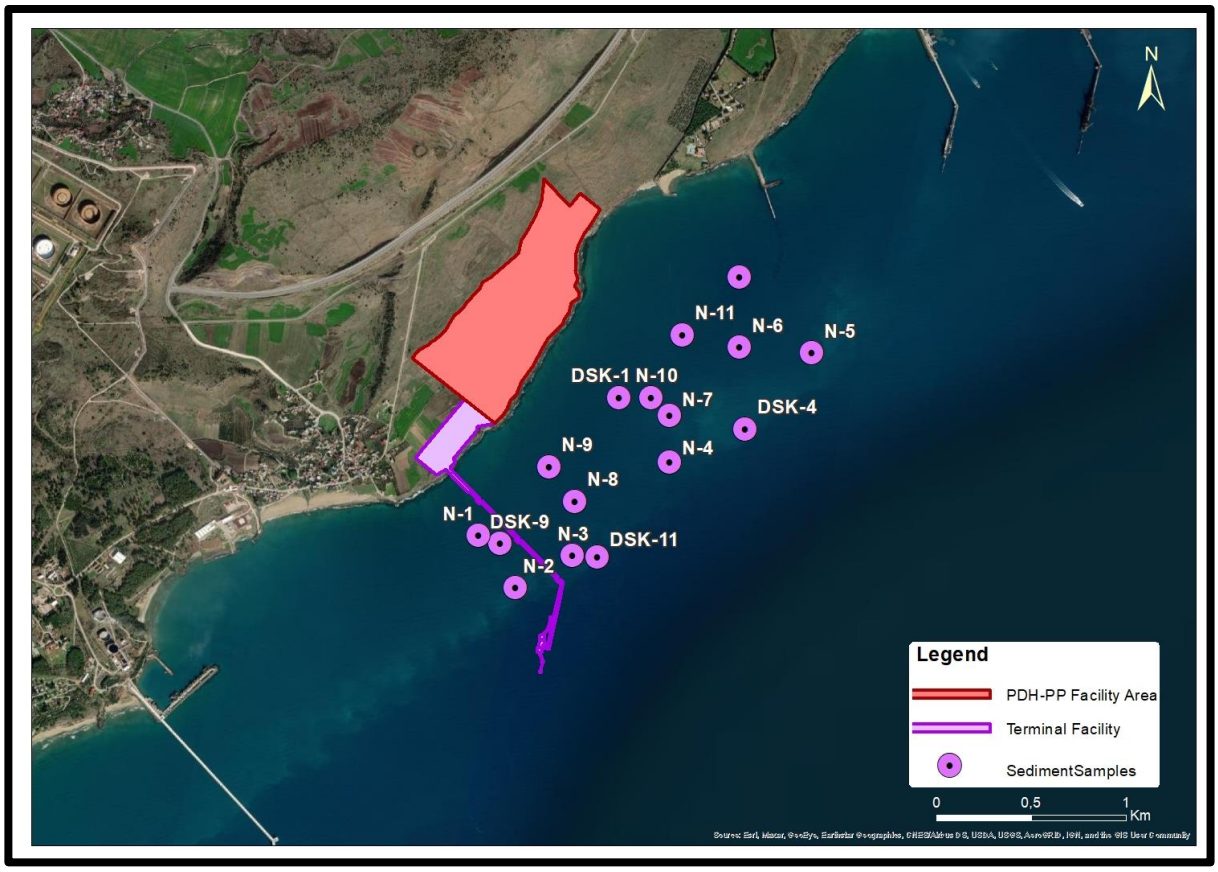


Figure 6-23. Sediment sampling locations

Table 6-5. Sediment analysis results (Limit values are defined for Mediterranean and Aegean Sea)

Sediment Samples	As (mg/kg)	Cu (mg/kg)	Hg (mg/kg)	Zn (mg/kg)	Cd (mg/kg)	Cr (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	PCBs (mg/kg)
DSK-1	<0.5	15.010	<0.05	39.984	1.359	345.950	4.141	396.351	<0.625
DSK-4	<0.5	17.877	<0.05	40.605	1.297	182.777	4.455	221.577	<0.625
DSK-9	<0.5	19.734	<0.05	42.740	1.425	204.095	4.010	249.472	<0.625
DSK-11	<0.5	15.032	<0.05	36.482	1.388	229.591	3.006	265.090	<0.625

Sediment Samples	As (mg/kg)	Cu (mg/kg)	Hg (mg/kg)	Zn (mg/kg)	Cd (mg/kg)	Cr (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	PCBs (mg/kg)
N-1	<0.5	9.849	<0.05	37.039	1.048	94.824	4.034	127.567	<0.625
N-2	<0.5	9.009	<0.05	33.084	0.985	91.571	3.939	123.966	<0.625
N-3	<0.5	13.492	<0.05	44.990	1.183	114.760	4.730	153.193	<0.625
N-4	<0.5	13.192	<0.05	45.496	1.154	113.614	4.966	157.002	<0.625
N-5	<0.5	5.213	<0.05	25.550	0.751	64.109	2.301	72.562	<0.625
N-6	<0.5	5.190	<0.05	22.723	0.701	60.197	2.197	69.525	<0.625
N-7	<0.5	13.373	<0.05	46.474	1.160	115.495	4.642	156.057	<0.625
N-8	<0.5	14.324	<0.05	50.862	1.214	125.334	5.462	164.482	<0.625
N-9	<0.5	13.824	<0.05	46.080	1.225	117.359	5.250	156.148	<0.625
N-10	<0.5	12.013	<0.05	39.721	1.077	102.278	4.476	141.092	<0.625
N-11	<0.5	5.019	<0.05	21.195	0.780	77.227	1.998	74.108	<0.625
N-12	<0.5	5.362	<0.05	22.100	0.746	67.885	2.145	71.009	<0.625
Lower Limit Values (mg/kg)	*30*	*100*	*0.5*	*200*	*1.5*	*850*	*100*	*1,000*	*23 (µg/kg)*
Upper Limit Values (mg/kg)	*50*	*200*	*2*	*400*	*2.5*	*1300*	*200*	*1,750*	*45 (µg/kg)*

6.4 Impacts

The significance criteria that are used for assessing impacts on geology, soils and sediments are established by identifying the impact magnitudes and the sensitivity / vulnerability / importance of the resources. The magnitude and sensitivity criteria related to the geology, soil and sediment are summarised in Table 6-6 and Table 6-7.

Table 6-6. Magnitude of impacts on geology, soils, and sediments

Magnitude	Description
Negligible	- Temporary use of barren land for the storage of excavated materials and construction equipment with no or little impact that is recoverable within a short time scale. - No impacts on the integrity of structures and functionality of the Project and associated facilities from earthquake loads
Low	- Small-scale oil / chemical spills during construction and during operation (e.g., accidents) activities on soils that lead to contamination below generic contamination levels stated in the Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites-RSPC (Soil Pollution Control Regulations). - Small-scale spills during construction and during operation (e.g., accidents) activities on sediments that lead to contamination below generic contamination levels stated in the Turkish Regulation on Environmental Management of Dredging Materials. - Minor impacts on the integrity of structures and functionality of the Project and associated facilities (e.g., minor cracks in the structures) from earthquake loads - In case of disturbance of existing contaminated soils: Increase contamination in nearby non-contaminated soils to slightly above the background level but below the generic contamination levels as stated in the regulation
Moderate	- Medium oil / chemical spills during construction activities on soils and during operation (e.g., accidents) (concentrations of pollutants in the soil defined in the Soil Pollution Control Regulations are exceeded above the generic contamination levels but below the long-term cancer and hazard risk).

Magnitude	Description
	- Medium spills during construction and during operation (e.g., accidents) activities on sediments that lead to contamination below generic contamination levels stated in the Turkish Regulation on Environmental Management of Dredging Materials. - Moderate impacts on the integrity of structures and functionality of the Project and associated facilities (e.g., major cracks on the structures) from earthquake loads - In case of disturbance of existing contaminated soils: Increase contamination in nearby non-contaminated soils to above the background level and above the generic contamination levels as stated in the regulation
High	- Major oil /chemical spills during construction activities on soils and during operation (e.g., accidents) (concentrations of pollutants in the soil defined in the Soil Pollution Control Regulations are exceeded to cause long term cancer and hazard risk). - Major spills during construction and during operation (e.g., accidents) activities on sediments that lead to contamination below generic contamination levels stated in the Turkish Regulation on Environmental Management of Dredging Materials. - Major impacts on the integrity of structures and functionality of the Project and associated facilities (e.g., collapse of the buildings) from earthquake loads - In case of disturbance of existing contaminated soils: Increase contamination in nearby non-contaminated soils to above the background level and above the generic contamination levels and contamination results from hazardous wastes as stated in the regulation

Table 6-7. Geology, sediment and soils resource sensitivity/vulnerability/importance

Value	Description
Negligible	- Land with Class* VIII Landuse Capability - Sediment samples with contaminant concentrations exceeding the upper limits for all parameters given in Annex 1, Table 2 of Turkish Regulation on Environmental Management of Dredging Materials - Areas with no seismic risk - Soils with negligible permeability
Low	- Land with Class* V – VII Landuse Capability - Sediment samples with contaminant concentrations exceeding the upper limits for all parameters given in Annex 1, Table 2 of Turkish Regulation on Environmental Management of Dredging Materials - Areas with low seismic risk - Soils with low permeability
Medium	- Land with Class III – IV Landuse Capability - Sediment samples with contaminant concentrations exceeding the lower limits but below the upper limits for all parameters given in Annex 1, Table 2 of Turkish Regulation on Environmental Management of Dredging Materials - Areas with medium seismic risk - Soils with medium permeability
High	- Land with Class I – II Landuse Capability - Sediment samples with contaminant concentrations below lower limits for all given in Annex 1, Table 2 of Turkish Regulation on Environmental Management of Dredging Materials - Areas with high seismic risk - Soils with high permeability

* Technical Guideline on Soil and Area Classification Standards published by Turkish Ministry of Agriculture and Rural Affairs provides a land classification system (Landuse Capability Classes) to be used for Landuse planning based on the vulnerabilities of the soil and its suitability for agricultural use. Accordingly, lands are classified into eight classes depending on their quality for agricultural use; Class I refers to the soils which do not have the risk of erosion and are suitable for economic agricultural activity; whereas Class VIII refers to soils which are not suitable for agriculture and can only be used for recreational uses.

6.4.1 Scoping of the Impacts during Construction and Operation

Impacts Related to Seismic Risk and Other Natural Hazards:

- According to the Earthquake Hazard Map of Turkey, the Project site has a PGA value of 0.303 g, (10% exceedance probability in 50 years period, i.e., 475 years recurrence period) and it lies close to areas classified as low to medium hazard areas;
- According to the national legislation, the Building Earthquake Regulation of Turkey (O.G. date/no: 18.03.2018/30364) is required to be complied with by the Project Company during the design and construction of all Project structures. Additionally, the Technical Earthquake Regulation on Construction of Coastal and Marine Structures, Railways, Airports (O.G. date/no: 18.08.2007/26617) are required to be followed for the design and construction of the Associated Facility Jetty Site by the CPIR Port Company;
- Considering the risks of natural disasters, other than earthquakes, it can be concluded that due to its flat topography, disasters such as rockfalls and landslides are not expected within the Project site. Moreover, the region is not located in a 100-year flood risk area of any major rivers. Hence, the flood risk at the site is found to be exceptionally low;
- Kandilli Observatory Earthquake Research Institute's study indicated a low tsunami risk with a wave height less than 1 m at northeast Mediterranean coasts including the Gulf of Iskenderun; and
- Based on the studies by Selensu Engineering and Toker Engineering there is no risk of liquefaction in the area.

Impacts on Soil:

- The vicinities of the Project site can be partly characterised as a rural residential area with several villages. The other land uses include several industrial developments. Within the Project site, past activities are limited to occasional grazing and agriculture activities and the Project site is a greenfield with marginal agricultural land properties (See Section 5.3 for details);
- No industrial activities were done within the Project site boundaries in the past;
- The baseline soil sampling and analysis study at the Project site indicated that lands within the Project site boundaries have no contamination and except for arsenic, concentrations of all potential pollutants are below the limit values defined by national regulations for contaminated lands;
- Arsenic concentrations in all soil samples exceeding the generic regulatory limit values are attributed to natural occurrence in the soil depending on local geology and soil properties. For this reason, the use of the excavated material as fill material to level off

roads or level topography and for landscaping purposes is not expected to cause human health risks from the naturally existing conditions that are likely to be present in the nearby areas. On the other hand, in the case that additional fill material is required to be supplied from external sources, the Project Company shall conduct necessary quality / hazard analysis for the fill material prior to the use at the Project site; and

- Project construction phase activities including site preparation, excavation, and construction will be mainly conducted within the boundaries of the Project site and its Associated Facilities, i.e., Mobilisation Area, Temporary Topsoil and Excavated Land Deposition Areas, and Jetty site, that will be located outside of the Project site but within the CPIR premises. Project operation phase activities will be mainly conducted within the Project site. Additionally, raw material (i.e., propane) delivery to the Project will be done through the Associated Jetty Facility that will be operated by the CPIR Port Company within the CPIR premises.

Impacts on Sediment:

- For the construction of the Associated Jetty Facility, no dredging activities will be conducted. Hence, dredging activities are not part of the Project and its Associated Facilities. On the other hand, the impact area of the dredging activities for the CPIR Port Project covers the Project site and the areas of the Associated Facilities;
- A sampling and analysis study was conducted within the scope of the CPIR Port Project EIA study to identify sediment quality and baseline contamination levels and relevant liabilities regarding the applicable regulations. According to the results of the study, all the parameters were found to be below the limit values indicating no sediment contamination in baseline conditions.

6.4.2 Assessment of the Impacts during Construction

Impacts Related to Seismic Risk:

- Project's construction phase is planned to continue for around 4 years period. Hence, considering the seismic hazard in the region (i.e., PGA value of 0.303 g with 10% exceedance probability in 50 years period, 475 years recurrence period) for the construction phase seismic risk is considered to be low.
- Both Turkish regulatory requirements related to seismic design and risk assessment and the findings of the site specific geological/geotechnical investigation study will be taken into consideration for the design of the Project facilities. Building Earthquake Regulation of Turkey (O.G. date/no: 18.03.2018/30364) will be complied with during construction of all Project structures. Additionally, provisions of Technical Earthquake Regulation on Construction of Coastal and Marine Structures, Railways, Airports (O.G. date/no: 18.08.2007/26617) is expected be followed during construction of the Associated Jetty Facility by the CPIR Port Company.

Impacts on Soils:

Poor environmental management during the construction phase may create adverse impacts on soil quality particularly due to events such as accidental spills of liquid cement and other chemicals, and compaction of topsoil. Spills of hazardous material such as oil, fuel, or similar materials (e.g., during fuel loading for machinery operating at the site) create risks of contamination of land, particularly during the construction activities and storage of construction equipment and materials directly on soil ground. The magnitude of these impacts can vary from small to large depending on the magnitude and duration of the adverse events. Any such events that may cause contamination of the soil in the Project site and/or its associated facilities would cause an exceedance of the maximum admissible concentrations defined by Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites-RSPC (Soil Pollution Control Regulations). Hence, stringent impact mitigation measures need to be taken to prevent any adverse impacts that may arise due to the activities discussed above to minimize the magnitude of the impacts.

Impacts on Sediments:

Construction of the jetty will create impacts on sediment quality unless good construction practices and environmental management are followed. Due to the sensitivity of the receiving environment (i.e., good sediment quality), the significance of the impacts on sediment is evaluated to be relatively high.

Table 6-8 and Table 6-9 show the summary of the respective impact magnitudes and related sensitivities during the construction phase. Impact significances are determined based on the methodology given in Table 6-10.

Table 6-8. Construction Phase Impact Magnitudes

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						
			Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)
Impacts related to seismic risk	Negative Direct	Definition	Potential seismic risks and relevant impacts during the Project construction are evaluated to be on a regional scale considering potential adverse impacts on the health and safety of the workers	The duration of potential impact is considered to be less than 1 year period.	In the case of an earthquake of PGA around 0.3g, moderate impacts are expected on the integrity of structures and functionality of the Project works and associated facilities	-	Depending on the relatively short duration of the construction works the probability of a high-intensity earthquake is evaluated as unlikely, i.e., event is unlikely but may occur at some time during implementation	An earthquake disaster with moderate impact during the construction phase is considered to have potential impacts that can be restored within weeks or months after the incident.
		Score	Regional	Short-term	Medium	NA	Unlikely	Short-term
		Value	3	2	3	-	1	1
	Impact Magnitude (G+D+I+F (or L)) x R		**9**					

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						
			Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)
Impacts on soils	Negative Direct	Definition	Potential contamination due to accidental spills of oil, fuel, or chemicals or due to poor material management and handling (e.g., poor storage conditions, deposition of chemicals or wastes on barren land) of chemicals, wastes or construction materials is expected to be limited to the area of the Project site and its Associated Facilities	Unless proper mitigation measures are taken contamination and combined impacts may continue for very long-term depending on the nature of the potential pollutants (e.g., fuels, mineral oils, and other chemicals)	Potential contamination of the soil is expected to create contaminant concentrations above the national legislative limits and some impairments might be expected regarding environmental elements	-	In the case of poor management, handling and storage of chemicals, construction material and/or fuel impact on soil is considered to be likely.	Potential accidents and relevant leaks, spills, etc. are expected to be on a relatively small scale during the construction phase. Hence, restoration of such impacts, rehabilitation, and treatment of contaminated soil is evaluated to be reversible in less than 1 year period.
		Score	Project Site	Very long	High	NA	Likely	Short/Mid-term
		Value	1	5	4	-	3	2
	Impact Magnitude (G+D+I+F (or L)) x R		**26**					

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						
			Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)
Impacts on sediments	Negative Direct	Definition	Potential sediment contamination impacts during the construction of the Associated Facility (i.e., Jetty) are evaluated to be on the local scale considering the contaminant dispersion potential in the marine environment	Unless proper mitigation measures are taken contamination and combined impacts may continue for very long-term depending on the nature of the potential pollutants (e.g., fuels, mineral oils, and other chemicals)	Potential contamination of sediment is expected to create contaminant concentrations above the national legislative limit values some impairments might be expected regarding environmental elements	-	In the case of poor management, handling and storage of chemicals, construction material and/or fuel accidental releases are considered to be likely.	Potential impacts will be evaluated to be reversible in the short- to mid-term with treatment and rehabilitation activities
		Score	Local	Very long	High	NA	Likely	Short/Mid-term
		Value	2	5	4	-	3	2
	Impact Magnitude (G+D+I+F (or L)) x R		**28**					

Table 6-9. Receptor Sensitivity

Potential Receptor	Sensitivity		
	Sensitivity Score	Description of the Sensitivity	Sensitivity Value
Vulnerability related to seismic risk	Medium	The Project site has no sensitivity regarding potential risks combined with disasters other than earthquake risk, such as rockfalls, landslides, liquefaction, flood, tsunami. According to the Earthquake Hazard Map of Turkey, the Project site has a PGA value of 0.303 g (10% exceedance probability in 50 years period, i.e., 475 years recurrence period). According to the correlation of the PGA with the Mercalli scale for the classification of the intensity of the potential earthquakes regarding the perceived intensity the PGA value of 0.303 g corresponds to earthquakes with potential moderate to heavy damage on structures with very strong to severe perceived shaking.	**3**
Soils	Low	The land in the Project site is mainly composed of very compact soil/clay or soft rock which represents low permeability. Therefore, the vulnerability of soil matrix can be taken as low.	**1**
Sediments	Medium	The sediment quality at the Project site is classified as good relying on the sediment analysis indicating concentrations below the limit values set in Annex-1 of Regulation on Environmental Management of Dredging Materials for potential contaminants. The vulnerability of the sediment matrix can be taken as medium.	**3**

Table 6-10. Impact Significances for Construction Phase

Potentail Impact	Impact Magnitude	Sensitivity	Impact Significance		
			Value	Score	Description
Impacts related to seismic risk	9	3	**27**	**Low**	Potential risks combined with earthquake hazard during construction significance is low and will be reversible in a short period of time considering the functionality of the Project elements.
Impacts on soils	26	1	**26**	**Low**	Unless proper mitigation measures are taken, and good practice means are followed during construction, potential impacts on soil will be noticeable. However, due to relatively low permeability of the soil at the Project site and likely limited scale of potential releases during construction, the significance of the impact is evaluated to be low.
Impacts on sediments	28	3	**84**	**Medium**	Impact can be minimized to a level that is ALARP by proper measures and management during the construction activities in the Project site and Associated Facility's area. Strict mitigation measures should be taken to prevent any spills and accidents during the construction phase of the Associated Facility.

6.4.3 Assessment of the Impacts during Operation

Impacts Related to Seismic Risk:

Project's operation phase is planned to continue near 50 years period. Hence, considering the seismic hazard in the region (i.e., PGA value of 0.303 g with 10% exceedance probability in 50 years period, 475 years recurrence period) for the operation phase seismic risk is considered to be significantly higher than the construction phase. According to the Earthquake Hazard Map of Turkey, the Project site has a PGA value of 0.303 g, and it lies close to areas classified as low to medium hazard area. Impacts on the integrity of structures and functionality of the Project (e.g., collapse of the buildings/structures) from earthquake loads might occur following an earthquake event of large magnitude if the designs did not consider the potential earthquake loads. This might result in a large impact magnitude on the environment as well as on the community and workers' health and safety due to any accident, spill, fire, etc. related to the seismic incident that might occur during operation. As such the resulting impact significance is estimated to be from moderate to major.

Impacts on Soil:

During operation, soil may be contaminated from spills of hazardous materials, poor management of hazardous wastes generated at the site and leakage from underground pipes used for chemical / raw material / product flows or wastewater discharges as well as leakage from the storage tanks. The resulting impact magnitude can be small to large depending on the magnitude and duration of the adverse events. The Project site mainly comprises low permeability soil that is classified as compact soil/clay unit or soft rock. Hence, the vulnerability of soil matrix can be taken as low. Depending on those conditions, the significance of the impacts during operation is classified to vary between low to moderate.

Stringent impact mitigation measures need to be taken to prevent any potential adverse impacts that may arise due to Project activities. The Project will therefore be designed by taking necessary mitigation measures into consideration (e.g., use of impermeable ground cover, secondary containment where necessary) to minimise the risk of spills of hazardous materials and wastewater.

Impacts on Sediment:

The Project's Associated Facility Jetty site will be constructed and operated by the CPIR Port Project Company. The Jetty will be used for material delivery to the Project during the Project's operation phase. Operation activities at the Jetty site, if not effectively managed, may lead to impacts on sediment quality due to unexpected adverse events such as accidental spills of hazardous materials such as oils, fuel, or similar. The magnitude of these impacts can vary between small to large depending on the magnitude and duration of the events.

During the operation of this associated facility, it is expected that CIPR Port Company will take all necessary precautions and mitigation measures such that spills and potential impacts to marine environment and sediment are avoided.

Table 6-11 shows the summary of the respective impact magnitudes during operation phase of Project and its Associated Facilities.

Table 6-11. Operation Phase Impact Magnitudes

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						
			Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)
Impacts related to seismic risk	Negative Direct	Definition	Seismic risks during the Project operation are evaluated to be on a regional scale considering potential combined incidents such as accidents, spills, fire, etc. related to the seismic incident along with the damage to the Project structures.	The duration of potential impacts is expected to be medium.	In the case of an earthquake of PGA over 0.3g, moderate impacts are expected on the integrity of structures and functionality of the Project works and associated facilities, unless proper measures are taken. Hence, unless the Project and associated Jetty Facility structures are designed and constructed according to the relevant Earthquake codes and standards significant impairment of Project operation, environment and social elements are expected.	-	The operation phase is planned to continue for 49 years period. Hence, an earthquake with moderate damage potential is likely to occur during operation.	An earthquake disaster with moderate impact during the operation phase is considered to have potential impacts that can be restored within one year after the incident through restoration.
		Score	Regional	Medium	High	NA	Likely	Short/Mid-term
		Value	3	3	4	-	3	2
	Impact Magnitude (G+D+I+F (or L)) x R		**26**					

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						
			Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)
Impacts on soils	Negative Direct	Definition	Potential contamination due to accidental spills of oil, fuel, or chemicals or due to poor material management and handling (i.e., poor storage or handling of chemicals) might create a local impact on the soil considering potential contaminant transfer means (e.g., sediment transport or transport of contaminants through groundwater or surface water) to be in the direction of south-east towards the Iskenderun Bay.	Unless proper mitigation measures are taken, contamination and combined impacts may continue for very long-term depending on the nature of the potential pollutants (e.g., fuels, mineral oils, and other chemicals)	Potential contamination of the soil is expected to create contaminant concentrations above the national legislative limit values and some impairments might be expected regarding environmental elements	-	In the case of poor management, handling and storage of chemicals, construction material and/or fuel, impact on soil is considered to be likely.	Potential accidents and related soil contamination at the site may create downstream impacts. The combined impacts are expected to be rehabilitated and/or restored in over 1 year period.
		Score	Local	Very long	High	NA	Likely	Mid-term
		Value	2	5	4	-	3	3
	Impact Magnitude (G+D+I+F (or L)) x R		**42**					

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						
			Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)
Impacts on sediments	Negative Direct	Definition	Potential sediment contamination impacts during the operation of the Associated Facility (i.e., Jetty) are evaluated to be on a regional scale considering the contaminant dispersion potential in the marine environment	Unless proper mitigation measures are taken contamination and combined impacts may continue for very long-term depending on the nature of the potential pollutants (e.g., fuels, mineral oils and other chemicals)	Potential contamination of the sediment is expected to create contaminant concentrations above the national legislative limit values and some impairments might be expected regarding the environmental and social elements	-	In the case of poor management, handling and storage of chemicals, and/or fuel, accidental releases are considered to be likely.	Potential impacts are expected to be reversible with rehabilitation and/or restoration activities in over one year period.
		Score	Regional	Very long	High	NA	Likely	Mid-term
		Value	3	5	4	-	3	3
	Impact Magnitude (G+D+I+F (or L)) x R		**45**					

Based on the Impact Magnitudes assessed for the Project's operation phase and the Sensitivities/Vulnerabilities of receptors and Project environment, Impact Significances for the Project's operation phase are assessed in Table 6-12.

Table 6-12. Impact Significances for Operation Phase

Potentail Impact	Impact Magnitude	Sensitivity	Impact Significance		
			Value	Score	Description
Impacts related to seismic risk	26	3	**78**	**Medium**	Unless proper measures are taken potential risks combined with earthquake hazard during operation is expected to be medium with some potential impairments in Project functionality along with environmental and social elements. However, such impacts can be minimized by using precautionary measures and following adequate design and construction standards against earthquake risks.
Impacts on soils	42	1	**42**	**Low**	Unless proper mitigation measures are taken, and good practice means are followed during construction potential impacts on soil will be noticeable. However, due to relatively low permeability of the soil at the Project site and likely limited scale of potential releases during construction the significance of the impact is evaluated to be low.
Impacts on sediments	45	3	**135**	**Medium**	Impact can be minimized to a level that is ALARP by proper measures and management during the operational activities in the Project site and Associated Facility's area. Furthermore, strict mitigation measures are expected to be taken by the CPIR Company to prevent any spills and accidents during the operation of the Associated Jetty Facility.

6.5 Mitigation Measures

Mitigation measures to avoid and/or mitigate the potential impacts and risks regarding site stability and earthquake hazard are listed below:

- The Project will be designed, constructed and operated in accordance with the Turkish regulations and standards for protection against seismic activity. For the design and construction all technically and financially feasible best practices will be followed to minimise relevant risks;
- Building Earthquake Regulation of Turkey (O.G. date/no: 18.03.2018/30364) will be complied with during construction of all structures in the Project site and Mobilisation Area (Associated Facility). The design and construction of the Associated Jetty

Facility that will be constructed and operated by the CPIR Company are expected to be done in accordance with the provisions of Technical Earthquake Regulation on Construction of Coastal and Marine Structures, Railways, Airports (O.G. date/no: 18.08.2007/26617);

- Engineering measures (e.g., use of adequate cut and fill slope designs with consideration of shrink-swell factors for excavated materials, design of the cut and fill surfaces to ensure appropriate surface/subsurface drainage, measures against erosion and sliding risks such as the use of riprap or special slope treatment, use rockfall catch ditch, wire mesh slope protection, shotcrete, rock bolts for rock slopes, etc.) shall be taken concerning the potential stability problems and the stability of slopes of deep excavations, if any, shall be supported by the use of supporting structures such as retaining walls;
- Construction and decommissioning (Mobilization Area, Topsoil and Excavated Material Deposition Areas) works shall be conducted in line with the IFC's General EHS Guideline 4.0 Construction and Decommissioning regarding the measures on structural (slope) stability issues as well as the environmental and health and safety measures;
- In line with the IFC's General EHS Guideline 3.0 Community Health and Safety hazardous material inventories on site will be reduced through inventory management in order to reduce or eliminate the potential off-site consequences of releases during an earthquake or other emergency incidents;

Specific measures for the protection of soil during the construction and operation phases will include the following:

- In the construction stage, before the start of the excavation and construction activities, soil stripping will be undertaken to remove the surface soil or topsoil (vegetation, fertile soil layer) and subsoil. During soil stripping, necessary precautions will be taken to keep them separately intact. Top and subsoil will be deposited separately, and long-term erosion and sedimentation will be prevented through rehabilitation/planting;
- Topsoil and land stripped and excavated from the Project site during Early Site Works and construction phase of the Project will be temporarily stored in the temporary Topsoil and Excavated Land Deposition areas, where unnecessary Project traffic and handling, or deposition of any contaminants such as oils, chemicals, wastes will be prevented. The temporary Topsoil and Excavated Land Deposition areas will be located within the CPIR premises as described in Chapter 2;
- All contractors will be required to adopt good construction practices at the site for the protection of soils and follow International Finance Corporation (IFC) General Environmental, Health and Safety (EHS) Guidelines;

- Mitigation measures will be taken (e.g., use of silt fences) to protect newly exposed soil surfaces from rain and wind erosion;
- Proper drainage systems shall be created which will remove the underground-, surface- and wastewater from the site.
- Effective management of soil and soil stockpiles is of utmost importance to reduce sediment transport from the site. Soil stripping (of topsoil and subsoil) before the start of the excavation suitable equipment will be used. Stockpiles will be protected from erosion and contamination impacts. Slopes formed during construction (excavation, fill and stockpile slopes) will be provided with proper drainage so as to prevent sediment transport and collect stormwater. Erosion and sedimentation must be reduced to a great extent by the plantation of the slopes of excavation and fillings. Rehabilitation/planting after the completion of the construction activities will be done to prevent long-term erosion and sediment transport. Re-planting activities will also contribute to the rehabilitation of the natural balance around the Terrestrial Section and soil rehabilitation at a significant level.
- Contaminated soils (if generated any) will be disposed of in an appropriately licensed disposal site;
- Regarding the prevention, impact minimisation and response to contaminated land the requirements by IFC's General EHS Guideline 1.8 Contaminated Land will be followed;
- In line with the preferred strategy of the reduction of the contamination level (EHS Guideline 1.8 Contaminated Land), the storage of chemicals, hazardous materials, and other potential contaminants will be kept at a minimum as practically feasible for construction and operation works;
- The use of cement and wet concrete in or close to any exposed soil surfaces will be carefully managed;
- Hazardous and non-hazardous materials and waste will be handled according to the Environmental and Social Management System to be prepared by Ceyhan PP A.Ş. and where needed, further site-specific management plans will be developed (e.g., Hazardous Material Management Plan). Details of waste generation and management methods are provided in *Chapter 8: Material Resources and Waste Management*;
- Regarding the management of the hazardous material the requirements by IFC's General EHS Guideline 1.5 Hazardous Material Management will be followed;
- Drummed hazardous materials with a total volume equal to or greater than 1,000 L will be stored on areas with an impervious floor. The floor of the storage area should be designed with a slope to enable proper drainage and with a spill, leak collection

system capacity to contain a minimum of 25 % of the total storage volume. Drip trays will be used for fuelling areas for mobile equipment;

- Appropriate secondary containment structures consisting of berms, dikes, or walls capable of containing at least 110% of the largest tank or 25% of the combined tank volumes will be provided at tank farms with above-ground tanks of total volume equal or greater than 1,000 litres. Secondary containment will be made of impervious, chemically resistant material;
- Any spillage from handling fuel and liquids will be immediately contained on site and the contaminated soil will be removed from the site for suitable treatment and disposal;
- Tank contents, and visible portions of tanks and piping shall be periodically inspected for leaks;
- For underground storage tanks and underground piping double-walled, composite, or specially coated storage and piping systems shall be used. For double-walled systems a leak detection system should be installed between two walls;
- Secondary containment, drip trays or other overflow and drip containment measures shall be provided for hazardous material containers at connection points or other possible overflow points;
- A Spill Response Plan as a part of Construction Emergency Preparedness and Response Plan should be prepared which include;
  - The locations of spill response equipment and procedures to be used and ensure that procedures are clear and concise;
  - Step-by-step instructions for the response to spills at a facility;
  - Individuals responsible for implementing the plan;
  - Safety measures to be taken with each kind of waste;
  - How to notify appropriate authorities, such as police and fire departments, hospitals, or municipal sewage treatment facilities for assistance;
  - Procedures for containing, diverting, isolating, and cleaning up the spill;
  - Spill response equipment to be used, including safety and clean-up equipment;
- The spill response plan should be announced to all employees. EHS should offer training for employees who work directly with chemicals;
- An Operation Emergency Preparedness and Response Plan should be prepared which include;
  - Risk Assessment: A thorough risk assessment should be conducted to identify potential hazards and risks associated with the polypropylene facility's operations.

This includes natural disasters, equipment failure, hazardous material spills, and other emergencies that may arise;

- Emergency Procedures: The emergency procedures should be well-defined and documented in the plan, including evacuation procedures, first aid procedures, fire safety procedures, and procedures for dealing with hazardous material spills;
- Equipment and Supplies: The emergency preparedness and response plan should include a list of essential equipment and supplies needed during an emergency, including personal protective equipment, spill control equipment, emergency communication devices, and first aid supplies;
- Hazardous Materials Management: The plan should include a comprehensive hazardous materials management program that identifies hazardous materials in use, storage, and transportation, their properties and risks, and the measures to control and respond to potential hazardous material releases;
- Contingency Planning: A contingency plan should be developed to deal with potential emergencies that cannot be prevented, including the identification of alternative suppliers, production process, and transport options in case of critical equipment failures or facility shutdowns.

- All necessary overflow protection measures shall be taken;
- Spoil and other surplus excavation material from the site which is classed as “acceptable fill” shall, wherever practicable, be recovered and used in the construction works. Relevant authorities shall be consulted regarding this on a site by site basis to ensure the re-use of waste materials is acceptable;
- Surplus excavation material will be made available to third parties for reuse on local development projects if it cannot be utilized on site;
- Operation of a closed drainage system and implementation of Construction Emergency Preparedness and Response Plan in the event of spills, fire etc. will prevent significant impacts on soil; and
- Audits and inspection programs to maintain the mechanical integrity and operability of pressure vessels, tanks, piping systems, relief and vent valve systems, containment infrastructure, emergency shutdown systems, controls and pumps, and associated process equipment shall be implemented.

6.6 Residual Impacts

With the implementation of above-mentioned mitigation measures and use of good site practices, the magnitudes and significances of the residual impacts can be estimated to be negligible. The assessment of the magnitudes and significances of the residual impacts after mitigation measures are shown in Table 6-13 and Table 6-14, respectively.

Table 6-13. Residual Impact Magnitudes for Construction and Operation Phases

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						
			Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)
Impacts related to seismic risk	Negative Direct	Definition	Potential seismic risks during the Project construction and operation are evaluated to be limited to the Project site with the assumption of necessary precautions against emergency conditions are taken	With the proper mitigation measures, impact duration will be short	By ensuring proper design and construction of the Project structures as well as efficient precautions against emergency conditions and occupational health and safety practices no significant impacts are expected on the integrity of structures and functionality of the Project works and associated facilities	-	On the condition that adequate precautionary and mitigation measures are taken, and considering the probability of a high-intensity earthquake, the likelihood of the damage to Project structures and the loss of functionality is evaluated as unlikely	Potential impacts that might be experienced from an earthquake will be easily reversible relying on that the impacts will be minimized through adequate measures.
		Score	Project Site	Very short	Low	NA	Unlikely	Short-term
		Value	1	1	2	-	1	1
	Impact Magnitude (G+D+I+F (or L)) x R		**5**					

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						
			Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)
Impacts on soils	Negative Direct	Definition	On the condition that proper material and waste handling and management means in compliance with the best management practices and IFC's EHS guidelines are followed on site, potential soil contamination due to accidental spills or leaks will be on a limited scale and the impact area will be limited to the Project site and/or its Associated Facilities	With proper mitigation measures, contamination and combined impacts will be minimized. Additionally, within the scope of the mitigation measures use of emergency action equipment (spill kits, etc.) and proper treatment, rehabilitation of contaminated soil will prevent any long-term impacts	Mitigation measures including remedial measures such as removal, treatment/rehabilitation, or disposal of contaminated soil will minimize the impact intensity to negligible	-	With the use of pre-emptive measures against accidental incidents, proper management of chemicals, and fast response to incidents with remedial actions will decrease the likelihood of the impacts to unlikely	Impacts minimised by the mitigation measures will be reversible within a short term
		Score	Project Site	Very short	Negligible	NA	Unlikely	Short-term
		Value	1	1	1	-	1	1
	Impact Magnitude (G+D+I+F (or L)) x R		**4**					

Potential Impact	Impact Type	Nature of Impacts (Magnitude designations)						
			Geographical Extent (G)	Duration (D)	Intensity (I)	Frequency (F)	Likelihood (L)	Reversibility (R)
Impacts on sediments	Negative Direct	Definition	On the condition that precautionary measures are taken, and best management practices are followed potential sediment contamination impacts during the operation of the Associated Jetty Facility will be basically limited to the Jetty site. However, considering the contaminant dispersion potential in the marine environment the impact may still extend to local scale	With proper use of precautionary measures and by following the best management practices contamination and combined impacts will be minimized. Additionally, within the scope of the mitigation measures use of emergency action equipment (spill kits, skimmers, containment booms, etc.) long-term impacts will be prevented	Mitigation measures and use of best management practices will minimize the impact intensity to negligible	-	With the use of pre-emptive measures against accidental incidents, proper management of chemicals and wastes during operation of the Associated Jetty Facility and fast response to incidents with remedial actions will decrease the likelihood of the impacts to unlikely	Impacts minimised by the mitigation measures will be reversible within a short term
		Score	Local	Very short	Negligible	NA	Unlikely	Short-term
		Value	2	1	1	-	1	1
	Impact Magnitude (G+D+I+F (or L)) x R		**5**					

Table 6-14. Residual Impact Significances for Construction and Operation Phases

Potentail Impact	Impact Magnitude	Sensitivity	Impact Significance		
			Value	Score	Description
Impacts related to seismic risk	5	3	**15**	**Negligible**	After the mitigation measures the impact is expected to be significantly low and recoverable within a very short time scale.
Impacts on soils	4	1	**4**	**Negligible**	After the mitigation measures the impact is expected to be indistinguishable from natural background variations and recoverable within a very short time scale.
Impacts on sediments	5	3	**15**	**Negligible**	After the mitigation measures the impact is expected to be indistinguishable from natural background variations and recoverable within a very short time scale.

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

(CHAPTER-7)

FEBRUARY 2023

ANKARA

CEYHAN PROPANE DEHYDROGENATION - POLYPROPYLENE PRODUCTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

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Draft	A.0	March 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya(2U1K)	Simon Taylor (RINA)	Elif Doğru (RINA)
	A.1	April 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Simon Taylor (RINA)	Elif Doğru (RINA)
	A.2	October 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Simon Taylor (RINA)	Elif Doğru (RINA)
	A.3	December 2021	Tilbe Nazlı (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	Buket Mesta (2U1K)	-
	A4	August 2022	Buket Mesta (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (2U1K)	-	Ilya Gulakov (RINA)
	A.5	October 2022	Buket Mesta (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (*2U1K*)	-	Ilya Gulakov (RINA)
Final Draft	B.0	February 2023	Leyla Demirçin (2U1K)	Esra Okumuşoğlu (2U1K)	D. Emre Kaya (*2U1K*)	Simon Taylor (RINA)	Ilya Gulakov (RINA)

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CLIENT:

Ceyhan Polipropilen Üretim A.Ş
Portakal Çiçeği Sokak No:33 Yukarı Ayrancı
Çankaya - Ankara / Türkiye
☎: +90 (312) 840 10 00
🖷: +90 (312) 442 58 16

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7 HYDROLOGY AND HYDROGEOLOGY

7.1 Introduction

The potential impacts of the Project and its associated facilities on surface water and groundwater resources are presented in this Chapter. The following issue(s) were identified as part of the assessment process:

- Potential impacts on the quantity and quality of the surface and groundwater resources during site preparation, construction, operation, and decommissioning;
- Potential flooding risk from the dry riverbed near the east end of the Project site (outside the boundaries of the Project site);
- Potential impacts of stormwater from the Project site; and
- Potential impacts on the seawater quality during construction, operation and decommissioning.

This Chapter provides a description of the baseline conditions for the terrestrial and marine environments, followed by an impact assessment and identification of potential mitigation measures. The main information sources used for the baseline study are as follows:

- Literature survey related to surface and groundwater resources and relevant water quality within the study area;
- Adana Environmental Status Report (2018) (published by the Ministry of Environment and Urbanization);
- Geographical Information System (GIS) Database of Ministry of Agriculture and Forestry (MoAF);
- Official website of State Hydraulic Works (DSI) (www.dsi.gov.tr);
- National Basin Management Strategy (2014-2023), DSI;
- Ceyhan Basin Flood Management Plan (February 2018) (Ministry Agriculture and Forestry formerly Ministry of Forestry and Hydraulic Works);
- EIA Reports for the Ceyhan PDH-PP Project (EIA Positive Decision of MoEU December 18th, 2020), and Raw Material Supply, Storage and Port Facility (the CPIR Port) Project (EIA Positive Decision of MoEU on September 1st, 2021) prepared in line with the national EIA requirements.

The baseline study area for hydrology and hydrogeology covers the Project site and the sites of the Project's associated facilities, its immediate vicinity, Yumurtalık Bay, and when necessary, as in the case of surface water courses, up to the Adana Province boundaries to contain the relevant river watershed area.

7.2 Legal Context

7.2.1 National and International Standards

The Project will comply with the following national regulations to mitigate the potential impacts of the Project on surface water and groundwater resources.

- Environmental Law (No: 2872)
  (Official Gazette date/no: 11.08.1983/18132);
- Coastal Law (No. 3621)
  (Official Gazette date/no: 17.4.1990/20495);
- Law on Ports (No: 618)
  (Official Gazette date/no: 20.04.1925/95);
- Decree No. 7/16349 of the Council of Ministers on the Law on Ports
  (Official Gazette date/no: 25.09.1978/16415);
- Coastal Law Implementation Regulation (No. 3621)
  (Official Gazette date/no: 3.8.1990/20594);
- Law on Groundwater (No. 167)
  (Official Gazette date/no: 23.12.1960/10688);
- Law on Aquaculture (No. 1380)
  (Official Gazette date/no: 04.04.1971/13799);
- Regulation on Aquaculture
  (Official Gazette date/no: 10.3.1995/22223);
- Water Pollution Control Regulation
  (Official Gazette date/no: 31.12.2004/25687);
- Regulation on Protection of Groundwater against Pollution and Deterioration
  (Official Gazette date/no: 07.04.2012/28257);
- Regulation on Control of Pollution Caused by Hazardous Substances in Aquatic Environment
  (Official Gazette date/no: 26.11.2005/26005);
- Regulation on Surface Water Quality
  (Official Gazette date/no: 30.11.2012/28483);
- Regulation on Management of Quality of Bathing Waters
  (Official Gazette date/no: 25.09.2019/30899);
- Regulation Concerning Water Intended for Human Consumption
  (Official Gazette date/no:17.02.2005/25730);
- Communique on Administrative Procedures Regarding Water Pollution
  (Official Gazette date/no: 10.10.2009/27372);
- Circular on Riverbeds and Floods (Circular No. 2006/27)
  (Official Gazette date/no: 09.09.2006/26284);
- Regulation on Sea and Inland Waters Hydrographic Survey
  (Official Gazette date/no: 09.08.2016/29796);

- Insurance Tariff and Instruction on Obligatory Financial Liability for Sea Pollution of Coastal Facilities (Official Gazette date/no: 25.04.2018/30402).

As Turkey is a candidate for accession to the European Union (EU), the following key legislation in the European Union and International Reference Documents are also considered to be relevant:

- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Official Journal/Date: L327/22.12.2000; Entry into force: 22.12.2000; last amended on 20.11.2014);
- Council Directive 91/271/EEC of 21 May 1991 concerning urban wastewater treatment (Official Journal/Date: L135/30.05.1991; Entry into force: 19.06.1991; last amended on 01.01.2014);
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December of 2006 on the protection of groundwater against pollution and deterioration (Official Journal/Date: L372/19 27.12.2006; last amended on 11.07.2014).

In addition to the EU Directives, the following European Bank for Reconstruction and Development (EBRD) and International Finance Corporation (IFC) Guidelines will also be followed:

- IFC EHS General Guidelines;
- IFC EHS Guidelines for Large Volume Petroleum-based Organic Chemicals Manufacturing;
- IFC EHS Guidelines for Petroleum-based Polymers Manufacturing;
- EBRD Sub-sectoral Environmental and Social Guidelines for Manufacture of Chemicals and Manufacture of Plastics and Synthetics.

The Turkish regulatory framework requirements and the conditions set in the Equator Principles, IFC, and EBRD guidance documents provide inherent mitigation measures against the impacts. These conditions were reviewed and discussed in Section 7.7.

7.3 Baseline Environmental Conditions: Project Site and Associated Facilities on Land

7.3.1 Surface Water Resources

Watershed Characteristics

Adana Province is within the jurisdiction of the 6th Regional Directorate of DSI which is in charge of the state waterworks in the area covering the Adana, Mersin, Hatay, and Osmaniye provinces. The lands of Adana Province contain a major portion of the Seyhan basin and relatively smaller parts of the Ceyhan and Asi basins among the major river basins (Figure 7-1) of Turkey. The Ceyhan and Yumurtalık districts of Adana are mainly (96% of Ceyhan, and 96% of Yumurtalık districts) located within the Ceyhan basin with the remaining surface area within the Asi basin. The Project site is within the boundaries of the Ceyhan basin.

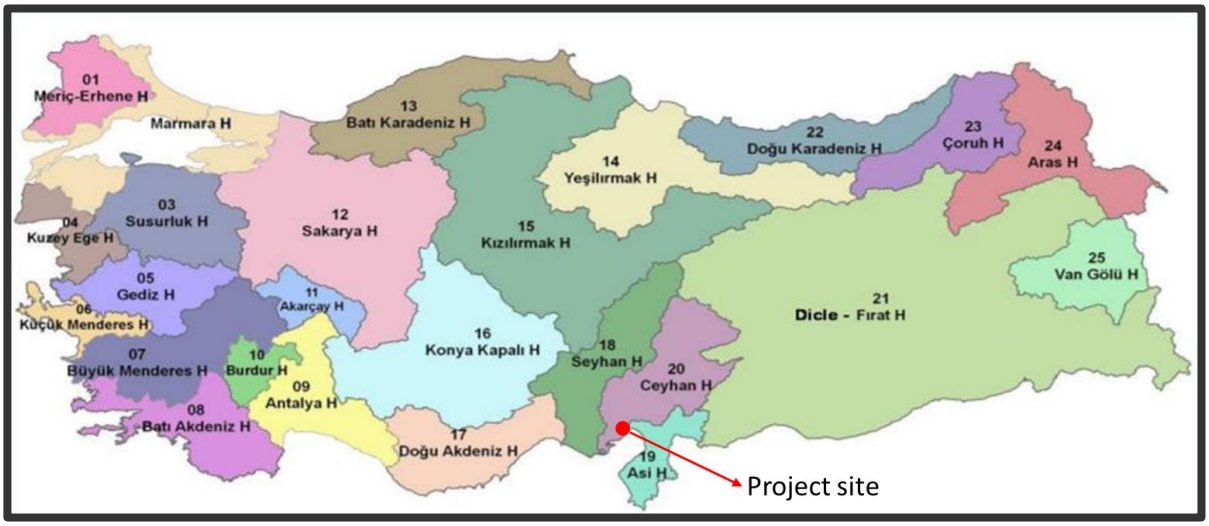

Figure 7-1. Basins in Turkey (Source: DSI, National Basin Management Strategy (2014-2023))

The Ceyhan basin has a catchment area of about 26,875 km^2 (see. Figure 7-2). Ceyhan basin stretching from İskenderun Bay until within Central Anatolia, includes mountains and wide alluvial bases. Ceyhan, Yumurtalık, Yüreğir, Feke, İmamoğlu, Karataş, Sarıçam and Kozan district of Adana are within the borders of the Ceyhan basin. Ceyhan basin also includes Kayseri, Osmaniye, Sivas, Adıyaman, Gaziantep, Malatya, Adana, Hatay, Kahramanmaraş provinces. The total length of the Ceyhan River is 425 km and annual flowrate is 82.9 m^3/s. The Ceyhan basin neighbours the Seyhan basin to the west, Fırat basin to the north-east and Asi basin to the south. The Kösürük and Kartal mountain ranges extend between Ceyhan and Asi basins[1] (MoFHW, 2018). Ceyhan Basin is divided into three subbasins. Three subbasins are Upper Ceyhan basin, Middle Ceyhan basin and finally Lower Ceyhan basin with 8.441 km^2

[1] Ministry of Forestry and Hydraulic Works (MoFHW), General Directorate of Water Management, 2018. Ceyhan Basin Flood Management Plan, 2018.

https://www.tarimorman.gov.tr/SYGM/Belgeler/Ta%C5%9Fk%C4%B1n%20Y%C3%B6netim%20Planlar%C4%B1/3)%20CEYHAN%20%20HAVZASI%20TA%C5%9EKIN%20YONETIM%20PLANI.pdf

catchment area that also contains part of the Ceyhan PDH-PP Project site. Lower Ceyhan basin contributes to half of the total flow of Ceyhan basin[2] (MoAF, 2019).

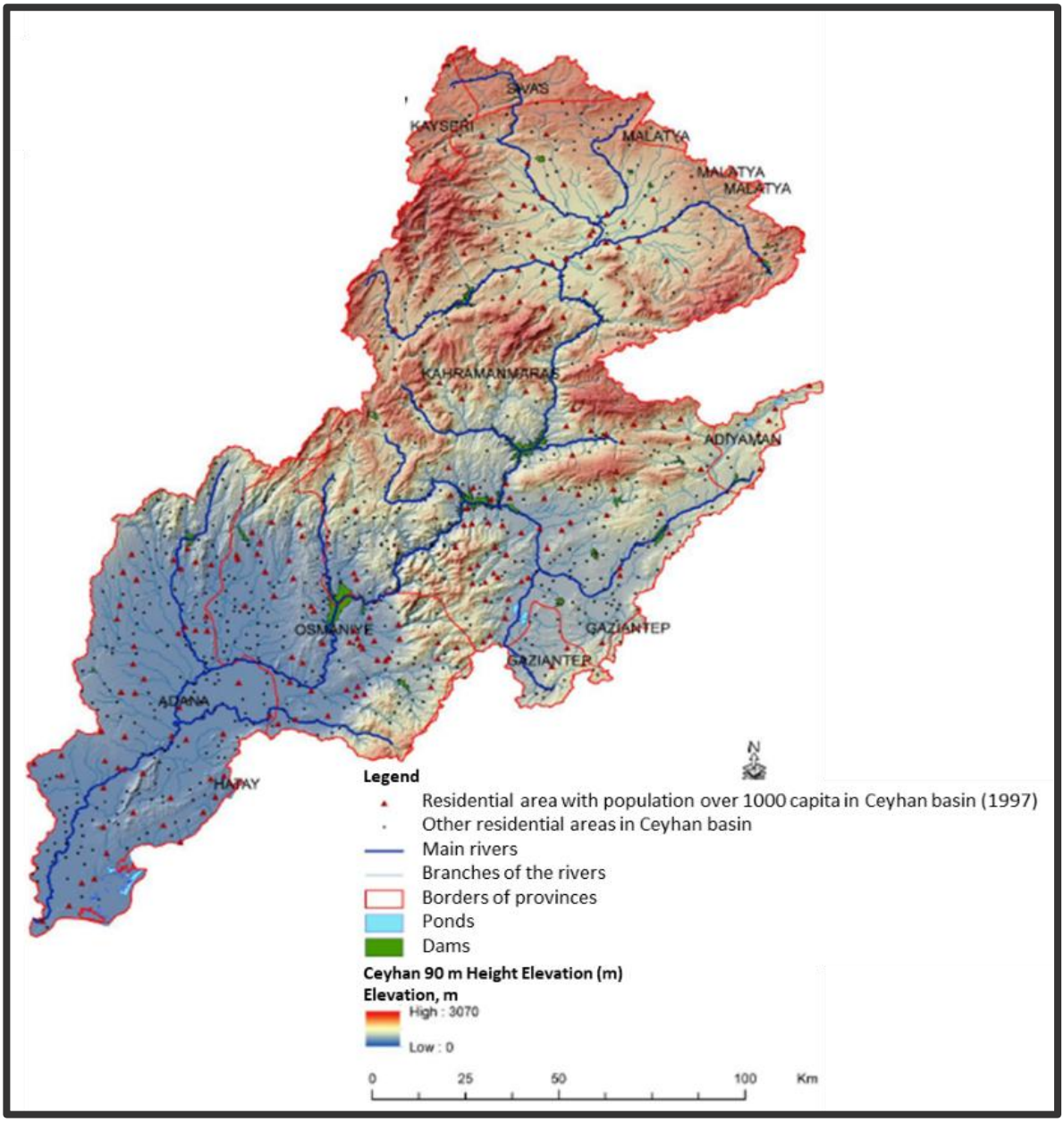

Figure 7-2. Map of the Ceyhan basin showing provinces, rivers, ponds and dams within the basin (MoFHW, 2018)

[2] Ministry of Agriculture and Forestry (MoAF), General Directorate of Water Management, 2019. Ceyhan Basin Drought Management Report, Ankara.
https://www.tarimorman.gov.tr/SYGM/Belgeler/Kurakl%C4%B1k%20Y%C3%B6netim%20Planlar%C4%B1/Ceyhan%20Havzas%C4%B1%20Kurakl%C4%B1k%20Y%C3%B6netim%20Plan%C4%B1%20Cilt%201.pdf

The major water courses in Adana are Seyhan River, Ceyhan River, Çakıt river, Eğlence creek, Körkün stream, and Üçürge creek (see. Table 7-1).

Table 7-1. Major streams in the Adana province and their characteristics

Stream	Total length (km)	Flow Length in Adana province (km)	Flowrate (m^3/s)
Seyhan River	560	300	190
Ceyhan River	500	115	195
Çakıt river	162	112	12.8
Eğlence creek	87	87	8.8
Körkün creek	157	80	13.4
Üçürge creek	60	60	0.7

Source: Adana Environmental Status Report (2018)

According to the map retrieved from the GIS database of MoAF, there are several creeks around the Project site as shown in Figure 7-3. None of these creeks flow within or in the close vicinity of the Project site. The closest surface water to the Project site is Boz creek passing 120 m to the west-southwest of the site crossing İncirli locality. Boz creek is an ephemeral stream. On the other hand, the Project site contains a few dry streamlines. Additionally, the official letter of the Directorate of Strategy Development of MoAF (former Ministry of Forestry and Hydraulic Works) dated 25.08.2017 related to the zoning works of the Ceyhan Energy Specialized Industrial Zone also states that coastal water body, a creek passing through and signs of a number of dry riverbeds are identified within the CPIR boundaries.

According to the Adana Ceyhan Energy Specialized Industrial Zone 1/1,000 scaled Implementation Zoning Plan (as provided in Annex E-II), and as observed in satellite images of the Project site, a riverbed is crossing along the northeast boundary of the Project site (see. Figure 7-3). As stated in the Investigation and Explanation Report of the zoning plan, all activities other than maintaining the canal structure or road maintenance, are prohibited on the indicated riverbed. It is also stated in the plan notes of the 1/1000 scaled Implementation Zoning Plan that the provisions stated in the official correspondence from DSI (dated/numbered: 25.10.2017/73270) shall be followed (the official letter was obtained for CPIR and within the scope of the 1/5000 scaled zoning plan and 1/1000 scaled implementation zoning plan). Any structural development along the canal structure for dry riverbed rehabilitation, that has been indicated in the 1/1000 scaled Implementation Zoning Plan, is prohibited. Figure 7-3 shows the locations of the streams and creeks in the proximity of the Project site. The dry riverbed along the northeast boundary of the Project site is illustrated in Figure 7-4.

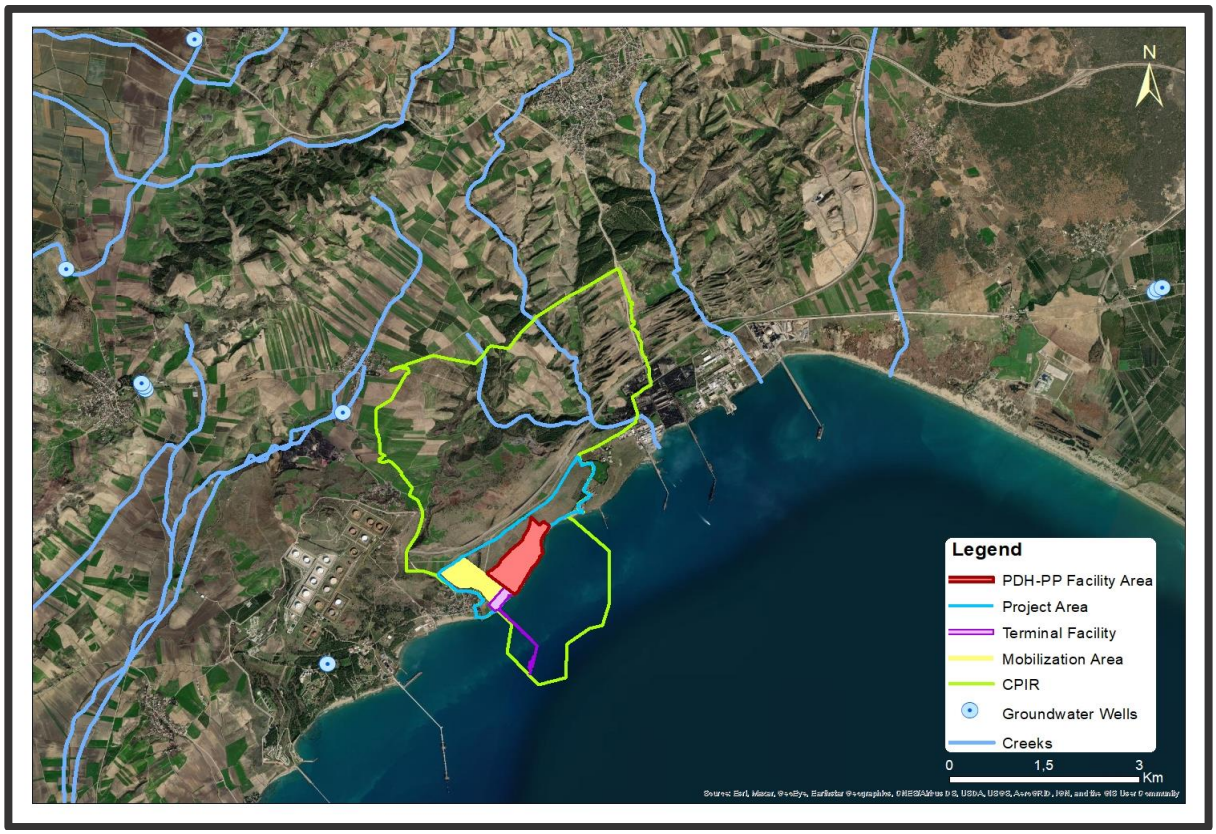

Figure 7-3. Creeks and groundwater wells within and in the proximity of the Project site (Source: GIS Database of MoAF, http://geodata.ormansu.gov.tr/)

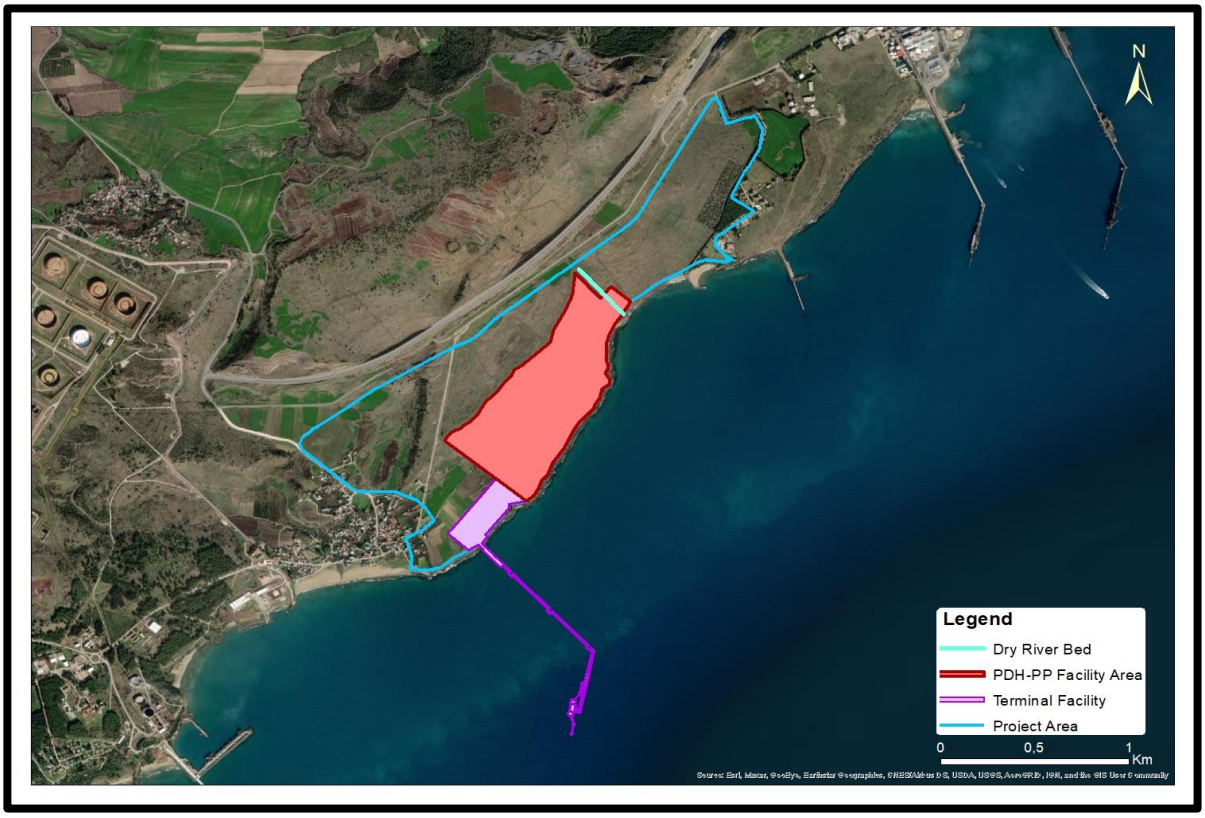

Figure 7-4. Dry riverbed along the northeastern boundary of the Project site

The national EIA procedure for the "Raw Material Supply, Storage and Port Facility Project (CPIR Port)" included the Jetty site which is a part of the associated Terminal Facility of the Project. The relevant EIA procedure was completed with the EIA Positive Decision of the MoEUCC on September 1st, 2021. The EIA process included official consultation with the local and national authorities including the General Directorate of State Hydraulic Works (DSI) regarding their comments and remarks on the CPIR Project site environment and related environmental assessment. In their official correspondence in response to the official consultation within the scope of the EIA procedure, DSI (Department of Investigation, Planning, and Allocation) raised the following issues to be taken into consideration for the EIA and planning of the CPIR Project.

- A seasonal (dry) riverbed is identified in the land section of the CPIR Port Project;
- The provisions of the Water Pollution Control Regulation (Official Gazette (O.G.) date/no: 31.12.2004/25687) and Regulation on the Protection of Drinking and Utility Water Basin (O.G. date/no: 28.10.2017/30224) shall be followed;
- In case of any groundwater use, the groundwater sources in the vicinity of the CPIR Project site as well as their purpose of use shall be assessed. Groundwater flow shall be studied. Hence, potential impacts on aquifers, and groundwater wells at the site shall be assessed and mitigation measures shall be proposed;
- All applicable regulations and laws concerning the protection of groundwater sources should be followed;
- Due to the lithological characteristics and potential groundwater sources of the CPIR Port Project site, necessary mitigation measures shall be undertaken against spills in order to prevent risks related to groundwater contamination;
- Necessary mitigation measures shall be applied concerning the associated regulations and laws concerning waste/wastewater management;
- In the case of the use of any springs in the vicinity of the Project site (if available), necessary mitigation measures shall be taken to protect the quality of the spring water;
- Provisions of the Law on Groundwater (No. 167) (O.G. date/no: 23.12.1960/10688) and the Regulation on Protection of Groundwater against Pollution and Deterioration (O.G. date/no: 07.04.2012/28257) shall be followed;
- Necessary applications concerning permits and opinions shall be made to the relevant authority if wastewater generated from onsite activities is required to be discharged to the receiving environment after treatment;
- Environmental Law (No. 2872) and its governing legislation shall be followed.

Additionally, a number of mitigation measures and precautions against flooding and water use are also provided in the official correspondence. The Project Company of the CPIR Port is obliged to undertake necessary mitigation measures against flooding. If river crossing is planned to be applied on dry or flowing streams within and in the vicinity of the CPIR Port Project site, a study shall be undertaken in line with the provisions of the Regulation concerning Disaster on Engineering Structures along Roadways. The related construction activities should only start when the approval of the 6th Regional Directorate of DSI is granted on the hydraulic structures. The minimum sizing for the culvert design used in the flood control facilities is 2m x 2m. It was also stated that the culverts are prone to clogging due to the dragged materials (tree branches etc.); therefore, all kinds of works shall be made under the supervision of the 6th Regional Directorate of DSI.

The disposal of any kind of waste in riverbeds is prohibited. The existing width of riverbeds shall be preserved, and any kind of construction works are prohibited within 20 m from each side of the riverbed. A study on the rehabilitation of the riverbed shall be undertaken by the CPIR Port Project Company and submitted for approval to the authority. Moreover, provisions of the Circular on Riverbeds and Floods (Circular No. 2006/27) (O.G. date/no: 09.09.2006/26284) shall be followed regarding the rivers within and in the vicinity of the CPIR Port Project.

The CPIR EIA study also included a modelling study for the surface hydrology of the proposed CPIR site for the determination of the runoff drainage lines, development of the stream network, and delineation of the catchment and sub-catchments within and in the immediate vicinity of the site. The hydrological study was conducted by Dolfen Consultancy and Engineering (Dolfen) based on the Digital Elevation Model (DEM) of the region. The drainage lines modelled for the CPIR Project site, and its vicinities are shown in Figure 7-5.

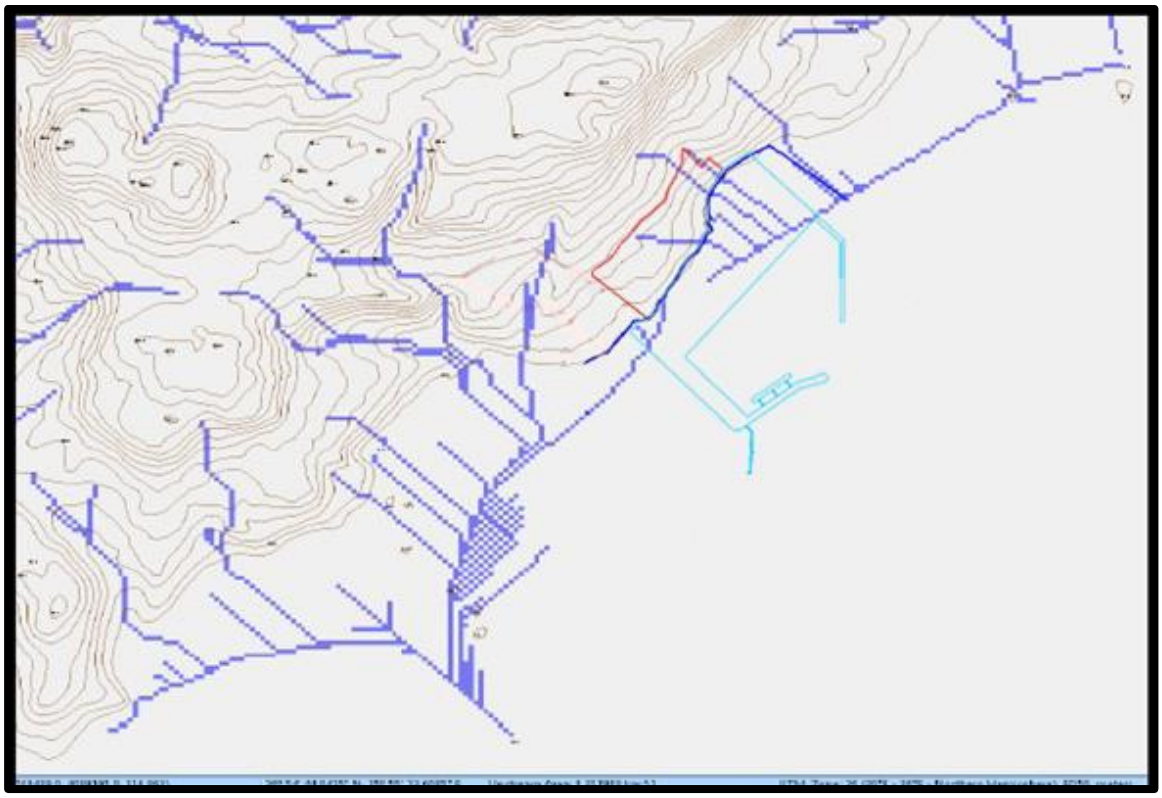

Figure 7-5. Drainage lines modelled for the CPIR project site and its surroundings (including the Ceyhan PDH-PP Project site) (Dolfen, 2021)

Lakes, Dams and Reservoirs

According to the DSI's official website, in Adana province, there are 15 dams and two (2) ponds in operation. The dams and ponds in the region of the Project are illustrated in Figure 7-6 below; the characteristics of the dams are presented in Table 7-2.

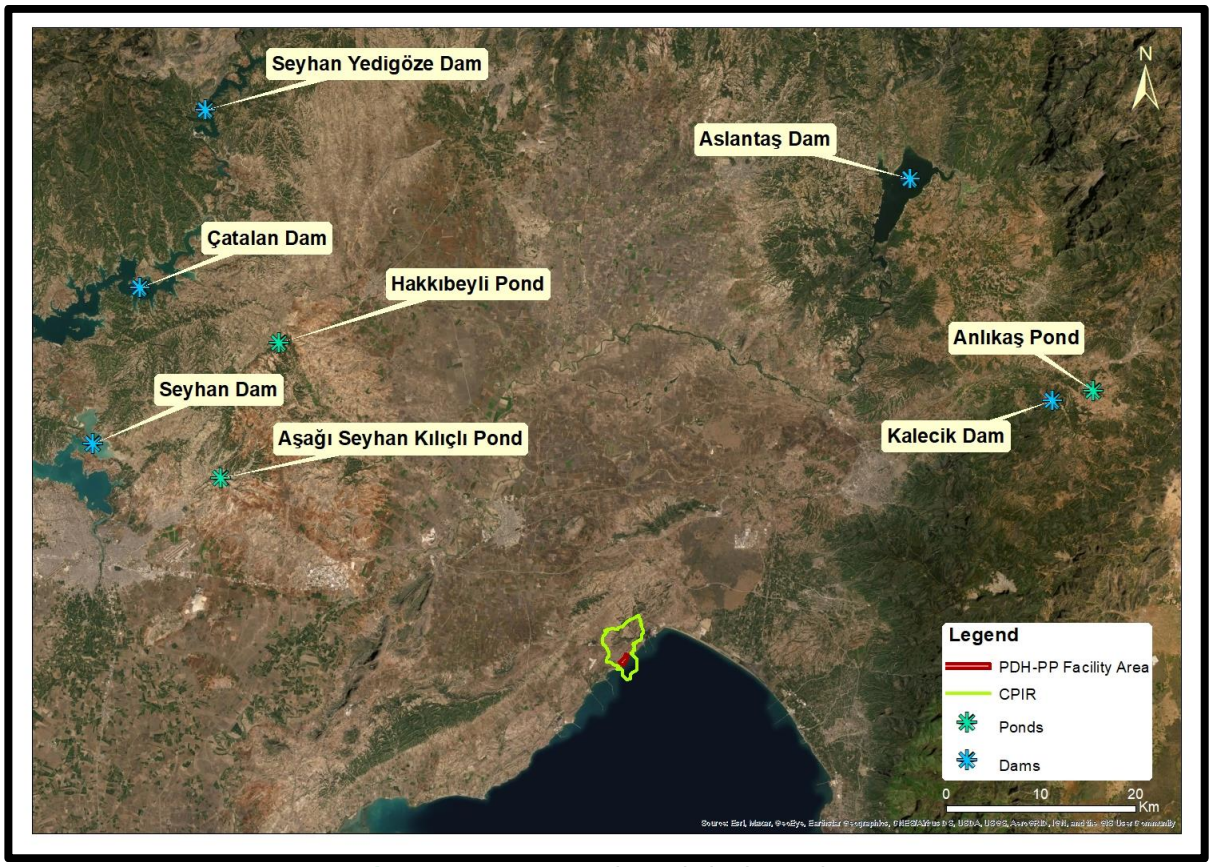

Figure 7-6. Dams and ponds in the region

The Seyhan Dam is located approximately 50 km northwest of the Project site and is used for irrigation and energy production purposes. The Çatalan Dam (~60 km) and Yedigöze Dam (~70 km) are used for irrigation, energy, and drinking purposes and are located to the northwest of the Project site. The Aslantaş Dam (~45 km) and Kalecik Dam (~50 km) are located to the northeast of the Project site. Both of the dams are within the boundaries of Osmaniye province. According to the Adana Environmental Status Report (2018), drinking and utility water requirements of Adana province (98% of the population) are supplied from the Çatalan Dam and the remaining 2% of the drinking and utility water requirements are supplied from groundwater sources (69 groundwater wells) after the disinfection processes. It is anticipated that the Çatalan Dam will be able to meet the drinking water requirements of the Adana province (serving 4 million people and with a capacity of 1 million m^3/day) until 2040.

Table 7-2. Characteristics of dams in the Adana province

Name	Date of Operation	Purpose	Power production capacity MW	Average Energy (GWh/year)	Gross irrigation area (ha)
Seyhan	1956	Irrigation and Energy	60	350	133,400
Çatalan	1996	Irrigation and Energy	168.40	596	56,400
Kozan	1972	Irrigation and Energy	4.68	10	7,430
Nergizlik	1995	Irrigation	-	-	2,326
Sarıçam Hakkıbeyli	1999	Irrigation	0-	-	1091
Yüreğir Kılıçlı	2006	Irrigation	-	-	677
Pozantı Yağlıtaş	2014	Irrigation	-	-	206

Name	Date of Operation	Purpose	Power production capacity MW	Average Energy (GWh/year)	Gross irrigation area (ha)
Sarıçam Baklalı	2014	Irrigation	-	-	412
Kozan Bağtepe	2015	Irrigation	-	-	223
Kozan Postkabasakal	2015	Irrigation	-	-	139
Kozan Zerdali	2015	Irrigation	-	-0	126
Aladağ Dölekli	2016	Irrigation	0-	0	301
Karaisalı Demirçit	2016	Irrigation	-	-	621
Kozan Meletmez	2016	Irrigation	0-	-	891
Yedigöze	2011	Irrigation, Drinking water and Energy	317	-	-

Source: Official website of State Hydraulic Works (www.dsi.gov.tr)

In addition to the ponds operated by the DSI, several irrigation ponds were built under the authority of the former Special Provincial Administration of the Governorate of Adana (MoFAH, 2013)[3]. These include Kılıçlı (45 km to the northeast), Hakkıbeyli (49 km to the northeast), Baklalı (32 km to the northeast), Ayvalık (25 km to the southeast), and Zeytinbeli (21 km to the southeast) irrigation ponds that are nearest to the Project site.

On the other hand, there are no lakes, irrigation ponds, reservoirs, or reservoir catchment areas located in the close vicinity of the Project site and its associated facilities.

Surface Water Quality

Table 5 of Annex 5 of the Surface Water Quality Management Regulation (SWMR) classifies surface water quality into four classes[4]: 1) Class I: High quality water; 2) Class II: Slightly polluted water; 3) Class III: Polluted water; and 4) Class IV: Highly polluted water. There are also several water quality assessment surveys have been conducted and reported in the literature. These include the Basin Protection Action Plans prepared for the major basins across Turkey.

A Basin Protection Action Plan was prepared for the Ceyhan Basin[5]. The Basin Protection Action Plan for the Ceyhan Basin was conducted as part of a TUBITAK (i.e., Scientific and Technological Research Council of Turkey) Project. The water quality classification was

[3] Ministry of Food Agriculture and Husbandry (MoFAH), 2013. Analysis of Agricultural irrigation infrastructure, problems and recommendations on solution, Adana
https://www.cka.org.tr/uploads/pages_v/8.pdf

[4] Class I: surface water courses (i) with high drinking water potential, (ii) that can be used for recreational purposes and swimming, (iii) that can be used for trout production and (iv) that can be used for animal breeding and farming.

Class II: surface water courses (i) with drinking water potential, (ii) that can be used for recreational purposes, (iii) that can be used for fish production other than trout and (iv) that can be used for irrigation purposes provided that necessary quality requirements are met.

Class III: water and industrial water (other than food or textile industry) that can be used in fisheries after appropriate treatment

Class IV: surface water courses with lower quality than the Class III water courses and can become higher quality with improvement measures

[5] https://www.tarimorman.gov.tr/SYGM/Belgeler/havza%20koruma%20eylem%20planlar%C4%B1/Ceyhan_Havzas%C4%B1.pdf

obtained from DSI reflecting measurements and analysis of the quality of water sources between 2003-2009. The water quality classes (I, II, III, IV) were determined for chemical oxygen demand (COD), biochemical oxygen demand (BOD_5), NH_4-N, NO_2-N and NO_3-N which are important water quality parameters in terms of organic matter and nitrogen pollution. The maps of the rivers indicating contaminant concentration levels are given in Annex F.

The following conclusions can be drawn from the Ceyhan Basin Protection Action Plan:[6]

- The “A group” parameters, that determine the classification of the water body in terms of its physical and inorganic parameters, show that water quality in Ceyhan Basin is mainly classified as Class III and Class IV. It is important to mention that the “A group” parameters are generally determined by NO_2-N. Additionally, NH_4-N is also a determining parameter;
- Ceyhan basin is generally classified as Class I for the “B group” parameters, that determine the classification in terms of organic parameters;
- Ceyhan basin is generally classified as Class I and Class II for the “C group” parameters (inorganic pollution). Iron, manganese, boron, and fluoride parameters are generally classified as Class I and Class II in Ceyhan basin;
- The water quality of the Ceyhan River and its tributaries in terms of organic and inorganic matters, and nitrate, is classified as Class I and Class II;
- The water quality of the Yumurtalık Dalyan lake is determined as Class IV in accordance with the analysis results of the parameters that are indication of organic pollution and ammonium nitrogen;
- The illustrative representations of the Ceyhan Basin in terms of parameters are shown in Figure F-1, Figure F-2, Figure F-3, and Figure F-4 in Annex F.

The sources of pollution were assessed and calculated depending on the measurements conducted in 2012 and projections were made for the coming years in terms of urban and industrial pollution point sources (see. Table 7-3).

Table 7-3. Sources and projections of pollutant loads

Year	Parameter	Type	Adana (ton/year)	Ceyhan Basin Total (ton/year)
2010	COD	Urban	5,144	16,477
		Industrial	4,646	11,005
	Total - N	Urban	545	3,384
		Industrial	231	431
	Total - P	Urban	91	553
		Industrial	25	101
2020	COD	Urban	1,925	6,292

[6] https://www.tarimorman.gov.tr/SYGM/Belgeler/havza%20koruma%20eylem%20planlar%C4%B1/Ceyhan_Havzas%C4%B1.pdf

Year	Parameter	Type	Adana (ton/year)	Ceyhan Basin Total (ton/year)
		Industrial	3,872	8,252
	Total - N	Urban	417	2089
		Industrial	201	356
	Total - P	Urban	77	393
		Industrial	23	89
2030	COD	Urban	2,214	7,197
		Industrial	3,485	7,427
	Total - N	Urban	503	2573
		Industrial	181	321
	Total - P	Urban	88	456
		Industrial	20	80
2040	COD	Urban	2,407	7,851
		Industrial	3,098	6,601
	Total - N	Urban	574	2979
		Industrial	161	285
	Total - P	Urban	101	522
		Industrial	18	71

According to the Ceyhan Basin Pollution Prevention Action Plan prepared by the MoEU (October 2016)[7], a total of 40 monitoring stations were identified on 38 rivers and two (2) drinking water sources. Water quality assessment was done based on the chemical and physicochemical parameters analyses. The location of the monitoring stations and analysis results are illustrated in Figure 7-7.

[7] Ministry of Environment and Urbanisation, General Directorate of Environmental Management, 2016. Ceyhan Basin Pollution Prevention Action Plan, Ankara.
https://webdosya.csb.gov.tr/csb/dokumanlar/cygm0014.pdf

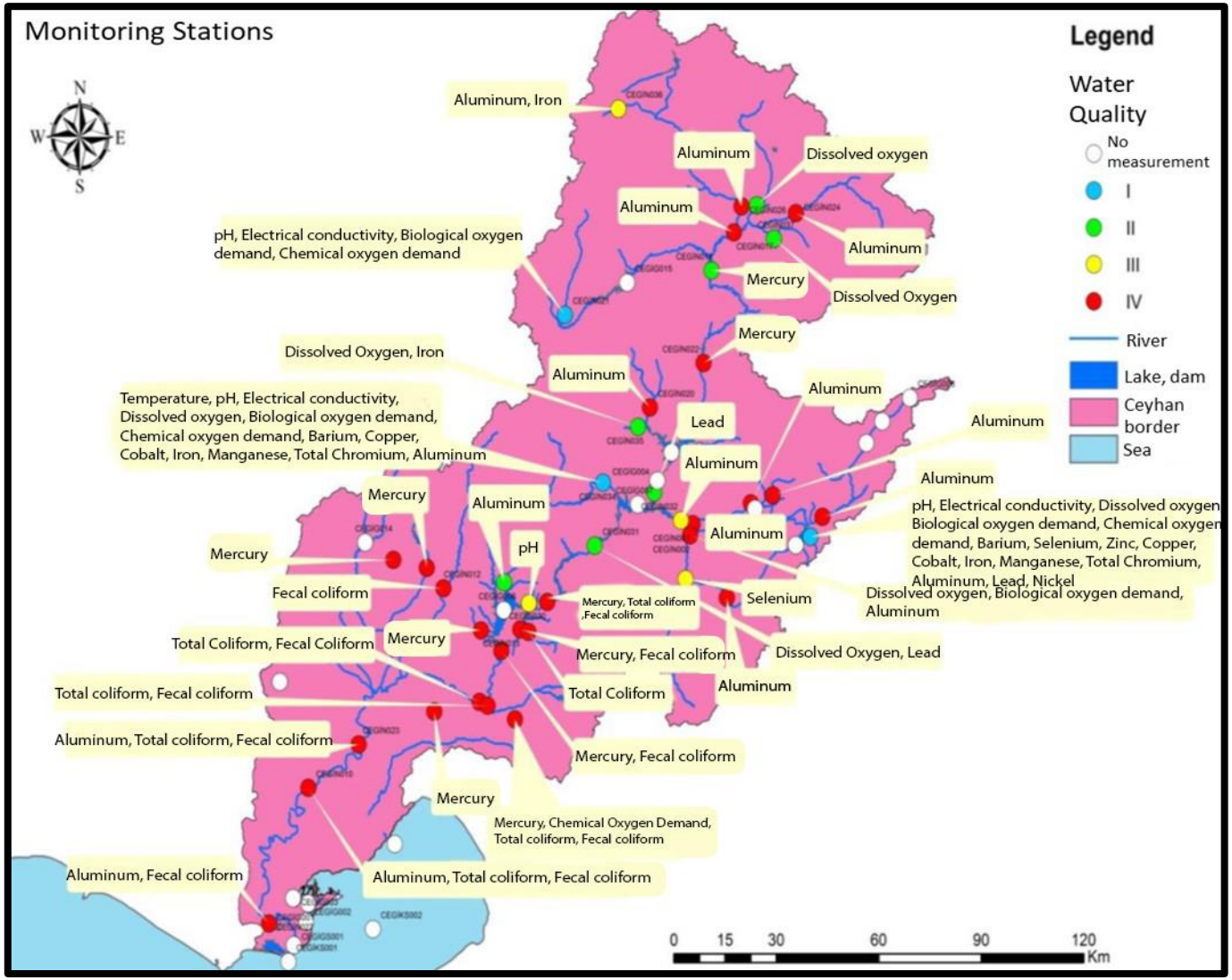

Figure 7-7. Classification of the monitoring stations (MoEU, 2016)

As can be seen from Figure 7-7, water quality at 26 monitoring stations is classified as Class IV, at four (4) monitoring stations as Class III, at six (6) monitoring stations as Class II, and at four (4) as Class I. The results indicate that the water quality at the monitoring station (Station ID: CEGİN010) on the Ceyhan River is classified as Class IV, considering aluminium, total coliform, faecal coliform (chemical and biological parameters). Furthermore, high coliform values are attributed to the bacteriological abundance in the water sources in the basin. Total and faecal coliform parameters are mainly related to animal waste or urban wastewater discharges. The high total and faecal coliform values are attributed to the untreated wastewater discharges and animal husbandry undertaken in the region.

Moreover, according to the Adana Environmental Status Report (2018)[8], nitrate concentrations were monitored at several monitoring stations in Adana in 2018. The locations of the monitoring stations are illustrated in Figure 7-8 and the monitoring results are shown in Table 7-4.

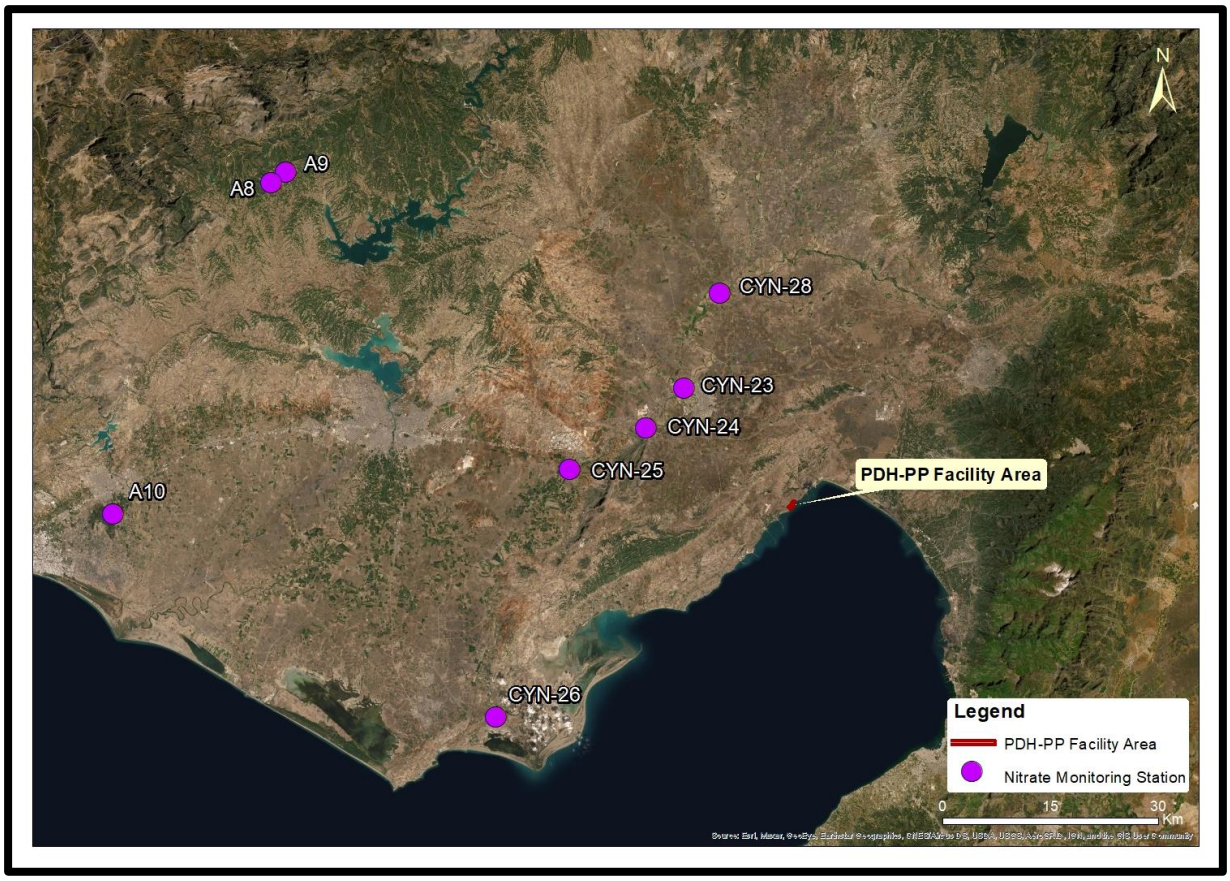

Figure 7-8. Locations of the monitoring stations (Source: Adana Environmental Status Report (2018)).

[8] https://webdosya.csb.gov.tr/db/ced/icerikler/adana_2018_-cdr-20190828111210.pdf

Table 7-4. Average annual nitrate concentrations (related with contamination from agricultural activities)

Monitoring Station	Location of the monitoring station	Coordinates	Annual average NO_3-N concentration (mg/L)	Water quality class	Distance to theProject site (km)
A8	Körkün creek, Hacılı village on the flowrate measurement station, Karaisalı Körkün creek Hacılı village	N 37°20'4.19" E 35°11'10.42"	1	II	~81
A9	Karaisalı Eğlence bridge, Eğlence creek, Çatalan Dam	N 37°20'37.48" E 35°12'35.82"	0.9	II	~81
A10	Salbaş Çakıt creek measurement station	N 36°55'20.30" E 34°55'41.84"	1.1	II	~88
CYN-23	Entrance of the Ceyhan River	N 37° 03'9.01" E 35°48'08.7"	1.6	II	~20
CYN-24	Ceyhan district exit, Küçükburhaniye neighbourhood	N 37° 00'21.04" E 35°44'31.1"	1.6	II	~20
CYN-25	Misis bridge (Karaçay connection point)	N 36°57'25.5" E 35°37'31.5"	1.8	II	~27
CYN-26	Ceyhan River (at location where flows into sea)	N 36°38'55.7" E 35°29'54.5"	1.8	II	~48
CYN-28	Kilgen-Deliçay-Sumbaş merger	N 37°10'20.1" E 35°51'47.3"	1	II	~30

Source: Adana Environmental Status Report (2018)

7.3.2 Flooding Risk

The City of Adana has experienced several natural disasters as shown in Figure 7-9. Adana province is also ranked 5th in the list of cities that have been affected the most by floods when the numbers of disaster victims and floods observed are considered. Figure 7-9 also shows statistics related to other natural disasters in Turkey[9]. Accordingly, between 1950 and 2018, there has been 301 landfalls, 202 floods, and 9 avalanche incidents occurred in Adana province.

[9] Disaster Management and Natural Disaster Statistics in Turkey Report published by Disaster and Emergency Management Authority, 2018

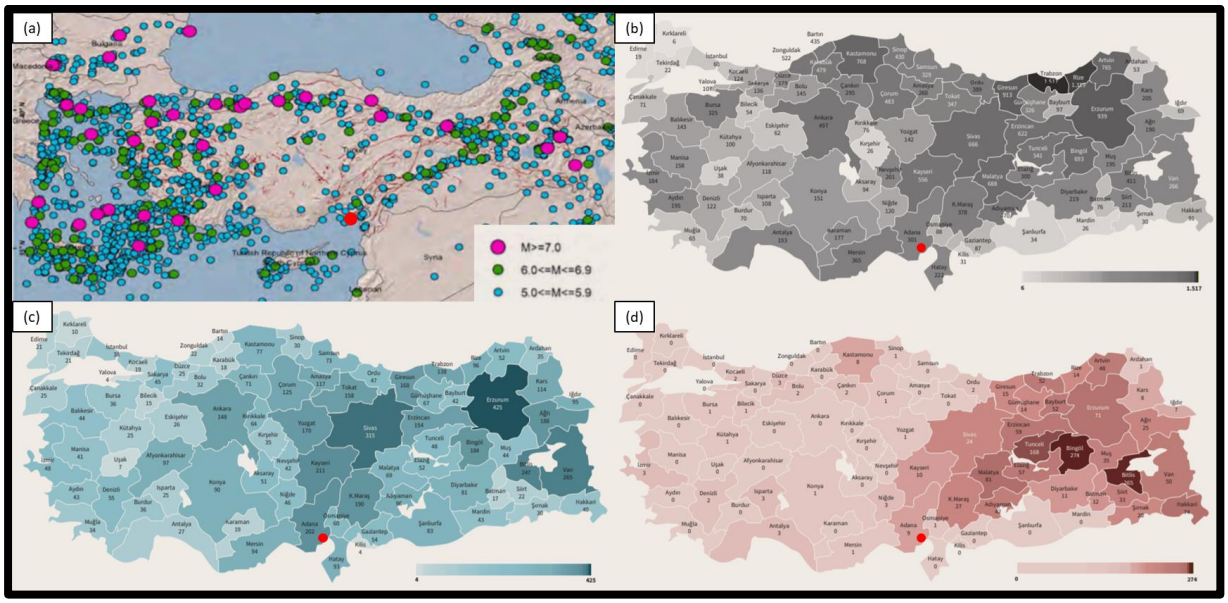

Figure 7-9. Distribution of Disaster Incidents in Turkey (Disaster Management and Natural Disaster Statistics in Turkey Report published by Disaster and Emergency Management Authority, 2018) – Project site is indicated in red (a) Earthquakes happened between 1990 – 2017; (b) Landfall incidents happened between 1950 – 2018; (c) Flooding incidents happened between 1950 – 2018; (d) Avalanche incidents happened between 1950 – 2018.

Ceyhan Basin Flood Management Plan has been prepared by the Ministry of Forestry and Agriculture (former Ministry of Forestry and Hydraulic Works) in February 2018. The list of floods that occurred in the Ceyhan basin, with a focus on incidents in Adana province, is provided in Table 7-5.

Table 7-5. Flood incidents recorded in the Ceyhan basin, in Adana province.

Flooding Event	Location	Date	Number of Casualties	Remarks
Ceyhan River	Adana- Lower Ceyhan plain	09.12.1989	0	-
Ceyhan River	Adana- Lower Ceyhan plain	17.04.1975	0	-
Ceyhan River	Adana- Lower Ceyhan plain	02.01.1979	0	-
Ceyhan River	Adana- Lower Ceyhan plain	14.04.1971	0	-
Ceyhan River	Adana- Lower Ceyhan plain	15.03.1974	0	-
Meletmez stream	Adana-Kozan Cennet plain	04.05.2012	0	Flood flowrate: 40 m^3/s and drainage area 0.25 km^2.
Ceyhan River	Adana- Lower Ceyhan plain	07.01.1968	0	-
Kanlıkavak creek	Adana-Çelikgünü village	03.07.1962	0	-
Ceyhan River (Sarısu, Çepelce, and Kurukulak streams)	Adana- Ceyhan plain	09.01.1958	0	-
Ceyhan River	Adana- Ceyhan plain	05.03.1968	0	-
Ceyhan River	Adana- Ceyhan plain	26.12.1968	0	-
Ceyhan River and its tributaries	Adana- Ceyhan plain	25.12.1968	0	-
Ceyhan River and its tributaries	Adana- Ceyhan and its vicinities	16.05.1963	0	-

Flooding Event	Location	Date	Number of Casualties	Remarks
Buharlı, Küçükkarı, and Akyar streams	Adana-Ceyhan- Burhaniye village	13.05.1967	0	-
Ceyhan River	Adana-Ceyhan-Hamdilli and Adatepe village	24.12.1962	0	-
Deliçay	Adana-Kozan	05.06.2009	0	-
Ceyhan River (Karapınar Deliçay and Kozan streams)	Adana-Kozan	09.01.1958	0	-
Ceyhan River	Adana-Misis plain	09.01.1958	0	-
Kum stream	Adana-Turgutlu Dereköy	08.05.1963	0	-

In the scope of the Ceyhan Basin Flood Management Plan, a hydraulic modelling study was completed in order to identify the potential areas of flood risk. Within the scope of the study, a total of 487 locations were assessed. According to the Plan, a total of 25 risky areas were identified. Among the 487 locations, Kurtpınarı neighbourhood (especially İncirli), Kurtkulağı, and Sarıçam, immediate surroundings at the Project site, were also assessed. Flood risk has not been reported for those areas.

According to the Pre-Geological – Geotechnical Report of Adana City, Ceyhan District, Kurtpınar neighbourhood, Ceyhan Petrochemistry Industrial Region PDH-PP Polypropylene Production Facility by Selensu Mühendislik, an assessment of the Project site for natural disasters excluding earthquake risks indicated that the flat topography of the site prevents risks of disasters such as rockfall and landslide. Moreover, since the region is not within 100-years flood risk areas of any major rivers, the risk of flooding is found to be significantly low (Selensu, 2018).

7.3.3 Stormwater

A site drainage system will be established on the Project site in order to collect storm water during operation. The drainage system is designed and will be constructed to collect different types of runoffs and drainages from the site separately based on the level and type of contamination. As described in *Chapter 8: Material Resources and Waste Management*, Non-oily sewer system (NOS), possibly oily contaminated sewer (POCS), oily water sewer (OWS), and sanitary sewer system (SS) will be established in line with the drainage scheme proposed for the Project. Drainage on the Project site will be managed in line with the “Drainage and Wastewater Gathering Philosophy” dated 21 November 2019 and “Specification for Drainage” dated 17 February 2020 reports prepared for the Project. According to the drainage system proposed for the Project, stormwater from unpaved areas, building roofs, clean stormwater from tank bunds, stormwater from non-process areas will be collected by a non-oily sewer system and will be discharged to the receiving environment in line with the national regulatory requirements. Further details of the site drainage system and management of drainage and wastewater are given in Chapter 8.

7.3.4 Groundwater Resources

According to the Adana Environmental Status Report (2018), drinking and utility water demand of 98% of Adana province's population is supplied from Çatalan Dam. The remaining %2 of the drinking and utility water demand is supplied from groundwater sources (69 groundwater wells) after disinfection. DSI has several stations located throughout Adana province to monitor the quality of groundwater. The locations of these stations retrieved from the GIS Database of MoAF[10] are indicated in Figure 7-10 below. The closest groundwater wells (~3 km and 2 km) in the vicinity of the Project site are also illustrated in Figure 7-10 below.

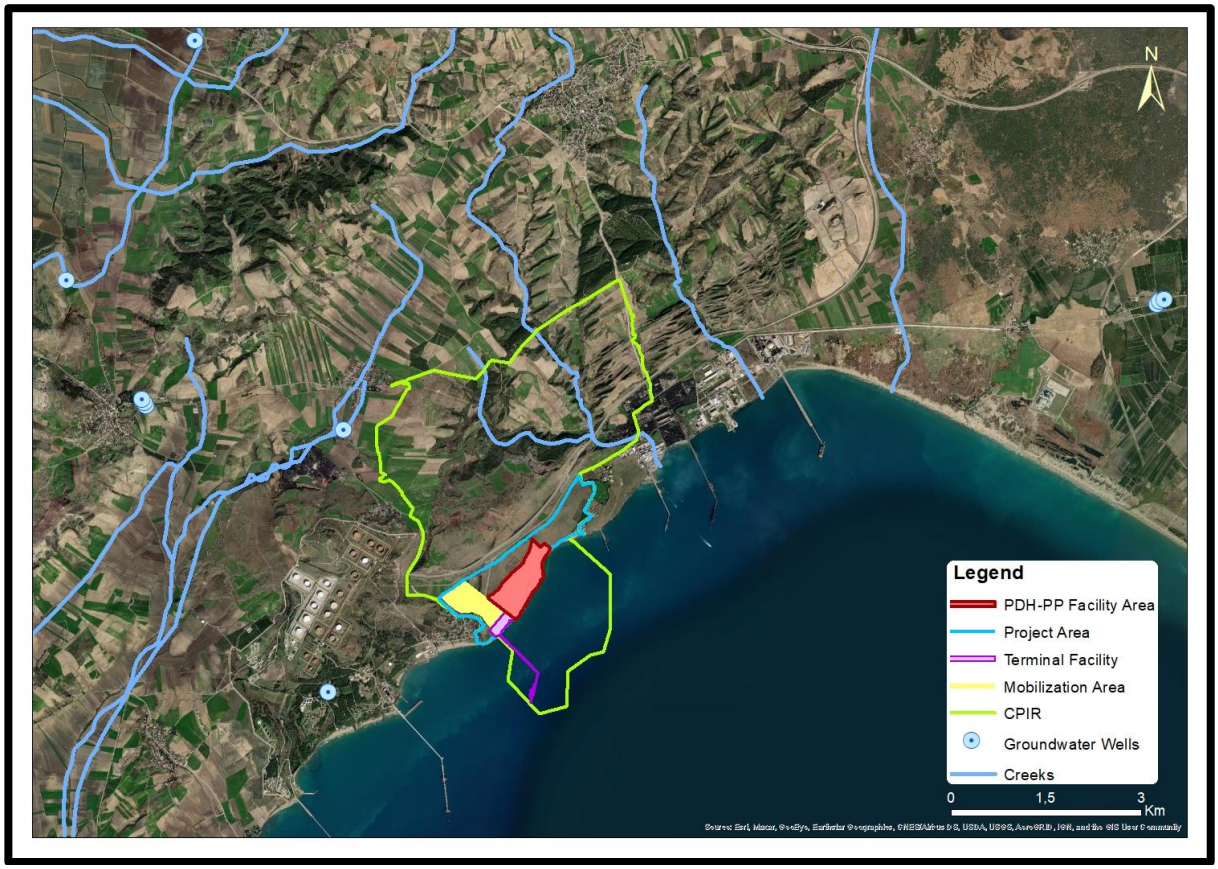

Figure 7-10. Creeks and groundwater wells within and in the proximity of the Project site (Source: GIS Database of MoAF, http://geodata.ormansu.gov.tr/)

As of 31.12.2018, there are 6,562 groundwater wells in Adana province. The groundwater reserve of the province is calculated as 609 hm^3/year (Ministry of Environment and Urbanization, 2018)[11].

The reports of the geological survey studies conducted at the site are listed below.

[10] http://www.geodata.gov.tr/
[11] Adana Environmental Status Report, 2018.

1. Preliminary Geological, Geotechnical Survey Report of the Ceyhan Petrochemical Industrial Zone PDH-PP Facility in “Adana, Ceyhan, Kurtpınarı Neighbourhood prepared by Selensu Engineering in November 2018;
2. 1:1000 and 1:5000 scaled Geotechnical and Geological Report of the Ceyhan Industrial Region in Adana, Ceyhan, Sarımazı Neighbourhood Energy Industry prepared for the Zoning Plan by Selensu Engineering in March 2019;
3. Geotechnical Survey Report (Ceyhan PDH-PP FEED Project) prepared by Selensu Engineering in 2019-2020.

Relevant studies included borehole drills and visual examination and laboratory analysis of the drill cores from the site. Accordingly, except for the drill holes in the final 2020 geotechnical study no groundwater was observed in the drill holes installed on the Project site. The final survey study included the excavation of 40 drill holes (details of the study are presented in *Chapter 6: Geology and Soils*). The drill hole depths were between 10-30 m for the study. Among 40 drill holes (see. Figure 7-11) only 3 (SK-7, SK-25, SK-35) were observed to contain groundwater at 16, 23, and 20m bgl, respectively. Hence, the survey study indicated seasonal fluctuations of the groundwater cause the water table to rise up to 16 m bgl at the western boundary of the Project site.

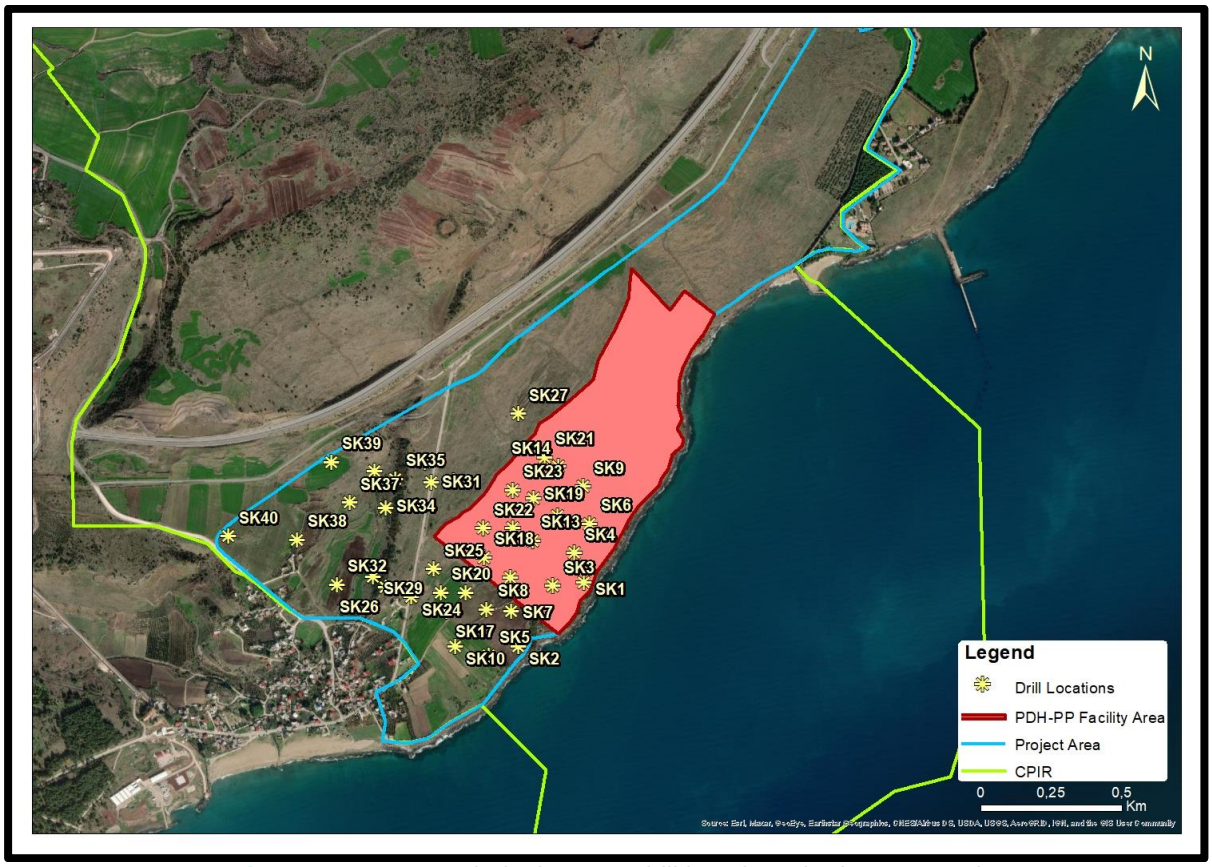

Figure 7-11. Geotechnical survey drill locations (Selensu, 2020)

A schematic cross-section of the Project site presenting the potential groundwater level and excavation area is given in Figure 7-12.

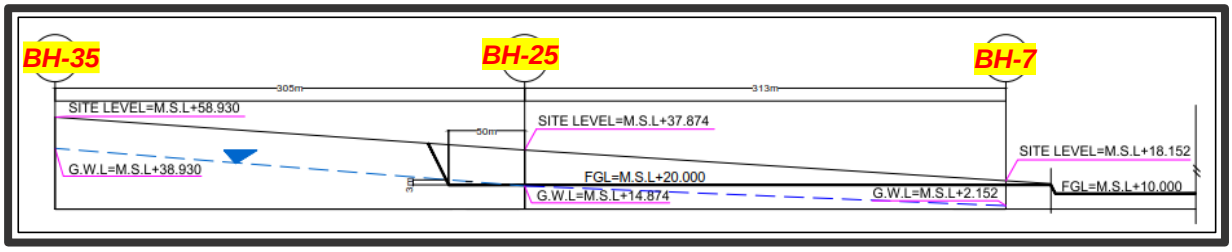

Figure 7-12. Cross-section of the site with potential groundwater level (Selensu, 2020)

Additionally, a desk-based Hydrology and Hydrogeology Assessment study was conducted by Dolfen within the scope of EIA of the CPIR Port Project that includes part of the Project site and Associated Terminal Facility.

Hydrology and Hydrogeology Assessment Report provides information on groundwater sources, flow direction, aquifer, and abstraction details for Kozan-Ceyhan-Yumurtalık sub-basins. Accordingly, groundwater recharge in the alluvial aquifer is through precipitation, which directly falls on alluvial unit and percolates through permeable units interacting with the alluvial unit. The infiltration and percolation of the precipitation falling on the alluvial unit depend on the amount of agricultural irrigation water use and recharge from the rivers which flow through alluvium formations. Groundwater recharge in other aquifers is through precipitation. Groundwater discharge/extractions are through natural discharges and wells for drinking and potable water supply. Groundwater balance (and annual change in groundwater reserve) calculated for Kozan-Ceyhan- Yumurtalık sub-basin and alluvial aquifer is given in Table 7-6.

Table 7-6. Groundwater balance for the Kozan-Ceyhan- Yumurtalık sub-basin in general and the Alluvial Aquifer (Dolfen, 2021)

Recharge	Subbasin in general (hm^3/yr)	Alluvial Aquifer (hm^3/yr)	Discharge	Subbasin in general (hm^3/yr)	Alluvial Aquifer (hm^3/yr)
From precipitation	912.77	591.63	**Natural discharge to surfacewaters**	1040	685.56
From surface flow	77.2	69.55	**Extraction**	75.61	75.61
From irrigation	207.91	182.96			
From external reservoir	6.79	6.79			
Total	1204.64	850.9	**Total**	1115.61	761.17

According to the groundwater balance, the annual change in the aquifer storage in general of the Kozan-Ceyhan-Yumurtalık sub-basin and for the alluvial aquifer in the subbasin are 89.03 hm^3/year and 89.73 hm^3/year, respectively. The Project site is located on Delihalil Basalt formation and volcanic geological formations including basalt formation generally show dispersed rich aquifer characteristics.

The water table and groundwater flow direction in the study area are illustrated in Figure 7-13. Accordingly, the groundwater table in the region varies between 5 to 75 m; whereas it is envisaged that the level within the Project site varies between 1 to 10 m (Dolfen, 2021).

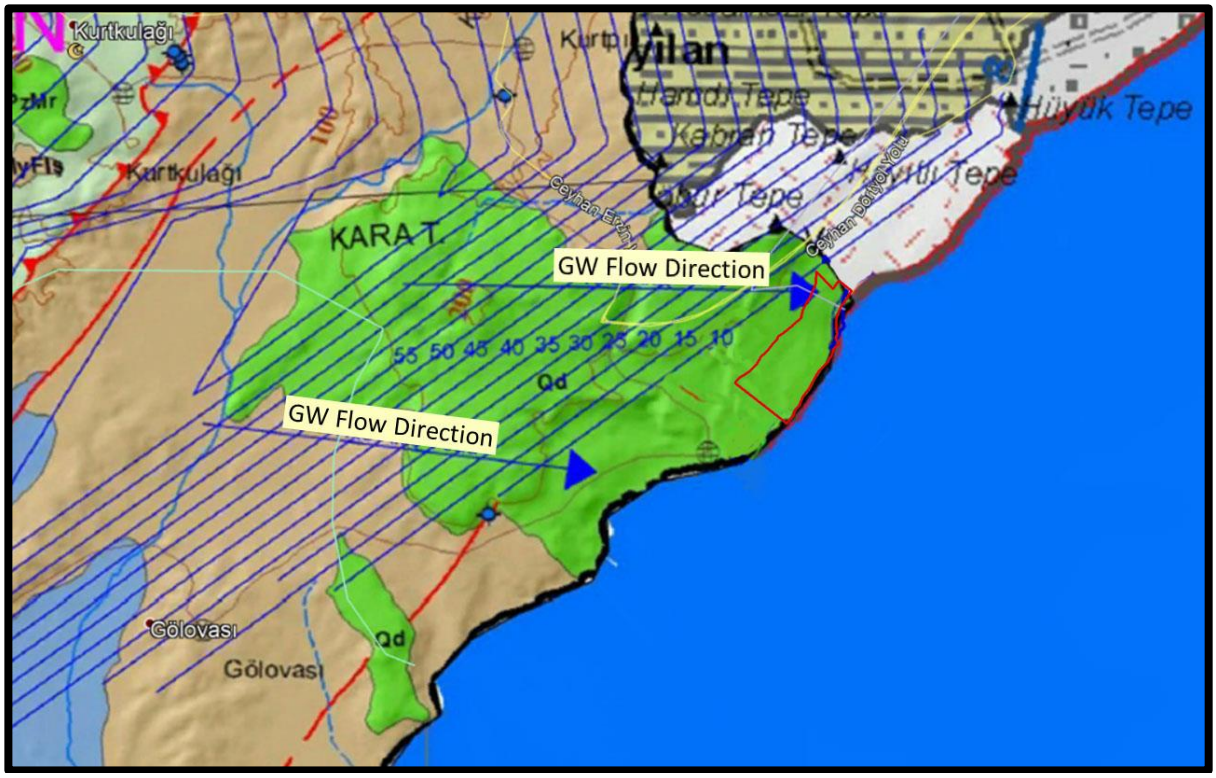

Figure 7-13. Groundwater level contours and groundwater flow direction (Project in red frame (Dolfen, 2021))

According to the Hydrology and Hydrogeology Assessment Report of CPIR Port seasonal groundwater discharge may be seen on the Project site. On the other hand, according to the geological/geotechnical site investigation study, Selensu (2020) reports that depending on the ground formation (mainly basalt bedrock), the groundwater potential at the site is very low and groundwater level is below the excavation level within the Project site.

Drilling of new water wells in the Project site is not planned for the raw water supply of the Project. On the other hand, as reported by the Project Company, the potential of using groundwater from existing groundwater wells around the Project site during the construction phase of the Project is being consulted with Ceyhan Petrokimya A.Ş., DSI, and Adana ASKİ.

Raw water will be supplied from outside the Project site; therefore, the Project Company is currently consulting with relevant authorities (i.e., State Hydraulic Works (DSI) and Adana Water and Sewerage Administration (Adana ASKI)) and Ceyhan Petrokimya A.Ş., who is responsible for providing all required infrastructure for the projects to be developed within the scope and boundaries of the CPIR. In that respect, the Management Company has issued an official letter dated 12.08.2020 stating that the required 106 MW of electricity, 14,400 m^3/day of raw water and 11,085 Nm^3/hour of natural gas will be supplied by the Management

Company. The Project Company shall follow up with the Management Company on the sources of the electricity, raw water, and natural gas and evaluate potential environmental and/or social risks, if any. Details on official communications are provided in the following sections.

7.4 Baseline Environmental Conditions: Associated Terminal Facility

The Eastern Mediterranean is connected to the North Atlantic Ocean through Western Mediterranean and Ionian basin as well as to the Black Sea and the Aegean Sea. There is a continuous water exchange between these basins. The Mediterranean Sea is a concentration basin which means evaporation exceeds precipitation and river run-off. The hydrographic features of the Eastern Mediterranean are highly affected by fresh Atlantic Water Mass. Atlantic water enters the Mediterranean with a salinity of ‰ 36.15 (with a temperature ~15^{0}C) through the Western Mediterranean. The seawater with increased salinity and density flows into the Eastern Basin. The circulation pattern of the Mediterranean Sea is governed by the salinity differences between the Atlantic and Eastern Mediterranean[12]. The bathymetry, rivers, and main currents can be seen in Figure 7-14 and Figure 7-15.

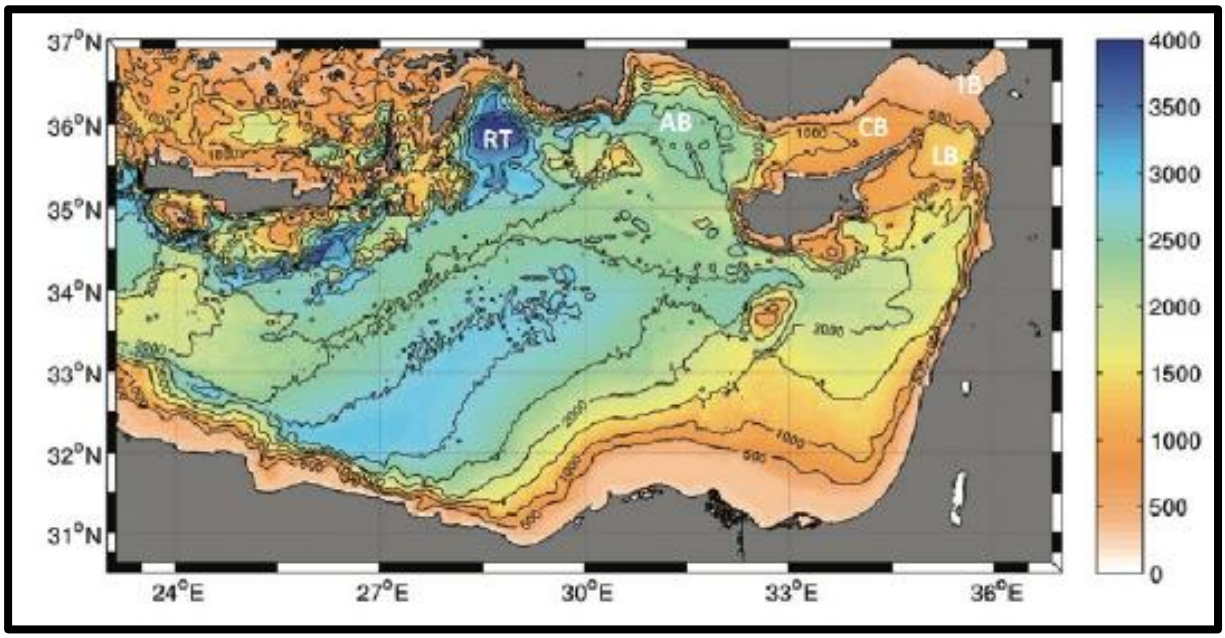

Figure 7-14. Bathymetry (This Bathymetry is for Levantine Basin; Abbreviations: RT-Rhodes Trough, AB-Antalya Basin, CB-Cilician Basin, LB- Latakia Basin, IB-Iskenderun Bay where the Project site is located.)[10]

[12] Turkish Mediterranean Sea Marine Biodiversity, Fisheries, Conservation and Governance (2016) (Last Access on 25.06.2020) http://tudav.org/wp-content/uploads/2018/04/MEDITERRANEAN_SEA_2016.pdf

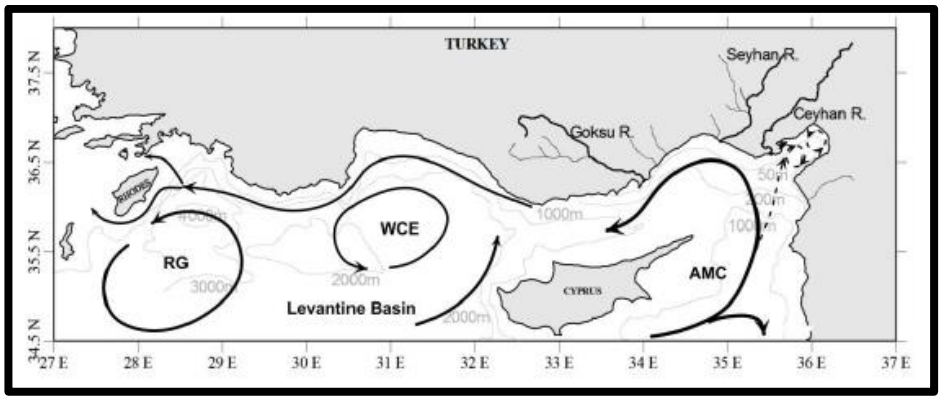

Figure 7-15. Bathymetry, rivers, and main currents of the North-eastern Mediterranean (Asian Minor Current (AMC), West Cyprus (WCE), Rhodos Gyre (RG)) [10]

As can be seen in Figure 7-14, the bathymetry of Iskenderun Bay is shallow. Taurus mountains and Amanos mountains surrounding the Eastern Mediterranean (except Seyhan and Ceyhan deltas) influence the atmospheric condition. The wind systems (namely Etesian and Westerlies) determine west-northwest winds over the Levantine Basin during summer and autumn seasons; whereas Poyraz and Sirocco winds result in modified climatic wind during winter and spring seasons. The climatological wind patterns for the summer and winter seasons are presented in Figure 7-16 below.

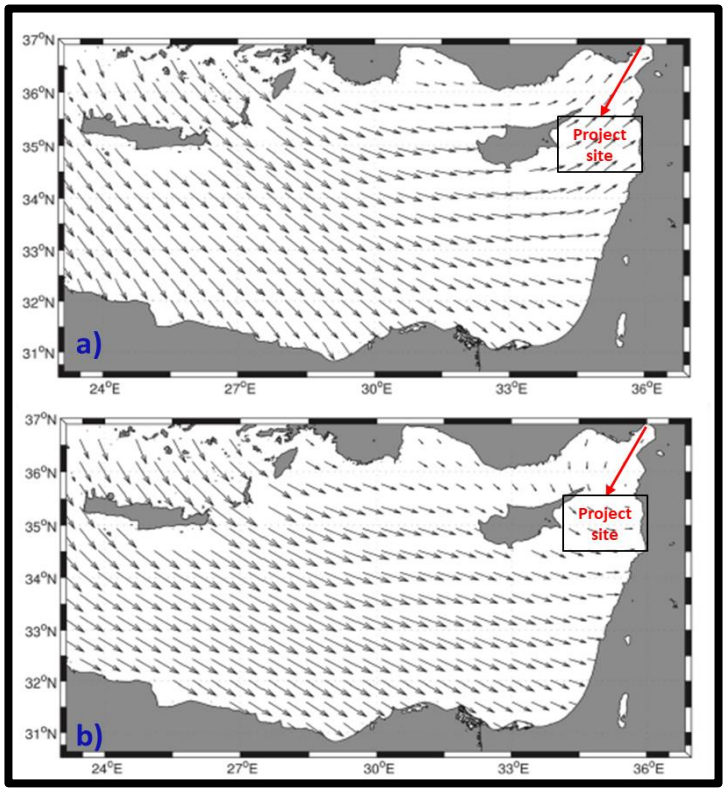

Figure 7-16. Seasonal climatological wind pattern (a) summer climatological wind pattern and b) winter climatological wind pattern (Climatology represents 1988-2011 means obtained from Cross-Calibrated Multi- Platform Ocean Surface Wind Vector L3.0 First-Look Analyses dataset (CCMP)) [10]

The north-eastern Mediterranean receives large volumes of nutrient input from the Göksu, Lamas, Tarsus, Seyhan, Ceyhan, and Asi rivers. Hence, chemicals are also introduced to Mersin and İskenderun bays (from domestic, agricultural, and industrial activities). Therefore, the inner part of İskenderun Bay becomes more polluted. The interaction between coastal and offshore systems determines spatial variations of the biochemical properties of bay and coastal ecosystems.

Iskenderun Bay in the Mediterranean Sea is one of the important areas in terms of fishing, industrialization, transport, and urbanization which creates a potential risk of pollution. MoEUCC has conducted pollution and quality monitoring studies in the Mediterranean Sea since the 2000s in accordance with the Regional Sea Conventions signed by Turkey (Barcelona and Bucharest Conventions) and national and international legislations. MoEUCC published Marine Quality Bulletin for the Mediterranean Sea (2018) which comprises ecological quality status assessments for the 2014-2016 period. Ecological quality is determined based on biological quality elements (phytoplankton, macroalgae, and benthic invertebrates) as well as physical and chemical parameters such as Total Phosphorus (TP), NO_3 +NO_2-N (NOx), Secchi Disk Depth (SDD).

According to this assessment, in sections of the coastal water bodies where the influence of the Ceyhan River and Yumurtalık Bay dominates, the ecological quality was determined as ranging from “moderate to good” for the shoreline; and “very good” for the Yumurtalık Bay in 2016 as shown in Figure 7-17 a. The ecological quality of coastal waters for the Mediterranean coasts has also been assessed in Adana Environmental Status Report (2018). Accordingly, the ecological quality of coastal waters dominantly affected by the Ceyhan River and Yumurtalık Bay ranges from “moderate to poor” for the shoreline and “good” for Yumurtalık Bay in 2018 (shown in Figure 7-17 b).

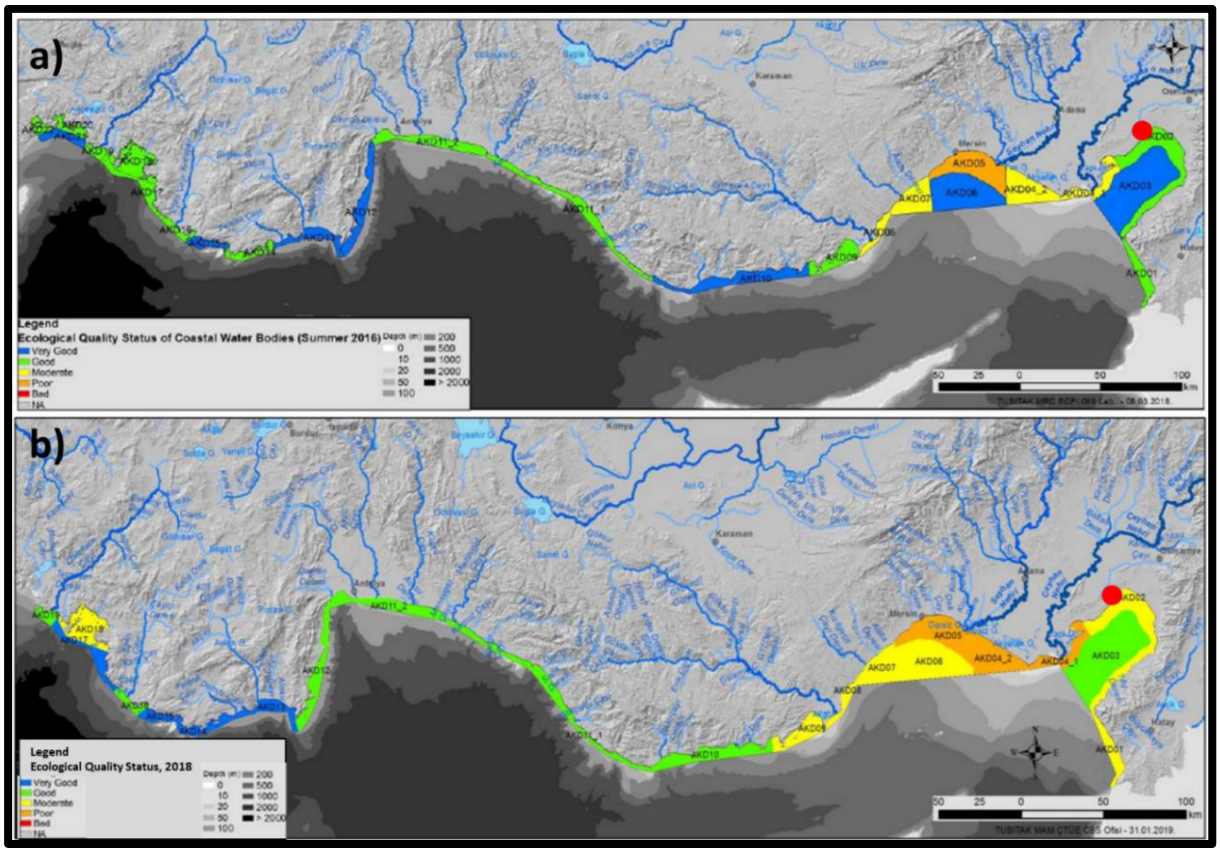

Figure 7-17. Coastal water bodies and ecological quality status in the Mediterranean Sea (a) ecological quality status in 2016 and (b) ecological quality status in 2018 (Marine Quality Bulletin for the Mediterranean Sea in 2018 and Adana Environmental Status Report (2018), respectively) – Project site is indicated in red

In order to identify the hydrographic features, a Hydrographic and Oceanographic Investigation Study (ARS, 2020) has been performed within the scope of the Ceyhan Petrochemical Industrial Region Port Project between 12 January and 18 February 2020. The study has been performed in line with the Law on Navigation and Hydrography Services (No. 1738) (O.G. date/no: 07.06.1973 /14557) and its implementing regulations and the Communique regarding Planning and Implementation of Coastal Structures and Facilities (O.G. date/no: 06.07.2011/27986). Within the scope of the Hydrographic and Oceanographic Investigation Study, bathymetric measurements, current measurements, conductivity, temperature, and depth (CTD) measurements, seismic profiling studies, side scan sonar studies, sediment sampling and analysis, and also data collection from literature have been performed. A Hydrographic and Oceanographic Investigation Study Report has been prepared and submitted to the Office of Navigation, Hydrography and Oceanography (ONHO) for approval. The study has been approved by ONHO on 14th April 2020.

The bathymetric measurement, current measurements, CTD measurements, side scan sonar studies, sub-bottom profiling, and sediment sampling were performed with the Bathy-500 DF (Echosounder), Valeport Model106 Current Meter, AML Base X CTD, Imagenex Yellow Fin,

Syqwest Stratabox, Van-veen grab sampler, respectively. The studies undertaken in the investigation area are summarised in Table 7-7.

Table 7-7. The summary of the studies undertaken in the investigation area of the CPIR Port Project

Measurement	Location	Completed Studies
Bathymetric Measurement	CPIR Port Project site	Conducting bathymetric measurements and preparation of bathymetric maps (1/1,000 scaled) and preparation of Hydrographic report for the project site (12-13-14 and 29 January 2020, and 1-2-3- 11-17-18 February 2020)
Current Measurement	Measurement at one point (current meter fixed at 1 m depth from the sea surface)	Conducting measurement at the same location on five days (12 hours per day) and the evaluation of the data and analysis (13-14-15-16, and 17 January 2020)
Conductivity, Temperature, and Depth (CTD) Measurements	Measurements at six (6) points in the CPIR Port Project site	Conducting measurements through the depth of the sea at 1 m intervals (from the sea surface to bottom), and on two consecutive days (14-15 January 2020) at each measurement point
Seismic (sea bottom profiling) Studies	CPIR Port Project site	Seismicity studies with sub-bottom profiler system at 29 (28 vertical to the shoreline and one (1) parallel to shoreline) line (14-15 January 2020)
Side Scan Sonar Studies	CPIR Port Project site	26 scans vertical to the shoreline (with 95-105 m profile interval) (14-15 January 2020)
Sediment Sampling and Analysis	Sampling at fourteen (14) points	Determination of the dispersion through index analysis (14 January 2020)
Literature Review	Investigation Area	Geological and geotechnical studies/investigations were conducted in and in the immediate surrounding of the Project site by universities, authorities and organizations, and international scientific institutions.

The current system in the investigation area was assessed through a current measurement study conducted on 13-17 January 2020 in one location (1 m below the surface level). The duration of the current measurement is 12 hours/day. The meteorological conditions were also taken into account for the assessment during the measurement study. It was found that the current in the investigation area varies between 145.79^0-248.79^0 and the maximum current is recorded in the 191.70^0 direction. The average current direction for the five-day measurement period is calculated as 200.48^0 and the current velocity is 10.82 cm/s.

CTD measurements were conducted on 14 - 15 January 2020 in six (6) different locations (see. Figure 7-18) in the investigation area. Physical parameters such as temperatures, salinity, and density were continuously measured at different depths from the sea surface to the sea bottom in each measurement location. It was found that SST varies between 17.64 ˚C and 17.77 ˚C, whereas it was found as 17.36 °C in one CTD measurement point (CTD-6 at 19.93 m depth). The salinity of the sea surface varies between ‰39.11- 39.15 and shows