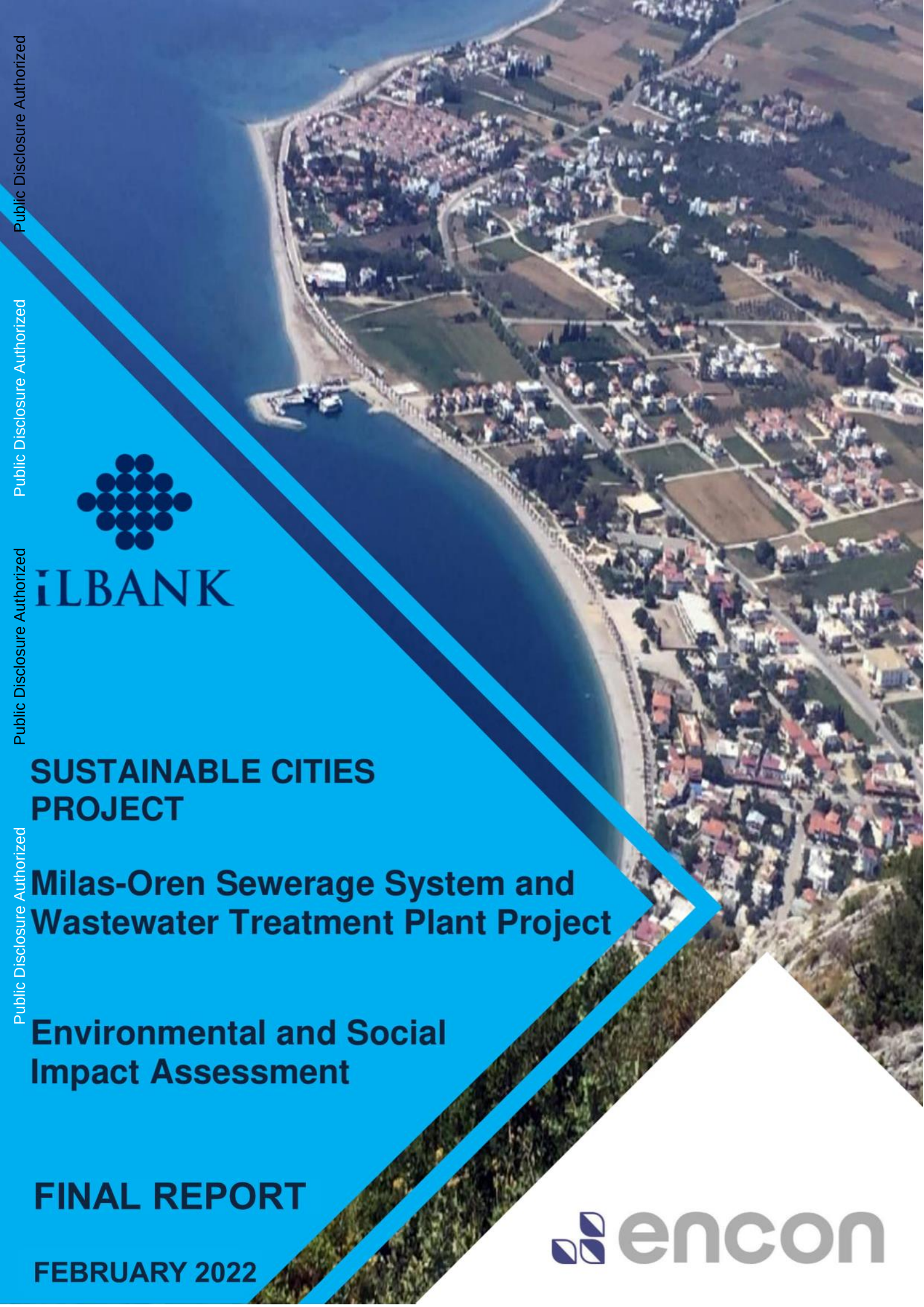

İLBANK

SUSTAINABLE CITIES PROJECT

Milas-Oren Sewerage System and Wastewater Treatment Plant Project

Environmental and Social Impact Assessment

FINAL REPORT

FEBRUARY 2022

encon

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ABBREVIATIONS

AoI	Area of Influence
BOD	Biochemical Oxygen Demand
CCD	United Nations Convention to Combat Desertification
CIMER	Communication Centre of Presidency of Turkey
CITES	Convention on International Trade in Endangered Species
CLRTAP	Convention on Long Range Transboundary Air Pollution
COD	Chemical Oxygen Demand
DLP	Defect Liability Period
DS	Dry Solids
EA	Environmental Assessment
EC	European Commission
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMEP	European Monitoring and Evaluation Programme
EMP	Environmental Management Plan
EP	Equivalent Population
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EU	European Union
EUR	European Euro
GP	Good Practices
GRP	Glass Reinforced Plastic
IFC	International Finance Corporation
ILBANK	Iller Bankasi A.S.
ILO	International Labor Organization
KBA	Key Biodiversity Area
MLSS	Mixed Liquor Suspended Solids
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MUSKI	Mugla Metropolitan Municipality General Directorate of Water & Sewerage Administration
OP	Operational Policies
PPF	Project Presentation File
pH	Power of Hydrogen
PM	Particulate Matter
POPs	Stockholm Convention on Persistent Organic Pollutants
PPM	Public Participation Meeting
PS	Performance Standard
RAMEN	Regulation on the Assessment and Management of Environmental Noise
RAMSAR	International Importance as Particularly Water Birds Living Environment
SEP	Stakeholder Engagement Plan
TN	Total Nitrogen

ABBREVIATIONS

TP	Total Phosphorus
TSS	Total Suspended Solids
TurkStat	Turkish Statistical Institute
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WBG	World Bank Group
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

İller Bankası A.Ş. (ILBANK) and World Bank (WB) have developed the Sustainable Cities Project (SCP) to establish a support mechanism for participating second level metropolitan municipalities to plan and invest in a sustainable future. The investments to be made within the scope of SCP will follow environmental legislation of Republic of Turkey as well as World Bank safeguard policies and standards. Under SCP financed by WB, two sub-loan agreements were signed between General Directorate of Water and Wastewater Utility of Mugla Metropolitan Municipality (MUSKI) and ILBANK in the wastewater sector. The project with MUS2-W2 code, which is subject to this study, is in the scope of SCP-II.

Currently there is no sanitary sewerage system in the Oren Neighborhood. Wastewater generated in the households is collected in septic tanks which are withdrawn by vacuum trucks. As of 2019, 103 l/s wastewater is generated from Oren Center, Turkevleri-Bozalan Neighborhoods (including marina) and Kilic Fishery. In addition to that, according to unofficial correspondence with MUSKI, in 2020, 1,971 wastewater withdrawals were made with eight-ton vacuum trucks, which corresponds to 15,768 tons of wastewater per year. However, the vast majority of existing septic tanks are not impermeable, therefore, significant part of the generated wastewater is also discharged into environment without any treatment.

This report has been prepared by Encon Çevre Danışmanlık Ltd. Şti. (ENCON) in the scope of the Environmental and Social Impact Assessment (ESIA) study conducted for the Milas-Oren Sewerage System and Wastewater Treatment Plant (WWTP) Project (the Project). The Project has two components; one is the construction of a 74.5 km sewerage network in Oren neighbourhood of Milas District with four buried pumping stations, and the other one is the construction of Oren WWTP on one parcel located in the borders of Oren neighbourhood and 1,542 meter discharge line.

The diameters of pipes to be used in Oren's sewerage system vary between Ø200 mm and Ø3000 mm. The pipes will be HDPE corrugated and Glass Reinforced Plastic (GRP). System's design is made according to 2054 population and flowrate. The 74.5 km sewerage network construction consists of installation of 53 km sewerage network, 9.5 km household connection and 12 km force main. Within the sewerage network, four underground pumping stations will be constructed. While two of the pumping pumping stations will be constructed as package pumping stations, the others will be constructed as reinforced concrete pumping stations.

The other component of the Project is Oren WWTP, which has a daily design capacity of 4,000 m^3/day for the 1st Stage (until 2028), and total of 8,000 m^3/day (4,000 m^3/day + 4,000 m^3/day) for the 2nd Stage (after 2028). The WWTP will be able to treat organic pollutants together with nitrogen and phosphorus. After the treatment, treated effluent will meet the national legislative quality criteria and necessary WBG EHS Guideline criteria and will be discharged to Hanay Creek through 1,542 meter discharge line to be constructed. Milas – Oren WWTP consists of the following units:

- Coarse Screen
- Pump Station
- Fine Screen
- Aerated Grit Chamber
- Rectangular Weir and Distribution Chamber
- Anaerobic BioP Tanks
- Aeration Tanks
- Final Sedimentation Distribution Chamber
- Final Sedimentation Tanks
- Treated Water Pit
- Disinfection Tank
- Sludge Pumping Station

- Sludge Thickener
- Sludge Dewatering Building
- Blower Building
- Administrative Building
- Transformer and Generator Building
- Security Cabin/Guardhouse

A map showing the location of the Project and the Project components is presented below in

Figure 0.1.

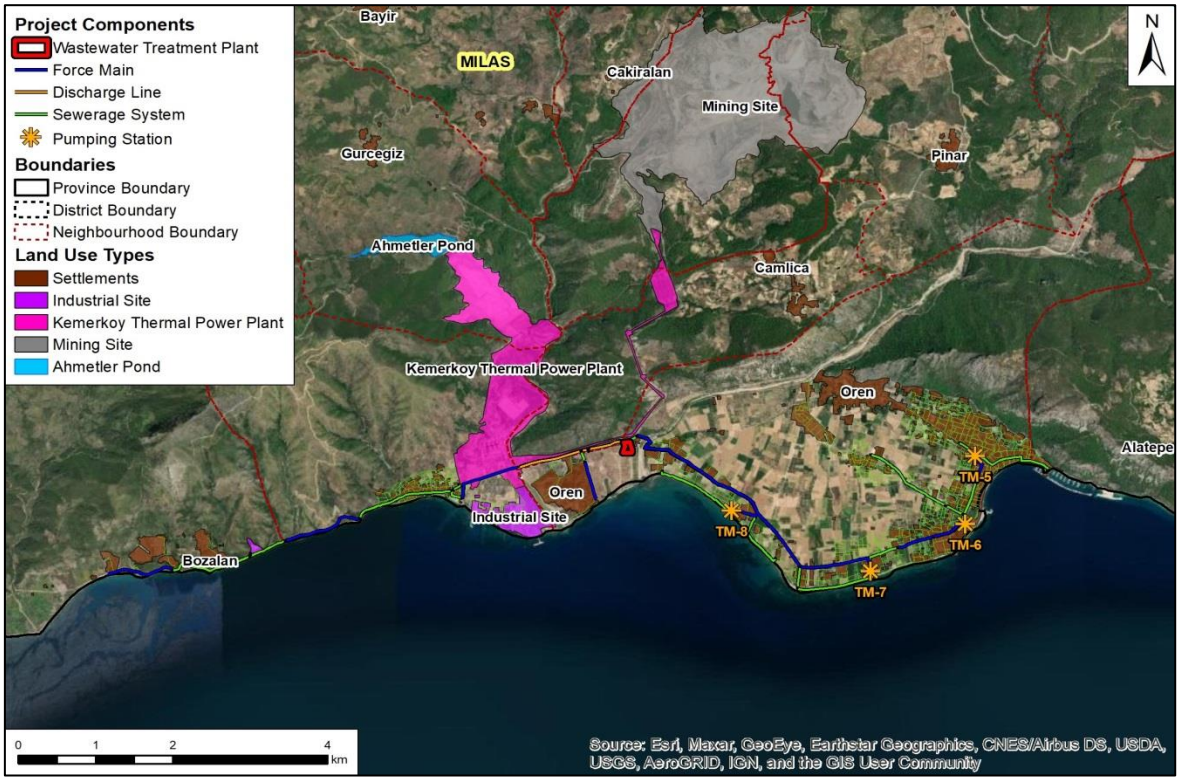


Figure 0.1 Location of the Project and the Project Components

The project will be in compliance with the good international practice, including World Bank Policies, guides, standards and best practices documents alongside the national legislation. Specific standards related to the project are as follows:

- World Bank OP 4.01 – Environmental Assessment
- World Bank OP 4.04 – Natural Habitats
- World Bank OP 4.11 – Physical Cultural Resources
- World Bank Group General Health and Safety Guidelines
- World Bank Group General EHS Guidelines: Water and Sanitation

According to the EU Environmental Impact Assessment (EIA) Directive the Oren WWTP is subject to Annex II, as the capacity of the WWTP is below 150.000 PE. Similarly, sewerage network is also subject to Annex II considering it within the scope of “Urban Development Projects”. For the projects that are subject to Annex II, the member states determine the need of an

Environmental Impact Assessment through a case-by-case basis examination or thresholds/criteria set by the Member State. According to the Turkish EIA Regulation, the Project is not subject to the mentioned legislation as the capacity of the WWTP is below both 150.000 PE for Annex I and 50.000 PE for Annex II requirement therein. Within this regard, EIA exempt decision is given for the WWTP. However, considering the location and environmental and social aspects of the Project, the Project has been proposed as a "Category A" Project by considering the OP 4.01 requirements. For "Category A" projects, a comprehensive full-scale ESIA is required to be conducted.

The Project is located at Oren neighbourhood of Milas district of Mugla. The Project design was made according to the projected populations for 2054. In 2054, the population to be served and wastewater generation rate will be 23,863 and 123 l/s, respectively.

In the scope of the baseline studies for the Project and to determine the existing contamination status of soils located in the site, two samples were taken from the site. Although both samples were taken from the WWTP site, the concentrations of some parameters significantly differ from each other, such as chromium, nickel and TPH. Chromium levels in uncontaminated soil vary in between 2 and 60 mg/kg and soils with chromium levels up to 100 mg/kg are considered as appropriate for agricultural activities (Seven v.d., 2018). Therefore, the chromium concentration observed in the sampling location-1 which is 205.2 mg/kg, and its comparison with the concentration observed in the second sampling location which is 57.17 mg/kg, indicate a possible contamination in the location-1. Nickel levels in soils vary widely depending on local geology and anthropogenic inputs, but concentrations typically range between 4 and 80 ppm (Seven v.d., 2018), however in the sampling location-1 nickel concentration is measured as 223.1 mg/kg. On the other hand in USA, the most commonly used soil cleanup standard for TPH is 100 mg/kg (Michelsen, 1993), in the current situation TPH levels in sampling location-2 is measured as 117.5 mg/kg. Therefore, the assessment made by evaluating chromium levels is also valid when considering TPH and nickel levels in the WWTP site.

Although it is not decided yet, it is expected that around 100 workers at the peak period of construction phase and 10 workers in the operation phase of the Project will be employed. Regardless of the exact number of people to be employed, priority will be given to the local community during recruitment process. The sewerage network and WWTP is planned to be completed in 24 months and 18 months, respectively, following tendering processes.

Within the scope of the Project, the excess sludge which will be generated during the operation of WWTP, will be analysed to determine compliance with the Annex-2 of the Regulation on Landfilling of Wastes and if it is deemed appropriate, the sludge will be collected by the licensed disposal companies determined by MUSKI every year. After that, the sludge will be disposed at landfill in accordance with the provisions of Urban Wastewater Treatment Regulation and other relevant legislation. According to the information retrieved from MUSKI, the sludge will be transported by competent and licensed firms to the landfill which has enough capacity. At the end, the sludge will be stored in the landfill. On the other hand, incineration and other options will be considered under the sludge management plan to be prepared prior to operational phase. Within this regard, according to information obtained from MUSKI, EIA Positive decision for incineration plant is obtained. However, whether the plant will be constructed or not is depends on the supply of funding for this issue. Currently, waste to energy system is not considered because the plant capacity is low, so the amount of sludge to be generated will be limited.

The Project's impacts on environmental and social issues are as follows:

- Project would have environmental and social impacts during construction and operation phases. Potential impacts of the Project during the construction phase would be generally short term with low to medium magnitude that would be locally significant. These impacts can be initially summarized as follows:
    - Permanent change of land type at the WWTP site.
    - Air emissions and increased level of noise generated from the operation of the construction machinery and equipment.

  - Soil contamination as a result of possible inadequate management of waste generated on site, and possible leakage of hazardous materials (oil and lubricants from outdoor equipment).
  - Loss of topsoil as a result of poor management.
  - Wastes to be produced by workers.
  - Removal of vegetation during land preparation.
  - Dust formation, increased level of noise, increased vehicle traffic and presence of workers can cause distress/disturbance to residents.
  - Disruption in traffic and infrastructure services.
- During both phases, significant adverse environmental impacts are not expected on soil and air. The most important impact related with air quality would be observed during construction phase at the Mugla Sitki Kocman University Fisheries Research and Development Centre, which is adjacent to the WWTP site. The increase in dust concentration might create problems for pools of the centre. In addition, there is a hospital around TM-6 pumping stations, and therefore, important impacts might be observed around this location.
- Oren WWTP's operation phase would possibly create odour nuisance in the close vicinity of the plant. Several levels of measures are recommended in the Chapter 7 of this report. It is recommended to MUSKI to plant trees to the WWTP borders to minimize impacts related with odour, noise, and dust generation, and aesthetics.
- One of the highest risks that Project carries is related with the ground characteristics of WWTP site. The WWTP site has liquefaction and ground stability risks and these risks should be managed.
- There is a minor risk of oil and chemical spills during the construction phase. However, in overall, the impacts can be reduced to negligible in significance through proper implementation of mitigation measures.
- Since the Project will be realized in settlements, the biological properties of the project area are determined to be negligible.
- The project will have positive impacts on both socio-economy and community health and safety, in general. Since the Project will solve wastewater problems of the region. However, there might be some risks to community during construction and operation phases. In construction phase, noise and dust generation, increase of traffic and community encroachment might be encountered. On the other hand, in operation phase, odor generation, operation failure of WWTP and community encroachment might be encountered. However, in overall, the impacts can be reduced to low in significance through proper implementation of mitigation measures.

For the management of anticipated impacts, an Environmental and Social Management Plan (ESMP) has been developed. The ESMP has been prepared to assess and identify the potential environmental and social impacts and risks arising out of the development of the Project and recommend mitigation measures for significant adverse environmental and social impacts and describes the monitoring and institutional requirements necessary to implement the ESMP. The primary purpose of the ESMP is to ensure that the environmental requirements and social commitments associated with the Project are carried forward into implementation and operational phases of the Project and are effectively managed. Summary of the mitigation measures developed for the anticipated impacts is as follows:

- For the impacts on soil environment:
  - The amount of soil that could be subject to compaction and contamination/pollution will be minimized by ensuring the use of only the designated work sites and routes for the construction machinery and equipment and field personnel
  - Wastes and wastewater to be generated during the construction phase of the Project will be stored and disposed in a controlled manner in accordance with the relevant regulations, WBG EHS Guidelines and in line with the management practices described in this report. Thus, it will not be possible for

the wastes and wastewater to be generated in the Project Area interact with the soil environment and cause any impacts.
    - Stripping of topsoil will not be conducted earlier than required to prevent the erosion of soil.
    - Topography will be restored for stop stabilization immediately after the completion of construction at each location
    - The areas that the construction works take place will be reinstated after the completion of works.
- For the impacts on air environment:
    - Dust should be minimized from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content
    - Continuous water spraying will be conducted at the WWTP site to minimize dust impacts on Mugla Sitki Kocman University Fisheries Research and Development, which is adjacent to the site, and during the works to be performed around TM-6.
    - Trees will be planted to the borders of WWTP, especially at the east and south borders.
    - Loading and unloading operations will be performed without throwing/scattering.
    - Wind shields/barriers will be placed at work sites, especially at the south and east borders of the WWTP site and around the TM-6 Pumping Station, to prevent dust dispersion.
- For the odor impacts:
    - First level measures:
        - Prevention of wastewater influents, which exceed treatment plant capacity.
        - Decrease in solid waste and activated sludge amounts.
        - Increase disposal frequency of screenings.
        - Proper and timely disposal of sludge in order to prevent flies and odor.
        - Increasing aeration rate in biological treatment process.
        - Addition of chlorinated water to sludge thickeners if activated sludge unit is in open area.
        - Addition of lime to activated sludge.
        - Keeping water level under control in order to prevent turbulence as a result of instant decrease of water.
    - If odor nuisance prevails after the proper implementation of first level measures, the second level measures shall be taken. These are
        - Plantation of trees in the WWTP site boundaries and the buffer zone around the treatment plant for the prevention of odor distribution.
        - Addition of oxidizing material (such as hydrogen peroxide, sodium hypochloride) (oxidizing materials, prevent generation of especially hydrogen sulphide). Addition of sodium hydroxide can also be considered. Sodium hydroxide will dissolve hydrogen sulphur gas in water.
        - Preventing anaerobic bacteria with control of pH levels or disinfection.
        - Oxidizing odorous compounds by the help of chemicals.
    - If nuisance still prevails after implementation of first and second measures, the final measure shall be determined as:
        - Enclosing of preliminary treatment units, aeration tanks and bio-P tanks.

- For noise impacts:
  - Construction noise barriers will be used at north-eastern boundary of the WWTP site and around the TM-6 Pumping Station and by doing so, around 5 to 10 dBA noise reduction would be achieved at the receptor.
  - Trees will be planted to the WWTP site, especially its north-eastern boundary, and around the pumping stations.
  - It will be ensured that machinery and equipment will not be operated together in the close section of the WWTP Area to nearest building
  - The works will be performed day-time; no night work unless it is absolutely necessary.
- For the impacts on water resources:
  - The MUSKI will minimize bypass of the treatment system.
  - The effluent water quality of the wastewater treatment plant will be consistent with applicable national requirements or internationally accepted standards.
  - Broken pipes and other repairs to be undertaken without delay,
  - Pumps and pumping stations to be adequately maintained,
  - System overflows will be prevented as much as possible by using level-meters.
  - No discharge will be made to water resources in the land preparation and construction within the scope of the Project.
  - The units of the Project that are in touch with water, wastewater and chemicals will be constructed with using concrete with appropriate cement ratio and durability in order to provide basement impermeability.
- For the impacts of waste generation:
  - Wastes to be generated within the scope of the Project will be managed in accordance with the waste management hierarchy.
  - Wastes will only be temporarily stored on site and final disposal will be carried out outside the facility.
  - Waste recycling, transport and disposal will be carried out by means of licensed companies and/or related municipalities.
  - Incineration or burying of wastes by any means at site and/or dumping of wastes to nearby roads or water resources will absolutely not be in question.
  - All kinds of implementations that may threaten personnel or public health will be avoided in all activities involving collection, temporary storage, transport and disposal of wastes throughout the Project.
  - Wastes to be temporarily stored on site will be delivered to licensed transport vehicles appropriate to the type of waste for disposal. Information related to the operations in this context will be recorded and the records will be kept in the administrative building.
  - Hazardous or non-hazardous inscription, waste code, stored waste amount and storage date will be indicated/labelled on wastes temporary stored by classifying according to their properties. The reaction of wastes with each other will be prevented by the measures taken in the Temporary Storage Area.
- For the impacts on biodiversity:
  - No protected and sensitive ecosystems or species are foreseen to exist within the project area. However, prior to the land preparation phase, definite working areas will be set up where activities (e.g. vegetation clearing, vegetation removal, levelling and construction) and permanent structures (units and roads) will be established;
  - Construction work will be done gradually so that it will have enough time to escape for possible fauna species to be found.
- For the impacts on socio-economic environment:
  - Prior to construction activities, the Contractor will install all signs, barriers and control devices needed to ensure the safe use of the road by traffic and pedestrians, as required by the transport and traffic management plan to be prepared.

  - Local authorities and residents in a working area will be consulted and informed before any detours for construction or diverted public traffic are established
  - Disruptions to traffic and road transport will be minimized. The contractor shall ensure that the roads remain open to traffic during construction activities.
  - Disposal sites and haul routes will be identified and coordinated with local officials.
  - Guidance, directives and recommendations of Republic of Turkey Ministry of Health, Republic of Turkey Ministry of Family, Labor and Social Services, and World Health Organization shall be followed and all relevant necessary measures shall be taken in case of an outbreak of any other pandemic/communicable disease including COVID-19.
- For the impacts on labour and working conditions:
  - Except local recruitment, the Project impacts on labour and working conditions are generally assessed as adverse and low in significance. In the management of labor and working conditions the World Bank policies will be followed together with the provisions of the related Turkish national legislation.
- For the impacts on community health and safety:
  - All unit shutdown requirements will be scheduled at least one week beforehand and MUSKI will make necessary adjustments.
  - In major shutdowns of the plant or biological treatment units that require longer times, nutrition levels will be maintained at the biological treatment units, aeration will be stopped after one day for aerobic processes.
  - During the longer shutdowns or failures, MUSKI will inform Provincial Directorate of Environment, Urbanization and Climate Change regarding the situation.
  - During excessive loads that the WWTP cannot handle, the bypass line of the plant will be used to bypass the load.
  - Community Health, Safety, and Security Management Plan that is in line with OP 4.01 and WBG EHS Guidelines (both general and sector specific) will be developed by MUSKI or security services provider before the construction phase. MUSKI and contractor will ensure that the plan is actively implemented.
- For the impacts on archaeological and cultural heritage:
  - As required by Article 4 of Law on the Conservation of Cultural and Natural Properties (2863 Numbered Law), chance finds procedure will be implemented during land preparation and construction works.

As a part of the mitigation measures, it is recommended that an Environmental and Social Management System (ESMS) covers all phases of the Project and consists of management plans on different subjects should be developed. A list of recommended management plans for both phases of the Project are presented below;

Construction Phase;

- A Soil Management Plan,
- An Oil and Chemical Spill Contingency Management Plan,
- A Dust Management Plan,
- A Noise Management Plan,
- A Water Resources and Effluent Management Plan,
- A Waste Management Plan,
- A Pollution Prevention Plan,
- A Transport and Traffic Management Plan,
- An Occupational Health and Safety Management Plan,
- A Community Health, Safety, and Security Management Plan,
- A Workforce Management Plan,

- An Emergency Preparedness and Response Plan,
- A Stakeholder Engagement Plan (SEP).
- A Contractor Management Plan

Operation Phase;

- An Odor Management Plan,
- A Sludge Management Plan,
- A Waste Management Plan,
- An Occupational Health and Safety Management Plan,
- A Community Health, Safety, and Security Management Plan
- A Water Resources and Effluent Management Plan,
- An Emergency Preparedness and Response Plan,
- A Stakeholder Engagement Plan.

To ensure the continuity and effectiveness of the implementation of mitigation management strategies defined, monitoring plays a key role and therefore, monitoring plans for construction and operation phases are defined and presented in Chapter VII Environmental and Social Management Plan of this report. The monitoring requirements cover monitoring of storage and reuse of excavation waste, storage conditions of chemicals and hazardous materials, soil quality, air quality, noise levels, effluent water quality of Oren WWTP and WWTP's treatment performance, requirements of Project's grievance mechanism, labour and working conditions, community health and safety, and socio-economic subjects.

MUSKI should manage an effective information disclosure system in line with the World Bank Information Disclosure Policy, and should request from its possible contractors to do so. Also, in order to collect the opinions of the community, MUSKI should operate an effective grievance mechanism and stakeholder engagement.

Overall, with the realization of the Project, the wastewaters will be treated, discharge of untreated wastewaters into environment will be prevented and the Project will have positive impact on both the environment and public health.

The first public participation meeting (PPM-1) was held on July 7, 2020, at Oren with the participation of 84 people. The discussions and Q&A sessions were fruitful and the community was made aware of the Project and its possible environmental and social impacts. In general, the community supports the Project since they have been awaiting this Project to start for many years. Following the completion of the Draft ESIA Report, PPM-II was held at February 11th, 2022 with the participation of 63 people. In this context, the findings of the ESIA studies were shared with the public and stakeholders. Their opinions, concerns and suggestions were obtained and considered and addressed in this Final ESIA as relevant.

I. INTRODUCTION

I.1 Description of the Project

İller Bankası A.Ş. (ILBANK) and World Bank (WB) have developed the Sustainable Cities Project (SCP) to establish a support mechanism for participating second level metropolitan municipalities to plan and invest in a sustainable future. The investments to be made within the scope of SCP will follow environmental legislation of Republic of Turkey as well as World Bank safeguard policies and standards. Under SCP financed by WB, two sub-loan agreements were signed between General Directorate of Water and Wastewater Utility of Mugla Metropolitan Municipality (MUSKI) and ILBANK in the wastewater sector. The project with MUS2-W2 code, which is subject to this study, is in the scope of SCP-II.

This report has been prepared by Encon Çevre Danışmanlık Ltd. Şti. (ENCON) in the scope of the Environmental and Social Impact Assessment (ESIA) study conducted for the Milas-Oren Sewerage System and Wastewater Treatment Plant (WWTP) Project (the Project). Under the scope of the Project, one component is the construction of sewerage networks in Oren neighbourhood of Milas District. The other component is the construction of Oren WWTP on one parcel located in the borders of Oren neighbourhood with additional discharge line.

The diameters of pipes to be used in Oren's sewerage system vary between Ø200 mm and Ø3000 mm. The pipes will be HDPE corrugated and GRP. System's design is made according to 2054 population and flowrate. The 74.5 km sewerage network construction consists of installation of 53 km sewerage network, 9.5 km household connection and 12 km force main. The other component of the Project is Oren WWTP, which has a daily design capacity of 4,000 m^3/day for the 1st Stage (until 2028), and total of 8,000 m^3/day (4,000 m^3/day + 4,000 m^3/day) for the 2nd Stage (after 2028). The WWTP will be able to treat organic pollutants together with nitrogen and phosphorus. After the treatment, treated effluent will meet the national legislative quality criteria and necessary WBG EHS Guideline criteria and will be discharged to Hanay Creek through 1,542 meter discharge line to be constructed.

I.2 Scope of the Environmental and Social Impact Assessment Studies

This ESIA Report in hand is prepared for the Project in full compliance with the World Bank Safeguards Policies, to ensure that the upcoming stages of the project will meet these standards. The ESIA studies for the Project were carried out through utilization of resources including the related literature, previously prepared reports, information provided by MUSKI and ILBANK, and outcomes of the field studies that covers sampling and measurement campaigns to determine baseline conditions and surveys, interviews, and discussions made with dwellers, muhtars and municipality representatives.

After gathering required data from the sources, the studies were carried out with impact assessment using relevant impact assessment methodologies including mathematical calculations, geographical information systems, sampling, analysis, face-to-face surveys, and interviews, and experts' opinions. The "List of Preparers and Contributors" who have contributed in the ESIA studies is included in Annex 1 of this report.

Various documents were consulted during the preparation of the ESIA Report, including legal reports, laws and regulations, technical and economic reports regarding the project, publications on land use, natural resources, geology, socio-economic features of the area/region, maps, various data on water quality, hydrology, and climatology obtained from different agencies (see References). The impacts were identified and evaluated in the light of all results gathered together.

Finally, the report was prepared by ENCON, covering baseline conditions of the physical, biological, and socio-economic environments, assessments regarding the potential impact of the

project on the outlined baseline conditions, mitigation measures, environmental and social management plans (ESMPs) that covers construction and operation phases, evaluation of project's site and technology alternatives, and public participation activities.

I.3 Structure of the ESIA Report

The World Bank policies formed the basis of the development of environmental, social and ESIA policies of the International Finance Institutions (IFIs). The general outline of this ESIA report is guided by the requirements of the World Bank's Operational Policy (OP) 4.01 Environmental Assessment (EA) for Category A Projects[1], and includes the following major headings;

- Introduction
- Project description
- Policy, legal and administrative framework
- Baseline data
- Environmental and social impacts and risk and mitigation measures
- Analysis of alternatives
- Environmental and social management plan (ESMP)
- Public participation
- Annexes

The Project was structured around the above-mentioned main headings. The information provided in the report was detailed under these headings to the extent that the best available data allowed. Accordingly, the chapters included in the ESIA Report can be briefly explained as the following:

- Chapter I. **Introduction**; leads an introduction to the project and ESIA Report, providing project details and environmental and social impact studies.
- Chapter II. **Project Purpose and Description**; is a description of the project including its location, components, technical specifications, associated construction and operation activities, and a proposed schedule for implementation.
- Chapter III. **Policy, Legal and Administrative Framework**; explains national and international legal requirements, and also identified environmental agreements that are relevant to the project. It also gives an in-depth explanation on the EIA procedure in Turkey.
- Chapter IV. **Environmental and Social Baseline Conditions**; describes the baseline conditions in and around the proposed project area, including physical, biological and socio-economic conditions.
- Chapter V. **Environmental and Social Impact Assessment and Mitigation Measures**; assesses the potential positive and negative impacts of the project, identifying mitigation measures.
- Chapter VI. **Project Alternatives**; is an analysis of feasible alternatives to the proposed project site, technology, design and operation, including a "no project" alternative.
- Chapter VII. **Environmental and Social Management Plan**; describes the necessary management strategies, monitoring activities, and responsibilities for implementation of the identified mitigation measures.

[1] *A proposed Project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. The impacts may affect an area broader than the sites or facilities subject to physical works. EA for a Category A project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives, and recommends any measures needed to prevent, minimize and mitigate, or compensate for adverse impacts and improve environmental performance (The World Bank, 2011).*

- Chapter VIII **Public Participation**, gives the detailed information about the conducted public participation meeting, sets out the comments of the community, and the results of the questionnaire,

In line with the World Bank OP 4.01, supplementary information, such as list of preparers and contributors, references, official letters, related reports, etc., which is relevant to the contents of the chapters listed above, will be provided in the annexes of the ESIA Report.

II. PROJECT DESCRIPTION

II.1 Project Location

Mugla is a city in south-western Turkey and stretches along the Aegean coast. The city center is located inland at an altitude of 660 m and lies at a distance of about 30 km from the nearest coast. Districts of Mugla are Bodrum, Dalaman, Datça, Fethiye, Kavaklıdere, Köyceğiz, Marmaris, Milas, Menteşe, Ortaca, Seydikemer, Ula and Yatağan. Mugla is surrounded by Aydın Province on north, Denizli Province on east, Burdur Province on east-southeast and Antalya Province on southeast. Major part of Mugla belongs to Aegean Region while the remaining small portion belongs to Mediterranean Region.

The Project Area is located in the Oren Neighborhood of Milas District. The districts of Mugla are shown in Figure II.1. In Figure II.2, the site location map of the Project is presented.

Air distances to the WWTP site are 33.5 km from Milas District Center and 44.5 km from Mugla City Center. Oren WWTP site's distances to nearest settlements are shown on a map given in Figure II.3.

The construction works of sewerage network will be conducted on existing zoning roads and no land acquisition is required. On the other hand, pumping stations will be built on public lands that are registered as park, therefore, no land acquisition is required for pumping stations either.

For the second component of the Project, which is Oren WWTP, parcel 407/1 will be used. The parcel, previously owned by Mugla Metropolitan Municipality, currently belongs to MUSKI. According to the information given by MUSKI, the parcel is currently in idle status and there is no land use for any purpose. On the other hand, construction works of the discharge line will be conducted on existing zoning roads and no land acquisition is required within this regard. Details about the vicinity of the WWTP site are as follows:

- On the north, state road
- On the west, Mugla Sitki Kocman University Fisheries Research and Development Center
- On the east and south; privately-owned plots where construction of yacht manufacturing repair and boatyard is currently undergoing.

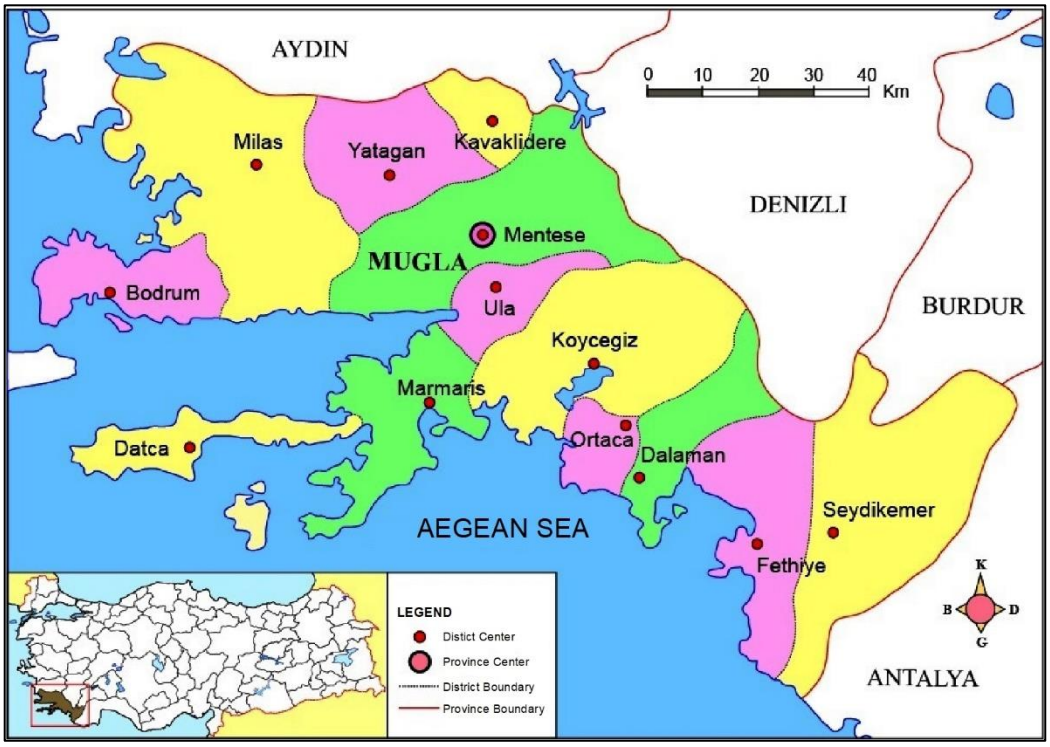


Figure II.1 Districts of Mugla

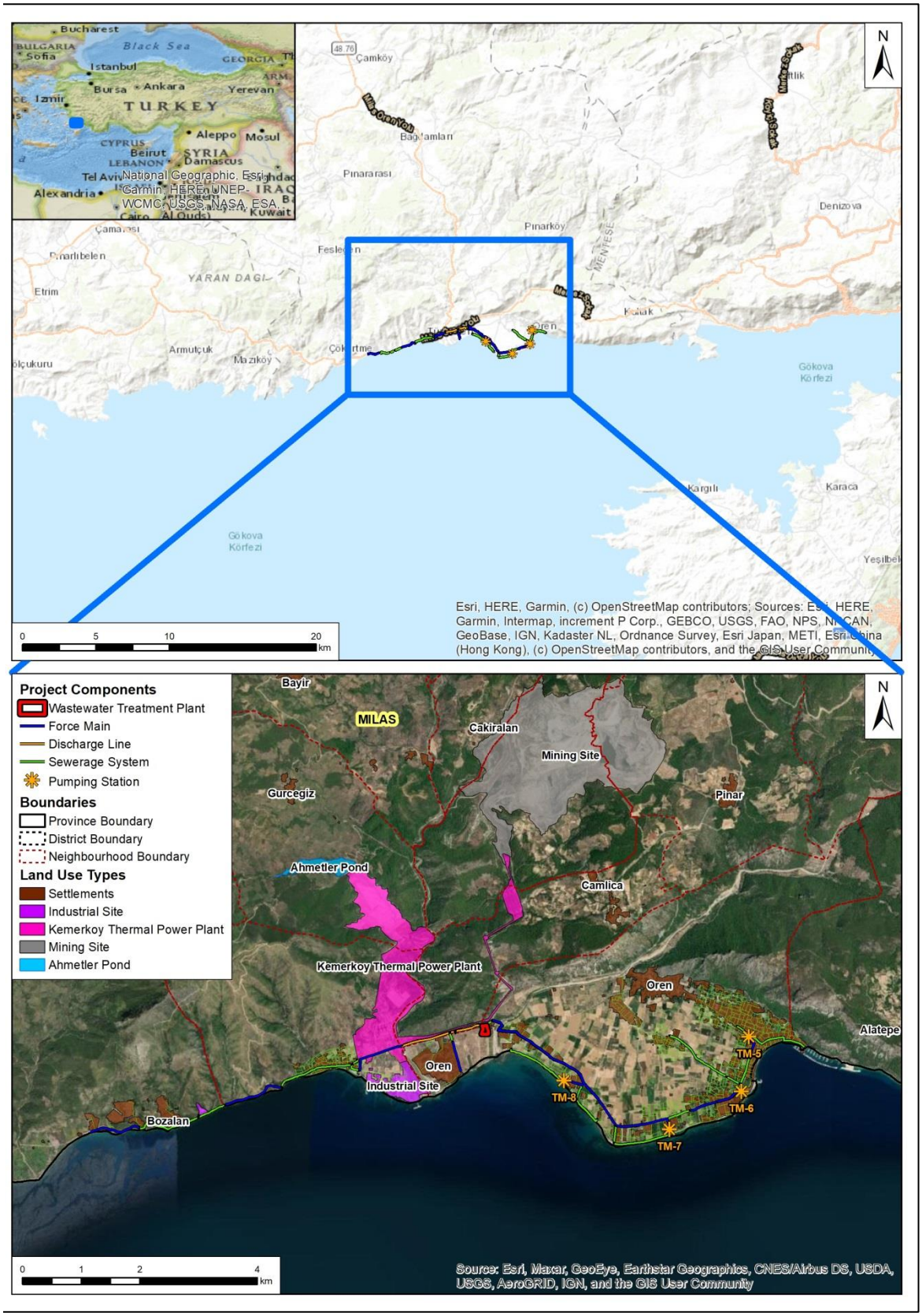


Figure II.2. Site location map

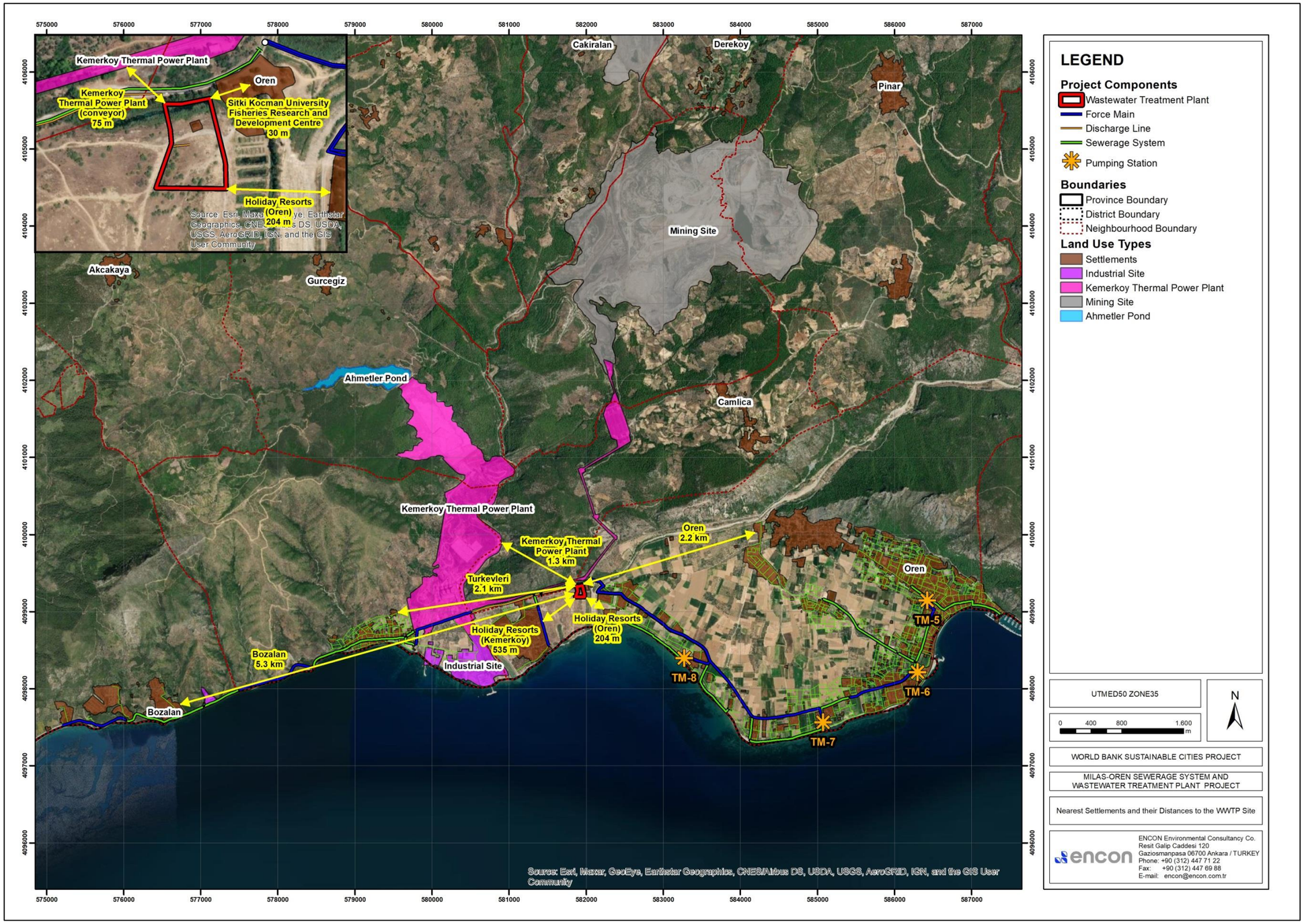
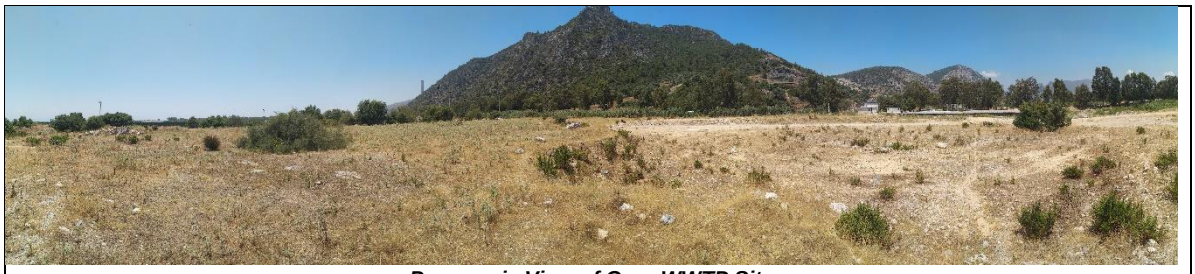


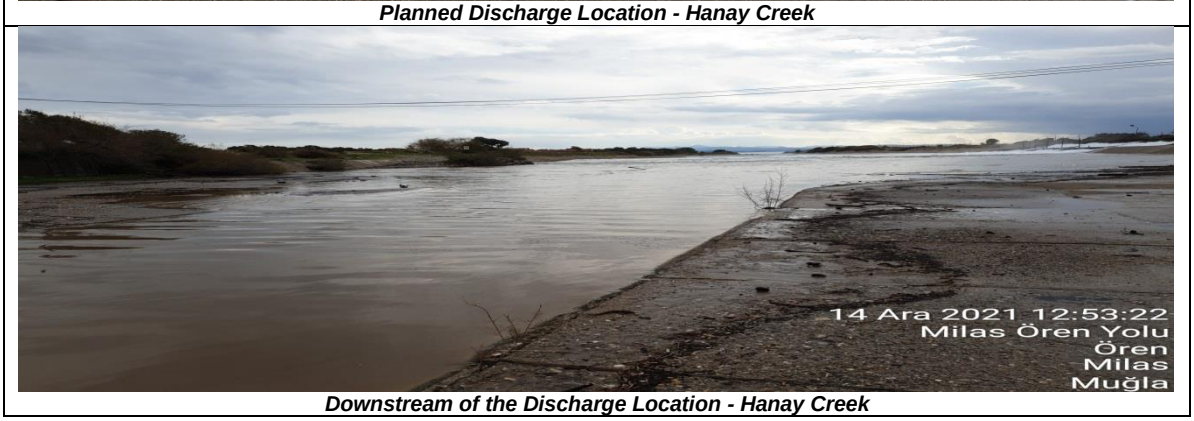
Figure II.3. Nearest Settlements and their Distances to the WWTP Site

Photos from the WWTP site are presented in Figure II.4 and following this, the general layout of the Project is presented in the Figure II.7.



Panoramic View of Oren WWTP Site

Planned Discharge Location - Hanay Creek



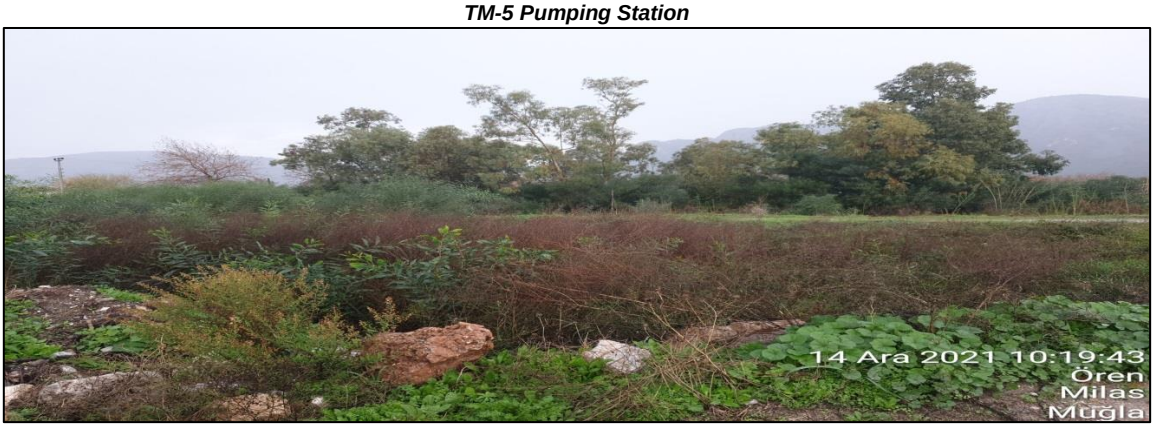
Downstream of the Discharge Location - Hanay Creek

Figure II.4 Photos from the Project Site

II.2 Land Ownership Status

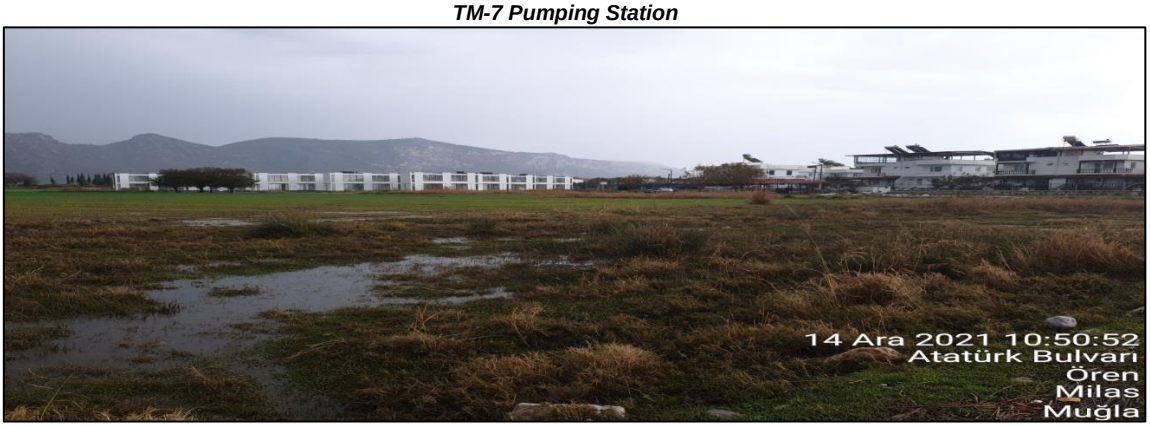
The construction works of sewerage network and discharge line will be conducted on existing zoning roads and no land acquisition is required. On the other hand, pumping stations will be built on public lands that are registered as park, therefore, no land acquisition is required for pumping stations either. Photos taken from the areas where pumping stations will be built are provided in Figure II.5.

TM-5 Pumping Station



TM-6 Pumping Station

TM-7 Pumping Station



TM-8 Pumping Station

Figure II.5 Photos from the Planned Pumping Stations

For the second component of the Project, which is Oren WWTP, parcel 407/1 will be used. The parcel, previously owned by Mugla Metropolitan Municipality, currently belongs to MUSKI. The parcel was transferred to the use of MUSKI on May 28th, 2020. The official letters and documents regarding the land ownership status of the Project components are provided in the Annex-8 of this report.

In terms of auxiliary facilities, the construction/camp site will be established at the WWTP site which currently belongs to MUSKI. For the energy transmission lines cadastral roads will be used.

Although the energy transmission line has a linear route, only electric poles with a base size of approximately 5m x 5m will be erected for the energy transmission line. For this reason, in case of any expropriation process will be needed, the land acquisition area will be very limited as the land acquisition will only be for the electric poles. Based on that, if energy transmission line will pass on any private lands or private users on public parcels on the finalized design, then expropriation and easement activities will be carried out based on the national Expropriation Law (Official Gazette Date: 08.11.1983 Number of Official Gazette: 18215) and World Bank OP 4.12 - Involuntary Resettlement. As per the Resettlement Policy Framework of Ilbank for the Project a RAP (consistent with RPF) will be prepared by MUSKI, reviewed by Ilbank and submitted to WB for review and approval. Expropriation activities and access to land will not take place without a World Bank-approved RAP being in place and implemented. Meaning, for any loss of land or establishing easement rights for the ETL components, compensations will be paid or deposited into escrow accounts in accordance with the RAP before civil works start. After the expropriation activities, ownership of the transmission line will be transferred to Turkish Electricity Transmission Corporation (TEİAŞ). According to that, necessary procedures will be followed as well.

According to the information given by MUSKI, the parcel is currently in idle status and there is no land use for any purpose. Photographs taken from the WWTP site are provided in Figure II.6.

Figure II.6 Photographs Taken from the WWTP Site

Moreover, as the WWTP site is accessible through the existing road network and the sewerage network and discharge line will be constructed on public roads, construction of any access/service road is not required.

However, no construction works should start in the parcels where public benefit decision is taken for the ETL components and hence, expropriation or easement rights to be applied. In order to enter the land, MUSKI has to prepare a RAP in line with the RPF and submit to ILBANK and WB for review and approval. After RAP approved and implemented (meaning depositing compensation to people's accounts) then they can access lands.

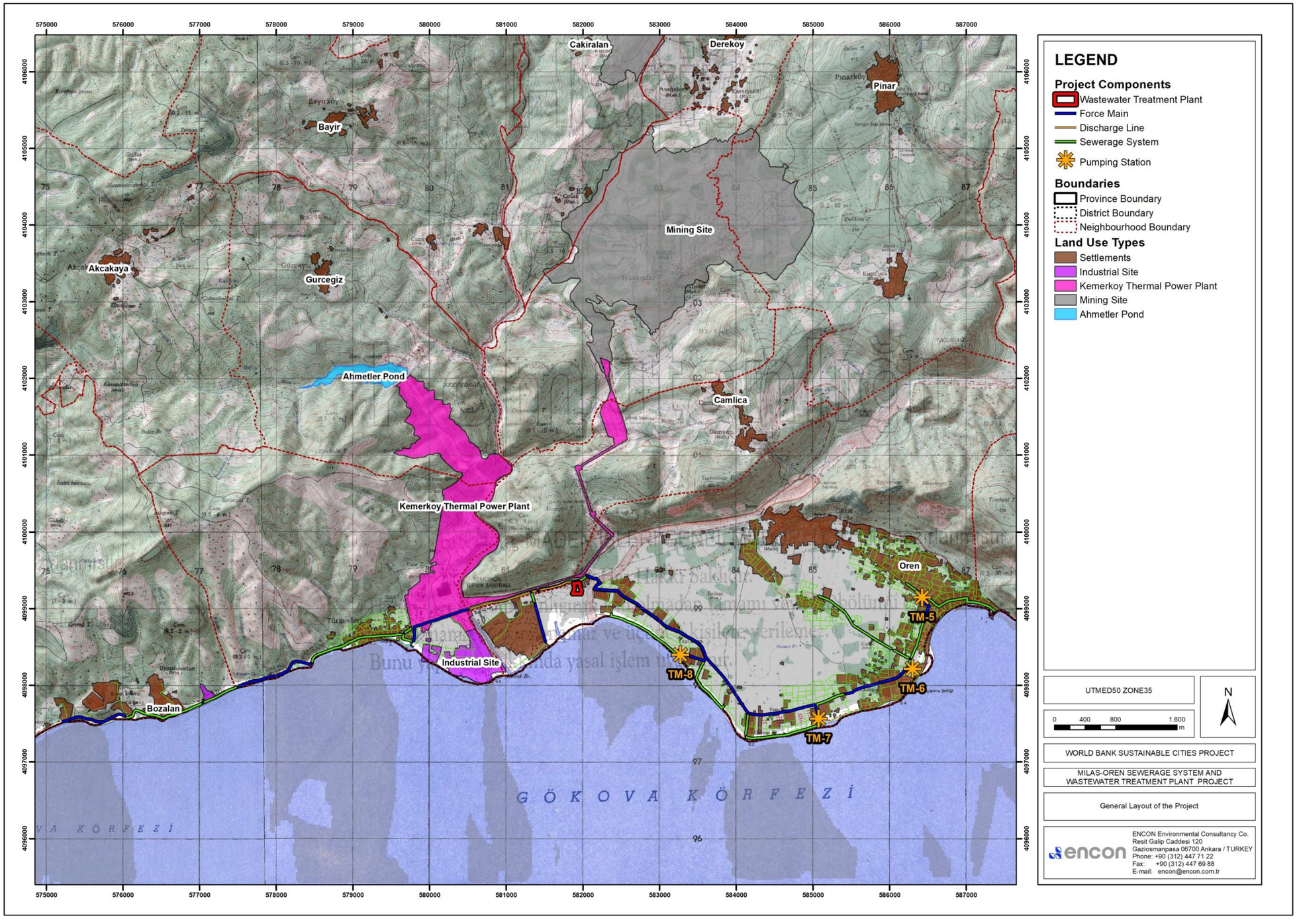


Figure II.7 General Layout of the Project

II.3 Population Projections

Population projection is an essential part in the design of a sewage network and WWTP projects. In order to meet the future demand, the population projection of the settlements located in the service area should be handled properly. When calculating the future population and accordingly the wastewater generation in the sewage and wastewater treatment facility projects, generally, 30 years for the service period and 5 years for the realization of the facility (construction) are accepted and thus, the target year of the project is determined. In the case of the Project at hand, the target year is determined as 2054 and the population calculations are done accordingly.

The projections are conducted by using several calculation methods such as Ilbank Population Calculation Method, Population Projection According to Zoning Plan. After the calculations, the results are compared with each other and the most realistic one selected as a design population.

II.3.1 Population Projection Methods

Ilbank Population Calculation Method

This method is developed and used frequently by Ilbank (former Bank of Provinces) and is utilized prevalently during the design phase of infrastructure projects in Turkey. The calculation is mainly based on geometric method.

According to this method, the following formulae are used; the first one is used to calculate population growth coefficient (P) and the second one is used to calculate future population (Ng):

$$P = \left(\sqrt[a]{\frac{Ny}{Ne}} - 1 \right) x100$$

$$Ng = Ny\left(1 + \frac{P}{100}\right)^{ng-ny}$$

Where:

P	: Population growth coefficient
N_g	: Projection year population
N_y	: Latest census result
N_e	: First census result
a	: Time between first and last census (in years)
n	: Calculation year

In this method, in order to avoid unrealistically high and/or low population projections, upper and lower limit values are defined for P. Therefore;

- If P<1, then P is taken as 1;
- If 1<P<3, then P is taken as found, and
- If P>3, then P is taken as 3.

Population Projection According to Zoning Plan

Land use in residential areas (Peer) = 60%

Area of an Average Apartment = 100 m²

Average Household Size (TUIK) = 2.86 Capita

Total Housing Zone in the Zoning Plan = Housing + Developing Housing Zone (m²)

$$\frac{Housing\ Zone * 60\% * 2.86}{100\ m^2} = N\ (Capita)$$

Housing Zone = 762,989.58 m²

$$\frac{762989.58 * 60\% * 2.86}{100\ m^2} = 13{,}093\ Capita$$

Land use in residential areas (Peer) = 100%

Area of an Average Apartment = 100 m²

Average Household Size (TUIK) = 2.86 Capita

Total Housing Zone in the Zoning Plan = Housing + Developing Housing Zone (m²)

$$\frac{Housing\ Zone * 100\% * 2.86}{100\ m^2} = N\ (Capita)$$

Housing Zone =615,446.00 m²

$$\frac{615146.00 * 100\% * 2.86}{100\ m^2} = 17{,}601\ Capita$$

Land use in residential areas (Peer) = 30%

Area of an Average Apartment = 100 m²

Average Household Size (TUIK) = 2.86 Capita

Total Housing Zone in the Zoning Plan = Housing + Developing Housing Zone (m²)

$$\frac{Housing\ Zone * 30\% * 2.86}{100\ m^2} = N\ (Capita)$$

Housing Zone =236,619.00 m²

$$\frac{236619.00 * \%30 * 2.86}{100\ m^2} = 2{,}031\ Capita$$

Türkevleri Neighborhood: 821 Capita

Total Population: 13,093 + 17,601 + 2,031 + 821 = 33,546 Capita

II.3.2 Comparison of Population Projections

The population increase rate (P_{avg}) is obtained as 1.82 by using the census results of the previous years (1940-2018) for Oren Neighborhood. However, another calculation was made at the request of the administration using Population Projection According to Zoning Plan and the resulting population was calculated as N = 33,546. The value of P_{avg} calculated by Ilbank Population Calculation Method was then accepted as 3.00 and the difference between the two projections was accepted as a result of Secondary Housings (Summerhouse, time-share etc.) and calculations were made accordingly.

According to the calculations, the projected populations are given in the Table II.1 and Table II.2 in terms of summer and winter populations, respectively. Winter populations are accepted as the resident population of Oren whereas; tourism contribution is also taken into consideration during the summer period projection calculations.

Table II.1 Oren Neighbourhood Winter Population Projection

Years	Population
2018	3.058
2019	3.150
2024	3.651
2029	4.233
2034	4.907
2039	5.689
2044	6.595
2049	7.645
2054	**8.863**

Source: Milas District Oren Neighbourhood Sewerage Network Project Identification Report

The summer populations of the settlement areas of the Oren neighbourhood, which constitute the subject of the project, in line with the projected design stages and considering that the region is a touristic one are considered with the addition of; the residential population, tourism population, secondary housings, excursionists and hotel population.

In this context, these categories are defined as;

- Residential Population: Population residing in the region during both winter and summer seasons.
- Tourism Population: Population coming to the region as a result of tourism activities and staying in hotels, motels, hostels, resorts and similar touristic facilities.
- Secondary Housing: The periodic residents of the housing estates, timeshare and private summer houses.
- Excursionists: Population found in the region for tourism purposes for less than a day.
- Hotel Population: The working population of hotels in the region.

Table II.2 Oren Neighbourhood Summer Population Projection

Years	Local Population		Tourism Related Population			Total
	Residents	Secondary Housing	Tourist Population	Excursionist Population	Hotel Personnel	
2019	3,150	5,000	800	2,500	200	11,650
2024	3,651	5,429	900	2,857	243	13,080
2029	4,233	5,857	1,000	3,214	286	14,590
2034	4,907	6,286	1,100	3,571	329	16,193
2039	5,689	6,714	1,200	3,929	371	17,903
2044	6,595	7,143	1,300	4,286	414	19,738
2049	7,645	7,571	1,400	4,643	457	21,716
2054	8,863	8,000	1,500	5,000	500	23,863

Source: Milas District Oren Neighbourhood Sewerage Network Project Identification Report

For further information on the population projection calculations please see the document named "*Milas District Oren Neighbourhood Sewerage Network Project Identification Report*" prepared by IC Engineering, Architecture and Consulting Services Ltd. for this Project.

II.4 Wastewater Projections for the Project

II.4.1 Wastewater Flowrate Projections

In order to identify the required capacities of sewerage network and WWTPs, accurate wastewater projections are as much important as population projections. The wastewater amount calculations are performed based on the water consumption per capita values. Assumed water consumption per capita data are provided in Table II.3. According to the accepted consumption rates the wastewater amounts that is foreseen to be generated in the coming years are given in Table II.4.

Table II.3 Population-Dependent Water Consumption per Capita

Population Type	l/cap.d
Resident Population	260
Secondary Housing	260
Tourism	360
Excursionist	60
Hotel Personnel	100

Source: Milas District Oren Neighbourhood Sewerage Network Project Identification Report

Table II.4 Wastewater Generation Rates in the Next Years According to Population Projection of Oren District

Years	Local Population		Tourism Related Population			Total (l/sec)
	Residents (l/sec)	Secondary Housing (l/sec)	Tourist Population (l/sec)	Excursionist Population (l/sec)	Hotel Personnel (l/sec)	
2019	9.48	15.05	3.33	1.74	0.23	30.00
2024	10.99	16.34	3.75	1.98	0.28	33.50
2029	12.74	17.63	4.17	2.23	0.33	37.50
2034	14.77	18.92	4.58	2.48	0.38	41.50
2039	17.12	20.20	5.00	2.73	0.43	45.50
2044	19.85	21.50	5.42	2.98	0.48	50.50
2049	23.01	22.78	5.83	3.22	0.53	55.50
2054	26.67	24.07	6.25	3.47	0.58	61.50

Source: Milas District Oren Neighbourhood Sewerage Network Project Identification Report

Domestic Wastewater Generation

The entire project area produces domestic wastewater. In the previous section, 24-hour wastewater generation of the District was determined. It is foreseen that the wastewater generated will reach the sewerage network in 12 hours. The total amount of wastewater generated according to the years is given in Table II.5 below.

Table II.5 The Total Amount of Wastewater Generated in Oren Neighbourhood

Years	Flowrate
2019	30.00 * 2 = 60.00 l/sec
2024	33.50 * 2 = 67.00 l/sec
2029	37.50 * 2 = 75.00 l/sec
2034	41.50 * 2 = 82.00 l/sec
2039	45.50 * 2 = 91.00 l/sec
2044	50.50 * 2 = 101.00 l/sec
2049	55.50 * 2 = 111.00 l/sec
2054	**61.50 * 2 = 123.00 l/sec**

Source: Milas District Oren Neighbourhood Sewerage Network Project Identification Report

In addition to the domestic wastewater generation rates of the area that the Project will serve, the wastewater flow coming from Turkevleri and Bozalan Neighborhoods which are generally consist of holiday camps and summer houses, located in the western part of Oren neighborhood are also considered as downstream flow for the Project. Also, the wastewater from the marina within the borders of the Oren neighborhood will also be given in the system as downstream flow.

Moreover, Kilic Fishery and Fish Farm located in Bozalan Neighborhood currently using a sewage truck to collect its wastewaters and discharge it. The wastewater from this Fish Farm will also be discharged into the new sewer system in the scope of the Project as downstream flow. The total wastewater flowrates of the area that the project will serve at the target year (2054) is given in Table II.6 below.

Table II.6 Wastewater Flows of the Settlements in the Scope of the Project (2054)

Settlements	Wastewater Flowrate (l/s)
Oren - Centre	**100.00**
Turkevleri – Bozalan Neighbourhoods (plus Marina)	**23.00**
Fishery	**13.00**
Total	**136.00**

Design Flowrates

The design flowrates of the Milas – Oren WWTP for 1st and 2nd stages are presented in Table II.7. These flowrate determinations were conducted based on the approved feasibility reports and the negotiations made with the related governmental authority.

Table II.7 Milas – Oren WWTP Design Flowrates

Flowrates	1st Stage (2028)	2nd Stage (2054)
Domestic Wastewater	4,000 m^3/day	8,000 m^3/day
Industrial Wastewater	-	-
Total Flowrate	**4,000 m^3/day**	**8,000 m^3/day**
Maximum Flow Q_{max}	333 m^3/h	666 m^3/h
Average Flow Q_{avg}	166.7 m^3/h	333 m^3/h
Minimum Flow Q_{min}	108 m^3/h	216 m^3/h
Pumping Flow Q_{pump}	350 m^3/h	700 m^3/h

Source: Milas District Oren Neighbourhood Sewerage Network Project Preliminary Design Report

II.4.2 Wastewater Characterization

For the characterization of wastewater, pollution load per capita data found by conducted literature research was used. This was found to be sufficient and accurate since the only wastewater source will be domestic and it is easy to find literature values for the characterization of domestic wastewater.

During literature searches, different pollution load per capita values were found (Erdogan et. al., 2005; WWTP Technical Specifications Communique, 2010; WWTP Design Guide, 2012; ATV-A 281 E, 2001 etc.). The wastewater characterization calculations were performed by using these entire different pollution load per capita values and ATV-DVWK standards. After the calculations performed, the obtained wastewater characteristics and pollution load of Milas – Oren WWTP are given in Table II.8.

Table II.8 Milas - Oren WWTP Wastewater Characterization and Pollution Load

Parameters (Winter)	1st Stage (2028) (P=4,250 cap, Q_{avg}=340 m^3/d)		2nd Stage (2054) (P=6,500 cap, Q_{avg}=520 m^3/d)	
	Pollution Load (kg/day)	Concentration (mg/L)	Pollution Load (kg/day)	Concentration (mg/L)
BOD_5	123	363	189	363
TSS	170	500	260	500
Nitrogen (N)	26	75	39	75
Phosphorus (P)	3	9	5	9
Parameters (Summer)	**1st Stage (2028) (P=11,000 cap, Q_{avg}=880 m^3/d)**		**2nd Stage (2054) (P=19,000 cap, Q_{avg}=1,520 m^3/d)**	
	Pollution Load (kg/day)	**Concentration (mg/L)**	**Pollution Load (kg/day)**	**Concentration (mg/L)**
BOD_5	319	363	551	363
TSS	440	500	760	500
Nitrogen (N)	66	75	114	75
Phosphorus (P)	8	9	13	9

Source: Milas District Oren Neighbourhood Sewerage Network Project Identification Report

II.4.3 Effluent Characterization

Discharge standards for Milas – Oren WWTP has been determined based on the Urban Wastewater Treatment Regulation (Official Gazette date: January 8, 2006, number: 26047) which was published to accomplish the harmonization of national regulations with Directive 91/271/EEC on Urban Waste Water Treatment and Directive 98/15/EEC amending Directive 91/271/EEC. Discharge standards to be complied with are given in Table II.9 and these standards are accepted as maximum limits. As the Project also follows WB standards and guidelines, the effluent quality will meet the limit values stipulated by these. WBG General EHS Guidelines refers to WBG EHS Guidelines for Water and Sanitation for guideline values for effluent quality of centralized, municipal, wastewater treatment systems. The WBG EHS Guidelines for Water and Sanitation states that effluent water quality should be consistent with applicable national requirements or internationally accepted standards such as Council Directive 91/71/EEC of 21 May 1991 on Urban Wastewater Treatment, whose discharge criteria is in line with the Turkish Urban Wastewater Treatment Regulation. Therefore, following Turkish Urban Wastewater Treatment Regulation will also keep the Project in line with international standards in terms of effluent quality.

The effluent of the WWTP will be discharged to the Hanay Creek through 1,542 meter discharge line. Hanay Creek is not determined as a sensitive receiving body, thus the effluent of the WWTP will be subjected to the limit values described in above paragraph. The Project will be subjected to the limit values given for TN and TP as well.

Table II.9 Milas – Oren WWTP Discharge Standards

Parameters	Unit	Urban Wastewater Treatment Regulation Discharge Criteria
TSS	mg/L	35
BOD	mg O_2/L	25
COD	mg O_2/L	125
TN	mg N/L	15 (for population equivalent btw 10,000 and 100,000)
TP	mg P/L	2 (for population equivalent btw 10,000 and 100,000)

Source: Milas District Oren Neighbourhood Sewerage Network Project Identification Report

II.4.4 Sludge Generation Rate Estimation

For the selected design of the WWTP, specific density and volume of the sludge that is expected to be generated after the sludge dewatering process, are estimated as 1.05-1.1 ton/m^3 and 0.13-0.21 L/capita.d, respectively[2]. For the calculation of sludge generation amount, below given formula is used.

Sludge Generation Amount = Total Population x Volume of Sludge x Sludge Density

Within the light of this information, estimated sludge generation amounts for the years and seasons are given in Table II.10.

Table II.10 Sludge Generation Amounts

Years	Winter	Summer
	ton/d	ton/d
2019	0.58	2.14
2024	0.67	2.40
2029	0.78	2.68
2034	0.90	2.97
2039	1.04	3.29
2044	1.21	3.62
2049	1.40	3.99
2054	1.63	4.38

II.5 Milas-Oren Sewerage Network

A new sewer system will be constructed to collect the wastewater of Oren Neighborhood of Milas District. This new sewer system will be connected to the Milas – Oren WWTP.

The wastewater system consists of manhole shafts, parcel connections, secondary and main collector network lines, and force mains, starting from the point where wastewater is generated. The network lines are designed such that the wastewater can be delivered to the main collector and thus the WWTP in the fastest way, without entering the reverse slope as much as possible. As for the collecting lines, wide roads were preferred as much as possible considering the grading. The system is determined to be a separate system. In separate systems, storm waters and wastewaters are collected with different networks.

Within the hydraulic principles for determining the diameters of the channels in the sewage system, the difference in water consumption at certain times of the day is the most important factor affecting the results. The change in water consumption gives different flow rate on an hourly, daily and weekly basis. The maximum flowrate during the day can be expressed as a function of the average flowrate. For this reason, a peak flow factor will be used to stay safe in the design of sewer channels, and the peak factor is determined as 2 for the project design of the channels.

Sewerage network channels are determined to be laid to a minimum depth as much as possible depending on the conditions, and under normal conditions, the crown depths will be 1.60 m in the starting channels and 1.70 m in intermediate channels. Additionally, some manhole shafts

[2] Andreoli, C., Sperling, M., & Fernandes, F. (2007). *Sludge treatment and disposal*. London: IWA Publishing.

will be kept shallow where required to prevent excessive excavations on the reverse sloping roads and these depths have been determined as 1.10-1.20 m.

The hydraulic calculations of the Oren sewerage system are made using the Kutter formula;

$$Q = F * \frac{a\sqrt{R}}{b + \sqrt{R}}\sqrt{JR}$$

Q: Flow rate of the pipe in full load (m^3/s)

F: Cross sectional area of the pipe (m^2)

a: Wall roughness Coefficient (100 in concrete pipes; 149 in HDPE pipes)

b: Kutter Coefficient (0.20 in concrete pipes; 0.10 in HDPE pipes)

R: Hydraulic Radius [R = F/r] (m)

r: Wetted Perimeter (m)

J: Channel Slope

According to the calculations made and conditions considered, the minimum, maximum slope limits, fill rate, and maximum distance between the manhole shafts, are given in the Table II.11.

Table II.11 Technical Characteristics of the Sewerage System

Diameter (mm)	Minimum Slope	Minimum Exceptional Slope	Maximum Slope	Maximum Exceptional Slope	Fill Rate %	Max. Manhole Range (m)
Ø200	200	-	7	4	40	60
Ø300	300	-	7	7	50	60
Ø400	600	900	25	15	60	70
Ø500	800	1000	25	15	60	70
Ø600	1000	1500	25	15	60	70
Ø800	1200	1800	50	-	60	80
Ø1000	2000	2500	75	-	70	100
Ø1200	2050	2500	75	-	70	125
Ø1400	2100	2500	75	-	80	150
Ø1600	2150	2500	75	-	80	150
Ø2000	2250	2500	75	-	80	150
Ø3000	2500	2500	75	-	80	150

Source: Milas District Oren Neighbourhood Sewerage Network Project Identification Report

In order to prevent blockages and provide the best flow in sewer systems, the minimum diameters of the parcel connection and network pipes will be 150 mm and 200 mm, respectively.

Manhole Shafts will be installed in direction changing locations, slope changing locations, and pipe connections. These manholes will be used for maintenance and cleaning of the channels. These Manhole Shafts will be designed in compliance with the standards of the ILBANK specifications, which are:

- The manholes must be water proof,
- The bottom of the manhole shafts must be sloped in line with the flow direction,

- If the levels of the connection channels are different, appropriate chutes should be used,
- Must have a wall thickness to withstand external loads,
- The selected manhole cover types should be ductile iron cast covers.

In manholes with chute, minimum chute height is planned as 0.75 m and maximum chute height is planned as 4.00 m. In the diameter change locations, the crown levels of the pipes will be levelled and there will be no transitions from large diameter pipes to small diameter pipes. The channels are designed telescopic both horizontally and vertically. The shortest possible vertical crossings have been made where the system crosses roads, streams, and channels.

The pipes that will be used in the sewer system will be HDPE corrugated pipes and GRP pipes with SN8 rigidity. The exemplary manhole structures that will be used in the sewer systems are given in the Figure II.8.

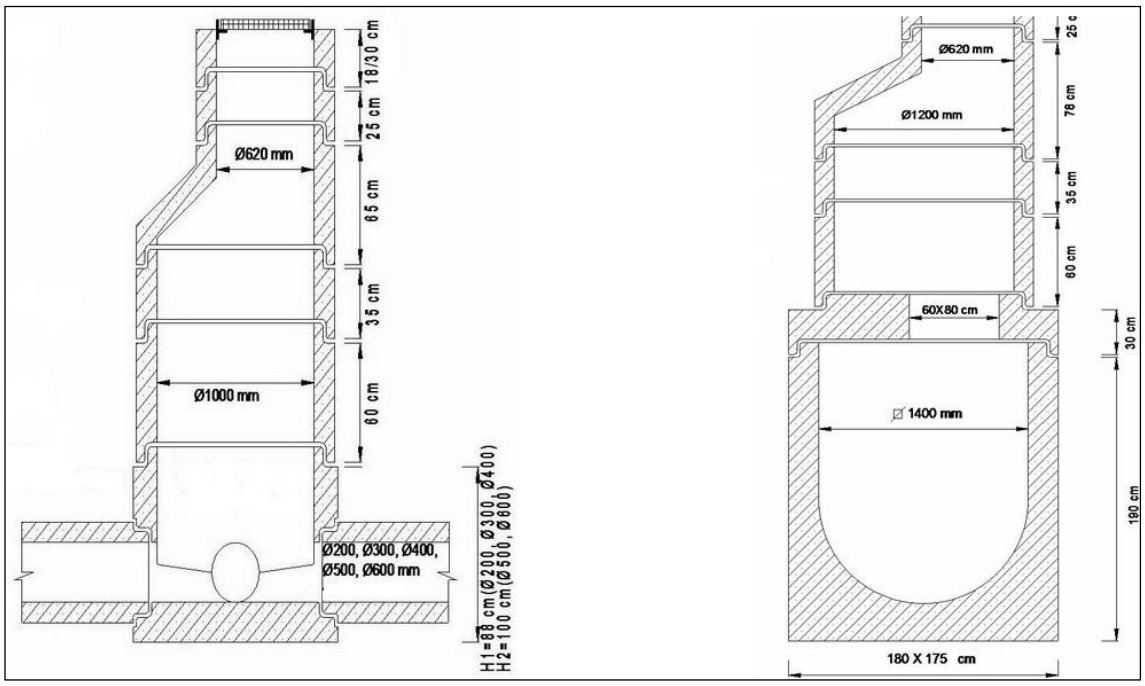


Figure II.8 Exemplary Manhole Structures with Dimensions

Pumping Stations

Within the scope of the Project, four underground pumping stations will be constructed. While two of the pumping stations will be constructed as package pumping stations, the others will be constructed as reinforced concrete pumping stations.

The pumps within the pumping stations are selected as submerged electromagnetic pulse pumps. Within the pumping stations, sound insulation building materials will also be used, in order to prevent generation of the excessive noise levels in the vicinity of the pumping stations. According to the Design and Pre-evaluation Report of the Project, the final design of the pumps is not decided yet apart from the numbers and locations. Thus, some changes may occur during the upcoming period. An exemplary design of the envisaged system of pumping stations is given in Figure II.9.

Figure II.9 Exemplary Image of a Pumping Station

During the site selection process for these pumping stations the sites were selected as public lands that are registered as parks, therefore no land acquisition processes will be triggered. If any changes occur on the site selected for pumping stations during subproject implementation, MUSKI will share this change for the approval of Ilbank and WB, and make necessary amendments in the site specific environmental and social safeguards instruments accordingly. Within this respect, an ESIA Addendum needs to be prepared when site selections are finalized for the pumping stations. When selected sites are known, eligibility evaluation should be done as a priority within the scope of the Project. Then, the ESIA Addendum will be conducted in line with the requirements of OP/BP 4.01 and will cover all the impacts covered in this ESIA, as minimum. The ESMP of this ESIA will be updated with the findings of ESIA Addendum.

II.6 Milas-Oren Wastewater Treatment Plant Components

Milas – Oren WWTP will be constructed as a part of this integrated Project. The Milas – Oren WWTP is designed as an advanced biological wastewater treatment system to work with Extended Aeration Activated Sludge Process. As mentioned before, the plant will have a daily capacity of 4,000 m^3/day for the 1st Stage, and total of 8,000 m^3/day (4,000 m^3/day + 4,000 m^3/day) for the 2nd Stage. The WWTP will be located on an area of 8278.11 m^2. The 1st Stage of the plant will be in operation until 2028. After 2028, the 2nd Stage of the plant will be realized. The area, where the WWTP will be constructed, is given in Figure II.10. The layout of the WWTP is given in Figure II.11.

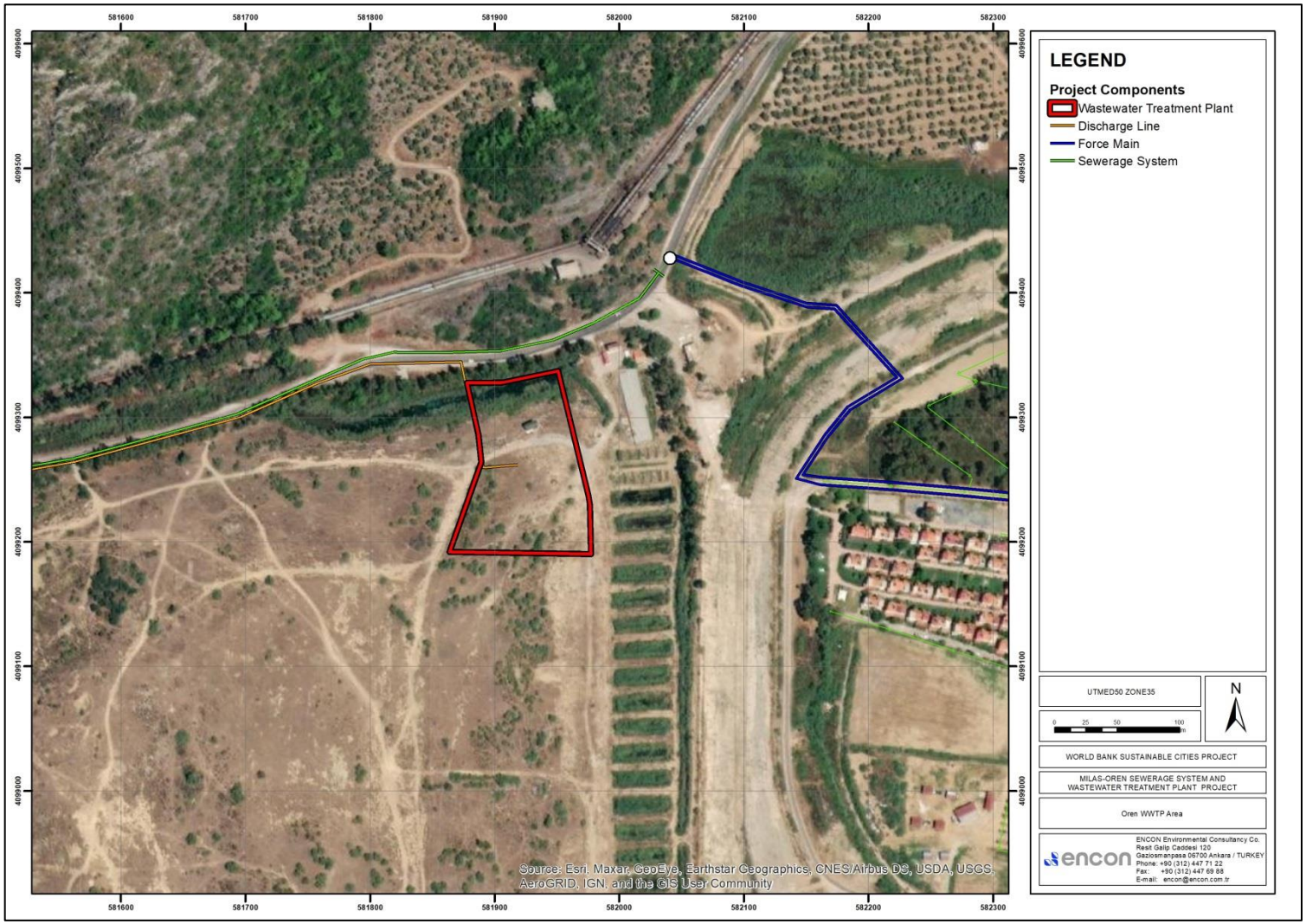


Figure II.10 Milas – Oren WWTP Area

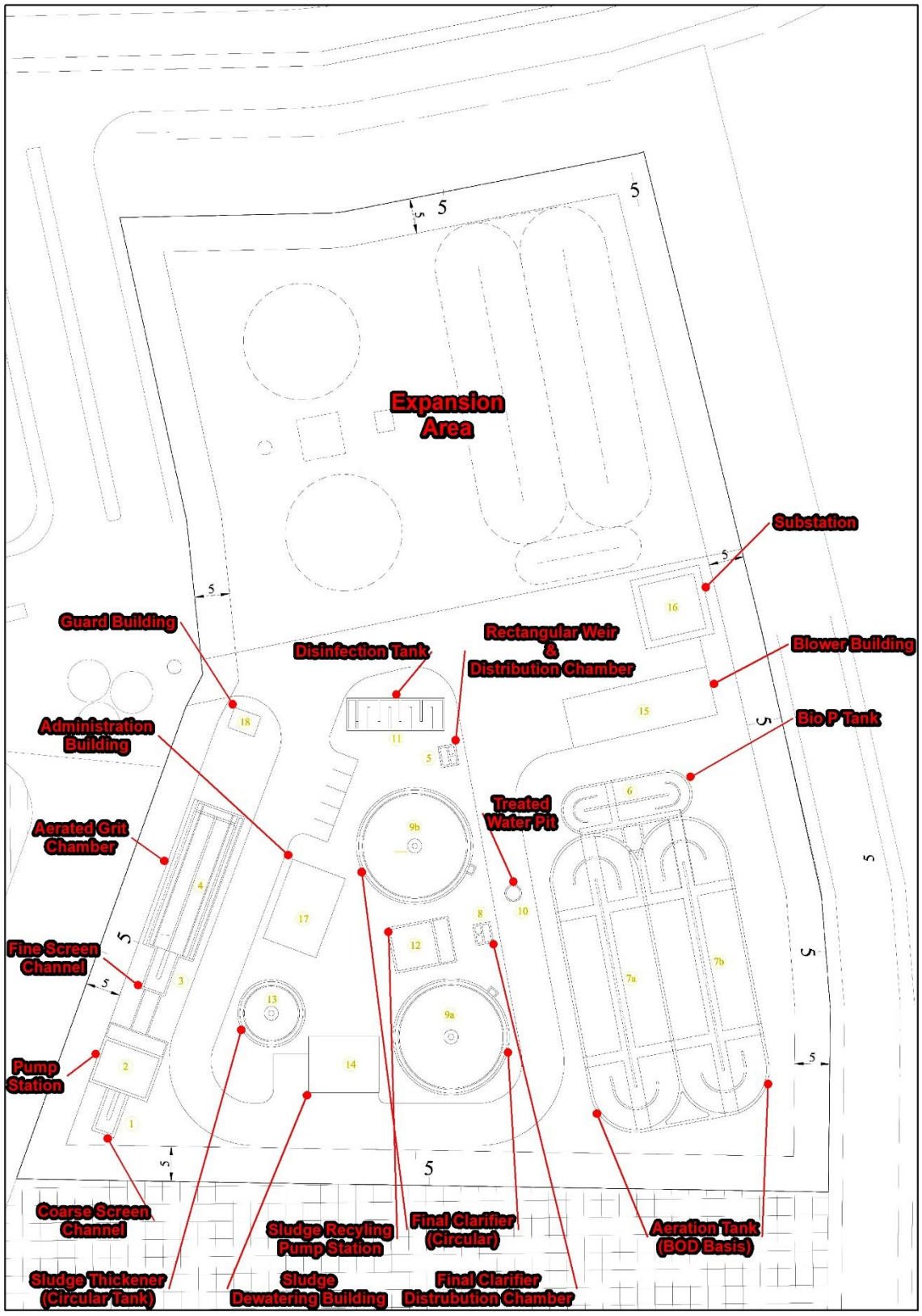


Figure II.11 Layout of Milas – Oren WWTP

Milas – Oren WWTP consists of the following units:

- Coarse Screen
- Pump Station
- Fine Screen
- Aerated Grit Chamber
- Rectangular Weir and Distribution Chamber
- Anaerobic BioP Tanks
- Aeration Tanks
- Final Sedimentation Distribution Chamber
- Final Sedimentation Tanks
- Treated Water Pit
- Disinfection Tank
- Sludge Pumping Station
- Sludge Thickener
- Sludge Dewatering Building
- Blower Building
- Administrative Building
- Transformer and Generator Building
- Security Cabin/Guardhouse

The Process Flow Diagram of the WWTP is presented in Figure II.12.

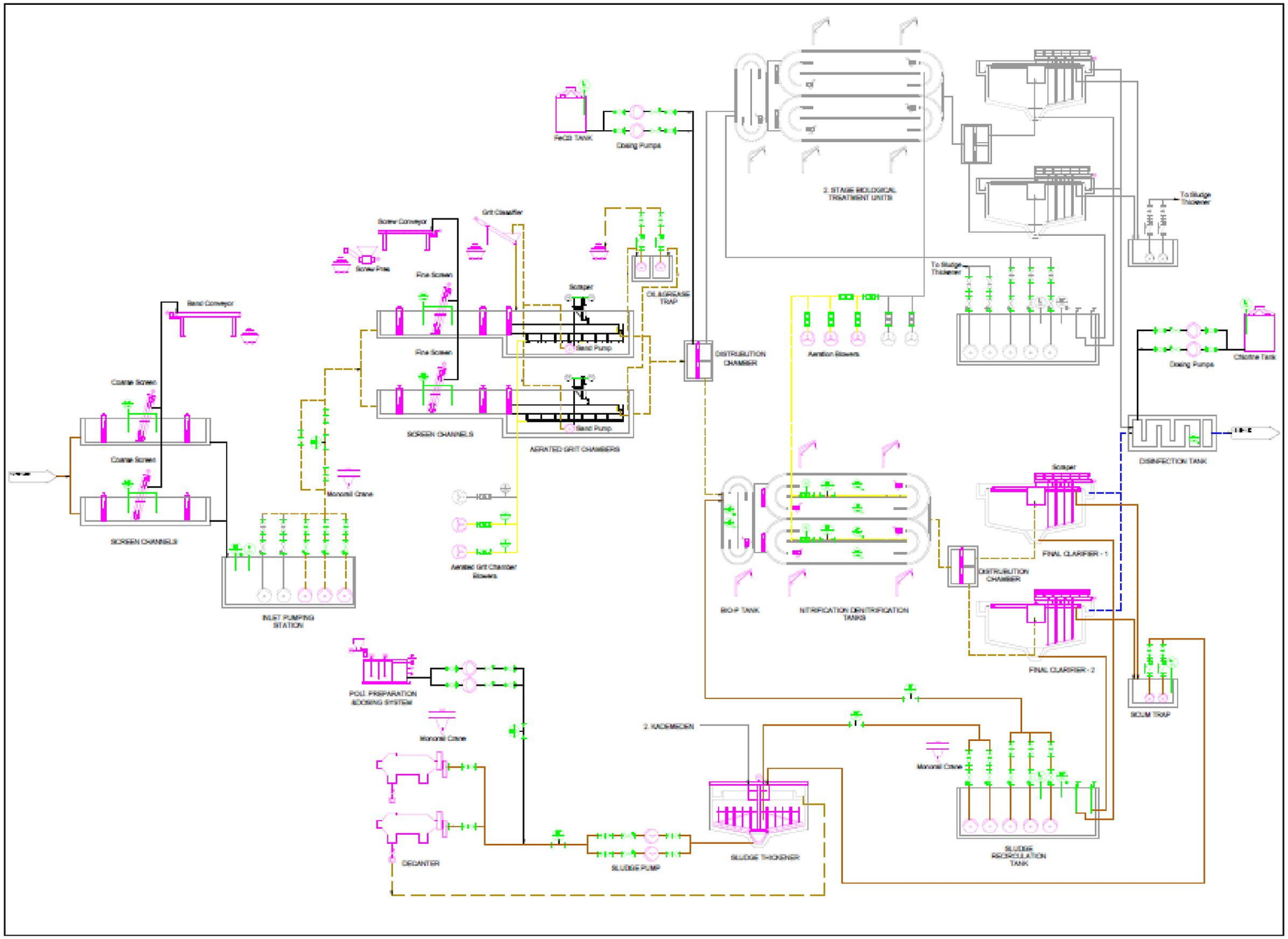


Figure II.12 The Flow Diagram

The detailed technical information about the units is provided in the following sub-sections.

II.6.1 Preliminary Treatment

Preliminary treatment units of Milas - Oren WWTP consist of coarse and fine screens and aerated grit chambers. Coarse and Fine screens are used for removing solid wastes such as debris, found in the wastewater. Aerated Grit Chambers are used for removing grit from wastewater streams.

Coarse Screens

Coarse screens remove rags, sticks, large solids and other debris ranging from 5 to 15 cm. They can be as simple as a trash rack or as complicated as a mechanically cleaned bar screen. Generally speaking, larger treatment facilities will install a mechanically cleaned bar screen whereas small, outdated facilities are likely to use a manually cleaned bar screen.

Fine Screens

Where coarse screens use bars or rods to remove solids, fine screens employ wire cloth, wedge wire elements or perforated plates. Fine screens are used to remove particles that may cause maintenance issues for process equipment and/or operational problems to the treatment process. Fine screen openings typically range from 1.5 mm to 5 cm. The smaller size openings allow the fine screens to remove 20 to 35% of suspended solid and BOD.

Aerated Grit Chamber

Removal of grit and oil-grease within the wastewater will be ensured through aerated grit chambers. In aerated grit chamber, inorganics like sand, pebble, silt, glass, metal etc. will be removed. Grit chambers are equipped with aeration systems to keep low density organics suspended and separating oil and grease. Grit chambers are designed to remove at least 85% of the solid particles with diameters greater than 0.2 mm and specific gravity greater than 2.65.

The scraper/skimmer bridge moves back and forth regularly over the tank and collects and sends the suspended grit to grit washer by its submersible pumps. The bridge also skims the oil and grease and collects them in the hopper. Floating material such as oil and grease collected at the hopper is transferred to the container for final disposal then.

II.6.2 Advanced Biological Treatment

Removal of carbon-based pollutants as well as nitrogen and phosphorus are carried out simultaneously at the bio-phosphorus tanks, aeration tanks and final sedimentation tanks. These units are considered as the advanced biological treatment components of Milas – Oren WWTP. The detailed information about these units is given in following subsections.

Anaerobic Tanks (Bio-Phosphorus Tanks)

Biological phosphorus removal consists of two stages. These stages are storage of phosphorus release in anaerobic environment and the storage of the excess of the released phosphorus in anoxic/oxic environment. To enable phosphorus release, readily degradable dissolved organic carbon in the inlet water shall be stored within the cell. When there is an electron

acceptor in the environment, the microorganism will use the stored carbon in order to sustain its activities and store excess phosphorus for regeneration of ATP.

Aeration Tanks

In the anoxic and oxic sections of the aeration tanks, biological treatment continues with nitrification and denitrification processes. The amount of air required for nitrification is supplied and the ammonium nitrogen at the inlet is converted into nitrate nitrogen. Generated nitrate nitrogen then is used as an electron acceptor for the removal of biochemical oxygen demand. Then the wastewater is transferred to aeration tanks for its further treatment in bio-P tanks. Aeration tanks are designed as pre-denitrification systems.

Final Sedimentation Tanks

The secondary (final) sedimentation tanks allow the microorganisms and other solids to settle after secondary or biological treatment. This sludge is pumped back into the inlet end of the primary sedimentation tanks and settles with the raw sludge. At this stage the BOD may be reduced to approximately 75 - 80% of the influent level and suspended solids are removed.

II.6.3 Sludge Treatment Units

Sludge Thickener

Sludge thickening process involves the concentration of thin sludges to more dense sludge in special circular tanks designed for this purpose. Its use is largely restricted to the watery excess sludge from the activated sludge process. It may also be used to concentrate sludge to primary tanks or a mixture of primary and excess activated sludge prior to high rate digestion.

The thickening tank is equipped with slowly moving vertical paddles built like a picket fence. Sludge is usually pumped continuously from the sedimentation tank to the thickener which has a low overflow rate so that the excess water overflows and the sludge solids concentrate in the bottom. A blanket of sludge is maintained by controlled removal which may be continuous at a low rate. Sludge with a solids content of 8 -10% or more can be produced by this method. This means that with an original sludge of 2%, about four-fifths of the water has been removed, and one of the objectives in sludge treatment has been attained.

Sludge Dewatering

Sludge dewatering will be performed by decanters. Biological sludge that will be collected from the final sedimentation tanks and the sludge that will be collected from sludge thickening tanks will be sent to the sludge dewatering system. Sludge dewatering units will increase the solid content of the sludge from 1% to 25%.

Sludge Disposal

After stabilization and dewatering, the excess sludge will be analysed to determine compliance with the Annex-2 of the Regulation on Landfilling of Wastes and if it is deemed appropriate, the sludge will be collected by the licensed disposal companies determined by MUSKI every year. The sludge will be collected from the facility by transportation vehicles of licensed companies and then will be stored in landfill.

If sludge would be determined as hazardous, the sludge will be sent to Anadolu Tehlikeli Atik Depolama Sanayi ve Ticaret A.Ş. for disposal by competent and licensed firms.

II.6.4 Disinfection Unit

In Milas – Oren WWTP, the treated effluent will be discharged into the Hanay Creek and hence, disinfection of the effluent is required. Disinfection is the process designed to kill or inactivate most microorganisms in wastewater, including essentially all pathogenic organisms. In this scope, the effluent of the Milas – Oren WWTP will be disinfected by using chlorination method.

II.7 Auxiliary Facilities

In the scope of the Project, several auxiliary facilities will be required. Related information about these facilities is given below:

- In order to provide energy for the WWTP, energy transmission line will be needed. According to the information given by MUSKI, the energy will be supplied from the transformer no. 3 located 700 meters away from the WWTP. 35.4 kV (medium voltage) of energy will be used from this transformer which has a capacity of 2 MVA. For the energy transmission line cadastral roads will be used. The subcontractor will be responsible from the construction of energy transmission line. Although the energy transmission line has a linear route, only electric poles with a base size of approximately 5m x 5m will be erected for the energy transmission line. For this reason, in case of any expropriation process will be needed, the land acquisition area will be very limited as the land acquisition will only be for the electric poles. Based on that, if energy transmission line will pass on any private lands or private users on public parcels on the finalized design, then expropriation and easement activities will be carried out based on the national Expropriation Law (Official Gazette Date: 08.11.1983 Number of Official Gazette: 18215) and World Bank OP 4.12 - Involuntary Resettlement, and a RAP (consistent with RPF) will be prepared and implemented as needed. After the expropriation activities, ownership of the transmission line will be transferred to Turkish Electricity Transmission Corporation (TEİAŞ). According to that, necessary procedures will be followed as well.
- The construction materials will be provided from close vicinity of the Project area. There will be no need for borrow pits/quarries within the scope of the project since the need will be met from the existing licensed quarries in the region.
- In terms of establishment of construction/camp site, the Contractor will be responsible within the scope of Project.
- Regardless of the exact number of people to be employed, the priority will be given to the local population. Therefore, there will be no accommodation at construction site.
- Since the WWTP site is accessible through the existing road network and the sewerage network and discharge line will be constructed on public roads, construction of any access/service road is not required.

However, no construction works should start in the parcels where public benefit decision is taken and hence, expropriation or easement rights to be applied. In order to enter the land, MUSKI has to prepare a RAP in line with the RPF and submit to ILBANK and WB for review and approval. After RAP approved and implemented (meaning depositing compensation to people's accounts) then they can access lands.

Map of energy transmission line are provided in Figure II.13.

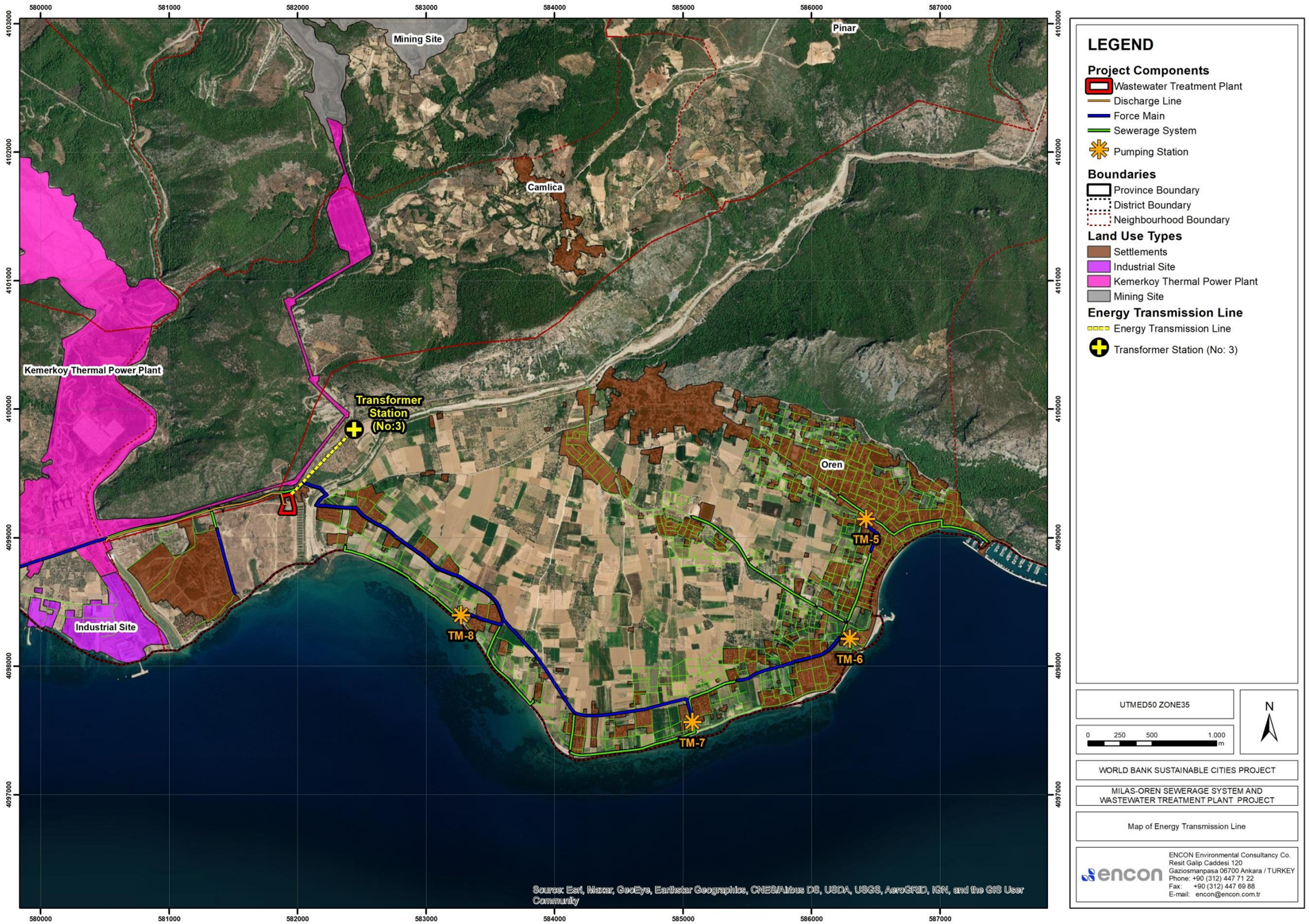


Figure II.13 Map of Energy Transmission Line

II.8 Personnel Requirements

Although it is not decided yet, it is expected that around 100 workers at the peak period of construction phase and 10 workers in the operation phase of the Project (WWTP and Sewerage Network) will be employed. Regardless of the exact number of people to be employed, the priority will be given to the local population. Therefore, there will be no accommodation on site.

II.9 Project Cost

The planned cost of the Project is 4,813,194 Euro.

II.10 Project Schedule

The tendering and contracting period of the Project is expected to take place in the Q1 of 2022, after the tendering period the construction works will start and last for 18 and 24 months for the WWTP and sewerage network, respectively. The defect liability period (DLP) starts just after that and lasts for 12 months. The anticipated schedule of the Project is provided in Table II.12.

Table II.12 Project Schedule

Year	2022 Quarters				2023 Quarters				2024 Quarters				2025 Quarters			
Item	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Wastewater Treatment Plant																
Tender docs, tendering																
Construction																
DLP																
Sewerage Network																
Tender docs, tendering																
Construction																
DLP																

III. LEGAL FRAMEWORK

This chapter is constructed to elucidate the main aspects of the legal and administrative framework followed in the design of ESIA studies and preparation of the report in hand. Various national and international legislations explained in the following sections are also to be complied with during different stages of the Project, including planning, pre-construction, construction and operation.

III.1 Turkish Legislation

The key national laws and regulations presented in this section include the legal requirements to reduce the potential environmental impacts that may arise from the construction and operational activities of the Project. Turkish Legislation related to the Project is presented in the following sections under relevant subtopics.

III.1.1 Turkish Environmental, Health and Safety Legislations

Environmental Law, which is ratified in August 1983, is one of the principal legislation related to the Project. Several by-laws and decrees are enforced under the Environmental Law.

The Environmental Impact Assessment Regulation (Official Gazette date November 25, 2014, number 29186) defines the administrative and technical procedures and principles to be followed throughout the EIA process. When an activity (a Project) is planned, the Project developer is responsible for preparing an Environmental Impact Assessment (EIA) Report along with many other permits required to realize the Project. However, facilities are subject to preparation of an EIA Report depending on the type of the facility, its capacity, or the location of the activity. The activities that are subject to the provisions of the Environmental Impact Assessment Regulation are listed in Annex I and Annex II of the Regulation. For Annex I activities a full EIA report is required and those Projects go through the full EIA process. For Annex II activities, a Project Presentation File (PPF) is prepared in accordance with the outline given in the Regulation and the relevant process has to be conducted. As a result of the submission of PPF, if “EIA is required” decision is given, a full EIA is prepared.

The EIA process starts with submitting a brief report (EIA Application File), summarizing the characteristics of the Project and the impact area, and the potential environmental impacts and mitigation measures, prepared according to the format provided in Annex III of the EIA Regulation to the Ministry of Environment, Urbanisation and Climate Change. Then the MoEUCC, General Directorate of EIA, Permit and Inspection forms a committee from related governmental and non-governmental agencies, which also includes the Project Owner and the consultant that would prepare the EIA report. With the formation of this committee the scoping phase starts.

This committee aims to define the scope of the EIA report to be prepared for the Project. The EIA scope is defined based on findings of the committee and the comments and suggestions received from a public consultation meeting to be held at the Project site. The purpose of the meeting is to give information regarding the Project and take the opinion of the public and answer their questions regarding the Project.

In addition, the Ministry shall announce that the EIA process regarding the Project has been initiated and information regarding the EIA process may be obtained also via the internet. The scoping phase is completed with a meeting of this committee during which the EIA scope is agreed on. Based on the agreed scope, the EIA studies are conducted and the report is prepared. After the submission of the EIA Report to the General Directorate of EIA, Permit and Inspection, it is checked with regard to the contents to decide whether the report is suitable for starting the review process. If the content of the report is found to be appropriate, the review period starts and ends with either a positive or negative decision.

Ministry of Environment, Urbanisation and Climate Change and the governorships are responsible for informing the public that the review period of the EIA Report is started via announcements using local and national media, boards, internet etc. Thus, public will be able to access the EIA Report from the web site of the MoEUCC or the relevant Provincial Directorate and comment on the Report. Those comments are reviewed in the Review Commission meeting and the results are reflected in the EIA Report.

Infrastructure projects such as sewerage networks, water supply networks and storm water systems are out of the scope of the Environmental Impact Assessment Regulation. Therefore, no EIA study is required for the sewerage network component of this Project. Wastewater treatment plants are scoped-in according to their daily capacity or equivalent population. While the treatment plants with an equivalent population higher than 150,000 and/or capacity higher than 30,000 m^3/day require full EIA study, which means these projects are listed under Annex I of the regulation; the ones with an equivalent population in between 50,000 and 150,000 and capacity in between 10,000 m^3/day and 30,000 m^3/day require PPF, which means these projects are listed under Annex II of the regulation. Therefore, the wastewater treatment plant of this Project, which has 8,000 m^3/day design capacity, does not require either an EIA or PPF. EIA exempt decision is given in Annex-9 of this report.

Medium voltage overhead transmission lines are not subjected to the national EIA Regulation. Energy transmission lines more than 15 km and higher than 154 kV are subjected to EIA procedure, whereas the ones between 5 km and 15 km and higher than 154 kV are subjected to Selection and Elimination criteria. By taking into consideration of the length and voltage of the proposed energy transmission line, it is anticipated that the risks and impacts due to construction and operation of the energy transmission line would be of a low magnitude.

The Project with all its components is out of the scope of the Turkish Environmental Impact Assessment Regulation.

The rest of the Turkish EHS Legislation that the Project will comply with is presented in Table III.1 below.

Table III.1 Turkish EHS Legislation Related to the Project*

Legislation	Official Gazette Date	Official Gazette Number	Implications for the Project Stages
Waste Management			
Waste Management Regulation	April 2, 2015	29314	• Management of wastes generated by construction staff during the construction stage and by operation staff during the operation stage • Hazardous wastes generated at construction and operation stages
Regulation on Landfill of Wastes	March 26, 2010	27533	• Final sludge generated during operation stage.
Regulation on the Control of Waste Oil	July 30, 2008	26952	• Waste oils generated at construction and operations stages.
Regulation on the Control of Waste Vegetable Oil	January 6, 2015	29378	• Waste vegetable oils generated at construction and operation stages.
Regulation on the Control of Packaging Waste	December 27, 2017	30283	• Packaging wastes generated at construction and operation stages.
Regulation on the Control of Medical Waste	January 25, 2017	29959	• Medical wastes generated at construction and operation stages.
Regulation on the Control of Waste Tires	November 25, 2006	26357	• Waste tires generated at construction and operation stages.
Regulation on the Control of Waste Batteries and Accumulators	August 31, 2004	25569	• Waste batteries and accumulators generated at construction and operation stages.

Table III.1 Turkish EHS Legislation Related to the Project*

Legislation	Official Gazette Date	Official Gazette Number	Implications for the Project Stages
Regulation on the Control of Excavation Materials, Construction and Demolition Wastes	March 28, 2004	25406	• Excavation materials, construction and demolition wastes generated during construction stage.
Regulation on the Control of Waste Vehicles	December 30, 2009	27448	• Management of waste vehicles currently stored in the Project Area.
Regulation on the Use of Domestic and Urban Sewage Sludge on Soil	August 3, 2010	27661	• Management of final sludge generated during operation stage.
Regulation on the Incineration of Wastes	October 6, 2010	27721	• Management of final sludge generated during operation stage.
Water Quality Control and Management			
Water Pollution Control Regulation	December 31, 2004	25687	• Discharge of treated effluent during operation stage. • Wastewater generated by the site staff at construction stage
Regulation on the Water Intended for Human Consumption	February 17, 2005	25730	• Drinking water supplied during construction and operation stages.
Regulation on the Control of Pollution Caused by Hazardous Substances in and around Water Environment	November 26, 2005	26005	• Management of hazardous substances at construction and operation stages.
Regulation on the Protection of Ground Waters against Pollution and Deterioration	April 7, 2012	28257	• Protection of groundwater sources against pollution during construction and operation stages.
Surface Water Quality Regulation	November 30, 2012	28483	• Discharge of treated effluent during operation stage. • Monitoring of water quality at receiving body during operation stage.
Regulation on the Monitoring of Surface Waters and Groundwaters	February 11, 2014	28910	• Monitoring of water quality at receiving body during operation stage.
Urban Wastewater Treatment Regulation	January 8, 2006	26047	• Effluent quality and treatment efficiencies to be met during the operation stage of Oren WWTP
Air Quality Control and Management			
Regulation on the Control of Air Pollution from Heating	January 13, 2005	25699	• Heating of the operational buildings during operation stage.
Regulation on the Assessment and Management of Air Quality	June 6, 2008	26898	• Emissions during operation stage.
Industrial Air Pollution Control Regulation	July 3, 2009	27277	• Dust emissions due to the construction activities performed at construction stage. • Emissions during operation stage.
Regulation on the Control of Odor Causing Emissions	July 19, 2013	28712	• Odorous emissions generated during operation stage.
Regulation on the Monitoring of Greenhouse Gas Emissions	May 17, 2014	29003	• Greenhouse gas emissions during construction and operation phases.
Regulation on Exhaust Gas Emission Control	March 11, 2018	30004	• Operation of Project vehicles, machinery and equipment at all phases of the Project

Table III.1 Turkish EHS Legislation Related to the Project*

Legislation	Official Gazette Date	Official Gazette Number	Implications for the Project Stages
Noise Control and Management			
Regulation on the Environmental Noise Emissions Caused by Equipment Used Outdoors	December 30, 2006	26392	• Noise levels caused by noise sources within the Project site at the construction and operation stages.
Regulation on the Assessment and Management of Environmental Noise	June 4, 2010	27601	• Noise emissions at construction and operation stages
Soil Quality Control and Management			
Regulation on the Control of Soil Pollution and Lands Contaminated by Point Sources	June 8, 2010	27605	• Risks of soil contamination at construction and operation stages.
Environmental Management, Permitting and Planning			
Environmental Impact Assessment Regulation	November 25, 2014	29186	• Impacts during construction and operation stages.
Environmental Auditing Regulation	November 21, 2008	27061	• Audits performed by either Project Owner or governmental authorities during construction and operation stages.
Environmental Permits and Licensing Regulation	September 10, 2014	29115	• Required permits and licenses at all stages of the Project.
Regulation on Wastewater Collection and Disposal Systems	January 6, 2017	29940	• At all stages of the Project.
Health and Safety			
Occupational Health and Safety Regulation	June 14, 2014	29030	• Health and safety measures to be taken during construction and operation stages.
Manual Handling Operations Regulation	July 24, 2013	28717	• Health and safety measures to be taken during manual handling activities at construction and operation stages.
Preparation, Completion and Cleaning Works Regulation	April 28, 2004	25446	• Health and safety measures to be taken during preparation, completion and cleaning works at construction and operation stages.
Personal Protection Equipment Regulation	November 29, 2006	26361	• Personal protection equipment to be used during construction and operation stages.
Regulation on the Use of Personal Protection Equipment at Workplaces	July 2, 2013	28695	• Personal protection equipment to be used during construction and operation stages.
First Aid Regulation	July 29, 2015	29429	• In case of a first aid requirement during construction and operation stages.
National Occupational Health and Safety Council Regulation	February 5, 2013	28550	• Health and safety measures to be taken during construction and operation stages.
Regulation on the Protection of Workers Against the Dangers of Explosive Environments	April 30, 2013	28633	• Health and safety measures to be taken during construction and operation stages.
Regulation on the Methods and Essentials of Occupational Health and Safety Trainings for Workers	May 15, 2013	28648	• Health and safety trainings to be performed during construction and operation stages
Regulation on the Protection of Workers from Noise Related Risks	July 28, 2013	28721	• Health and safety measures to be taken against the noise impacts during construction and operation stages.

Table III.1 Turkish EHS Legislation Related to the Project*

Legislation	Official Gazette Date	Official Gazette Number	Implications for the Project Stages
Regulation on the Protection of Workers from Vibration Related Risks	August 22, 2013	28743	• Health and safety measures to be taken against the vibration impacts during construction and operation stages.
Health and Safety Signs Regulation	September 11, 2013	28762	• Health and safety signs to be placed during construction and operation stages.
Regulation on the Occupational Health and Safety for Temporary or Fixed Term Jobs	August 23, 2013	28744	• Health and safety measures to be taken for temporary workers during construction and operation stages.
Regulation on the Occupational Health and Safety in Construction	October 5, 2013	28786	• Constructional health and safety measures to be taken during construction phase.
Communiqué on Occupational Health and Safety Hazard Classes List	December 26, 2012	28509	• Determination of hazard classes during construction and operation phases.
Management of Chemicals and Other Dangerous Substances			
Water Pollution Control Regulation	December 31, 2004	25687	• Chemicals and hazardous goods to be used during construction and operation phases.
Regulation on the Classification, Labelling and Packaging of Materials and Mixtures	December 11, 2013	28848	• Chemicals and mixtures to be used during construction and operation phases.
Regulation on the Road Transportation of Hazardous Goods	October 24, 2013	28801	• Hazardous goods to be transported during operation phase.
Land Use			
Regulation on the Protection, Usage and Planning of Agricultural Lands	December 9, 2017	30265	• Change in the land use
General			
Regulation on the Implementation of the Law Concerning Private Security Services	October 7, 2004	25606	• Private security services to be used during construction and operation services
Regulation Concerning the Buildings to be built in Earthquake Zones	March 6, 2007	26454	• Construction works within the scope of the Project.
Regulation on the Protection of Buildings from Fire	December 19, 2007	26735	• Measures to be taken for fire protection during construction and operation phases.
Regulation Concerning the Ozone Depleting Substances	April 07, 2017	30031	• Substances to be used during construction and operation phases.
Regulation Concerning the Increase in the Efficiencies of Energy Consumption and Energy Resources	October 27, 2011	28097	• Energy consumption during construction and operation phases.

*Relevant amendments of the listed legislation will be applicable.

MUSKI shall comply with the requirements of the current national legislations and codes of practice, and fulfil all other legal requirements. Therefore, during each stage of the planned Project and implementation of related management plans, all activities will be carried in accordance with certain standards and limits set by the above-mentioned laws and regulations and any license and/or permit required for the upcoming stages of the Project will be acquired accordingly.

III.1.2 Turkish Legislation on the Conservation of Nature and Wildlife

Project-related Turkish legislation on conservation of nature and wildlife is presented below in Table III.2.

Table III.2 Project related Turkish Legislation on the Conservation of Nature and Wildlife

Legislation	Official Gazette Date	Official Gazette Number	Implications for the Project Stages
Regulation on the Management of Natural Assets, Natural Protected Areas, and State-Owned Lands Located on Environmental Conservation Lands	May 2, 2013	28635	• Measures to be taken during the construction stage.
Law on Conservation of Cultural and Natural Assets	July 23, 1983	18113	• Measures to be taken during chance finds at the construction stage.
Land Hunting Law	July 11, 2003	25165	• Monitoring requirements regarding hunting and wildlife.
Law on Fisheries	April 4, 1971	13799	• Measures to be taken during the construction and operation stages.
Regulation on Fisheries	March 10, 1995	22223	• Measures to be taken during the construction and operation stages.

III.1.3 Labour Law

The Turkish Labor Law (Law No: 4857) was enacted on 22.05.2003 and published in official gazette on 10.06.2003. The purpose of this law is to regulate the working conditions and work-related rights and obligations of employers and employees working under an employment contract. This Law applies to all the establishments and to their employers, employer's representatives and employees, irrespective of the subject matter of their activities with the exception of the activities and employment relationships listed in Article 4 of this law, some examples to these exceptions are; sea and air transport activities, any construction work related to agriculture which falls within the scope of family economy, domestic services, sportsmen, etc. This law regulates the labor related subjects such as; The principle of equal treatment which aims to avert discrimination based on language, race, sex, political opinion, philosophical belief, religion or similar reasons; The transfer of the establishment or one of its sections which defines the process of the transfer paying attention to not to victimize anyone; Temporary employment relationships in order to protect the rights of both parties. Also, labor law regulates the employment contracts, types and terminations, wages, organization of work, employment service, supervision and inspection of working conditions, administrative penal provisions and supplementary, transitional and concluding provisions of labor related subjects.

III.1.4 Law on the Right to Information

The Turkish Law on the Right to Information (Law No: 4982) was adopted in 09.10.2003 and published in the official gazette on 24.10.2003. The main objective of this law is to regulate the procedure and the basis of the right to information according to the principles of equality, impartiality, and openness that are the necessities of a democratic and transparent government. This law is applied to the activities of the public institutions and the professional organizations which qualify as public institutions. The Law which is formed of five parts in total explains the legal obligations about information disclosure processes. The first part of the law defines the objective, scope, and definitions of terms that are used in law. The second part of the Law makes statements about the subjects of the Right to Information and the Obligation to Provide Information. According to Articles 4 and 5 of this Law found in this part, everyone has the right to information and the

responsible parties are obligated to provide information. The application process for accessing information is explained in the third part of the law. In the fourth part of the Law the information that is restricted is described some exemplary ones are; information and documents pertaining to the state secrets, information, and documents pertaining to the economical interests of the state, etc. Finally, the last part of the Law describes the miscellaneous aspects of this law such as entry into force and execution.

III.1.5 Permits

The Project-related permits to be taken are as follows;

Permits for the WWTP:

- Wastewater Treatment Plant Project Approval
- Construction license
- Building license
- Operation license
- Temporary certificate of operation
- Environmental Permit and License

Permits for the sewerage network:

- Project Approval
- Construction license
- Permit for zoning amendment
- Permits for pumping stations

III.2 International Agreements and Standards

International financial institutions follow certain policies and procedures regarding assessment and management of environmental and social impacts of the projects to be financed. As requirements of international extent of the Project, environmental and social database and impact assessment studies will also guarantee that Project's design, construction and operation will be satisfactory for international environmental standards alongside national legislation.

III.2.1 International Environmental Conventions that Turkey is a Contracting Party

Turkish national policy on protection of cultural heritage and conservation of biological resources has been constituted on the base of relevant international agreements that Turkey is a party which are ratified or acceded by laws or relevant legislation. In addition to these, there are various laws and regulations on protection and conservation of natural habitats, wildlife and cultural heritage.

The international agreements and conventions that Turkey had ratified are:

- Paris Convention on the Protection of the World Cultural and Natural Heritage (1975),
- Barcelona Convention on the Protection of the Mediterranean Sea Against Pollution (1976),
- Bern Convention on Protection of Europe's Wild Life and Living Environment (1982),
- The Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) (1981),
- Convention on Long Range Transboundary Air Pollution (CLRTAP) (1983)

- Convention on Long-Range Transboundary Air Pollution and the Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmissions of Air Pollutants in Europe (EMEP) (1983),
- Vienna Convention for the Protection of the Ozone Layer (1988),
- Montreal Protocol on Substances Depleting the Ozone Layer (1990),
- Convention on Biological Diversity (Rio Convention) (1992),
- The International Convention on the Established of an International Fund for Compensation for Oil Pollution Damage (FUND 1992),
- International Convention on Civil Liability for Oil Pollution Damage (1992),
- UN Framework Convention on Climate Change (UNFCCC) (2004),
- Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (RAMSAR) (1994),
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1994),
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1996),
- Kyoto Protocol (1997),
- UN Convention to Combat Desertification (CCD) (1998),
- European Landscape Convention (2001),
- United Nations Europe Economic Commission Convention on Transboundary Effects of Industrial Accidents (2000),
- Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) (2001),
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention) (2004),
- Stockholm Convention on Persistent Organic Pollutant (POPs),
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (1972),
- Mediterranean Sea Protocol Concerning Specially Protected Areas and Biodiversity (1988), including related protocols,
- Convention for the Protection of the Black Sea Against Pollution (Bucharest) (1994) and its protocols including the Protocol for the Protection of Biological and Landscape Diversity in the Black Sea (2004).

III.2.2 World Bank Policies and Standards

Since the main finance source of the Project is WB; the Project must be in compliance with the good international practice, including WB Safeguard Policies, guides, performance standards and best practices documents alongside the national legislation.

WB governs projects and activities by the Safeguard Policies in order to assure that they are conducted in an environmentally, financially and socially sound manner. Safeguard Policies include Environmental Assessments and other policies that define environmental and social adverse effects of the projects as well as their reduction and prevention. These policies are enlarged upon in “The World Bank Operations Manual”, which also provides guidance on compilation with the Operational Policies (OP), Bank Procedures (BP) and Good Practices (GP). OPs are defined as statements of policy objectives and operational principles including the roles and obligations of both the Borrower and the Bank, while BPs are compulsory procedures to be followed by both the Borrower and the Bank and GP are non-compulsory advisory material. Specific policies related and maybe related to the Project are listed below:

- Environmental and Social Policies

    - OP/BP 4.01 Environmental Assessment
    - OP/BP 4.04 Natural Habitats
    - OP/BP 4.11 Physical Cultural Resources
    - OP/BP 4.12 Involuntary Resettlement
    - OP 7.50 International Waterways

- BP 17.50 Bank Disclosure Policy

The main objectives and tasks of the Project-related WB Safeguard Policies are explained below:

OP/BP 4.01 Environmental Assessment

- To ensure the proposed projects' environmental and social sustainability and soundness
- To inform decision-makers about the environmental and social risks
- To increase transparency by providing stakeholder engagement in the decision-making process

OP/BP 4.04 Natural Habitats

- To conserve natural habitats and biodiversity
- To avoid significant conversion/degradation of critical natural habitats
- To ensure the sustainability of services and product provided to human society by natural habitats

OP/BP 4.11 Physical Cultural Resources

- To minimize and mitigate impacts on physical cultural resources
- To ensure that measures are in compliance with the framework of national and international agreements

OP/BP 4.12 Involuntary Resettlement

- To avoid resettlement to the extent possible
- To minimize and mitigate impacts on private assets and private users
- Assess the potential economic and social impacts of land acquisition/resettlement on affected people (on livelihoods of them),
- Promote the process of inclusive and meaningful consultation/participation of all PAPs including all groups and genders; including vulnerable groups in the land acquisition (and resettlement if any) preparation and planning, as well as information dissemination to the PAPs. Environmental and Social meetings can be held together where possible,
- Compensate for lost assets at full replacement cost, compensation arrangements
- Compensate informal/illegal land users for lost assets and provide assistance in relocating, if needed,
- Compensate and obtain legal access to expropriated land before starting construction,
- Provide information and prepare special assistance programs for vulnerable groups including the persons without any immovable property,
- Provide and prepare the plans for grievance redress and monitoring in line with the WB policy guidelines.

OP 7.50 International Waterways

- To notify the riparian countries in case of any activities implemented affecting the quality and quantity of water on international waterways. The waterways identified as NOT an international waterway (do not trigger OP 7.50) in Turkey are as follows: Susurluk, North Aegean, Gediz, Kuçuk Menderes, Buyuk Menderes, Western Mediterranean, Antalya, Sakarya, Western Black Sea, Yesilirmak, Kizilirmak, Konya Kapali, Eastern Mediterranean, Seyhan, Ceyhan, Eastern Black Sea, Burdur, Afyon,Orta Anadolu, and Van. There is no international waterway within the scope of the Project.

BP 17.50 Bank Disclosure Policy

- To support the decision-making process by allowing public access to information on environmental and social aspects of the project.

Under the WB's Operational Policy for Environmental Assessment (OP 4.01), projects are classified as Category A, B and C, based on the level of their likely environmental and social impacts. Brief definition of these categories is given as follows:

- Category A: A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts (based on type, location, sensitivity, and scale of the project and the nature and magnitude of its potential impacts). These impacts are generally large-scale, irreversible, sensitive, diverse, cumulative or precedent setting and may affect an area broader than the sites or facilities financed by the project. For a Category A project, the borrower is required to prepare an ESIA which examines the project's potential negative and positive environmental impacts as well as its social impacts, compares them with those feasible alternatives (including the "without project" situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental and social performance. ESIA also includes an Environmental and Social Management Plan (ESMP) which details the measures to be taken during the implementation and operation of a project to eliminate, reduce or offset adverse environmental and social impacts, the actions needed to implement these measures as well as monitoring indicators and actions and responsibilities.

- Category B: A proposed project is classified as Category B if the potential impacts on the environment are typically site-specific, reversible in nature, less adverse than those of Category A projects and for which mitigatory measures can be designed more readily. The scope of Environmental Assessment for a Category B projects may vary from project to project, but is narrower than that of Category A. Like Category A ESIA, it examines the project's potential negative and positive environmental and social impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. If the project is recognized as Category B, this information may be contained in an ESMP only unless there are site-specific issues which necessitating a site-specific assessment in addition to the ESMP.

- Category C: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further Environmental Assessment action is required for a Category C project.

Considering the location of the Project and the nature of its potential environmental and social impacts, the Project would be categorized as Category A Project for which a full-scale environmental and social impact assessment is required under WB screening criteria and OP 4.01.

It should be noted that Turkish laws, notably Law No. 2863 dated 21.07.1983 on the Protection of Cultural and Natural Assets (revised through the amendment issued on 27.07.2004 dated Official Gazette) and practices meet the World Bank requirements for physical cultural resources (OP 4.11). The Regulation on Research, Drillings and Excavations in Relation to the Cultural and Natural Assets, which was published in the Official Gazette No. 18485 dated 10.08.1994 define the procedures and obligations concerning the cultural and natural assets found out during construction.

The World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines constitutes technical reference resources that include general and sector specific examples of international good sector practices. It includes the information on applicable environmental, health and safety issues for all industrial sectors. WBG uses the EHS Guidelines as a technical source of information during project appraisal. EHS Guidelines include performance levels and measurements that can be achieved at newly installed facilities using WBG's available technologies at reasonable cost.

General Health and Safety Guidelines include the following main items;

- Environmental
  - Air Emissions and Ambient Air Quality
  - Energy Conservation
  - Wastewater and Ambient Water Quality
  - Water Conservation
  - Hazardous Materials Management
  - Waste Management
  - Noise
  - Contaminated Land
- Occupational Health and Safety
  - General Facility Design and Operation
  - Communication and Training
  - Physical Hazards
  - Chemical Hazards
  - Biological Hazards
  - Radiological Hazards
  - Personal Protective Equipment
  - Special Hazard Environments
  - Monitoring
- Community Health and Safety
  - Water Quality and Availability
  - Structural Safety of Project Infrastructure
  - Life and Fire Safety
  - Traffic Safety
  - Transport of Hazardous Materials
  - Disease Prevention
  - Emergency Preparedness and Response
- Construction and Decommissioning
  - Environment
  - Occupational Health and Safety
  - Community Health and Safety

In addition to the General EHS Guidelines, WBG EHS Guidelines for Water and Sanitation is also applicable.

III.3 Gaps between National Legal Framework and World Bank Policies (OP 4.01 and OP 4.04)

III.3.1 Environmental Protection and Conservation

Turkish national policy on conservation of biological resources and protection of cultural heritage has been constituted on the base of relevant international agreements (see Chapter III.2.1) that Turkey is a party which are ratified or acceded by laws or relevant legislation. In this regard, there are various national laws and regulations on protection and conservation of natural habitats, wildlife and cultural heritage. Thus, Turkey had agreed on implementation of the conservation measures specified in the international agreements and formulated them into national legislation.

According to national legislation, the areas, with significant biological diversity, with local endemics of importance, with species that has a threat status of endangered, etc. are given protection status. With this regard, sites can be put under protection and conservation as national park, nature conservation area, wildlife protection and/or development area, specially protected area, water products production area.

In Turkey, there is no conservation concept for vegetation communities and habitats as is provided in EU countries by the EU Habitats Directive. In Turkey, there is no specific habitat compensation requirement. There is only a policy regarding forest areas, which aims to reforest at least as much as the forest area lost due to development activities, fires, etc. Therefore, if an area is not provided some type of protection status (, then it is not given any special attention in terms of;

- Studying the area for classifying it as a natural habitat or an important/critical natural habitat;
- Requiring detailed studies for the human activities (projects) to be conducted based on the existing environmental/ecological factors (EIA or PPF is required based on the project type); and
- Studying on putting limitations, or means of implementation for certain type of activities in such areas.

Main issues between Turkish legislation and OP 4.04 are in fact related with Turkish planning and environmental assessment requirements, but some other issues can be summarized as follows:

- The process for identification of important natural habitats and lack of consultation with relevant stakeholders in this process.
- Requirements of baseline studies in important natural habitats
- Identification of the projects that would be allowed in such areas.
- Study requirements (such as EIA reports) for the projects to be realized in important/critical natural habitats.

III.3.2 EIA Process and Requirements

National regulatory process and procedures for the EIA reports are in general compatible with the WB policies on environmental assessment (OP 4.01). EIA regulation requires the coverage of all issues regarding biological diversity and terrestrial and aquatic flora and fauna in the EIA reports. In these terms, they are compatible with WB policies on natural habitats (OP 4.04).

The main issues rise in the scope and details of the EIA studies and reports can be listed as given in the following paragraphs:

- Turkish EIA regulation allows consideration of all projects in an integrated fashion, but does not necessarily require it. In other terms, definition of project boundaries is generally done by the project owners. WB Policies require all projects to be evaluated together with the associated facilities especially in terms of natural habitats.
    - For example, in a project where construction material is required from borrow areas, these borrow areas might or might not be evaluated in the EIA for the main project. Thus, associated and auxiliary facilities are not always required to be evaluated in one EIA. The associated facilities can be assessed in separate EIAs to be approved by the MoEUCC.
    - Another example would be a project requiring access roads. Generally, when these are on site and short roads, they are included in the EIA since otherwise they would not need any type of assessment. However, when they are longer roads that would have connections to main roads or carry a status of provincial or state roads, separate PPF or EIA reports could be prepared. Thus, EIA report for the main project can be approved without evaluation of those roads.
- The area of influence is rather implicit in many EIA studies in Turkey, in many cases without a specific or clear definition in the report. WB Policies require identification and definitions of the project area of influence (including the associated facilities as well) during scoping of the report.
- The studies on biodiversity and natural resources in the EIA reports are not always site and season specific. Depending on the sensitivity of the project, use of literature and a more regional evaluation is allowed by the authorities in the review and approval of the reports. In many cases there is no seasonal sampling or observations except for rather large scale and critical projects with potentially very significant impacts and international loan involvement. WB Policies require reliable and actual data that represents the conditions in the impact area before the project (baseline) and then assessment of the impacts on the biological resources and habitats accordingly.
- Cumulative impacts are not being considered in EIA reports in Turkey yet. WB Policies require assessment of the cumulative impacts of the development projects when there is a valued ecosystem component in the area of influence of the project that can be affected by other activities (existing, under construction or planned).
- There is no requirement for an environmental and social management plan (ESMP), including monitoring plan, in Turkish EIAs. Generally, mitigation measures are provided for the significant impacts in the impact assessment sections without formulating them to an ESMP and/or getting into details to be provided in an ESMP. This argument is valid for monitoring measures as well though sometimes there is a section on monitoring in the EIA report based on the decision of the Scoping Committee. WB Policies require a well-defined ESMP in the ESIA reports or as a result of the EIA studies.
- There is a requirement for EIA monitoring during the construction phase of the projects, which receive EIA Positive Decisions. However, this monitoring is not in terms of monitoring of environmental performance or compliance with the relevant emission, discharge and such standards. This monitoring mainly covers the issues committed in the EIA report, mostly which are physical.
    - For example in EIA monitoring the coordinates of the project area is checked if it is the same as given in the EIA report or not.
    - Another example is the treatment facilities to be installed. They are checked to confirm if they are installed or not, but their performance (do they provide the necessary treatment) are not checked.
- WB Policies require a well-defined monitoring plan in the ESIA reports or as a result of the ESIA studies so that the environmental issues to be monitored and responsible parties are clear and committed.
- In Turkish EIAs the social aspects of the projects generally assessed in a brief manner, however WB Policies requires a more detailed assessment of the possible social impacts of the project at hand.

III.3.3 PPF Process and Requirements

National PPF process is basically a process for screening projects (which are listed in Annex 2 of the EIA regulation) to decide if there is a need for a full EIA. In these terms, it does not comply with the project classification of the WB for environmental assessments. That is to say WB might require an ESMP based on a more simple impact assessment, when compared with EIA assessments, for category B projects. However, in PDF reports in Turkey a simple impact assessment is required, but it ends up generally with very limited environmental management and monitoring measures and there is no requirement of monitoring. In fact, these differences are again due to the scoping and review of these PPF reports and not due to the lack of relevant terms in the legislation.

In this regard, main conflict or gap with the WB policies in terms of environmental assessment comes into picture for the Annex 2 projects (which are like Category B projects of WB) in Turkey.

- For these projects impact assessment in the PPF is rather superficial and does not come up with relevant impact management and monitoring measures.
- These projects are accepted to be rather small scale and associated facilities for such projects are either all ignored or very slightly mentioned.
- The biodiversity issues and natural habitats evaluations in PPF reports are almost all depended on literature for many projects (if there is not international loan involvement or a well-known sensitive area).
- The social assessment is not included in the PPF reports. Therefore, during the PPF there aren't any requirements for social studies, in terms of both desktop and field research.
- There is no requirement for an ESMP, or a monitoring plan. Generally mitigation measures are provided for the significant impacts in the impact assessment sections without formulating them to an ESMP and/or getting into details to be provided in an ESMP.
- There is no environmental performance monitoring and no ESIA monitoring requirement either.

III.3.4 Differences between Project-related National Legislation and WBG Guidelines' Limit Values

Among the legislation presented in Chapter III.1.1, the key Project-related national regulations are Surface Water Quality Regulation and Urban Wastewater Treatment Regulation in terms of thresholds and limit values. While Surface Water Quality Regulation determines water quality of the receiving body in its Annex-5 Table 3, Urban Wastewater Treatment Regulation sets limit values for effluent quality and treatment efficiencies as presented in Table III.3.

Table III.3 Urban Wastewater Treatment Regulation Discharge Limits

Parameters	Concentration (mg/L)	Minimum Treatment Efficiency (%)
Biochemical Oxygen Demand (BOD_5) (without nitrification)	25	70-90
Chemical Oxygen Demand (COD)	125	75
Total Suspended Solids (TSS)	35	90

Parameters	Concentration (mg/L)	Minimum Treatment Efficiency (%)
	35 (EP* > 10,000)	90
	60 (EP 2,000-10,000)	70
Total Phosphorus**	2 (EP 10,000-100,000)	80
	1 (EP >100,000)	
Total Nitrogen**	15 (EP 10,000-100,000)	70-80
	10 (EP >100,000)	

* EP: Equivalent Population
** Requirements for discharges from urban waste water treatment plants to sensitive areas which are subject to eutrophication

The WBG's Environmental, Health and Safety Guidelines for Water and Sanitation, which is another key document, does not provide limit values for effluent water quality parameters as in Turkish Urban Wastewater Treatment Regulation. However, the Article 65 of the Guideline refers to the "*applicable national requirements or international accepted standards*" for the effluent water quality. The Turkish Urban Wastewater Treatment Regulation has been constituted on the base European Union: Council Directive 91/271/EEC of 21 May 1991 Concerning Urban Wastewater Treatment, which is the footnote-referred legislation of the Guideline, thus; there are no gaps in between.

IV. BASELINE CONDITIONS

IV.1 Physical Environment

This chapter is divided into subsections of geological, hydrogeological and hydrological characteristics, seismicity and natural hazard conditions, soil, erosion and land use characteristics, climate, environmental air quality and noise levels, landscape characteristics, biological environment and protected areas located in the Project area, its vicinity and the region Results of the investigation studies conducted under these subheadings are described in this chapter.

Descriptions and information provided in this chapter, regarding current conditions of the Project area and its vicinity, are based on reports prepared by related public and private institutions, field studies conducted for identification of physical environment, Geographical Information Systems (GIS) studies and satellite imagery, data acquired from the Ministry of Agriculture and Forest and data acquired from the meteorology stations of the General Directorate of Meteorology.

IV.1.1 Land Use and Property

In this section detailed information on the land use and ownership status of the Project area is given.

Land Use

The site (8278.11 m^2) designated for Milas-Oren WWTP currently consists of an area that is used as pasture but currently idle and it is not used for any purpose (See sections II.1 and II.2 for the photographs taken from the site). The site is selected due to the closeness to the Hanay Creek. The WWTP area previously owned by Mugla Metropolian Municipality, currently belongs to MUSKI. In the close vicinity of the WWTP area, there are roads, belt conveyor of Kemerköy Thermal Power Plant, Mugla Sitki Kocman University Fisheries Research and Development Centre, and privately-owned plots where construction of yacht manufacturing repair and boatyard is currently undergoing.

The closest settlement to the WWTP site is located 50 meters at the northeast at Mugla Sitki Kocman University Fisheries Research and Development Centre and the closest settlement area is around 175 meters at the south-east. The WWTP area can be accessible with the current roads; therefore, no access roads will be constructed.

In the scope of the Project, the WWTP will be constructed within the area that belongs to MUSKI and there will be no need for land acquisition. On the other hand, construction of the discharge line will take place in existing roads and no land acquisition is required within this respect.

The new sewerage system will be constructed by following the same route of the existing system and pumping stations will be built on public lands that are registered as park. Therefore, there will be no resettlement and/or physical displacement of persons in and around the Project Area.

In terms of auxiliary facilities, the construction/camp site will be established at the WWTP site which currently belongs to MUSKI. For the energy transmission lines cadastral roads will be used, therefore, no land acquisition will be required.

During the land preparation and construction phase of the Project, existing roads will be used. For the road opening requirements, if needed, MUSKI will apply to related Municipality. All the roads that will be used during Project are shown on zoning maps.

According to the 1/5000 and 1/1000 scale development/zoning plans, WWTP area has been allocated as WWTP site and pumping station areas as park (public garden) sites. MUSKI applied to Milas Municipality regarding the amendment of 1/5000 and 1/1000 scale development/zoning plans for the allocation of related park sites to technical infrastructure (such as pumping station) sites on July 06, 2020 (see Annex-8). As a result of this application respective amendments are still under evaluation by the municipality.

Property

The WWTP site is selected due to the closeness to the Hanay Creek. In the scope of the Project, the WWTP will be constructed within the area belongs to MUSKI and there will be no land acquisition. Currently, the area is idle and it is not used for any purpose (See sections II.1 and II.2 for the photographs taken from the site).

The closest building to Oren WWTP is located 50 meters at the north-east, which is Mugla Sitki Kocman University Fisheries Research and Development Centre, and the closest settlement is around 175 meters at the south-east. The area can be accessible with the existing roads; therefore, no access roads will be constructed.

There are no land related issues expected for sewerage network and discharge line, as they will be constructed on existing roads.

On the other hand, pumping stations will be built on public lands that are registered as park, therefore, no land acquisition is required for pumping stations either.

In terms of auxiliary facilities, the construction/camp site will be established at the WWTP site which currently belongs to MUSKI. For the energy transmission lines cadastral roads will be used. Although the energy transmission line has a linear route, only electric poles with a base size of approximately 5m x 5m will be erected for the energy transmission line. For this reason, in case of any expropriation process will be needed, the land acquisition area will be very limited as the land acquisition will only be for the electric poles. Based on that, if energy transmission line will pass on any private lands or private users on public parcels on the finalized design, then expropriation and easement activities will be carried out based on the national Expropriation Law (Official Gazette Date: 08.11.1983 Number of Official Gazette: 18215) and World Bank OP 4.12 - Involuntary Resettlement, and a RAP (consistent with RPF) will be prepared and implemented as needed. After the expropriation activities, ownership of the transmission line will be transferred to Turkish Electricity Transmission Corporation (TEİAŞ). According to that, necessary procedures will be followed as well.

However, no construction works should start in the parcels where public benefit decision is taken and hence, expropriation or easement rights to be applied. In order to enter the land, MUSKI has to prepare a RAP in line with the RPF and submit to ILBANK and WB for review and approval. After RAP approved and implemented (meaning depositing compensation to people's accounts) then they can access lands.

IV.1.2 Topography, Soils and Geology

This chapter identifies existing topographical, soil and geological conditions along the Milas-Oren Wastewater Treatment Plant, discharge line and sewerage network. As, the sewerage system and discharge line will be constructed on the existing public roads and pumping stations will

be built on public lands that are registered as park, the baseline studies given in this sub-section mostly cover the WWTP area.

Topography

The project area is located in the Aegean region of Turkey, which is known with its tourism potential. The Aegean Sea is located in the south of the Project area, the Milas district in the north, the (Merkez) Mentese district in the east and the Bodrum Peninsula in the west.

The only streams that flow inside the town are the Kemer and Koca Streams which are also located in the vicinity of the WWTP site. In addition, Hanay Creek can be mentioned also, as this stream is the closest stream to town apart from Koca and Kemer Streams. The highest elevation is +60 meters and the lowest elevation is around +1 meter within the zoning plan in the Project area. The regional center has a topographic structure that slopes from north to south.

Soil

Turkish General Directorate for Rural Services database defines the land use capabilities in 8 different classes as summarized in Table IV.1. These classes represent the agricultural potential of the soils. In this classification system, soils are categorized between Class I, which represent the arable lands on which agricultural activities can be conducted in the most efficient, economic and simplest way without causing erosion, and Class VIII, which represent the lands that are not arable, cannot even be used as grassland or forest areas but support only wildlife development or can be used as resting area or national park by human. Characteristics of each class are summarized in Table IV.1 (*Former Ministry of Agricultural and Rural Services, July 2008*).

The Land Use Capabilities of the soils corresponding to the WWTP area is agricultural lands not suitable for soil cultivation as Class V. Map of great soil groups and land use capability classes for the project area is represented in Figure IV.1.

Table IV.1 Agricultural Potentials Represented by Different Land Use Capability Classes and Their Characteristics

Class	Agricultural Potential	Definition of Land Use Capability
Class I	Agricultural lands suitable for agricultural soil cultivation	Class I lands are; flat or near flat, deep, fertile and easily cultivated so that the conventional agricultural methods can be applied; potential for water and soil erosion are minimal; have good drainage; are not prone to flood damage exposure; suitable for hoe plants and other intensively grown crops; Class I irrigated lands with low precipitation rates have slope values less than 1% slope, loamy structure, good water holding capacity and medium level permeability.
Class II		Class II lands are decent lands that can only be processed after taking some special precautions. Their difference from Class I lands are one or more of the limiting factors such as slight slope, moderate exposure to erosion, moderately thick soil, exposure to occasional moderate floods and a moderate level of moisture that can easily be isolated.
Class III		Class III lands are moderately good lands for hoe plants which can generate solid income provided they are utilized with a good cropping system and proper agricultural methods. Moderate slope, increased erosion sensitivity, excessive moisture, exposed soil, presence of stones, having a lot of sand and/or gravel, low water holding capacity and low yield are properties of this type of land.
Class IV		Class IV lands can be constantly utilized as meadows. Field crops can also be occasionally grown. High levels of slope, bad soil characteristics, erosion and climate are the factors limiting agricultural activities on these lands. Soils with low slopes and poor drainage are also classified as Class IV lands. These soils are not subject to erosion, but they are unsuitable for growing many agricultural products as they have a low yield and a tendency to suddenly dry up in the spring. In semi-arid regions, cropping systems incorporating legumes are generally not possible due to climate.
Class V	Agricultural lands not suitable for	Class V lands are reserved for long-life plantations such as meadows and forests as they generally are unsuitable for cultivated plants. A few factors such as stony structure and sogginess hinder cultivation here. The land is flat or near-flat. It is not subject to an

Class	Agricultural Potential	Definition of Land Use Capability
	soil cultivation	excessive amount of wind and water erosion. Grazing and tree logging activities can be carried out on condition that a good soil cover is constantly maintained.
Class VI		Class VI lands require moderate precautions even when they are used as forest or meadow since they have quite a bit of slope and are subject to severe erosion. Exposed, soggy or very dry conditions make this type of land unsuitable for cultivation.
Class VII		Class VII lands have high slope, are stony and have been subject to violent erosion. Exposed soils, dry and/or some unfavourable conditions and swamps can be classified as Class VII soil. These can be used as forest or meadow without showing due care. If the vegetation on these soils diminishes, erosion can get quite violent.
Class VIII	Non-arable lands	Class VIII lands exhibit features that prevent them from being used as forest, meadow or cultivated land. This type of land is habitat to wild life and can also be used for recreational purposes or as catchment basins for streams. These include lands containing marshes, swamps, deserts as well as areas of high mountainous regions, rocky lands or lands with very deep craters.

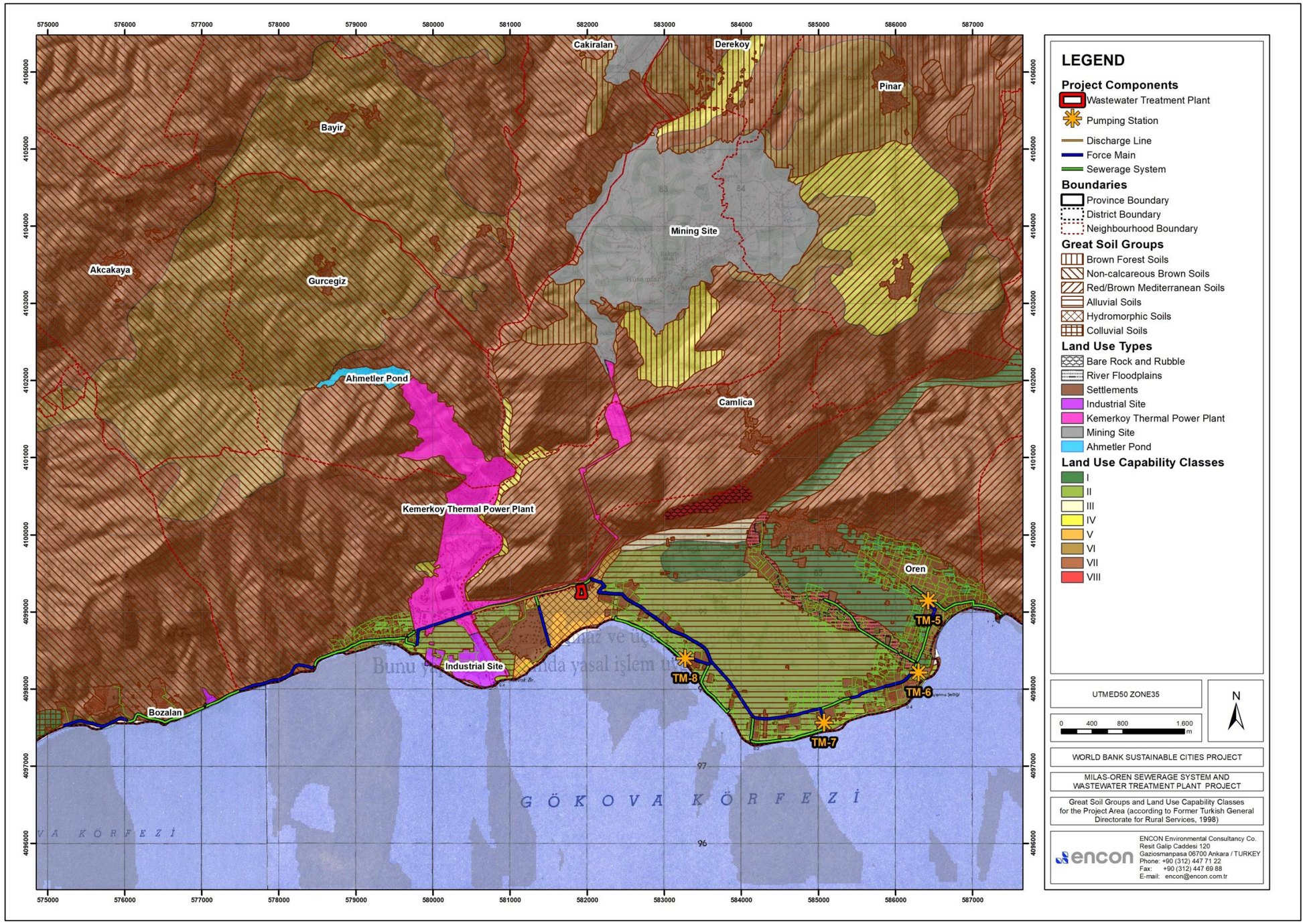


Figure IV.1. Great Soil Groups and Land Use Capability Classes for the Project Area

According to the former Turkish General Directorate for Rural Services database analysis (1998), the great soil groups of WWTP area includes hydromorphic soils.

Hydromorphic soils are characterized by excessive soil moisture. Drainage is generally impaired due to the profile characteristics that prevent normal water infiltration or the soil is located in a sedimentary area. Large soil groups in this lower row have different characteristics. In the mapping studies in our country, only High Mountain Meadow Soils were distinguished from them. These soils, formed in the place where the forest strip ends, are formed due to various materials in bad drainage and cold climate conditions. There is a dark layer on top and gray colored soil under it. The natural vegetation on them is grass, sedge and flowering plants. Due to the cold climate, their productivity is limited. They are mostly used for grazing in summer.

In bad drainage areas, also Hydromorphic Alluvial Soils have been distinguished in mapping studies of Turkey. These soils are not suitable for agriculture in their current form. Some of these soils have surface or near surface, groundwater for most of the year. In some soils, in wet cool seasons, the water is close to the surface, but in late summer, it drops below 1m for a short time. Some of the soils are exposed to floods. Topography is flat or concave. Surface drainage and internal drainage are very bad or there is no drainage. Therefore, especially the lower levers are wet. The rising and lowering of the groundwater causes successive oxidation and reduction in the part of the soil above it. The result is bluish-gray reduction and reddish oxidation (oxidation, rust) spots. Although the depth is high in these soils, the reduced floors limit the root zone (*Former Ministry of Agricultural and Rural Services, July 2008*).

Erosion levels of the project area and its vicinity is given in Figure IV.2. According to the erosion map, Project area which includes the WWTP, the sewerage network, discharge line and pumping stations is affected with moderate to low level of erosion. Factors such as structure of soil, bareness of its surface, slope of the land and wrong cultivation of the soil are causes that increase erosion risk of the soil. Although at Mugla province forest areas are not confronted with destructive erosion danger due to effects of geographic conditions, measures taken for erosion control are continued.

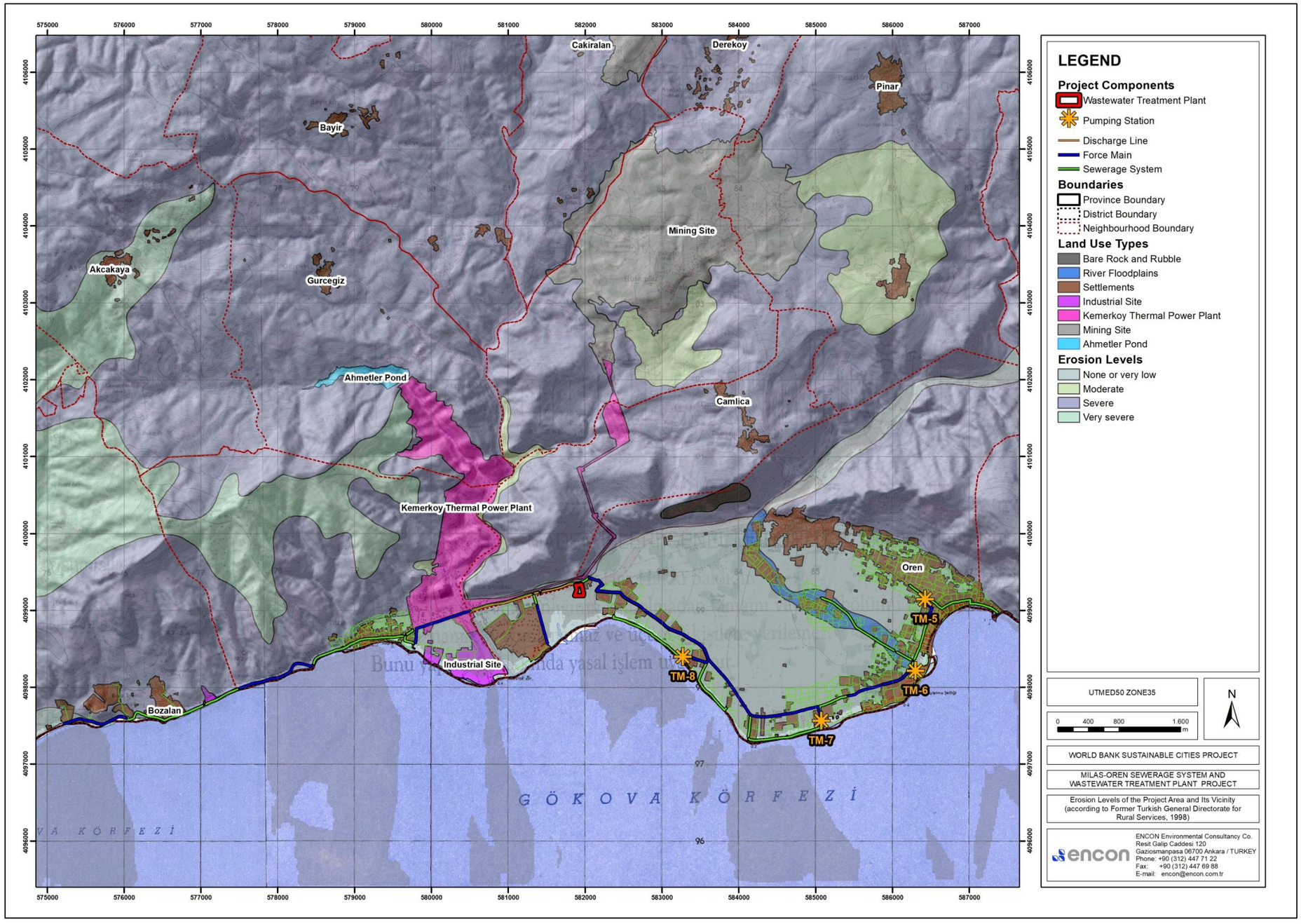


Figure IV.2 Erosion Levels of the Project Area and Its Vicinity

Field trips to the WWTP site showed that it is likely encounter contaminated soils at this area. Therefore, in the scope of the baseline studies for the Project and to determine the existing contamination status of soils located in the site, two samples were taken from the site by ENCON Laboratory on July 7, 2020. Photos from site and sampling study are provided in Figure IV.3. Sampling locations are shown in Figure IV.4 and measurement and analysis results are presented in Table IV.2. The laboratory reports are presented in Annex-2 of this report.

Figure IV.3 Photos from the WWTP Site and Soil Sampling

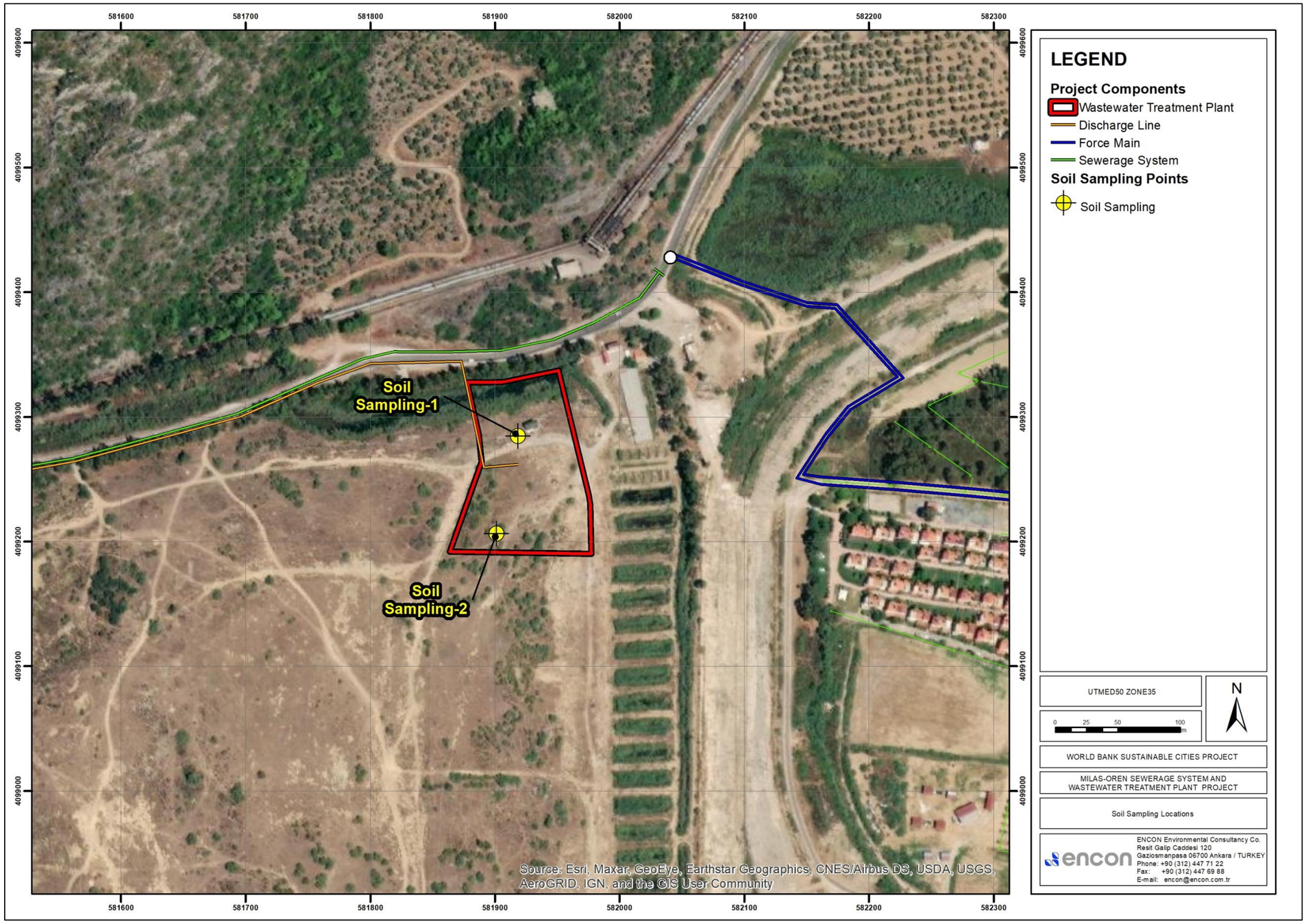


Figure IV.4 Soil Sampling Locations

Table IV.2 Soil Sampling Measurement and Analysis Results

Parameter	Soil Sampling Location-1 (X:581996, Y:4099345)	Soil Sampling Location-2 (X:582162 Y:4099205)
Antimony (mg/kg)	3.985	1.875
Arsenic (mg/kg)	<0.5	0.839
Boron (mg/kg)	28.56	16.35
Cadmium (mg/kg)	<0.5	<0.5
Chromium (mg/kg)	205.2	57.17
Copper (mg/kg)	31.85	17.52
Lead (mg/kg)	7.657	5.104
Mercury (mg/kg)	<0.1	<0.1
Nickel (mg/kg)	223.1	61.93
Selenium (mg/kg)	<0.5	<0.5
Silver (mg/kg)	<0.5	<0.5
Tin (mg/kg)	<10.0	<10.0
Total Petroleum Hydrocarbons (TPH) (mg/kg)	47.95	117.5
Zinc (mg/kg)	54.23	33.72
Total Organic Halogen (TOX) (mg/kg)	24.0	<20

The soil sampling and analysis study provides insight on existing soil quality in the WWTP site. Soil sample locations 1 and 2 correspond to expansion area and sludge treatment units, respectively. These locations are selected in order to provide baseline conditions regarding to 1st and 2nd stage areas of WWTP. Addition to that, soil sample location 2 is also selected to observe any possible sludge related contamination. Although both samples were taken from the WWTP site, the concentrations of some parameters significantly differ from each other, such as chromium, nickel and TPH.

Chromium levels in uncontaminated soil vary in between 2 and 60 mg/kg and soils with chromium levels up to 100 mg/kg are considered as appropriate for agricultural activities (Seven v.d., 2018). Therefore, the chromium concentration observed in the sampling location-1 and its comparison with the concentration observed in the second sampling location indicate a possible contamination in the location-1. Nickel levels in soils vary widely depending on local geology and anthropogenic inputs, but concentrations typically range between 4 and 80 ppm (Seven v.d., 2018). In USA, the most commonly used soil cleanup standard for TPH is 100 mg/kg (Michelsen, 1993). Therefore, the assessment made by evaluating chromium levels is also valid when considering TPH and nickel levels in the WWTP site.

In addition, during the soil sampling study carried out in the site, visually no pollution source that could cause permanent soil pollution was observed. Therefore, possible soil pollution at the site might have resulted from a one-time source.

Geology

In Mugla Province, oldest lithologies are from the Precambrian time, which are gneiss, micaschist, fine grained schist and quartzite, starting from the mountainous part north of Yatagan and Milas Districts and spreading further north. Paleozoic age rocks; cemented sandstones, marbles and schists cover these Precambrian units from the south. Marbles and crystalline limestones, clayey schists, sandstones, conglomerates, siliceous schists and phyllites can be observed in the Yatağan - Mugla trough are also Paleozoic aged.

Main units that can be observed in Mugla and its vicinity are; Menderes Massif, Lycia Nappes and Beydaglari autochthon. Menderes Massif starts with Precambrian gneiss, and covered

with micaschits and followed by metamorphics such as metaquartzite, phyllite, recrystallized limestones. Towards to top, molasses and flysch sedimentary rocks are deposited. The Lycian Nappes include nappe slices sediments from various times, and ophiolite and ophiolitic melange slices formed in the Late Cretaceous period. Beydaglari autochthon is made up of various formations. Carbonate sequence of the autochthon starts with rudist reef deposits and semi-pelagic massive limestones with planktonic foraminifera fossils deposited on top of it. Later under transgressive conditions, units with abundant plantonic foraminifera deposited in the basin.

The Mugla Region has undergone intense tectonic activites in Cenozoic and resulted with uplift and subsidence which exposed Precambrian and Paleozoic units. Many lakes formed due to this tectonism and some of them filled with Quaternary alluvium. General Geology Map of project site that was studied is presented in Figure IV.5.

Aegean Sea is a tectonically active region as a result of subduction of African Plate beneath to the Eastern Turkey. This subduction causes to extension in the region which occurs mainly in North-South and Southwest - Northeast direction. An active fault system and grabben formation are the results of the extension. Fault system consists of mainly East - West, Northeast - Northwest trending faults that creates seismicity in Western Anatolia and Mugla Province is also affected by this system. While different names can be given, there are four main fault zones in the Mugla region which are; Karaova-Milas, Mugla-Yatagan, Bodrum- Oren -Ula and Burdur-Fethiye Fault Zone.

Geology of the Study Area

Quaternary alluvium sediments cover the entire study area. The WWTP area was used as the filling area of the excavation material that excavated during the construction of a thermal power plant. It was determined that the filling thickness varies in the between 3.60 and 8.00 m, depending on the previous topography of the site and time.

Alluvium is made up of lenticular layers of clay, sand and small gravel materials in different proportions. Silt and fine sand dominated lithologies are gray, dark gray due to organic residues, and they are intercalated laterally and vertically. However, due to the precipitation conditions, silt and sandy pebbly materials under the filling (excavation material) vary between 1.80 - 4.60 m thicknesses.

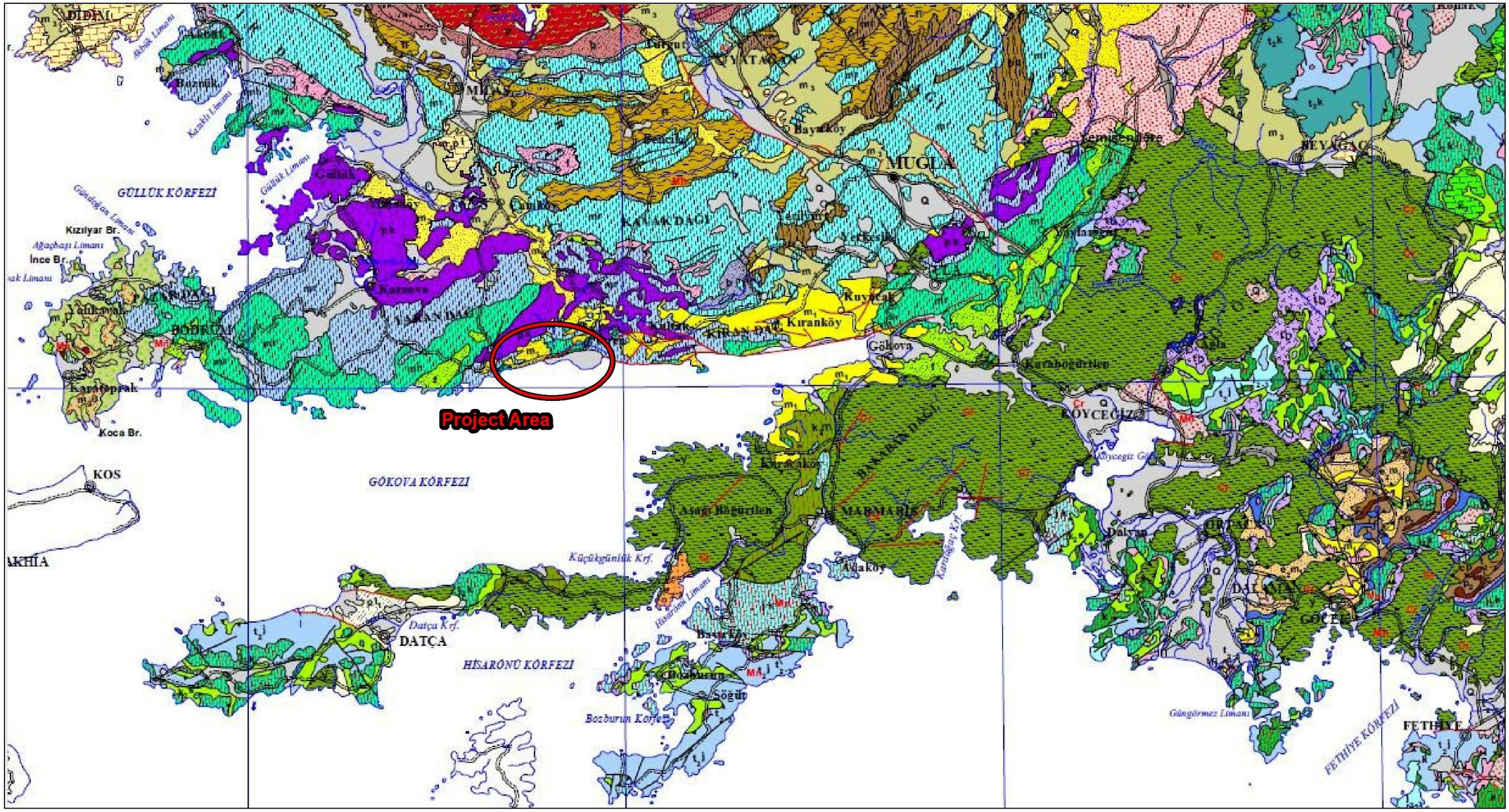


Figure IV.5. General Geology Map

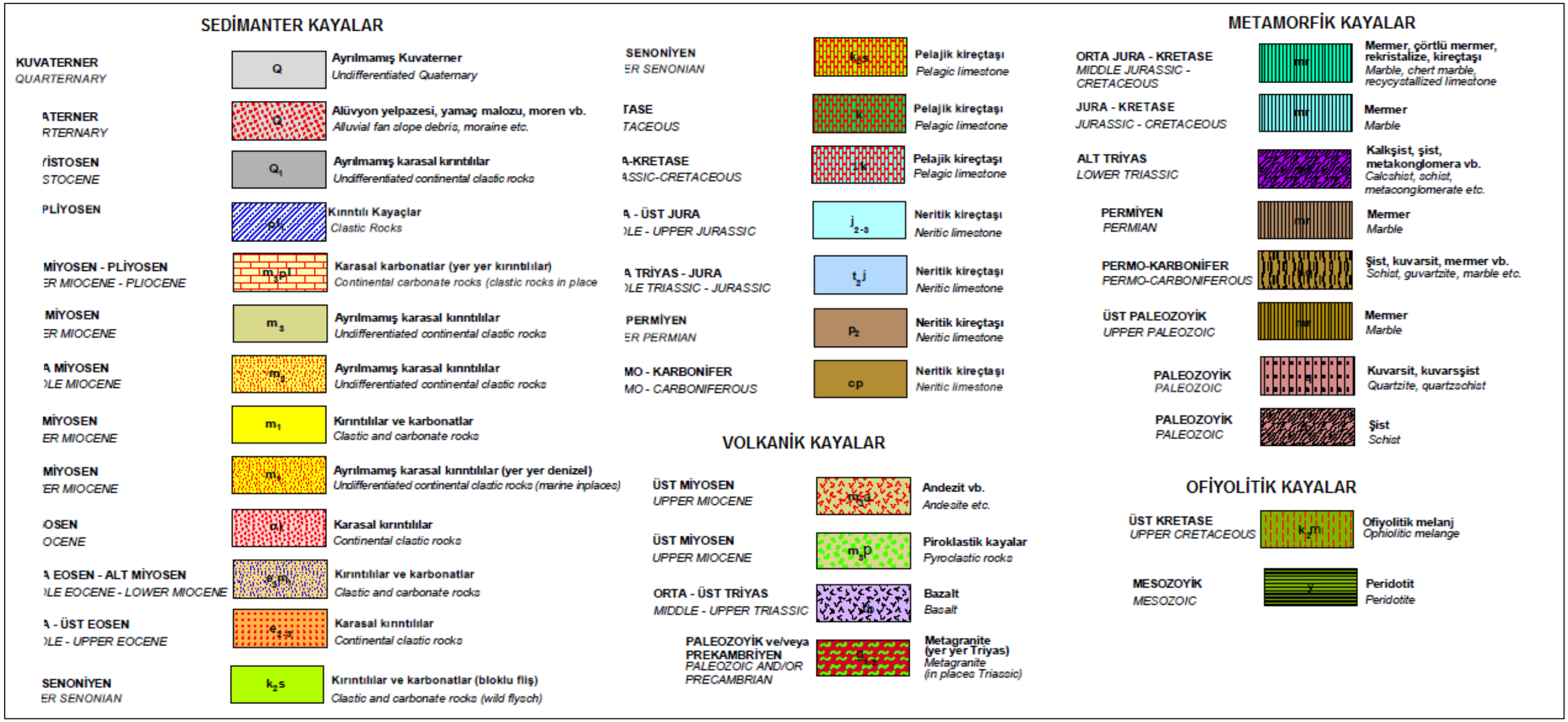


Figure IV.6 General Geology Map Legend

IV.1.3 Natural Hazards and Seismicity

Natural Hazards

According to “Spatial and Statistical Distribution of Disasters in Turkey Information Inventory” prepared by former Ministry of Public Works and Settlement in 2008, general natural disasters observed in Mugla are; landslides and rock falls. Landslides are observed in Fethiye and Central districts and rock falls are observed in Central and Marmaris Districts.

When Milas District is examined by Distribution of Disaster Events maps prepared by former Ministry of Public Works and Settlement, records of earthquake, landslide, rock fall and flood can be observed on maps, however it is not expected to observe natural disasters such as flooding, active and potential mass movements (landslides) in the study area and its immediate surroundings.

As a result, no risks related to natural disasters including landslide, rock fall, avalanche, etc. are identified at the Project Area which covers both the WWTP and the sewerage network to be considered as part of "Law on Aids Implemented with Mitigations taken for Natural Disasters on Public Life" numbered 7269.

Seismicity

According to Map of Earthquake Regions of Turkey issued by Official gazette No. 30364 dated 18.03.2018, ground acceleration of Mugla province, including Milas District is classified as between 0.2-0.3 g. Therefore, earthquake risk has to be taken into consideration in the design of the WWTP. Earthquake Regions Map is given in Figure IV.7 and Active Fault Map of Turkey is given in Figure IV.8.

Aegean Sea Region is tectonically active, earthquakes with various magnitudes can happen Mugla Province, and its vicinity, thus, earthquake risk must be taken to consideration for the design of the WWTP.

Turkish Earthquake Zones Map was prepared by the T.R. Ministry of Public Works and Settlement and came into effect with Council of Ministers’ Decision no 96/8109 dated 18.4.1986. According to this map, Mugla region is in 1st degree earthquake region.

According to Council of Ministers decision dated March 18, 2018, published in the Official Gazette No. 30364 is, "Turkey Earthquake Building Regulation" which entered into force on January 1, 2019, construction works are going to comply with the principles of the regulation rigorously.

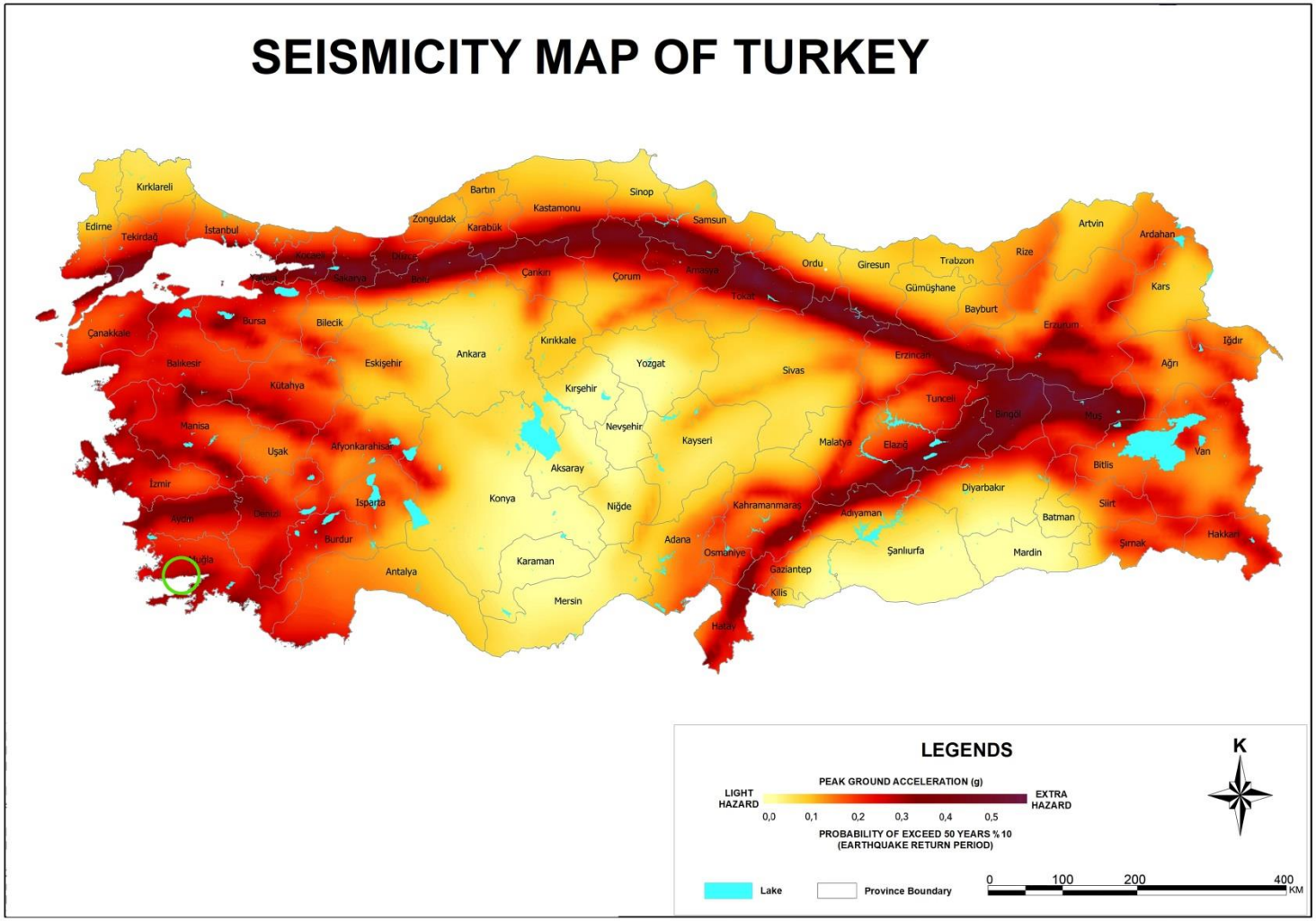


Figure IV.7. Seismicity Map of Turkey

Figure IV.8. Active Fault Map of Turkey

IV.1.4 Hydrogeology

Within scope of Wastewater Treatment Plant Project, GAB Engineering and Consultancy Company ("GAB") conducted field work, drilling and laboratory studies in order to collect geological-geotechnical data and their evaluations.

According to "Oren (Milas/MUGLA) WWTP Ground Investigation and Evaluation Report" prepared by "GAB" following results were obtained related to hydrogeology from the studies mentioned above:

- There is no lake around the project site.
- There is a surface water stream (drainage ensured) with continuous flow and high salinity which limits the north of the study area.
- Groundwater levels determined in the wells drilled within the scope of the Project, are related to seasonal precipitation and spring waters. Static water levels encountered in the wells drilled in the project area are given in Table IV.3 below.

Table IV.3 Groundwater Levels Determined in Boreholes (and trial pits)

Drilling Well/Trial Pit No.	Depth (m)	Coordinates (ITRF-96)		Groundwater Depth (m)
		X	Y	
DW-1	30.45	581957,65	4100648,67	2.67
DW-2	15.00	581958,21	4100695,87	3.15
DW-3	15.00	581911,85	4100647,65	3.70
DW-4	15.00	581898,43	4100680,44	4.00
DW-5	15.00	581892,11	4100746,22	3.70
DW-6	15.00	581942,65	4100754,88	3.60
TP-1	2.00	581941,88	4100721,95	-
TP-2	3.00	581965,14	4100660,84	-
TP-3	3.00	581904,86	4100711,96	-

The drilling wells showed that groundwater levels are ranging from 2.67 to 4.00 m in the WWTP area. Accordingly, the groundwater-related problems are expected in cases where the foundation depth of the WWTP units to be built exceeds 2.60 m It should also be noted that depending on seasonal conditions and precipitation, the groundwater level may change. The locations of the boreholes are presented in Figure IV.9.

In addition, during the soil sampling study carried out in the site, visually no pollution source that could cause permanent soil pollution was observed. Therefore, possible soil pollution at the site might have resulted from a one-time source. Within this context, no significant impact on groundwater is foreseen due to a possible soil contamination.

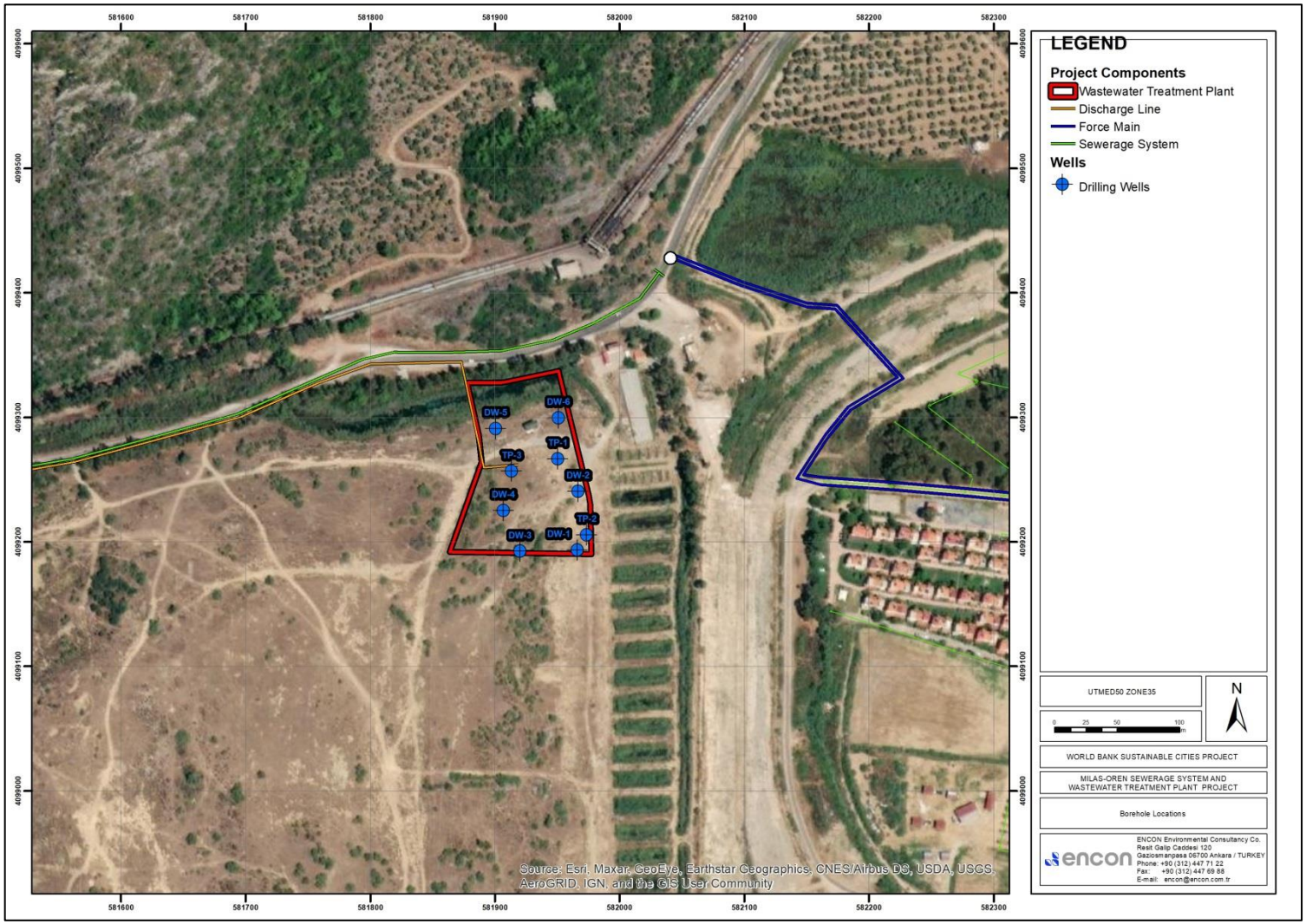


Figure IV.9 Borehole Locations

IV.1.5 Water Resources

Project area is located in West Mediterranean Water Basin. West Mediterranean Water Basin incudes Gokova Bay and Akdaglar mountains of Mugla province. The catchment area of the basin is approximately 21,000 km^2. There are 322,000 hectares of plain in the basin. 211,500 hectares of the plains are irrigable. The waters of the Western Mediterranean Basin are discharged to the Mediterranean with Dalaman and Esen Creek. These creeks are also two most important streams of the province.

Main water courses in the Mugla are Kargicik Creek Namnam Creek, Kargi Creek, Karaculha Creek, Kocadere Creek, Saricay Creek. The water potentials of these water courses are given in Table IV.4 and maps of the hydrology of the Project area and its vicinity is shown in Figure IV.10.

Natural lakes in Mugla Province can be listed as Bafa Lake, Koycegiz Lake, Sulungur Lake, and Kocagol Lake. The areas of this main lakes located in the Mugla are given in Table IV.5.

Table IV.4 Rivers of Mugla

Name	Total Length (km)	Length in Province Borders (km)	Flow Rate (m^3/sec)		
			Min	Max	Average
Dalaman Creek	190	65	9.51	1050	43
Kargıcık Creek	17	17	0.35	22.8	1.33
Esen Creek	128	80	1.65	271	14.9
Namnam Creek	33	33	0.014	556	9.65
Dipsiz Creek	-	-	0.114	-	4.707
Sancay	-	-	-	220	1.32
Kartaculha River	-	-	0.001	2.2	0.071
Batis River	-	-	-	35.4	0.189

Source: West Mediterranean Basin Protection Action Plan

Table IV.5 Lakes in Mugla

Name	Area (ha)
Bafa Lake	2519
Koycegiz Lake	5500
Sulungur Lake	260
Kocagol Lake	260

Source: West Mediterranean Basin Protection Action Plan

Mugla Province Dams and Ponds

Information on ponds and dams of Mugla province are presented in Table IV.6 and locations are shown in Figure IV.11.

Table IV.6 Dams of Mugla

Name	Lake Capacity hm^3	Purpose
Geyikli Dam	41.1	Cooling water for Milas Kemerköy Thermal Power Plant, Drinking water for Bodrum Peninsula
Mumcular Dam	19.4	Drinking water, Irrigation
Marmaris Dam	30	Drinking water, Irrigation
Bayir Dam	7.20	Irrigation
Akkoprü Dam	384.5	Irrigation, Drinking water, Flood protection
Akgedik Dam	31	Irrigation
Kazan Dam	3	Irrigation

Source: West Mediterranean Basin Protection Action Plan

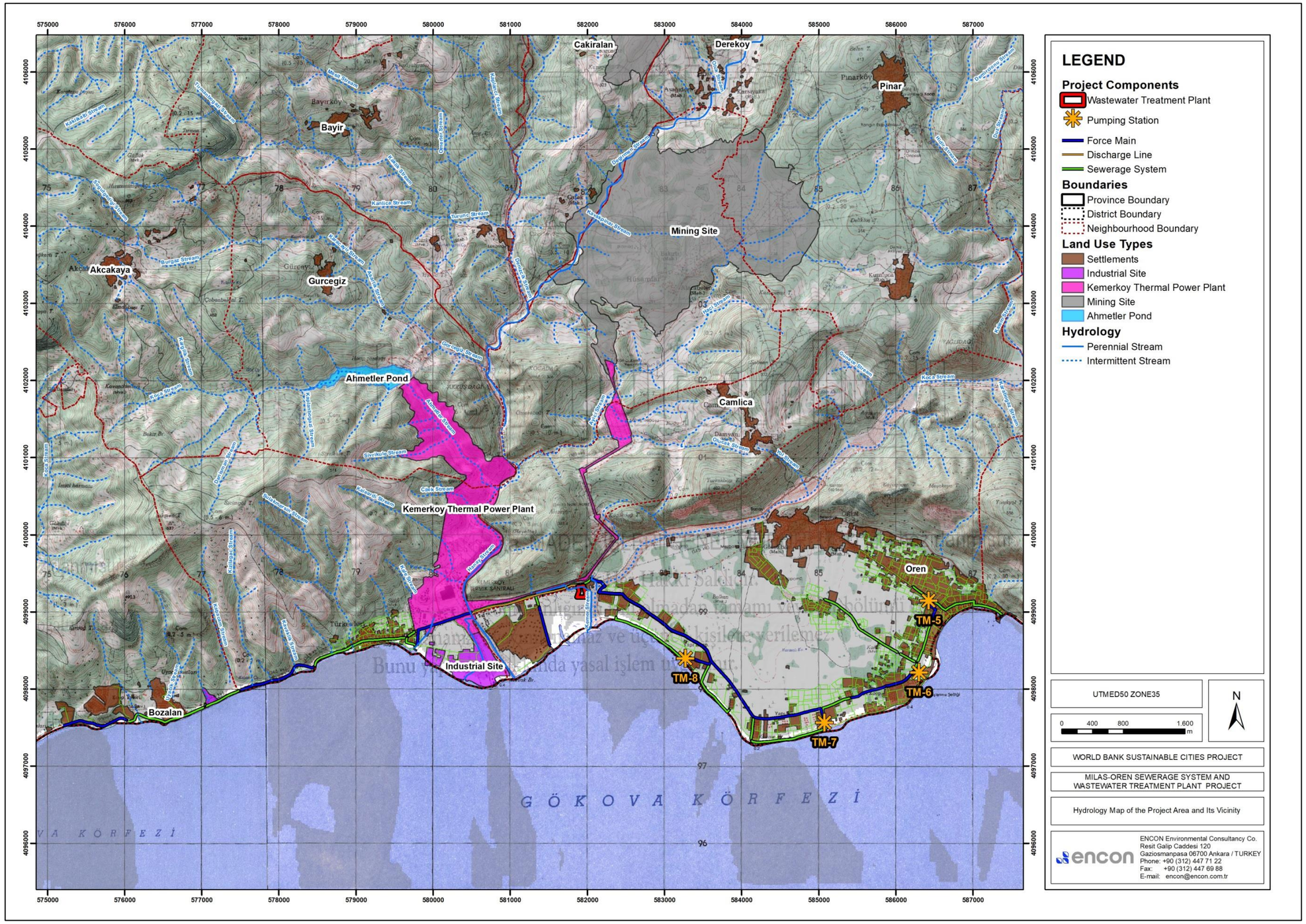


Figure IV.10 Hydrology Map of the Project Area and Its Vicinity

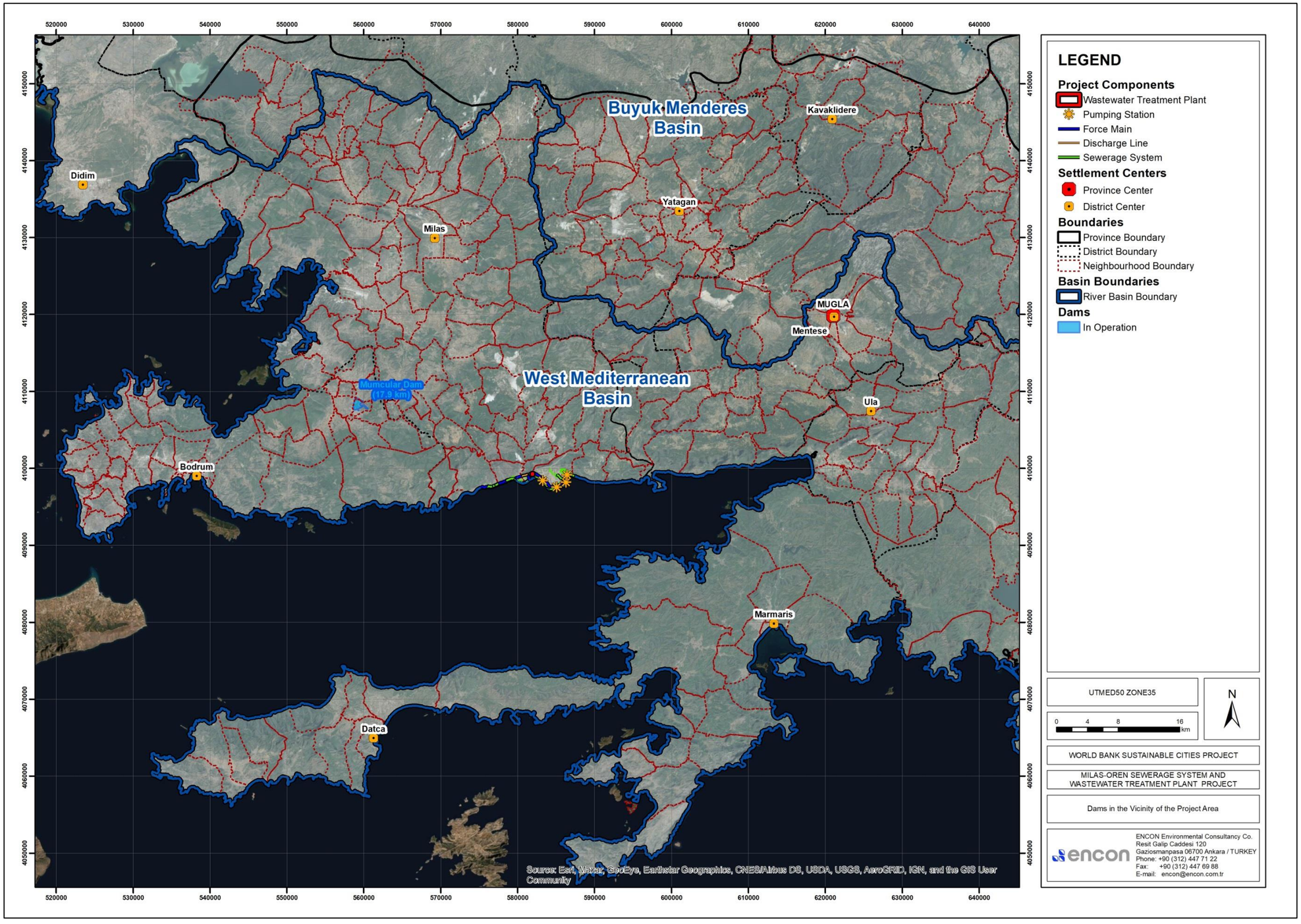
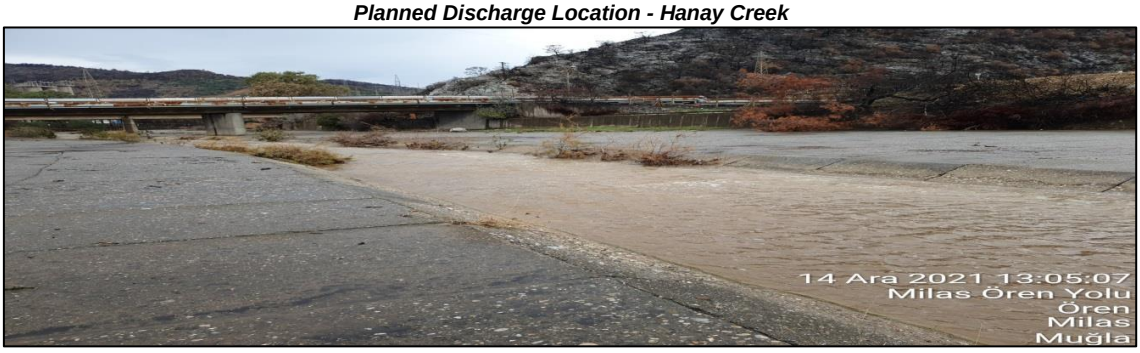


Figure IV.11 Dams in the Vicinity of the Project Area

IV.1.6 Characteristics of Receiving Environment

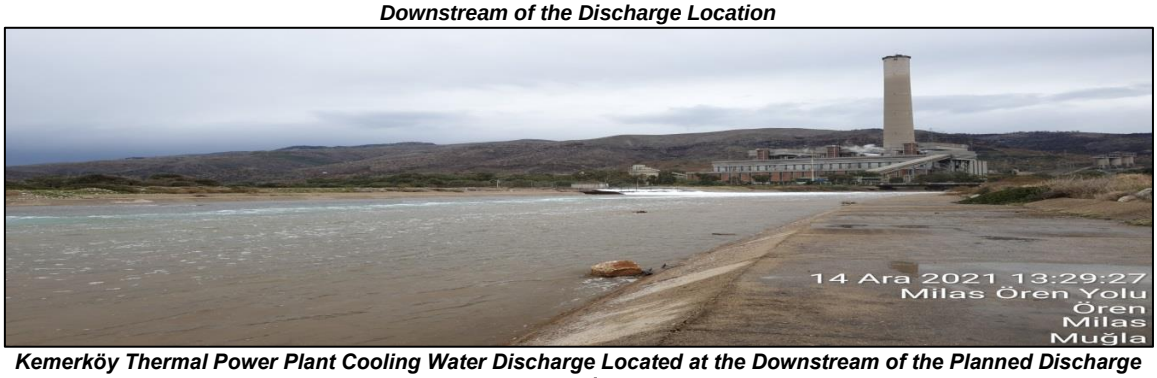
The Oren WWTP that will be constructed within the scope of the Project will discharge its effluent through 1,542 meter discharge line to Hanay Creek which is located at the western part of the WWTP and reaching directly to the sea. The creek bed is made of concrete. While the creek current is approximately 5 meters wide at the upstream of the discharge point, at the downstream it reaches up to 45 meters width due to cooling water that is being discharged from Kemerköy Thermal Power Plant. The photos of Hanay Creek are provided in Figure IV.12**Hata! Başvuru kaynağı bulunamadı.**.

Planned Discharge Location - Hanay Creek



Upstream of the Discharge Location

Downstream of the Discharge Location



Kemerköy Thermal Power Plant Cooling Water Discharge Located at the Downstream of the Planned Discharge Location

Figure IV.12 Photos of Receiving Environment – Hanay Creek

To constitute a baseline inventory and to determine the existing quality of the receiving environment a sampling study was conducted on December 14th, 2021. In the scope of the study, total of three surface water samples were taken from the upstream (upstream surface water sampling location) and downstream (downstream surface water sampling location) of the planned discharge location, and downstream of the Kemerköy Thermal Power Plant where cooling water is being discharged (downstream surface water sampling location-2). Sampling locations are presented on a map given in Figure IV.13. Laboratory reports are provided in Annex-2 of this report.

The measurement and analysis results of Hanay Creek are presented in Table IV.7 together with the water quality classification criteria stipulated in the Water Pollution Control Regulation and Surface Water Quality Regulation (indicated with "*" sign).

As seen from the Table IV.7, upstream and downstream of the planned discharge location of the Hanay Creek is classified as Class IV in terms of total coliform. Class III due to pH and total phosphorus parameters. Other measured parameters are mostly belongs to Class I and Class II. Although total coliform levels are high, low *E.coli* and fecal coliform levels indicate that high total coliform levels might be caused by entry of soil or organic matter into the water. Therefore, it can be concluded that there is no reach or continuous direct discharge of sewerage to Hanay Creek.

On the other hand, downstream of the Kemerköy Thermal Power Plant where cooling water is being discharged is classified as Class IV in terms of TDS and conductivity. Other measured parameters are belongs to Class I and Class II. Within this regard, high levels of TDS and conductivity might resulted from wastewaters originated from fossil fuel extraction activities that enter the surface water.

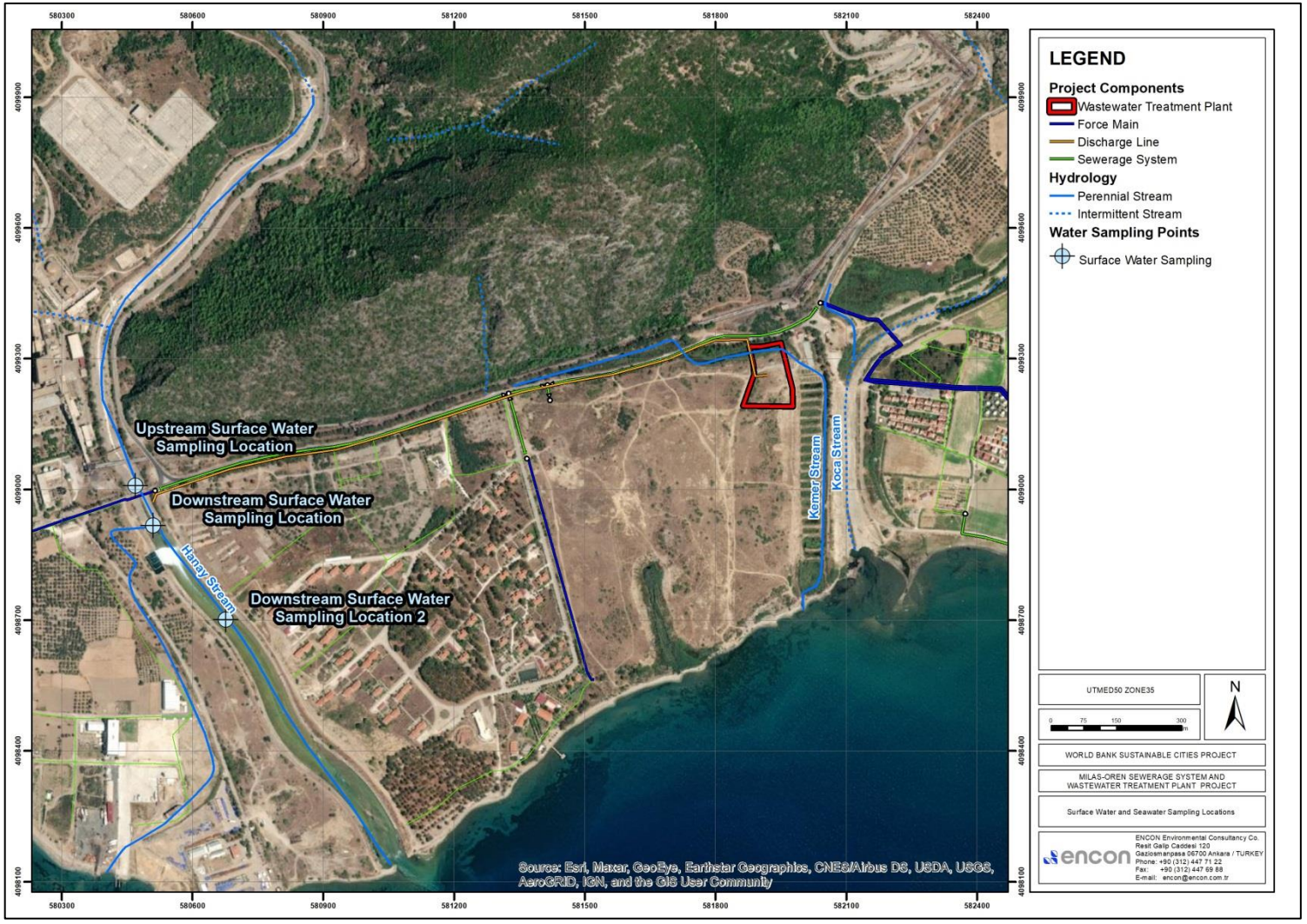


Figure IV.13 Surface Water and Seawater Sampling Locations

Table IV.7 Physicochemical and microbiological characteristics of Hanay Creek (December 2021)

Parameters	Unit	Upstream of the Planned Discharge Location (X: 580469, Y: 4099008)	Downstream of the Planned Discharge Location (X: 580505, Y: 4098924)	Downstream of the Kemerköy Thermal Power Plant (X: 580644, Y: 4098750)	Water Pollution Control Regulation and Surface Water Quality Regulation Water Quality Classes			
					I	II	III	IV
Temperature	°C	15.3	15.0	15.7	25	25	30	>30
pH	-	8.58	8.55	8.28	6.5-8.5	6.5-8.5	6.0-9.0	<6.0 - >9.0
Dissolved Oxygen	mg/L	9.29	9.31	9.16	8	6	3	<3
Ammonium	mg NH_4^+-N /L	<0.02	<0.02	<0.02	0.2	1	2	>2
Nitrite	mg NO_2^--N /L	0.01	0.0090	0.004	0.002	0.01	0.05	>0.05
Nitrate	mg NO_3^--N /L	0.274	0.306	<0.1	5	10	20	>20
TP	mg/L	0.24	0.18	0.10	0.02	0.16	0.65	>0.65
TDS	mg/L	322	601	37859	500	1500	5000	>5000
COD	mg/L	18.53	18.04	10.61	25	50	70	>70
BOD	mg/L	4.80	6.00	3.16	4	8	20	>20
TKN	mg/L	0.92	0.62	0.76	0.5	1.5	5	>5
Fecal Coliform	CFU/100 mL	37	52	0	10	200	2000	>2000
Total Coliform	CFU/100 mL	>100000	>100000	210	100	20000	100000	>100000
Escherichia coli	CFU/100 mL	0	0	0	-	-	-	-
TSS	mg/L	613	144	42	-	-	-	-
Turbidity	NTU	249	80.90	4.11	-	-	-	-
Salinity	‰	0.3	0.54	38	-	-	-	-
Conductivity*	µS/cm	628	1098	56300	<400	1000	3000	>3000

IV.1.7 Protected Areas

In order to identify and evaluate the protected areas within the Project Area and its immediate vicinity, desktop studies and literature researches were carried out by using the databases of the relevant institutions within the scope of the Project. For this purpose, sensitive area list available in Annex 5 of the EIA Regulation was used as reference. This list covers areas that need to be protected in accordance with international conventions that Turkey is contracting party and nationally declared protected areas. As can be seen from the evaluations in the following paragraphs, the nearest protected area is Gokova Special Protected Environmental Area, located about 1.1 km away from the site.

National Parks, Natural Parks, Natural Monuments, Nature Reserve Areas, Wildlife Protection Areas, Wild Animal Raising Areas, Cultural Assets, Natural Assets, Protected Areas, Areas under Protection in accordance with Bosporus Law, Biogenetic Reserve Sites, Biosphere Reserves, Special Environmental Protection Areas and Protected Areas related to Drinking and Utility Water Reserves are not located within Project Site.

Utilized main data sources within the scope of the desktop studies, but not limited to, are listed below:

- Database of Ministry of Agricultural and Forestry (former Ministry of Forestry and Water Affairs) (http://geodata.ormansu.gov.tr)
- Database of Ministry of Agricultural and Forestry, General Directorate of Nature Conservation and National Parks (http://www.milliparklar.gov.tr)
- Database of Ministry of Culture and Tourism, General Directorate of Cultural Heritage and Museums (http://kve.ulakbim.gov.tr)
- Map of Prohibited and Open Hunting Areas in Mugla Province for years 2018-2019

Protected Areas in accordance with National Legislation

Areas required to be protected in accordance with the legislation of the country defined under Annex 5 (Sensitive Regions) of the EIA Regulation are listed in the following items and the evaluations related to the indicated areas are presented therein.

National Parks, Nature Parks, Nature Monuments and Nature Conservation Areas defined in Article 2 and 3 of the National Parks Law

There are 11 Natural Parks in Mugla Province. The closest one to the Project Area is Cubucak Nature Park which is located 26.7 km southeast of the Project Area (covering both the WWTP and the sewerage network).

There are 2 National Parks in Mugla Province. The closest one to the Project Area is Marmaris National Park and it is located 27.9 km southeast of the Project Area.

Sirtlandagi Aleppo Pine Nature Conservation Area is located 27.0 km northwest of the Project Area, at the Mugla-Milas Province Border.

There are 5 nature monuments in Mugla Province and the closest one is Olive Tree Nature Monument and it is located 41.5 kilometers west of the Project Area.

The closest Biogenetic Reserve Area (Calabrian pine) is located 9.1 km away from the Project area. The closest Seed Stand Type (Calabrian pine) is 9 km west of the Project area.

Wildlife Protection Areas, Wildlife Development Areas and Wild Animal Nestling Areas determined in accordance with the Land Hunting Law

Map of prohibited and open hunting areas for years 2019-2020, prepared by Ministry of Agricultural and Forestry, General Directorate of Nature Conservation and National Parks, is presented in Figure IV.16. As could be seen from the map given in Figure IV.14, the closets wildlife development area is Mugla-Koycegiz WDA that is located about 39.3 km southeast of the Project Area. There are various hunting areas in the Province as well as prohibited hunting areas (see Figure IV.16).

Areas defined as Cultural Property, Natural Property, Protected Site and Protected Area according to 2863 numbered Law on Protection of Cultural and Natural Properties dated July 21 1983, Article 3, Paragraph 1, Clause (a) (Definitions); Sub-clauses 1, 2, 3 and 5; and areas identified and registered in the same Law and amendments

WWTP site is located at a distance of 1613 m distance to Grade 1 archaeological protected area, and 1310 m distance to Grade 3 archaeological protected area. Archaeological protected areas around the Project Area are given in Figure IV.14 and Figure IV.15. In addition to those, Oren's city centre is declared as Grade 3 archaeological protected area considering its urban texture.

Aquaculture Production and Breeding Sites within the scope of Aquaculture Law

Dalyan channels which is in Koycegiz district is completely prohibited hunting inland waters in Mugla province.

Closest natural lake to the Project Area is Metruk Tuzlası Wetland, which is located 26.7 km northwest of the Project Area. The closest dam in operation to the Project Area is Mumcular Dam, which is located about 17.9 km northwest of the Project Area.

Areas defined in Air Quality Assessment and Management Regulation

According to the 7th Article of Air Quality Assessment and Management Regulation, zones and sub-zones for air quality identification are listed in Annex-1 of Memorandum 2013/37. With the relevant circular, Turkey is divided into various regions and sub-regions. With this distinction, the Ministry tried to determine the pollution profile of the provinces. The list in Annex-III of the circular is divided into two groups according to the pollution profile of provinces substances: "high pollution potential cities" and "low pollution potential cities". Pollution profiles of provinces were carried out within the 2012-2013 winter season air quality data and air quality bulletins received from air quality monitoring stations connected to the national air quality monitoring network. According to this, the Mugla Province is in the list of "high pollution potential".

Areas identified and declared as Special Environmental Protection Areas by the Cabinet of Ministers in accordance with the 9th Article of Environment Law

There are 5 special environmental protection areas in Mugla Province. Gokova Special Environmental Protection Areas are the closest ones which are located about 1.1 km southeast of the Project Area.

Areas defined in Pasture Law

The Project Area is not located in pasture land which is subjected to 4342 numbered Pasture Law.

Areas designated in accordance with the Regulation of the Wetland Conservation

There are 7 wetland areas in Mugla Province. These are; Koyceyiz Lake, Bafa Lake, Dalyan Wetland, Dalyan Wetland Ecosystem, Girdev Lake, Golkoy Lake, Gulluk Delta. There are not any RAMSAR areas in Mugla Province.

Other Protected/Restricted Areas

In addition to presented information above, the areas listed below (also listed in Annex 5 of the EIA Regulation) do not exist in the Project Area:

- Areas in accordance with the 17th, 18th, 19th and 20th Articles in the Water Pollution Control Regulation
- Protected areas within the scope of Bosporus Law
- Forest Areas within the scope of Forest Law
- Areas subject to construction ban in accordance with the Coastal Law
- Areas designated in accordance with the Law on the Vaccination of Pesticides and Improvement of Olive Cultivation
- Areas subjected to construction ban and areas of which their present characteristics should be protected according to Approved Environment Plans (areas of which their natural characteristics should be protected, biogenetic reserve areas, geothermal areas, etc.)
- Agricultural Areas: Agricultural development areas, irrigated areas, potentially irrigated areas, areas with land use capability class of I, II, III and IV, rainfed agricultural lands classified as I and II and specific product plantations areas
- Wetlands: Natural or artificial, permanently or temporarily, standing water or flowing, freshwater, hard or salt water, all the wetlands have importance for the organisms especially for aquatic birds, sea depth range below six meters during the low tide, swamp, reeds and turbaries and ecologically wetlands on their coastal sides
- Lakes, rivers, groundwater operation sites
- Areas important for endemic species that is endangered or potentially endangered or important for scientific researches, biosphere reserve, biotopes, biogenetic reserve areas, areas have unique characteristics for geologic and geomorphologic formations

In order to identify the cultural assets and protection areas in the vicinity of the Project Area, the database of cultural heritage of Turkey (*http://kve.ulakbim.gov.tr*) has been queried. As the Project Area is located about 39.6 km southwest of Mugla city center, cultural assets have been searched in district basis (i.e. by considering Milas district of Mugla Province). The identified immovable cultural assets that are vicinity of the project area are listed in Table IV.8.

Table IV.8 Inventory of Immovable Cultural Assets in Milas District

Asset Subtype	Number in Milas District
Monuments	1
Archeological Protection Area	75
Military	6
Other	2
Religious	28
Natural Protection Area	8

Asset Subtype	Number in Milas District
Natural Assets	11
Industrial and Commercial	6
Folk Culture	206
Administrative	9
Ruins	24
Cultural	44
Graveyards	14
Civil Architecture Sample	40
Total	**474**

Protected Areas in accordance with International Conventions

Areas required to be protected in accordance with the international conventions to which Turkey is a party and defined under Annex 5 (Sensitive Regions) of the EIA Regulation are listed in the following items and the evaluations related to the indicated areas are presented therein.

Other Protected/Restricted Areas

There are no areas within the context of below mentioned protected/restricted areas;

- Mediterranean Monk Seal Living and Reproduction Areas, I. and II. Conservation Zones defined in Important Sea Turtle Reproduction Areas from the protected areas in accordance with the Convention for the Protection of the Wildlife and Habitats of Europe (BERN Convention)
- Areas protected under the Convention on the Protection of the Mediterranean from Pollution (Barcelona Convention)
- Areas designated as Special Protection Area in Turkey in accordance with the Protocol on the Protection of Special Protection Areas in the Mediterranean
- Fields on the list of 100 Coastal Historic Sites with Joint Prevention in the Mediterranean published by the selected United Nations Environment Program in accordance with the Geneva Declaration
- The coastal areas that are the living and feeding environment of Native Species of Hazardous Dangers to the Mediterranean included in 17th Article of the Geneva Declaration
- Cultural, historical and natural areas that are protected by the Ministry of Culture under Cultural Heritage and Natural Heritage status according to the 1st and 2nd articles of the Convention for the Protection of the World's Cultural and Natural Heritage
- Protected areas in accordance with the Convention for the Protection of Wetlands with International Importance as Particularly Water Birds Living Environment (RAMSAR Convention)
- European Landscape Contract

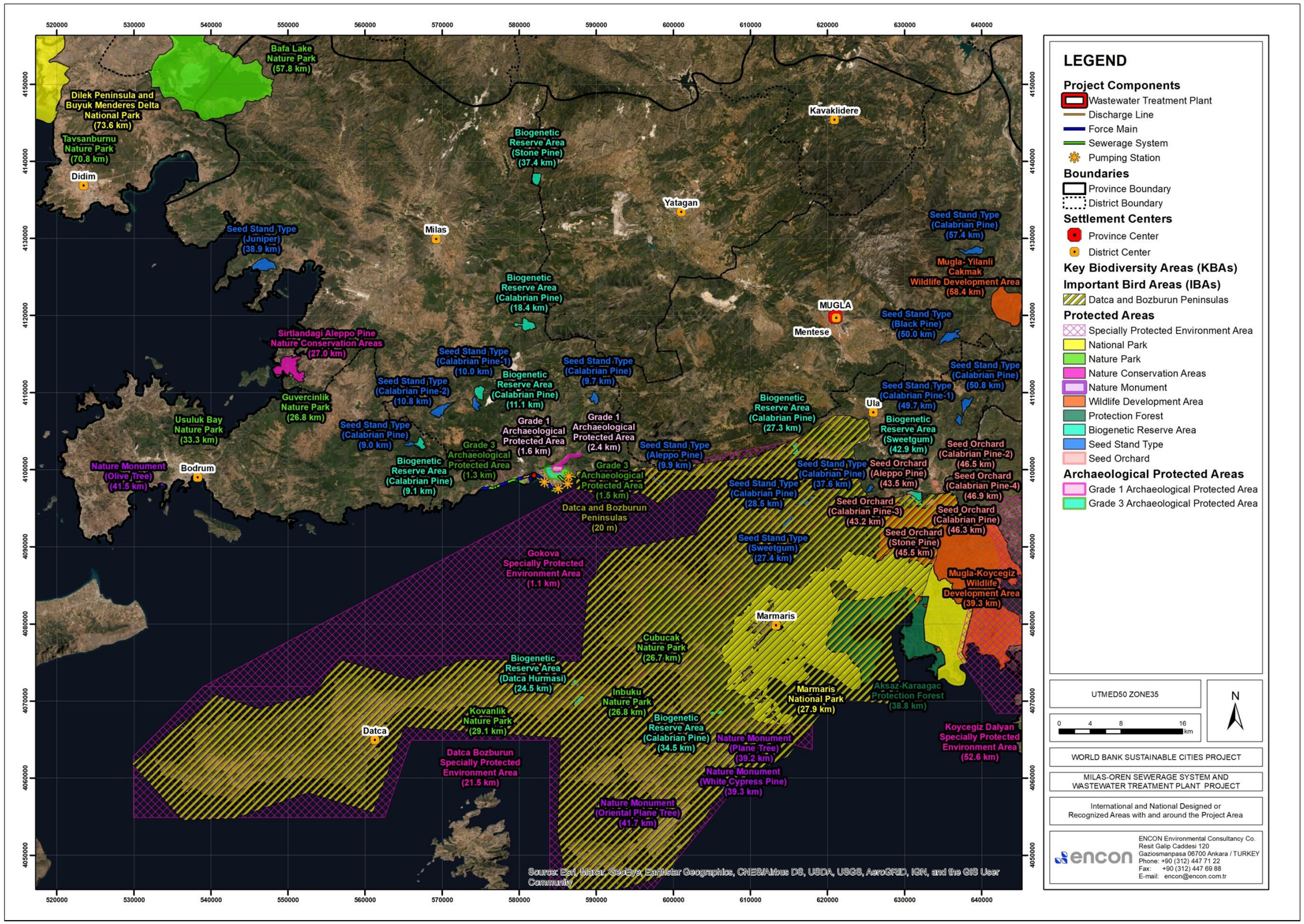


Figure IV.14 Protected Areas around the Project Area

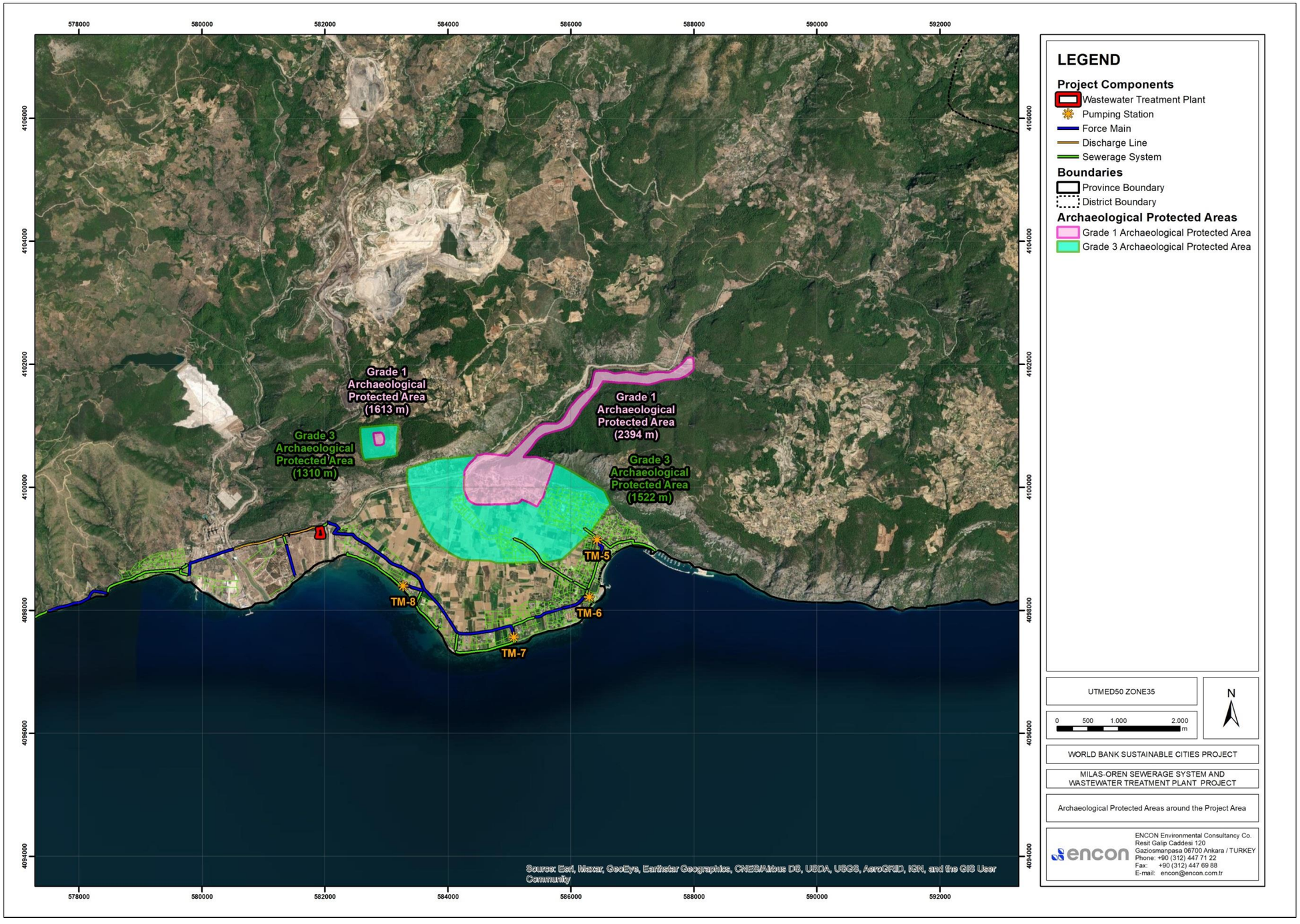


Figure IV.15 Archaeological Protected Areas Around the Project Area

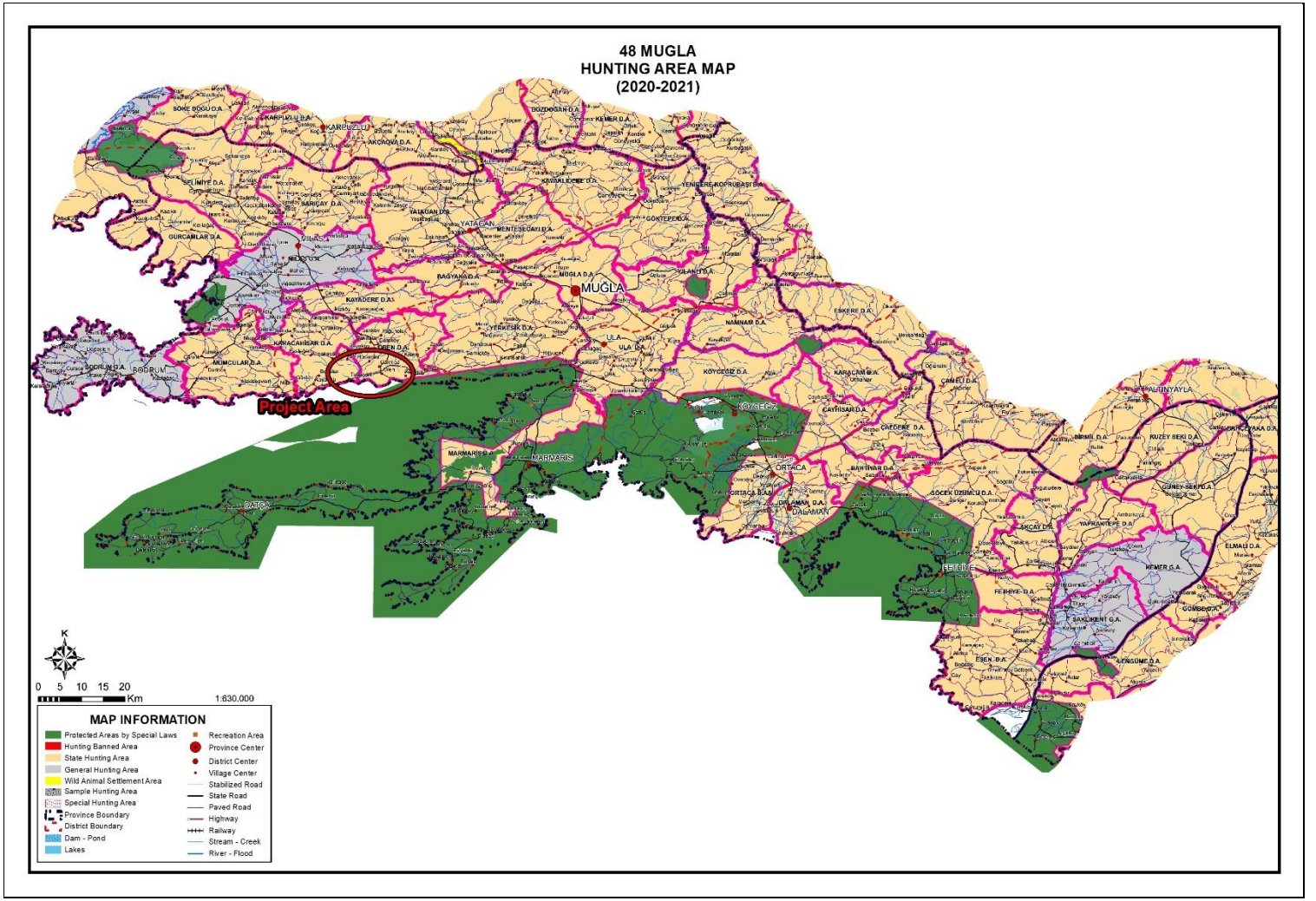


Figure IV.16 Prohibited and Open Hunting Areas in Mugla (2019-2020)

IV.1.8 Meteorology and Climatic Characteristics

The region has a climate characteristic composed of the synthesis of Aegean and Mediterranean climates. It is warm and rainy in winter, and hot and dry in summer and has micro-climate area features in peninsula, which is also valid for Oren. There is hardly any moisture in the summer months. In the winter months, the humidity rate is quite low. It is hot and dry in the summer months, quite warm and rainy in the winter months.

The primary factors affecting the air quality are the natural factors such as topography, meteorology, natural vegetation, and the human factors such as population increase, unplanned urbanization and industrialization. Domestic heating and industry take place near the top in ranking of the basic factors affecting the air quality in Mugla province.

For the ESIA studies, comparing to the Milas meteorological observation station, which is located inland and around 40 km away from the sea and consequently its direct effects, the Marmaris meteorological observation station is considered to best represent the Project Area. The data presented in the following subsections are retrieved from the State Meteorology Services Marmaris Meteorological Observation Station.

Temperature Distribution

Marmaris Meteorology Station records show that annual mean temperature is 19.1 °C. The highest temperature is recorded as 45ºC in August. The lowest temperature is recorded as –4.5ºC in February. The graphical and tabular representation of the average, maximum, minimum temperature records measured in this station are given in Figure IV.17 and Table IV.9, respectively

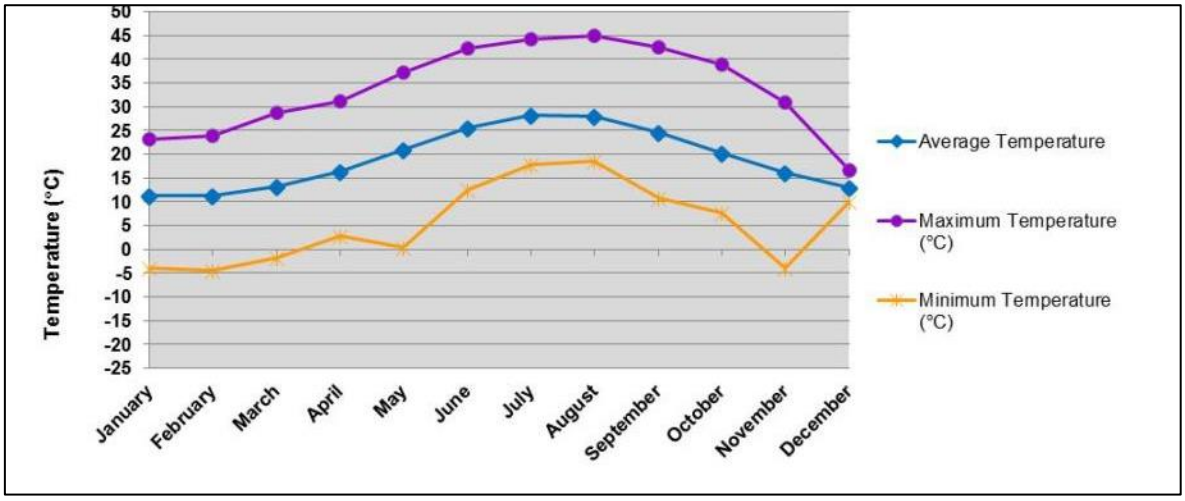


Figure IV.17 Average Temperature, Maximum Temperature and Minimum Temperature

Table IV.9 Temperature Values

Months	Average Temperature (°C)	Maximum Average Temperatures (°C)	Minimum Average Temperatures (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)
January	11.3	15.1	8.3	23.1	-4
February	11.4	15.4	8.3	24	-4.5
March	13.3	17.6	9.8	28.7	-1.8
April	16.5	21.1	12.7	31.2	2.8
May	21	26.1	16.6	37.2	0.5
June	25.7	31.2	20.8	42.3	12.6
July	28.3	34.2	23.2	44.2	17.8
August	28.1	34.1	23.3	45	18.5
September	24.6	30.4	20.4	42.6	10.8
October	20.3	25.6	16.8	38.9	7.8
November	16.2	20.5	13	31	-4
December	13	16.6	10	24.5	-1.5
Annual	19.1	24.0	15.3	34.4	4.6

Precipitation Distribution

Marmaris Meteorology Station records show that annual average total precipitation is 59,8 mm. Total precipitation is maximum in September with 232 mm and minimum in July with 5 mm. Average monthly precipitation and daily maximum precipitation amounts are given graphically in Figure IV.18 and tabulated in Table IV.10.

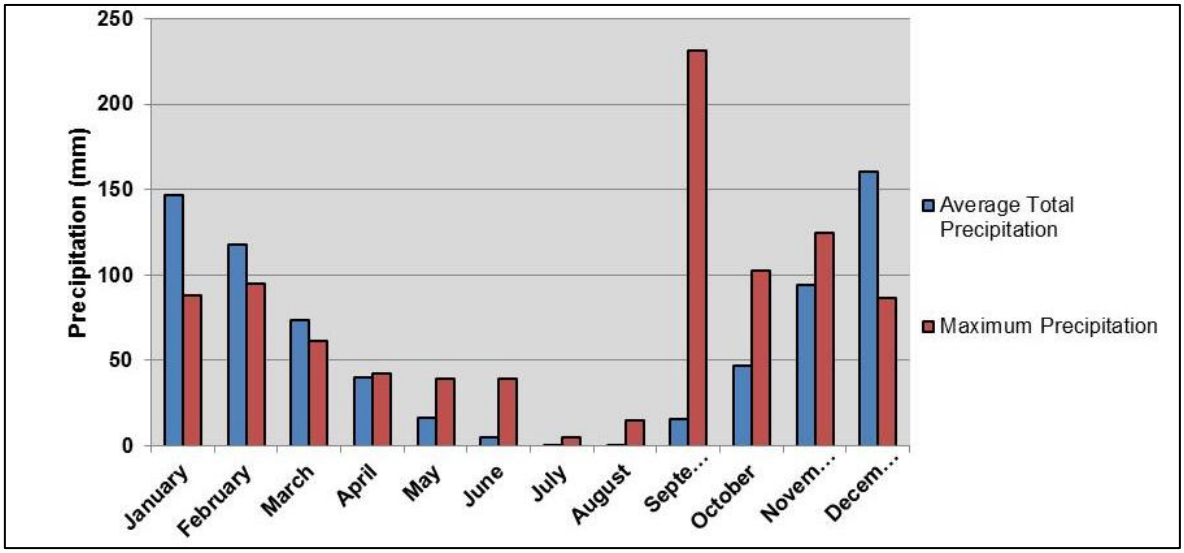


Figure IV.18 Average Monthly Precipitation and Maximum Precipitation Amounts

Table IV.10 Average Monthly Precipitation and Maximum Precipitation Amounts

Months	Average Total Precipitation (mm)	Maximum Precipitation (mm)
January	146.6	88.1
February	118.1	95.1
March	73.7	61
April	39.7	42.4
May	16.1	39
June	4.7	39.2
July	0.3	5
August	0.7	15.1
September	15.9	231.6
October	47	102.2
November	94.5	124.5
December	160.4	86.6
Annual	59.8	77.5

Humidity Distribution

Marmaris Meteorology Station records show that average annual humidity is 60.5%. Minimum monthly relative humidity is recorded in July (49.8%) and maximum relative humidity is recorded in December (67.6%). The monthly average and minimum relative humidity values are given graphically in Figure IV.19 and in tabular format in Table IV.11.

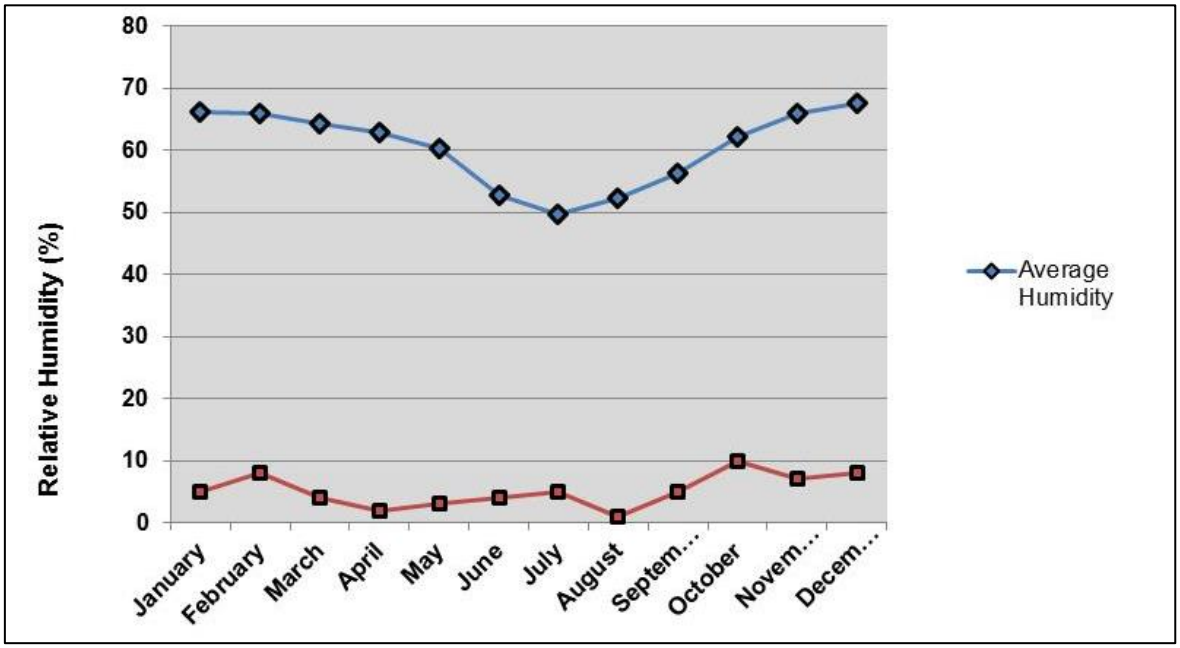


Figure IV.19 Average and Minimum Relative Humidity Values

Table IV.11 Average and Minimum Relative Humidity Values

Months	Average Humidity (%)	Minimum Humidity (%)
January	66.3	5
February	65.9	8
March	64.3	4
April	63	2
May	60.2	3
June	52.8	4
July	49.8	5
August	52.2	1
September	56.4	5
October	62.1	10
November	65.9	7
December	67.6	8

Pressure Distribution

Annual mean local pressure measured in Marmaris Meteorology Station is 1010.4 hPa. During the whole observation period, minimum pressure is recorded as 979.10 hPa in January and maximum pressure is recorded as 1028,90 hPa in February. Monthly average, maximum and minimum pressure values recorded in the station are provided in Figure IV.20 and Table IV.12.

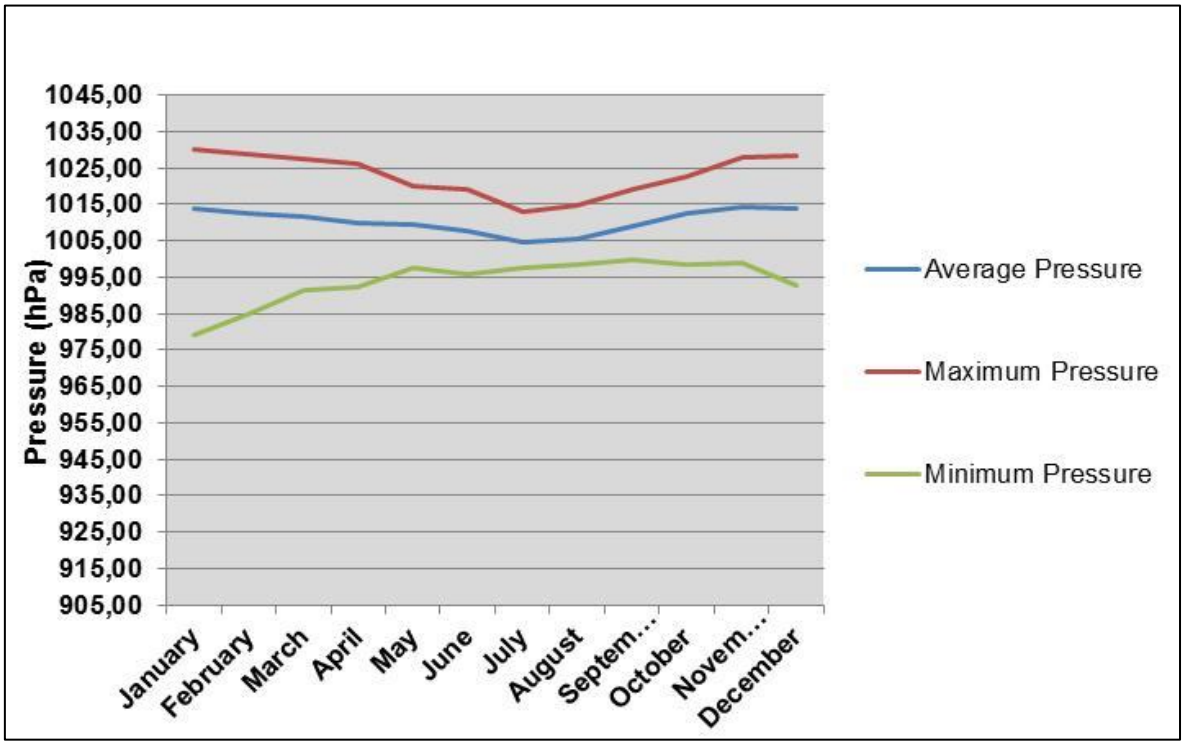


Figure IV.20 Monthly Average, Maximum and Minimum Pressure Values

Table IV.12 Monthly Average, Maximum and Minimum Pressure Values

Months	Average Temperature (hPa)	Maximum Pressure (hPa)	Minimum Pressure (hPa)
January	1013.70	1030.00	979.10
February	1012.60	1028.90	985.00
March	1011.60	1027.60	991.40
April	1010.00	1026.30	992.40
May	1009.60	1020.00	997.40
June	1007.70	1019.20	995.80
July	1004.80	1013.00	997.40
August	1005.30	1014.70	998.60
September	1009.20	1019.00	1000.00
October	1012.40	1022.60	998.50
November	1014.10	1028.00	998.80
December	1013.90	1028.30	992.80
Annual	1010.4	1023.13	993.93

Foggy, Snowy, Hail, Frosty and Stormy Days Distribution

Marmaris Meteorology Station records show that the number of annual average snowy days is 2.8 and annual average number of days with snow blanket is 0.7. The snow cover depth is recorded only on January as 3 cm. Monthly distribution of average foggy, snowy, snow covered, hail, frosty and stormy days are given in Table IV.13.

Table IV.13 Monthly Average Foggy, Snowy, Snow Covered, Hail, Frosty and Stormy Days Distribution

Months	Number of Snowy Days	Number of Snow Covered Days	Average Number of Foggy Days	Average Number of Hail Days	Average Number of Frosty Days	Average Number of Stormy Days
January	0.1	0		0.5	0.5	4.1
February	0.1			0.4	0.4	3.5
March	0.1			0.3	0.3	2.3
April				0.2	0.2	1.7
May				0	0	1.6
June			0			0.7
July						0.2
August						0.1
September						0.8
October			0	0.1		2.5
November	0	0.1		0.1		3.1
December	2.5	0.6		0.3		4.4
Annual	2.8	0.7	0	1.9	1.4	25

Wind Distribution

The annual and seasonal distribution of wind blow numbers and wind speeds recorded in Marmaris Meteorological Station are graphically represented in Figure IV.21, Figure IV.22 and Figure IV.23. According to annual wind blow numbers, 1st dominant wind direction is NNE (north-northeast). 2nd dominant wind direction is N (north). 3rd dominant wind direction is NE (northeast) and 4th dominant wind direction is SSE (south-southeast).

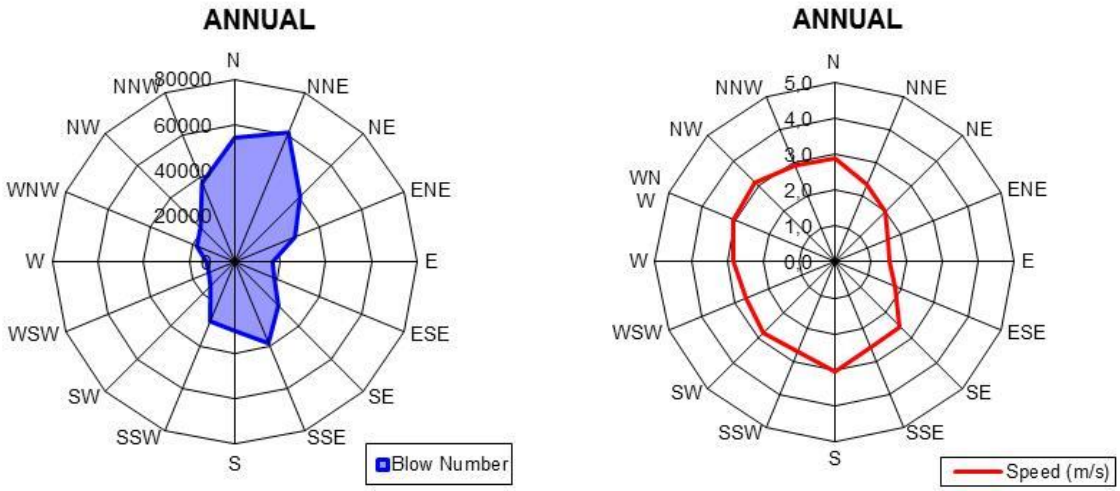


Figure IV.21 Annual Wind Diagram of Wind Blow Numbers and Average Wind Speeds

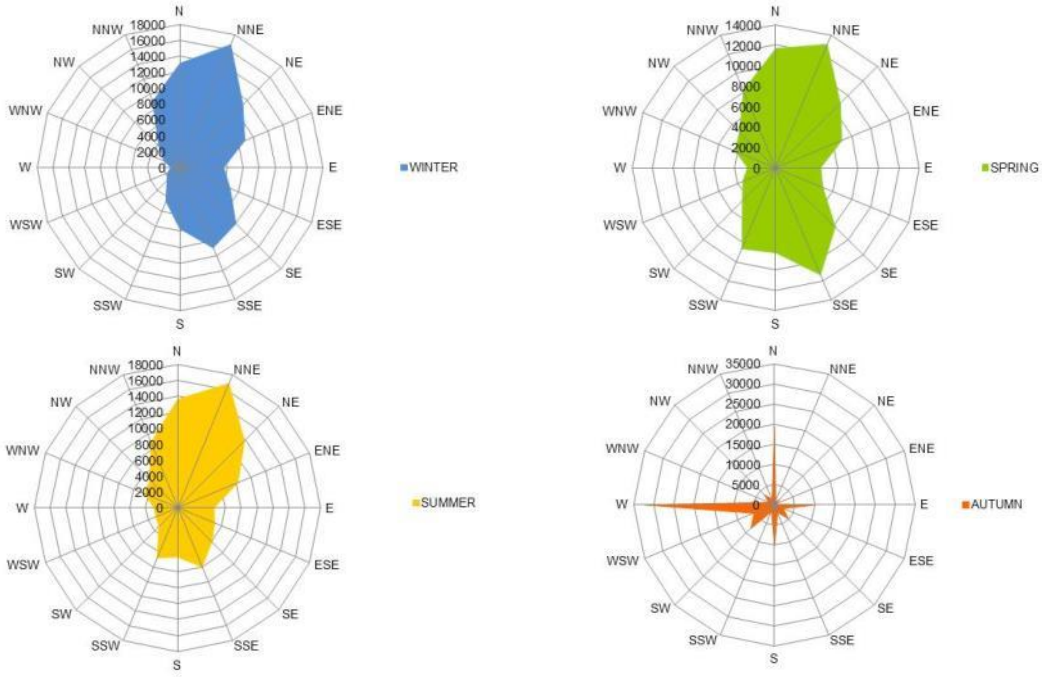


Figure IV.22 Seasonal Wind Diagram of Wind Blow Numbers

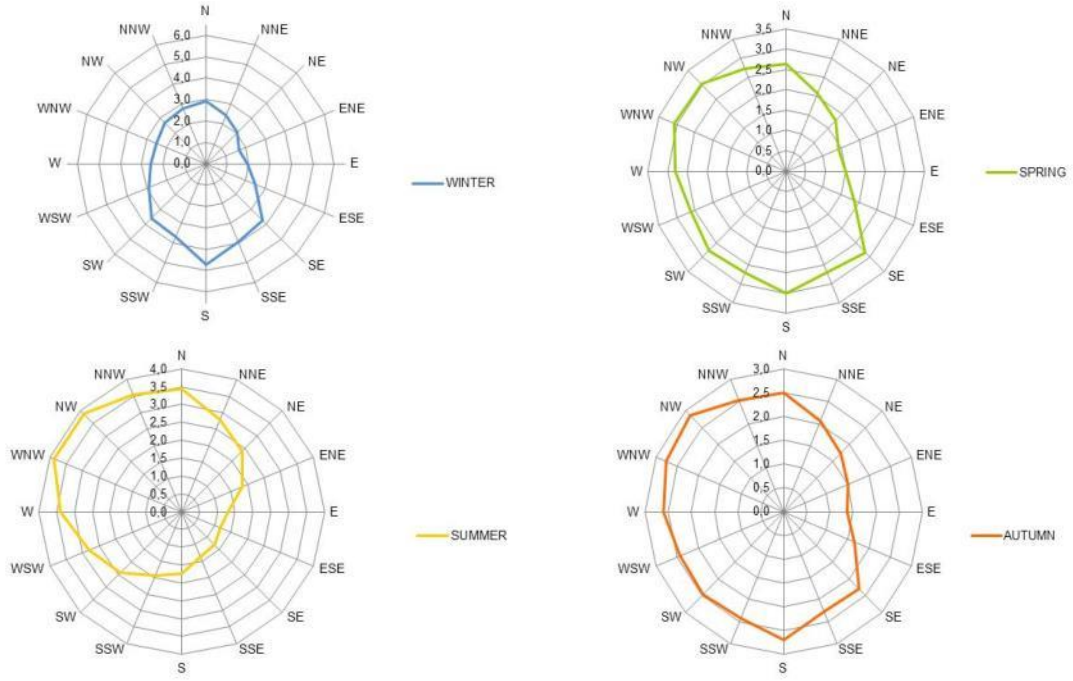


Figure IV.23 Seasonal Wind Diagram of Average Wind Speeds (m/sec)

The annual average wind speed is 3.2 m/sec and monthly average wind speeds are presented for each month in Table IV.14.

Table IV.14 Monthly Average Wind Speeds

Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average Wind Speed (m/sec)	3.6	3.8	3.4	3	2.7	3.1	3.6	3.2	2.8	2.6	3	3.6

Marmaris Meteorology Stations records show that the direction of the highest wind speed is south (S) with 41.7 m/sec. The number of annual average stormy days is 2.8 and number of annual average strong windy days is 8. Maximum wind speeds, directions and average stormy and strong windy day numbers are provided in Table IV.15.

Table IV.15 Maximum Wind Speeds and Directions, Average Numbers of Stormy and Windy Days (1960-2015)

Months	Direction of Maximum Wind	Maximum Wind Speed (m/sec)	Average Number of Stormy Days	Average Number of Strong Windy Days
January	S	41.7	4.8	9.1
February	S	38.2	5	8.4
March	SSE	32.2	4.2	8.2
April	SSE	39.2	2.8	7.4
May	SE	26.4	1.1	6.4
June	SE	27	1.6	7.8
July	N	26	2.1	10.4
August	NNE	28	1.6	8.5
September	NNE	27.5	1.1	6.4

Months	Direction of Maximum Wind	Maximum Wind Speed (m/sec)	Average Number of Stormy Days	Average Number of Strong Windy Days
October	SSE	34.1	1.4	6.6
November	S	35.7	2.8	7.6
December	SW	37.3	4.9	9.5

IV.1.9 Noise Level

Environmental noise in Turkey is regulated by the Regulation on the Assessment and Management of Environmental Noise (RAMEN) which is published on 04.06.2010 in Official Gazette No: 27601. This regulation is intended to ensure that precautions are taken to prevent disturbance to peace and tranquility, and to ensure the physical and mental health of persons potentially exposed to environmental noise. For this purpose, the regulation sets out requirements regarding noise mapping, acoustic reporting, environmental noise assessment for determination of noise exposure levels and preparation and application of action plans to prevent or mitigate negative impacts of noise exposure on human being and environment.

The operation noise limit values defined in the RAMEN Annex VII Table 4 are presented in Table IV.16.

Table IV.16. Environmental Noise Limits for Industrial Plants

Areas	L_{day} (dBA)	$L_{evening}$ (dBA)	L_{night} (dBA)
Educational, cultural and health facilities as noise sensitive areas, and places densely populated with summer houses and camp grounds	60	55	50
Areas densely populated with residences among the areas containing commercial structures and noise sensitive structures all together	65	60	55
Areas with dense work places among the areas containing commercial structures and noise sensitive structures all together	68	63	58
Industrial Areas	70	65	60

For construction activities noise limit values are defined in Table 5 Appendix VII of RAMEN and presented in Table IV.17.

Table IV.17. Environmental Noise Limits for Construction

Type of Activity (Construction, Demolition and Repair)	L_{day} (dBA)
Building	70
Road	75
Other Sources	70

WBG Standards

Noise limit levels are described under, WBG Environmental, Health and Safety (EHS) Guidelines, General EHS Guidelines: Environmental Noise. The noise limit values are based on World Health Organization Guidelines for Community Noise. Noise levels defined by WBG EHS Guidelines are presented in Table IV.18. WBG EHS Guidelines requires that noise impacts should not exceed the levels presented in Table IV.21, or result in a maximum increase in background noise levels of 3 dB at the nearest receptor location off-site.

Table IV.18. Noise Level Guidelines of WBG

Receptor	One Hour L_{Aeq} (dBA)	
	Daytime 07:00 – 22:00	Nighttime 22:00 – 07:00
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Noise during the construction phase will be mainly generated due to the activities of construction machinery and equipment. To determine the impact significance, background noise levels should be known. Therefore, a noise level measurement study was conducted to determine background levels around the WWTP site. Since the sewerage system component of the Project will be constructed in the city centre, where there are numerous noise sources, no measurement was conducted.

Two locations were selected as sensitive receptors and these are presented on Figure IV.24 below. Noise Measurement Location-1 (NML-1) is the nearest sensitive receptor to the WWTP site, which is Sitki Kocman University Fisheries Research and Development Centre. NML-2 represents background noise levels at summer housings located at 180 m east of the WWTP site. The background noise measurements were carried out at these points on July 6th and 7th, 2020 by ENCON Laboratory and the results are presented in Table IV.19. Assessment of noise impacts of the Project is provided in Section V.4.5.

Table IV.19. Background Noise Level Measurement Results

Measurement Points	Type of the Receptor	Measurement Coordinates (UTMED50-Z35)		Measurement Results (Leq) (dBA)				
				RAMEN Periods			WBG General EHS Guideline Periods	
		X	Y	Daytime (07.00-19.00)	Evening (19.00-23.00)	Night (23.00-07.00)	Daytime (07.00-22.00)	Nighttime (22.00-07.00)
NML-1*	Educational	581954	4099159	53.8	53.1	50.2	53.7	50.6
NML-2	Residential	582120	4099020	54.0	47.7	47.6	53.1	47.6

As it is seen from Table IV.19, background noise levels were very close to each other at NML-1 and NML-2 during the periods determined by the Regulation on the Assessment and Management of Environmental Noise (RAMEN) and WBG General EHS Guidelines: Environmental Noise. However, nighttime measurements are already above the limits that are defined in WBG General EHS Guidelines: Environmental Noise. The high measurement results might be related with traffic. Based on these measurement results, background noise levels should not be exceeded more than 3 dB at the nearest receptor location off-site during the construction and operation phases of the Project.

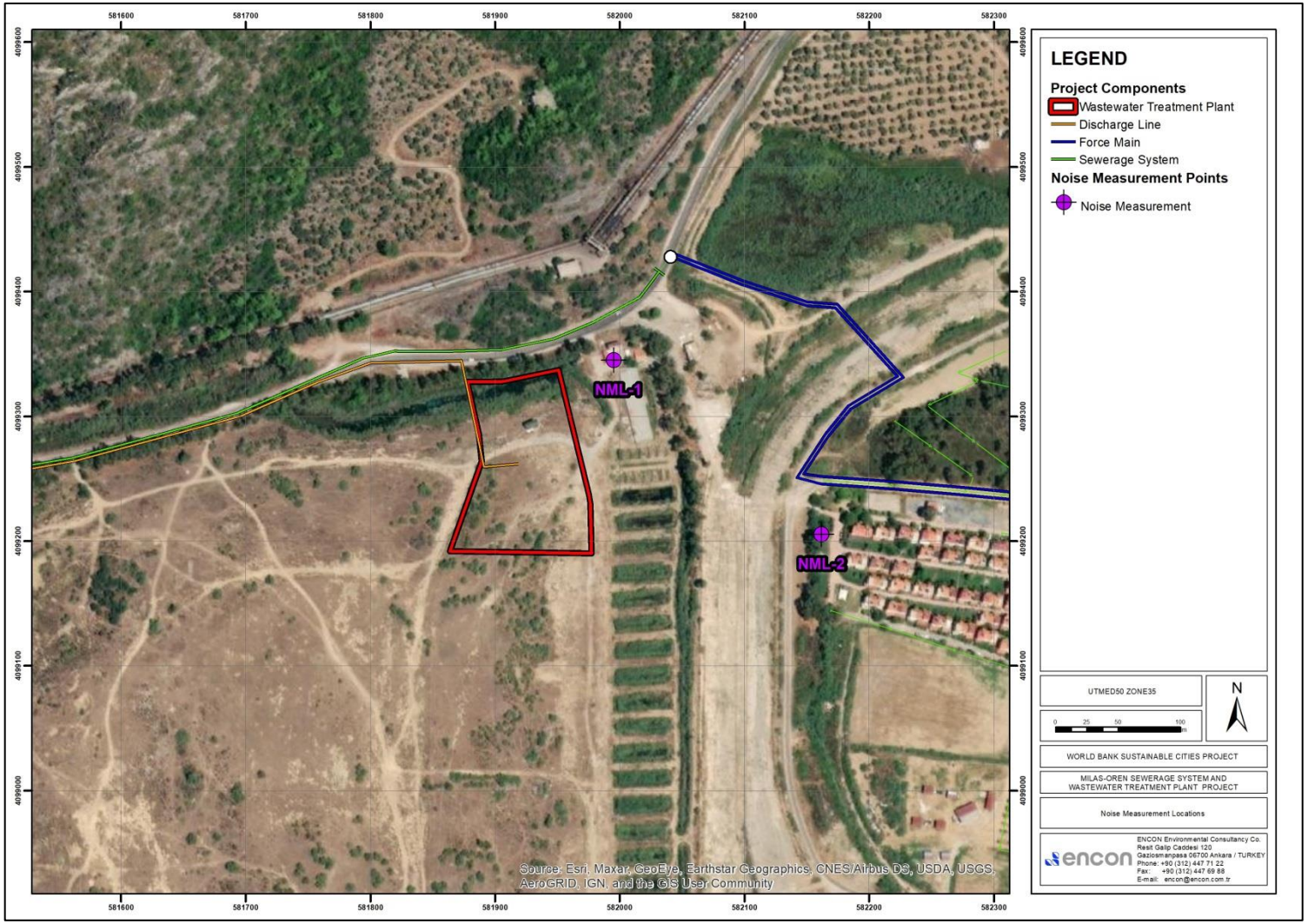


Figure IV.24 Noise Measurement Locations

IV.1.10 Air Quality

In Mugla, there are two air quality monitoring stations that belong to MoEUCC. One of these stations is located at Yatagan, while the other one is located at the Mugla city centre. There is no monitoring station in Oren and considering its population density and industries, it is anticipated that there should not be much pollution stress on air environment in Oren. However, it should be noted that SO_x, NO_x and CO_2 emissions of Kemerköy Thermal Power Plant located in Oren contributes to air pollution in the region.

Mugla's air pollution data taken from Musluhittin monitoring station, which only monitors PM_{10} and SO_2 parameters, is presented in the Table IV.20 below. The data belongs to period between January 2019 and July 2020. As seen from the table, while daily average PM_{10} concentration is a little higher than the regulatory limit value, SO_2 concentration is in compliance with the Regulation on the Assessment and Management of Air Quality limit value.

Table IV.20 Air Quality of Mugla

Measurement Location	PM10		SO_2	
	Daily Average (µg/m³)	Limit Value (µg/m³)	Hourly Average (µg/m³)	Limit Value (µg/m³)
Mugla-Musluhittin	51.82	50	20.88	350

There is no active air quality monitoring stations in the local level. Therefore, to constitute a baseline inventory and to determine air quality in the Project area; 24-hour PM_{10} and $PM_{2.5}$ measurements were conducted at the nearest sensitive receptor, which is 50 m to the WWTP site. The measurement location is same with the NML-1 presented in Figure IV.24. The measurement results are presented in Table IV.21.

Table IV.21 PM_{10} and $PM_{2.5}$ measurement results (July 2020)

Coordinates of the Measurement Location	Type of the Sensitive Receptor	Result (µg/Nm³)	
		PM_{10}	$PM_{2.5}$
581996/4099345	Educational*	32.74	<6.0

* Mugla Sitki Kocman University Fisheries Research and Development Centre

According to the Industrial Air Pollution Control Regulation, PM_{10} values should not exceed 50 µg /Nm³ more than 35 times in a year. On the other hand, according to WBG General EHS Guidelines: Air Emissions and Ambient Air Quality PM_{10} and $PM_{2.5}$ values should not exceed 50 µg /Nm³ and 25 µg /Nm³, respectively. Therefore, PM_{10} and $PM_{2.5}$ baseline measurement results satisfy both national and WBG General EHS Guidelines ambient air quality limit values.

IV.2 Ecology and Biodiversity

For this Report, biological environment was investigated which included habitat structures of the Project area, protected areas and key biodiversity areas (KBA). For this purpose, both desktop studies and field survey were carried out. The related literature and previous studies have been reviewed and the general biological characteristics of the region have been revealed. Also a field visit was conducted with an expert biologist on July 7th, 2020.

Definition of Study Area

The project area is located within the borders of Oren neighbourhood of Milas district in Mugla Province. As mentioned in the previous sections, the project consists of two components, the sewerage line and the WWTP. Both components have heights ranging from 0 to 10 m altitudes above sea level.

The Mediterranean climate is dominant in the project area which located in the Aegean region. The average annual temperature is around 20°C. In July and August, this temperature increases to 32 -44°C. Although the temperature does not fall below 10°C in winter, rainy and warm weather is dominant in winter.

Since the project area is located in the Aegean region, it is located entirely in the Mediterranean Plant Geography region and it has the characteristics of the Mediterranean climate. However, since the regions where the activities in the project area are located close to the settlements, the anthropogenic effect is quite high.

The sewerage network covers a very large area within the Oren neighbourhood. However, due to the nature of the Project, the sewerage network will be constructed in residential areas while sewerage network and discharge line will be installed mainly on roadsides. Therefore, the sewer lines and discharge line will be built on areas that do not have high value in terms of biological diversity.

The WWTP part of the project covers an area of 8,278.11 m^2. The area where WWTP will be built is located 400 m from the sea. The closest settlement to the planned WWTP is 175 m away. The WWTP is generally surrounded by distributed trees and scrubs, herbaceous species and riparian vegetation. Also, there is a dry dock construction site on the west of the project area. For this reason, rubbles of construction and uncontrolled site entry of work machines has been partially destroyed the area. Some photographs of the WWTP area are given in Figure IV.25.

Figure IV.25 Some Photographs of the Planned WWTP Area

Standards and Guidelines

Ecology and Biodiversity part of the Project is guided by the requirements of the World Bank's Operational Policy (OP) 4.04 in order to manage environmental risks and impacts on ecology and biodiversity. (OP) 4.04 aims that the protection of critical natural habitats and to be taken mitigation measure to minimizing habitat loss. According to the (OP) 4.04 this issue is explained as "…*If the environmental assessment indicates that a project would significantly convert or degrade natural habitats, the project includes mitigation measures acceptable to the Bank. Such mitigation measures include, as appropriate, minimizing habitat loss (e.g., strategic habitat retention and post-development restoration) and establishing and maintaining an ecologically similar protected area…".* As appropriate, the project will take the necessary measures and

implement commitments. Also Annex A of the (OP) 4.04 straightens out to determine the critical and/or natural habitats.

In the line with the (OP) 4.04, assessments of the baseline conditions and determined significance criteria for impacts assessments were detailed according to IFC Performance Standards 6 (PS6). IFC PS6 covers areas of biodiversity conservation, ecosystem services and sustainable management of living resources, which are all fundamental to achieve sustainable development. The objectives of PS6 are outlined as follows:

- To protect and conserve biodiversity;
- To maintain the benefits from ecosystem services; and
- To promote the sustainable management of living natural resources through the adoption of practices that integrates conservation needs and development priorities.

The requirements of PS6 are applied to projects: (i) located in modified, natural, and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant influence; or (iii) that include the production of living natural resources (e.g. agriculture, animal husbandry, fisheries and forestry) based on the risks and impacts identification process.

Legal and Regulatory Framework

Bern Convention

Bern Convention was put forward in 1982 in order to protect the European wildlife and natural habitats. Species to be protected according to the Bern Convention are listed in four appendices, which are presented in Table IV.22 with their explanations:

Table IV.22 Annexes to the Bern Convention

Annex	Explanation
I	Strictly protected flora species
II	Strictly protected fauna species
III	Protected fauna species
IV	Prohibited means and methods of killing, capture and other forms of exploitation

The Convention aims at conserving and promoting biodiversity, developing national policies for the conservation of wild flora and fauna and their natural habitats, protection of the wild flora and fauna from the planned development and pollution, developing trainings for protection practices, promoting and coordinating the researches made regarding this subject. It has been signed by 26 member states of the European Council (as well as Turkey) with the aim of conserving the wild life in Europe. Species that are not included within the appendices of the Convention are those that do not require any special protection. Species are not listed individually but instead are protected due to the habitat protection approach of the Bern Convention. All of the nations, which are party to the BERN Convention, have signed the Convention on Biological Diversity as well. Parties of this convention are responsible from ensuring sustainable use of resources in line with their national development trends and conserving the threatened species.

CITES

CITES stands for the Convention on International Trade in Endangered Species of Wild Flora and Fauna. It is an international agreement that has been ratified by governments of 164 states (including Turkey), whose aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The principles of CITES are based on sustainability of the trade in order to safeguard ecological resources (live animals and plants, vast array of wildlife products derived from them, including food products, exotic leather goods, etc.). CITES was signed in 1973 and entered in force on July 1, 1975. Turkey ratified the Convention in 1996. Categories and species included in CITES are listed in three different appendices based on their protection statuses. These appendices and their explanations are given in Table IV.23.

Table IV.23 Appendices to CITES

Appendix	Explanation
I	covers the species, which are under the threat of extinction. Trade in the specimens of these species is not allowed except extraordinary circumstances
II	includes species, which are not threatened with extinction, but trade in specimens is restricted in order to prevent utilization incompatible with their survival
III	for which other parties of CITES is applied for assistance in controlling trade and which are conserved at least in one country.

The International Union for Conservation of Nature (IUCN) publishes its Red List of Threatened Species, which intends to draw attention to species whose populations are at risk or under threat. The IUCN places a species on the Red List only after studying its population and the reasons for its decline. Some countries pay greater attention to IUCN-listed species than Bern-listed species, since the Red List relies on more research. The 1994 (ver.2.3) and 2001 (ver.3.1) categories and criteria of the IUCN Red List are presented below in Table IV.24. The Red List Categories and Criteria had been re-formed through evaluating more open and easier to use systems. As a result the IUCN Commission made revisions in February 2000, and the new set of categories and criteria were published in 2001.

Table IV.24 IUCN Red List Categories and Criteria

IUCN Red List Categories and Criteria 1994 (ver. 2.3)		IUCN Red List Categories and Criteria 2012 (ver. 4.0)	
EX	Extinct	EX	Extinct
EW	Extinct in the Wild	EW	Extinct in the Wild
CR	Critically Endangered	CR	Critically Endangered
EN	Endangered	EN	Endangered
VU	Vulnerable	VU	Vulnerable
LR	Lower Risk		
	cd : conservation dependent	NT	Near Threatened
	nt : near threatened	LC	Least Concern
	lc : least concern		
DD	Data Deficient	DD	Data Deficient
NE	Not Evaluated	NE	Not Evaluated

Demirsoy, A. (2002). General and Turkish Zoogeography (RDB)

This reference prepared by Prof. Dr. Ali Demirsoy and published by the former Ministry of Environment and Forestry lists the threat/conservation statuses for vertebrates in Turkey as presented in Table IV.25.

Table IV.25 National Threat Statuses for Vertebrates

Category	Definition
Ex	Extinct
E	Endangered
R	Rare species
V	Vulnerable species
I	Status of taxon is unknown
K	The category of taxon is unknown due to data deficiency
O	Species that are not threatened
nt	Widespread, abundant species that are not threatened

Kiziroglu, I. (2009). The Pocket Book for Birds of Turkiye (RDB for Birds)

Birds of the biodiversity study area were also assessed according to national threat categories defined in The Pocket Book of Birds of Turkey (Kiziroglu, 2009) within the categories defined in Table IV.26.

Table IV.26 National Threat Categories for Bird Species

Category A		
A.1.2	**(CR)**	Critically endangered and breeding species in Turkey
A.2	**(EN)**	Endangered and breeding species in Turkey
A.3	**(VU)**	Vulnerable and breeding species in Turkey
A.3.1	**(D)**	Declining, vulnerable and breeding species in Turkey
A.4	**(NT)**	Near threatened, breeding species do not face to risk now but are likely to qualify for threatened category in the near future in Turkey
A.5	**(LC)**	Least concern, breeding species that are widespread in Turkey
A.6	**(DD)**	Data deficient, breeding species on which there is deficient information in Turkey
A.7	**(NE)**	Not evaluated, Breeding species which have not been evaluated in Turkey
Category B		
B.1.2	**(CR)**	Critically endangered and non-breeding species in Turkey
B.2	**(EN)**	Endangered and non-breeding species in Turkey
B.3	**(VU)**	Vulnerable and non-breeding species in Turkey
B.3.1	**(D)**	Declining, vulnerable and non-breeding species in Turkey
B.4	**(NT)**	Near threatened, non-breeding species do not face to risk now but are likely to qualify for threatened category in the near future in Turkey
B.5	**(LC)**	Least Concern, non-breeding species that are widespread in Turkey
B.6	**(DD)**	Data deficient, non-breeding species on which there is deficient information in Turkey
B.7	**(NE)**	Not Evaluated, non-breeding species which have not been evaluated in Turkey

Protected Areas and Internationally Recognized Areas within the Region of the Project Area

The map showing the national protected areas and internationally recognized areas in the project area or its immediate surroundings can be shown in

Figure IV.28. International recognized areas investigated as KBA (Key Biodiversity Area), IBA (Important Bird Area) and AZE (the Alliance for Zero Extinction).

Turkey's KBAs have been identified on a national scale by Doga Dernegi (the Nature Society of Turkey) in collaboration with the Ministry of Agriculture and Forestry (former Ministry of Environment and Forestry), Birdlife International and Royal Society for the Protection of Birds.

Important Bird Areas were identified by a database prepared by Birdlife International and Royal Society for the Protection of Birds.

The Alliance for Zero Extinction (AZE), established in 2004 and comprising 88 biodiversity conservation NGOs, is dedicated to the identification and safeguard of all KBAs holding effectively the entire global population of at least one Critically Endangered or Endangered species. A total of 587 AZE sites have been identified. (Brooks T M., et al.,2016) AZE members work to rebuild populations of endangered and critically endangered species through efforts to eliminate human threats such as commercial exploitation, disease and the introduction of invasive species.

Effective conservation of all AZEs is by definition essential to achieve the CBD target of preventing extinctions of known threatened species (all such sites are under threat and the loss of any one of them in the short- to medium-term would almost certainly result in global extinction of at least one species)

AZEs hold ≥95% of the global population of any Critically Endangered or Endangered species, and hence are locations at which species extinctions are imminent unless appropriately safeguarded (i.e. protected or managed sustainably in ways consistent with the persistence of populations of target species); 588 such sites have been identified for 919 highly threatened vertebrate and conifer species. Terrestrial AZE sites have been identified globally for all mammals, birds, amphibians, selected reptile clades (Testudines, Crocodylia and Iguanidae) and conifers (Butchart, S. H. M. et al., 2012)

AZEs are sites meeting three criteria:

- endangerment (supporting at least one Endangered or Critically Endangered species, as listed on the IUCN Red List);
- irreplaceability (holding the sole or overwhelmingly significant (≥95%) known population of the target species, for at least one life history segment);
- discreteness (having a definable boundary within which the character of habitats, biological communities, and/or management issues have more in common with each other than they do with those in adjacent areas)

One suggestion for safeguarding AZE sites is to begin by considering two levels of protection: any protection and “targeted” protection. A second and more long-term goal can be to work towards “targeted” protection for all AZE sites, with “targeted” defined on a case-by-case basis centered on the threats to and ownership of each site and the AZE species’ management needs.

- Level 1: Any protection: Any level of official protection for unprotected or partially-protected AZE sites. All unprotected or partially-protected AZE sites receive a basic level of official protection
- Level 2: Targeted protection: Protection based on threats to the sites on a case-by-case basis centered on the threats to and ownership of each site. Some sites are at risk due to specific threats, such as invasive species, trafficking, or logging. Working to reduce or eliminate these threats will be key to the long-term persistence of such sites.

As can be seen on the map, the nearest national protected area to the sewerage system part of the Project Gokova Specieal Protected Area with a distance of 1.1 km. In addition, the Datca and Bozburun Peninsula KBA and IBA border is 20 m away from the sewerage system part of the Project.

Gokova Special Environmental Protection Area covers a large area of 57,690 hectares. The area is home to 34 species that are protected by national and international conventions. However, it is seen that these species are distributed in the southern coasts of Gokova Bay, especially in the region between “Yedi Islands and Tuzla Bay”, and they do not intensively use the area where the Project Area is located. Akbuk Bay and around (black dot in Figure IV.26) southeast of Hanay Creek, are inhabited by *Epinephelus marginatus* and *Sciaena umbra* species.

Akbuk Bay is about 17 km away from Hanay Creek, and the fish species protected in the area are mobile aquatic fauna species.

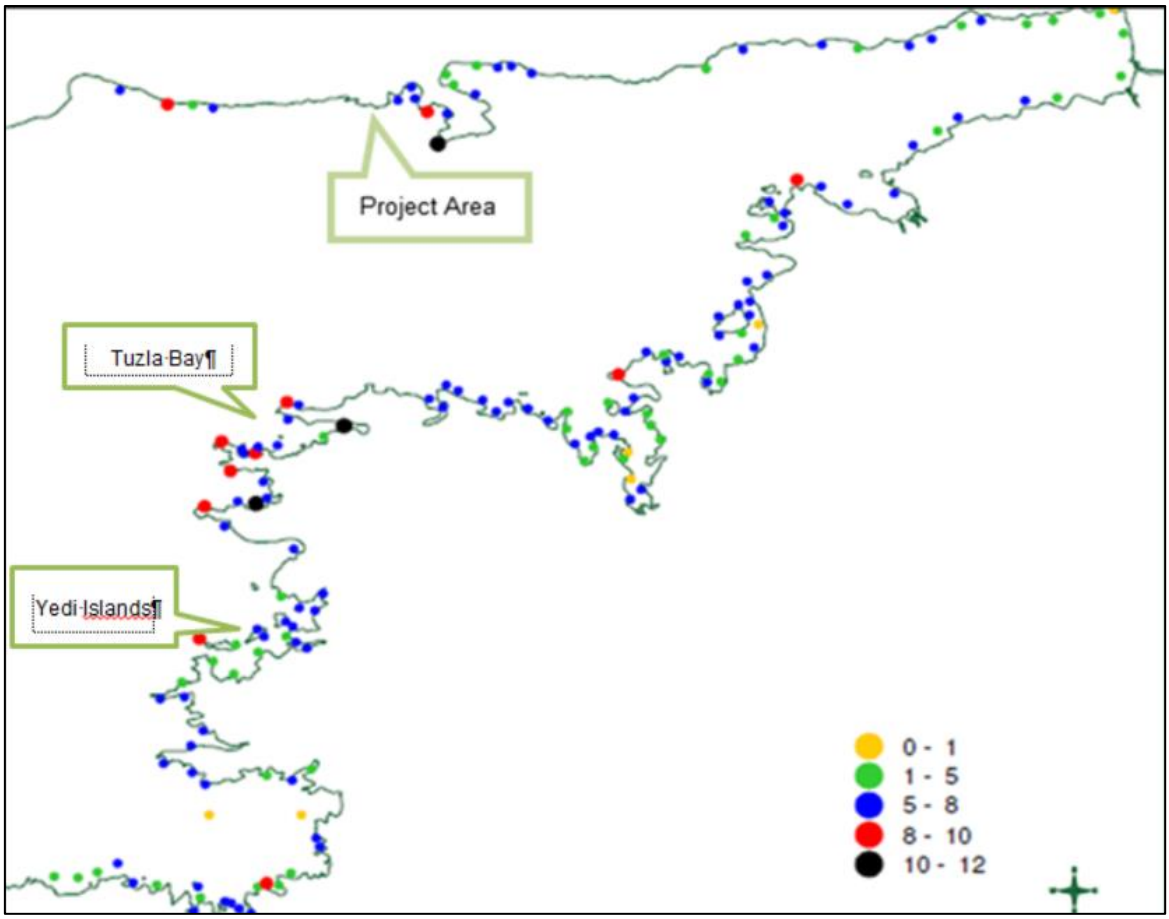


Figure IV.26 The Protection Area and Number of Protected Species

Anadromous fish species are fish that complete their growth and development in the seas and go to inland waters to spawn when they reach reproductive maturity. In other words, it defines fish species that migrate from marine waters to inland waters. No fish species protected within the scope of the Gökova Special Environmental Protection Area enter the Hanay Creek by anadromous migration.

The region has freshwater inlets due to its natural structure. This situation increases the productivity of the coastal ecosystem and causes many species to prefer this area as a spawning area. However, as shown from the map below, the region where the project area is located is not among the dense areas used by the species for spawning.

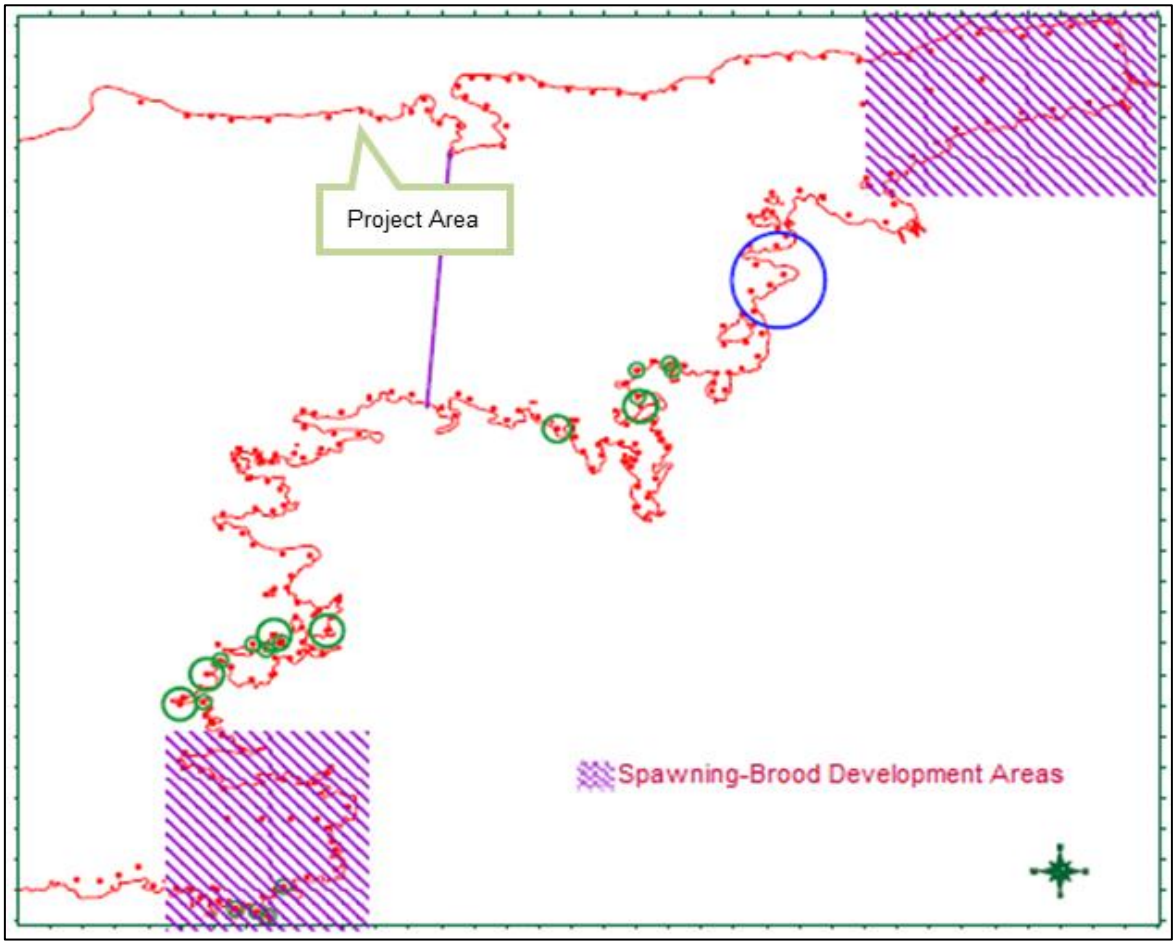


Figure IV.27 The Protection Area and Spawning-Brood Development Areas

Hanay Creek is an anthropogenic creek, which currently has a concrete creek bed and from which the cooling water of the thermal power plant is discharged. The water to be treated and discharged at the wastewater treatment plant is not expected to adversely affect the aquatic environment in the Gökova SEPA, where the creek flows.

As a result, it has been determined that sensitive species in Gokova Special Environmental Protection Area do not use the Hanay Creek for breeding or spawning purposes. According to that, the Gokova Special Environmental Protected Area is not included in the Project's Area of Influence.

In Turkey, there are three AZE sites determined. The closest one to the Project area is Gulluk Mountain with 210 km away. In addition, the other closest AZE site is Nissos Saria kai Voria Karpathos where is a Greece Island located in 139 km southwest of the Project area. Both AZE sites are quite far away from the Project area and these sites will not affected from the Project activities.

These areas are wild and natural areas with high biodiversity value. A large part of the project area will be built in the city. The area to be WWTP is relatively poor in terms of biodiversity. Therefore, the project area is not considered to reflect the characteristics of the protected areas in the environment.

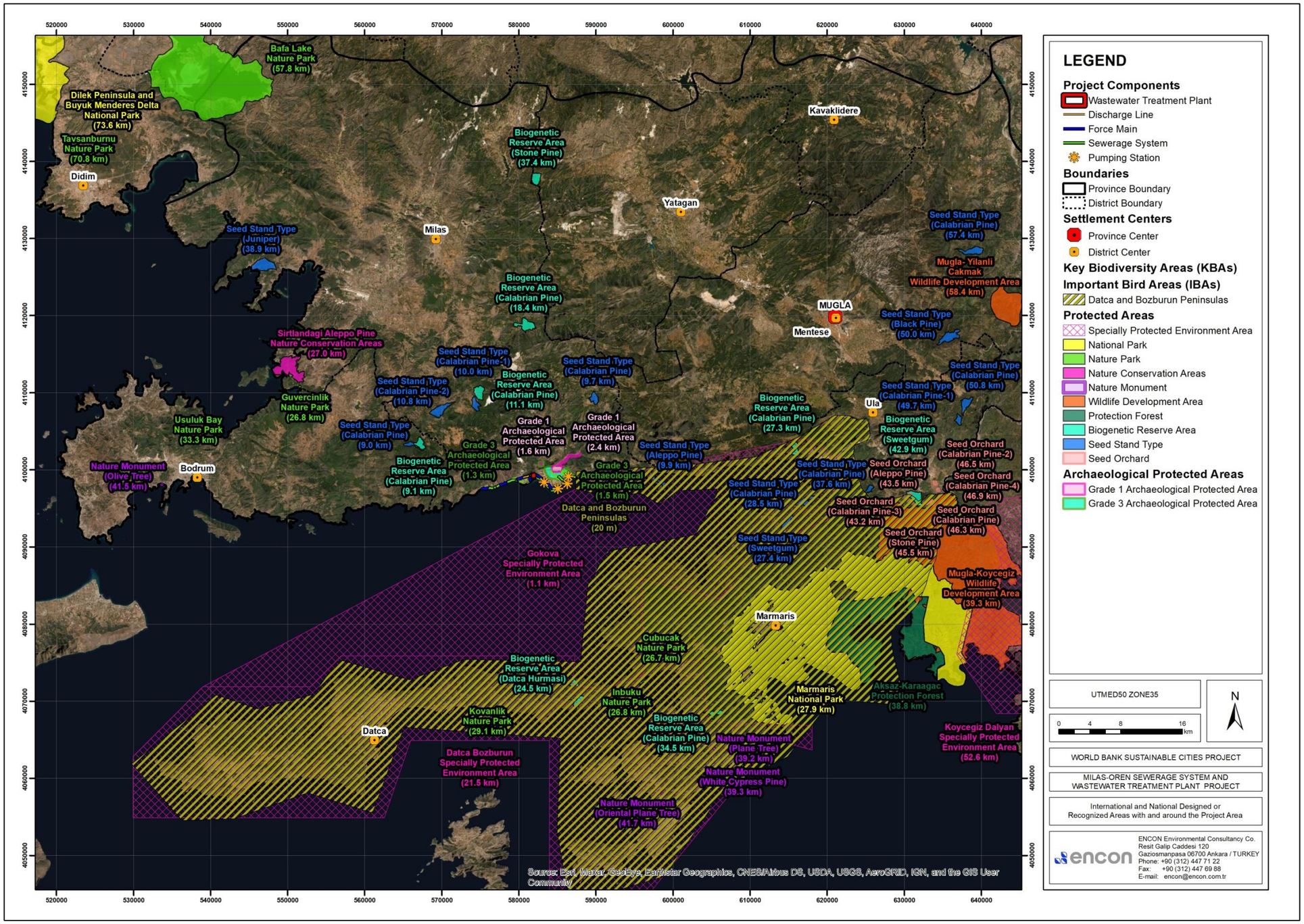


Figure IV.28. International and National Designed or Recognized Areas with and around the Project Area

Vegetation and Habitat Types of the Terrestrial Ecosystem

Project area is located in C1 grid in grid square system of flora of Turkey and phytogeographically speaking, is located in a transition zone of Mediterranean zone. Climate feature of the region has the Mediterranean climate characteristic due to the project area is located in the Aegean region (see Figure IV.29).

The grid square system is a method used to understand spatial distributions of species. According to the system, distributions of endemic species of Turkey are shown in Figure IV.30. When the distribution of the endemics taxa in Turkey is analysed as the grid system, it was determined that C1 square area where the project is located, below an average of Turkey with 0.9% (*Turk Cografya Journey 69 (2017) 109-120*).

In addition, planned WWTP area covers 8278.11 m^2. Settlements start about 175 m from the project area and the anthropogenic effect is dominant therefore vegetation of close vicinity of the area has poor vegetation. Randomly distributed trees and scrubs and ruderal areas are dominant in the area. Also, there is riparian vegetation near the area. It is possible to examine the planned WWTP area as two types of vegetation in general:

a) Riparian vegetation: The dominant plants of this vegetation that grows in streams in the research area are plants like *Platanus orientalis, Ulmus minor*, *Nerium oleander*, *Vitex agnus-castus, Rubus sanctus, Bolboschoenus maritimus, Juncus heldreichianus, Ononis spinosa, Melisa officinalis.* All of these plants have more or less water demand.

b) Ruderal vegetation: This type of vegetation grows mostly on field edges and roadsides in the study area. Dominant shrub species like *Rosa canina, Prunus divaricata ssp. divaricata, Quercus coccifera, Paliurus spina-christi, Crataegus monogyna ssp. azarella* and *Pyrus amygdaliformis var. amygdaliformis. In addition, Hirschfeldia incana, Rapistrum rugosum, Sisymbrium officinale, Hypericum triquetrifolium, Daucus carota, Notobasis syriaca, Carlina corymbosa* are widely available as herbaceous plants.

Habitat Types of the Project Area

All components of the Project cover poor vegetation features and modified. There are seven habitat types in the sewerage line and WWTP area according to EUNIS Habitat Classification. None of these habitats are critical or sensitive habitats. Flora species of these habitats are widespread and adapted to human pressure. Habitat types of the Project area are described as follow:

G1.3: Mediterranean Stream Trees: This habitat is spread along stream near the project area. The dominant plants of this habitat are *Platanus orientalis, Nerium oleander, Vitex agnus-castus* and *Ulmus minor.*

F5.5: Warm Mediterranean Shrubs: It represents maquis in the form of a green bush in the project area. Its characteristic species are *Quercus coccifera, Quercus infectoria, Olea europaea and Phillyrea latifolia.*

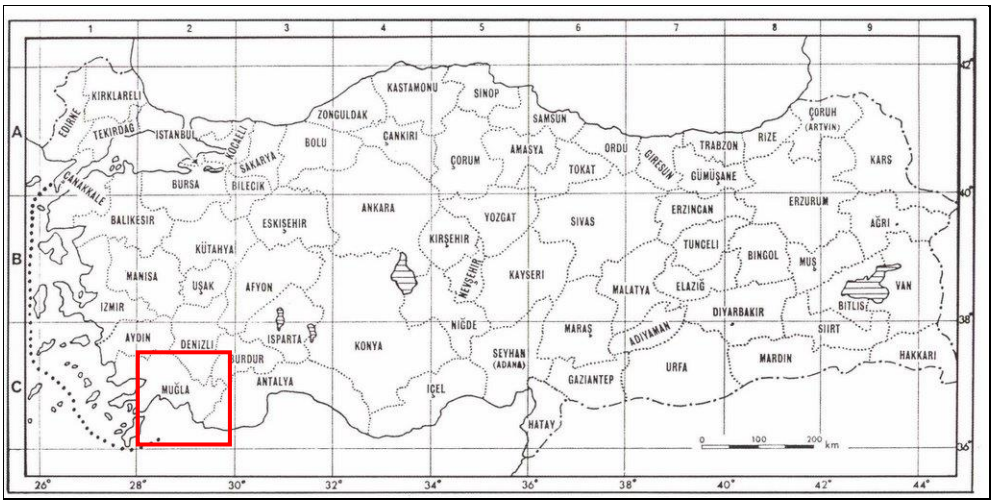
I1.2: Agricultural areas and cultured areas: Represents olive groves and dry agricultural areas within the project area.

E1.6: Mediterranean subnitrophilous grass communities: These habitats which located in field and road sides have mostly annual cheeky plant species.

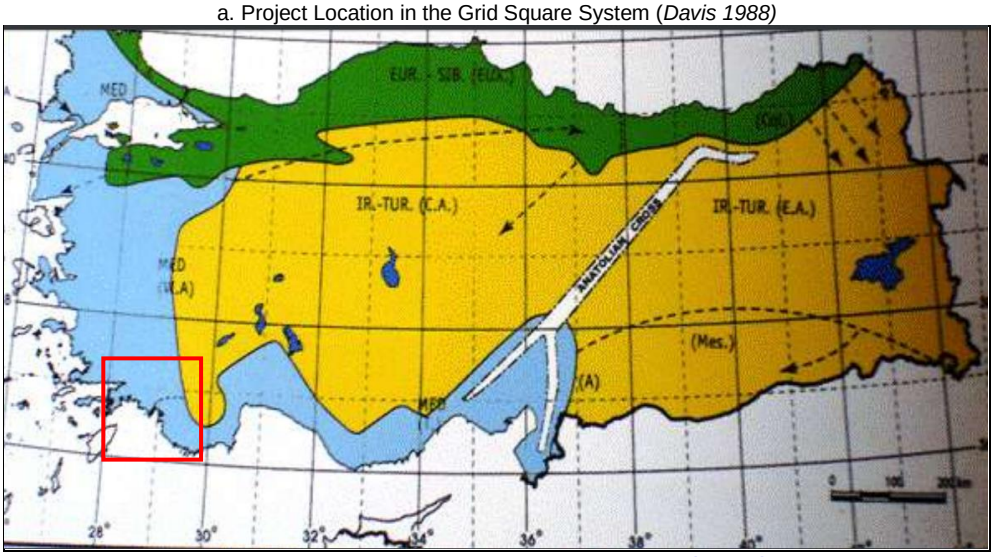
J4.2: Disused road, rail and other constructed hard-surfaced areas: Road surfaces and car parks, together with the immediate highly-disturbed environment adjacent to roads, which may consist of roadside banks or verges.

J1.4: Urban and suburban industrial and commercial sites still in active use: Buildings with public access, such as hospitals, schools, churches, cinemas, government buildings, shopping complexes and other places of public resort.

J 2.1: Scattered residential buildings: Houses or flats in areas where buildings, roads and other impermeable surfaces are at a low density.



a. Project Location in the Grid Square System (*Davis 1988)*



b. Phytogeographical Regions Map in Turkey *(www.ktü.edu.tr)*

Figure IV.29. Bioecological Location of the Project

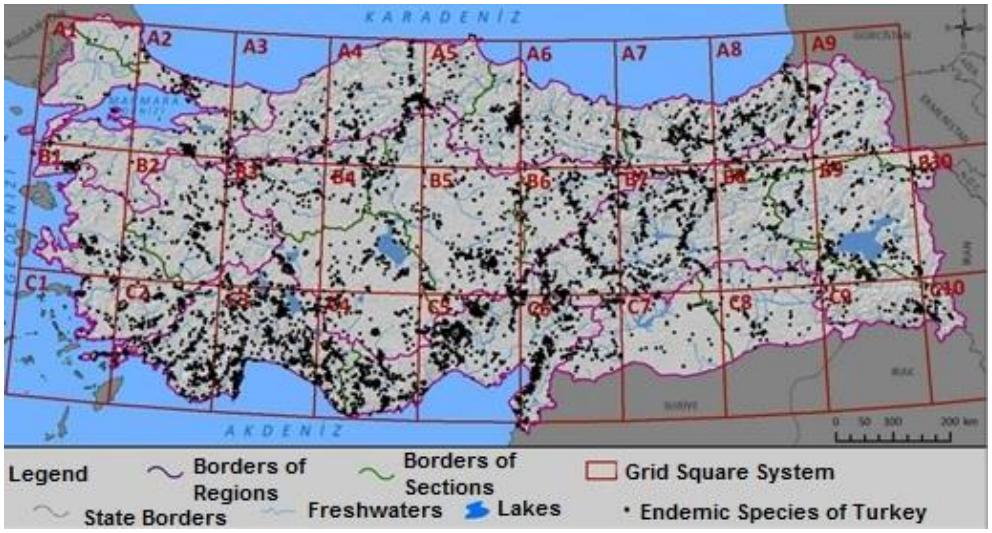


Figure IV.30. Distribution of 9677 Endemic Taxa Locations in Turkey Flora According to Region,Subregion and Grid System (*Turk Cografya Journey 69 (2017) 109-120*)

Flora Species

The flora vegetation of the project area is very weak. The planned sewerage line, discharge line and wastewater treatment plant area consists of unnatural or semi-natural areas. For this reason, possible flora species of the areas consist of herbaceous plants and widely distributed species. According to field studies and literature reviews, the flora types of the Project area are presented in the Table IV.27.

According to Table IV.27 there are not any endemic and/or sensitive flora species are expected within the sewerage line and WWTP areas.

Table IV.27 Possible Flora Species in and around the Project Area

Family	Taxon	Phytogeographical Region	Endemism	IUCN	BERN	CITES		
					App1	App1	App2	App 3
SPERMATOPHYTA								
GYMNOSPERMAE								
PINACEAE	*Pinus brutia* Ten.	Mediterranean	-	LC	-	-	-	-
ANGIOSPERMAE								
RANUNCULACEAE								
	Ranunculus ficaria L. subsp. *ficariiformis* Rouy & Fouc.	Widespread	-	-	-	-	-	-
	Ranunculus arvensis L.	Widespread	-	-	-	-	-	-
PAPAVERACEAE	*Papaver rhoeas* L.	Widespread	-	LC	-	-	-	-
CRUCIFERAE	*Hirschfeldia incana* (L.) Lag.-Foss.	Widespread	-	-	-	-	-	-
	Biscutella didyma L.	Widespread	-	-	-	-	-	-
	Thlaspi perfoliatum L.	Widespread	-	-	-	-	-	-
	Capsella bursa-pastoris (L.) Medik	Widespread	-	LC	-	-	-	-
	Nasturtium officinale R. Br.	Widespread	-	LC	-	-	-	-
	Sinapis arvensis L.	Widespread	-	LC	-	-	-	-
	Sisymbrium officinale (L.) Scop.	Widespread	-	LC	-	-	-	-
	Erysimum smyrnaeum Boiss. & Bal.	Widespread	-	-	-	-	-	-
CARYOPHYLLACEAE	*Minuartia hybrida* (Vill.) Schischk. subsp.*hybrida*	Widespread	-	-	-	-	-	-
	Holosteum umbellatum L. var. umbellatum	Widespread	-	-	-	-	-	-
	Silene vulgaris (Moench) Garcke var. vulgaris	Widespread	-	LC	-	-	-	-
	Silene behen L.	Widespread	-	-	-	-	-	-
ILLECEBRACEAE	*Herniaria incana* Lam.	Widespread	-	-	-	-	-	-
GUTTIFERAE	*Hypericum perforatum* L.	Widespread	-	LC	-	-	-	-
	Hypericum triquetrifolium Turra	Widespread	-	-	-	-	-	-
MALVACEAE	*Malva sylvestris* L.	Widespread	-	LC	-	-	-	-
LINACEAE	*Linum bienne* Miller	Mediterranean	-	-	-	-	-	-
GERANIACEAE	*Geranium lucidum* L.	Widespread	-	-	-	-	-	-

Family	Taxon	Phytogeographical Region	Endemism	IUCN	BERN	CITES		
					App1	App1	App2	App 3
	Erodium moschatum (L.) L'Herit.	Mediterranean	-	-	-	-	-	-
POLYGONACEAE	*Rumex tuberosus* L. subsp. *tuberosus*	Widespread	-	-	-	-	-	-
	Rumex bucephalophorus L.	Widespread	-	-	-	-	-	-
	Polygonum equisetiforme S,ibth. & Sm.	Widespread	-	-	-	-	-	-
TAMARICACEAE	*Tamarix smyrnensis* Bunge	Widespread	-	LC	-	-	-	-
RHAMNACEAE	*Paliurus spina-christi* Miller	Widespread	-	-	-	-	-	-
LEGUMINOSAE	*Cersis siliquastrum* L. subsp. *siliquastrum*	Widespread	-	-	-	-	-	-
	Anagyris foetida L.	Mediterranean	-	LC	-	-	-	-
	Vicia cracca L. subsp. *stenophylla* Vel.	Widespread	-	-	-	-	-	-
	Vicia sericocarpa Fenzl var. *sericocarpa*	Widespread	-	-	-	-	-	-
	Lathyrus aphaca L var. *affinis* (Guss.) Arc.	Widespread	-	-	-	-	-	-
	Lathyrus clymenum L.	Mediterranean	-	LC	-	-	-	-
	Ononis spinosa L. subsp. *leiosperma* (Boiss.) Sirj	Mediterranean	-	-	-	-	-	-
	Ononis pubescens L.	Mediterranean	-	-	-	-	-	-
	Medicago sativa L. subsp. *sativa*	Widespread	-	-	-	-	-	-
	Medicago minima (L.) Bart. var. *minima*	Widespread	-	-	-	-	-	-
	Scorpiurus muricatus L. var. *subvillosus* (L.) Fiori	Mediterranean	-	-	-	-	-	-
	Coronilla parviflora Willd.	Mediterranean	-	-	-	-	-	-
	Onobrychis aequidentata (Sibth. & Sm.) d'Urv.	Mediterranean	-	-	-	-	-	-
ROSACEAE	*Rubus sanctus* Schreber	Widespread	-	-	-	-	-	-
	Potentilla recta L.	Widespread	-	-	-	-	-	-
	Sangiosorba minor Scop subsp. *muricata* (Spach) Brig	Widespread	-	-	-	-	-	-
UMBELLIFERAE	*Eryngium campestre* L. var. *campestre*	Widespread	-	-	-	-	-	-
	Tordylium aegaeum Runem.	Mediterranean	-	-	-	-	-	-
	Scandix australis L. subsp. grandiflora *(L.) Thell.*	Widespread	-	-	-	-	-	-

Family	Taxon	Phytogeographical Region	Endemism	IUCN	BERN	CITES		
					App1	App1	App2	App 3
	Daucus carota L.	Widespread	-	LC	-	-	-	-
DIPSACACEAE	*Pterocephalus plumosus* (L.) Coulter	Widespread	-	-	-	-	-	-
	Scabiosa argentea L.	Widespread	-	-	-	-	-	-
	Scabiosa sicula L.	Mediterranean	-	-	-	-	-	-
COMPOSITAE	*Inula viscosa* (L.) Aiton	Widespread	-	-	-	-	-	-
	Xanthium strumarium L. supsp. *strumarium*	Widespread	-	-	-	-	-	-
	Anthemis chia L.	Mediterranean	-	-	-	-	-	-
	Bellis perennis L.	European-Siberia	-	-	-	-	-	-
	Senecio vernalis Waldst. et Kit	Widespread	-	-	-	-	-	-
	Notobasis syriaca (L.) Cass.	Mediterranean	-	-	-	-	-	-
	Centaurea solstitialis L. subsp. *solstitialis*	Mediterranean	-	-	-	-	-	-
	Centaurea cyanus L.	Widespread	-	LC	-	-	-	-
	Scariola viminea (L.) F:W:Schmidt	Widespread	-	LC	-	-	-	-
	Crepis sancta (L.) Babcock	Widespread	-	-	-	-	-	-
	Crepis reuterana Boiss. subsp. reuterana	Mediterranean	-	-	-	-	-	-
	Sonchus asper (L.) Hill subsp. *glaucescens* (Jordon) Ball	Widespread	-	-	-	-	-	-
	Lapsana communis L. subsp. *adenophora* (Boiss.) Rech. Fil	Widespread	-	-	-	-	-	-
	Chondrilla juncea L. var. *juncea*	Mediterranean	-	-	-	-	-	-
PRIMULACEAE	*Anagallis arvensis* L.var. *arvensis*	Widespread	-	-	-	-	-	-
STYRACACEAE	*Styrax officinalis* L.	Widespread	-	LC	-	-	-	-
APOCYNACEAE	*Nerium oleander* L.	Mediterranean	-	LC	-	-	-	-
GENTIANACEAE	*Centaurium erythraea* Rafn. Subsp. *turcicum* (Velen) Melderis	Widespread	-	-	-	-	-	-
BORAGINACEAE	*Alkanna tinctoria* (L.) Tausch subsp. *anatolica* Hub.-Mor.	Mediterranean	-	-	-	-	-	-
	Echium italicum L.	Mediterranean	-	-	-	-	-	-

Family	Taxon	Phytogeographical Region	Endemism	IUCN	BERN	CITES		
					App1	App1	App2	App 3
	Anchusa azurea Miller var. *azurea*	Widespread	-	-	-	-	-	-
	Anchusa undulata L. subsp. *hybrida* (Ten.) Coutinho	Mediterranean	-	-	-	-	-	-
SCROPHULARIACEAE	*Misopates orantium* (L.) Rafin.	Widespread	-	-	-	-	-	-
	Veronica cymbalaria Bodard	Mediterranean	-	-	-	-	-	-
	Veronica anagallis-aquatica L.	Widespread	-	LC	-	-	-	-
	Verbascum sinuatum L. var. *sinuatum*	Mediterranean	-	-	-	-	-	-
VERBANACEAE	*Vitex agnus-castus* L.	Mediterranean	-	DD	-	-	-	-
LABIATAE	*Prunella vulgaris* L.	European-Siberia	-	LC	-	-	-	-
	Origanum vulgare L subsp. *hirtum* (Link) Iestwart	Mediterranean	-	-	-	-	-	-
	Melissa officinalis L. subsp. *altissima* (Sm) Arcengeli	Mediterranean	-	-	-	-	-	-
	Salvia viridis L.	Mediterranean	-	-	-	-	-	-
	Salvia virgata Jacq.	Iran-Turan	-	-	-	-	-	-
EUPHORBIACEAE	*Euphorbia apios* L.	Mediterranean	-	-	-	-	-	-
MORACEAE	*Ficus carica* L. subsp. *caica*	Widespread	-	-	-	-	-	-
SALICACEAE	*Populus nigra* L. subsp. *nigra*	Plantation	-	-	-	-	-	-
	Salix alba L.	European-Siberia	-	LC	-	-	-	-
PLANTAGINACEAE	*Plantago major* L. subsp. *intermedia* (Gilib.) Lange	Widespread	-	-	-	-	-	-
	Plantago lanceolata L.	Widespread	-	LC	-	-	-	-
LILIACEAE	*Ornithogalum orthophyllum* Ten.	Widespread	-	-	-	-	-	-
	Asphodelus aestivus Brot.	Mediterranean	-	LC	-	-	-	-
ORCHIDACEAE	*Ophrys mammosa* Desf.	Mediterranean	-	LC	-	-	-	-
CYPERACEAE	*Bolboschoemus maritimus* (L.) Pallas var. *maritimus*	Widespread	-	-	-	-	-	-
GRAMINEAE	*Trachynia distachya* (L.) Link	Mediterranean	-	-	-	-	-	-
	Hordeum bulbosum L.	Widespread	-	LC	-	-	-	-
	Bromus tectorum L.	Widespread	-	-	-	-	-	-
	Poa bulbosa L.	Widespread	-	-	-	-	-	-

Family	Taxon	Phytogeographical Region	Endemism	IUCN	BERN	CITES		
					App1	App1	App2	App 3
	Poa annua L.	Widespread	-	LC	-	-	-	-
	Brachypodium sylvaticum (Hudson) P.Beauv.	Europan-Siberia	-	-	-	-	-	-
	Piptatherum miliaceum (L.) Cosson subsp. *tmomasii* (Duby) Freitag	Widespread	-	-	-	-	-	-
	Calamagrostis pseudophragmites (Haller fil.) Koeler	European-Siberia	-	LC	-	-	-	-
	Dactylis glomerata L. subsp. *hispanica* (Roth) Nyman	Widespread	-	-	-	-	-	-
	Phragmites australis (Cav.) Trin. ex Steudel	European-Siberia	-	LC	-	-	-	-
	Polypogon viridis (Gouan) Breistr.	European-Siberia	-	LC	-	-	-	-

Wildlife Features of the Project Area

Since the project will be constructed in the city center, it is not expected to have habitat types that will inhabit wildlife. However, as a result of the studies conducted by examining the literature and previous studies, it was possible to make an inventory for the fauna species. The investigations were carried out as reptiles-amphibians, birds and mammals.

Amphibians and Reptilians

Reptile and amphibian species are concentrated in riparian habitat beside the planned WWTP area. Amphibian and reptile species likely to be found in the area are shown in Table IV.28.

Among the detected species, only tortoise (*Testudo graeca*) is in the category “VU” (Vulnerable: Sensitive) (Table IV.20) according to IUCN. However, tortoise is a widely spread reptile species found in every region except the Eastern Black Sea region in Turkey. Other reptile species are not in any threatened category. According to the IUCN species "LC: Least Concern" category is located in this region, and Turkey in general are widespread species of Western Palearctic zoogeographical.

Table IV.28 Possible Reptile and Amphibian Species in and around the Project Area

Species Name	Turkish Name	English Name	Threatened Status				
			International			National	
			IUCN	BERN	CITES	RDB	Endemism
Bufo bufo	Siğilli Kurbağa	Common Toad	LC	Annex II	-	nt	-
Bufotes variabilis	Gece Kurbağası	Green Toad	DD	Annex II	-	nt	-
Phelophylax bedriagae	Ova Kurbağası	Marsh Fog	LC	Annex II	-	nt	-
Mauremys rivulata	Balkan Çizgili Kaplumbağası	Western Caspian Turtle	LC	-	-		-
Testudo graeca	Tosbağa	Spur-thighed Tortoise	VU	Annex II	Annex II	nt	-
Mediodactylus kotschyi	İnceparmaklı keler	Kotschy's Gecko	LC	Annex II	-	nt	-
Hemidactylus turcicus	Geniş parmaklı keler	Turkish Gecko	LC	Annex III	-	-	-
Laudakia stellio	Dikenli Keler	Hardim	LC	Annex II	-	nt	-
Lacerta trilineata	İri Yeşil Kertenkele	Balkan green lizard	LC	Annex II	-	nt	-
Ophisops elegans	Tarla Kertenkelesi	Wester sanke-eyed lizard	LC	Annex II	-	nt	-
Ablepharus kitaibelii	İnce kertenkele	European copper skink	LC	Annex II	-	nt	-
Trachylepis aurata	Tıknaz Kertenkele	Levant skink	LC	Annex III	-	nt	-
Blanus strauchi	Kör Kertenkele	Anatolian worm lizard	LC	Annex III	-	nt	-
Typlops vermicularis	Kör Yılan	Blind snake	LC	Annex III	-	nt	-
Platyceps najadum	İnce Yılan	Dahl's whip snake	LC	Annex II	-	nt	-
Platyceps collaris	Toros Yılanı	Taurus whip snake	LC	Annex II	-	nt	-
Eirenis modestus	Uysal Yılan	Ring-headed dwarf snake	LC	Annex III	-	nt	-
Natrix natrix	Yarısucul Yılan	Grass Snake	LR/	Annex III	-	nt	-
Natrix tasellata	Su Yılanı	Dice Snake	LC	Annex II	-	nt	-
Telescopus fallax	Kedigözlü Yılan	Soosan Snake	LC	Annex II	-	nt	-

Birds

In the Project area, it is possible that some of the bird species are found in a certain period of the year (spring-breeding and / or autumn-migration) and are usually that leave the region in the fall. It has been determined that the project site is not on the main migration route for large migratory birds flying with long wings. It is not a preferred transition area for migratory birds due to the lack of suitable wintering habitats (permanent) wetlands (such as river-lake) and nutrient-rich steppe areas for the project site and its immediate surroundings. Flocks of birds using as accommodation and wintering areas during migration were not observed.

Since the Project area is located in the city center, there are mostly passeriform birds and cosmopolitan species. Possible bird species expected to be seen in the project area are presented in Table IV.29.

According to Table IV.29 *Streptopelia turtur* categorized as VU according to the IUCN Red List but this species is very common (widespread) in Mugla and in Turkey.

Table IV.29 Possible Bird Species in and around the Project Area

Species Name	Turkish Name	English Name	Threatened Status				
			International			National	
			IUCN	BERN	CITES	RDB	Endemism
Buteo buteo	Şahin	Common buzzard	LC	Annex III	Annex II	A.3	-
Larus michahellis	Gümüş Martı	Yellow-legged gull	LC	Annex III		A.4	-
Columba livia	Kaya Güvercini	Rock pigeon	LC	Annex III		A.5	-
Columba palumbus	Tahtalı	Woodpigeon	LC	-		A.4	-
Streptopelia decaocto	Kumru	Collared dove	LC	Annex III		A.5	-
Streptopelia turtur	Üveyik	Turtle dove	VU	Annex III		A.3.1	-
Cuculus canorus	Guguk	Cuckoo	LC	Annex III		A.2	-
Athene noctua	Kukumav	Little owl	LC	Annex II	Annex II	A.2	-
Tachymarptis melba	Ak Karınlı Ebabil	Alpine swift	LC	Annex II		A.3.1	-
Galerida cristata	Tepeli Toygar	Crested lark	LC	Annex III		A.3	-
Alauda arvensis	Tarlakuşu	Sky lark	LC	Annex III		A.4	-
Hirundo rustica	Kır Kırlangıcı	Barn swallow	LC	Annex II		A.5	-
Delichon urbicum	Ev Kırlangıcı	House martin	LC	Annex II		A.3	-
Motacilla alba	Ak Kuyruksallayan	White wagtail	LC	Annex II		A.3.1	-
Phoenicurus ochruros	Kara Kızılkuyruk	Black redstart	LC	Annex II		A.2	-
Saxicola rubetra	Çayır Taşkuşu	Whinchat	LC	Annex II		A.3	-
Turdus merula	Karatavuk	Blackbird	LC	Annex II		A.3	-
Hippolais pallida	Ak Mukallit	Olivceous warbler	LC	Annex II		A.3	-
Phylloscopus collybita	Çıvgın	Chiff chaff	LC	Annex II		A.3.1	-
Muscicapa striata	Benekli Sinekkapan	Spotted flycatcher	LC	Annex II		A.3	-
Parus major	Büyük Baştankara	Great tit	LC	Annex II		A.3.1	-

Species Name	Turkish Name	English Name	Threatened Status				
			International			National	
			IUCN	BERN	CITES	RDB	Endemism
Sitta neumayer	Kaya Sıvacısı	Rock nuthatch	LC	Annex II		A.2	-
Lanius collurio	Kızıl Sırtlı Örümcekkuşu	Red-backed shrike	LC	Annex III		A.2	-
Garrulus glandarius	Alakarga	Jay	LC	-		A.3.1	-
Corvus corone corone	Avrupa Leş Kargası	Carrion crow	LC	-		A.5	-
Passer domesticus	Ev Serçesi	House sparrow	LC	-		A.5	-
Carduelis carduelis	Saka	Goldfinch	LC	Annex II	Annex I	A.3.1	-
Miliaria calandra	Tarla Çintesi	Corn bunting	LC	Annex III	Annex II	A.4	-

Mammals

The project area is not expected to support the wildlife considering the location of the project components. The mammalian species of the region, like other fauna groups, are widely distributed species with high adaptation to the city. Sewerage lines, discharge line and WWTP will be constructed within settlements and areas where human impact is intense. Therefore, the area is not expected to accommodate mammalian species that will require protection. Possible mammal species expected to be seen in the project area are presented in Table IV.30.

Table IV.30 Possible Mammal Species in and around the Project Area

Species Name	Turkish Name	English Name	Threatened Status				
			International			National	
			IUCN	BERN	CITES	RDB	Endemism
Erinaceus concolor	Kirpi	Hedgehog	LC	-	-	nt	-
Rhinolophus ferrumequinum	Büyük Nalburunlu Yarasa	Greater Horseshoe Bat	LC	Annex II	-	V	-
Rhinolophus hipposideros	Küçük Nalburunlu Yarasa	Shorter Horseshoe Bat	LC	Annex II	-	V	
Myotis mystacinus	Bıyıklı Siyah Yarasa	Whiskered Bat	LC	Annex II	-	V	-
Pipistrellus pipistrellus	Cüce Yarasa	Common Pipistrelle	LC	Annex III	-	V	-
Sciurus anomalus	Anadolu Sincabı	Caucasian Squirrel	LC	Annex II	-	R/I	-
Rattus rattus	Ev Sıçanı	Black Rat	LC	-	-	nt	-
Mus domesticus	Ev Faresi	House Mouse	LC	-	-	nt	-
Hystrix indica	Oklu Kirpi	Porcupine	LC	Annex II	-	R	-
Vulpes vulpes	Kızıl Tilki	Red Fox	LC	-	Annex III	nt	-
Mustela nivalis	Gelincik	Least Weasel	LC	Annex III	-	nt	-
Martes foina	Kaya Sansarı	Stone Marten	LC	Annex III	Annex III	nt	-
Sus scrofa	Yaban Domuzu	Wild Boar	LC	Annex III	-	nt	-

Aquatic Environment

The treated water of the WWTP project will be discharged to Hanay Creek and its characteristics are provided in Chapter IV.1.6. It directly drains into the sea without connecting to another stream. The creek bed is made of concrete, and the cooling water is being discharged from Kemerköy Thermal Power Plant to the Hanay Creek. The creek is an anthropogenic creek that has lost its natural characteristics.

In the field studies, it was observed that there is flow in the creek (see Figure IV.31). However, no fish were detected in the creek due to anthropogenic effects. The mouth of the sea is located at a distance of about 1 km to the discharge point. Fish species can live in brackish waters at the intersection of the creek and the sea. The most dominant species in the region is mullet belonging to the Mugilidae family. Mullet is seen as a widespread species in Turkey and classified as "LC: Least Concern" according to IUCN. However, it is known that the environment, whose temperature increases due to cooling water discharge, creates a barrier for mullet species.

Figure IV.31 Hanay Creek

IV.3 Characteristics of Socio-Economic Environment

In this section, information regarding the economic activities and demographic features of Mugla province and Milas district on the regional scale and Oren, Bozalan, and Turkevleri regions on the local scale are presented to the extent possible. The state data retrieved from TurkStat is supported with the results of field studies and site surveys conducted at Oren.

IV.3.1 Economical Characteristics

According to the “Socio-Economic Development Ranking Survey of Provinces and Regions -2011” which was published by former Ministry of Development, Regional Development and Structural Adaptation General Directorate, Mugla was ranked as the 8th in Turkey as socio-economic development. According to this index, Mugla with a population less than 1 million (along

with Eskisehir) is one of the First Level Advanced Provinces. The table below shows the basic indicators of the province of Mugla.

Table IV.31 Indicators for Development Level of Mugla

Parameters	Value
Socio-economic development ranking (Ministry of Development, 2011)	8th
GDP per capita (TurkStat, 2018)	9.448 $
Number of Firms in Top 1000 (Istanbul Association of Manufacturers, 2018)	2
Number of Foreign Financed Firms (TOBB, 2019)	8
Total Exportation (TÜİK, 2019)	559 Million $
Primary school enrolment rate 2012 and after-net (%) (Turkey % 91.92) (TurkStat, 2018)	%90.49
Secondary Education Schooling Rate (Turkey % 93,28) (TurkStat, 2018)	%92.01
Number of Students Per Classroom (Primary School-Secondary School) (Turkey 24) (TurkStat, 2018)	18
Number of Hospital Bed per 100,000 Persons (Turkey 283) (TurkStat, 2018)	211
Forest Area / Total Area Ratio (General Directorate of Forestry)	%67.54
Tourism Facility Licensed Bed Numbers (MUTSO-TurkStat, 2018)	197,054
Total number of overnights (TurkStat, 2019)	14,497,222

Mugla located in a region that historical and cultural heritage traces are present. From the scope of employment and income, the most important sector is tourism. 1,124 km coastal length, Mugla pine honey, Milas carpet, Bodrum tangerine and natural beauties are the prominent values of Mugla. While foreign tourists visit the province for summer vacation, winter season is not evaluated enough from tourism scope. With advanced tourism opportunities such as airports, seaports and marinas, hotels and beach facilities it is one of the most popular destinations of Turkey.

In Table IV.32 and Table IV.33, Mugla Chamber of Commerce and Industry's latest available data showing number of tourists entering to Mugla and tourism facility statistics are presented, respectively. It should be noted that data presented in Table IV.32 does not contain access by road, which is the primary choice for most of the local tourists.

Table IV.32 Number of Tourists Entering Mugla by Mode of Transportation between 2016 and 2018

Year	Local Tourist			Foreign Tourist			Total Tourist
	Airline	Seaway	Total	Airline	Seaway	Total	
2016	31760	131881	163641	1368353	123284	1491637	1655278
2017	32648	153572	186220	1609791	214364	1824155	2010375
2018	47625	120397	168022	2225080	320660	2713762	2713762

Table IV.33 Tourism Facility Statistics Prepared by TurkStat for Mugla Chamber of Commerce and Industry.

Year	Tourism Certified			Municipal Certificated			Total		
	Facility	Room	Bed	Facility	Room	Bed	Facility	Room	Bed
2016	506	64693	139995	1231	31416	67460	1737	96109	207455
2017	496	64015	138955	863	27299	61409	1359	91314	200364
2018	505	63356	137225	870	26547	59829	1375	89903	197054

While there is a decline in total bed number, according to “Mugla Business and Investment Setting” report prepared by Southern Aegean Development Agency, Mugla owns 11.3% of the total beds of Turkey. The most visited destinations in Turkey are respectively Istanbul, Antalya and Mugla.

Important sectors other than tourism are seafood and animal products, mining and quarrying, fresh fruit and vegetables, ship and yacht. For development of the economy of Mugla, the province has potential future for medical tourism, renewable energy, organic agriculture, agriculture based industry, ecology tourism and medicinal and aromatic plant production.

Mugla’s exports mainly consists of four main sectors; manufacturing, mining and stone quarry, agriculture, forestry and fishing. Their total contribution to expropriation of Turkey is around 559 Million $.

The Southern Aegean Region, identified as TR32 Region, is composed of Aydin, Denizli and Mugla provinces. Turkey’s 4.1% population lives in this region. TR32 Region constitutes 4.6% of total labor force, 4.7% of total employment, and 3.2% of total unemployment of Turkey.

In 2019, employment and unemployment rates of TR32 are 51.2% and 9.2%, respectively. The employment rate in the region is higher than Turkey’s average, which is 45.7%, and unemployment rate in the region is lower than Turkey’s average, which is 13.7%. The employment and unemployment rates according to years are presented in Figure IV.32.

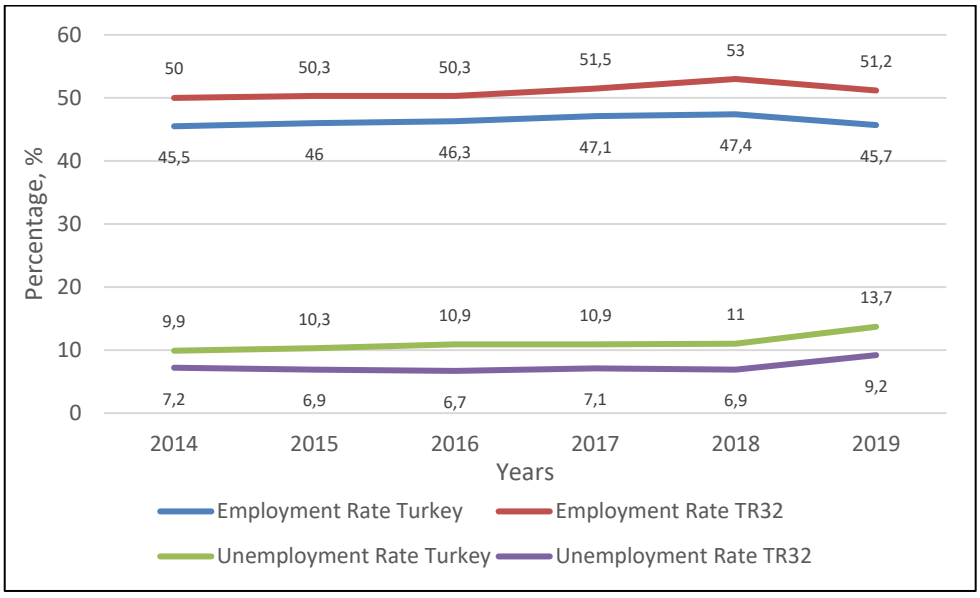


Figure IV.32 Employment and Unemployment Rates According to Years, TR32 (TurkStat, 2019)

The shares of service, agriculture and industry sectors within the region are 41.1%, 39.6% and 19.1%, respectively (see Figure IV.33).

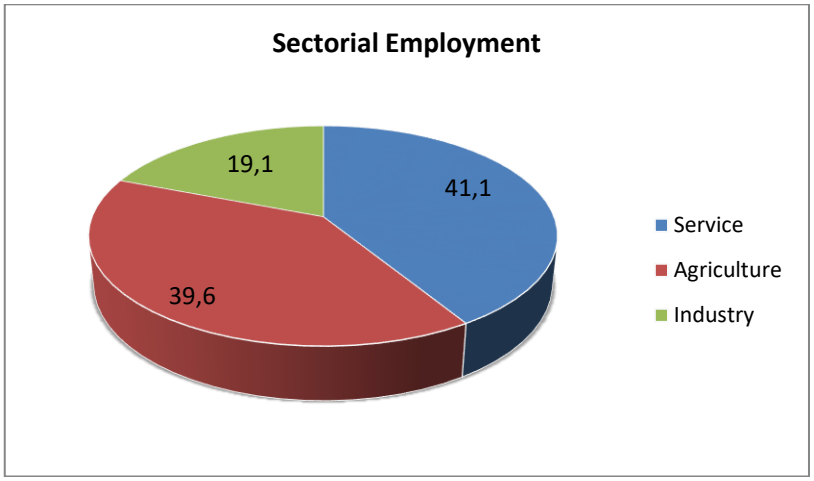


Figure IV.33Sectorial Employment in TR32 (TurkStat, 2019)

In Milas District, where Oren neighborhood is located at, agriculture is the main sector that contributes most to the district's economy, but mining and industry have also great importance. The district ranks first in the province in terms of the number of industrial workplaces registered to Turkish Union of Chambers and Commodity Exchanges and employment. Milas Airport and Gulluk Port strengthen the district's transportation and storage infrastructure. The vast majority of fish production, packaging and feed mills of the region are located in Milas and vicinity, and 68% of Turkey's farmed fish production is met. There are many feldspar and marble quarries and marble processing facilities in the district. Milas has the 2nd place after Yatagan for the number of workers in mining sector.

While agricultural lands of Mugla's districts are presented in Figure IV.34, the breakdown of Milas's agricultural land is provided in Table IV.34, and following that top ten agricultural products of Milas and their amounts are presented in Table IV.35. As seen from Figure IV.34, Milas ranks first in terms of agricultural land acreage among Mugla's districts. Mugla's 42.7% of agricultural lands consist of olive groves (53080 ha, around 8 million trees). There are 16 businesses in Milas that produce organic olive and olive oil.

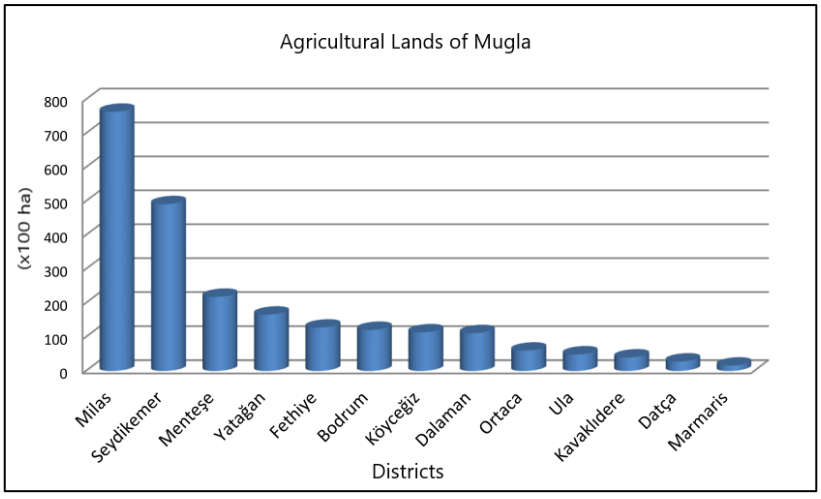


Figure IV.34 Agricultural Lands of Mugla (TurkStat, 2019)

Table IV.34 Agricultural Lands of Milas (TurkStat, 2019)

Agricultural Land	Area
Fruits and spices	53779 ha
Cereals, grains and others	13673 ha
Vegetable	4902 ha
Fallow	200 ha
TOTAL	**72554 ha**
Milas's Total Acreage	**2067 km^2**
Agricultural Land / Milas's Total Acreage	**35%**

Table IV.35 Top Ten Agricultural Products of Milas (TurkStat, 2019)

Agricultural Products	Amount (ton)	Ratio to the Total Production (%)
Corn (silage)	299250	41.52
Clover	80000	11.10
Olive oil	77545	10.75
Tomatoes	63389	8.79
Watermelon	62600	8.68
Italian ryegrass	21900	3.03
Common vetch	17500	2.42
Triticale	15300	2.12
Cucumber	9360	1.29
Wheat	8553	1.18

In addition to agriculture, Milas also ranks first in terms of stockbreeding among districts of Mugla as it can be seen from Figure IV.35. Milas also ranks first in honey production with 2800 ton.

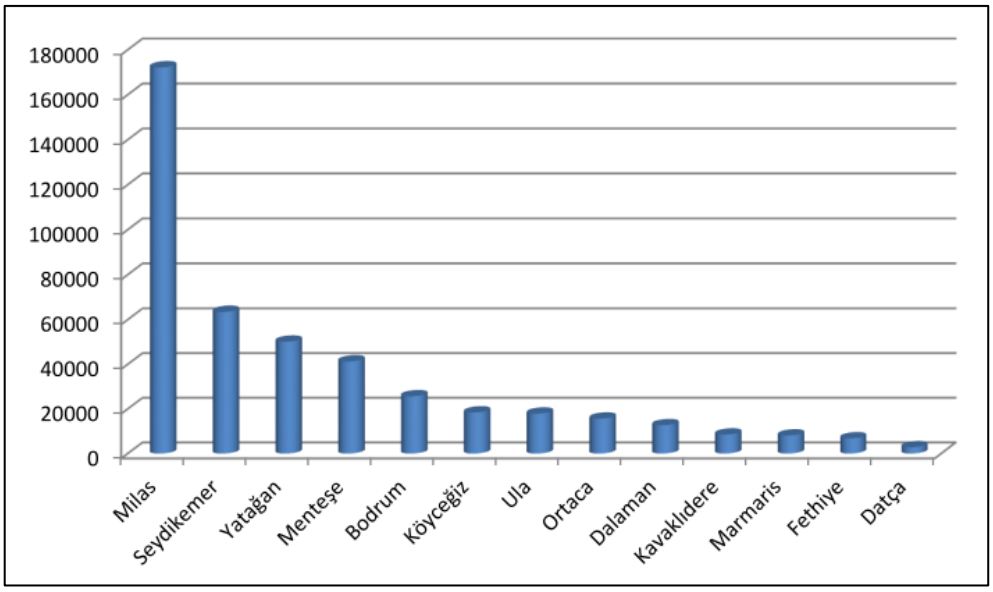


Figure IV.35 Number of Cattles in Mugla's Disctricts (TurkStat, 2019)

Milas is one of the regions in Turkey whose inhabitants kept their Turkmen heritage in its liveliest. As aside clothing and traditions, this heritage also includes the art of carpet weaving. It is generally admitted that a distinctive breed of Milas rugs came into existence in the 16th century. Although very few in numbers (one or two producers), carpet weaving is still valid for some of the villages of Milas including Oren, Turkevleri, and Bozalan.

The residents of Oren were making their living from agriculture (citrus, sesame, tobacco, cotton, and cereals), husbandry, and waving until 1990. After 1990, growth in tourism has changed the economy of Oren and its vicinity. Then hotel management, restaurant management, yachting, and service jobs have become widespread and started to contribute to the economy of Oren (Milas District Governorship Information Notice, 2018). TurkStat does not provide any economic data on neighbourhood level; therefore, site surveys were used to gather as much data as possible on socio-economics of Oren and its vicinity. Eighteen surveys were conducted in Oren during the first public participation meeting held on July 7, 2020. The information gathered by these surveys are presented in Table IV.36. As seen from below, mostly elderly people participated to the survey studies and almost all of them are on retirement pension. Unemployment rate among the participants is quite high (28.58%) comparing to Muğla's data presented above. However, all participants have social securities and 53% of them have savings.

Table IV.36 Survey Results

Information on Participants	
Number of surveys	18
Ratio of female participants	29.40%
Ratio of male participants	70.60%
Average age of the participants	53
Percentage of participants between the ages of 20 and 30	12.50%
Percentage of participants between the ages of 30 and 40	6.25%
Percentage of participants between the ages of 40 and50	12.50%
Percentage of participants between the ages of 50 and 60	37.50%
Percentage of participants between the ages of 60 and 70	25%
Percentage of participants between the ages of 70 and 80	6.25%
Percentage of people living in Milas 12 months of a year	35.71%
Percentage of people living in Milas less than 6 months of a year	42.85%
Percentage of residents who have been in Milas for more than 10 years	33.30%
Percentage of residents who have been in Milas for less than 10 years	66.70%
Sources of Income	
Salary	46.66%
Retirement pension	20.04%
Commercial income and retirement pension	6.66%
Commercial income	6.66%
Rent and retirement pension	6.66%
Tourism income and rent	6.66%
Tourism income and retirement pension	6.66%
Main Unemployment Reason	
Retired	57.13%
Unemployed	28.58%
Seasonal unemployment	14.29%
Total Annual Income in 2019	
Less than 100.000 TL	40%
More than 100.000 TL	60%
Savings	

Yes	53.85%
No	46.15%
Social Security	
Yes	100%
No	0 %
Private Health Insurance	
Yes	18.75%
No	81.25%
INFRASTRUCTURE AND EXPENDITURES	
How many square meters is the usage area of the house you currently live in?	
Greater than 150 m²	16.67%
Between 149 and 90 m²	33.33%
Between 81 and 89 m²	8.33%
Between 20 and 80 m²	41.67%
Number of rooms	
5	16.66%
4	72.22%
3	5.55%
2	5.55%
Does your house have a garden?	
Yes	100%
No	0%
How many square meters is the garden of your house?	
Between 10 and 80 m²	46.15%
Between 80 and 180 m²	15.38%
Between 180 and 500 m²	30.76%
More than 500 m²	7.70%
What is the main drinking water supply source in your house?	
City network	88.90%
Demijohn	5.55%
Private well	5.55%
What is the main domestic water supply source in your home?	
City network	88.24%
Water tank	5.88%
Tap water in the garden	5.88%
What is the main irrigation source in your home/garden?	
No additional source	28.58%
Well	64.28%
Other	7.14%
Do you have electricity at home?	
Yes	100%
No	0%
Monthly average electrical consumption (in TL)	
Between 50 and 100 TL	18.75%
Between 100 and 200 TL	68.75%
More than 200 TL	12.50%
What kind of toilet do you have?	
Siphon flush toilet	89.47%
Squatting toilet	5,.6%
Garden toilet	5.26%

What kind of wastewater system do you have in your household?	
Regularly pumped-out by municipality's sewer trucks	37.50%
Regularly pumped-out by private sewer trucks	12.50%
Septic Tank / Pit Latrine	43.75%
Other	6.25%
How much money do you spend annually to solve your wastewater problems?	
On average	2.822 TL
Wastewater-related problems in the households	
Odor	33.34%
Pollution	16.67%
Shortage of sewage trucks and costs	16.67%
No sewerage and infrastructure	8.33%
Technical faults	8.33%
Official formalities	8.33%
No problems	8.33%
How do you manage domestic wastes?	
Milas Municipality regularly collects	94.44%
Other	5.56%
How much money do you spend annually for energy?	
On average	1080 TL
How much money do you spend monthly for water?	
On average	130.33 TL
How much do you spend on kitchen expenses (food, beverage, etc.) per month?	
On average	2200 TL
What is your first choice to take loan in case needed?	
Credit card	53.33%
Bank	40%
Close relatives	6.67%
Are you in debt?	
Yes	41.18%
No	58.82%
The average debt of those who answered yes to the question	63.750 TL
All of them took loans from banks	

The biggest industry in Oren is Kemerköy Thermal Power Plant and associated coal mines. Other than the plant, there are no attraction centres in Oren for active population. In off-season, Oren's population decreases to 3000 from 30000 and mostly elderly residents stay in the village according to the interviews made with the public.

Oren has three schools; one primary school, one secondary school and one high school. The total number of students in the neighbourhood is 450. There are 30 classrooms and 50 teachers in these schools (Milas District Directorate of National Education, 2020). It can be said that education infrastructure in Oren is strong with sufficient number of schools, classrooms, and teachers. For university-level education, nearest university is Mugla Sitki Kocman University.

Despite strong education infrastructure, Oren has very limited health services. There is only one primary care clinic in Oren. The clinic is occupied with three doctors. This indicates that number of population per doctor is 1000 for winter period and this value is way beyond the Turkish average (498.2) and OECD average (341.3). The ratio is much worse for summer season, where the population reaches ten-fold. The nearest full-fledged hospital, which is 75. Yıl State Hospital, is

at Milas and 50 km away from Oren. In addition to the state hospital, there is also one private hospital in Milas.

IV.3.2 Population

Provincial Level

Mugla ranks twenty fourth province of Turkey in terms of total population, as of 2019, its population is 983.142. Population density (number of people per square kilometer) is 76.5, it is lower than Average of Turkey (108.05) when compared with. It is a famous settlement in the Aegean Region, with a small part of its territory in the Mediterranean Region, where the holiday resorts such as Ortaca, Dalaman, Fethiye, Marmaris, Milas, Datca and Bodrum are located. The province has 13 districts (TurkStat,2019).

Substantial part of the Mugla population consists of age group of 0-24 and this group comprises 30.67 percent of total population. Age and gender distribution of Mugla is given in Table IV.37 and it is shown that the age group of “35-39” (8.22%) and “40-44” (8.06%) has the highest ratio within the total population.

Table IV.37: Age and Gender Distribution of Mugla Province (TurkStat, 2019)

Age Group	Male	Female	Total	Age Group/Total Male (%)	Age Group/Total Female (%)	Total Age Group/Total (%)
0-4	29105	27367	56472	5,81	5,67	5,74
5-9	31229	29343	60572	6,24	6,08	6,16
10-14	31500	29459	60959	6,29	6,10	6,20
15-19	30289	27719	58008	6,05	5,74	5,90
20-24	34457	31078	65535	6,88	6,44	6,67
25-29	34264	31115	65379	6,84	6,45	6,65
30-34	36254	35238	71492	7,24	7,30	7,27
35-39	41246	39523	80769	8,24	8,19	8,22
40-44	40927	38329	79256	8,18	7,94	8,06
45-49	38486	36403	74889	7,69	7,54	7,62
50-54	35112	33309	68421	7,01	6,90	6,96
55-59	33472	32026	65498	6,69	6,64	6,66
60-64	27345	26597	53942	5,46	5,51	5,49
65-69	21057	21615	42672	4,21	4,48	4,34
70-74	15115	16206	31321	3,02	3,36	3,19
75-79	9892	11557	21449	1,98	2,40	2,18
80-84	6243	7973	14216	1,25	1,65	1,45
85-89	3517	5365	8882	0,70	1,11	0,90
90+	1092	2318	3410	0,22	0,48	0,35

Population pyramid of Mugla province is presented in Figure below. When the population pyramid examined, it can be said that Mugla has contracting population pyramid profile. By considering these data, the dependency ratio (of Mugla is 43.9% and this ratio is slightly lower than the average ratio of Turkey (47.46%).

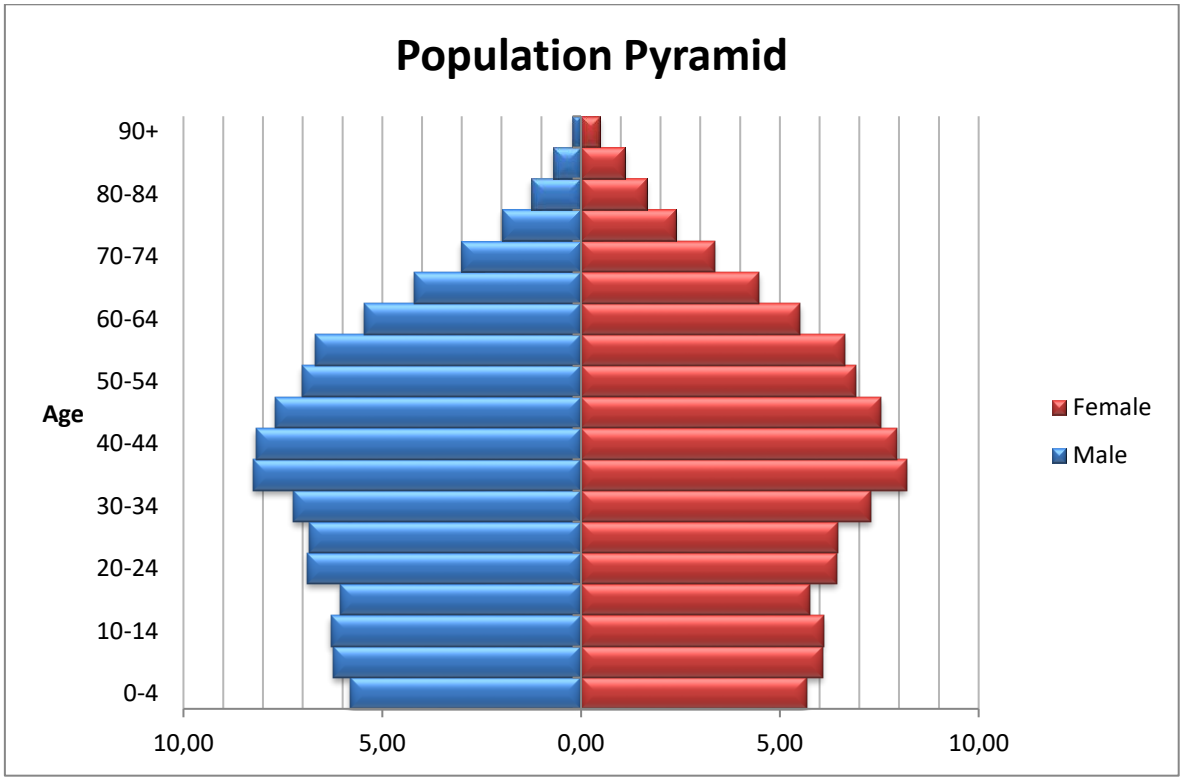


Figure IV.36 Population Pyramid of Mugla Province (TurkStat, 2019)

According to the data obtained from Address Based Population Registration System, 2019 results, population of the Milas district, where project area is located, is 141,107. With this population, Milas has the 3rd highest population behind Bodrum and Fethiye respectively. The population distribution of Mugla and the population of the districts are given in Table IV.38.

Table IV.38 Population of Mugla Districts (TurkStat, 2019)

District	Male	Female	Total	Male (%)	Female (%)
Bodrum	89244	86191	175435	50,87	49,13
Dalaman	22295	19729	42024	12,71	11,25
Datca	11442	10961	22403	6,52	6,25
Fethiye	81656	81030	162686	46,54	46,19
Kavaklıdere	5472	5320	10792	3,12	3,03
Koycegiz	18610	18316	36926	10,61	10,44
Marmaris	49719	45030	94749	28,34	25,67
Mentese	57869	57190	115059	32,99	32,60
Milas	71538	69569	141107	40,78	39,66
Ortaca	25083	24944	50027	14,30	14,22
Seydikemer	32264	29389	61653	18,39	16,75
Ula	12836	12566	25402	7,32	7,16
Yatagan	22574	22305	44879	12,87	12,71

District Level

Milas ranks third with its 141,107 population among districts of Mugla. The population density is 68.7, which is lower than both Mugla average 76.5 and Turkey average 108.05. Age and gender distribution of the population is presented in Table IV.39. The table shows that the age distribution of Milas is balanced and the age group of “35-39” (7.68%) and “30-34” (7.26%) has the highest ratio within the population. The average age in Milas is 38.7, which is 42 for Mugla and 32.7 for Turkey. The dependency ratio of Milas is calculated as 47.2 %, while it is 43.9% in Mugla and 47.46% in Turkey.

Table IV.39 Age and Gender Distribution of Milas Province (TurkStat, 2019)

Age Group	Male	Female	Total	Age Group/Total Male (%)	Age Group/Total Female (%)	Total Age Group/Total (%)
0-4	4499	4182	8681	3.2	3.0	6.15
5-9	4651	4143	8794	3.3	2.9	6.23
10-14	4500	4308	8808	3.	3.1	6.24
15-19	4261	4063	8324	3.0	2.9	5.90
20-24	4440	4127	8567	3.1	2.9	6.07
25-29	4859	4494	9353	3.4	3.2	6.63
30-34	5142	5102	10244	3.6	3.6	7.26
35-39	5463	5289	10752	3.9	3.7	7.62
40-44	5270	4909	10179	3.7	3.5	7.21
45-49	5072	4980	10052	3.6	3.5	7.12
50-54	5001	4910	9911	3.5	3.5	7.02
55-59	5260	4920	10180	3.7	3.5	7.21
60-64	4320	3981	8301	3.1	2.8	5.88
65-69	3149	3178	6327	2.2	2.3	4.48
70-74	2307	2482	4789	1.6	1.8	3.39
75-79	1538	1847	3385	1.1	1.3	2.40
80-84	999	1342	2341	0.7	1.0	1.66
85-89	645	927	1572	0.5	0.7	1.11
90+	162	385	547	0.1	0.3	0.39
TOTAL	71538	69569	141107	50.7	49.3	100

Population pyramid of Milas is presented in Figure IV.37. When the population pyramid examined, it can be said that Mugla has contracting population pyramid profile.

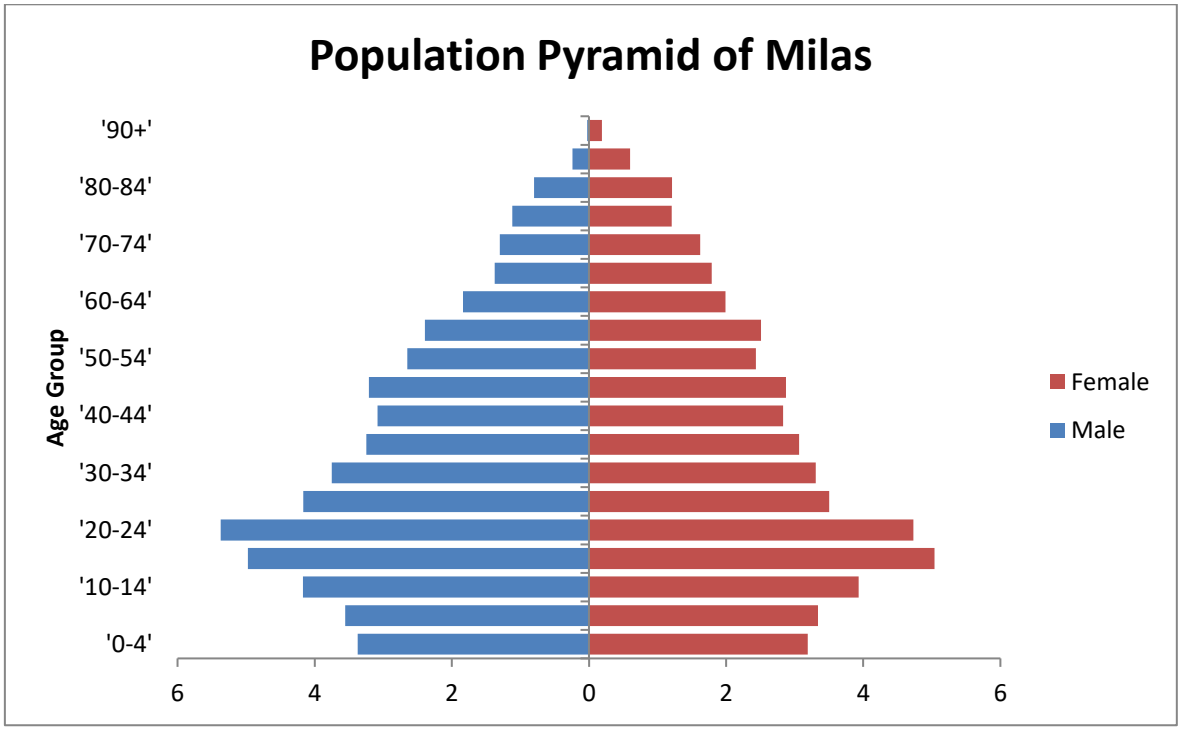


Figure IV.37 Population Pyramid of Milas (TurkStat, 2019)

Neighbourhood Level

Three neighbourhoods of Milas – Oren, Turkevleri, and Bozalan - are in the scope of the Project. The demographic information of these neighbourhoods are retrieved from TurkStat and presented in Table IV.40. It should be noted that during summer season, these numbers could go up-to ten times.

Table IV.40 Population of Oren, Turkevleri and Bozalan (TurkStat, 2019)

Neigbourhood	Male	Female	Total
Oren	1546	1492	3038
Turkevleri	424	402	826
Bozalan	279	240	519
TOTAL	2249	2134	4383

V. ENVIRONMENTAL AND SOCIAL IMPACTS OF THE PROJECT AND MITIGATION MEASURES

The main purpose of the ESIA is to identify and assess the potential positive and adverse impacts that may arise due to the Project activities on the natural environment and on the socio-economic wellbeing and conditions of the population (community and workforce) at the local and regional level. This assessment is based on the Project characteristics and activities and the baseline conditions in the Project area.

As a result of this assessment relevant mitigation measures would be developed for avoiding, preventing and minimizing significant adverse impacts and enhancing beneficial impacts. Furthermore, the assessment includes the significance of residual impacts remaining on the environment and community as a result of the Project following implementation of the mitigation measures. Consequently, monitoring activities for checking effectiveness of the proposed mitigation measures would be identified.

V.1 Scope-in/Scope-out Process

The ESIA scoping process for the Project considered relevant project activities and the environmental and social aspects they would interact with in order to identify the issues to be focused on in the ESIA studies. The analysis of these potential interactions has been done using a color code (see Table V.1) in a modified Leopold matrix (see Table V.2). This approach provided the means to identify the potential interactions each Project activity may have on a range of resources/receptors within the Project Area of Influence (AoI).

The Turkish EIA Regulation defines the area of influence as "*the area affected by a planned project before operation, during operation and after operation*". The area of influence may be different for different types of impacts and different environmental components (physical, biological, social) (World Bank ESMAP, December 2012).

According to World Bank Group (WBG) International Finance Corporation (IFC) Performance Standard (PS) 1 Assessment and Management of Environmental and Social Risks and Impacts, the Area of Influence (AoI) is to encompass the following as appropriate:

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

In this respect, the Project together with all of its components and auxiliary facilities (sewerage network including the pumping stations, Oren WWTP, energy transmission lines and construction camp) has been considered in the ESIA to the extent the level of information allowed.

Table V.1 Colour Code Used in the Scope-in/Scope-out Process

(White)	An interaction is not reasonably expected.	Aspect "scoped out"
(Grey)	An interaction is reasonably possible, but none of the resulting impacts are likely to lead to significant effects, and/or interaction is addressed through embedded mitigation measures.	Aspect "scoped out", but rationale is provided in relevant section of current report
(Red)	An interaction is reasonably possible and at least one of the resulting impacts is likely to lead to a negative effect that is significant.	"Scoped in" – subject to impact assessment.
(Green)	Impacts which are considered likely to be positive.	"Scoped in" – subject to impact assessment.

Those interactions that are coloured white are scoped out of further consideration in the impact assessment process and no discussion is warranted in the ESIA report. Those interactions that are coloured grey are also scoped out, but during the impact assessment process these potential interactions have been reviewed to confirm that resulted impacts are not significant and/or are appropriately addressed through one or more embedded controls. Those interactions marked with red and green are scoped in and subject to impact assessment as part of the ESIA process. These impacts would be assessed for their significance and additional mitigation measures, beyond the already planned embedded controls, would be proposed as necessary.

Table V.2 and

Table V.3 summarize the potential interactions between the Project and environmental resources (air, water, noise, etc.) and socioeconomic receptors.

Table V.2 Potential Interactions between Project Activities and Environmental Resources

Project stage/activity	Environmental Resources								
	Air Quality	Geology, Soils and Contaminated Land	Groundwater	Surface Water Resources	Noise and Vibration	Biological Environment	Landscape and Visual (Aesthetics)	Resources and Wastes	Climate Change
Construction									
Vegetation clearance, levelling works and construction activities at Oren WWTP site									
Excavation of surface material for laying down of sewerage system									
Provision of material, equipment, and service									
Use of energy									
Generation of domestic and hazardous waste									
Operation									
Water supply and use (domestic)									
Emissions and odour									
Generation of domestic wastewater									
Generation of solid waste including sludge									
Provision of material, equipment, and service									
Regular and timely maintenance works at WWTP, discharge line, sewerage network and pumping stations									

Table V.3 Potential Interactions between the Project Activities and Social/Socio-economic Receptors

Project stage/activity	Social / Socio-economic Receptors									
	Socio-Economics				Other Social Receptors					
	Local Economics	Community Demographics	Infrastructure and Services	Community Cultural Situation/ Social Cohesion	Ecosystem Services	Land Use	Livelihood	Worker Health and Safety (Labour & Working Conditions)	Community Health and Safety and Security	Archaeological and Cultural heritage
Construction										
Employment of personnel and procurement of goods and services (from local market)										
Labor influx										
Construction traffic (transportation of workers and materials)										
Operation of construction machinery, equipment and generators										
Road closures										
Wastes/wastewater handling and disposal										
Operation										
Employment of personnel and procurement of goods and services (from local market)										
Maintenance of sewerage system, discharge line, pumping stations and WWTP										
Waste handling and disposal										
Emissions and odour										

V.2 Impact Assessment Approach and Methodology

The purpose of impact assessment and mitigation is to identify and evaluate the significance of potential impacts (positive or negative) on identified receptors and resources according to defined assessment criteria; to develop and describe the measures that will be taken to avoid or minimize any potential adverse effects and enhance potential benefits; and to report the significance of the residual impacts that remain following mitigation.

The assessment of environmental and social impacts has been done based on the criteria provided below using mainly expert judgement, relevant standards and guidelines:

- **Nature of the impact:** Positive (+), Negative (-)
- **Type of Impact:** Direct, Indirect, Cumulative
- **Extent/area of Impact:** On-site/project footprint, Local, Regional, National
- **Duration of Impact:** Short term, Mid-term, Long term, Permanent
- **Likelihood of Impact Occurrence:** Very likely/certain, Likely, Unlikely

The magnitude and severity of the adverse impacts have been assessed based on the criteria given above and significance of the impacts has been determined based on this assessment and sensitivity of the receiver/source exposed to the impact, as much as possible. The matrix given in Table V.4 combines the sensitivity information with the magnitude of impacts. The significance of the impact is first designated without mitigation measures and then evaluated with proposed mitigation measures. This evaluation serves to determine the significance of the residual impacts (impact left after employing mitigation measures).

Table V.4 Impact Significance Matrix*

Sensitivity of Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Negligible/None**
High	High	High	Medium	Negligible/None
Medium	High	Medium	Low	Negligible/None
Low	Medium	Low	Low	Negligible/None

** Adapted from Scottish Natural Heritage – A handbook on environmental impact assessment, 2013*

V.3 Potential Area of Influence

Project's location is presented in Figure V.1. As described before, the Project will have impacts especially on the vicinity of the Project sites. The potential area of influence for the Project includes the neighbourhoods that are located in the sewerage network service area, discharge line, pumping stations, WWTP, energy transmission line, construction camp and its close vicinity. In short, the settlement areas located in the Oren, Turkevleri, and Bozalan Neighbourhoods are considered as the potential area of influence, which is shown in Figure V.2. Project's potential social area of influence and the distances between WWTP and nearest settlements are show on a map given in Figure V.3, which is similar with the potential area of influence. The identified sensitive receptors are shown on a map presented in Figure V.4.

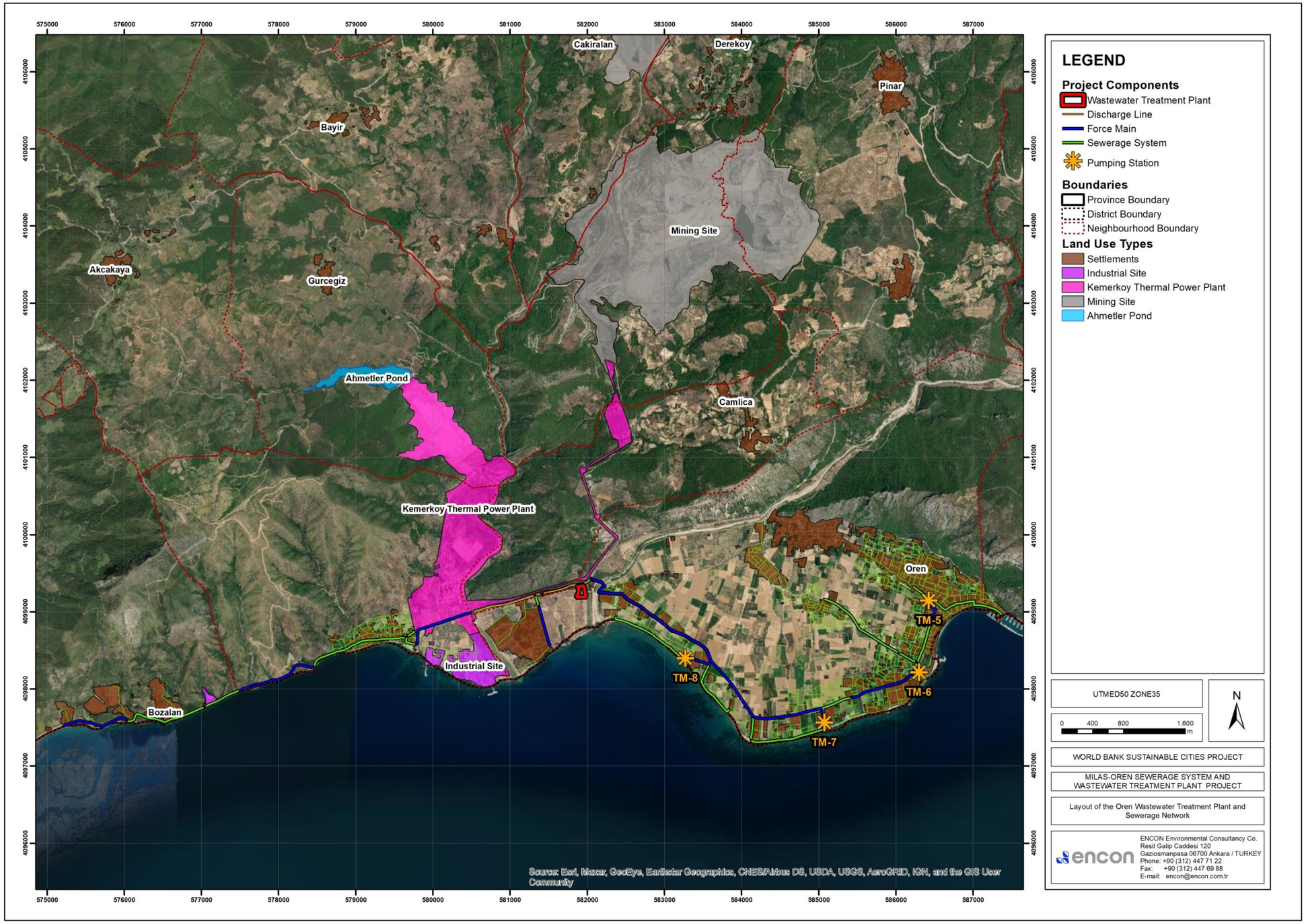


Figure V.1. Layout of the Oren Wastewater Treatment Plant and Sewerage Network

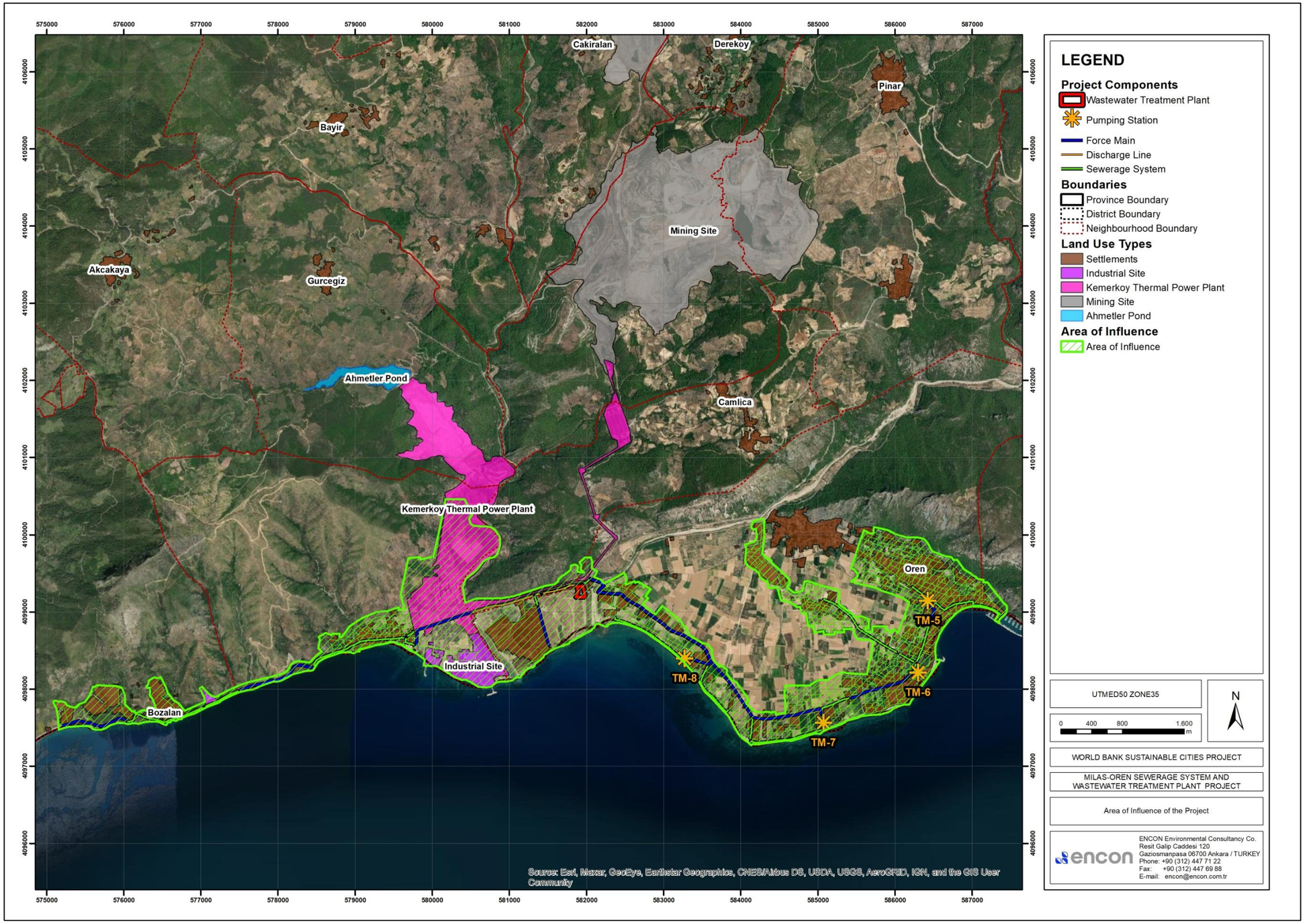


Figure V.2. Area of Influence of the Project

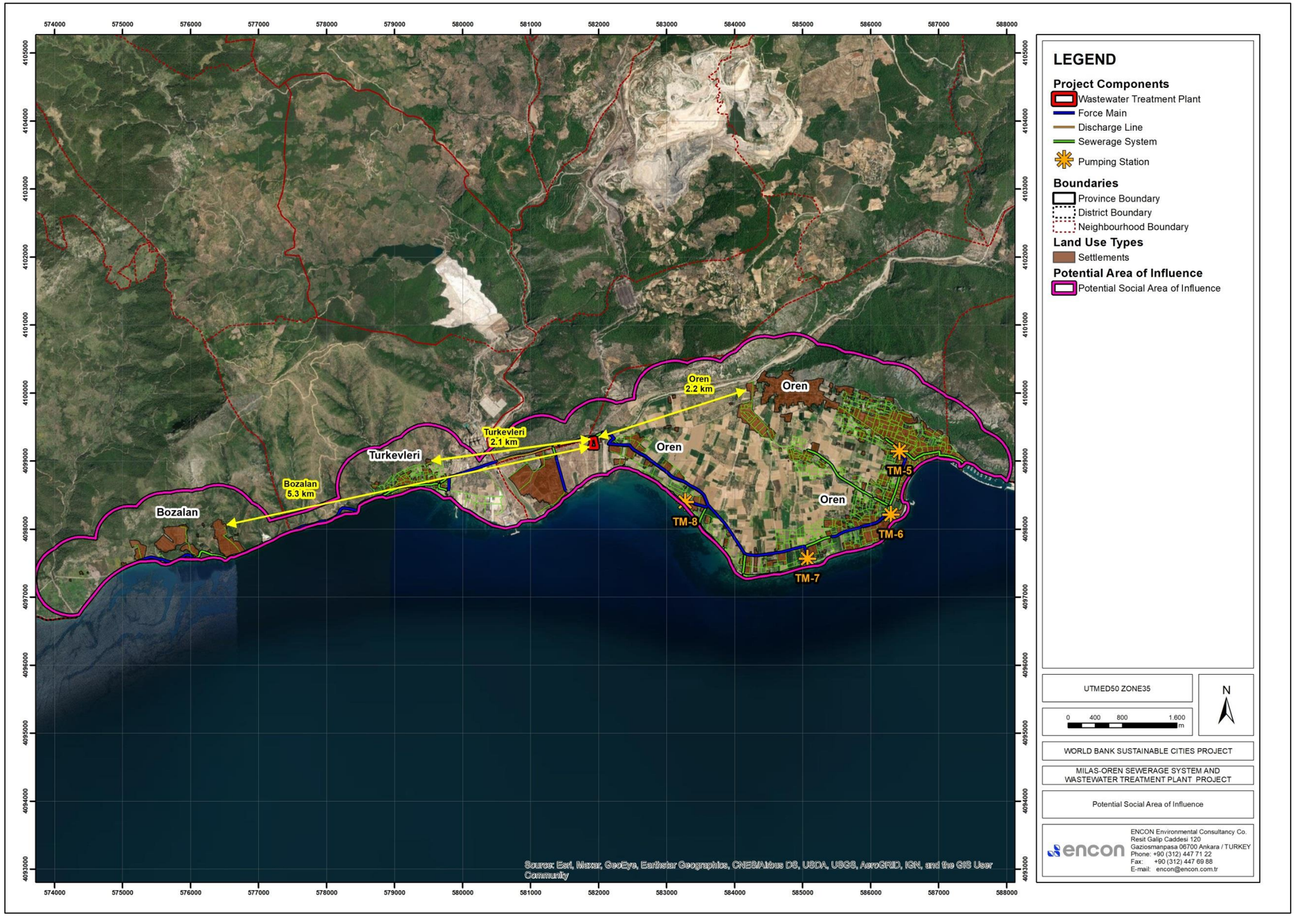


Figure V.3 Potential Social Area of Influence

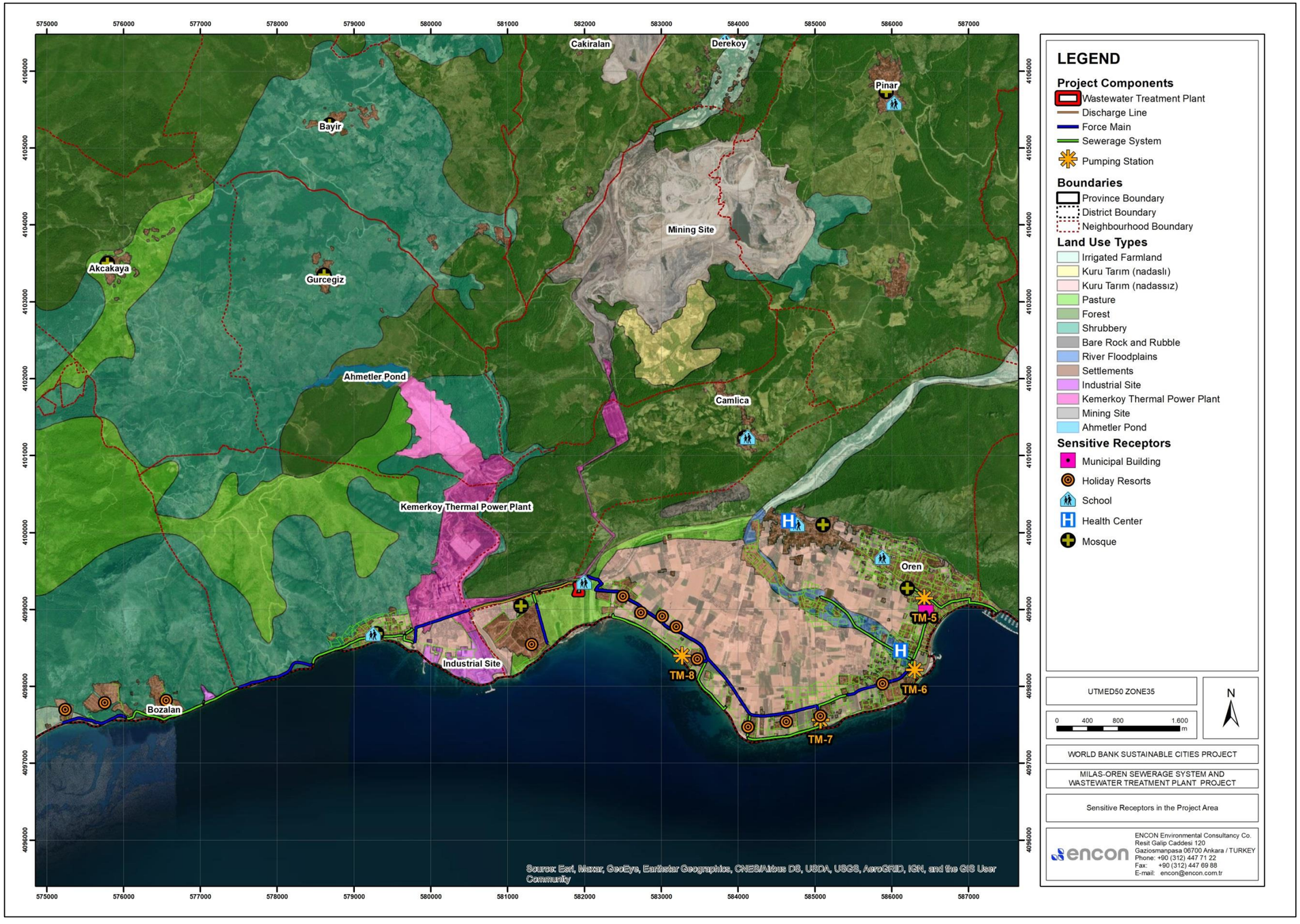


Figure V.4 Sensitive Receptors in the Project Area

V.4 Environmental Impacts (Physical and Biological Environment)

In Table V.5 identification of level of impact in terms of environmental resources (air, geology, water, etc.) for two project phases (construction and operation phases) are presented.

Project would have environmental impacts during construction and operation phases. Potential impacts of the Project during the construction phase would be generally short term with low to medium magnitude that would be locally significant. These impacts can be initially summarized as follows:

- Air emissions and increased level of noise generated from the operation of the construction machinery and equipment.
- Soil contamination as a result of inadequate management of waste generated on site, and possible leakage of hazardous materials (oil and lubricants from outdoor equipment).
- Wastes to be produced by workers.

In terms of auxiliary facilities, impacts during the construction activities are expected to be similar to the impacts regarding to main Project components, therefore, these impacts are evaluated together for both main Project components and auxiliary facilities. Although the energy transmission line has a linear route, only electric poles with a base size of approximately 5m x 5m will be erected for the energy transmission line. For this reason, excavation works will be limited for the electric pole and construction activities will be carried out in a short period of time. Therefore, impacts related to energy transmission line during the construction phase will be low in significance and short-term. On the other hand, for operation phase, impact regarding to electrocution from energy transmission line could be considered as significant if not properly managed.

During the operation phase significant adverse environmental impacts are not expected. The operation of the WWTP might create noise, odour, and sludge related impacts on sensitive receptors, which could be considered as significant if not properly managed. Maintenance and repair works of the WWTP, discharge line, sewerage network, pumping stations and energy transmission line might have minor environmental impacts such as generation of waste and increased level of noise. These impacts will be local and short-term with low in significance.

The following table provides a detailed overview of the identified impacts and their assessment as a result of the execution of project activities in different project phases, types of activities and baseline conditions on the Project area.

Table V.5 Matrix Table with Identification of Impact Level in Terms of Environmental and Social Attributes

No	Environmental Attributes	Impact																		
		Nature		Type			Extent/area				Duration				Likelihood of Occurrence			Sensitivity of the Receptor	Magnitude of the Impact	Impact Significance without ESMP	Impact Significance with ESMP
		Positive (+)	Negative (-)	Direct	Indirect	Cumulative	On-site/project footprint	Local	Regional	National	Short term	Mid-term	Long term	Permanent	Very likely/ certain	Likely	Unlikely	High	High	High	High
																		Medium	Medium	Medium	Medium
																		Low	Low	Low	Low
																		Negligible/ None	Negligible/ None	Negligible/ None	Negligible/ None
A. CONSTRUCTION PHASE																					
1. Air Quality																					
1	Increase in dust concentration		✓	✓			✓				✓				✓			**Medium**	**Low**	**Low**	**Low**
2	Increase in exhaust emissions		✓	✓			✓				✓				✓			**Medium**	**Low**	**Low**	**Low**
3	Impact on human health		✓		✓			✓			✓					✓		**Medium**	**Negligible**	**Negligible**	**Negligible**
2. Geology, Soils and Contaminated Land																					
1	Contamination of soil		✓	✓			✓						✓			✓		**Medium**	**Low**	**Low**	**Low**
2	Loss of topsoil at Oren WWTP site		✓	✓			✓							✓		✓		**Medium**	**Medium**	**Medium**	**Low**
3	Erosion Potential		✓	✓			✓						✓			✓		**Medium**	**Medium**	**Medium**	**Low**
4	Liquefaction and ground stability related risks at Oren WWTP Site		✓	✓			✓						✓				✓	**High**	**High**	**High**	**Low**
3. Surface Water Resources																					
1	Surface water quality		✓	✓				✓			✓						✓	**Medium**	**Low**	**Low**	**Negligible**
4. Groundwater Resources																					
1	Groundwater quality		✓	✓				✓			✓						✓	**Medium**	**Low**	**Low**	**Negligible**

Table V.5 Matrix Table with Identification of Impact Level in Terms of Environmental and Social Attributes

No	*Environmental Attributes*	*Impact*																		
		Nature		***Type***			***Extent/area***				***Duration***				***Likelihood of Occurrence***			***Sensitivity of the Receptor***	***Magnitude of the Impact***	***Impact Significance without ESMP***	***Impact Significance with ESMP***
		Positive (+)	**Negative (-)**	**Direct**	**Indirect**	**Cumulative**	**On-site/project footprint**	**Local**	**Regional**	**National**	**Short term**	**Mid-term**	**Long term**	**Permanent**	**Very likely/ certain**	**Likely**	**Unlikely**	High	High	High	High
																		Medium	Medium	Medium	Medium
																		Low	Low	Low	Low
																		Negligible/ None	Negligible/ None	Negligible/ None	Negligible/ None
5. Noise and Vibration																					
1	Increase in Noise Level		✓	✓				✓			✓				✓			**Medium**	**Medium**	**Medium**	**Low**
2	Increase in Vibration Level		✓	✓			✓				✓						✓	**Medium**	**Low**	**Low**	**Negligible**
6. Biological Environment																					
1	No significant impacts on biological environment are expected																	**Low**	**Low**	**Low**	**Negligible**
7. Landscape and Visual (Aesthetics)																					
1	Impairment of quality of life due to the overall presence of annoying construction works and activities		✓	✓				✓			✓				✓			**Medium**	**Medium**	**Medium**	**Low**
8. Resources and Wastes																					
1	Improper waste management		✓	✓				✓			✓					✓		**Medium**	**Low**	**Low**	**Low**
9. Climate Change																					
1	Contribution to climate change through GHG emissions		✓	✓					✓		✓				✓			**Medium**	**Low**	**Low**	**Negligible**

Table V.5 Matrix Table with Identification of Impact Level in Terms of Environmental and Social Attributes

No	*Environmental Attributes*	*Impact*																		
		Nature		***Type***			***Extent/area***				***Duration***				***Likelihood of Occurrence***			***Sensitivity of the Receptor***	***Magnitude of the Impact***	***Impact Significance without ESMP***	***Impact Significance with ESMP***
		Positive (+)	**Negative (-)**	**Direct**	**Indirect**	**Cumulative**	**On-site/project footprint**	**Local**	**Regional**	**National**	**Short term**	**Mid-term**	**Long term**	**Permanent**	**Very likely/ certain**	**Likely**	**Unlikely**	High	High	High	High
																		Medium	Medium	Medium	Medium
																		Low	Low	Low	Low
																		Negligible/ None	Negligible/ None	Negligible/ None	Negligible/ None
10. Socioeconomic Environment																					
1	Job creation and local procurement	✓		✓				✓					✓		✓			**Positive**			
2	Infrastructure damage		✓	✓				✓			✓					✓		**Low**	**Low**	**Low**	**Negligible/ None**
11. Occupational Health and Safety																					
1	Workers' exposure to work-related occupational health and safety risks		✓	✓			✓				✓				✓			**High**	**High**	**High**	**Low**
12. Community Health and Safety																					
1	Project traffic and construction activities related risks		✓	✓				✓			✓					✓		**Low**	**Medium**	**Low**	**Low**
2	Community encroachment		✓	✓			✓				✓						✓	**Low**	**Medium**	**Low**	**None/ Negligible**
13. Archaeological and Cultural Heritage																					
1	Chance finds		✓	✓			✓				✓						✓	**Low**	**Low**	**Low**	**Negligible/ None**

Table V.5 Matrix Table with Identification of Impact Level in Terms of Environmental and Social Attributes

No	Environmental Attributes	Impact																		
		Nature		Type			Extent/area				Duration				Likelihood of Occurrence			Sensitivity of the Receptor	Magnitude of the Impact	Impact Significance without ESMP	Impact Significance with ESMP
		Positive (+)	Negative (-)	Direct	Indirect	Cumulative	On-site/project footprint	Local	Regional	National	Short term	Mid-term	Long term	Permanent	Very likely/ certain	Likely	Unlikely	High	High	High	High
																		Medium	Medium	Medium	Medium
																		Low	Low	Low	Low
																		Negligible/ None	Negligible/ None	Negligible/ None	Negligible/ None
B. OPERATION PHASE																					
1. Air Quality																					
1	Air and odorous gas emissions from Oren WWTP		✓	✓				✓					✓		✓			**Medium**	**Medium**	**Medium**	**Low**
2. Geology, Soils and Contaminated Land																					
1	Loss of Land		✓	✓			✓							✓			✓	**Medium**	**Low**	**Low**	**Negligible**
2	Soil contamination		✓	✓				✓				✓					✓	**Medium**	**Low**	**Low**	**Negligible**
3. Surface Water Resources																					
1	Change in surface water quality	✓		✓					✓				✓		✓			**Positive**			
4. Groundwater Resources																					
1	Change in ground water quality		✓		✓			✓			✓						✓	**Medium**	**Low**	**Low**	**Negligible**
5. Noise and Vibration																					
1	Increase in Noise Level		✓	✓			✓						✓		✓			**Medium**	**Low**	**Low**	**Low**
6. Biological Environment																					
1	Discharge of the treated effluent	✓		✓					✓				✓		✓			**Positive**			

Table V.5 Matrix Table with Identification of Impact Level in Terms of Environmental and Social Attributes

No	*Environmental Attributes*	*Impact*																		
		Nature		***Type***			***Extent/area***				***Duration***				***Likelihood of Occurrence***			***Sensitivity of the Receptor***	***Magnitude of the Impact***	***Impact Significance without ESMP***	***Impact Significance with ESMP***
		Positive (+)	**Negative (-)**	**Direct**	**Indirect**	**Cumulative**	**On-site/project footprint**	**Local**	**Regional**	**National**	**Short term**	**Mid-term**	**Long term**	**Permanent**	**Very likely/ certain**	**Likely**	**Unlikely**	High	High	High	High
																		Medium	Medium	Medium	Medium
																		Low	Low	Low	Low
																		Negligible/ None	Negligible/ None	Negligible/ None	Negligible/ None
7. Landscape and Visual (Aesthetics)																					
1	The existence of the WWTP and energy transmission line		✓	✓				✓						✓		✓		**Low**	**Low**	**Low**	**Low**
8. Resources and Wastes																					
1	Generation of different types of waste during maintenance and repair works and sludge from Oren WWTP		✓				✓						✓			✓		**Medium**	**Low**	**Low**	**Low**
9. Climate Change																					
1	GHG emissions		✓	✓					✓		✓						✓	**Medium**	**Low**	**Low**	**Negligible**
10. Socioeconomic Environment																					
1	Job creation and local procurement	✓		✓				✓					✓		✓			**Positive**			
11. Community Health and Safety																					
1	Community's exposure to disease due to improper handling of wastes, including sludge		✓	✓				✓			✓						✓	**Low**	**Medium**	**Low**	**Negligible/ None**

Table V.5 Matrix Table with Identification of Impact Level in Terms of Environmental and Social Attributes

No	*Environmental Attributes*	*Impact*																		
		Nature		***Type***			***Extent/area***				***Duration***				***Likelihood of Occurrence***			***Sensitivity of the Receptor***	***Magnitude of the Impact***	***Impact Significance without ESMP***	***Impact Significance with ESMP***
		Positive (+)	**Negative (-)**	**Direct**	**Indirect**	**Cumulative**	**On-site/project footprint**	**Local**	**Regional**	**National**	**Short term**	**Mid-term**	**Long term**	**Permanent**	**Very likely/ certain**	**Likely**	**Unlikely**	High	High	High	High
																		Medium	Medium	Medium	Medium
																		Low	Low	Low	Low
																		Negligible/ None	Negligible/ None	Negligible/ None	Negligible/ None
2	Increased traffic due to waste and sludge disposal																	**Low**	**Low**	**Low**	**Low**
3	Failure of operation		✓	✓					✓		✓						✓	**Medium**	**High**	**High**	**Low**
4	Community encroachment		✓	✓			✓				✓						✓	**Low**	**Medium**	**Low**	**None/ Negligible**
5	Electrocution from Energy Transmission Lines		✓	✓			✓				✓						✓	**Medium**	**High**	**High**	**Low**
12. Occupational Health and Safety																					
1	Workers' exposure to work-related occupational health and safety risks																	**High**	**High**	**High**	**Low**

V.4.1 Air Quality

Construction Phase

The major impacts on air quality during the construction phase of this project will be related with the material handling, vehicle movement and emission from heavy construction machinery (trucks, excavators, etc.). Air pollution will be mainly dust emissions and exhaust emissions as well as GHG emissions. The sensitive receptors that will be exposed to these air emissions will be the local population who lives near the construction sites.

During construction phase of the project, there will be vehicle movement for transportation of various construction materials to the project site. Impacts on air quality will be mainly due to dust emissions caused by the vehicle movement on unpaved roads and earthworks to be performed within the Project Area. In addition to the fugitive dust emissions, exhaust emissions will originate from vehicles used in construction activities. In order to determine fugitive dust and exhaust emissions during the construction phase, the number of machinery and equipment to be used for the construction should be known. The machinery requirement of the Project is not determined by MUSKI yet and therefore, the construction machineries and equipment to be used during the construction phase is assumed and presented in Table V.6.

Table V.6 Indicative Construction Machinery and Equipment List

Construction Machinery/Equipment	Number
Dump Truck	6
Excavator	2
Loader	2
Mini Loader	3
Mobile Crane	2
Sprinkler	1
Grader	1

The amount of fugitive dust emission generated during the construction phase of the Project is calculated with the emission factors defined in IAPCR. The emission factors are presented in Table V.7.

Table V.7. Emission Factor to be used to Calculate Dust Emissions

Sources	Emission Factors		Unit
	Uncontrolled	Controlled	
Dismantling/Excavation	0.025	0.0125	kg/ton
Loading	0.010	0.0050	
Unloading	0.010	0.0050	
Storage	5.800	2.9000	kg dust/ha.day
Transportation (total distance)	0.700	0.3500	kg/km- vehicle

Source: Industrial Air Pollution Control Regulation, Appendix 12.

According to the project schedule, construction activities are planned to last for 18 months (approximately 450 work days) and daily shifts will last for 8 hours. Construction works will start with earthworks, which will last for 240 days. Earthworks consist of levelling, excavation, temporary storage, loading and transportation of excavation material.

The total amount of excavated material that will be generated as a result of construction activities is 69,664.20 m^3 (see Table V.8). 12,379.51 m^3 of the extracted material will be temporarily stored in the Project site for backfilling. Excavation is planned to be conducted step by step. However, the worst case scenario is assumed in the calculations and all the activities are assumed to be conducted simultaneously.

Table V.8. Excavation Amounts

Unit	Footprint (m^2)	Excavation Depth (m)	Excavation Amount (m^3)
Coarse Screen	8.00	2.00	16.00
Pump Station	48.00	4.50	216.00
Fine Screen	9.60	2.00	19.20
Aerated Grit Chamber	110.00	3.00	330.00
Rectangular Weir and Distribution Chamber	5.00	3.50	17.50
Anaerobic BioP Tanks	72.00	4.50	324.00
Aeration Tanks	720.00	4.50	3,240.00
Final Sedimentation Distribution Chamber	5.00	4.50	22.50
Final Sedimentation Tanks	50.00	4.50	225.00
Treated Water Pit	6.00	3.00	18.00
Disinfection Tank	48.00	3.00	144.00
Sludge Pumping Station	36.00	4.50	162.00
Sludge Thickener	28.00	4.50	126.00
Sludge Dewatering Building	80.00	6.00	480.00
Blower Building	147.00	6.00	882.00
Administrative Building	64.00	3.00	192.00
Transformer and Generator Building	96.00	1.50	144.00
Security Cabin/Guardhouse	12.00	3.00	36.00
Sewerage Network	37,100.00	1.70	63,070.00
Total Excavation			**69,664.20**

The amount of dust emission expected as a result of the construction activities of the Project have been calculated and presented in detail below.

Total Excavation Volume	: 69,664.20 m^3
Density of Excavation Material	: 1.8 ton/m^3
Total Amount of Excavation	: 125,395.6 ton
Total Volume of Excavation Material will be Reused	: 12,379.51 m^3
Total Volume of Excavation Material will be sent to Disposal	: 57,284.69 m^3
Total Amount of Excavation Material will be sent to Disposal	: 103,112.4 ton
Distance within the Plant (unpaved roads)	: 0.2 km
Truck Capacity	: 26 ton
Total Number of Trips	: 103,112.4 ton /26 ton : 3,965 trips
Number of Trucks	: 6
Number of Trips per Truck	: 661 trips/truck
Total Distance to be travelled (round trips on unpaved roads)	: 152 km
Excavation Duration	: 240 days
Work Hours in a Day	: 8
Hourly Excavated Material Amount	: 53.70 ton/hour

Uncontrolled Dust Emissions:

Emission from excavation:

Excavation emission factor (uncontrolled): 0.025 kg/ton
Amount of PM_{10} emissions: 53.70 ton/hour * 0.025 kg/ton = **1.34 kg/hour**

Loading emission factor (uncontrolled): 0.010 kg/ton
Amount of PM_{10} emissions: 53.70 ton/hour * 0.010 kg/ton = **0.54 kg/hour**

Emission from transportation activities

Transportation emission factor (uncontrolled): 0.700 kg/km-vehicle
Amount of PM_{10} emissions: 152 km x 0.700 kg/km-vehicle x (1/240 days) x (1/8 hours)
= **0.05 kg/hour**

Emission from storage

12,379.51 m^3 of excavated soil will be stored for its reuse in the WWTP Area and sewerage network. The storage height will be 3 m. Thus, required storage area is 4,126 m^2, which is 0.41 ha.

Storage emission factor (uncontrolled): 5.8 kg/ha
Amount of PM_{10} emissions:0.41 ha x 5.8 kg/ha x (1/24 hours) = **0.09 kg/hour**

Total uncontrolled PM10 emissions

Total: 1.34+0.54+0.05+0.09= 2.02 kg/hour

Controlled Dust Emissions:

Emission from excavation:

Excavation emission factor (controlled): 0.0125 kg/ton
Amount of PM_{10} emissions: 53.70 ton/hour * 0.0125 kg/ton = **0.67 kg/hour**

Loading emission factor (controlled): 0.005 kg/ton
Amount of PM_{10} emissions: 53.70 ton/hour * 0.005 kg/ton = **0.27 kg/hour**

Emission from transportation activities

Transportation emission factor (controlled): 0.350 kg/km-vehicle
Amount of PM_{10} emissions: 152 km x 0.35 kg/km-vehicle x (1/240 days) x (1/8 hours)
= **0.027 kg/hour**

Emission from storage

Storage emission factor (controlled): 2.9 kg/ha
Amount of PM_{10} emissions: 0.41 ha x 2.9 kg/ha x (1/24 hours) = **0.04 kg/hour**

Total uncontrolled PM10 emissions

Total: 0.67+0.27+0.027+0.04 = 1.00 kg/hour

According to the calculations, the total amounts of uncontrolled and controlled PM_{10} emissions are expected as 2.02 kg/hour and 1.00 kg/hour, respectively. As stated above, these emission rates are calculated based on the worst-case scenario. However, it is found that the emission rate for uncontrolled activities is greater than the limit value defined for non-stack sources in IAPCR, which is 1 kg/hour. Therefore, mitigation measures defined in this section will be applied tightly during the construction phase of the Project to keep the impacts related with fugitive dust emissions in low significance.

Dust will be generated mainly during the excavation works performed for the construction of the sewerage network, discharge line, pumping stations and WWTP. The sewerage network and discharge line will follow the cadastral roads and the construction will be performed gradually. For the pumping stations, construction activities will take place on the route of sewerage network. Therefore; the receptors will be limited to the vicinity of construction works and these receptors are presented in Figure V.3. Their sensitivity is assessed as medium, especially the ones in populated areas (i.e. city centre). The most sensitive receptor to dust is considered as Sitki Kocman University Fisheries Research and Development Centre, which is located adjacent to the WWTP site. Additionally, there is a hospital around TM-6 Pumping Station. Therefore, necessary mitigation measures described in the further sections of this report should be taken to not to impact the regular operation.

Standards for PM_{10} (particles with aerodynamic diameter smaller than 10μm) are defined for particles which are respirable by humans and therefore, PM_{10} is the accepted measure of particles in atmosphere. In this context, the Regulation on Air Quality Assessment and Management defines the standards in terms of PM_{10}.

Regulation on the Assessment and Management of Air Quality (RAMAQ)

Regulation on Assessment and Management of Air Quality was put into force in Official Gazette dated June, 6 2008 and numbered 26898. With this regulation, the Regulation on Protection of Air Quality was abolished. Long and short terms standards were specified for the harmonization of environmental regulations in the process of accession to the European Union. However, the regulation sets a transition period for the application of these limit values.

Industrial Air Pollution Control Regulation (IAPCR)

Industrial Air Pollution Control Regulation (IAPCR) published in Official Gazette dated July 3, 2009 and numbered 27277 aims to control emissions in form of smoke, dust, gas, vapor and aerosol which are released to the atmosphere as a result of activities of industrial plants and energy generation facilities, to protect human beings and the environment from pollution, and to manage and prevent negative impacts of air pollution which result in significant problems on public health. With this regulation, the Regulation on Air Pollution Caused by Industry has been abolished.

Ambient air quality limit values for various pollutants defined in above-mentioned legislations are presented in Table V.9.

Table V.9 Ambient Air Quality Limit Values – Turkish Regulations

Parameter	Duration	Limit Value* (µg/m^3)
SO_2	Hourly (cannot be exceeded more than 24 times a year)	350
	24 hour	125
	Long term limit	60
	Annual and winter season (October 1 - March 31)	20
NO_2	Hourly (cannot be exceeded more than 18 times a year)	250
	Annual	40
Particulate Matter (PM 10)	24 hour (cannot be exceeded more than 35 times a year)	50
	Annual	40
CO	8 hour daily maximum	10,000

** Regulation on Assessment and Management of Air Quality*
*** Industrial Air Pollution Control Regulation*

WBG Standards

In addition to the Turkish legislations, the ambient air quality limit values stipulated in the WBG General EHS Guidelines shall be complied. The WBG General EHS Guidelines – Environmental Air Emissions and Ambient Air Quality refers primarily to national legislated standards or in their absence to WHO Air Quality Guidelines. Therefore, the national legislated standards will be followed.

During the construction phase of the project, the above-mentioned regulations and standards will be complied with. As a result, when the works to be carried out within the scope of construction activities and corresponding work load are taken into account, it can be concluded that the impacts will be low in significance upon implementation of the mitigation measures and adherence to good construction methods.

The following techniques for the reduction and control of air emissions will be implemented during the construction phase in accordance with relevant Turkish regulations and international standards:

- Dust should be minimized from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content.
- Daily backfilling, bedding and covering materials will be stored at temporary storage areas, the materials will be moisturized and compacted to prevent the materials moving with the help of wind.
- Continuous water spraying will be conducted at the WWTP site to minimize dust impacts on Mugla Sitki Kocman University Fisheries Research and Development, which is adjacent to the site, and during the works to be performed around TM-6, where there is a hospital nearby.
- Inner roads of the WWTP will be covered to prevent dust formation.
- Speed limitations will be defined and obeyed for construction vehicles.
- The drop height of potentially dust generating materials will be kept as low as possible.
- Trees will be planted to the borders of WWTP, especially at the east and south borders.
- When there is traffic flow on the existing roads, where the works performed at, dust suppression measures will be continuously applied to ensure traffic safety. If there is no traffic existing in the local roads, dust suppression measures will be applied only at local residential and business areas.
- Loading and unloading operations will be performed without throwing/scattering.

- During transportation, excavated materials will be covered with nylon canvas or materials with grain size larger than 10 mm.
- Exhaust systems of the vehicles will be controlled regularly (biennially) through exhaust emission decals.
- Modern equipment and tools that can provide EU emission standards during the construction activities will be selected.
- Work sites will be sprayed regularly, particularly in spring and summer, to reduce the effects of dust-causing activities such as excavation and backfilling.
- Wind shields/barriers will be placed at work sites, especially at the south and east borders of the WWTP site and around the TM-6 Pumping Station, to prevent dust dispersion.
- Relevant provisions of the IAPCR and RAMAQ will be complied with to minimize air emissions sourced from construction machinery and trucks.
- Tire cleaning ponds will be installed at the exit of WWTP site to prevent mud transport on roads.
- Any damage caused by insufficient or lack of dust suppression measures (i.e. pollution of the surrounding area, transportation of dust with wind to a residential area, wind-blown dust deposits etc.) will be compensated by the construction contractor.

In addition to the fugitive dust emissions, there will be exhaust emissions of heavy construction machinery. Primary emissions from exhaust gases of vehicles are NO_2, CO, HC, SO_2 and PM. Emission characteristics depend on parameters such as; age of the vehicle, engine speed, working temperature, ambient temperature and pressure, type and quality of fuel. Emission factors developed by USEPA for gasoline and diesel fuelled vehicles are presented in Table V.10.

Table V.10. Emission Factors (USEPA)

POLLUTANTS	EMISSIONS (g/km/vehicle)	
	Gasoline	Diesel Fuel
Nitrogen oxides (NO_x)	1.20	9.00
Carbon monoxide(CO)	39.0	15.0
Sulphur dioxide(SO_2)	0.08	1.50
Hydrocarbons (HC)	2.60	2.90
Particulate Matter (PM)	0.40	0.80

The indicative list of construction machinery to be used for the construction activities were previously presented in Table V.6. Exhaust emissions of the machinery are presented in Table V.11.

Table V.11. Expected Amounts of Exhaust Emissions (kg/h)

Emissions (kg/hour)				
NO_X	CO	SO_2	HC	PM
0.153	0.255	0.026	0.049	0.014

According to the calculations made, exhaust emissions are quite below the IAPCR limit values for all parameters. Although no significant exhaust emission is expected during the

construction phase, a set of mitigation measures that are summarized below and also presented in Chapter VII will be implemented for further reduction of any related impacts on air environment.

- Well and adequate maintained vehicles shall be used. Regular maintenance of machinery and equipment will be ensured.
- Construction vehicles will not be permitted to keep engines running while waiting to enter the site or waiting on-site.
- Relevant provisions of the Regulation on Air Pollution Control Sourced from Industry and Regulation on the Assessment and Management of Air Quality will be complied with to minimize air emissions sourced from construction machinery and trucks.

In addition to that only electric poles with a base size of approximately 5m x 5m will be erected for the energy transmission line. For this reason, excavation works will be limited for the electric posts and construction activities will be carried out in a short period of time. Therefore, impacts related to energy transmission line will be low in significance and short-term.

In conclusion, with the implementation of above-listed mitigation measures, Project's impacts on air environment will be low, short-term, local/ on-site/project footprint and with low significance.

Operation Phase

The operation phase of the Project is not expected to cause significant dust and exhaust emissions. However, as stated in the IFC's EHS Guidelines for Water and Sanitation, air emissions from wastewater treatment operations may include hydrogen sulfide, methane, gaseous or volatile chemicals used for disinfection processes, and bioaerosols. Hydrogen sulfide and methane are known as odorous gases. Therefore, odor impacts will be observed during the operation phase of the Project.

During the operation phase, odor is generally generated in physical treatment and sludge units of wastewater treatment plants. Screens, aeration tanks, sedimentation tanks, sludge thickeners and dewatering units and operations performed within these units can result in generation of odor which may result in disruptive impacts around the treatment plant. In addition, pumping stations can also cause odor emissions even though they will be buried underground and will have odor removal units with activated carbon filters.

Wastewater influent contains high amounts of organic material. Organic materials are decomposed into odorous compounds by bacteria in biological treatment process. Activated sludge contains high amounts of bacteria and organic matter which can be decomposed by bacteria in short amount of time. Odor is generated as a result of compounds generated during this process.

As stated previously, wastewater treatment operations may emit hydrogen sulfide, methane, gaseous or volatile chemicals used for disinfection processes, and bioaerosols. Among those, hydrogen sulfide and methane gases are the most significant odorous gas. Due to the sludge treatment performed in the WWTP, ammonia, sulphur compounds, fatty acids, aromatic compounds and some hydrocarbons can also cause odor. Petroleum and organic solvents are also sources of disruptive odor.

Establishing a buffer zone between the treatment plant and residential areas and isolating odor is the main method to prevent odor generated in the treatment plant to be dispersed to settlements. Suggested buffer zone distances between treatment plants units and residential areas are presented in **Hata! Başvuru kaynağı bulunamadı.**. Distance of the treatment units to the nearest residential/commercial area is also presented in the table. As seen below, the nearest

receptors are in the recommended buffer zone, thus mitigation measures shall be applied seriously to reduce the nuisance on these receptors.

Table V.12 Recommended Distances to Settlements for Odor Prevention and Nearest Receptors

Treatment unit	Buffer zone, m	Nearest Building, m
Sedimentation Tank	122	60
Aeration Tank	152	25
Sludge Disposal Units	305	70

Source: Tchobanoglous, 1991

By good operation conditions and relevant measures taken for deodorization, disruptive odors can be prevented. Below proposed mitigation measures will be implemented in three levels for the WWTP. The first level measures are as follows:

- Prevention of wastewater influents, which exceed treatment plant capacity.
- Decrease in solid waste and activated sludge amounts.
- Increase disposal frequency of screenings.
- Proper and timely disposal of sludge in order to prevent flies and odor.
- Increasing aeration rate in biological treatment process.
- Addition of chlorinated water to sludge thickeners if activated sludge unit is in open area.
- Addition of lime to activated sludge.
- Keeping water level under control in order to prevent turbulence as a result of instant decrease of water.

If odour nuisance prevails after the proper implementation of first level measures, the second level measures will be taken. These are as follows:

- Plantation of trees in the WWTP site boundaries and the buffer zone around the treatment plant for the prevention of odor distribution.
- Addition of oxidizing material (such as hydrogen peroxide, sodium hypochloride) (oxidizing materials, prevent generation of especially hydrogen sulphide). Addition of sodium hydroxide can also be considered. Sodium hydroxide will dissolve hydrogen sulphur gas in water.
- Preventing anaerobic bacteria with control of pH levels or disinfection.
- Oxidizing odorous compounds by the help of chemicals.

If nuisance still prevails after implementation of first and second measures, following final measures will be implemented

- Enclosing of preliminary treatment units, aeration tanks and bio-P tanks.

Apart from that, following mitigation measures will be implemented within the scope of Project.

- Establishment of an operating grievance mechanism to manage odor related grievances.
- Maintaining pipelines and ensuring effective management and operation of the sewerage system including effective maintenance of all elements of the sewerage system and rapid response to emergencies.

- Regular maintenance and cleaning works shall be conducted on the machinery and equipment in order to prevent occurrence of odor.
- Regular and sufficient ventilation at the pumping stations will be provided.
- Trees will be planted around the pumping station areas.

Significant odor related nuisances are not expected to be observed as long as the measures mentioned above are taken. In addition, in the operation phase of the Project, necessary action shall be taken to comply with the provisions of Regulation on the Control of Odor-Causing Emissions. There are no mandatory numerical standards set in Turkey for odor concentration in ambient air at the site boundary or at receptor locations. If a new regulatory limit value will be set in the future, the Project shall comply all the mandatory numerical standards.

In conclusion, with the implementation of mentioned mitigation measures, the impact will be medium, long-term, local and with low significance.

V.4.2 Geology, Soils and Contaminated Land

Construction Phase

There are some geological risks in the construction phase of Oren WWTP as described in the Soil Investigation Report prepared by GAB Mühendislik ve Danışmanlık Ltd. Şti. Therefore, MUSKI shall take necessary mitigation measures to minimize risks and related impacts. The risks are summarized below:

- The groundwater table levels observed in the boreholes drilled in the WWTP site vary between 2.67 and 4 m.
- The site has a liquefaction potential after 7.5 m depth.

Soil Investigation Report also recommends mitigation measures as presented below to reduce the stability risks:

- The excavation works should be performed under the supervision of senior geology/geotechnical engineer.
- To lower the liquefaction potential and support the bearing capacity of ground, piling options should be developed.
- 50 cm thick filling material with suitable grain sizes should be laid under the foundation of all structures.
- Drainage of site should be ensured.

Through proper implementation of abovementioned crucial measures, it is considered that the significance of impacts related with liquefaction and ground stability can be decreased from high to low.

Additionally, according to requirements specified in the Regulation on Soil Pollution Control and Point Source Contaminated Fields, firstly MUSKI is obliged to notify the Ministry of Environment, Urbanisation and Climate Change (MoEUCC) regarding to the soil pollution in the Project Area, according to the procedure defined in the regulation. After that, based on the inspections that will be carried out by the MoEUCC regarding to MUSKI's notification, if the site will be defined as a contaminated site that needs to be cleaned up, the site will be cleaned up by firms authorized by the MoEUCC and MUSKI will be the responsible entity to ensure clean up. Within the scope of cleanup activities, following measures will be taken for the contaminated areas during the construction phase:

- Vehicles containing any excavated soil will be suitably covered to limit potential dust emissions, and truck bodies and tailgates will be sealed to prevent any discharge during transport;
- Only licensed waste haulers will be used to collect and transport contaminated soil to an appropriate treatment/disposal site and illegal disposal of the soil will be prohibited;
- The use of contaminated soil for landscaping will be prohibited.

Another impact of the construction of the Project is loss of topsoil, which is mostly valid for the WWTP site since the sewerage system and discharge line will follow cadastral roads and pumping stations will be buried underground. Therefore, necessary mitigation measures to lower the impact significance are developed and presented.

In the construction phase of the project, soil contamination may be seen due to accidental oil leakages in the areas where the works are carried out as well as improper disposal of wastes. This may affect the soil quality in the project area, if necessary mitigation measures are not taken. These impacts can be easily managed and mitigated to low in significance.

Additionally, hazardous materials to be used during the construction of energy transmission lines such as insulating oil/grease, fuel, etc. might cause soil pollution. However, these impacts can also be easily managed and mitigated to low in significance.

Potential impacts and possible risks on the soil environment in case that necessary measures will not be taken during land preparation and construction phase of the Project are summarized below:

- Soil compaction as a result of soil stripping, levelling excavation and filling activities, work of construction machinery;
- Mixing of soil layers as a result of excavation and filling activities;
- Loss of topsoil at the WWTP site;
- Soil contamination as a result of oil or fuel leaks or spillage that may result from incidents and unexpected events; and
- Soil pollution which may occur in case of uncontrolled storage or disposal of solid and/or liquid wastes to be generated within the scope of the Project.
- Erosion potential due to earthworks

The proposed mitigation measures are as follows:

- In order to minimize the impacts on soil environment, the amount of soil that could be subject to compaction and contamination/pollution will be minimized by ensuring the use of only the designated work sites and routes for the construction machinery and equipment and field personnel.
- Wastes and wastewater to be generated during the construction phase of the Project will be stored and disposed in a controlled manner in accordance with the relevant regulations, WBG EHS Guidelines and in line with the management practices described in this report. Thus, it will not be possible for the wastes and wastewater to be generated in the Project Area interact with the soil environment and cause any impacts.
- The areas that the construction works take place will be reinstated after the completion of works.
- By establishing a suitable drainage system in the field, the potential impact of surface runoff will be minimized. In this context, drainage channels will be constructed in accordance with the topographical conditions of the site.

- In order to develop background data on soil contamination status at the WWTP site, MUSKI or the construction contractor will conduct a soil sampling study at the site before any activity.
- Topsoil at the WWTP site will be stripped (minimum 30 cm) before any activity on site and properly stored to be reused for the landscaping works .
- Stripping of topsoil will not be conducted earlier than required to prevent the erosion of soil (wind and water).
- The disturbed areas and soil stock piles will be kept moist to avoid wind erosion of soil
- Construction activities (especially excavation works) will be undertaken in the dry weather condition as much as possible.
- The fuel required for the construction equipment and vehicles to be used within the site during construction phase will be supplied primarily from the nearest station; if deemed necessary, fuels that may possibly be stored at site will be stored in the areas where necessary impermeability precautions are taken.
- Measures to be taken in case of leaks and spills that may arise from construction machinery and vehicles, and unexpected accidents will be described in site-specific Emergency Response Plan to be prepared.
- The provisions of the Regulation on the Control of Excavation Soil, Construction and Demolition Wastes shall be complied during land preparation and construction phase of the Project.
- Following the completion of construction works, the stripped topsoil will be reused within the project areas, such as landscaping of WWTP and pumping station areas.
- Topography will be restored for stop stabilization immediately after the completion of construction at each location.
- The excavation works will be performed under the supervision of senior geology/geotechnical engineer.
- To lower the liquefaction potential and support the bearing capacity of ground, piling options will be developed.
- 50 cm thick filling material with suitable grain sizes will be laid under the foundation of all structures.
- For the amount of the topsoil that cannot be reused will not be wasted and the unused topsoil will be transferred to locations close to the current topsoil storage area by consulting with the potential users; farmers, livestock owners.
- In case of a damage caused to the existing roads, community assets, individual's crops and assets during land preparation and construction phases, the construction contractor will compensate the losses by identifying damage in accordance with the WB's safeguards with the supervision of MUSKI. MUSKI's grievance mechanism will be used in the event of any damage or loss.
- A Soil Management Plan should be prepared prior to the construction phase.
- An Oil and Chemical Spill Contingency Management Plan should be prepared prior to the construction phase.
- Provisions of the Regulation on the Control of Soil Pollution and Sites Contaminated by Point Sources shall be complied within the scope of the Project.

Project's anticipated impacts on geology, soils, and contaminated land are assessed as low in significance.

Operation Phase

In the operation phase of the Project, the activities will have a limited physical interaction with the environment. In the operation phase of the Project, no additional significant direct impacts on topography, soil and land use are anticipated under normal operating conditions. Impacts of

operation phase of the Project are related with the risks arise during repair and maintenance works, such as spillage/leakage of wastewater, oil, and chemicals to soil and the permanent land use change at the WWTP site, which is not used for any purpose before this Project. Therefore, the impact significance is determined as negligible.

V.4.3 Surface Water Resources

Water Supply during Construction Phase

During the construction phase, employees' needs and dust suppression will create water supply requirement. The drinking water needs of employees will be fulfilled by bottled water to be purchased from the local market and the domestic water required will be met by water trucks until the network connections are constructed. For dust suppression and tire cleaning, water will be provided to site by water trucks with sprinkler system. The total amount of daily water requirement is calculated based on the multiplication of number of employees that will be working at the peak time of the phase and the daily water requirement for a person, which is 0.23 m^3 (TurkStat, 2018). Although the number of personnel required is not determined yet, it is assumed as 100. Therefore, the daily water requirement of employees during the construction phase will be;

100 employees x 0.23 m^3/employee.day=23 m^3/day

Together with the amount of water required for dust suppression and tire cleaning, which are predicted to be 10 m^3/ day, the total water requirement during the construction phase will be 43 m^3/day.

The quality of drinking water that will be supplied to the Project shall be in compliance with the Regulation Concerning the Water Intended for Human Consumption together with the internationally accepted standards, such as WHO and WBG's General EHS Guidelines.

Water Supply during Operation Phase

During the operation phase of the Project, the drinking water will be procured from the local market, and for the other needs the tap water will be used as the connections to the water network will be constructed. The total amount of water required by employees is calculated as in the previous section. Although the number of personnel required is not determined yet, it is assumed as 10. Therefore, the daily water requirement of employees during the operation phase will be;

10 employees x 0.23 m^3/employee.day=2.30 m^3/day

In addition to the daily needs of the personnel, there will be operational water requirements, and these are presented together with the Project's water requirement according to its phases in Table V.13.

Table V.13. Water Requirement of the Project

Project Phase	Intended Use	Water Requirement		
		m^3/h	m^3/day	m^3/year
Construction	Drinking water / Tap water	0.96	23.00	8,395
Construction	Dust Suppression	1.25	10.00	3,650
Construction	Tire Cleaning	1.25	10.00	3,650
Operation	Drinking water / Tap water	0.10	2.30	840

Discharge of Treated Effluent

Domestic wastewater discharge criteria to the receiving bodies are regulated under Urban Wastewater Treatment Regulation Annex-IV Table 1 and Table 2. The discharge limits given in the regulation are presented below in Table V.14.

Table V.14 Domestic Wastewater Discharge and Treatment Efficiency Criteria

Parameters	Concentration (mg/L)	Minimum Treatment Efficiency (%)
BOD_5	25	70-90
COD	125	75
TSS	35	90
TP	2	80
TN	15	70-80

Currently, there is no WWTP in Oren and the generated wastewater is either discharged uncontrollably to receiving bodies or sent to the nearest WWTPs after pumped-out from septic tanks by sewer trucks. The realization of the Project will enable MUSKI to manage the collection, treatment and discharge of wastewater in Oren. The wastewater that is collected by sewerage network and sent to Oren WWTP for treatment will be discharged to Hanay Creek after reaching effluent concentrations and minimum treatment efficiencies given in Table V.14. Therefore, the realization of the Project will positively affect the environment as well as public health.

Impacts on Surface Water

Construction Phase

In the construction phase of the Project, the water requirement will be very low. Since the water demand/requirement within the scope of the Project will be provided/supplied by water network which will be connected at the beginning of the construction period and by purchasing from the market, a direct impact on surface water within the AoI of the Project is not expected.

Also, during the construction phase of the WWTP tire cleaning ponds will be inserted to both entrance and exits of the construction site. The water found in the cleaning ponds will never be discharged into the environment under any circumstances; the water will be collected in leakproof containers and will be disposed in a proper way.

Construction activities may pose the potential for accidental release/leakages of petroleum-based products, such as lubricants, hydraulic fluids, or fuels during their storage, transfer, or use in equipment. All chemical storage containers, including diesel fuel, and hazardous liquid waste drums/containers should be placed in secondary containment so as to minimize the risk of soil, surface water and groundwater contamination during construction.

In the construction phase of the project the impact will be direct and negative with short - term duration, local and negligible significance.

Operation Phase

During the operation phase of the Project, the regular maintenance works to be performed on sewerage network, discharge line and pumping stations might create impacts similar to the ones in construction phase. In Oren WWTP's operation on the other hand, there will be storage of some chemicals such as acids, bases, disinfectants, lubricants, etc. All storage tanks and drums will be

placed on concrete areas with proper secondary containments. When necessary; spill kits, absorbent pads or materials and adsorbent sands will be provided near the chemical storage areas at all times. On the other hand, generated wastewater will be given to the influent of the WWTP. In terms of water quality, the WWTP discharge will be in compliance with the discharge standards defined in Urban Wastewater Treatment Regulation of Turkey. Additionally, due to the multiple parallel units in the WWTP, possible negative consequences arising from the failure of any of the units will be prevented by enabling the use of the parallel unit. It is unlikely that two units will fail at the same time, so it is unlikely that creek quality will be affected. However, during the longer shutdowns or failures, MUSKI will inform Provincial Directorate of Environment, Urbanisation and Climate Change regarding the situation. With these measures, potential releases to environment, an adverse impact to soil, surface water, and groundwater will be prevented.

In terms of flooding, there is no flood risk in Milas-Oren according to the models prepared within the scope of the Western Mediterranean Basin Flood Management Plan studies (Ministry of Agriculture and Forestry General Directorate of Water Management, 2019. Western Mediterranean Basin Flood Management Plan). On the other hand, wastewater discharged into the creek might change the hydrology of the stream. However, during the site visit the width of the creek bed which is approximately 45 meters, was found to be sufficient for effluent discharge. Therefore, the creek bed can handle the flow.

To conclude, operation phase impacts of the Project is generally found to be positive on water resources. However, measures should be taken to prevent any unexpected deterioration on the receiving water quality. During the operation phase of the project the impact will be direct and positive with long term duration.

Mitigation Measures

Water to be used in dust suppression during land preparation and construction phase of the Project will be absorbed by soil or lost by evaporation. Therefore, there will not be any surface runoff formation or wastewater generation due to watering for dust suppression.

Within the scope of the measures to be taken in order to protect the water resources in the region, the limited amount of domestic wastewater generated at site will be collected in the container of toilet cabins to be established or leak-proof septic tanks to be constructed in the Project Area during construction phase and will be sent to the nearest WWTPs after pumped-out from septic tanks by sewer trucks. No discharge will be made to water resources in the land preparation and construction within the scope of the Project.

In the operation phase of the Project, the following measures will be taken:

- In order to develop background data on water quality, MUSKI or the construction contractor will conduct water quality measurements at the Hanay Creek before any activity on site.
- MUSKI will minimize bypass of the treatment system.
- An Emergency Response and Preparedness Plan to be developed and implemented
- The water quality of Hanay Creek will be monitored regularly, and if deemed, necessary further mitigation measures will be developed.
- The effluent water quality of the wastewater treatment plant will be consistent with applicable national requirements or internationally accepted standards.
- MUSKI will search options to increase the effluent water quality based on the assimilative capacity of the receiving body, if needed.
- Broken pipes and other repairs to be undertaken without delay,
- Pumps and pumping stations to be adequately maintained,
- System overflows will be prevented as much as possible by using level-meters.

In all phases, the Project will follow the provisions of the national legislation together with WBG EHS Guidelines and good international practices.

V.4.4 Groundwater Resources

Construction Phase

In construction phase, the major impact on groundwater may be seen due to accidental oil leakages in the areas where the works with construction machinery are carried out as well as improper disposal of wastes. This may affect the groundwater quality in the project area, if necessary mitigation measures are not taken. However, it can be said that the impacts will not be significant upon implementation of the mitigation measures and adherence to good engineering methods.

It is assessed that in the construction phase of the Project, the impact significance will be negligible.

Operation Phase

The impacts on groundwater resources in the operation phase will be similar to the ones of the construction phase. The impacts will be mostly related with the accidental spills/leakages and poor management of generated wastes and sludge. The impacts will be low and negligible in significance upon adherence to good engineering methods.

Mitigation Measures

Within the scope of the measures to be taken in order to protect the water resources in the region, the limited amount of domestic wastewater generated at site will be collected in the container of toilet cabins to be established or leak-proof septic tanks to be constructed in the Project Area during construction phase and will be sent to the nearest WWTPs after pumped-out from septic tanks by sewer trucks. No discharge will be made to water resources in the land preparation and construction within the scope of the Project.

The units of the Project that are in touch with water, wastewater and chemicals will be constructed with using concrete with appropriate cement ratio and durability in order to provide basement impermeability. Thus, no leakages to soil and groundwater will occur during the operation phase of the Project.

In all phases, the Project will follow the provisions of the national legislation together with WBG EHS Guidelines and good international practices.

V.4.5 Noise and Vibration

A noise measurement study was conducted at the Project area in order to measure the background noise level of the area. When the baseline study results are compared with the standards given in national legislation and WBG EHS, it can be seen that the background noise levels are generally in compliance. However, nighttime measurements are already above the limits that are defined in WBG General EHS Guidelines: Environmental Noise. The high measurement results might be related with traffic. Therefore, noise impacts should not result in a maximum increase in background noise levels of 3 dB at the nearest receptor location off-site within the scope of Project activities according to the WBG General EHS Guidelines and noise limit values of RAMEN should also be complied with according to national legislation.

Construction Phase

The project activities within the construction phase are associated with a range of activities that generate noise. The noise would be potentially generated by transportation vehicles, machinery and outdoor equipment used for preparation of the terrain, trenching and drilling.

The indicative list of machinery and equipment, which will be used during the land preparation and construction phase and are likely to cause noise, and their number and noise intensity levels are presented in Table V.15.

Table V.15. Machinery and Equipment and their Noise Intensity Levels (L_w)

Machinery and Equipment	Number	Noise Intensity Level* (dBA)
Truck	6	85
Excavator	2	115
Loader	2	115
Mini Loader	3	115
Crane	2	105
Sprinkler	1	85
Grader	1	111

Source: Industrial Noise Control and Environmental Noise, Ozguven H.N.

In order to assess the noise impacts of the activities that will be conducted during phase, the total noise generations should be calculated for the worst-case scenario and should be compared with the national legislative and WBG EHS Guidelines requirements. To satisfy this need, noise generation calculation is performed below with the assumption of worst case scenario. The worst case scenario assumes that all machines and equipment operates simultaneously at maximum noise intensity levels at the same location in the Project Area.

The formulas given below were used for the calculation of noise levels regarding land preparation and construction phase of the Project. Formula (1) is used to calculate total noise level at the source according to noise intensity level of each equipment, Formula (2) is used to calculate the noise level that reaches a definite distance (L_{pt}), and Formula (3) used to include topographical absorption effect into consideration.

L_{wt} = 10 log $\sum_{i=1}^{n} 10L^{wi/10}$ (1)

L_{pt} = L_{wt} + 10log ($Q/4\pi r^2$) (2)

C1 = 5xlog(d_o/d) (3)

L_{wt} : Noise level at the source
L_{pt} : Noise level that reaches a defined distance
Q : Orientation coefficient/atmospheric reduction factor (assumed as 1)
r : Distance from the source
C1 : Topographical noise absorption
d : Distance

As it is mentioned before, in the equations given above, it is accepted that construction equipment and machinery are used at the same physical location, non-stop at maximum noise intensity levels (worst case scenario). Therefore, it is expected that in reality noise level caused by construction activities will be much smaller than the worst case scenario calculation result.

L_{wt} = 10 log $\sum_{i=1}^{n} 10L^{wi/10}$

= 10 log ($6x10^{8.5}+2x10^{11.5}+2x10^{11.5}+3x10^{11.5}+2x10^{10.5}+1x10^{8.5}+1x10^{11.1}$)

L_{wt} = 123.8 dBA

The calculation of noise level that reaches to the nearest residential building (which is 50 m away from the border of the WWTP area) is as follows:

$L_{pt} = L_{wt} + \log (Q/4\pi r^2)$
$L_{pt\ (50m)} = 123.8+10 \log(1/4x3.14x50^2)$
$L_{pt\ (50m)}$ = 78.8 dBA

Topographical absorption for 50 m:

C1 $= 5x\log(d_o/d)$
C1 $=5x\log(1/50)$
C1 =-8.49 dBA

L_{pt} at 40 m by taking into consideration of topographical absorption

$L_{pt\ (50m)\ total} = L_{pt\ (50m)} + C1$
$L_{pt\ (50m)\ total}$= 78.8 dBA -8.49 dBA
$L_{pt\ (50m)\ total}$= 70.3 dBA

The distribution of noise generated with respect to distance from the source is presented in tabular format in Table V.16 and graphically in Figure V.5. Environmental noise level decreases below the regulatory limit value defined for construction activities (70 dBA) at a distance about 138 m from the source.

Table V.16. Distribution of Noise Generated Relative to Distance

Distance (m)	L_{pt} (dBA)	L_{pt} with topographical absorption (dBA)	Distance (m)	L_{pt} (dBA)	L_{pt} with topographical absorption (dBA)
15	89.3	83.4	500	58.8	45.3
50	78.8	70.3	600	57.3	43.4
100	72.8	62.8	700	55.9	41.7
138	70.0	59.3	800	54.8	40.2
150	69.3	58.4	900	53.7	39.0
200	66.8	55.3	1000	52.8	37.8
300	63.3	50.9	1500	49.3	33.4
400	60.8	47.8	2000	46.8	30.3

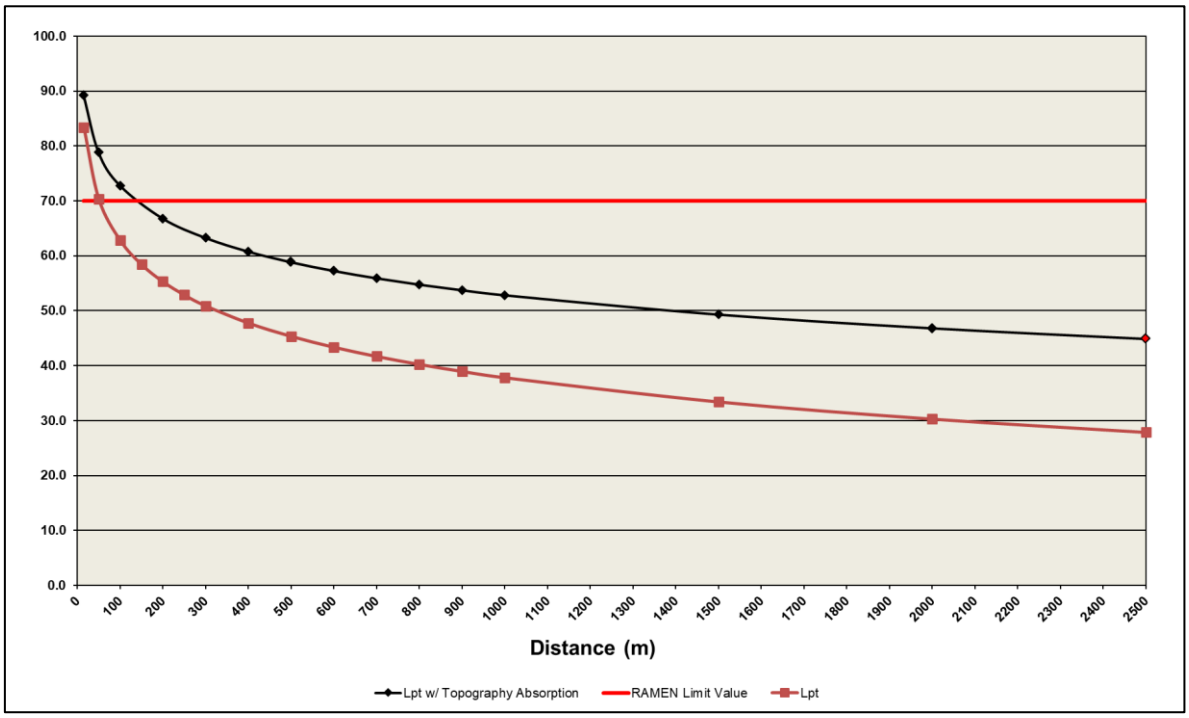


Figure V.5 Distribution of Noise Generated in the Project Area with respect to Distance

As seen from the above, under the worst case conditions, noise level near the closest building to the center of the WWTP Area caused by the construction phase of the Project is above regulatory limit values. In addition, the noise that will be generated at the site will cause a cumulative impact on the background noise level by reaching the nearest building at different levels. In this context, the cumulative noise level expected at the settlement is calculated numerically by logarithmically adding of the noise resulting from the construction activities to the background noise level measured at the settlement. The cumulative noise at the receptor is given in Table V.17.

Table V.17. Estimated Noise Level around the Nearest Residential Building

<table>
<tr><th rowspan="2">Measurement Location</th><th colspan="4">Background Noise Level (dBA)</th><th rowspan="2">Calculated Construction Noise Level at 50 m (dBA)</th><th colspan="2">Cumulative Noise Level (dBA)</th><th rowspan="2">RAMEN Noise Limit (dBA)</th><th rowspan="2">WBG Residential Noise Limit (dBA)</th></tr>
<tr><th colspan="2">RAMEN Periods</th><th colspan="2">WBG Periods</th><th>RAMEN</th><th>WBG</th></tr>
<tr><td rowspan="3">NML-1
(50 m northeast of the border of the WWTP Area)</td><td>Daytime (07-19)</td><td>53.8</td><td>Daytime (07-22)</td><td>53.7</td><td rowspan="3">70.3</td><td>70.3</td><td>70.3</td><td>68</td><td>55</td></tr>
<tr><td>Evening (19-23)</td><td>53.1</td><td rowspan="2">Night (22-07)</td><td rowspan="2">50.6</td><td>70.3</td><td rowspan="2">70.3</td><td>63</td><td rowspan="2">45</td></tr>
<tr><td>Night (23-07)</td><td>50.2</td><td>70.3</td><td>58</td></tr>
</table>

As seen from the Table V.17, while the cumulative noise level of the nearest receptor is above the limit values given in Turkish RAMEN. In addition to RAMEN, the calculated cumulative noise levels exceed the limits defined by WBG General EHS Guidelines. In that case, necessary measures defined below shall be taken to decrease the noise level at the nearest receptor.

On the other hand, it is unlikely in reality that all construction machinery and equipment are used at the same physical location and non-stop at maximum noise intensity levels (worst case

scenario). In addition, as the construction activities will occur outdoors, it is expected that there will be a decrease in noise level depending on the distance due to the atmospheric reduction in real conditions. Similarly, vegetation cover is among the factors that could reduce the impact during the spread of noise. However, since calculations are based on the worst case approach, factors such as effect of location, atmospheric reduction, vegetation cover, etc. have not been taken into consideration. According to all these evaluations, it is expected that in real terms the noise level at the nearest building will be lower than the calculated value during construction activities of the Project.

As the noise to be generated at the Project Area during construction activities could have an impact beyond the borders of the Project Area during certain times of the construction phase and the background noise level at certain parts of the neighborhood could increase within the limit values of RAMEN and WBG EHS Guidelines.

In addition to that only electric poles with a base size of approximately 5m x 5m will be erected for the energy transmission line. For this reason, excavation works will be limited for the electric posts and construction activities will be carried out in a short period of time. Therefore, impacts related to energy transmission line will be low in significance and short-term. As explained above, if any of the electric poles or transmission lines hit or pass-through private parcels or private users on public lands, a RAP, consistent with the Project RPF, will be prepared by MUSKI ahead of the civil works and access to private lands.

In order to prevent noise transmission following mitigation measures will be taken:

- A Noise Management Plan that is in line with the OP/BP 4.01 Environmental Assessment and WBG EHS Guidelines (both general and sector specific) will be prepared by the construction contractor prior to the construction phase.
- Construction noise barriers will be used at north-eastern boundary of the WWTP site and around the TM-6 Pumping Station and by doing so, around 5 to 10 dBA noise reduction would be achieved at the receptor.
- Trees will be planted to the WWTP site, especially its north-eastern boundary, and around the pumping stations.
- It will be ensured that machinery and equipment will not be operated together in the close section of the WWTP Area to nearest building (north-eastern boundary) so that the noise level at the nearest buildings does not exceed the regulatory and WBG General EHS Guidelines limit values as it is calculated so.
- Attention will be given to the selection of equipment with low noise level.
- The maintenance of the construction machinery and equipment will be carried out regularly and regulatory speed limitations will be followed for construction vehicles and this should be included in the construction site transport and traffic management plan to be prepared by the contractor.
- The works will be performed day-time; no night work unless it is absolutely necessary.
- A grievance mechanism will be established to manage noise related grievances as well.

Vibration that will affect humans or the structures in the vicinity is not expected to occur as there will be no blasting activity within the project.

Operation Phase

During the operation phase of the Project, noise will be generated from WWTP equipment such as engines, compressors, pumps and blowers. The level of noise generated from the equipment is expected to be constant as all equipment will be in operation during the plant operation hours (24 hours). Equipment generating noise during the operation of the plant will be

located in isolated closed buildings and some of them will be submerged in wastewater. So, no significant noise is expected to be generated during the operation of the WWTP. However, as the nearest building to the WWTP is 50 m away, natural noise barriers such as trees should be planted to the east and south borders of the WWTP. During the procurement of equipment and machinery, sound levels given in the technical specifications/data sheet will be taken into consideration. Moreover, relevant provisions and limit values of national legislations and World Bank Group's General EHS Guidelines and Sectorial Guidelines will be complied with during the operation phase.

On the other hand, all pumping stations will be built underground and building materials that provide sound insulation will be used. Also, machinery and equipment at the pumping stations will be in enclosed structures. Therefore, no significant impact is expected from the pumping stations regarding noise generation. However, regular maintenance activities will be carried in order to ensure that.

The impact is assessed as direct and negative with long term duration, local and low in significance.

V.4.6 Biological Environment

In this section, potential impacts of the proposed construction activities for the Project on the biological environment are considered. These impacts could be in effect during both the construction and operation phases of the project. Potential impacts will affect terrestrial and aquatic flora-fauna directly or indirectly. Therefore, impacts of project activities can be further divided into the target group of biological elements as terrestrial.

The following subsections define the potential impacts of the project considering the foreseen project activities during construction and operation. The potential impacts are assessed for terrestrial and aquatic flora and fauna. Mitigation measures to be taken in order minimize these impacts are also included in the assessments.

The impact of project activities on ecological components is related to the size of the impact and the vulnerability of the recipient. For terrestrial flora-fauna species, size and significance of the effects according to the matrices presented below have been determined in accordance with the criteria determined according to the ecological sensitivities of the species. It is known that the features of each step in the systematic classification of species are different from each other and accordingly the shapes and dimensions of the influence from the Project will vary within themselves. Sensitivities of terrestrial flora and fauna species determined within the Project Area are explained in detail in the report. Criteria for significance for ecological components are explained in following topic.

Impact Assessment Criteria

The impact assessment criteria for the impacts on ecology and biodiversity were determined, as high, moderate or low, based on the evaluation of magnitude of impact and sensitivity/value of the receptors/resources. OP 4.04 definitions are used in habitat and species assessments. These definitions are explained step-by-step.

According to OP 4.04, Annex A, Natural Habitats, Critical Natural habitats, Significance conversion and Degradation defined as**:**

"*Natural habitats are land and water areas where (i) the ecosystems' bio-logical communities are formed largely by native plant and animal species, and (ii) human activity has not essentially modified the area's primary ecological functions. All natural habitats have important biological, social, economic, and existence value. Important natural habitats may occur in tropical humid, dry, and cloud forests; temperate and boreal forests; Mediterranean-type shrub lands;*

natural arid and semi-arid lands; mangrove swamps, coastal marshes, and other wetlands; estuaries; sea grass beds; coral reefs; freshwater lakes and rivers; alpine and sub alpine environments, including herb fields, grasslands, and paramos; and tropical and temperate grasslands. "

"Critical Natural habitats: (i) existing protected areas and areas officially proposed by governments as protected areas (e.g., reserves that meet the criteria of the World Conservation Union [IUCN] classifications), areas initially recognized as protected by traditional local communities (e.g., sacred groves), and sites that maintain conditions vital for the viability of these protected areas (as determined by the environ-mental assessment process); or (ii) sites identified on supplementary lists prepared by the Bank or an authoritative source determined by the Regional environment sector unit (RESU). "

Significance conversion: Such sites may include areas recognized by traditional local communities (e.g., sacred groves); areas with known high suitability for bio-diversity conservation; and sites that are critical for rare, vulnerable, migratory, or endangered species.

Listings are based on systematic evaluations of such factors as species richness; the degree of endemism, rarity, and vulnerability of component species; representativeness; and integrity of ecosystem processes.

Significant conversion may include, for example, land clearing; replacement of natural vegetation (e.g., by crops or tree plantations); permanent flooding (e.g., by a reservoir); drainage, dredging, filling, or channelization of wetlands; or surface mining. In both terrestrial and aquatic ecosystems, conversion of natural habitats can occur as the result of severe pollution.

Conversion can result directly from the action of a project or through an indirect mechanism (e.g., through induced settlement along a road).

Degradation is modification of a critical or other natural habitat that substantially reduces the habitat's ability to maintain viable populations of its native species."

Based on these criteria, sensitivity criteria for ecological components within the scope of the project have been determined as given in Table V.18.

Table V.18 Severity of Impacts on Resource/Receptor

Ecosystem Component	Severity of Impact		
	High	**Medium**	**Low**
Designed Areas	Internationally Recognised Areas (e.g. UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (the Ramsar Convention))	Nationally designated areas.	N/A
Habitats	Habitats is natural or critical natural habitat under the OP 4.04 definitions and/or Habitats that trigger critical habitat under the following IFC PS6 Criteria: • Criterion 4: Highly threatened and/or unique; and/or ecosystems • Criterion 5: Key	Areas of habitat that represent >1% distribution within Turkey or are threatened at a national level. Habitats that support species of Medium sensitivity.	Natural habitats that do not meet the criteria for either medium or high sensitivity. Habitats that support species of Low sensitivity.

Ecosystem Component	Severity of Impact		
	High	**Medium**	**Low**
	evolutionary processes Habitats that support species of High sensitivity		
Species	Species populations that trigger critical habitat under the following IFC PS6 Criteria: • Criterion 1:Critically Endangered (CR) and/or Endangered (EN) species; • Criterion 2: Endemic and/or restricted-range species; and/or • Criterion 3:Migratory and/or congregator species.	Nationally/regionally important concentrations of a Vulnerable (VU) species, or locally important concentrations of Critically Endangered (CR) and/or Endangered (EN) species. Locally important populations of endemic/range restricted species. Populations of migratory species that represent >1 % of the national (Turkish) population.	Locally important populations of Near Threatened (NT) or Vulnerable (VU) species, or locally important populations of species listed on Annexes to the Bern Convention.

Construction Phase Impacts on Ecology

In the construction phase of a project some direct or indirect impacts could be occurred. The loss of habitat and biodiversity are the most important examples to direct impacts. However, the planned Project will be realized in an already modified area. There is not any critical natural vegetation which harbours wildlife, so there will not any sensitive habitat and vegetation loss during the Project construction activities.

Another direct impact of the construction phase will be the vehicle traffic for construction. The fauna species which have limited mobility will be prone to fauna mortality. The risk of crushing will increase as the animals cross the road.

Indirect impacts of construction include disturbance in terms of noise and visual nuisance and pollution. Some of the secondary impacts have been identified as changes in the composition of soil and water quality, changes in air quality (dust generation, etc.), wastes to be generated due to project activities and noise pollution that might impact species' behaviour especially that of fauna elements.

Internationally and National Recognized Areas

IFC PS6 states that internationally and/or nationally recognized areas of high biodiversity value are likely to be qualified as critical habitat. The closest natural protected area is Gokova Special Protected Area and the closest KBA-IBA is Datca-Bozburun Peninsula KBA and IBA. Although this seems to be ecologically important, it is obvious that the biological structure of the project area and its immediate environment does not provide the characteristics of the protected areas. In addition there are not any AZE sites within and around the Project Area. The impact of construction activities on Internationally and National Recognized Areas is assessed as negligible.

Terrestrial Flora

The most major impacts of this kind of projects on the terrestrial environment are generally habitat and vegetation loss or damage. However Project will be built in semi-natural area with poor vegetation. There are a lot of settlements in the vicinity of project area. Therefore, there are no sensitive habitats or flora species and such an effect will not be the issue.

The effects of the construction activities will include dust. These effects may soon lead to effects on plant species within the vicinity of the project area, but none of these effects will have a

lasting effect on species. When necessary measures are taken and after the construction activity is over, it is expected that the composition of the plant species will return to its original state in time.

According to the OP 4.04 “Natural habitat” definition, land part of the project area does not have any natural habitat and wild life. To conclude, the impacts on the biological environment during construction will be limited. It is considered that all the impacts will be minimized or eliminated completely if necessary precautions are taken. The impact of construction activities on terrestrial flora species is assessed as negligible.

Terrestrial Fauna

There are poor vegetation and settlements in the immediate vicinity of the project area. This makes mammals and bird species not preferring these areas. However, the effects of construction activities on fauna species in the region can be seen. These effects will mostly consist of secondary effects. Due to the construction activities, mortalities may be observed due to disturbed fauna species and traffic congestion. At the same time, dust and noise formation due to construction activities may also have a negative impact on fauna species. All these effects can be eliminated by taking appropriate measures. The impact of construction activities on terrestrial fauna species is assessed as negligible .

Aquatic Environment

Hanay Creek, where the discharge will be made, is a creek that has lost its natural characteristics due to anthropogenic effects. However, due to the construction activities, it is likely that destruction in the physical and chemical properties of the species constituting the aquatic biodiversity might occur. These impacts can be reduced to a low level with the relevant mitigation measures. The impact mitigation measures to be taken on this issue are presented in the following sections.

Operation Phase Impacts on Ecology

The negative impact of the project's operational activities on terrestrial flora and fauna is not expected. When necessary preventive measures are taken, natural life will continue in its former state.

In addition, during the operation, the receiving body will be free from intense pollution due to the treated effluent discharge. This will be an important step towards conserving biodiversity and protecting the water quality of the Hanay Creek. With the Project, the treated water will be discharged to receiving body with nitrogen and phosphorus removal through the advanced biological treatment process. Therefore, it is considered that the effect on the species in the environment will be at the minimum level. This is considered as the most important positive impact of the project on the biological environment.

Mitigation Measures

The mitigation measures to be taken to the possible impacts on the terrestrial biologic environment from the Project activities during the construction and operation phases are given below.

Terrestrial Environment

- Prior to the land preparation phase, definite working areas will be set up where activities (e.g. vegetation clearing, vegetation removal, leveling and construction) and permanent structures (units and roads) will be established,
- Project construction sites and access roads will be separated from other areas with appropriate signboards, signs and fences. Therefore, staff and vehicle access to the area will be limited to the construction site,
- Avoid and/or minimize dust emissions by lightly watering the immediate surroundings of construction sites, and wetting the stored material,
- Construction waste generated due to project activities will first be stored at designated storage areas and then disposed,
- Construction work will be done gradually so that it will have enough time to escape for possible fauna species to be found,
- If there is a nest of birds species, the nest should be marked with a safety strip about 3 meters in diameter and an expert ornithologist should be informed,
- If there is a species that has limited mobility, transfer to safer locations if encountered during construction,
- Measures to reduce noise are provide in Chapter V.4.5 Noise for details,
- Measures to reduce dust and air pollution are provide in Chapter V.4.1 Air Quality for details,
- Project workers will not be allowed to bring any live animals or plants into the construction site to avoid the risk of pest/invasive species establishing in the Project Area,
- Construction and operation sites will be fenced in order to prevent fauna species' entrance into these areas.

Aquatic Environment

The following mitigation measures are recommended in order to minimize the potential impacts of the Project on aquatic species:

- Mixing any chemical substances, that is used in the construction area, in waterbed and/or aquatic ecosystems will be prevented.
- Excavation materials will not be dumped onto riverbed.
- Especially during the breeding season of fish species (April-June), any intervention on riverbed will be prevented.
- The natural structure of the riparian vegetation will be preserved which forms the spawning and sheltering area for many aquatic organisms.
- Monitoring studies in Hanay Creek will be conducted in operational phase with aquatic biologist on appropriate seasons, as appropriate.

In case any construction sources impact on rivers and/or streams within the scope of the Project, following criteria of water quality should be taken into consideration and should be monitored for the continuity of aquatic species.

- Water temperature is one of the most important factors impacting the life in aquatic ecosystems and it changes according to seasons, circulation of air and depth. Increase in temperature decrease the gas solubility (such as oxygen and corbondioxide) in water (Polat, 1997). In addition, increase in temperature can cause change in density and also viscosity of water. Beside, temperature affects species distribution, feeding, spawning and general behavior.
- Dissolved oxygen (DO) is another parameter that is recommended to be continuously monitored during the construction and operation phases of the Project. It is quite

important for organisms that are dependent on aerobic metabolism. Amount of dissolved oxygen decreases with increasing temperature and organic matter concentrations. It increases with increasing air pressure (Yaramaz, 1992). In addition, factors like salinity and flow rate also affect amount of dissolved oxygen (Wetzel, 1983).

- Electrical conductivity (EC) value, which defines the electrical transmission capability of water ions, and it is directly changes with many parameters such as anion, cation, salt density, temperature, akcalinity, dissolved solids in the water. Besides, Bremond et Vuichard (1973) states that electrical conductivity is an indicator of dissolved matter and fluctuates between 150 and 750 µS/cm in inland waters suitable for fish species. When it reaches a concentration of 3,000 µS/cm, it causes disruption of ecological balance in water.
- One of the water quality parameters is pH, which is an indicator of acidic and basic characteristics of water. It is very important in terms of fish life and productivity. Freshwater fish usually prefer pH levels between 6.5 and 8.5.

V.4.7 Landscape and Visual (Aesthetics)

Construction Phase

During construction phase of the project, due to the nature and location of the works, there will be impairment of quality of life. All the sewerage network and pumping station works will be performed in the city centre and this will create nuisance for the people living or working nearby the sites. However, the impacts will be short-term. In order to mitigate, which are assessed to have medium significance, the sewerage network and discharge line construction works will be limited to day-time only. Moreover, the construction plan will be disclosed to the public and this will also ease the traffic planning. Therefore, the impact significance after implementation of mitigation measures would be low.

As for the construction of the WWTP, discharge line and energy transmission line, the impacts of the works will again be short-term. In order to mitigate the impacts of the construction of the WWTP the construction works will be limited to day time similar to the sewerage network. In order to reduce the nuisance for the people residing in the area the construction plan of the WWTP will be shared with public and the public will be informed about the issues regarding the traffic. Since the pumping stations will be built underground, no impact on landscape and visual is expected by them.

Operational Phase

In operational phase, the aesthetics impacts will be mostly related with the WWTP and energy transmission line, which will be a permanent impact. Pumping stations will be buried and built on public lands registered as park. Landscaping of pumping stations will be conducted compatible with the existing landscape of the park areas and trees will be planted, as appropriate. In order to decrease the impacts of WWTP, it is recommended MUSKI to plant trees at the borders of the plant and paint the visible buildings to colours suits to the background.

V.4.8 Resources and Wastes

As a result of the use of resources, construction and operation/maintenance activities as well as domestic requirements of the personnel, different types of wastes will be generated throughout the life of the Project.

All the wastes to be generated during the land preparation and construction and operation phases of the Project are required to be properly managed in line with the requirements of national

waste management legislation and international good practice in order to avoid impacts on soils, nearby water resources and flora and fauna elements. This Chapter identifies the wastes to be generated in this context and assesses the impacts associated with waste generation. Waste management measures to be applied in accordance with relevant Turkish regulations and international standards (i.e. WBG EHS Guidelines) are also described in this Chapter. The potential impacts on the physical, biological and socio-economic environment in the construction and operation phases of the Project, as well as measures to prevent/minimize these effects have been elaborated in detail.

The possible sources that will generate various type of waste are listed below:

- Municipal solid waste
- Packaging waste such as wood, paper, cardboard, and plastic etc.
- Hazardous and special wastes that may be generated within the scope of the land preparation and construction and operation phases of the Project can be listed as contaminated vessels, cloths and overheads, waste batteries and accumulators, waste oils etc.
- Excavation and construction wastes
- Final sludge

Wastes to be generated in the scope of project activities will be managed in accordance with the waste management hierarchy as given in Figure V.6. In this respect, waste generation will be avoided/prevented at the source. In cases where prevention is not possible at the source, respectively; minimization of waste generation, selection of materials that will not cause generation of hazardous waste as much as possible, separate collection of wastes according to their type (hazardous, non-hazardous, recyclable, etc.), reuse of generated wastes at site as much as possible, assessment of alternatives such as recycling and energy recovery for wastes (where reuse is not possible) will be considered. The final step in the hierarchy of waste management involves the final disposal of wastes in accordance with relevant regulations, where reuse, recycling and energy recovery options are not possible.

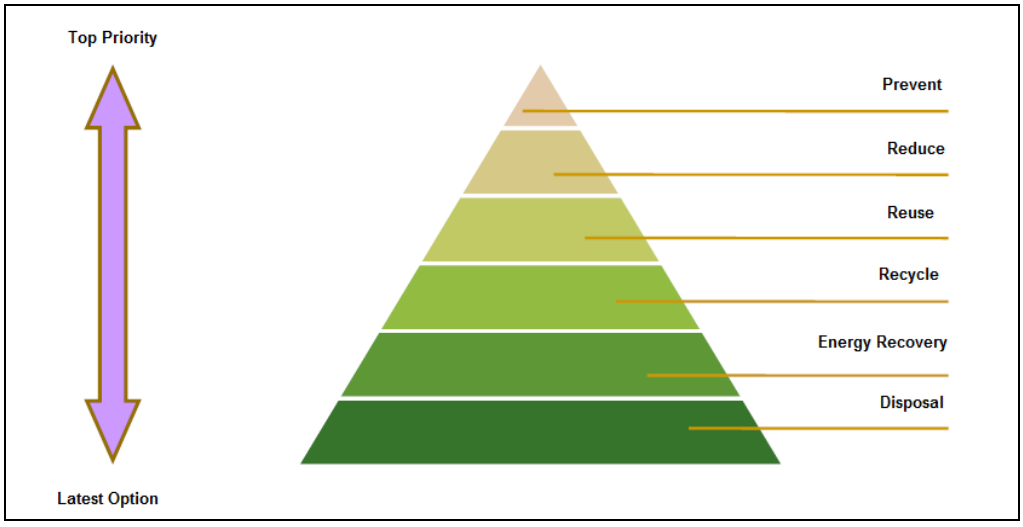


Figure V.6. Waste Management Hierarchy

Construction Phase

During construction phase of the Project, activities such as vegetation clearance, levelling, construction and installation of main operation and auxiliary units, procurement, transportation and assembly of units and equipment will be carried out. Solid waste types expected to be generated within the scope of these activities are; municipal wastes, packaging wastes of system equipment (e.g. wood, cardboard, plastic, etc.), hazardous wastes, special wastes, excavation and construction wastes (e.g. scrap metal, wood, concrete waste, etc.), and waste system equipment (panels, cables, electronic components). Hazardous and special wastes might contain chemical substances (e.g. paint, solvent) or packaging materials and cloths contaminated with oils, waste oils resulting from operation and maintenance of machinery and vehicles, solvents, accumulators, batteries, filters, machine parts. These kinds of wastes will be stored in special compartments in the Temporary Storage Area allocated for this purpose, in containers, separated from the non-hazardous wastes. This area will have an impermeable base/ground and will be protected from the surface flows and rain. Additionally, necessary drainage for the area will be provided. Hazardous wastes will be collected and disposed of by companies licensed by the Ministry of Environment, Urbanization and Climate Change.

Table V.19 lists the types of wastes that can be generated during the construction phase of the Project and their waste codes according to the waste lists given in the annexes of the Waste Management Regulation

Table V.19. List of Possible Waste Types to be Generated during Land Preparation and Construction Phase of the Project

Waste Code	Definition of Waste Code
13	**Oil Wastes and Liquid Fuel Wastes (Excluding Edible Oils, 05 and 12)**
13 02	Waste Engine, Transmission and Lubrication Oils
15	**Waste Packages, Unspecified Absorbents, Wipes, Filter Materials and Protective Clothing**
15 01	Packaging Wastes (Including Packaging Wastes Separately Collected by the Municipality)
15 02	Absorbents, Filter Materials, Cleaning Cloths and Protective Clothing
16	**Wastes Not Specified Otherwise in the List**
16 06	Batteries and Accumulators
17	**Construction and Demolition Wastes (Including Excavations from Contaminated Sites)**
17 01	Concrete, Brick, Tile and Ceramic
17 02	Wood, Glass and Plastic
17 04	Metals (Including Alloys)
17 05	Soil (Including Excavations from Contaminated Sites), Stones and Dredging Sludge
17 09	Other Construction and Demolition Wastes
20	**Municipal Wastes Including Separately Collected Fractions (Domestic and Similar Commercial, Industrial and Institutional Wastes)**
20 01	Separately Collected Fractions (Except 15 01)
20 03	Other Municipal Wastes

Solid waste management studies in Mugla province continue within the framework of Waste Management Regulation. In the province, solid wastes collected by Bodrum, Dalaman, Datça, Fethiye, Kavaklıdere, Köyceğiz, Marmaris, Menteşe, Milas, Ortaca, Seydikemer, Ula and Yatağan Municipalities are stored by the Metropolitan Municipality in a total of six Solid Waste Landfills in Datça, Fethiye, Milas, Marmaris, Menteşe and Ortaca in Muğla Province.

Municipal wastes within the scope of the Waste Management Regulation are referred to domestic wastes or commercial, industrial and institutional wastes similar to domestic wastes in terms of its content or structure, which are defined with waste code of 20, in the Waste List given in

Annex-4 of the Regulation and of whose management responsibility belongs to the municipality. Therefore, these types of wastes will be stored separately from hazardous wastes and recyclable wastes and will be collected regularly by Milas Municipality. Milas Solid Waste Landfill Facility of Muğla Metropolitan Municipality is located in Milas district. The facility serves in Bodrum and Milas districts and the wastes generated in these districts are stored. Milas Solid Waste Landfill Facility is arranged in 2 lots and will be able to meet the 25-year need of the region. The facility has a storage volume of 1 million 235 thousand 186 cubic meters and 250 tons of waste per day can be disposed of at the facility. The infrastructure of the Milas Municipality is sufficient for managing the wastes produced in the Project site.

In addition, a pre-treatment facility will be established in the facility area, where waste with economic value in mixed waste will be separated. In this way, it is aimed to use the facility for a longer period by reducing the amount of stored waste.

In order to determine the amount of municipal wastes to be generated at site, the average daily municipal waste per person is taken as 1.08 kg according to the municipal waste statistics of TURKSTAT in year 2014 (TURKSTAT, 2014). The estimated amount of municipal waste to be generated during the construction phase of the Project, based on the number of people working, is given below. This amount includes also separately collected fractions such as paper, cardboard, glass, metal, plastic, etc. together with biodegradable wastes:

- 100 persons x 1.08kg/person.day=108 kg/day

There will be no cafeteria in the construction site. Thus, there will be no food preparation related waste generation within the context of the Project. The food will be supplied through catering services.

The general composition of the municipal waste in Turkey is as demonstrated in Figure V.7 according to the results of the solid waste composition determination study made within the scope of the Solid Waste Master Plan Project. 34% of municipal waste consists of kitchen wastes. Separately collectable and recyclable fractions such as paper, cardboard, bulk cardboard, plastic, glass and metal constitute 25% of municipal waste.

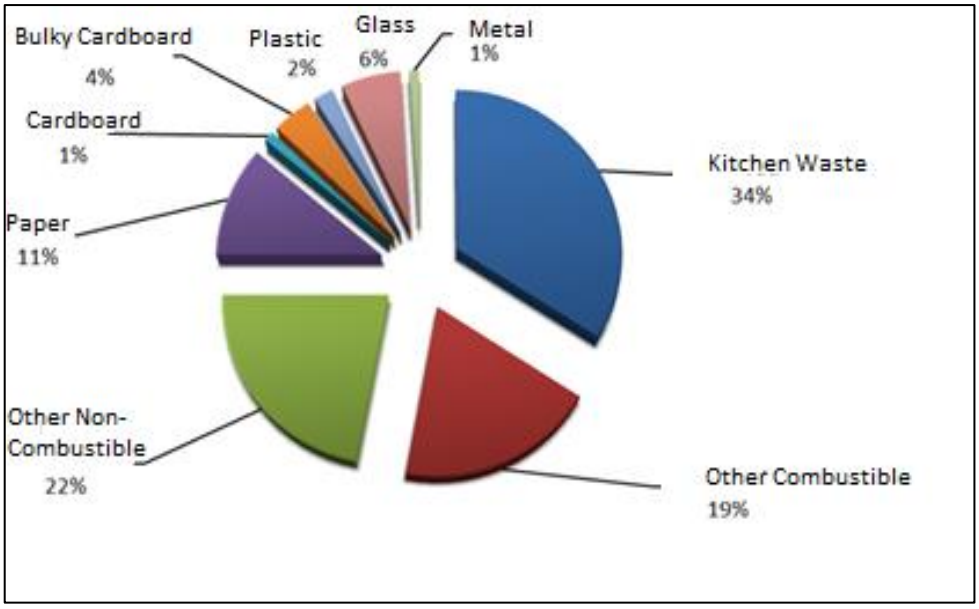


Figure V.7. Composition of Municipal Waste (*former Ministry of Science, Industry and Technology, 2014)*

Considering the information provided in Figure V.7, it is also valid for the municipal wastes to be generated within the scope of the Project. The only difference will be the kitchen waste percentages since there will be no kitchen/cafeteria in the Project. By reflecting this and the assumption of only 5% food waste, the composition of the municipal waste will be as follows:

- Food Waste : 5%
- Other Combustible : 27%
- Other Non-combustible : 31%
- Paper : 16%
- Cardboard : 2%
- Bulky Cardboard : 6%
- Plastic : 3%
- Glass : 8%
- Metal : 2%

Now, it can be said that approximately 5.4 kg of food wastes and 40 kg of separately collectable and recyclable wastes will be generated daily during the construction phase of the Project.

Waste vegetable oil will not be generated at site during the construction activities as meals for the staff will be provided by catering companies. Waste tire generation and storage will not take place due to the fact that the tire changes of the construction machines and other vehicles to be used at this stage will be carried out at the facilities in the region providing service for this purpose. Besides, there will not be any significant amount of medical waste generation at site within the scope of the Project, as there will no infirmary in the project site and Oren Primary Care Clinic will be used for possible medical interventions in case of an incident during the activities. The negligible amount of medical waste generation might happen as a result of the first-aid applications.

Vegetation clearing and levelling works will be carried out at certain locations in order to flatten the area during the construction phase of the Project. For all activities regarding excavation storage, transport and reuse; provisions of Regulation on the Control of Excavation, Construction and Demolition Wastes will be complied.

The construction machinery will require oil changes during the land preparation and construction phase of the Project, at least once in every two-month period of the phase. Oil changes of the construction machinery will be carried out at services licensed for the maintenance of the machinery. Thus, there will be no waste oil generation in the land preparation and construction phase of the Project.

The annual amount of waste battery per person in Turkey is six and this value corresponds to 140 grams (*Ministry of Environment and Forestry, General Directorate of Environmental Management, 2009*). According to this, the annual waste battery production of 100 people to be employed during the construction phase of the Project is calculated as 14 kg.

No significant impact resulting from waste generation is expected due to the nature and scale of the Project, as explained above. Therefore, the impact is assessed as direct and negative with short term duration, local and low significance. However, mitigation measures proposed in the following sections in order to prevent and/or minimize likely impacts will be implemented such as:

- Wastes to be generated within the scope of the Project will be managed in accordance with the waste management hierarchy.
- Wastes will only be temporarily stored on site and final disposal will be carried out outside the facility

- Removal of the excavated material, which will not be used for backfilling, from the site at regular intervals without waiting These materials will be transferred to Municipality's permitted excavation waste storage sites by licensed transportation companies.
- Waste recycling, transport and disposal will be carried out by means of licensed companies and/or related municipalities.
- Incineration or burying of wastes by any means at site and/or dumping of wastes to nearby roads or water resources will absolutely not be in question.
- All kinds of implementations that may threaten personnel or public health will be avoided in all activities involving collection, temporary storage, transport and disposal of wastes throughout the Project.
- Wastes to be temporarily stored on site will be delivered to licensed transport vehicles appropriate to the type of waste for disposal. Information related to the operations in this context will be recorded and the records will be kept in the administrative building.
- Hazardous or non-hazardous inscription, waste code, stored waste amount and storage date will be indicated/labelled on wastes temporary stored by classifying according to their properties. The reaction of wastes with each other will be prevented by the measures (impermeable base, drainage, top cover, different compartments based on type of wastes, etc.) taken in the Temporary Storage Area. The permit for the Temporary Storage Area will be obtained from the Muğla Provincial Directorate of MoEUCC.

Operation Phase

In the operation phase, there might be waste generation resulting from damaged, malfunctioned or end-of-life equipment and material that could be replaced or controlled during maintenance and repair activities to be performed periodically or in case of a breakdown. Also, procurement of new equipment, pieces and others will also result generation of packaging waste. Besides, personal protective equipment, clothes and rags used during maintenance and repair activities might result a limited amount of waste generation. Milas Solid Waste Landfill Facility is arranged in 2 lots and will be able to meet the 25-year need of the region. The facility has a storage volume of 1 million 235 thousand 186 cubic meters and 250 tons of waste per day can be disposed of at the facility. The infrastructures of the Milas Municipality is sufficient for managing the wastes produced in the Project site.

10 workers will be employed in the project's operation phase. Therefore, municipal waste generation will be 13.5 kg/day and using the same approach as in land preparation and construction, the recyclable portion of the municipal waste and the amount of food waste will be 10 kg/day and 1.35 kg/day, respectively. In addition, in addition to recycling municipal waste, recyclable waste such as packaging waste, paper, cardboard, plastic and scrap metals are expected to be taken into account.

In the operation phase of the Project, due to the oil change needs of equipment such as blowers, there will be limited amount of waste oil generation.

Table IV.17 lists the waste types and waste codes that may occur during the operational phase of the Project, according to the waste lists given in the Waste Management Regulation's Annex.

Table V.20 List of Possible Waste Types to be Generated During Operation Phase

Waste Code	Definition of Waste Code
13	**Oil Wastes and Liquid Fuel Wastes (Excluding Edible Oils, 05 and 12)**
13 02	Waste Engine, Transmission and Lubrication Oils
13 03	Waste Insulation and Heat Conduction Oils
15	**Waste Packages, Unspecified Absorbents, Wipes, Filter Materials and Protective Clothing**
15 01	Packaging Wastes (Including Packaging Wastes Separately Collected by the Municipality)
15 02	Absorbents, Filter Materials, Cleaning Cloths and Protective Clothing
16	**Wastes Not Specified Otherwise in the List**
16 02	Electrical and Electronic Equipment Waste
16 06	Batteries and Accumulators
19	Waste from Waste Management Facilities, Offsite Wastewater Treatment Plants and Water Preparation Facilities for Human Consumption and Industrial Use
19 08	Wastewater Treatment Plant Wastes Not Described otherwise
20	**Municipal Wastes Including Separately Collected Fractions (Domestic and Similar Commercial, Industrial and Institutional Wastes)**
20 01	Separately Collected Fractions (Except 15 01)
20 03	Other Municipal Wastes

The most important waste that will be generated as a result of the activities of the WWTP is sludge together with the screenings. The solid content of the sludge that will be generated will be increased through sludge dewatering and drying units. The water that will be extracted from the sludge cake will be sent back to the inlet of the WWTP. After dewatering, the sludge cake will be transferred to a covered and appropriate container through the belt conveyor. After that, the excess sludge will be analysed to determine compliance with the Annex-2 of the Regulation on Landfilling of Wastes and if it is deemed appropriate, the sludge will be collected by the licensed disposal companies determined by MUSKI every year. After that, the sludge will be disposed in accordance with the provisions of Urban Wastewater Treatment Regulation and other relevant legislation. According to the information retrieved from MUSKI, the sludge will be transported by competent and licensed firms to the landfill which has enough capacity. Sludge will be stored in the landfill.

If sludge would be determined as hazardous, the sludge will be sent to Anadolu Tehlikeli Atik Depolama Sanayi ve Ticaret A.Ş. for disposal by competent and licensed firms.

The impact is assessed as direct and negative with long-term duration, on-site and low in significance. Mitigation measures proposed in the following sections in order to prevent and/or minimize likely impacts will be implemented such as:

- Wastes to be generated within the scope of the Project will be managed in accordance with the waste management hierarchy.
- Wastes will only be temporarily stored on site and final disposal will be carried out outside the facility
- Waste recycling, transport and disposal will be carried out by means of licensed companies and/or related municipalities.
- Incineration or burying of wastes by any means at site and/or dumping of wastes to nearby roads or water resources will absolutely not be in question.
- All kinds of implementations that may threaten personnel or public health will be avoided in all activities involving collection, temporary storage, transport and disposal of wastes throughout the Project.
- Wastes to be temporarily stored on site will be delivered to licensed transport vehicles appropriate to the type of waste for disposal. Information related to the operations in this context will be recorded and the records will be kept in the administrative building.

- Hazardous or non-hazardous inscription, waste code, stored waste amount and storage date will be indicated/labelled on wastes temporary stored by classifying according to their properties. The reaction of wastes with each other will be prevented by the measures (impermeable base, drainage, top cover, different compartments based on type of wastes, etc.) taken in the Temporary Storage Area. The permit for the Temporary Storage Area will be obtained from the Muğla Provincial Directroate of MoEUCC.
- A Sludge Management Plan and Waste Management Plan will be prepared and implemented, and more sustainable alternatives for sludge disposal will be researched by MUSKI.

V.4.9 Climate Change

According to IPCC Guideline for National Greenhouse Gas Inventories, waste sector includes the following components:

- Solid waste disposal (4A)
- Biological treatment of solid waste (4B)
- Incineration and open burning of waste (4C)
- Wastewater treatment and discharge (4D)
- Other (4E) (IPCC, 2006)

In scope of this report, components 4A and 4B and partly components 4C, 4D and 4E are investigated. According to 2007 data, waste sector is the second highest source of greenhouse gas emissions in Turkey. However, there is no inventory on greenhouse gas emissions from generation and disposal of WWTP sludge.

In addition, activities which are subject to greenhouse gas monitoring, reporting and verification are presented under heading “Activities subject to monitoring, reporting and verification of greenhouse gas emissions” in Annex-1 of the Regulation on Tracking Greenhouse Gas Emissions (dated May 17, 2014, Official Gazette No: 29003), and any of the components of this Project are not listed in Annex-1 of the Regulation.

Construction Phase

The Project’s contribution to the climate change during the construction phase will be due to the emission of GHG. The majority of greenhouse gas emissions will be due to construction machinery/equipment usage. The major greenhouse gas emission will be CO_2 emissions resulting from the combustion of petroleum-based products, like gasoline, in internal combustion engines. Relatively small amounts of methane and nitrous oxide will also be emitted during fuel combustion. Therefore, these emissions will contribute to the climate change.

The project’s contribution to the climate change through GHG emissions is assessed as a negative and direct impact. The impact’s extent will be regional and duration will be short-term. Although the sensitivity of the receptor is considered as medium, due to the usage of small number of construction machinery/equipment, the significance of the impact is considered as low.

With the realization of proper mitigation measures, GHG emissions can be minimized.

Within this regard, the following measures are suggested to mitigate the potential impacts of the project on climate change through greenhouse gas emissions:

- Construction operations of the project will be in line with good industrial practices.
- Speed restrictions and equipment to optimize fuel efficiency will be adopted by construction vehicles.

- Regular maintenance of construction vehicles and equipment will be applied.
- Energy uses associated with construction vehicles and equipment will be monitored.
- Trainings will be performed on project personnel regarding energy efficiency

Operation Phase

The project's contribution to the climate change during the operation phase will be similar to the one explained for the construction phase and the significance of the impact will be low. In the operation phase, usage of fossil fuel burning equipment/machinery (including procurement of materials) usage will be limited.

GHG emissions generated operation phase of the project can be considered as relatively short term emissions. With the realization of proper mitigation measures, GHG emissions can be minimized.

Within this regard, the following measures are suggested to mitigate the potential impacts of the project on climate change through greenhouse gas emissions:

- Operations of the project will be in line with good industrial practices.
- Trainings will be performed on project personnel regarding energy efficiency.

V.5 Impacts on Socioeconomic Environment

Improvement of the existing roads or establishment of new access roads is not foreseen within the scope of the Project as both components will use existing cadastral roads.

The construction phase of the Project will last for 24 months (18 months for WWTP, 24 months for sewerage network) hence; vehicle load on existing traffic infrastructure will be somewhat significant. However; as part of the Project, existing traffic volume will be affected only during transportation of the excavation materials and receiving the relevant technical equipment. During the construction phase of the Project, the traffic access will be interrupted. The major impact of the works will be the ones related with the traffic.

In the operation phase of the Project, main traffic load contributions will be observed due to the sewage trucks of the close vicinity neighbourhoods, which have no connection to sewerage network, and recycle and disposal companies' trucks. It is anticipated that accumulation of sludge cake and other disposable and/or recyclable wastes will be slow. Thus, the operation phase impacts on transport network are considered as negligible.

Moreover, since the Project is located in a touristic area, the impacts on the tourism should also be assessed. The impact on tourism enterprises and local businesses during the construction will only be temporary and anticipated to be insignificant. Roads might be closed for a short-time, therefore, tourism enterprises and local businesses will not be significantly affected during the construction phase.

Within this regard, a project specific SEP will be prepared by MUSKI as well. The SEP will include a robust stakeholder engagement and active management programme which enables regular updates on construction progress and activities to all Project Affected Parties, including reference to the Project Grievance mechanism to enable the prompt addressal of any issues which may arise. Within this respect, any party who may potentially be significantly affected by temporary economic displacement, will be identified within the SEP and regular engagement/communication will be undertaken with these parties.

Additionally, in case of an any unforeseen delays in the Project that could impact on the project timeline and ultimately impede access to local businesses which may subsequently lead to

related potential livelihood impacts, a RAP (consistent with RPF) will be prepared and implemented. The RAP will also consider an appropriate response to any potential temporary economic displacement as a result of the construction programme.

On the other hand, as stated before in the present case, there is no wastewater treatment plant in the region. The hotels and other tourism complexes located in the region solve their wastewater problems by their own means. For these facilities, the most common solution is to install a package treatment plant followed by a septic tank. However, the summerhouses located in the region are dealing with the problem in a primitive way, such as septic tanks. During the withdrawal of these tanks by sewage trucks, odor and leakage of the wastewater occur quite frequently. While this method is creating environmental nuisance among the residents of the region, it also causes financial and managerial burden. It is envisaged that the realization of the Project will positively contribute to the residents and investors of the region.

Mitigation Measures

Within this regard, the following measures are suggested to mitigate the potential impacts of the Project on socioeconomic environment:

- In case any road, facility, building etc. will be damaged due to the activities originating from the construction activities the necessary maintenance, improvement and compensation works will be done by the Contractor promptly in accordance with the responsible authority.
- Prior to construction activities, the Contractor will install all signs, barriers and control devices needed to ensure the safe use of the road by traffic and pedestrians, as required by the transport and traffic management plan to be prepared.
- The Contractor will take and ensure the implementation of necessary precautions in terms of road traffic safety along the road by cooperating with the relevant authority/administration. In addition, precautions will also be taken in the entry and exit of the treatment plant.
- Local authorities and residents in a working area will be consulted and informed before any detours for construction or diverted public traffic are established
- Trucks, trailers and other vehicles to be used to transport necessary equipment and materials will be provided to comply with the speed limits. MUSKI will ensure that the Contractor will comply with Highways Traffic Law, Road Transport Law and the regulations issued in compliance with these laws, as well as WB policies, standards, and guidelines.
- Signs, crossing guards and other appropriate safety features will be incorporated at grade level rail and road crossings.
- Disruptions to traffic and road transport will be minimized. The contractor shall ensure that the roads remain open to traffic during construction activities.
- Disposal sites and haul routes will be identified and coordinated with local officials.
- Construction vehicles will use temporary roads constructed for that purpose to minimize damage to agricultural land and local access roads. Where local roads are used, they will be maintained and reinstated to their original condition after the completion of work.
- MUSKI will ensure that the contractor will prepare and implement a Transport and Traffic Management Plan during the construction phase.
- MUSKI will ensure that a Waste Management Plan prepared and implemented during both construction and operation phases.
- MUSKI will disclose construction plan to the public. This will help people to know when there will be interruptions in traffic and on which roads the access will be limited.
- At the beginning of construction activities, a MUSKI Representative will conduct face to face meetings with the tourism enterprises and local businesses in order to inform

them about the usage of grievance mechanism for the cases of significant income losses.
- The construction activities around the tourism enterprises will be performed at off-season (October 15-May 15), to the extent possible.

Apart from that, the necessary measures regarding the COVID-19 Pandemic will be taken during both construction and operation phases of the Project such as;

- Guidance, directives and recommendations of Republic of Turkey Ministry of Health, Republic of Turkey Ministry of Family, Labor and Social Services, and World Health Organization shall be followed and all relevant necessary measures shall be taken in case of an outbreak of any other pandemic/communicable disease including COVID-19
- Preparation and implementation of site-specific contingency / emergency / crisis management / action plan regarding COVID-19 and any other pandemic/communicable disease risk. Contingency plans should consider arrangements for the storage and disposal arrangements for medical waste, which may increase in volume and which can remain infectious for several days (depending upon the material). To ensure that individuals roles and responsibilities are clear, contingency plans should be communicated widely.
- Provide regular trainings to workers on COVID-19 symptoms, how to be protected and what to do when symptoms appear.

V.6 Labour and Working Conditions

This section presents application of WB OP/BP 4.01 and WBG General EHS Guidelines for the Project.

Although the number of personnel to be recruited is not yet decided it is estimated 100 workers will be employed during construction and 10 will be employed for operation. During recruitment the priority will be given by MUSKI and contractors to local people during the recruitment process.

On the overall, labour and working conditions for the construction and operation phase include the issues listed below:

- Working Conditions and Management of Worker Relationship
- Protecting the Work Force
- Occupational Health and Safety
- Workers Engaged by Third Parties and the Supply Chain

Commitments on labour and working conditions are concluded with a range of mitigation measures for managing labour-related risks and impacts.

The legal frame for the chapter can be drawn with two major national laws relevant to the Project:

- The Labour Law (Act. No. 4857) which regulates the relations between an employer and an employee;
- Occupational Health and Safety Law (Law No: 6331) which regulates management of all occupational health and safety issues

Turkish Labour Law and related regulations covers the basic principles of international labor standards and the OP/BP 4.01 and WBG General EHS Guidelines in the issues of equal

treatment of employees, restrictions on the working age and employment of children, avoidance of forced labour and ensuring occupational health and safety at the workplaces. Monitoring of the implementation is essential to ensure full compliance of the activities with the relevant legislation.

Turkey has ratified a broad range of International Labor Organization (ILO) Conventions including the following:

- Forced Labor Convention
- Minimum Age (Industry) Convention (Revised)
- Labor Clauses (Public Contracts) Convention
- Protection of Wages Convention
- Right to Organize and Collective Bargaining Convention
- Equal Remuneration Convention
- Social Security (Minimum Standards) Convention
- Abolition of Forced Labor Convention
- Discrimination (Employment and Occupation) Convention
- Equality of Treatment (Social Security Convention)
- Workers' Representatives Convention
- Minimum Age Convention
- Human Resources Development Convention
- Tripartite Consultation (International Labor Standards) Convention
- Occupational Safety and Health Convention
- Termination of Employment Convention
- Occupational Health Services Convention
- Safety and Health in Construction Convention
- Safety and Health in Mines Convention
- Worst Forms of Child Labor Convention
- Protection Framework for Occupational Safety and Health Convention

The requirements defined in the Turkish Occupational Health and Safety Law regarding the HR Policy will be fulfilled in accordance with the ILO conventions.

V.6.1 Working Conditions and Management of Worker Relationship

MUSKI will ensure that the contractors and sub-contractors provide workers with documented information that is clear and understandable, regarding their rights under national labor law; including collective agreements, their rights related to hours of work, wages, overtime, compensation, and benefits as of start-up of working relationship and when any material changes occur.

MUSKI will ensure that the contractors and sub-contractors will not discourage workers from electing worker representatives, forming or joining workers' organizations of their choosing, or from bargaining collectively, and will not discriminate or retaliate against workers who participate, or seek to participate, in such organizations and collective bargaining.

MUSKI will pay particular concern on principles of non-discrimination and equal opportunity. In this respect, MUSKI will not make and ensure that the contractors will not make employment decisions (i.e. recruitment and hiring, compensation, wages and benefits, working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices) on the basis of personal characteristics unrelated to job requirements. Wages, work hours and other benefits shall be per the Turkish Labor Law.

MUSKI will provide a grievance mechanism for workers to raise workplace concerns. MUSKI will inform the workers about the grievance mechanism at the time of recruitment and make it easily accessible to them.

V.6.2 Protecting the Work Force

MUSKI will ensure measures to prevent child labour and forced labour. In this respect, children under 18 years of age will not be employed during construction and operation stages. Contractors will develop an age verification system to ensure no one under 18 years old are involved in hazardous works.

Stipulations of Ministry Circular on Covid-19 Measures to be taken at Construction Sites will be followed during all phases of the Project as long as the COVID-19 pandemic outbreak prevails.

V.6.3 Occupational Health and Safety

Construction stage of the Project includes assembling works for equipment and the use of duty vehicles in this scope. As described in the WBG EHS Guidelines for Water and Sanitation; work at sanitation facilities is often physically demanding and may involve hazards such as open water, trenches, slippery walkways, working at heights, energized circuits, and heavy equipment. The nature of the work may also involve entry into confined spaces, including manholes, sewers pipelines, storage tanks, wet wells, digesters, and pump stations.

Before the commencement of the construction works, contractor will prepare a site-specific Emergency Preparedness and Response Plan and Occupational Health and Safety Management Plan for the Project based on construction site OHS risk assessment in line with the Turkish Legislation and international standards such as ILO standards inclusive of:

- Regulation on Occupational Health and Safety (Official Journal of 09.12.2003; No: 25311)
- Regulation on Occupational Health and Safety in Construction Works (Official Journal dated 05.10.2013; No: 28786)
- Regulation on the Use of Personal Protective Equipment in Workplaces (Official Journal dated 25.04.2013; No: 28628 – amended: 24.04.2017; No: 30047)
- Regulation on the Procedures and Principles of Occupational Health and Safety Trainings of Employees (Official Journal dated15.05.2013; No: 28648)
- ILO Conventions including Occupational Safety and Health Convention (No. 155), Occupational Health Services Convention (No. 161), and Safety and Health in Construction Convention (No. 167)
- WBG EHS General and Sector-specific Guidelines

In addition to preparing its own OHS management plan, the contractor will also ask the subcontractor to prepare an OHS management plan in line with the Project's OHS requirements. These requirements will be added to the bid documents to be prepared for construction tenders.

OHS Plan for the construction phase will include the measures listed below in order to prevent accidents and risks but not limited to:

- All Project staff shall comply with the environmental, health and safety policies and guidelines.
- An OHS Management Plan will be prepared before the commencement of works that will also cover measures to address COVID-19 and/or any other pandemic/communicable disease risk.

- In order to minimize the risks and hazards that may arise (e.g. natural disasters, accidents, equipment malfunctions etc.) on human health and safety, safe working environments in the working sites will be established and physical hazards and risks will be prevented.
- The relevant plans and procedures of the relevant Turkish legislation and the MUSKI will be complied within the OHS measures and practices.
- Employees will be informed about the hazards that may cause from their work and thus a safer work environment will be created.
- Training will be given to employees according to the Regulation on the Procedures and Principles of Occupational Health and Safety Trainings. In this context, a training program will be prepared, training records will be kept and evaluation activities will be carried out after the trainings.
- Personal protective equipment will be provided to all employees and necessary training will be given for their use.
- Work areas will be equipped with warning signs (e.g. "Hazard", "Entry Prohibited", etc.) in accordance with the quality and potential risks of the work to be performed in that area.
- All necessary precautions will be taken in the Project Area to prevent possible fires from construction activities. Uncontrolled fires in and out of the field will be prevented.
- Smoking in areas where there is a risk of fire will be prohibited. All employees must have knowledge of what to do in the event of a fire.
- Project staff will include first aid trained personnel. In case of emergency where an intervention is required, personnel will be sent to the nearest health centre by appropriate means.
- The Contractor will apply the sufficiency of the technical requirement of the machinery, equipment, and tools to be used in the activities.
- Moving parts of machinery and equipment will be equipped with appropriate protective systems (e.g. metal shields etc.), minimizing the risk of injury or damage to the person using the machine or equipment.
- Personal factors that may create and control risks during activities (e.g. long hair, jewellery and accessory use, clothing etc.) will be removed from the site by the regulations brought by the field management. Project staff will be informed about the relevant regulations within the scope of the training program.
- Drivers and operators will be trained to comply with traffic rules and to control the vehicles and equipment they use against risks and hazards originating from vehicle traffic. Required traffic signs will be placed in the Project Site and its surroundings. Machine operators and other employees will be informed and alerted about the relevant signs. The wastes to be generated within the scope of the construction phase of the Project will be managed under the Waste Management Regulation and the negative impacts on public health will be minimized.
- Areas where excavation work is to be carried out will not be accessible other than the authorized personnel. The loading and unloading activities shall be carried out together with the persons to oversee the personnel to carry out the activity.
- Persons and/or organizations with the necessary permits will be assigned to ensure the security of the Project Area, especially the WWTP site. These persons and/or organizations shall regularly monitor the facility and its surroundings. The special security applications and officials' authorities within the scope of the Project shall comply with the provisions of Regulation on the Implementation of the Law on Private Security Services and the Law on Private Security Services.
- In addition to safety personnel, monitoring of the WWTP site for security purposes will be provided by a closed circuit camera system that will be installed at appropriate distances on the site boundary (e.g. 30-40 m) to provide daytime and night-time monitoring of the whole area.
- Since the works will be performed at areas close to the public, the public access to these areas shall be restricted by any means. If a trench needed to be left open for

night, the sufficient illumination of the area shall be ensured by MUSKI and necessary signs shall be placed, and the area shall be enclosed with barriers.

- An adequate OHS organizational structure will be defined, as defined by the local legislation and necessary number of OHS officers should be assigned to be at the site during working hours.
- A risk assessment will be done before commencing the works and personnel will be trained regarding any potential risks.
- OHS Personnel will daily inspect the site and if any additional risk is observed relevant plans and trainings will be renewed.
- Emergency Preparedness and Response (EPR) Plan to cover the issues about the contagious diseases as well as COVID-19 pandemic will be prepared and implemented.
- MUSKI will ensure that the contractors will have code of conduct (CoC) and this CoC will be signed during the start of the work. Employees should be trained/informed on the rules that apply on site grounds in particular to interaction with local community.
- Where a worker may be exposed to any chemical, physical or biological hazard to such an extent that her/his health may be adversely affected, appropriate preventive measures shall be taken, including:
    - Replacing dangerous goods with harmless or less dangerous substances where possible
    - Applying technical measures to the plant, machinery, equipment or process
    - Where it is not possible to comply with above measures, applying other effective measures, including the use of personal protective equipment and protective clothing
- Where workers are required to enter any area in which a toxic or harmful substance may be present, or in which there may be an oxygen deficiency, or a flammable atmosphere, adequate measures shall be taken to guard against danger.
- The wastes will not be destroyed or disposed of in a way that is harmful to health in the construction site.

Mitigation measures that will be taken during the operation phase are listed below:

- The whole WWTP site will be fenced, the access of local people and wildlife will be controlled and encroachment will be prevented. The entry of personnel and third parties into the facility will be carried out in a controlled manner.
- Personal Protective Equipment will be provided for the workers according to the nature of work to be performed. The necessary trainings will be carried out for their use.
- Smoking will be prohibited where the risks of fire is high. All the workers will be informed about the action plan in a case of fire
- All equipment will be operated in proper working order.
- Procedures approved by the MUSKI in the maintenance and repair activities and the requirements of the technical specifications of the supplier companies will be complied with.
- The necessary health and safety signs and traffic signs will be placed around the project site. Employees will be informed and alerted about the subject matter markings.
- Trainings will be given to employees and operational and maintenance personnel within the scope of the Regulation on Procedures and Principles of Occupational Health and Safety Trainings and measurement and evaluation activities will be carried out after the trainings.
- Entrance of operation and maintenance personnel and third parties will be carried out in a controlled manner.
- Equipment that meets international standards in terms of electrical performance and safety will be used.

- After the plant is constructed, necessary electrical test will be carried out to check that the electrical connections and other related equipment are made properly before the plant is taken into operation.
- An Emergency Preparedness and Response Plan including the issues about the contagious diseases as well as COVID-19 pandemic will be prepared before the plant is taken into operation.
- Automatic cleaning screens should be used instead of manually cleaning screens to prevent entrance of cleaning workers into the channels.
- Appropriate ventilation systems should be installed at where methane accumulation is expected.
- Railings will be installed around all tanks and pits.
- MUSKI will prepare a Confined Spaces Entry Procedure that is consistent with WBG EHS Guidelines and applicable national requirements.
- MUSKI will conduct trainings for operators who work with disinfectants regarding safe handling practices and emergency response procedures.
- MUSKI will distribute sufficient number of personal gas detection equipment to its employees.
- MUSKI will advise individuals with asthma, diabetes, or suppressed immune systems not to work at the treatment plant and its auxiliary facilities due to greater risk of infection.
- MUSKI will ensure the compliance of all the activities with national standards and WBG EHS Guidelines.
- The OHS Management Plan will be prepared before the commencement of the WWTP that will also cover measures to address COVID-19 and/or any other pandemic/communicable disease risk.
- An adequate OHS organizational structure will be defined, as defined by the local legislation and necessary number of OHS officers should be assigned to be at the site during working hours.
- A risk assessment will be done before commencing of the WWTP and personnel will be trained regarding the risks.
- OHS Personnel will daily inspect the site and if any additional risk is observed relevant plans and trainings will be renewed.

V.6.4 Workers Engaged by Third Parties and the Supply Chain

MUSKI will ensure that subcontractors are reputable and legitimate enterprises and have an appropriate ESMS that will allow them to operate in a manner consistent with the labor conditions provided by MUSKI.

MUSKI will monitor the performance of subcontractors such that human rights policy and labor rights of all workers are exercised properly.

MUSKI will ensure that workers of subcontractors have access to the overall grievance mechanism to be established for the Project.

MUSKI will monitor its primary supply chain for safety issues related to supply chain workers, and where necessary MUSKI will introduce procedures and mitigation measures to ensure that suppliers are taking steps to prevent or to correct life-threatening situations.

In order to realize those, MUSKI will prepare a Contractor Management Plan and ensure its implementation.

MUSKI shall ensure that the impacts and measures defined by this ESIA and the relevant ESMP are followed by the Contractor.

In the event of any significant incident (e.g. environmental, social, labor or lost-time incidents) the Contractor shall immediately notify MUSKI and MUSKI shall inform ILBANK and WB within three business days. Then, within 30 days, a report on the root causes of the incident and the corrective actions to be taken will be presented to ILBANK and WB.

V.6.5 Labour Influx

In case when personnel or material or services required for the works to be carried out in a construction project cannot be sourced from local sources; technical personnel with adequate capacity or materials that meet international standards must be brought from outside the project area. In such cases, suppliers, potential suppliers and potential jobseekers might move to the close vicinity of the project area to provide goods and services to the Project and create an influx in the region. In order to call this situation as workforce influx, which can be observed in any project, people who will work on the project or provide goods and services to the project should be settled quickly in the region. In such a case, people who settle in the area due the project may have a negative impact on the local population (especially if the area is rural, remote and small).

As mentioned earlier, 100 employees in the construction phase and 10 employees in the operation phase is expected to be employed. In order to avoid the negative impacts of the workforce influx, MUSKI will give priority to the local people in recruitment and this will be added to the terms of the contracts of the Contractor and possible subcontractors in order to ensure this. In contract process, MUSKI will request the contractor to plan the workforce and request from the contractor to prepare a Workforce Management Plan if the requirement for a workforce other than the one specified in this ESIA is seen. MUSKI will evaluate and submit this plan to ILBANK for approval. In addition, there will be no accommodation within the scope of the Project. The Project is not expected to cause workforce influx, if an unusual situation is not triggered. Therefore, it is thought that the impacts of workforce influx will be insignificant.

MUSKI and the Contractor shall ensure that code of conduct and public communication trainings are given to all employees as an orientation training to prevent a possible future dispute.

V.6.6 Local Procurement

If it is possible and feasible to do so, local procurement options will be selected at all phases of the Project and this will have a positive impact on the local economy of the region.

V.7 Community Health and Safety

Construction Phase Impacts

The community health and safety impacts of the Project are mostly limited to the construction phase. In the construction phase, emissions of gaseous pollutants and fugitive dust from equipment and machinery used, noise generation, poor handling of wastes to be generated, requirement to shut down the entire plant and/or specific units for construction works and risks associated with community encroachment might create negative impacts on community health and safety. Impacts associated with emissions, noise and waste generation will be managed with the proper implementation of mitigation measures presented previously in the related sections of this report.

Construction works will involve increased traffic of heavy vehicles and equipment at local level and traffic interruptions. Accidents and incidents leading to fatalities could result from traffic operation while transporting equipment and materials to the construction sites as well as from truck and vehicle movements. The significance of the impact is considered as medium and through the implementation of mitigation measures; it could be reduced to low. Impacts associated with traffic

will be managed with the proper implementation of mitigation measures presented previously in the related sections of this report.

Another risk would be community encroachment to the active worksites. The risks associated with this issue would be easily mitigated to negligible significance through implementation of mitigation measures presented at the end of this section.

Operation Phase Impacts

Similar to the impacts during the construction phase, improper handling of wastes would create negative impacts on community health and safety. Differently from the construction phase, sludge will be generated as a result of the operation of the WWTP. In case that the final sludge will not be handled properly and/or disposed in an uncontrolled manner, magnitude of its impacts on community health and safety would be somewhat significant.

There will be an increase in the traffic load between the WWTP site and sludge disposal sites in the operation phase. This increase will be lower than the one anticipated to happen during construction phase since material transport during the operation phase will be limited with disposal of wastes and sludge generated. The significance of the impact would be low. In the operation phase of the WWTP, there would be times that the entire plant or specific units need shutdown due to excessive precipitation, planned or unplanned maintenance requirements, or any other foreseen or unforeseen challenges. A shutdown has major consequences for wastewater treatment, especially biological wastewater treatment. Stopping a physical-chemical treatment generally does not present many problems; however, turning down of aerobic and anaerobic treatment units has major impact on the speed of the start-up process, which directly affects effluent quality. The significance of the shutdown or failure related impacts on community health and safety would be high without proper implementation of mitigation measures.

Similar to the construction phase, community encroachment to the active worksites is also a risk in operation phase. The risks associated with this issue would be easily mitigated to negligible significance through implementation of mitigation measures presented at the end of this section

Additionally, electrocution through energy transmission line is a risk in operation phase. The risks associated with this issue would be easily mitigated to low significance through implementation of mitigation measures presented at the end of this section

Mitigation Measures

In terms of community health and safety aspects, the generated wastes and sludge will be disposed in accordance with the measures presented in Chapter V.4.8. In addition to that, MUSKI will ensure that the Sludge Management Plan to be prepared before the commencement of the operation phase covers community health and safety point of view. For the electrocution through energy transmission line regular vegetation clearance and maintenance requirements of the energy transmission line route will be carried out while communicating with the related authority.

For the WWTP and/or unit shutdowns or failures during the operation phase, following measures will be applied:

- All unit shutdown requirements will be scheduled at least one week beforehand and MUSKI will make necessary adjustments.
- In major shutdowns of the plant or biological treatment units that require longer times, nutrition levels will be maintained at the biological treatment units, aeration will be stopped after one day for aerobic processes.

- During the longer shutdowns or failures, MUSKI will inform Provincial Directorate of Environment, Urbanization and Climate Change regarding the situation.
- During excessive loads that the WWTP cannot handle, the bypass line of the plant will be used to bypass the load.

For the community encroachment that might happen during both construction and operation phases of the Project, similar mitigation measures will be implemented. These measures are as follows:

- Community Health, Safety, and Security Management Plan that is in line with OP 4.01 and WBG EHS Guidelines (both general and sector specific) will be developed by MUSKI or security services provider before the construction phase. MUSKI and contractor will ensure that the plan is actively implemented.
- Persons and/or organizations with the necessary permits will be assigned to ensure the security of the Project Area (e.g. private security companies/officials). These persons and/or organizations shall regularly monitor the facility and its surroundings. The special security applications and officials' authorities within the scope of the project shall comply with the provisions of the Regulation on the Implementation of the Law on Private Security Services and the Law on Private Security Services.
- The entrance to the existing WWTP will continue to be restricted through strengthening security procedures such as repair of existing fences, installation of security cameras at key access points and use of a site visitor register.
- Sufficient lighting of the existing WWTP and active construction worksites will be ensured.

V.8 Archaeological and Cultural Heritage

Construction phase

During the construction phase (earth and construction works) of these type of projects it is possible to discover unknown archaeological locations or findings. In this context, a potential damage to archaeological or cultural heritage elements in the project area is possible. Uninformed employees cannot identify and warn about possible chances for findings. Thus, it is possible to lose or destroy important undiscovered archaeological locations, together with potentially valuable evidence. With a properly managed chance finds procedure this impact can be mitigated.

In a case of damage to and loss of assets during any phase of the Project, MUSKI will compensate for the losses by swiftly identifying the damage on site or through its Grievance Mechanism (building control team, written grievances, grievances collected from web site etc.). MUSKI will make efforts to avoid any temporary and/or permanent damage or loss that may occur during the construction. In addition, contracts made with contractor and sub-contractors will include clauses to cover the damages given during the construction period stemming from civil works.

As required by Article 4 of Law on the Conservation of Cultural and Natural Properties (2863 Numbered Law), chance finds procedure will be implemented during land preparation and construction works. In this context, related Civilian Authority or Museum Directorate will be informed latest in three days in case of finding any movable or immovable cultural asset by chance during construction works. Construction works will be stopped immediately. In case of result of any damage on protected areas or cultural assets due to the Project during construction phase, the damage will be compensated by the Contractor. In case of a chance find, the communication with the relevant stakeholders will be performed.

The impact is assessed as direct and negative with short term duration, on-site and low significance.

Operation phase

No significant impacts on archaeological and cultural heritage are expected in the operation phase as there is no activity other than the maintenance/repair works, which will be limited.

VI. PROJECT ALTERNATIVES

The planned Project will be constructed in the vicinity of Oren neighbourhood of Milas District in Mugla Province. The Project Area covers a land of 8278.11 m^2. Within the scope of the project, it is planned to treat wastewater collected from Oren neighbourhood and its close vicinity. In the following sections, factors considered in the site and technology selection will be described and evaluation of alternatives will be presented.

In the light of the information given by MUSKI and the Ilbank the locations for the pumping stations and WWTP is chosen as these lands were already categorized as public lands and owned by Milas Municipality. The required permits regarding the transfer of these areas from Milas Municipality to MUSKI were obtained.

VI.1 "No-Project" Alternative

No project alternative concerns the scenario that the Project does not become operational and negative or positive possible consequences of the scenario.

As explained in the previous sections, the domestic wastewater generated in the service area of the Project is currently being discharged to receiving environment without any treatment.

In case of the project is not actualized, the situation will continue and the wastewater of the region will be discharged uncontrollably without treatment. Therefore, its negative impacts will continue and the discharge will create pollution stress on the environment. Furthermore, in order to ensure that the settlements located in the service area of the Project will not be able to benefit from wastewater services in a healthy and sustainable manner since necessary treatment is not applied. Therefore, adverse impacts could continue to occur on public health, especially in terms of bathing water.

Since the WWTP site is already belongs to MUSKI, there will not be any new area use. Therefore, the Project will not cause a significant change on land use.

Construction phase short term impacts such as noise and dust generation will not occur if the Project is not actualized. However, these impacts will be kept in regulation limits and will not have significant impacts on local residents anyway.

Due to the abovementioned reasons, no project alternative is not considered as a reasonable alternative. The benefits of the positive impacts of the project are of great importance to the surrounding population.

VI.2 Site Alternatives for the WWTP

Site selection criteria for the planned WWTP are listed below;

- Need of collection and treatment of wastewater at Oren and its close vicinity,
- The absence of residences in the immediate vicinity of the treatment plant,
- The absence of any rare and endangered flora and fauna species in the WWTP Area,
- The ownership of the area belongs to the General Directorate of Water and Sewerage Administration of Mugla,
- The facility should be easily accessible at all times during the year, energy, communication and drinking water connections should be made easily,
- The site should be close to a large body of water and/or a green field where the treated wastewater can be discharged or can be used for irrigation purposes,
- The wastewater treatment facility should have a low elevation area where the collected wastewater can be brought with gravity flow;

- A moderately-slope site, if possible, should be preferred, especially as it would allow a suitable hydraulic profile.

The area that meets the above criteria at the most appropriate level has been selected as the Project Area which is also subject to this ESIA Report. The planned Milas – Oren Wastewater Treatment Plant is at a point where most of the wastewater coming from the pump stations is reached with gravity flow. Wastewater collected from TM 5 - 8, will be provided to the facility by evaluating the most feasible condition of operating conditions. Also, as the site that the WWTP will be constructed belongs to MUSKI, during the site selection this situation was considered.

VI.3 Pumping Station Alternatives

There are many criteria that should be taken into account in the construction of the pumping station and should be examined by different engineering disciplines such as infrastructure, hydraulic, electricity, machinery, ground engineering. The optimum solutions regarding all these considerations are also made taking into account the possible environmental and social impacts (noise, odor, etc.).

The pumping stations that are planned under the scope of the Project will be constructed in a manner that these stations will be completely closed to the outside and have no effect on human health in terms of emissions of toxic gases or pest formation, etc. In addition, each pumping station will also be equipped with an active carbon filtered odor removal unit and will be built using advanced technology.

During the site selection process for these pumping stations, the sites were selected paying particular attention to that they are not categorized as agricultural lands but public lands which are registered as parks. As it stated in the previous sections of the report, the sites that chosen for constructing the pumping stations were originally belonged to Milas Municipality and the required permits are obtained regarding the transfer of these sites to MUSKI. Also, the site selection was made accordingly to the assessment and technical studies such as hydraulic calculations and the selection of the optimum alternative was ensured. In addition, the areas where the pumping stations are located are planned to be properly afforested and put into use as a park if possible.

Four underground pumping stations will be constructed within the scope of Project. It is planned that two of the pumping stations will be constructed as package pumping stations whereas the others will be buried reinforced concrete pumping stations. Advantages and disadvantages of the buried pumping stations compared to above ground pumping stations are given below:

Advantages of the buried pumping stations:

- Less noise and odor emission impacts
- Better landscape and aesthetics
- Protection from severe weather damages

Disadvantages of the buried pumping stations:

- Higher cost
- Difficult for maintenance activities

Package pumping stations are also underground structures that can reach a depth of up to 5 m used for pumping wastewater at low flow rates. Its technical features are the same as semi buried-aboveground reinforced concrete pumping stations and it does not differ except that it is

completely buried. An exemplary design of the envisaged system of pumping stations is given in Figure VI.1.

Figure VI.1 Exemplary Image of a Pumping Station

VI.4 Technology Alternatives for the WWTP

VI.4.1 Process Alternatives

In this section, the alternatives of the advanced biological treatment of the Milas – Oren Wastewater Treatment Plant are examined. When BOD/COD concentrations and the discharge criteria are taken into consideration within the scope of feasibility study, the necessity of the advanced treatment for the removal of nitrogen and phosphorus is understood.

In order to identify the process alternatives, working principle of the system is determined. Sequencing batch or continuous treatment configurations can be applied. Sequencing batch configuration is not recommended for touristic regions due to possible difficulties in operation and high design flowrates. The big difference between summer and winter flowrates makes hard to design and apply different operation alternatives (i.e. while operating whole lines during summer and operating less lines during winter). Therefore, continuous configuration is recommended for the plant.

The alternatives of the continuous advanced biological treatment for the plant are:

- Membrane Bioreactor (MBR)
- Conventional Activated Sludge Systems
- Integrated Fixed Film Activated Sludge (IFAS).

Membrane Bioreactor (MBR)

Membrane Bioreactor System (MBR) is actually an improved version of conventional activated sludge process. It is a suspended growth system separating the treated effluent and biomass with low pressure membrane filtration. MBR consist of a bioreactor providing biological treatment and filtration unit (with pores of 0.02-1 microns) providing physical separation (ultrafiltration and microfiltration). An effluent with hardly any solids and microorganisms can be obtained. MBR can achieve % 80-%98 COD removal. Continuous flow on the filter surface prevent filter from clogging by filtered solids. Still pores of the membrane are clogged in time and the permeability decreases. Thus backwash of the filter with chemicals (citric acid or sodium hypcloride) or treated water within certain periods is needed.

When compared to conventional activated sludge, MBR systems requires %50 less area. Also final sedimentation is not required in MBR systems, therefore filamentous growth and bulking sludge problems occurring in sedimentation tanks are not possible. Separation of biomass is done by filters. Moreover, MBR systems can be operated with high MLSS concentrations which cause decrease in bioreactor volume and enable high organic loads. Also, toxic organics create less operational problems and nitrification is not affected negatively as much in conventional activated sludge. However, the configuration is more complex and control is harder than conventional systems because treatment process takes place in single tank. Necessary engineering services for operation and monitoring of development cost more than conventional systems. Moreover, initial investment cost is higher than conventional systems because membranes are expensive and delicate automation and control systems are necessary. For MBR to be able to operate properly in long run, pre-treatment may be required; which requires additional costs. Furthermore, membranes must be renewed within certain periods. Energy used during backwash and chemicals used in backwash increases cost. Consequently, initial investment cost and operational cost are higher than conventional systems, thus MBR systems are not utilized frequently.

Other drawbacks of the MBR are the clogging of the membrane frequently during treatment of industrial and domestic wastewater, absence of high flowrate system application examples, and the need of field test during project design, which consumes time and cause additional cost. Figure VI.2 presents overall flow diagram of MBR process.

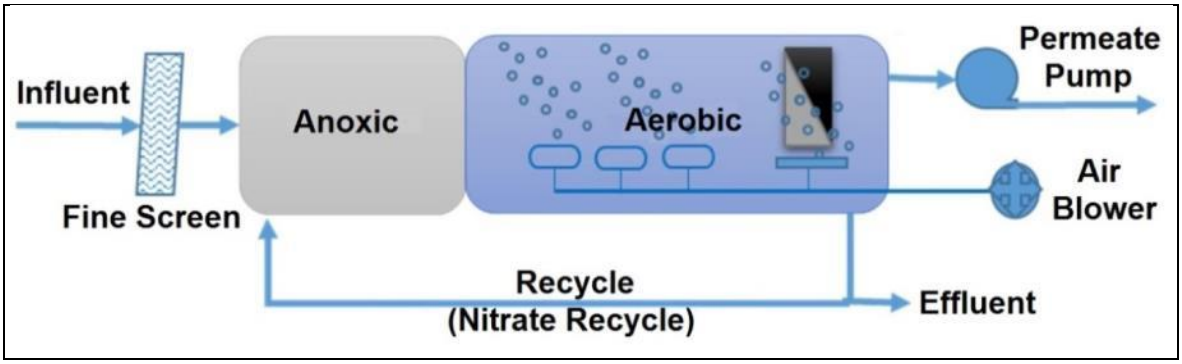


Figure VI.2. Flow Diagram of the MBR Process

Conventional Activated Sludge Systems

A^2O (denitrification first or simultaneous systems), Step Feed, Bardenpho and UCT are the conventional activated sludge systems. These systems can be converted to each other via placing gates in transition points of tanks and inserting pipes. For the treatment plant, these systems are recommended and explained below:

A^2O Process

A^2O is a modification of the AO process which provides phosphorus removal via anaerobic tank and nitrogen removal via anoxic tank. Hydraulic retention time of anoxic tank is about 1-1.5 hours. Denitrification takes place in anoxic reactor. In order to denitrify the nitrate produced via nitrification in aerobic tank, recycling of some portion of the effluent of the aerobic tank to anoxic tank entry and well mixing with the raw waste water is required. Necessary carbon source for denitrification is contained in raw wastewater and conveyed to anoxic tank via activated sludge recycle line. When it is not required anoxic and aerobic tanks to be separated, by providing recycle in oxidation tanks and forming anoxic and aerobic parts in each tank, simultaneous nitrogen removal can be achieved. Simultaneous systems are more suitable to treatment plants with low flowrates.

Entry of the dissolved oxygen to anoxic tank via nitrate recycle line must be minimized. Nitrogen removal efficiency is directly proportional to internal recycle ratio. A^2O process is not affected negatively by the changes in flowrate and pollution strength. Also, extended aeration systems of the process provide sludge stabilization; thus there is no need to apply additional sludge stabilization methods. Figure VI.3, A^2O shows the flow diagram of the process.

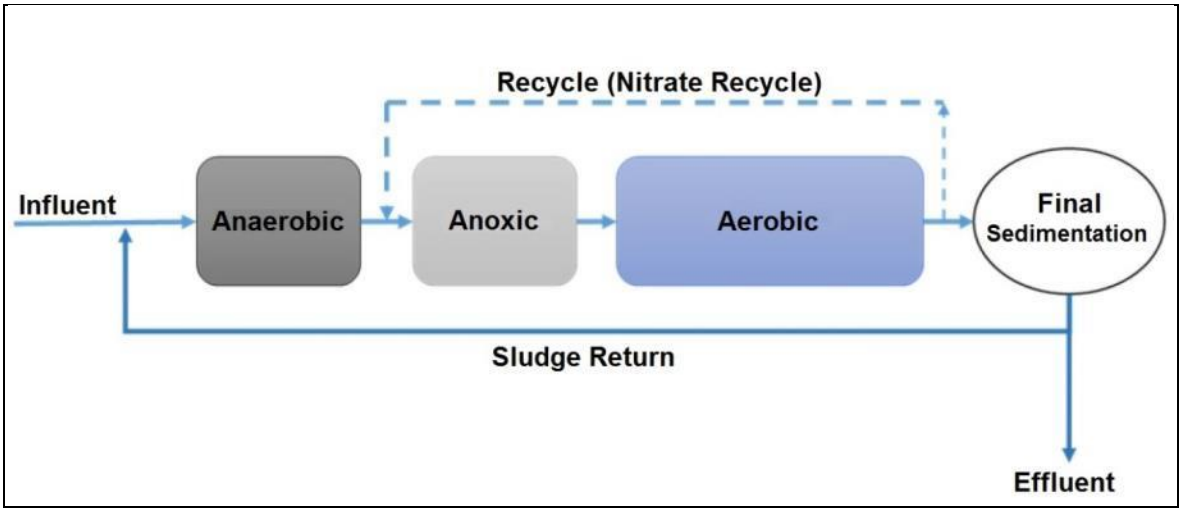


Figure VI.3 Flow Diagram of the A2O Process

Step Feed System

Step Feed configuration is capable of removing carbon and nitrogen and it is applied to optimize the biological nitrogen removal. Raw wastewater is given to tanks at 2 or 3 points. Therefore, second and the following anoxic tanks receive carbon source for denitrification from raw wastewater. Increased denitrification efficiency and relatively constant MLSS concentration through reactor can be counted as the advantages of this configuration. It is suitable for high nitrogen concentrations. Figure VI.4 shows the flow diagram of the process.

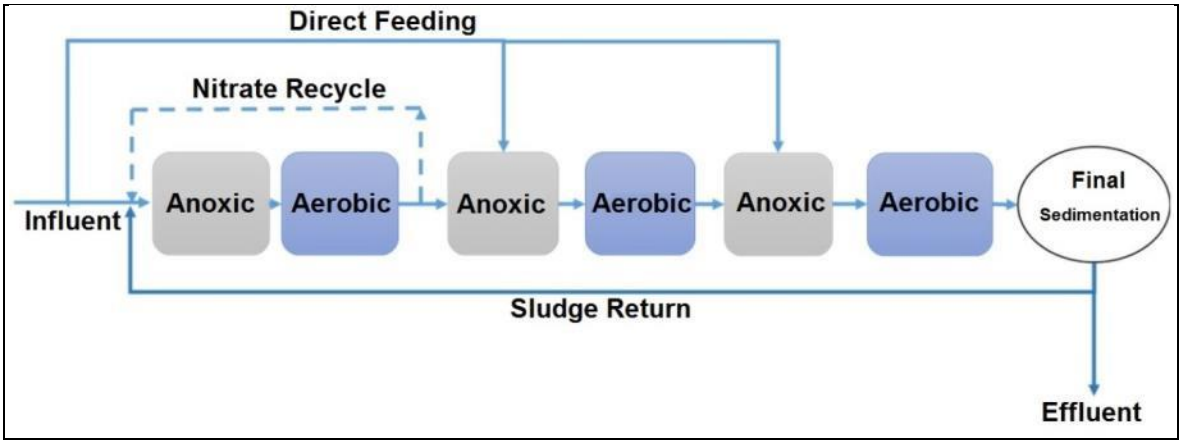


Figure VI.4 Flow diagram of the Step Feed System

Bardenpho Process (5 Staged)

5 Staged Bardenpho Process is a configuration providing nitrogen, phosphorus and carbon removal. 5 Staged Bardenpho is obtained by adding an additional anaerobic tank to the beginning and a recycle line from final sedimentation to that anaerobic tank to the 4 Staged Bardenpho. Carbon sources both present in raw wastewater and/or produced from endogenous respiration are used for denitrification. Nitrate coming from recycle line and/or present in raw wastewater denitrified with the carbon sources in wastewater. Ammonium nitrogen goes to the first aerobic tank where the wastewater nitrified and then the second anoxic tank where denitrification is performed by released carbon in the endogenous respiration. The second aerobic tank is smaller than the first one, is used to increase dissolved oxygen concentration and remove the nitrogen gas from environment. Flow diagram of 5 staged Bardenpho process is presented in Figure VI.5 below.

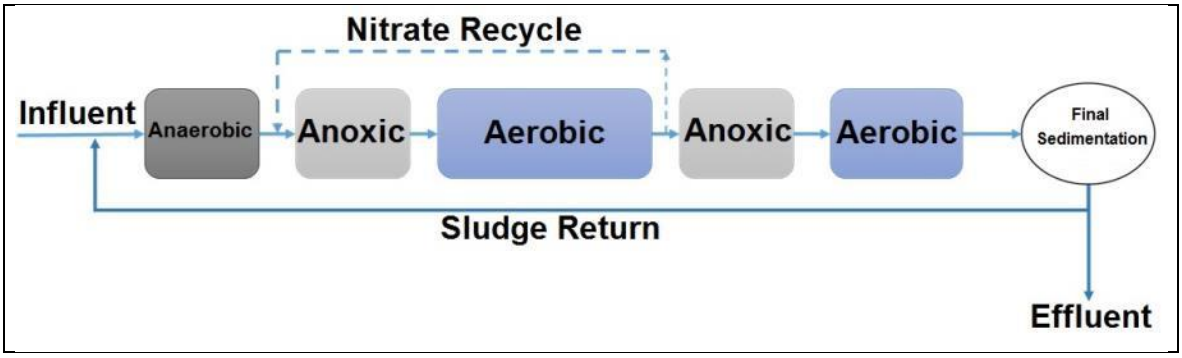


Figure VI.5 Flow Diagram of the 5-Staged Bardenpho Process

UCT Process

Activated sludge system configurations with the anaerobic, aerobic and anoxic tank are needed to remove nitrogen and phosphor from wastewater. Nitrate and oxygen concentration should be minimized in the recycle line from anoxic tank to improve phosphor removal and avoid negative effects on treatment performance. That is why UCT process, which is a modification of A^2O process, is developed. Nitrate is recycled from aerobic to anoxic tank to reduce nitrate concentration in the anaerobic tank and sludge is recycled from the final sedimentation tank to anoxic tank and also from anoxic to anaerobic tank. UCT process is especially applicable for the wastewater which has the low COD/TP to be able to increase phosphor removal.

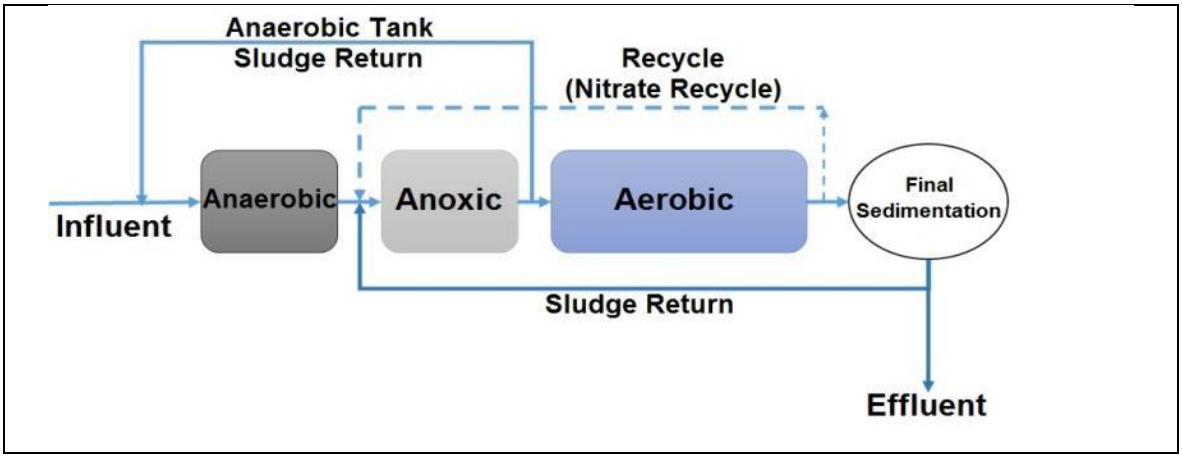


Figure VI.6 Flow Diagram of the UCT Process

Integrated Fixed Film Activated Sludge (IFAS) Process

Hybrid system is obtained by the integration of the biofilm layers into the suspended activated sludge system. As IFAS have more biomass, higher quality effluent standards and higher influent loads are obtained. IFAS can be used in the domestic wastewater treatment plant, differs from activated sludge process in that all biomass is not suspended, it will grow by holding onto a media integrated in the aeration tank. Anaerobic and anoxic tanks are required for the nitrogen and phosphorous removal as in the conventional activated sludge process.

Advantages of IFAS are;

- Need small area,
- Odorless and aesthetic treatment technology,
- Resistance to shock loads,
- High quality of effluent,
- Short time needed for the plant construction and installation.

Disadvantages of IFAS are;

- Non-widespread technology,
- High quality of staff needed for the maintenance and repair,
- Higher initial investment and operating costs than conventional activated sludge systems.

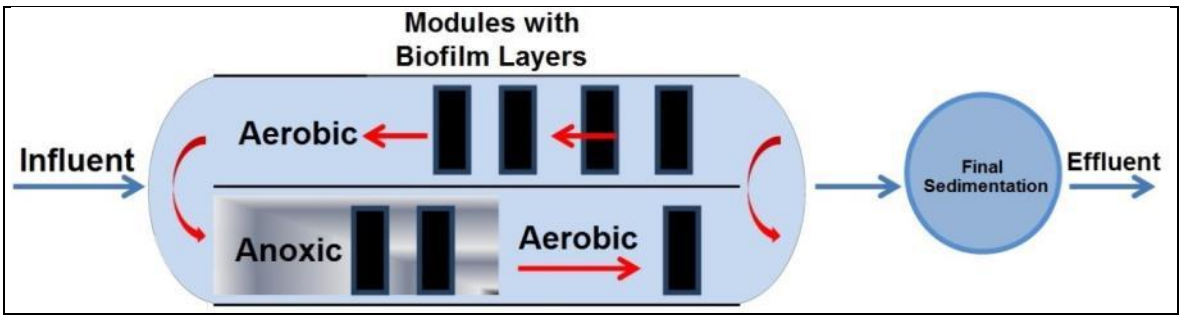


Figure VI.7 Flow Diagram of the Integrated Fixed Film Activated Sludge (IFAS) Process

VI.4.2 Sludge Management Methods

Sludge treatment is one of the most difficult processes in terms of operation and planning in wastewater treatment plants. Although the amount of sludge produced corresponds to a low percentage of 1% to 6% by volume of wastewater, the investment and operation costs of the sludge treatment units are a higher in the total cost of the plant. In general waste management; primarily strategy is to prevent waste generation or to minimize , then to recover it if possible, if it cannot be recovered, it is essential to dispose of it in harmony with the environment. Sludge should be reused on the soil, used as additional fuel in cement plants, anaerobic digestion and energy recovery methods, and environmentally compatible and regularly stored and incinerated. In general, the sludge from the system with the pumps is first condensed and then decomposed by suitable sludge stabilization method selected under the sludge management, dewatered, dried and removed using the final disposal methods.

Sludge Thickening Alternatives

The concentration of the solid content of sludge coming from the wastewater treatment units is increased by removing a portion of liquid fraction and volume is decreased in sludge thickening.

Volume reduction decrease;

- Capacity of tanks and equipment required,
- Quantity of chemical required,
- Amount of heat required for the subsequent sludge thickening units

Gravity Thickening

Solid matter that has high density in the sludge and can precipitate spontaneously is separated from water and becomes concentrated by gravity. It is applied to the preliminary settling sludge which has the high inorganic and perceptible solid content. Sludge thickening is accomplished in circular sedimentation basins. The solids concentration reached in the gravitational sludge thickening is generally 5-10% solids content for preliminary settling sludge, 2-3% solid content for waste activated sludge, 3-6% solid content for drip-filtered filter sludge and 4-7% for mixed sludge.

Floatation Thickening

It is primarily used to thicken the solids in biological process. The incoming solids is concentrated as 2~8 times degree. Separation of solids is achieved by introducing fine air bubbles created under pressure of several atmospheres into the liquid, attaching to solids to cause flotation of solids. The condensed sludge that accumulates on the surface of the tank is stripped away. Coagulant addition can also be performed to better perform solid/liquid separation in process. Disadvantages of flotation thickening are equipment cost, maintenance-repair and high operating cost depending on energy requirement.

Mechanical Thickening (Centrifugation)

It is a common method for sludge thickening and dewatering. During the centrifugation process, centrifugal force separates the solid substances and free water in the sludge. The most advanced centrifuges are spinner type solids decanter type centrifuges. Entrance of the sludge is continuous and the solid materials are gathered around the horizontal cylinder and paddled out of the cradle. The water of the sludge is removed from the thickener by means of weirs.

Advantages of centrifugation;

- Better concentration performance
- Easier and closed system operation
- Need low area
- Easy maintenance and repair
- Lower risk of odor problem and formation of pathogens

Disadvantages of centrifugation;

- Higher initial investment cost

Gravity Belt Thickening

Gravity belt thickeners which are used in the waste activated sludge, aerobic and anaerobic digestive sludge and some industrial sludge are applied in solids concentrations less than 2%. Treatment sludge is distributed on the condensation band in the pore structure and the water is directed by gravity effect after the addition of polymer. Through the use of a series of scraper knives placed along the course of the band, the water is allowed to pass from the sludge to the band.

Disadvantages of gravity belt thickening;

- Need high polymer addition and equipment,
- The need for backwashing of the band increases the formation of filtrate water, which acts as additional pollution load to the treatment plant,
- Need good ventilation due to odor formation.

Sludge Stabilization Alternatives

Stabilization is applied in order to eliminate problems such as reduction of pathogenic organisms, prevention of unwanted odors, decay, deterioration and spoilage in the contents of treatment sludge. The most important feature in the stabilization process is the volatile or organic content of the treatment sludge.

If sludge incineration applications are preferred as a final disposal, since the amount of energy to be obtained as a result of the combustion process depends on the calorific value of the sludge, it may be considered that not to conduct stabilization of the sludge since the stabilization of the sludge will reduce calorific value of the sludge.

In this case, however, the dewatered sludge must be transferred to the incineration process without prolonged storage. The main technologies used for sludge stabilization are as follows:

Aerobic Digestion

Aerobic digestion can be applied to waste active sludge or mixed sludge (primary sedimentation + waste active sludge or primary sedimentation + dripping filter sludge). Waste activated sludge into a separate tank and aerated for a few days. Thus, the volatile solid materials in the sludge are biologically stabilized.

Advantages of aerobic digestion;

- Low initial investment cost,
- Less operational problem.

Disadvantages of aerobic digestion;

- High energy need to provide necessary oxygen to the system,
- No useful final product such as methane can be obtained and lack of energy recovery.

Anaerobic Digestion

Sludge in the anaerobic digestion, one of the most common processes used for sludge stabilization, is heated at about 35°C to decompose organic and inorganic substances in the mesophilic environment in the absence of molecular oxygen. Condensed primary sludge and excess the biological sludge is pumped to the digesters where air intake is off and well mixing conditions are provided. The organic substances in the waste sludge are biodegraded and converted into various end products such as methane and carbon dioxide. The most important parameter in reactor design is the waiting period, which can be accepted between 20-25 days. The most important advantage of anaerobic digestion is that biogas can be obtained as a product and heat and electricity can be supplied by the gas cogeneration system collected in the gas reservoirs.

Electricity is generated by inserting the generator into the generator. The generator meets some of the electricity needed by the treatment plant. The cooling water from the gas motor is used as heat energy to protect the existing mesophilic temperature of the sludge digester.

Chemical Sludge Stabilization

In chemical stabilization, the lime is added to the raw water to raise pH above 12. The environment created by high pH is not suitable for the survival of microorganisms. Thus, microorganism will not cause rot, bad smell and harmful health. Despite the low initial investment cost, the operating cost is high due to the high amount of chemical addition and sludge formation.

Stabilization in the Aeration Tank

Extended aeration activated sludge systems have a high sludge age and therefore excess biological sludge removed from the system is in a stabilized state. Larger tank volumes and more oxygen supply are needed due high sludge age. It is stated that the process according to our specification will be done according to ATV-DVWK-A131. Aerobic sludge stabilization in ATV-A131 is also recommended.

In such a case, additional units need to be done;

- Mechanical Thickener
- Aerobic Sludge Stabilization Pool
- Diffuser System
- Mixers, dosing pumps PE dosing unit
- Blower Unit
- Lime Unit is required.

Disadvantages of aerobic sludge stabilization tank;

- No energy recovery,
- More costly due to the energy costs which is spent for aeration,
- Weaker dewatering character of digested sludge,
- Process is affected by temperature, tank geometry, amount of solids in the input sludge, the quality of mixing / ventilation equipment and the type of tank building material.

Also; in some facilities that are in MUSKI's responsibility, for example existing Marmaris Wastewater Treatment Plant; the aerobic sludge stabilization pool and lime unit were constructed. It has been declared by the plant manager that the sludge stabilization pool has never been used to date since these facilities were built. It is not possible to use the stabilization pool in all seasons of the year since there are serious seasonal differences in the summer and winter pollution load of the incoming wastewater. On the basis of all these evaluations, it was concluded that since it is not economical and useful in the operation and it would be more appropriate to not construct aerobic sludge stabilization due to insufficient land.

Sludge Dewatering Alternatives

To facilitate the final disposal of treatment sludge and to reduce the amount of sludge to be removed, it is necessary to increase the content of solids and reduce the water content. The reduction in the volume of sludge is of great importance for the capacity and investment of the final disposal facilities. In addition, it reduces the cost of transporting and transporting sludge. Sludge dewatering by mechanical methods, is the most preferred method for dewatering treatment sludge, have low area requirement and higher dewatering efficiency. Decanter centrifuges, belt filter presses and filter presses are most widely used dewatering equipment. Other mechanical sludge dewaters are vacuum filters and drill presses which their usage rates are low.

Dewatering with Centrifugation

Today, centrifugation is one of the most common used methods. Centrifugation dewatering is the treatment of sludge under the influence of centrifugal forces, making it more dense sludge. The sludge, which usually contain chemicals such as polyelectrolyte, alum and limestone, are given to centrifuges rotating about a horizontal axis at a speed of 1,600-2,000 rpm. The sludge drained from the ditch is conveyed to the entrance to the wastewater treatment plant. The dewatering yields are 90-95%, and the solids content of the outlet sludge can vary between 20-25%.

Advantages of centrifugation dewatering;

- Need less space,
- No odor problem because it is a closed system,
- High dewatering efficiency.

Disadvantage of centrifugation dewatering;

- High investment cost.

Dewatering in Belt Filter

Dewatering with a belt filter is based on the principle that the squeezing of the sludge with the pressure effect applied to the sludge will remove the water. Polymer addition is required to purify the sludge quenching feature. Sludge is compressed between the two strips with a porous surface, with the tension provided by the cylinders of different diameters. Belt filter designs have basic features such as polymer conditioning, gravity drainage, under-compression and under-compression. The filtration area provided by the belt filter, the use of additional rollers, and the belt rotation speed are factors affecting the dewatering efficiency. Belt filter dewatering can be dewatered to 18-20% solids in general, depending on the yield sludge characterization.

Dewatering in Filter Press

Filter press dewatering is the method of dewatering mechanical sludge which provides the oldest and highest output solid matter ratio. Higher pressures are applied in filter press dewatering. It is a suitable method to be used in industrial sewage sludge which has discontinuous sludge feed and low water supply ability. 28-30% solid matter ratios can be achieved.

Sludge Drying Alternatives

The water in the sludge has to be evaporated in order to dry the sludge. Since the water in the sludge has different properties, it is generally considered in two main parts; free water not bound to solid particles and part of the water that is difficult to evaporate. Both natural and mechanical dewatering and drying methods have been developed for the sludge disposal with different moisture contents according to the final sludge disposal method. The dried sludge is biologically stable and has low water content as well as burning and storage, and so on. The advantages of sludge drying are that the problem of odor is low, transport, handling and storage costs are reduced considerably by reducing the volume of wet sludge in large volumes.

The biggest advantages of dried the treatment sludge is the possibility of using the final product as following areas;

- Use as fertilizer in agriculture and forestry,
- Use as energy in cement plants, energy plants and incineration plants,
- Use for topsoil landscaping, fill and regular storage.

Thermal Drying

Thermal drying reduces the content of moisture in the sludge far below that obtained by mechanical dehydration methods. Advantages of the dried sludge are lower transportation costs, reduction of pathogens and better storage and marketing.

In the contact drying process, heat is indirectly transferred to the sludge through the heated surface while heat is directly supplied to the particles in the convection drying process. The most common types of drying are tape, drum and fluid bed dryers.

The sludge is poured onto the conveyor belt and the hot air is fed into the system. Since the speeds of the driers are adjustable, it is possible to obtain between 65% and 90% solids. The drying capacities of the dryers vary between 500 - 4000 kg H2O / hr. Mixing with dry matter (pre-dried slurry) is required at the beginning of the system in order to pass the adhesive phase to prevent plugging.

Solar Drying

Wet sludge is dried in specially prepared greenhouse areas where are extremely transparent, with special coverings that prevent uncontrolled air change and therefore unnecessary heat loss. With ventilators located in the unit, the drying air of the ambient air is introduced into the circuit by the optimal air flow rate. Solar drying, climatic conditions and mud drying characteristics are parameters that determine the design of the drying facility. Space required for drying depends on sludge characteristics and atmospheric conditions such as precipitation, relative humidity and temperature. The disadvantage of solar drying is that very high area is needed.

Lime Drying

By the addition of slaked lime, to a hygienic and pathogen free product is obtained from the waste sludge. This is achieved by reaction heat and alkalization. The obtained product has organic content, can be used in agriculture and in soil lacking in lime.

VI.4.3 Disposal Methods

Land application, storage, incineration and composting alternatives can be applied for final disposal. Information about the final disposal methods that can be applied to the treatment sludge to be formed at the Milas – Oren Treatment Plant is as in the following.

Field Application

The application of treatment sludge to agricultural areas aims to increase the use of sludge, fertilizer as a source of nutrients or as soil conditioner and to increase agricultural production. The pH of the soil to be applied to the treatment sludge must be 6.5. Thus, the movement of heavy metals within the soil is limited.

Regulation on the Use of Soil and Municipal Sewage Sludge, which was published in the Official Gazette dated 03.08.2010 and numbered 27661, covers the technical and administrative principles related to soil controlled use in such a way that treatment sludge does not harm soil, plant, animal and human. It is strictly forbidden to use raw sludge to the soil according to the Regulation. In treatment sludge, there are limit values for heavy metals, organic compounds and dioxins. Heavy metal content limit values for soil and stabilized sludge to be used in soil are presented in Table VI.1 and Table VI.2.

Table VI.1 Heavy Metal Limit Values in the Soil

Heavy Metal (Total)	6≤ph<7 mg. Kg-1 Oven Dry Soil	pH≥7 mg. Kg-1 Oven Dry Soil
Lead	70	100
Cadmium	1	1,5
Chromium	60	100
Copper	50	100
Nickel	50	70
Zinc	150	200
Mercury	0,5	1

Table VI.2 Maximum Heavy Metal Content Limit Values for Stabilized Sludge to be used in Soil

Heavy Metal (Total)	Limit Values (mg kg-1 dry matter)
Lead	750
Cadmium	10
Chromium	1000
Copper	1000
Nickel	300
Zinc	2500
Mercury	10

The maximum permissible values of stabilized sludge for organic compound are given in Table VI.3 below. The limit value for the stabilized sludge content for the polychlorinated dibenzodioxin / dibenzofurans is specified as 100 ng Toxic Equivalent kg-1 dry matter.

Table VI.3 Organic Compound Limit Values for Stabilized Sludge to be used in Soil

Organic Compounds	Limit Values (mg kg-1 dry matter)
AOX (Absorbable organic halogens)	500
LAS (Linear alkyl benzene sulphonate)	2600
DEHP (Diptalate (2-ethylhexyl))	100
NPE (Nonyl phenol and nonyl phenol ethoxylates with 1 and 2 ethoxy groups)	50
PAH (sum of polycyclic aromatic hydrocarbons or polyaromatic hydrocarbons)	6
PCB (sum of polychlorinated biphenyl compounds 28, 52, 101, 118, 138, 153, 180)	0,8

There are important restrictions on the use of the sludge in the soil both in terms of soil quality, and in the treatment sludge, heavy metals, organic compounds and dioxin content.

There are significant restrictions on the soil quality of the treatment sludge in terms of heavy metal, organic compound and dioxin content. Therefore, heavy metal content of the treatment sludge within the limit values does not mean that the sludge can be used in the soil.

Composting

Composting is the process of decomposition of waste sludge by biological activity. Composting boxes and tunnel reactors are widely used in composting process. The heavy metal content in the final product has critical importance and must provide specifications about the end product standards, local and national legislation.

Disadvantages of composting;

- Operating costs are higher than laying out of the raw sludge.
- Ventilation causes energy consumption. In order to ensure an optimum C/N ratio, it may be advantageous to mix the treatment sludge with other wastes, and in the case where it is necessary to purchase these wastes, it can turn into a disadvantage.

Landfill

Regulation on the Regular Storage of Wastes, which was published in the Official Gazette dated 26.03.2010 and numbered 27533, covers the technical and administrative basis for the prevention and management of environmental effects that may occur during the disposal process of waste through the regular storage method.

Regular Storage Facilities belonging to the Metropolitan Municipalities is considered as II. Class regular storage facility in the line with the description of the facility with the substructure required for the storage of municipal wastes and non-hazardous wastes. II. Class regulated storage facilities acceptance limit values are given in the Table VI.4 below.

Table VI.4 Waste Acceptance Limit Values for Class II Landfill Facilities

Parameter	Unit	Limit Value
As	mg / lt	0,05
Ba	mg / lt	2
Cd	mg / lt	0,004
Cr	mg / lt	0,05
Cu	mg / lt	0,2
Hg	mg / lt	0,001
Mo	mg / lt	0,05
Ni	mg / lt	0,04
Pb	mg / lt	0,05
Sb	mg / lt	0,006
Se	mg / lt	0,01
Zn	mg / lt	0,4
Chloride	mg / lt	80
Floride	mg / lt	1
Sulfate	mg / lt	100
DOC (Dissolved Organic Carbon)	mg / lt	50
TDS (Total Dissolved Solid)	mg / lt	400
pH	mg / lt	≥6
Total Organic Carbon	mg / lt	50.000 - %5

The most important provisions in the Regulation on the Regular Storage of Wastes are included in Temporary Article 4. Temporary Article 4 is stated below:

- In Appendix-IV to the Regulation on the General Principles of Waste Management, sludge classified as non-hazardous does not require compliance with the Dissolved Organic Carbon (DOC) limit value in a separate lot storage in the Class 2 regular storage area Class on condition that all other parameters given in Appendix-2 is provided, at least 30% by weight of dry matter is involved and of bad smell is eliminated.

Incineration

The disposal of sewage sludge directly for agricultural purposes or to the landfill site is subject to increasingly stringent legal controls. Mixing domestic solid wastes and waste sludge optimize the operation of the combustion plants. The volumetric reduction in very significant quantities is the result of the burning.

It is estimated that incineration will be increasingly used by burning sewage sludge, despite the high investment costs in incineration systems, the incidence of incineration criteria, increased costs associated with the processing of emission gases, and the difficulty of disposal of ash resulting from combustion.

The Regulation on the Waste Incineration, which was published in the Official Gazette dated 06.10.2010 and numbered 27721, is designed to prevent the adverse impacts of the incineration of wastes on the environment, in particular the risks that may arise for pollution resulting from emissions in air, soil, surface waters and groundwater and human health.

Some definitions related to sludge management within the scope of the Regulation are as follows:

Combined incineration plant: The main objective of the project is to develop a waste management system for the production of energy, waste acceptance unit, temporary storage unit, pretreatment unit, waste feed and air supply systems, boiler, flue gas treatment units, including all units in co-incineration facilities, including measuring equipment and systems used to control incineration, flue, burning operations, recording and monitoring of incineration conditions, for the temporary storage of incineration residues and for the treatment of wastewaters all installations are considered to be incinerators (but if the incineration process is aimed at the thermal disposal of the waste, not the product or energy production).

Current incineration or co-incineration plant: It means an incinerator or co-incinerator plant which has been operating on the date of entry into force of this Regulation and which has already submitted licensed installations or license application files.

Incineration plant: The units included in the facility for waste storage, preheating unit, waste treatment and waste disposal systems, boiler, flue gas treatment systems, regular storage of residues resulting from combustion and wastewater treatment, control and burning of flue, including any other thermal disposal operations such as pyrolysis, gasification, or plasma processes, including the combustion of waste by oxidation, which may or may not recover the resulting combustion heat, including all the units involved in the process, including measurement devices and systems used to monitor and record thermal disposal refers to any kind of system.

The moisture content of the sludge is important for the incineration because dewatered sludge with a moisture content of 70% or more cannot sustain the combustion process and require additional fuel. For the sludge to be used as an alternative fuel, it must have a dry matter content of at least 85%. Cement factories around the treatment plant accept dried sludge as fuel in calorific value range 2,700-3,000 kcal.

The main advantages of the incineration method are listed below;

- After burning, there is a significant reduction in the volume of the treated sludge (it is linked to the organic matter content of the sludge being burnt).
- Sewage sludge is used as energy.
- It is possible to use the by-products produced after the burning of the treatment sludge by recycling (asphalt road filler, concrete production and brick making).
- This process is not affected much by the sludge composition.
- They are reliable (known / implemented) systems.
- The smells are minimized due to the system being closed and high temperatures.

VI.5 Comparison of Alternatives

VI.5.1 Comparison of Technology Alternatives

A scoring system was established during the comparison of treatment alternatives considered for the design of Milas – Oren Wastewater Treatment Plants and the following criteria were taken into consideration:

- To be able to provide discharge standards,
- Ease of operation and maintenance,
- Investment costs,
- Operation and maintenance costs,
- Flexibility to flow and load changes,
- Resistance to toxic substances,
- Land requirements,
- Aesthetic.

These criteria are graded according to importance by weighted percentage and percentile. According to the treatment technology, each criterion is given between 0 and 5 points (5 best points, 1 weakest point, 0 ineffective points). Weighted scores were obtained by multiplying the importance grade and the technology score, and the total score was obtained by their aggregation. It is accepted that the technology alternative with the highest total score is the most feasible option. Table VI.5 shows the results of the evaluation.

Table VI.5 Comparison of Wastewater Treatment Alternatives

Concept	Significance Level	MBR Process	Conventional Activated Sludge Systems	IFAS Process
Providing Discharge Standards	15	5	4	5
Ease of Operation and Maintenance	10	2	5	3
Land Requirements	10	5	3	4
Electricity and Maintenance Costs	20	2	4	3
Resistance to flow and load changes	10	3	5	4
Investment Costs	20	2	4	2
Aesthetic	5	4	3	4
Sludge Disposal Costs	10	4	2	3
Total (weighted score)	**100**	**3.15**	**3.85**	**3.35**

Table VI.5 compares the advantages and disadvantages of three different biological treatment processes capable of nitrogen and phosphorus removal. Conventional activated sludge systems containing different configurations of classical activated sludge systems have been evaluated together at this stage. All processes can provide discharge standards, but the highest quality effluent is obtained by MBR and IFAS processes.

Operating conventional activated sludge systems is easier than operating IFAS systems. The fact that the application examples are not common in our country and that the application examples for high wastewater treatment are limited is disadvantageous in terms of operation.

The MBR process requires the least land due to the fact that the final settling tanks are not needed. On the contrary, conventional activated sludge processes require higher space requirements than other systems because of the higher pool volumes and the need for the final settling tank. In IFAS systems too, low ventilation pool volumes arise due to the adherence of some of the biomass to the media. Also the filtration unit instead of the last settling tank can also be used.

MBR systems have a disadvantage in terms of operating cost due to high electricity consumption and frequent blockage of MBR units. In conventional activated sludge systems, operating cost is much lower than other systems. In IFAS systems, low sludge production, high energy consumption is the issue.

The application example for resistance to flow and shock pollution loads are the most common conventional activated sludge systems is more advantageous than other alternatives. In the MBR process biological treatment performance against shock loads is significantly affected. In case of shock loading in MBR application examples, the caps are automatically closed in biological reactors and no water is taken into the system. This is a major drawback to the business. The IFAS system has been evaluated as a process resistant to shock pollution loads and flow rates due to its two types of microbial lifecycle.

In the MBR system, the initial investment cost is higher than conventional systems due to the high membrane cost and the need for precise measurement-automation. Similarly, the IFAS process is often patented technology and has high initial investment costs.

MBR systems have a view and aesthetic advantage because they have closed and low space requirements. IFAS processes also have an aesthetic appearance because they can be used with purification plants in patented application examples. Since conventional activated sludge systems are composed of open and high-volume units, they have an aesthetic appearance. However, the aesthetic criterion has a lower significance level because the areas where the treatment facilities are located for the project area are not intensive and the areas are far from the city centre.

Since the most sludge production from the treatment alternatives under consideration is related to the conventional systems, it has the highest score in terms of sludge disposal costs. Since the least sludge production occurs in the MBR and IFAS processes, a lower rating is made.

Sewage sludge that is generated after the treatment process in all wastewater treatment plants operated by MUSKI is disposed of at Solid Waste Regular Storage Facilities operated by the Environmental Protection and Control Department.

The result of technical evaluation of treatment technologies is the technologically most suitable alternative for conventional Milas – Oren Wastewater Treatment Plant is the conventional activated sludge systems.

VI.5.2 Comparison of Sludge Management Methods

Sludge treatment is one of the most difficult processes in terms of operation and planning in wastewater treatment plants. Although the amount of the originating sludge corresponds to a low percentage like 1% to 6% of wastewater in volume, the investment and operation costs of the sludge treatment units have a higher share in the total cost of the plant. Therefore, it is of great importance to select the most suitable sludge treatment system.

Generally, in waste management; it is firstly essential not to generate waste or to minimize waste generation, and then if possible, to ensure recovery thereof, and if it is not possible, to dispose of it in an environment-friendly way. If sludge shall be recovered, the methods to use it on soil, to use it as additional fuel in cement plants and to generate energy with anaerobic digesters shall be assessed. In case it is disposed of in an environment-friendly way, then the regular storage and drying/burning methods are assessed.

When the sludge treatment and disposal alternatives, the project site, the location and other related conditions of the wastewater treatment plants are taken into account, meeting legal standards, operational and maintenance costs and ease of operation, initial investment costs and land requirements of the place to be selected shall be considered.

The assessment method for the sludge treatment system is the same as the one used for wastewater treatment technologies. The criteria are weighted in percentiles according to the significance level. The weighted scores have been achieved by multiplying the scores indicating significance level with the technology scores (Table VI.6).

It is required to select the most feasible disposal method for the sludge according to the characteristics of the sludge generated from the treatment plant as a by-product and considering the environmental conditions.

Within the framework of the five basic criteria determined upon examination of Table VI.6, the most appropriate method is the incineration system, as no sludge stabilization is required, energy recovery is ensured, the products generated as a result of incineration are suitable for re-use, and it decreases to a large extent in volume. The incineration operation is a system with a high initial investment cost and operating cost, and which highly requires qualified personnel to operate it.

The environmental conditions that affect selection of the disposal method are climate, presence of infertile soils in the region, availability or non-availability of thermal power plants or cement plants, presence of unused quarries and mines, and cheapness or expensiveness of the land in such regions where the population is dense. Due to the fact that the activity field and its surroundings are located within the boundaries of the tourism center, and that, correspondingly, the land acquisition prices are high; the land selection process for the incineration plant to be constructed for disposal of the sludge generated in the treatment plants across Mugla province has not yet been completed.

The other alternative is that the treatment sludge may be dried and stored by the licensed companies. In this context, the analyses of the sludge shall be carried out in accordance with the parameters specified in Appendix-2 of the “Regulation on Regular Storage of Wastes” entering into force after publication in the Official Gazette dated 26.03.2010 and numbered 27533, and the final disposal form shall be determined according to the results of the analyses. Albeit, while disposing of the sludge, it is required to pay attention to the Provisional Article 4 of the “Regulation on the Amendment of the Regulation on Regular Storage of Wastes” entering into force after publication in the Official Gazette dated 11.03.2015 and numbered 29292.

As another alternative, it is recommended to prioritize use of the sludge in agricultural activities. Because organic materials shall improve the structure of soil, the water holding capacity of soil, the infiltration and aeration of the soil; in addition, the macro nutrients and micro nutrients shall contribute to plant development. Through this method, it shall be possible to recover the sludge, which is a waste matter, into economy. However, when it is assessed in terms of socio-economic aspects, the social approach to the use of wastewater treatment sludge in agricultural activities is negative.

It is necessary that the society is firstly informed and its awareness on this issue is raised. If the sludge cannot be used in the agricultural activities, energy recovery is provided by transferring them to the cement plants as the final disposal method.

Within this regard, final decision on sludge management is that the excess sludge which will be generated during the operation of WWTP, will be analysed to determine compliance with the Annex-2 of the Regulation on Landfilling of Wastes and if it is deemed appropriate, the sludge will be collected by the licensed disposal companies determined by MUSKI every year. After that, the sludge will be disposed in accordance with the provisions of Urban Wastewater Treatment Regulation and other relevant legislation. According to the information retrieved from MUSKI, the sludge will be transported by competent and licensed firms to the landfill which has enough capacity. At the end, sludge will be stored in the landfill. Currently, the only option available is landfilling, but incineration and other options will also be considered under the sludge management plan to be prepared prior to operational phase. Within this regard, according to information obtained from MUSKI, EIA Positive decision for incineration plant is obtained. However, whether the plant will be constructed or not is depends on the supply of funding for this issue.

During the operation period, documents related to the amount of sludge delivered to the licensed disposal company shall be issued, and a record shall be kept within the scope of monitoring.

Table VI.6 Comparison of Sludge Treatment and Disposal Methods

Concept	Significance	Sludge Stabilization				Sludge Dewatering			Sludge Drying			Sludge Removal			
		Aerobic Stabilization	Anaerobic Stabilization	Chemical Sludge Stabilization	Extended Aeration System	Centrifugal Dewatering	Belt Press Dewatering	Filter Press Dewatering	Thermal Methods	Sun Drying	Lime Drying	Land Application	Composting	Landfill	Incineration (Cement etc. facilities)
Land requirement*	20	3	4	4	3	5	4	4	4	1	3	1	3	2	4
Operation and maintenance difficulties	20	3	2	3	5	4	3	2	3	4	4	4	4	4	3
Investment costs	20	3	3	4	3	3	4	4	3	4	4	3	3	4	1
Operation and maintenance costs	25	2	4	3	3	4	3	3	3	4	2	4	4	3	5
Feasibility	15	4	5	1	5	5	4	3	4	5	2	2	3	4	5
Total (Weighted Score)	**100**	**2.9**	**3.6**	**3.1**	**3.7**	**4.15**	**3.55**	**3.2**	**3.4**	**3.5**	**3**	**2.9**	**3.25**	**3.35**	**3.60**

VII. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

The ESMP has been prepared to assess and identify the potential environmental and social impacts and risks arising out of the development of the Project components and auxiliary facilities and recommend mitigation measures for significant adverse environmental and social impacts and describes the monitoring and institutional requirements necessary to implement this Plan.

The primary purpose of this ESMP is to ensure that the environmental requirements and social commitments associated with the Project are carried forward into implementation and operational phases of the Project and are effectively managed. The specific objectives are:

1. Anticipating and avoiding, reducing, mitigating and if these are not achieved compensating any adverse environmental, social and health impacts resulting from the project activities;
2. Prevent or compensate any loss of the affected person;
3. Conducting all project activities in accordance with the applicable national legislation and in compliance with the World Bank's Environmental and Social Framework (ESF)
4. Prevent environmental degradation as a result of either individual subprojects or their cumulative effects;
5. Enhance positive environmental and social outcomes;
6. Ensure that the ESMP is feasible and cost-efficient;
7. To act as an Action Plan in order to ensure that the project impact mitigation measures are properly implemented and monitored; and
8. Ensure that all stakeholders concerns are addressed.

This ESMP has been prepared consistent with the World Bank guidance specified in the OP4.01.

This ESMP was developed based on the findings of the impact assessment studies. Identification of risks, mitigation and monitoring activities are considered for the two main phases of the Project, which are "Construction" and "Operation". In order to achieve environmental and social outcomes consistent with the WB OP given in the Terms of Reference of the Project, potential adverse environmental and social impacts anticipated in each phase of the project components will be identified; requirements for effective and timely interventions will be defined; and means for meeting these requirements will be described in the context of this ESMP.

In order to reflect developments on detailed Project design, this ESMP will be improved and evolved in the future. Hence, this ESMP is a living document that will be continuously reviewed and updated by taking into account of these subjects:

- Monitoring results,
- Test and trial results performed during Project's operation phase,
- Changes on national legislation and international standards, and
- Changes on Project parameters (if any).

The following chapters were prepared to outline the legislative background for management, organizations that will be responsible for the implementation of this ESMP, specifications of the Project, mitigation plans for construction and operation phases of the Project, monitoring plan, public participation, and inspection and reporting.

The purpose of the Mitigation Management and Monitoring Plan presented under this chapter is to apply mitigation measures to reduce the impacts of the Project, describe the roles of the participating parties and key personnel responsible for the implementation of the mitigation

measures, and identify procedures to ensure that the mitigation measures are implemented adequately during all phases of the Project.

VII.1 Mitigation Management Plan

Impact mitigation measures and activities are developed for all phases of the Project for both project components and auxiliary facilities including energy transmission lines and working camps in the scope of this ESMP and are in compliance with the national legislation as well as international standards. Impact mitigation management plan is presented in Table VII.1 and Table VII.2 for construction and operation phases, respectively.

Table VII.1 Construction Phase Impact Mitigation Plan

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Cost	Key Performance Indicators
C1	Soil Environment	Soil Contamination, Topsoil Loss	Adverse	Low (for soil contamination) Medium (for loss of topsoil at Oren WWTP site)	The impacts on soil environment will be most visible at the WWTP site. However, the following measures should be taken at all areas of the Project, not limited to the WWTP site. • Topsoil will be stripped to a sufficient depth (minimum 30 cm) prior to the start of the construction activities. To avoid soil compaction, stripping operation will not be done when soil is wet. Average height of topsoil stacks will be 1.5 meters. Side slope of these stacks will not exceed 3:1 (h:v). • In order to minimize the impacts on soil environment, the amount of soil that could be subject to compaction and contamination/pollution will be minimized by ensuring the use of only the designated work sites and routes for the construction machinery and equipment and field personnel. In case of the need for the area relevant permit will be obtained before the construction. • The fuel required for the construction equipment and vehicles to be used within the site during construction phase will be supplied primarily from the nearest station; if deemed necessary, fuels that may possibly be stored at site will be stored in the areas where necessary impermeability precautions are taken; • Measures to be taken in case of leaks and spills that may arise from construction machinery and vehicles, and unexpected accidents will be described in site-specific Emergency Response Plan to be prepared; • In order to develop background data on soil contamination status at the WWTP site, MUSKI or the construction contractor will conduct a soil sampling study at the site before any activity; • According to requirements specified in the Regulation on Soil Pollution Control and Point Source Contaminated Fields, firstly MUSKI is obliged to notify the Ministry of Environment, Urbanisation and Climate Change (MoEUCC) regarding to the soil pollution in the Project Area, according to the procedure defined in the regulation. After that, based on the inspections that will be carried out by the MoEUCC regarding to MUSKI's notification, if the site will be defined as a contaminated site that needs to be cleaned up, the site will be cleaned up by firms authorized by the MoEUCC and MUSKI will be the responsible entity to ensure clean up. Within the scope of cleanup activities, following measures will be taken for the contaminated areas during the construction phase: ○ Vehicles containing any excavated soil will be suitably covered to limit potential dust emissions, and truck bodies and tailgates will be sealed to prevent any discharge during transport; ○ Only licensed waste haulers will be used to collect and transport contaminated soil to an appropriate treatment/disposal site and illegal disposal of the soil will be prohibited; ○ The use of contaminated soil for landscaping will be prohibited. • The provisions of the Regulation on the Control of Excavation Soil, Construction and Demolition Wastes shall be complied during land preparation and construction phase of the Project; • Provisions of the Regulation on the Control of Soil Pollution and Sites Contaminated by Point Sources shall be complied within the scope of the Project; • Wastes and wastewater to be generated during the construction phase of the Project will be stored and disposed in a controlled manner in accordance with the relevant regulations and in line with the management practices described in this report. Thus, it will not be possible for the wastes and wastewater to be generated in the Project Area interact with the soil environment and cause any impacts. • Following the completion of construction works, the stripped topsoil will be reused within the project areas, such as landscaping of WWTP and pumping stations; • For the amount of the topsoil that cannot be reused will not be wasted and the unused topsoil will be transferred to locations close to the current topsoil storage area by consulting with the potential users; farmers, livestock owners; • In case of a damage caused to the existing roads, community assets, individual's crops and assets during land preparation and construction phases, the construction contractor will compensate the losses by identifying damage in accordance with the WB's safeguards with the supervision of MUSKI. MUSKI's grievance mechanism will be used in the event of any damage or loss. • A Soil Management Plan should be prepared prior to the construction phase. • An Oil and Chemical Spill Contingency Management Plan should be prepared prior to the construction phase • The areas that the construction works take place will be reinstated after the completion of works	Contractor MUSKI Supervision Consultant	Included in construction costs	The number of events that trigger spill response Soil analysis results Contaminated soil amount Contaminated soil treatment/disposal methodology Stripped/stored/reused topsoil amount Environmental spill/leak incident records/report Excavation amount Reused excavation amount Amount of excavated material that is sent to final disposal Monitoring report findings
C2	Soil Environment	Erosion potential	Adverse	Medium	• By establishing a suitable drainage system in the field, the potential impact of surface runoff will be minimized. In this context, drainage channels will be constructed in accordance with the topographical conditions of the site; • Construction activities (especially excavation works) will be undertaken in the dry weather condition as much as possible; • Stripping of topsoil will not be conducted earlier than required to prevent the erosion of soil (wind and water); • The disturbed areas and soil stock piles will be kept moist to avoid wind erosion of soil; • Topography will be restored for stop stabilization immediately after the completion of construction at each location.	Contractor MUSKI Supervision Consultant	Included in construction costs	Monitoring report findings

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Cost	Key Performance Indicators
C3	Soil	Liquefaction and ground stability related risks at Oren WWTP site	Adverse	High	• The excavation works should be performed under the supervision of senior geology/geotechnical engineer; • To lower the liquefaction potential and support the bearing capacity of ground, piling options should be developed. • 50 cm thick filling material with suitable grain sizes should be laid under the foundation of all structures. • Drainage of site should be ensured.	Contractor Supervision Consultant	Included in construction costs	Construction contract Drainage network design Monitoring report findings
C4	Air Environment	Dust emissions, exhaust emissions	Adverse	Low	A Dust Management Plan that is in line with OP 4.01 and WBG EHS Guidelines (both general and sectorial) should be prepared before the construction phase to ensure: • Dust should be minimized from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content; • The drop height of potentially dust generating materials will be kept as low as possible; • When there is traffic flow on the existing roads, where the works performed at, dust suppression measures will be continuously applied to ensure traffic safety. If there is no traffic existing in the local roads, dust suppression measures will be applied only at local residential and business areas; • Wind shields/barriers will be placed at work sites, especially at the south and east borders of the WWTP site and around the TM-6 Pumping Station, to prevent dust dispersion; • Work sites will be sprayed regularly, particularly in spring and summer, to reduce the effects of dust-causing activities such as excavation and backfilling; • Continuous water spraying will be conducted at the WWTP site to minimize dust impacts on Mugla Sitki Kocman University Fisheries Research and Development, which is adjacent to the site, and during the works to be performed around TM-6, where there is a hospital nearby;; • Trees will be planted to the borders of WWTP, especially at the east and south borders; • Inner roads of the WWTP will be covered to prevent dust formation; • Speed limitations will be defined and obeyed for construction vehicles; • Daily backfilling, bedding and covering materials will be stored at temporary storage areas, the materials will be moisturized and compacted to prevent the materials moving with the help of wind; • Tire cleaning ponds will be installed at the exit of WWTP site to prevent mud transport on roads; • Loading and unloading operations will be performed without throwing/scattering; • During transportation, excavated materials will be covered with nylon canvas or materials with grain size larger than 10 mm; • Exhaust systems of the vehicles will be controlled regularly (biennially) through exhaust emission decals; • Modern equipment and tools that can provide EU emission standards during the construction activities will be selected; • Well and adequate maintained vehicles shall be used. Regular maintenance of machinery and equipment will be ensured; • Relevant provisions of the Regulation on Air Pollution Control Sourced from Industry and Regulation on the Assessment and Management of Air Quality will be complied with to minimize air emissions sourced from construction machinery and trucks; • Construction vehicles will not be permitted to keep engines running while waiting to enter the site or waiting on-site; • Any damage caused by insufficient or lack of dust suppression measures (i.e. pollution of the surrounding area, transportation of dust with wind to a residential area, wind-blown dust deposits etc.) will be compensated by the construction contractor; • A Pollution Prevention Plan that is in line with OP 4.01 and WBG EHS Guidelines (both general and sectorial) should be prepared.	Contractor MUSKI Supervision Consultant	Included in construction costs	Visual observations Exhaust emission decal follow-up Air quality (Settled dust and PM10/PM2.5) measurement results, if any Maintenance records of all machinery and equipment Monitoring report findings Air quality grievance records

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Cost	Key Performance Indicators
C5	Noise	Increase in noise levels	Adverse	Medium	A Noise Management Plan that is in line with OP 4.01 and WBG EHS Guidelines (both general and sectorial) should be prepared before the construction phase to ensure • The machinery and equipment to be used during the land preparation and construction activities will not be operated at the same point/location but homogeneously distributed in the site; • Attention will be given to the selection of equipment with low noise level; • The maintenance of the construction machinery and equipment will be carried out regularly and regulatory speed limitations will be followed for construction vehicles and this should be included in the Transport and Traffic Management Plan to be prepared by the Contractor • The works will be performed day-time; no night work unless it is absolutely necessary; • Construction noise barriers will be used at north-eastern boundary of the WWTP site and around the TM-6 Pumping Station and by doing so, around 5 to 10 dBA noise reduction would be achieved at the receptor. • Trees will be planted to the WWTP site, especially its north-eastern boundary, and around the pumping stations. • Establishment of a grievance mechanism defined in the SEP to manage noise related grievances as well.	Contractor MUSKI Supervision Consultant	Included in construction costs	Noise level measurement results Construction machinery and equipment maintenance log Noise grievance records Monitoring report findings
C6	Water Resources (Surface and groundwater)	Water requirement and wastewater generation	Adverse	Low	A Water Resources and Effluent Management Plan that is in line with the OP 4.01 and WBG EHS Guidelines (both general and sectorial) should be prepared before the construction phase to ensure: • Surface runoff or wastewater generation due to dust suppression activities will be prevented; • The limited amount of domestic wastewater generated at site will be sent to a temporary isolated impermeable septic tank, then it will be sent to the nearest WWTPs after pumped-out from septic tanks by sewer trucks.; • The units of the Project that are in touch with water, wastewater and chemicals will be constructed with using concrete with appropriate cement ratio and durability in order to provide basement impermeability. Thus, no leakages to soil and groundwater will occur during the operation phase of the Project. • Construction activities may pose the potential for accidental release/leakages of petroleum-based products, such as lubricants, hydraulic fluids, or fuels during their storage, transfer, or use in equipment. All chemical storage containers, including diesel fuel, and hazardous liquid waste drums/containers should be placed in secondary containment so as to minimize the risk of soil, surface water and groundwater contamination during construction • A Pollution Prevention Plan that is in line with OP 4.01 and WBG EHS Guidelines (both general and sectorial) should be prepared.	Contractor MUSKI Supervision Consultant	Included in construction costs	Visual observations Surface water / groundwater quality analysis and measurements that include spill-related pollutants, when needed Septic-tank impermeability Septic-tank pump out records Wastewater disposal agreements Monitoring report findings
C7	Waste	Waste generation	Adverse	Low	A Waste Management Plan shall be prepared that is in line with OP 4.01 and WBG EHS Guidelines (both general and sectorial) should be prepared before the construction phase • Wastes to be generated within the scope of the Project will be managed in accordance with the waste management hierarchy; • Wastes will only be temporarily stored on site and final disposal will be carried out outside the facility; • Removal of the excavated material, which will not be used for backfilling, from the site at regular intervals without waiting These materials will be transferred to Municipality's permitted excavation waste storage sites by licensed transportation companies; • Waste recycling, transport, and disposal will be carried out by means of licensed companies and/or Milas Municipality; • Incineration or burying of wastes by any means at site and/or dumping of wastes to nearby roads or water resources will absolutely not be in question; • A Pollution Prevention Plan that is in line with OP 4.01 and WBG EHS Guidelines (both general and sectorial) should be prepared • All kinds of implementations that may threaten personnel or public health will be avoided in all activities involving collection, temporary storage, transport and disposal of wastes throughout the Project; • Wastes to be temporarily stored on site will be delivered to licensed transport vehicles appropriate to the type of waste for disposal. Information related to the operations in this context will be recorded and the records will be kept in the administrative building, and • Hazardous or non-hazardous inscription, waste code, stored waste amount and storage date will be indicated/labelled on wastes temporary stored by classifying according to their properties. The reaction of wastes with each other will be prevented by the measures (impermeable base, drainage, top cover, different compartments based on type of wastes, etc.) taken in the Temporary Storage Area. The permit for the Temporary Storage Area will be obtained from the Muğla Provincial Directorate of MoEUCC.	Contractor MUSKI Supervision Consultant	Included in construction costs	Types and amounts of waste generated Waste segregation practices (amount of waste per type) Proper temporary waste storage area on site and related storage records Waste Disposal Agreements and Records Waste Grievance Records Monitoring Report Findings

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Cost	Key Performance Indicators
C8	Terrestrial and Freshwater Biodiversity	Disturbance on flora and fauna species	Adverse	Low	• The sewerage network lines, discharge line and pumping stations will mostly be constructed within the urban area. Therefore, no protected and sensitive ecosystems or species are foreseen to exist within the project area. However, prior to the land preparation phase, definite working areas will be set up where activities will be conducted. • Construction works at the WWTP site will be done gradually so that it will give enough time to possible fauna to escape. • Mixing any chemical substances, that is used in the construction area, in waterbed and/or aquatic ecosystems will be prevented. • Excavation materials will not be dumped onto riverbed. • Especially during the breeding season of fish species (April-June), any intervention on riverbed will be prevented. • Avoid and/or minimize dust emissions by lightly watering the immediate surroundings of construction sites, and wetting the stored material • The access of local people and wildlife in the construction site will be controlled by fencing the working area. The entry of personnel and third parties into the facility will be carried out in a controlled manner, • Project construction sites and access roads will be separated from other areas with appropriate signboards, signs and fences. • Construction waste generated due to project activities will first be stored at designated storage areas and then disposed • Monitoring studies in Hanay Creek will be conducted in operational phase with aquatic biologist on appropriate seasons, as appropriate • Project workers will not be allowed to bring any live animals or plants into the construction site to avoid the risk of pest/invasive species establishing in the Project Area, • If there is a species that has limited mobility, transfer to safer locations if encountered during construction • If there is a nest of birds species, the nest should be marked with a safety strip about 3 meters in diameter and an expert ornithologist should be informed • The natural structure of the riparian vegetation will be preserved which forms the spawning and sheltering area for many aquatic organisms.	Contractor MUSKI Supervision Consultant	Included in construction costs	No accidental mortality of fauna species No mixing any chemical substances and excavation material Reforming the spawning and sheltering area for aquatic organisms Monitoring Report Findings
C9	Traffic	Increased traffic Difficulties in road access	Adverse	Low	A Transport and Traffic Management Plan that is in line with the WBG EHS Guidelines (both general and sectorial) will be constituted and implemented to ensure the following: • Disruptions to traffic and road transport will be minimized. The contractor shall ensure that the roads remain open to traffic during construction activities; • Trucks, trailers and other vehicles to be used to transport necessary equipment and materials will be provided to comply with the speed limits. MUSKI will ensure that the Contractor will comply with Highways Traffic Law, Road Transport Law and the regulations issued in compliance with these laws, as well as WB policies, standards, and guidelines. • Prior to construction activities, the Contractor will install all signs, barriers and control devices needed to ensure the safe use of the road by traffic and pedestrians, as required by the transport and traffic management plan to be prepared. • The Contractor will take and ensure the implementation of necessary precautions in terms of road traffic safety along the road by cooperating with the relevant authority/administration. In addition, precautions will also be taken in the entry and exit of the treatment plant. • Signs, crossing guards and other appropriate safety features will be incorporated at grade level rail and road crossings; • Safe-driving training will be provided for all Project proponents and their main suppliers; • Local authorities and residents in a working area will be consulted and informed before any detours for construction or diverted public traffic are established; • Disposal sites and haul routes will be identified and coordinated with local officials; • Construction vehicles will use temporary roads constructed for that purpose to minimize damage to agricultural land and local access roads. Where local roads are used, they will be maintained and reinstated to their original condition after the completion of work; • In case any road, facility, building etc. will be damaged due to the activities originating from the construction activities the necessary maintenance, improvement and compensation works will be done by the Contractor promptly in accordance with the responsible authority; • MUSKI will disclose construction plan to the public. This will help people to know when there will be interruptions in traffic and on which roads the access will be limited.	Contractor MUSKI Supervision Consultant	Included in construction costs	Construction Plan Public disclosure of road closures and diversions Traffic flow and patterns Number of complaints Number of road traffic accidents Number of drivers trained

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Cost	Key Performance Indicators
C10	Labor Force	Working Conditions	Adverse	Low	• Workers will be provided with documented information that is clear and understandable, regarding their rights under national labor law; including collective agreements, their rights related to hours of work, wages, overtime, compensation, and benefits as of start-up of working relationship and when any material changes occur, • Workers will not be discouraged from electing worker representatives, forming or joining workers' organizations of their choosing, or from bargaining collectively, and will not discriminate or retaliate against workers who participate, or seek to participate, in such organizations and collective bargaining, • Particular concern will be paid on principles of non-discrimination and equal opportunity. In this respect, employment decisions (i.e. recruitment and hiring, compensation, wages and benefits, working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices) will not be made on the basis of personal characteristics unrelated to job requirements. Wages, work hours and other benefits will be per the Turkish Labor Law, • A grievance mechanism defined in the SEP will be implemented to raise workplace concerns. The workers will be informed about the grievance mechanism at the time of recruitment and make it easily accessible to them. • A Code of Conduct will be defined by MUSKI and signed by all workers of the Project, including contractors and subcontractors before works start.	Contractor MUSKI Supervision Consultant	Included in construction costs	Workers' Grievance Records Presence of union or workers' representative Findings of Monitoring Report Labor/social security records
C11	Labor Force	Protecting the Workforce (including pandemic)	Adverse	Low	• Employment of child labor and forced labor will be prevented. • Contractors will be required to have age verification system, ensuring no one under 18 years old are involved in hazardous works as indicated in the LMP. • Stipulations of Ministry Circular on Covid-19 Measures to be taken at Construction Sites will be followed. • Guidance, directives and recommendations of Republic of Turkey Ministry of Health, Republic of Turkey Ministry of Family, Labor and Social Services, and World Health Organization shall be followed and all relevant necessary measures shall be taken in case of an outbreak of any other pandemic/communicable disease including COVID-19. • Preparation and implementation of site-specific contingency / emergency / crisis management / action plan regarding COVID-19 and any other pandemic/communicable disease risk. Contingency plans should consider arrangements for the storage and disposal arrangements for medical waste, which may increase in volume and which can remain infectious for several days (depending upon the material). To ensure that individuals roles and responsibilities are clear, contingency plans should be communicated widely. • Provide regular trainings to workers on COVID-19 symptoms, how to be protected and what to do when symptoms appear.	Contractor MUSKI Supervision Consultant	Included in construction costs	No child and forced labor
C12	Climate Change	Emission of GHG	Adverse	Low	• Construction operations of the project will be in line with good industrial practices. • Speed restrictions and equipment to optimize fuel efficiency will be adopted by construction vehicles. • Regular maintenance of construction vehicles and equipment will be applied. • Energy uses associated with construction vehicles and equipment will be monitored. • Trainings will be performed on project personnel regarding energy efficiency	Contractor MUSKI Supervision Consultant	Included in construction costs	Monitoring Result Findings Exhaust decal follow-up records
C13	Archaeological and cultural heritage	Chance finds	Adverse	Low	• As required by Article 4 of Law on the Conservation of Cultural and Natural Properties (2863 Numbered Law), chance finds procedure will be implemented during land preparation and construction works. In this content: - Construction works will be stopped immediately in case of finding any movable or immovable cultural asset by chance. - Related Civilian Authority or Museum Directorate will be informed latest in three days. - Works will not proceed until official notification is received	Contractor Supervision Consultant	No costs involved	Visual observation Official notification to authorities Number of chance finds Monitoring Report Findings

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Cost	Key Performance Indicators
C14	Labor Force	Occupational Health and Safety	Adverse	High	• An occupational health and safety engineer/expert should be appointed and an adequate OHS organizational structure should be defined, as per the national legislation. • A risk assessment should be done before commencing the works and personnel should be trained regarding any potential risks. • Project and site-specific OHS Management Plan based on construction site OHS risk assessment and that will also cover measures to address COVID-19 and/or any other pandemic/communicable disease risk, which will be in line with the WBG EHS guidelines (both general and sector specific) should be developed before the commencement of works and implemented on site. • An Emergency Preparedness and Response Plan based on construction site OHS risk assessment and covering also the issues about the contagious diseases as well as COVID-19 pandemic should be prepared. • Site implementations should be monitored by OHS Engineer, • All Project staff shall comply with the environmental, health and safety policies and guidelines. • Project staff will include first aid trained personnel. In case of emergency where an intervention is required, personnel will be sent to the nearest health centre by appropriate means. • The Contractor will maintain the sufficiency of the technical requirement of the machinery, equipment, and tools to be used in the activities. • Moving parts of machinery and equipment will be equipped with appropriate protective systems (e.g. metal shields etc.), minimizing the risk of injury or damage to the person using the machine or equipment. • Personal factors that may create and control risks during activities (e.g. long hair, jewellery and accessory use, clothing etc.) will be removed from the site by the regulations brought by the field management. Project staff will be informed about the relevant regulations within the scope of the training program. • Drivers and operators will be trained to comply with traffic rules and to control the vehicles and equipment they use against risks and hazards originating from vehicle traffic. Required traffic signs will be placed in the Project Site and its surroundings. Machine operators and other employees will be informed and alerted about the relevant signs. • Areas where excavation work is to be carried out will not be accessible other than the authorized personnel. The loading and unloading activities shall be carried out together with the persons to oversee the personnel to carry out the activity. • Since the works will be performed at areas close to the public, the public access to these areas shall be restricted by any means. If a trench needed to be left open for night, the sufficient illumination of the area shall be ensured by MUSKI and necessary signs shall be placed, and the area shall be enclosed with barriers. • Work areas will be equipped with warning signs (e.g. "Hazard", "Entry Prohibited", etc.) in accordance with the quality and potential risks of the work to be performed in that area. • Personal Protective Equipment will be provided for the workers according to the nature of work to be performed. The necessary trainings will be carried out for their use, • Smoking will be prohibited where the risks of fire is high and all necessary precautions will be taken in the Project Area to prevent possible fires from construction activities. All the workers will be informed about the action plan in case of a fire, • The relevant plans and procedures of the relevant Turkish legislation and the MUSKI will be complied within the OHS measures and practices. • Employees will be informed about the hazards that may cause from their work and thus a safer work environment will be created. • All equipment will be operated in proper working order, • The necessary health and safety signs and traffic signs will be placed around the project site. Employees will be informed and alerted about the subject matter markings, • Trainings will be given to employees and operational and maintenance personnel within the scope of the Regulation on Procedures and Principles of Occupational Health and Safety Trainings and measurement and evaluation activities will be carried out after the trainings, • Equipment that meets international standards in terms of performance and safety will be used at the plant, • Appropriate ventilation systems should be installed at where methane accumulation is expected, • In order to minimize the risks and hazards that may arise (e.g. natural disasters, accidents, equipment malfunctions etc.) on human health and safety, safe working environments in the working sites will be established and physical hazards and risks will be prevented. • Railings will be installed around all tanks and pits, • Confined Space Entry Procedure will be prepared in accordance with applicable national requirements and internationally accepted standards, • Trainings for operators who work with chemicals will be conducted regarding safe handling practices and emergency response procedures,	Contractor MUSKI Supervision Consultant	Included in construction costs	Incident Records Number of nonconformities Period of disease occurrence Number of personnel who are infected with an infectious disease Training records Work Permits Monitoring Report Findings H&S reports H&S meetings Emergency drills Grievance records

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Cost	Key Performance Indicators
					• Sufficient number of personal gas detection equipment will be provided for the employees, • Stipulations of Ministry Circular on Covid-19 Measures to be taken at Construction Sites will be followed. • Incidents or accidents related to the Project will be notified and reported in line with the national and WB's standards and all incidents will be registered. • In the event of any significant incident or accident (e.g. environmental, social, labor or lost-time incidents) the Contractor shall immediately notify MUSKI and MUSKI shall inform ILBANK and WB within three business days. Then, within 30 days, a report on the root causes of the incident and the corrective actions to be taken will be presented to ILBANK and WB. • MUSKI will ensure that the contractors will have code of conduct (CoC) and this CoC will be signed during the start of the work. Employees should be trained/informed on the rules that apply on site grounds in particular to interaction with local community • Where a worker may be exposed to any chemical, physical or biological hazard to such an extent that her/his health may be adversely affected, appropriate preventive measures shall be taken, including: o Replacing dangerous goods with harmless or less dangerous substances where possible o Applying technical measures to the plant, machinery, equipment or process o Where it is not possible to comply with above measures, applying other effective measures, including the use of personal protective equipment and protective clothing • Where workers are required to enter any area in which a toxic or harmful substance may be present, or in which there may be an oxygen deficiency, or a flammable atmosphere, adequate measures shall be taken to guard against danger. • The wastes will not be destroyed or disposed of in a way that is harmful to health in the construction site.			
C15	Labor Force	Workers Engaged by Third Parties and the Supply Chain	Adverse	Low	• Subcontractors will be reputable and legitimate enterprises and have an appropriate ESMS that will allow them to operate in a manner consistent with the labor conditions requirements, • The performance of subcontractors will be monitored such that human rights policy and labor rights of all workers are exercised properly, • The workers of subcontractors will have access to the overall grievance mechanism to be established for the Project.	Contractor MUSKI Supervision Consultant	Included in construction costs	Sub-contractor Agreements Grievance Records Monitoring Report Findings
C16	Landscape and Visual (Aesthetics)	Nuisance for the People	Adverse	Medium	• The construction works will be limited to day time only. • The construction plan will be disclosed to the public.	Contractor Supervision Consultant	No costs involved	Visual observation Monitoring Report Findings
C17	Community Health and Safety	General construction related impacts on community	Adverse	Low	• A Community Health, Safety, and Security Management Plan that is in line with WBG OP/BP 4.01 Environmental Assessment and WBG EHS Guidelines (both general and sector specific) will be developed by the construction contractor	Contractor Supervision Consultant	Included in construction costs	Incident records Grievance records
C18	Community Health and Safety	Encroachment	Adverse	Low	• Community Health, Safety, and Security Management Plan that is in line with WBG OP/BP 4.01 and WBG EHS Guidelines (both general and sector specific) will be developed by MUSKI or security services provider before the construction phase. MUSKI and contractor will ensure that the plan is actively implemented. • Persons and/or organizations with the necessary permits will be assigned to ensure the security of the Project Area (e.g. private security companies/officials). These persons and/or organizations shall regularly monitor the facility and its surroundings. The special security applications and officials' authorities within the scope of the project shall comply with the provisions of the Regulation on the Implementation of the Law on Private Security Services and the Law on Private Security Services. • In addition to safety personnel, monitoring of the Project Site for security purposes will be provided by a closed circuit camera system which will be installed at appropriate distances on the site boundary (e.g. 30-40 meters) to provide daytime and night-time monitoring of the whole area. • Entry of staff and third parties into the working site will be carried out in a controlled manner from the doors at which authorized security personnel will work.	Contractor MUSKI Supervision Consultant	Included in construction costs	Active CCTV system Security reports Visitor logs

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Cost	Key Performance Indicators
C19	Stakeholder Engagement	Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment	Adverse	Low	• All details of the Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) survivors will be kept strictly confidential in the Grievance Register Database; and • The GM Officer will not ask for, or record, information on more than the following related to the GBV and SEA/SH allegation: - The nature of the complaint (what the complainant says in her/his own words without direct questioning); - If, to the best of the survivor's knowledge, the perpetrator was associated with the project; and - If possible, the age and sex of the survivor. - The GM officer would be responsible to share the service providers (provincial directorate of family and social services, municipality's or local NGOs' women and care centers with the survivor - The GM officer would direct the case to the legal authorities as per the national legislation in the country, with the consent of the survivor	Contractor MUSKI Supervision Consultant	Included in construction costs	Grievance records
C20	Socioeconomic Environment	Impacts on Tourism and Local Businesses	Adverse	Low	• At the beginning of construction activities, a MUSKI Representative will conduct face to face meetings with the tourism enterprises and local businesses in order to inform them about the usage of grievance mechanism for the cases of significant income losses. • The construction activities around the tourism enterprises will be performed at off-season (October 15-May 15), as much as possible.	Contractor MUSKI Supervision Consultant	Included in construction costs	Grievance records Construction schedule

Table VII.2 Operation Phase Impact Mitigation Plan

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Costs	Key Performance Indicators
O1	Odor	Odor nuisance	Adverse	Medium	An Odour Management Plan will be prepared and implemented that offers strategies to ensure the following especially at the WWTP site: The first level measures: • Prevention of wastewater influents which exceed treatment plant capacity. • Reduction of solid waste and activated sludge amounts. • Increasing disposal frequency of screenings. • Proper and timely disposal of sludge to prevent flies and odour. • Increasing aeration rate in biological treatment process. • Addition of chlorinated water to sludge thickeners if activated sludge is in open area. • Addition of lime to activated sludge. • Keeping water level under control in order to prevent turbulence as a result of instant decrease of water. If odour nuisance prevails after the proper implementation of first level measures, the second level measures shall be taken. These are: • Addition of oxidizing material (such as hydrogen peroxide, sodium hypochloride) (oxidizing materials, prevent generation of especially hydrogen sulphide). Addition of sodium hydroxide can also be considered. Sodium hydroxide will dissolve hydrogen sulphur gas in water. • Preventing anaerobic bacteria with control of pH levels or disinfection. • Oxidizing odorous compound by the help of chemicals. • Planting trees in the WWTP site and the buffer zone around the treatment plant for the prevention of odour distribution. If nuisance still prevails after implementation of first and second measures, the final measure shall be determined as: • Enclosing of preliminary treatment units, aeration tanks and bio-P tanks Apart from that, following mitigation measures will be implemented throughout the Project. • Establishment of an operating grievance mechanism to manage odor related grievances. • Maintaining pipelines and ensuring effective management and operation of the sewerage system including effective maintenance of all elements of the sewerage system and rapid response to emergencies. • Regular maintenance and cleaning works shall be conducted on the machinery and equipment in order to prevent occurrence of odor. • Regular and sufficient ventilation at the pumping stations will be provided. • Trees will be planted around the pumping station areas.	MUSKI	Included in the operational costs	Grievance Records Odor Measurement Results Monitoring Report Findings
O2	Noise	Increase in noise levels	Adverse	Low	• During the procurement of equipment and machinery, sound levels given in the technical specifications/data sheet will be taken into consideration, • Relevant provisions and limit values of national legislations and World Bank Group's General EHS Guidelines and Sectorial Guidelines will be complied with during the operation phase. • Equipment generating noise during the operation of the plant will be located in isolated closed buildings and some of them will be submerged in wastewater, if necessary. • All pumping stations will be built underground and building materials that provide sound insulation will be used. • Natural noise barriers such as trees will be planted particularly to the east and south borders of the WWTP and around the pumping stations.	MUSKI	Included in the operational costs	Noise Measurement Results Grievance Records Monitoring Report Findings

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Costs	Key Performance Indicators
O3	Water Resources	Sewage Overflows Discharge of treated effluent	Adverse	Low	A Water Resources and Effluent Management Plan shall be prepared and implemented that includes measures and procedures for operational activities. • Broken pipes and other repairs to be undertaken without delay, • Pumps and pumping stations to be adequately maintained, • All storage tanks and drums will be placed on concrete areas with proper secondary containments. When necessary; spill kits, absorbent pads or materials and adsorbent sands will be provided near the chemical storage areas at all times. • System overflows will be prevented as much as possible by using level meters, • Bypass of the treatment system will be minimized • Effluent water quality of the WWTP will comply with the limit values stipulated in the Urban Wastewater Treatment Regulation and World Bank Group's General EHS Guidelines and Sectorial Guidelines, • An Emergency Response and Preparedness Plan to be developed and implemented • The water quality of Hanay Creek will be monitored regularly, and if deemed, necessary further mitigation measures will be developed. • MUSKI will search options to increase the effluent water quality based on the assimilative capacity of the receiving body, if needed.	MUSKI	Included in the operational costs	Incident Records Monitoring Report Findings Hanay Creek monitoring results Results of further researches
O4	Solid Waste	Waste and solid generation	Adverse	Low	A Sludge Management Plan and a Waste Management Plan that are both in line with WB Operational Policies and WBG EHS Guidelines (both general and sector specific) will be prepared and implemented that cover the following: • Wastes to be generated within the scope of the Project will be managed in accordance with the waste management hierarchy. • Wastes will only be temporarily stored on site and final disposal will be carried out outside the facility. • Waste recycling, transport and disposal will be carried out by means of licensed companies and/or related municipalities. • Incineration or burying of wastes by any means at site and/or dumping of wastes to nearby roads or water resources will absolutely not be in question. • All kinds of implementations that may threaten personnel or public health will be avoided in all activities involving collection, temporary storage, transport and disposal of wastes throughout the Project. • Wastes to be temporarily stored on site will be delivered to licensed transport vehicles appropriate to the type of waste for disposal. Information related to the operations in this context will be recorded and the records will be kept in the administrative building. • After stabilization and dewatering, the excess sludge will be analysed to determine compliance with the Annex-2 of the Regulation on Landfilling of Wastes and if it is deemed appropriate, the sludge will be collected by the licensed disposal companies determined by MUSKI every year. After that, the sludge will be disposed in accordance with the provisions of Urban Wastewater Treatment Regulation and other relevant legislation. According to the information retrieved from MUSKI, the sludge will be transported by competent and licensed firms to the landfill which has enough capacity. Sludge will be stored in the landfill. • If sludge would be determined as hazardous, the sludge will be sent to Anadolu Tehlikeli Atik Depolama Sanayi ve Ticaret A.Ş. for disposal by competent and licensed firms. • Hazardous or non-hazardous inscription, waste code, stored waste amount and storage date will be indicated/labelled on wastes temporary stored by classifying according to their properties. The reaction of wastes with each other will be prevented by the measures (impermeable base, drainage, top cover, different compartments based on type of wastes, etc.) taken in the Temporary Storage Area. • More sustainable alternatives for sludge disposal will be researched by MUSKI.	MUSKI	Included in the operational costs	Proper temporary waste storage are on site and related storage records Type and amount of wastes generated including sludge Waste Disposal Agreements and Records Waste Grievance Records Monitoring Report Findings Waste segregation practices (amount of waste per type)
O5	Labor Force	Working Conditions	Adverse	Low	• Workers will be provided with documented information that is clear and understandable, regarding their rights under national labor law; including collective agreements, their rights related to hours of work, wages, overtime, compensation, and benefits as of start-up of working relationship and when any material changes occur, • Workers will not be discouraged from electing worker representatives, forming or joining workers' organizations of their choosing, or from bargaining collectively, and will not discriminate or retaliate against workers who participate, or seek to participate, in such organizations and collective bargaining, • Particular concern will be paid on principles of non-discrimination and equal opportunity. In this respect, employment decisions (i.e. recruitment and hiring, compensation, wages and benefits, working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices) will not be made on the basis of personal characteristics unrelated to job requirements. Wages, work hours and other benefits will be per the Turkish Labor Law, • A grievance mechanism for workers will be provided to raise workplace concerns. The workers will be informed about the grievance mechanism at the time of recruitment and make it easily accessible to them.	MUSKI	Included in the operational costs	Workers' Grievance Records Presence of union or workers' representative Findings of Monitoring Report Labor/social security records
O6	Labor Force	Protecting the Workforce	Adverse	Low	• Employment of child labor and forced labor will be prevented. • MUSKI will be required to have age verification system, ensuring no one under 18 years old are involved in hazardous works as indicated in the LMP. • Stipulations of Ministry Circular on Covid-19 Measures to be taken at Construction Sites will be followed.	MUSKI	Included in the operational costs	No child and forced labor

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Costs	Key Performance Indicators
O7	Labor Force	Workers Engaged by Third Parties and the Supply Chain	Adverse	Low	• Subcontractors will be reputable and legitimate enterprises and have an appropriate ESMS that will allow them to operate in a manner consistent with the labor conditions requirements, • The performance of subcontractors will be monitored such that human rights policy and labor rights of all workers are exercised properly, • The workers of subcontractors will have access to the overall grievance mechanism to be established for the Project.	MUSKI	Included in the operational costs	Grievance Records Monitoring Report Findings
O8	Climate Change	Emission of GHG	Adverse	Low	• Operations of the project will be in line with good industrial practices. • Trainings will be performed on project personnel regarding energy efficiency.	MUSKI	Included in the operational costs	Monitoring Result Findings
O9	Landscape and Visual (Aesthetics)	The existence of the Treatment Plant and pumping stations	Adverse	Low	• It is recommended MUSKI to plant trees at the borders of the plant • MUSKI should paint the visible buildings to colours suits to the background. • Landscaping of pumping stations will be conducted compatible with the existing landscape of the park areas and trees will be planted, as appropriate.	MUSKI	Included in the operational costs	Monitoring Report Findings
O10	Community Health and Safety	Community's exposure to disease due to improper handling of wastes, including sludge Failure of operation	Adverse	High	• Generated wastes will be managed as described in the Waste Management Plan. Uncontrolled disposal of wastes is forbidden and all wastes will be sent to final disposal and/or recycle by licensed companies. • Generated sludge will be collected in impermeable containers and will be sent to final disposal based on the characteristics of the sludge, in accordance with the Sludge Management Plan. Uncontrolled sludge disposal is forbidden. • All unit shutdown requirements will be scheduled at least one week beforehand and MUSKI will make necessary adjustments. • In major shutdowns of the plant or biological treatment units that require longer times, nutrition levels will be maintained at the biological treatment units, aeration will be stopped after one day for aerobic processes. Recirculation will be turned down for anaerobic processes, and pH regulation and nutrient dosing will be conducted only when the gas production is less than 10% of the original gas production. • During the longer shutdowns or failures, MUSKI will inform Provincial Directorate of Environment, Urbanisation and Climate Change regarding the situation. • During excessive loads that the WWTP cannot handle, the bypass line of the existing plant will be used to bypass the load.	MUSKI	Included in the operational costs	Monitoring Report Findings Period of disease occurrence Training records Grievance records
O11	Community Health, Safety and Security	Community encroachment	Adverse	Low	• Community Health, Safety, and Security Management Plan that is in line with WBG OP/BP 4.01 and WBG EHS Guidelines (both general and sector specific) will be developed by MUSKI or security services provider before the commencement of operation phase. MUSKI will ensure that the plan is actively implemented. • Persons and/or organizations with the necessary permits will be assigned to ensure the security of the Project Area (e.g. private security companies/officials). These persons and/or organizations shall regularly monitor the facility and its surroundings. The special security applications and officials' authorities within the scope of the project shall comply with the provisions of the Regulation on the Implementation of the Law on Private Security Services and the Law on Private Security Services. • The entrance to the existing WWTP will continue to be restricted through strengthening security procedures such as repair of existing fences, installation of security cameras at key access points and use of a site visitor register. • Sufficient lighting of the WWTP will be ensured.	MUSKI	Included in the operational costs	Active CCTV system Security reports Visitor logs
O12	Community Health and Safety	Electrocution from Energy Transmission Lines	Adverse	Low	• Regular vegetation clearance and maintenance requirements of the energy transmission line route will be carried out while communicating with the related authority.	MUSKI	Included in the operational costs	Incident Records Monitoring Report Findings

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Costs	Key Performance Indicators
O13	Labor Force	Occupational and Community Health and Safety	Adverse	Medium	• All Project staff shall comply with the environmental, health and safety policies and guidelines. • Private security officers will be hired in order to provide the security of the plant. The special security applications within the scope of the Project, and the competent authorities shall be in compliance with the provisions of the Law on Private Security Services and the Implementation of the Law on Private Security Services; • Personal Protective Equipment will be provided for the workers according to the nature of work to be performed. The necessary trainings will be carried out for their use. • Smoking will be prohibited where the risks of fire is high. All the workers will be informed about the action plan in a case of fire. • All equipment will be operated in proper working order. • Procedures approved by the MUSKI in the maintenance and repair activities and the requirements of the technical specifications of the supplier companies will be complied with. • The necessary health and safety signs and traffic signs will be placed. Employees will be informed and alerted about the subject matter markings. • Trainings will be given to employees and operational and maintenance personnel within the scope of the Regulation on Procedures and Principles of Occupational Health and Safety Trainings and measurement and evaluation activities will be carried out after the trainings. • Equipment that meets international standards in terms of performance and safety will be used. • Appropriate ventilation systems should be installed at where methane accumulation is expected. • MUSKI will distribute sufficient number of personal gas detection equipment to its employees. • MUSKI will advise individuals with asthma, diabetes, or suppressed immune systems not to work at the confined spaces due to greater risk of infection. • MUSKI will ensure the compliance of all the activities with national standards and WBG EHS Guidelines. • All pandemic outbreak measures recommended by Ministry of Health will be taken. • In order to minimize the risks and hazards that may arise (e.g. natural disasters, accidents, equipment malfunctions etc.) on human health and safety, safe working environments in the working sites will be established and physical hazards and risks will be prevented. • The relevant plans and procedures of the relevant Turkish legislation and the MUSKI will be complied within the OHS measures and practices. • Work areas will be equipped with warning signs (e.g. "Hazard", "Entry Prohibited", etc.) in accordance with the quality and potential risks of the work to be performed in that area. • All necessary precautions will be taken in the Project Area to prevent possible fires from maintenance and operation activities. • Project staff will include first aid trained personnel. In case of emergency where an intervention is required, personnel will be sent to the nearest health centre by appropriate means. • MUSKI will maintain the sufficiency of the technical requirement of the machinery, equipment, and tools to be used in the activities. • Moving parts of machinery and equipment will be equipped with appropriate protective systems (e.g. metal shields etc.), minimizing the risk of injury or damage to the person using the machine or equipment. • Personal factors that may create and control risks during activities (e.g. long hair, jewellery and accessory use, clothing etc.) will be removed from the site by the regulations brought by the field management. Project staff will be informed about the relevant regulations within the scope of the training program. • Drivers and operators will be trained to comply with traffic rules and to control the vehicles and equipment they use against risks and hazards originating from vehicle traffic. Required traffic signs will be placed in the Project Site and its surroundings. Machine operators and other employees will be informed and alerted about the relevant signs. • The wastes to be generated within the scope of the construction phase of the Project will be managed under the Waste Management Regulation and the negative impacts on public health will be minimized. • Areas where excavation work is to be carried out will not be accessible other than the authorized personnel. The loading and unloading activities shall be carried out together with the persons to oversee the personnel to carry out the activity. • In addition to safety personnel, monitoring of the WWTP site for security purposes will be provided by a closed circuit camera system that will be installed at appropriate distances on the site boundary (e.g. 30-40 m) to provide daytime and night-time monitoring of the whole area. • Since the maintenance works for sewerage network will be performed at areas close to the public, the public access to these areas shall be restricted by any means. If a trench needed to be left open for night, the sufficient illumination of the area shall be ensured by MUSKI and necessary signs shall be placed, and the area shall be enclosed with barriers.	MUSKI	Included in the operational costs	Incident Records Period of disease occurrence Number of personnel who are infected with an infectious disease Number of nonconformities Training records Work Permits Monitoring Report Findings H&S reports H&S meetings Emergency drills Grievance records

No.	Topic	Definition of Potential Impact	Type of Impact	Impact Significance Before Mitigation	Measures to be Taken	Responsibility	Costs	Key Performance Indicators
					• Entrance of operation and maintenance personnel and third parties will be carried out in a controlled manner. • After the plant is constructed, necessary electrical test will be carried out to check that the electrical connections and other related equipment are made properly before the plant is taken into operation. • Automatic cleaning screens should be used instead of manually cleaning screens to prevent entrance of cleaning workers into the channels. • Railings will be installed around all tanks and pits. • MUSKI will prepare a Confined Spaces Entry Procedure that is consistent with WBG EHS Guidelines and applicable national requirements. • MUSKI will conduct trainings for operators who work with disinfectants regarding safe handling practices and emergency response procedures. • The whole WWTP site will be fenced, the access of local people and wildlife will be controlled and encroachment will be prevented. The entry of personnel and third parties into the facility will be carried out in a controlled manner. • OHS Management Plan will be prepared before the commencement of the WWTP that will also cover measures to address COVID-19 and/or any other pandemic/communicable disease risk. • An adequate OHS organizational structure will be defined, as defined by the local legislation and necessary number of OHS officers should be assigned to be at the site during working hours. • A risk assessment will be done before commencing the works and personnel will be trained regarding any potential risks. • OHS Personnel will daily inspect the site and if any additional risk is observed relevant plans and trainings will be renewed. • Emergency Preparedness and Response (EPR) Plan to cover the issues about the contagious diseases as well as COVID-19 pandemic will be prepared and implemented. • MUSKI will ensure that the contractors will have code of conduct (CoC) and this CoC will be signed during the start of the work. Employees should be trained/informed on the rules that apply on site grounds in particular to interaction with local community.			
O14	Stakeholder Engagement	Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment	Adverse	Low	• All details of the Gender-Based Violence (GBV) and Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) survivors will be kept strictly confidential in the Grievance Register Database; and • The GM Officer will not ask for, or record, information on more than the following related to the GBV and SEA/SH allegation: - The nature of the complaint (what the complainant says in her/his own words without direct questioning); - If, to the best of the survivor's knowledge, the perpetrator was associated with the project; and - If possible, the age and sex of the survivor. - The GM officer would be responsible to share the service providers (provincial directorate of family and social services, municipality's or local NGOs' women and care centers with the survivor - The GM officer would direct the case to the legal authorities as per the national legislation in the country, with the consent of the survivor	MUSKI	Included in operation costs	Grievance records

VII.2 Monitoring Plan

In order to ensure the continuity and effectiveness of the implementation of mitigation management strategies defined, monitoring plays a key role. The main objective of the Monitoring Plan is to provide a basis for the evaluation of the impacts of the Project.

Information collected with the monitoring can be used to improve management plans during all phases of the Project. While impact assessment attempts to encompass all relevant potential impacts to identify their significance and include appropriate responses for these impacts, unanticipated impacts may still arise, which can be managed or mitigated before they become a problem using the information obtained through monitoring. Therefore, monitoring will ensure the successful implementation of the mitigation/management plans and optimize environmental protection through good practice at each and every stage of the Project.

Consequently, monitoring studies will provide implementation of impact mitigation measures and optimization of environmental protection by using best practices at the all stages of the Project.

Some of the monitoring parameters are determined in the scope of engineering design studies. Monitoring studies will ensure the accordance with the relevant legislation, contract necessities and implementation of impact mitigation measures.

Monitoring activities are submitted in tabular form in Table VII.3 and Table VII.4.

Table VII.3 Land Preparation and Construction Phase Monitoring Plan

No.	Subject	Which parameters shall be monitored?	Why the parameters shall be monitored?	Where the parameters shall be monitored?	How the parameters shall be monitored?	When the parameters shall be monitored?	Costs	Responsibility
C1	Storage and usage of excavation waste	Amount of refilled, stored, and disposed excavation materials Amount of stripped and reused topsoil by indicating reuse locations Storage conditions of topsoil (humidity and pile height)	To assess the efficiency of the waste management	Construction site and storage areas	Visual observation Records	Once in a week starting from the initialization of land preparation and construction phase	Included in construction cost	Contractor MUSKI
C2	Storage and usage of chemicals	Conditions of the storage area Number of leaks, spills, etc.	To see if the chemicals are handled in a proper way	Storage areas	Visual observation Site inspections Environmental incident registry	Once in a week starting from the initialization of land preparation and construction phase	Included in construction cost	Contractor MUSKI
C3	Soil pollution	Soil quality, including, pH, heavy metals, phosphorus, nitrogen, Na, Ca, salts, PAHs hydrocarbons Number of oil/fuel and chemical leakages/spills	To assess if there are any pollution/ contamination in the soils	Work sites and storage areas	Sampling and analysis Spot checks Grievance registration Environmental incident registry	Upon grievance and any contamination observed during spot checks Once prior to initialization of land preparation and construction phase Once in a week starting from the initialization of land preparation and construction phase	Included in construction cost	Contractor MUSKI

No.	Subject	Which parameters shall be monitored?	Why the parameters shall be monitored?	Where the parameters shall be monitored?	How the parameters shall be monitored?	When the parameters shall be monitored?	Costs	Responsibility
C4	Wastes	Amount of waste generated per types	To record the waste categories and amounts	Construction site, storage areas, and administration office	Visual observation Waste records Site inspections Disposal truck register	Once in a week starting from the initialization of land preparation and construction phase	Included in construction cost	Contractor MUSKI
C5	Air Quality	Settled dust and PM10/2.5 Maintenance records of all machinery and equipment	To assess the air quality	Nearest sensitive receptors for measurements (Nearest resident)	Sampling/analysis Maintenance records	Quarterly starting from the initialization of construction phase Upon grievance (for settled dust and PM10/2.5)	Included in construction cost	Contractor MUSKI
C6	Noise	Noise levels	To assess the noise levels	At the complainants house/workplace	Noise level measurements	Upon grievance	Included in construction cost	Contractor MUSKI
			To assess the noise levels	At Mugla Sitki Kocman University Fisheries Research and Development Center	Noise level measurements	Quarterly starting from the initialization of construction phase	Included in construction cost	Contractor
C7	Water Resources	Surface water / groundwater quality analysis and measurements that include spill-related pollutants	To assess if there are any discharge of pollutants to the surface waters	At related water body (wells, surface water bodies, etc.)	Sampling and in situ / laboratory measurements Spill notices/correspondences to authorities in case of major spills	In case of a major spill In case of a leak/spill reaches to water resources	Included in construction cost	Contractor MUSKI

No.	Subject	Which parameters shall be monitored?	Why the parameters shall be monitored?	Where the parameters shall be monitored?	How the parameters shall be monitored?	When the parameters shall be monitored?	Costs	Responsibility
			To establish baseline data	At related groundwater body (wells etc.) At Hanay Creek: • Upstream of the discharge point • Downstream of the discharge point	Sampling and in situ / laboratory measurements	Seasonally starting from pre-construction works		Contractor
C8	Traffic	Traffic flow and patterns Number of complaints Number of road traffic Accidents Number of drivers trained Records of safe-driving training for all Project proponents and their main suppliers	To assess the project caused effects on the traffic	Access roads, and work site and its vicinity	Accident records	Monthly starting from the initialization of land preparation and construction phase	Included in construction cost	Contractor MUSKI
C9	Chance Finds	Number of chance finds	To protect and conserve the cultural heritages	On and around the working location	Visual observation Official notification to authorities	Daily basis starting from the initialization of land preparation and construction phase	Included in construction cost	Contractor MUSKI

No.	Subject	Which parameters shall be monitored?	Why the parameters shall be monitored?	Where the parameters shall be monitored?	How the parameters shall be monitored?	When the parameters shall be monitored?	Costs	Responsibility
C10	Grievances	Number of received grievances Number of open and closed grievances Average grievance response and closure time Variety of grievance channels	To assess the success in responding the needs of PAPs	Administration office	Grievance records (grievance log, received grievance forms, etc.) Grievances related to the GBV and SEA/SH allegation	Monthly during the construction phase	Included in construction cost	Contractor MUSKI
C11	Community conflicts	Number of conflicts	To see if there are any conflicts with the community	Administration office	Grievance records Conflicts with security personnel and workers of the Project	Upon grievances and events starting from the initialization of the Project	Included in construction cost	Contractor MUSKI
C12	Occupational Health and Safety	Number of accidents/Injuries Number of nonconformities Period of disease occurrence Number of personnel who are infected with an infectious disease	To evaluate the project in terms of OHS implementations	Construction site	Visual observation Site inspection Incident Records Training Records Work Permits	Daily basis starting from the initialization of land preparation and construction phase	Included in construction cost	Contractor MUSKI
C13	Job creation and impacts on local businesses	Number of employed person from the local community Business growth/increase in income for local communities	To record the job related effects of the Project	Oren and its vicinity	Employment records Procurement records Inspection	Prior to construction and during construction	Included in construction cost	Contractor MUSKI

No.	Subject	Which parameters shall be monitored?	Why the parameters shall be monitored?	Where the parameters shall be monitored?	How the parameters shall be monitored?	When the parameters shall be monitored?	Costs	Responsibility
C14	Access restriction, disruption of tourism and business activities	Number of affected business owner Loss of income from access restrictions	To assess if there are any impacts on local businesses and tourism	In the vicinity of the work sites	Face-to-face meetings with business owners and field surveying Grievance Registration	At the beginning of construction activities Once in a month starting from the initialization of land preparation and construction phase Upon grievance	Included in construction cost	MUSKI
C15	Environmental hygiene	Quantity and conditions of cleaning tools First aid box Number of infectious and contamination cases	To keep the general hygiene and health conditions on a healthy level	Within and around the work sites	Visual observation Health records of workers Grievance Registration	Once in a week starting from the initialization of land preparation and construction phase Upon grievance	Included in construction cost	Contractor MUSKI
C16	Impacts on infrastructure	Complaints to Utility Service Providers	To prevent any potential harm on the infrastructure	Work sites (excavated areas)	Grievance Registration Meetings with service providers	Monthly during excavation works Upon grievance	Included in construction cost	Contractor MUSKI
C17	Labor Force	Local employment	To monitor improper working conditions, child labor, forced labor and unregistered employment	Administration office	Employment records Grievance records	Quarterly starting from the operation phase of the Project	Included in construction cost	Contractor MUSKI

No.	Subject	Which parameters shall be monitored?	Why the parameters shall be monitored?	Where the parameters shall be monitored?	How the parameters shall be monitored?	When the parameters shall be monitored?	Costs	Responsibility
C18	Encroachment	Community encroachment cases	To control if community encroachment is prevented	Administration office	Security reports Visitor logs	Weekly during the construction phase	Included in construction cost	Contractor MUSKI
		Condition of CCTV system			System checks	Daily during the construction phase		

Table VII.4 Operation Phase Monitoring Plan

No.	Subject	Which parameters shall be monitored?	Why the parameters shall be monitored?	Where the parameters shall be monitored?	How the parameters shall be monitored?	When the parameters shall be monitored?	Cost	Responsibility
O1	Storage and usage of chemicals	Conditions of the chemical and disinfectant storage area Maintenance records of chemical dosing system Number of leaks, spills, etc.	To see if the chemicals are handled in a proper way	Storage areas	Visual observation Chemical dosing system checks	Daily basis starting from the initialization of the operation phase of the Project	Included in operation cost	MUSKI
O2	Wastes	Type and amount of wastes generated including sludge	To record the waste categories and amounts	Treatment plant site, storage areas and administration office	Visual observation Waste Records Site inspections	Weekly basis starting from the initialization of the operation phase of the Project	Included in operation cost	MUSKI
O3	Odor	Odor level	To assess the impacts of the odor on the vicinity	Nearest sensitive receptors At pumping stations Manholes Close vicinity of the WWTP Close vicinity of the pumping stations	Grievance records Site Inspection Sampling/analysis/measurement	Upon grievance	Included in operation cost	MUSKI
O4	Noise	Noise level	To assess the noise levels	Nearest sensitive receptors or At the complainant's house/workplace	Noise measurement	Upon grievance Once in a year	Included in operation cost	MUSKI

No.	Subject	Which parameters shall be monitored?	Why the parameters shall be monitored?	Where the parameters shall be monitored?	How the parameters shall be monitored?	When the parameters shall be monitored?	Cost	Responsibility
O5	Surface Water Quality	At least the following: pH, EC, BOD, COD, TN, TP, TSS, Total Coliform, Fecal Coliform, E.coli	To assess if there are any discharge of pollutants to the surface waters	At planned Oren WWTP's: • Discharge point • Upstream of the discharge point • Downstream of the discharge point	In-situ measurements Laboratory analysis and measurements	Monthly starting from the commencement of the operation of Milas-Oren WWTP	Included in operation cost	MUSKI
O6	Effluent water quality	Legislation applicable parameters, and parameters to be followed according to the WBG guidelines	To assess the efficiency of the treatment	Oren WWTP discharge unit	Automatic measurement for relevant parameters, and laboratory analysis for others	Continuous monitoring for the detectable by automation measurement device Weekly basis for others	Included in operation cost	MUSKI
O7	Grievances	Number of received grievances Number of open and closed grievances Average grievance response and closure time Variety of grievance channels	To assess the success in responding the needs of PAPs	Administration office	Grievance records (grievance log, received grievance forms, etc.) Grievances related to the GBV and SEA/SH allegation	Quarterly during the operation phase	Included in operation cost	MUSKI
O8	Community conflicts	Number of conflicts	To see if there are any conflicts with the community	Administration office	Grievance records Conflicts with security personnel and workers of the Project	Upon grievance and/or incident	Included in operation cost	MUSKI

No.	Subject	Which parameters shall be monitored?	Why the parameters shall be monitored?	Where the parameters shall be monitored?	How the parameters shall be monitored?	When the parameters shall be monitored?	Cost	Responsibility
O9	Failure of operation	Number and duration of unit/plant shutdowns	To control if the provisions given in ESIA are managed properly	Administration office	Shutdown/failure reports	Weekly during operation phase	Included in operation cost	MUSKI
		Amount of discharge during shutdown/failure			Measurements	During each shutdown/failure		
O10	Occupational Health and Safety	Number of accidents/Injuries Number of nonconformities Period of disease occurrence Number of personnel who are infected with an infectious disease	To evaluate the project in terms of OHS implementations	Worksites	Visual observation Site inspection Incident Records Training Records Work Permits	Daily basis starting from the initialization of the operation phase of the Project	Included in operation cost	MUSKI
O11	Community Encroachment	Community encroachment cases	To control if community encroachment is prevented	Administration office	Security reports Visitor logs	Weekly during operation phase	Included in operation cost	MUSKI
		Condition of CCTV system			System checks	Daily during operation phase		
O12	Electrocution from Energy Transmission Lines	Number of accidents/Injuries	To control if the provisions given in ESIA are managed properly	Energy Transmission Line Route	Visual observation Site inspection Incident Records	Weekly during operation phase	Included in operation cost	MUSKI
O13	Labor Force	Employment data	To keep the records of employment	Administration office	Employment records Grievance records	Quarterly starting from the operation phase of the Project	Included in operation cost	MUSKI

VII.3 Institutional Arrangements

Main responsible organization for implementation of this ESMP is MUSKI. Besides, on different phases of the Project, various parties (Contractors, Ilbank, WB etc.) will take responsibility on various works in the scope of the ESMP. All mentioned works will be coordinated by the MUSKI. Mitigation management and monitoring tables, which are given in this ESMP, summarize relevant responsibilities.

In that scope, it is suggested to add below mentioned liabilities to tender documents of any possible contractor(s):

- Technical characteristics of the ESMP
- Environmental, social, and health and safety liabilities
- Other environmental and social issues that can show-up

VII.3.1 Environmental and Social Management Structure

As the possible impacts of the Project are varied according to the land preparation and construction, and operation phases and/or impact levels are different, environmental and social management is assessed separately. ESMP consists of three main components in that scope, which are as follows:

- Mitigation Management Plan
- Monitoring Plan
- Monitoring Report

Graphical representation of the environmental and social management structure is given in the figure below.

Figure VII.1 Environmental and Social Management Structure

VII.3.2 Roles and Responsibilities

MUSKI holds ultimate responsibility for the environmental and social performance of the overall Project, including the technical performance of its contractors and any other subcontractors. Organizational structure of the MUSKI is provided in Figure VII.2. Within this regard, the Wastewater Project Chiefship, which is under the Plan Project Investment and Construction Department, Planning and Investment Branch Directorate, will be the responsible unit from the implementation and monitoring of the Project. MUSKI's environmental engineer who is under the Wastewater Project Chiefship and currently responsible from conducting, managing and monitoring environmental and social subjects within the projects funded by the World Bank, will act as the Environmental Manager of this Project, will oversee the implementation of the ESMP and monitoring progress. The environmental engineer will be supported by environmental and social consultants, when necessary. Environmental engineer will appoint a representative in the treatment plant to lead the development of this ESMP, and site implementation of it.

In addition, MUSKI's social expert who will be employed under Wastewater Project Chiefship for this Project, will act as the Social Affairs Manager of this Project, and will manage the social issues determined in the ESIA Report, this ESMP, and their monitoring progress. The social expert will also manage the grievance mechanism and stakeholder engagement.

However, if necessary, additional coordination team within MUSKI will be established. Overall, MUSKI is highly experienced in the internationally financed projects.

Supervision consultant will include at least one Environmental Expert, one Social Expert and one Occupational Health and Safety Expert. Within this context, obligation to employ an OHS specialist/expert will be added to the contractual requirements of Supervision Consultant. Number of experts will be increased if necessary. Supervision Consultant will provide supervision of construction and/or rehabilitation works and installation of equipment. The expert will identify and manage environmental, social and OHS related risks and initiate corrective actions where necessary. The expert will also monitor and evaluate performance of services provided by the contractor. In addition, regular monthly report regarding to environmental, social and OHS issues of the Project during construction phase will be provided by Supervision Consultant.

ILBANK, being the financial intermediary, is responsible for the satisfactory implementation of the project including the environmental and social performance. The regional directorate of ILBANK in Mugla will act as controller of the project compliance during construction period and will work closely with the MUSKI for the successful accomplishment of the project.

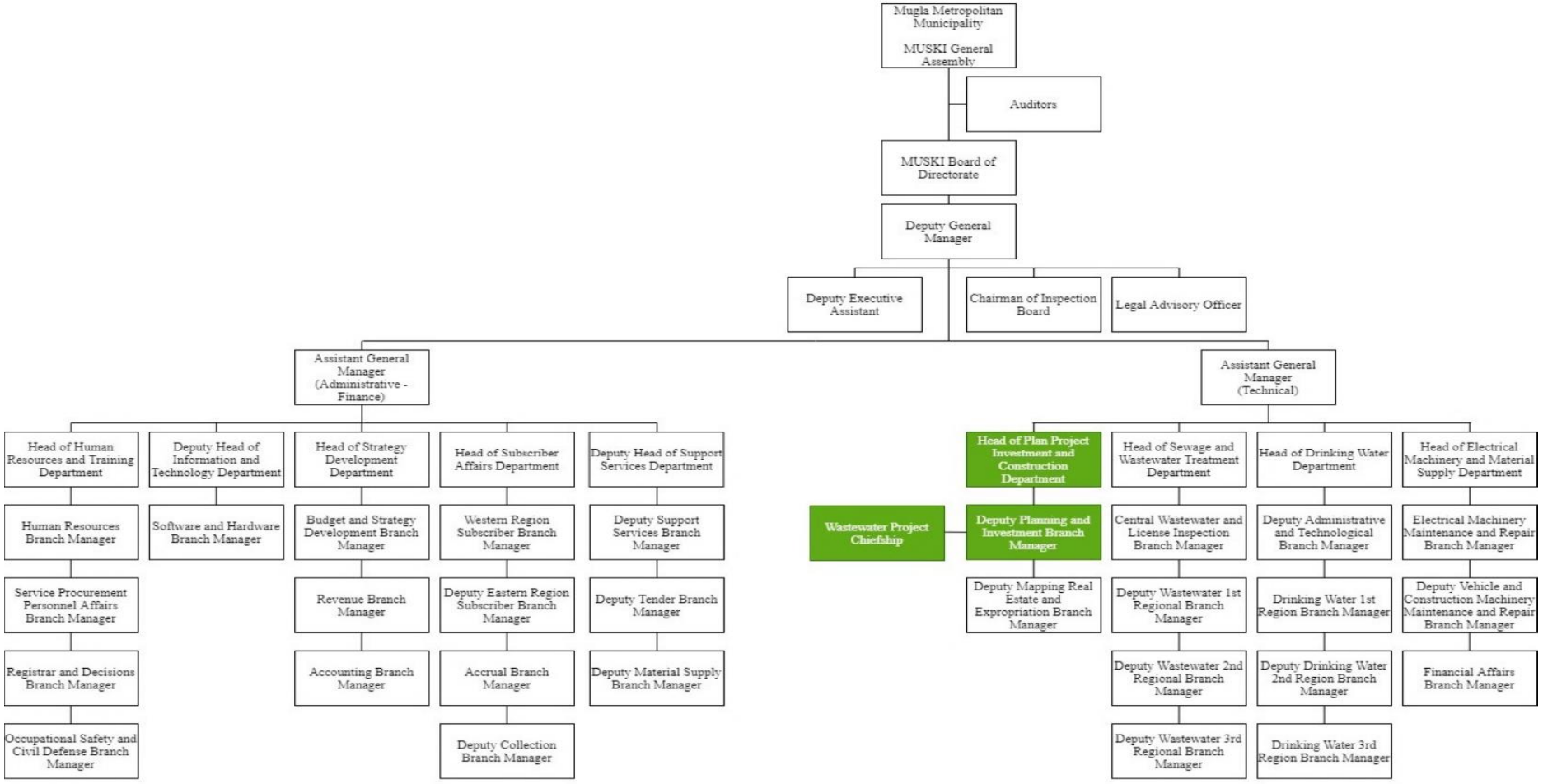
The World Bank and ILBANK will be promptly notified of any incident or accident related to the Project which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers including but not limited to; incidents and accidents encountered during construction works, environmental spills, etc.

Sufficient detail will be provided regarding the incident or accident, findings of the Root Cause Analysis (RCA), indicating immediate measures or corrective actions taken or that are planned to be taken to address it, compensation paid, and any information provided by any contractor and supervision consultant, as appropriate. It will be ensured that the incident report is in line with the World Bank's Environment and Social Incidence Response Toolkit. Subsequently, per the Bank's request, a report on the incident or accident and propose any measures to prevent its recurrence will be prepared.

Therefore, MUSKI will report details of any significant environmental or social incidents (e.g. fatalities, lost time incidents, environmental spills etc.) within three business days and submit an incident report, including RCA, precautions and compensation measures taken within 30 business days. ILBANK will forward the incident report to the World Bank immediately upon receipt from MUSKI. Prompt notification of accident and incidents will remain inclusive under the contractor's ESMP.

The contractor will construct the project in line with the approved design documents and will be the responsible body to implement and apply the mitigation measures given in this ESIA during construction phase. The contractor will adhere its responsibilities specified in this ESIA and ensure that it is aware of its duties and responsibilities within this ESIA for compliance with national regulation and WB OPs. The contractor will employ a full time OHS specialist and a full time environmental and social expert who will instruct and consult the workers on compliant working structure and implementation of ESIA (including grievance redress mechanism and the applicable stakeholder engagement activities). Within this context, obligation to employ an OHS specialist/expert will be added to the contractual requirements of the Contractor. Furthermore, a competent ESHS manager of contractor will monitor implementation of measures given in the mitigation plan. The prompt notification of accident and incidents within the scope of construction works in line with the above-described provisions is the responsibility of the contractor. The contractor will keep an incident register at construction site throughout the construction and defects liability period.

The contractor will develop monthly and quarterly Environmental and Social Monitoring Reports in order to submit to the ILBANK though MUSKI and supervision consultant. During the construction phase, the contractor firm will train its workers on environmental and social aspects (including OHS) as per WB's OPs and national regulations in order to raise environmental and social awareness. During the defects liability period, the contractor will be responsible for any repairs of the newly constructed facilities, in accordance with legal regulations as of provisional acceptance. Within the liability period, the contractor will implement measures given in Environmental and Social Mitigation Plan for operation.



*The units responsible for the project are highlighted in green.

Figure VII.2 Organizational Structure of MUSKI

VII.3.3 Training

One of the main necessities of the ESMP is trainings for the MUSKI's and contractor's top level management and employees. Table VII.5 provides examples of the basic trainings for the ESMP implementation. The training programs will be developed and delivered by the MUSKI.

Table VII.5 Proposed Training Programme

Module 1	
Training course	Environmental and social supervision, monitoring and reporting
Participants	Environmental staff, technical staff and administrative staff of MUSKI
Time	Soon after the project effectiveness but at least 1 month before the construction of the first contract. The follow-up training will be scheduled as needed.
Duration	Four days of training twice a year to be repeated on a yearly basis until the end of the DLP.
Content of the Training	General environmental and social management relating to the Project Requirements on environmental and social monitoring Monitoring and implementation of mitigation measures Guide and supervise contractor in implementation of the ESMP Documentation and reporting Code of conduct Sexual exploitation, abuse and harassment training/ awareness Risk response and control Other areas to be determined
Trainer	Environmental and Social Consultant or Ilbank
Module 2	
Training course	Implementation of mitigation measures
Participants	Contractor, related authorities: On-site construction management staffs, environmental staffs of contractor, related authorities
Time	After signing the works contract
Duration	Three days of training twice a year to be repeated on a yearly basis depending on needs.
Content of the Training	Overview of potential impacts and mitigation measures Requirements of environmental monitoring Occupational Health and Safety Training Role and responsibilities of the contractor Content and methods of implementation of environmental mitigation measures Response and risk control Preparation and submission of report Risk response and control Other areas to be determined
Trainer	MUSKI with support of ILBANK

VII.4 Environmental and Social Monitoring Report

Environmental and Social Monitoring Report is one of the most important tools to record the monitoring activities.

In that scope, an Environmental and Social Monitoring Report will be prepared in quarterly basis, in Turkish and English. Monitoring report will at least include all the issues defined in the monitoring plan.

Results of technical assessments of relevant issues given in Table VII.3 and Table VII.4 will be presented in the monitoring report. The results shall be compared with the national legislative requirements and World Bank Group EHS Guidelines. The results of the visual observations together with the key issues observed will be submitted in written form. The report should focus on the negative findings as well as the good practices. The negative findings should be supported with the photographical evidence. For each negative observation, a corrective action should be suggested with a reasonable due date. Any analysis/sampling/measurement report should be given as an annex of the report together with the relevant assessment and necessary remediation activities. The findings of the Environmental and Social Monitoring Reports will keep this ESMP as a living document; thus, the ESMP should be reviewed and revised by the environmental and social unit of the Municipality according to these findings, if necessary to do so.

The contractor will develop monthly and quarterly Environmental and Social Monitoring Reports and submit these reports to MUSKI. MUSKI will produce and submit ILBANK quarterly progress reports including the environmental and social performance of the Project. ILBANK will prepare and submit to the World Bank regular monitoring reports on the environmental, social, health and safety performance of the Project semi-annually (every 6 months).

The reports will be prepared in both Turkish and English, and annual performance reports will be disclosed through MUSKI's website and at least Turkish versions will be made physically available at Oren, Turkevleri, and Bozalan neighbourhoods' muhtar offices.

VIII. STAKEHOLDER ENGAGEMENT

Stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts. The purpose of stakeholder engagement is to establish and maintain a constructive relationship with a variety of external stakeholders over the entire life of the project. Initiating the engagement process in the early phases of the project helps ensure timely public access to all relevant information and provides the stakeholders with an opportunity to input into the project design and the assessment of impacts.

Currently, a Project specific Stakeholder Engagement Plan (SEP) is not developed for the Project. MUSKI aims to finalize the SEP, before the commence of the construction activities, after the draft SEP is disclosed for public consultations along with the ESIA and other relevant site specific instruments of the subproject. MUSKI is currently developing site specific SEPs for all of the sub-projects under their responsibility. Therefore, in this section the information on public consultation activities and the grievance mechanism for the Project are mentioned along with the purpose and scope of the SEP.

The SEP will cover the measures to be adopted by MUSKI and the contractors to ensure effective and efficient community relations during all phases of the Milas-Oren Sewerage System and Wastewater Treatment Project.

The SEP will developed for;

- To involve and interact with the Project Affected Person, Stakeholders and other institutions that may be affected by the project or that may affect the project during the construction phases;
- To ensure continuous and good relations with the members of the local community and affected parties.
- To minimise impacts and manage those that are unavoidable in order to maintain good relations
- To increase pre-construction awareness in areas such as construction schedule, impacts, mitigation measures and recruitment
- To enable pre-notification for any disturbance to infrastructure or utilities; immediate action for unplanned disturbances
- To avoid impacts to access -- for education, health care, cultural heritage sites, pasture access, etc.
- To prepare and implement a Grievance Management Procedure, and establishing a project grievances mechanism that allows for taking, investigating, following up, reporting and resolving grievances from all stakeholders

VIII.1 Public Participation Meeting-I

Public Participation Meeting-I (PPM-I) was conducted on July 7, 2020 at Oren. Tools used during the planning stage for informing public are described below. Similar tools can be used for informing the public in the further stages of the Project. The aim of the public participation meeting is to inform people who may be potentially affected from the project and to understand their concerns, opinions and suggestions about the project.

PPM-I was first announced on June 26, 2020 through MUSKI's website with presentation to be made during the PPM attached to gather communities' opinions prior to the meeting. The announcement is presented in Figure VIII.1. Following that national and local newspaper announcements were published on June 26 and June 29, 2020 as presented in Figure VIII.2 and Figure VIII.3, respectively. In addition to these, the correspondence letters were sent to muhtars of Oren, Turkevleri, and Bozalan neighbourhoods by MUSKI.

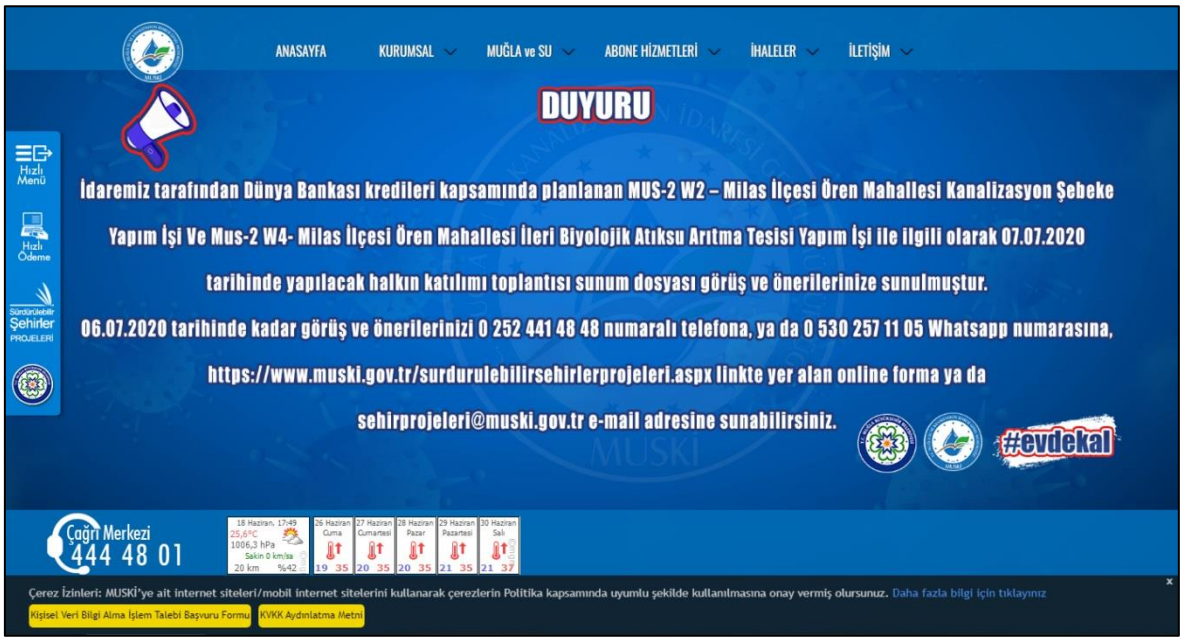


Figure VIII.1 PPM-1 Website Announcement (June 26, 2020, www.MUSKI.gov.tr)

Figure VIII.2 PPM-1 National Newspaper Announcement (June 26, 2020, Birgun)

Figure VIII.3 PPM-1 Local Newspaper Announcement (June 29, 2020, Milas)

The PPM-1 took place at Oren Labranda Cafeteria by taking necessary COVID-19 measures at 10:30 on July 7, 2020. Before the commencement of meeting, information brochures regarding the Project were distributed to attendants and A0 maps of the Project made available for them. The brochure is provided in Annex-3 of this document.

The meeting was held with the participation of representatives from MUSKI, Mugla Metropolitan Municipality, Milas Municipality, and ENCON. MUSKI performed the moderation of the meeting. The meeting started with an introduction and explanation of the purpose and scope of the meeting which is to inform the locals about the Project at hand and understand their concerns, opinions and suggestions about the project, and followed by a presentation given by ENCON and a final discussion session where questions, concerns and suggestions were received.

Eighty-four people participated to the meeting including muhtars of Oren, Bozalan and Turkevleri. The meeting lasted for 1.5 hours. Photographs taken during the meeting are presented in Figure VIII.4.

Figure VIII.4 Photos from the PPM-1 (July 7, 2020)

Questions received during the Q&A session of the meeting and answers given to them are summarized below:

Q1: Will odor problems occur due to collectors to be built within the sewerage system? (Resident of Oren)

A1: When the wastewater velocity in the collectors is above a certain level, odors caused by H_2S can be prevented. This situation will also be taken into consideration in the system to be built, so odors that may emanate from the collectors will be prevented.

Q2: Where will the treatment plant effluent be discharged, will the wastewater mix with the sea?

A2: After the treatment, the effluent reaches the quality specified in the legal regulations and it will be discharged to the Kemer stream[3] located near the facility. The water of Kemer stream reaches the sea, but since the facility will be built with the principle of advanced biological treatment, the treatment will be performed at high efficiency, so the effluent from the treatment plant will not cause pollution in the sea.

Q3: Which regions does the project cover?

A3: The regions covered by the project are Oren, Turkevleri and Bozalan Neighborhoods.

Q4: Will residents have to pay any fee while connecting to the channel?

A4: Pipes to be made between households and sewer collectors will be made under the responsibility of the residents, but these pipes will only be 1-2 m long. Also, the channel participation fee will be charged from the households for the connection.

Q5: Will this project prevent water problems frequently experienced in the region?

A5: Within the scope of this project, only a sewerage system and wastewater treatment plant will be built, the drinking water network is not included in this project.

Q6: What are the exact start date and end date of the project? When will the project be finalized?

A6: The World Bank will provide the financing of the project. This meeting is held in accordance with the World Bank procedures. Your opinions that are gathered with this meeting will be taken into consideration in the ESIA report that is being prepared, and then the tender phase will begin after the approval of the ESIA report by ILBANK and the World Bank. In the tender phase, if the necessary approvals are obtained from the World Bank, the construction of the project will start. If there is no setback during these processes, the project construction is expected to start in 2021. The project will take approximately 18 to 24 months to complete.

Following the Q&A session, 18 people were selected for socio-economic questionnaire. Part of the questionnaire findings is previously presented in Chapter IV.3.1. The remaining relevant information are presented in Table VIII.1 below.

Table VIII.1 Results of Questionnaire Made after the PPM-1

PERCEPTIONS AND EXPECTATIONS	
Do you think you are informed enough about the Oren Sewage and Wastewater Treatment Plant Project?	
No	26.32%
I have partial information	42.10%
Yes	31.58%
What would you like to learn the most about the project?	
When will it start and when will it end	

[3] After the PPM, the discharge location was changed to Hanay Creek.

Whether treated wastewater will be used in agriculture	
Whether the project covers drinking water supply network	
How the connections will be made between the sewer system and detached houses	
Where/From which sources (TV, radio, newspaper, municipality announcement, internet, meeting, etc.) did you get the information about the project?	
By my own means	9.09%
Municipal Announcement	54.55%
Internet	18.18%
Social media	9.09%
Newspaper	9.09%
Did you find the public participation meeting useful?	
Yes	57.14%
No	28.57%
I don't know	14.29%
What are the benefits of the project in your opinion? Please indicate in order of importance? (health, education, infrastructure, increase in livelihoods, etc.)	
100% of the participants have stated that the main benefit of the project is health.	
What are the damages of the Project in your opinion and what do you suggest to prevent these damages?	
Wastewater treatment plant discharge that will be made to the sea	
Do you think that the region will be affected (either positive or negative) by the implementation of the sewerage network and wastewater treatment plant?	
Yes	31.25%
No	62.50%
I don't know	6.25%

MUSKI will prepare the mentioned SEP with regard to the information provided above.

VIII.2 Public Participation Meeting-II

PPM-II was conducted on February 11th, 2022 at Oren. Tools used during the planning stage for informing public are described below. The aim of the public participation meeting was to inform people who may be potentially affected from the Project and to understand their concerns, opinions and suggestions about the Project.

PPM-II was firstly announced through national and local newspapers that were published on February 2nd, 2022 as presented in Figure VIII.5 and Figure VIII.6, respectively. Following that, PPM-II was announced on February 3rd, 2022 through MUSKI's website as presented in Figure VIII.7. In addition, official letters were written by MUSKI to the relevant public authorities, the muhtars of the Project affected neighborhoods were invited through face-to-face meetings/phone calls and announcements were made in the Oren neighborhood.

SAYFA 13 SIYAH

BİRGün 2 ŞUBAT 2022 / ÇARŞAMBA
SAYFA TASARIMI: AHMET CAN SARIKAYA

DÜNYA 13

Sistematik ayrım insanlık suçudur

Uluslararası Af Örgütü, İsrail'in Filistinlilere yönelik politikalarını "apartheid" olarak niteledi. Sistematik ayrımcılık anlamına gelen apartheid'ın uluslararası hukukta "insanlığa karşı bir suç" olduğu belirtildi

İSRAİL yönetiminin Filistinlilere yönelik politikaları Uluslararası Af Örgütü'nün raporunda 'apartheid' olarak nitelendirildi. Londra merkezli örgüt tarafından yayımlanan 211 sayfalık kapsamlı raporda Tel Aviv'in Filistinlilere baskı uygulama ve boyun eğdirmeye yönelik bir sistem dayattığı belirtildi.

İsrail'i Filistinlilere karşı sistematik ayrımcılık, mülksüzleştirme ve dışlama politikası uygulamakla suçlayan raporda sistematik ayrımcılık anlamına gelen 'apartheid'ın uluslararası hukukta "insanlığa karşı bir suç" olduğu belirtildi.

Filistin halkına yönelik ayrımcı uygulamaların ayrıntılarına yer verilen kapsamlı raporda değinilen suçlar arasında Filistinlilerin topraklarına ve mülklerine el koyma, zorla yerinden etme, hukuka aykırı öldürme vakaları, dolaşım kısıtlamaları ve Filistinlileri vatandaşlık hakkından yoksun bırakma uygulamaları yer aldı. Örgüt, İsrail'e geniş kapsamlı bir silah ambargosu uygulanması çağrısında da bulundu.

AA

ANTİ-SEMİTİZM TEPKİSİ

Tel Aviv yönetimi ise rapora sert tepki gösterdi, bir yıl içerisinde ikinci kez benzer bir raporun hazırlanmasını, nefret gruplarının yalanlarının pekiştirilmesi ve antisemitizmi körüklemek girişimi olarak değerlendirdi. Dışişleri Bakanlığı, iddiaların tümüyle reddedildiğini belirterek raporun İsrail devletinin var olma hakkını tanımadığı ve anti-Semitist bir dil kullandığı belirtildi.

Dışişleri Bakanı Yair Lapid de, "İsrail bir Yahudi devleti olmasaydı Af Örgütü'nde kimse böyle bir argümana başvurmaya cesaret edemezdi" diye konuştu.

FİLİSTİNLİLER MEMNUN

Filistin'se raporu memnuniyetle karşıladığını açıkladı. Filistin Kurtuluş Örgütü (FKÖ) Yönetim Komitesi Üyesi Bassam El-Salhe yaptığı açıklamada raporun İsrail ve Filistin arasında yaşanan gerçek durumu ortaya koyduğu değerlendirmesini yaptı.

EL KOYUYORLAR

10 milyona yakın İsrail nüfusunun yüzde 20'den fazlası Filistinli, ayrıca 3 milyona yakın Filistinli de işgal altındaki topraklarda yaşıyor.

İsrail'in işgal altında tuttuğu topraklarda Filistinlilerin evlerini yıkma ve Yahudi yerleşimlerine izin verme politikası uluslararası toplumun da tepkisini çekiyor.

BM KARARI YOK SAYILIYOR

Birleşmiş Milletler (BM) Güvenlik Konseyi'nin Aralık 2016'da aldığı 2334 sayılı karar, İsrail'in işgal altındaki Filistin topraklarında tüm yerleşim faaliyetlerini derhal durdurmasını talep ediyor. Buna rağmen Tel Aviv yönetimi tepkilere rağmen yerleşim faaliyetlerini genişletiyor. BM Ortadoğu Barış Süreci Özel Koordinatörü Nickolay Mladenov, kararın kabul edildiği 2016'dan 2019'a kadar Doğu Kudüs de dahil olmak üzere Batı Şeria'da 22 binden fazla yerleşim birimine onay verildiğini kaydetmişti.

İsrail'in 1967'de işgal ettiği Batı Şeria'da 250'den fazla yasa dışı Yahudi yerleşim birimi bulunuyor. Bu yerlerde yaklaşık 500 bin yerleşimci yaşıyor.

İsrailli insan hakları kuruluşları B'Tselem ile Kerem Navot'un Mart 2021'de hazırladığı raporda da Yahudi yerleşimcilerin, Filistinlilere ait arazileri yağmalamalarının bazı İsrail makamlarınca desteklendiği vurgulanmıştı. Rapora göre, Batı Şeria'daki Yahudi yerleşimci sayısı öngörülebilir bir gelecekte 1 milyona yükselecek.

12 ÜLKE ELEŞTİRMİŞTİ

Ekim ayında Almanya, Belçika, Danimarka, Finlandiya, Fransa, İrlanda, İtalya, Hollanda, Norveç, Polonya, İsveç ve İspanya İsrail'in işgal altındaki Filistin topraklarındaki yerleşimlerini genişletme planına tepki göstermişti. Batı Şeria'da 3 bin 130 yerleşim birimi inşa etme kararından vazgeçilme çağrısı yapılmıştı. **Dış Haberler**

Peru Devlet Başkanı Castillo (solda) ve Kolombiya lideri Ivan Duque. AA

Solcu başkan Castillo'ya başbakan dayanmıyor

Peru'da Başbakan Mirtha Vasquez'in görevinden istifa etmesinin ardından solcu Devlet Başkanı Pedro Castillo yeni kabine kurulacağını açıklamıştı. Cuma günü İçişleri Bakanı Avelino Guillen'in görevi bırakmasının ardından dün de Başbakan Mirtha Vasquez istifa etmişti. Vasquez, ülke yararına uzlaşmaya varmanın imkansız hale gelmesi üzerine Devlet Başkanı Pedro Castillo'ya istifa mektubunu sunduğunu ifade etti. Başbakan Vasquez, insan hakları konusunda uzmanlaşmış bir avukat ve Cajamarca yerlisiydi. Devlet Başkanı Castillo ise hükümet krizi üzerine kabineyi yeniden kuracağını açıklarken, sosyal medya hesabından yaptığı paylaşımda eski Başbakan Mirtha Vasquez ve diğer bakanlara hizmetlerinden dolayı teşekkür etti. Yeni kurulacak olan kabine Castillo'nun 6 aylık yönetiminde görev gelen üçüncü kabine olacak. Mirtha Vasquez 6 Ekim'de Başbakan Guido Bellido'nun istifa etmesinin ardından göreve gelmişti. **Dış Haberler**

Irak Cumhurbaşkanlığı için 25 adaya vize verildi

Irak cumhurbaşkanlığı seçimi için yasal işlemleri onaylanan 25 aday belli oldu. Parlamento, cumhurbaşkanı seçiminin 7 Şubat'ta yapılmasına karar vermişti. Adaylar arasında, mevcut Cumhurbaşkanı ve Kürdistan Yurtseverler Birliği'nin (KYB) adayı Dr. Berhem Salih ve Kürdistan Demokrat Parti (KDP) yöneticilerinden eski Dışişleri ve Maliye Bakanı Hoşyar Zebari'nin ismi öne çıkıyor. Adaylar arasında Halid Sıddık Aziz, Faysal Muhsin Abdu, Şahab Ahmed Abdullah, Hüseyin Ahmed Haşim, Gelawej Ali Emin, Radi Hızır Difak gibi isimler de var.

Irak Parlamentosu Sekreteri Sirwan Sirini, Rödaw'a yaptığı açıklamada, adaylardan Şilan Fuad Abdullatif'in adaylığının ise reddedildiğini söyledi. Irak'ta 2005 yılında siyasi taraflar arasında varılan anlaşmaya göre Cumhurbaşkanlığı Kürtlere, Meclis Başkanlığı Sünnilere ve Başbakanlık Şiilere veriliyor. **Dış Haberler**

T.C. ADANA 18. ASLİYE CEZA MAHKEMESİ

DOSYA NO : 2020/399 **KARAR NO : 2021/802**

İLAN

Cebir tehdit veya hile kullanarak kişiyi hürriyetinden yoksun kılma suçundan sanık Ali oğlu,14/06/1991 Halep doğumlu, Suriye uyruklu MUHAMMED EMİN ABDULRAHİM hakkında yapılan yargılama sonucunda Cebir tehdit veya hile kullanarak kişiyi hürriyetinden yoksun kılma suçundan beraatine karar verilmiş, karar katılan vekili tarafından istinaf edilmiştir. Tebliğden itibaren 7 gün içinde istinaf yolu açık olmak üzere verilen hüküm ve istinaf dilekçesi sanık MUHAMMED EMİN ABDULRAHİM'e tüm aramalara rağmen tebliğ edilememiştir.

1-7201 Sayılı Tebligat Kanununun 29. maddesi gereğince hüküm özetinin Türkiye Genelinde **TİRAJI 50.000'İN ALTI BİR GAZETEDE İLANEN TEBLİĞİNE,**

2-Hüküm fıkrasının ilan tarihinden itibaren 15 gün sonra tebliğ edilmiş sayılacağına,

3-Hükmün 1412 sayılı CMK.nun 310 maddesi gereğince tebliğ tarihinden itibaren 7 gün içinde istinaf edilmediği taktirde kesinleşeceği ilan olunur.

Resmi İlanlar www.ilan.gov.tr'de BASIN: 1545296

DUYURU
MİLAS-ÖREN KANALİZASYON ŞEBEKESİ VE ATIKSU ARITMA TESİSİ PROJESİ HALKIN KATILIMI TOPLANTISINA DAVET

Muğla Su ve Kanalizasyon İdaresi Genel Müdürlüğü (MUSKİ) tarafından, İller Bankası A.Ş. ve Dünya Bankası'nca belediyelerin sürdürülebilir bir geleceği planlamaları ve buna ilişkin yatırım yapmalarına yönelik bir destek mekanizması oluşturmak amacıyla geliştirilen **"Sürdürülebilir Şehirler Projesi -II" kapsamında Muğla İli Milas İlçesi Ören Mahallesinde Kanalizasyon Şebekesi ve Atıksu Arıtma Tesisi** Projesinin yapılması planlanmaktadır.

Bu proje için yürütülen çevresel ve sosyal çalışmalar kapsamında halkı bilgilendirmek, halkın görüş ve önerilerini almak, inşaat ve işletme dönemlerinde halk ile işbirliği tesis etmek üzere ilgili taraflardan planlanan ve aşağıda detayları verilen "2.Halkın Katılımı Toplantısı" düzenlenecektir.

Halkımıza saygı ile duyurulur.

Toplantı Yeri	:	Belediye (Labranda) Çay Bahçesi
Toplantı Yerinin Adresi:		Ören Mahallesi Atatürk Bulvarı Üzeri Milas / Muğla
Toplantı Tarih ve Saati	:	11.02.2022 - 10:30
Proje Sahibi	:	Muğla Büyükşehir Belediyesi Su ve Kanalizasyon İdaresi Genel Müdürlüğü (MUSKİ)
Tel	:	444 48 01
ÇSED Raporunu Hazırlayan		
Kuruluş	:	ENCON Çevre Danışmanlık Ltd. Şti.
Tel	:	(0 312) 447 71 22

Resmi İlanlar www.ilan.gov.tr'de BASIN: 1545593

Liderler arası Ukrayna satrancı

ABD Başkanı Biden, Katar Emiri Al Sani'yi Beyaz Saray'da; Rusya Lideri Putin ise Macaristan Başbakanı Orban'ı Kremlin'de ağırladı. Her iki görüşmenin merkezinde ise Ukrayna krizi yer aldı

NATO'nun Doğu Avrupa ile Baltıklar'a silah ve asker yığmaya devam ederken Ukrayna krizinde diplomasi trafiği hızlandı. ABD Başkanı Joe Biden, Beyaz Saray'da ağırladığı Katar Emiri Şeyh Temim bin Hamed Al Sani ile görüşmesinde her türlü senaryoya hazırlıklı olduklarını söyledi. Biden, Rusya'ya doğalgaz yaptırımları getirilmesi olasılığına karşı Katar'dan daha fazla doğal gaz tedarik etmesi talebinde bulundu. Oval Ofis'te Katar Emiri el Sani'yle birlikte basına açıklamalarda bulunan Biden, Katar'ı "NATO üyesi olmayan önemli müttefik ülke" olarak belirleme planları yaptığını söyledi. Bu statü, Katar'ı ABD'nin karşısında özel bir konuma getirecek. El Sani ise bu hamle karşısında Biden'la hem bölgesel güvenlik hem de Filistin halkına eşit haklar konusunu görüşeceğini söyledi.

İNGİLTERE KIŞKIRTIYOR

ABD'nin "her türlü adıma hazırız" açıklamasıyla birlikte İngiltere'den de bir adım geldi. İngiltere Dışişleri Bakanı Liz Truss, Rusya'ya daha geniş çaplı yaptırımların mümkün kılınması konusunda adım attıklarını açıkladı. Londra yeni yasayla birlikte çok daha geniş çerçevede bireylere ve şirketlere yaptırım uygulayabilecek.

Biden, Al Sani görüşmesinde Katar'ı NATO üyesi olmayan önemli müttefik olarak tanımladı. AA

Moskova ise bu adımın İngiliz şirketlere ve hissedarlara zararı olacağı konusunda uyarıda bulundu. Kremlin Sözcüsü Dmitri Peskov, "Bu durum iş dünyasına açık bir saldırıdır ve çıkarlarımız doğrultusunda karşılık vermemizi gerektirir" açıklaması yaptı. Fransa ve İtalya ise ABD'nin görüşmelerde ilerleme sağlayamadığı Rusya ile teması artırdı. Fransa Cumhurbaşkanı Emmanuel Macron, bir hafta içinde Rusya Devlet Başkanı Vladimir Putin'le ikinci telefon görüşmesini yaptı.

Kremlin'den yapılan açıklamada, Rusya'nın önerdiği güvenlik garantilerinin görüldüğü, iki liderin yüz yüze görüşme yapma konusunda da uzlaştığı belirtildi.

İtalya Başbakanı Mario Draghi ile Putin yaptıkları telefon görüşmesinde Ukrayna krizi bağlamındaki son gelişmeleri ve iki ülke ilişkilerini ele aldı.

Batı cephesinde bunlar olurken hedefteki Putin ise Macaristan Başbakanı Orban'ı Kremlin'de ağırladı. Liderler gaz sevkıyatından koronavirüs aşısı teknolojisine ve ABD ile güvenlik garantisi görüşmelerine kadar pek çok konuyu ele aldı. Kremlin'deki görüşmenin basına açık kısmında konuşan Putin, enerji konusunun Rusya ile Macaristan arasındaki işbirliğinin önemine vurgu yaptı. Orban'ın Rusya ve Macaristan'ın çıkarına birçok şey yaptığının altını çizdi. **Dış Haberler**

Afrika Boynuzu'nda kıtlık alarmı

Birleşmiş Milletler Çocukları Yardım Fonu (UNICEF), Afrika Boynuzu'nda milyonlarca kişinin kıtlıkla mücadele ettiğini bildirdi. UNICEF tarafından yapılan açıklamada, kıtlığın bölgede özellikle çocukları olumsuz etkilediği belirtildi.

Açıklamada, mart ayının ortasına kadar sadece Etiyopya'da 6 milyon, Somali'de ise 7 milyondan fazla kişinin acil gıda yardımına ihtiyaç duyduğu ifade edildi. İklim değişikliğinin yol açtığı su sıkıntısına bağlı yaşanan kuraklığın da hayvanların hayatına mal olduğu kaydedildi.

Birleşmiş Milletler Gıda ve Tarım Örgütü (FAO) da 17 Ocak'ta yaptığı açıklamada Etiyopya, Somali ve Kenya'daki kuraklığın uzun süredir devam ettiğine dikkati çekmişti. FAO Acil Durum Direktörü Rein Paulsen, Kenya, Etiyopya ve Somali'deki kuraklıktan etkilenen 25 milyon kişi için 138 milyon dolarlık yardım gerektiğini belirtmişti. Afrika Boynuzu ülkeleri 2019'da çöl çekirgelerinin tarım arazilerini istila etmesi nedeniyle gıda krizi ile karşı karşıya kalmıştı. **AA**

Figure VIII.5 PPM-II National Newspaper Announcement (February 2nd, 2022, Birgun)

5

Bağımsız Günlük Siyasi Gazete gazete MİLAS

02 Şubat 2022 Çarşamba

OKURA SAYGI ÖRNEĞİ

19 yıldır okuyucularına tarafsız ve korkusuz haberleri ile ulaşan Milas Gazetesi yeni yüzü ile her gün Yay-Sat bayilerinde. Geçtiğimiz günlerde Serap Ülkü Medya A.Ş. bünyesine katılan Milas Medya'nın amiral gemisi Milas Gazetesi okuyucularının desteği ile Korkusuz ve tarafsız haber anlayışı ile yayın hayatına yenilenen yüzü ile devam ediyor.

Büyüyen ebadı renklenen sayfaları ile Milaslı okuyucularına kaliteyi sunan Milas Gazetesi'ne haftanın altı günü Yay-Sat bayilerinden ulaşabiliyorlar. Milas Medya Yönetim Kurulu Başkanı Serap Ülkü Özdemir; "Yıllardır sektörün içinde vatandaşlarımıza hizmet vermeye devam ediyoruz. Yıllarca Fethiye ilçesinde hem gazete hem de televizyon yayınlarıyla gelen tecrübemizi Milas Medya'nın genç ve başarılı ekibi ile bir araya getirerek Milas'ta da kaliteli, korkusuz ve tarafsız habercilik anlayışımızla hezimet vermeye devam ediyoruz. Okuyucumuza olan saygımızı stantlara koyduğumuz gazetemiz ile göstermeye devam ediyoruz. Milas'a yakışır yeni ebadımız ve renklenen sayfalarımızla ulusal boyutta okurlarımızla buluşmaya devam ediyoruz."dedi.

❍ HASAN TELLİ

TÜKÜRÜK BEZİ TÜMÖRLERİNİN BELİRTİLERİNE DİKKAT!

Tükürük bezlerinden salgılanan tükürük; ağız içini nemlendiriyor, yutmayı, konuşmayı ve tat almayı mümkün kılıyor. Yetişkin bir insan günde yaklaşık 0,6 ila 1,5 litre tükürük salgılıyor. Vücutta çok önemli bir görevi olan tükürük bezlerinde tümörler meydana gelebiliyor. Kesin nedenleri tam olarak bilinmeyen tükürük bezi tümörlerinin başarılı bir şekilde tedavi edilebilmesi için erken teşhis önem taşıyor. Memorial Şişli Hastanesi Kulak Burun Boğaz Hastalıkları Bölümü'nden Doç. Dr. Ela Araz Server, tükürük bezi tümörleri ve tedavisi hakkında bilgi verdi:

Vücutta; ikisi kulak önünde (parotis bezi), ikisi çene altında (submandibular bez) ve ikisi dilaltında (sublingual) olmak üzere üç çeşit büyük tükürük bezi, ağız içi, solunum ve sindirim sisteminde yerleşmiş çok sayıda da küçük tükürük bezi bulunmaktadır. Çene altındaki bezler submandibular tükürük bezidir ve en fazla tükürük salgılayan bezlerdir. Kulak önündeki bezlere parotisbezleri adı verilir ve yemek yemek gibi uyaranlarla tükürük salgılar. Tükürük bezi hücrelerinde iyi huylu (benign) ya da kötü huylu (malign) tümörler oluşabilmektedir. Tükürük bezlerinde sıklıkla iyi huylu tümörler görülür. İyi huylu tükürük bezi tümörleri başka dokulara sıçramazken, kötü huylu tümörler yayılma potansiyeline sahiptir. Kötü huylu tükürük bezi kanserlerinde erken teşhis tedavinin başarısını artırmaktadır.

SİGARA TETİKLEYİCİ FAKTÖRLERDEN BİRİ

Tükürük bezi kanserine erkeklerde daha sık rastlanmaktadır. Tükürük bezi tümörlerinin neden oluştuğu tam olarak bilinmemektedir. İyi huylu tümörlerde altta yatan bir neden gösterilememiştir ancak kötü huylu tükürük bezi tümörlerinde; genetik yatkınlık, sigara kullanımı, radyasyon maruziyeti, asbest kullanılan işlerde çalışmak, kauçuk ve kereste işçiliği, çeşitli tesisat işleri etkili olabilmektedir.

İLK BELİRTİSİ KULAK ÖNÜ YA DA ÇENE ALTINDA ŞİŞLİKTİR

Tükürük bezi tümörü çıktığı bezeye göre belirtiler gösterir. En sık belirtisi şişliktir. Etkilenen bezin bulunduğu bölgede örneğin kulak önünde, çene altında, dil altında, ağız içerisinde şişlikler (yumrular) görülebilir. Bu şişlikler büyük oranda ağrısız ve serttir. Eğer tümör çok büyür ve bası yapmaya başlarsa ağrı, yutma güçlüğü, ağız açmada zorluk, yüz yarısında uyuşma, yüz sinir felci sonucu yüzde kayma görülebilir.

TEK TEDAVİ YÖNTEMİ CERRAHİDİR

Tükürük bezi tümörlerinin ilaç tedavisi yoktur, tek tedavi yöntemi cerrahidir. Ameliyatın boyutu ve sonrasında gerekebilecek ek tedaviler tümörün büyüklüğüne, tipine ve yerleştiği bölgeye göre değişir. Eğer tümör iyi huylu ve küçükse çoğu zaman sadece kitleyi çıkarmak yeterli olurken kötü huylu tümörlerde, büyük tümörlerde etkilenen tükürük bezinin tamamının çıkarılması gerekir. Eğer tümör kötü huylu ise ameliyat sonrasında kemoterapi veya radyoterapi gerekebilir.

AMELİYAT SONRASI BUNLARA DİKKAT EDİN

Tükürük bezi ameliyatlarının yaklaşımı hangi bezi tuttuğuna göre değişmektedir. Kulak önü, çene altı gibi bulunduğu bölgeye göre ameliyat yapılır. Ameliyat sonrasında yara bölgesinde hafif ağrı, kulak ve yüz bölgesinde uyuşma, hissizlik, karıncalanma hissedilmesi normaldir. Ameliyattan sonra bazen çene hareketleri ile oluşan ağrılar olabilir. Hasta çenesini çok yormamalı, bir hafta kadar sert yiyeceklerden kaçınmalı, tükürük salgısını tetiklememek için salgıyı artıran limon, narenciye, turşu gibi yiyecekler tüketmemelidir. Yara yerinin bir hafta boyunca ıslatılmaması, temiz kalması gerekir. Eğer bu bölgede şişlik, ağrı, kızarıklık, akıntı olursa zaman geçirilmeden doktora başvurulmalıdır. Yara bölgesindeki izi azaltmak için skar önleyici bazı kremler kullanılabilir. Yine bu bölge güneşe duyarlı olacağından güneşten korunmalı ve mutlaka güneş koruyucu kremler kullanılmalıdır.

■ HABER MERKEZİ

Sürdürülebilir Şehirler Projeleri

DUYURU

MİLAS-ÖREN KANALİZASYON ŞEBEKESİ VE ATIK-SU ARITMA TESİSİ PROJESİ

HALKIN KATILIMI TOPLANTISINA DAVET

Muğla Su ve Kanalizasyon İdaresi Genel Müdürlüğü (MUSKİ) tarafından, İller Bankası A.Ş. ve Dünya Bankası'nca belediyelerin sürdürülebilir bir geleceği planlamaları ve buna ilişkin yatırım yapmalarına yönelik bir destek mekanizması oluşturmak amacıyla geliştirilen "Sürdürülebilir Şehirler Projesi -II" kapsamında Muğla İli Milas İlçesi Ören Mahallesinde Kanalizasyon Şebekesi ve Atıksu Arıtma Tesisi Projesinin yapılması planlanmaktadır.

Bu proje için yürütülen çevresel ve sosyal çalışmalar kapsamında halkı bilgilendirmek, halkın görüş ve önerilerini almak, inşaat ve işletme dönemlerinde halk ile işbirliği tesis etmek üzere idare tarafından planlanan ve aşağıda detayları verilen "2.Halkın Katılımı Toplantısı" düzenlenecektir.

Halkımıza saygı ile duyurulur.

Toplantı Yeri :Belediye (Labranda) Çay Bahçesi
Toplantı Yerinin Adresi:Ören Mahallesi Atatürk Bulvarı Üzeri Milas /Muğla
Toplantı Tarih ve Saati :11.02.2022 - 10:30

Proje Sahibi:Muğla Büyükşehir Belediyesi Su ve Kanalizasyon İdaresi Genel Müdürlüğü (MUSKİ)

Tel :444 48 01
ÇSED Raporunu Hazırlayan Kuruluş:ENCON Çevre Danışmanlık Ltd. Şti.
Tel :(0 312) 447 71 22

İlanlar:www.ilan.gov.tr BASIN-1545593

Figure VIII.6 PPM-II Local Newspaper Announcement (February 2nd, 2022, Milas)

Figure VIII.7 PPM-II Website Announcement (February 3rd, 2022, www.muski.gov.tr)

The PPM-II took place at Oren Labranda Cafeteria, by taking necessary COVID-19 measures, at 10:30 on February 11th, 2022. Before the commencement of meeting, information brochures regarding the Project were distributed to attendants and A0 maps of the Project made available for them. The brochure is provided in Annex-5 of this document.

The meeting was held with the participation of representatives from MUSKI, Mugla Metropolitan Municipality, Milas Municipality, and ENCON. MUSKI performed the moderation of the meeting. The meeting started with an introduction and explanation of the purpose and scope of the meeting which is to inform the locals about the Project at hand and understand their concerns, opinions and suggestions about the Project, and followed by a presentation given by ENCON and a final discussion session where questions, concerns and suggestions were received. The presentation is provided in Annex-6 of this document.

Sixty-three people participated to the meeting and the meeting lasted for 1.5 hours. Photographs taken during the meeting are presented in Figure VIII.8.

Figure VIII.8 Photos from the PPM-II (February 11th, 2022)

Questions received during the Q&A session of the meeting and answers given to them are summarized below:

Q1: When will the construction phase start? (Resident of Oren)

A1: After this meeting, findings of this public participation meeting will be incorporated into the final ESIA report. Then, the final ESIA report will be submitted for the approval of ILBANK and World Bank. After the approval, the tendering period which is expected to last a year at most, will be started. Following that, construction phase of the Project will begin.

Q2: When will the construction phase of the Project be completed and the Project will be implemented? (Resident of Oren)

A2: The construction of the sewerage network and WWTP will take 24 months and 18 months, respectively.

Q3: Will the treated effluent water from the WWTP be discharged directly to the sea? In addition, will the treatment in the WWTP be carried out chemically or biologically? (Resident of Oren)

A3: Wastewater coming to the WWTP will be treated and then discharged to Hanay Creek in accordance with the discharge standards specified in the Urban Wastewater Treatment Regulation. Discharge permits were obtained from related authorities in this regard. In addition, advanced biological treatment will be carried out at the WWTP and the treated wastewater will be discharged after disinfection.

Q4: Can we use the treated wastewater for irrigation? (Resident of Oren)

A4: Wastewater coming to the WWTP will be treated and discharged to Hanay Creek in accordance with the discharge standards specified in the Urban Wastewater Treatment Regulation. In other words, treatment of wastewater in accordance with standards suitable for agricultural irrigation is not considered.

Q5: Why are pumping stations foreseen in the project, can't the wastewater be conveyed by gravity? (Resident of Oren)

A5: Although the topography of the project area is relatively flat, deep excavations cannot be made and elevation differences cannot be adjusted due to the groundwater levels.

Q6: Does the project cover the 1st degree archaeological site? (Resident of Oren)

A6: No, the project does not cover the 1st degree archaeological site.

Q7: Will there be any expropriation within the scope of the Project? (Resident of Oren)

A7: The WWTP area is currently owned by MUSKI. Construction of the sewerage network and discharge line will take place in existing roads and no land acquisition is required within this respect. Pumping stations will be built on public lands that are registered as park. Therefore, there will be no resettlement and/or physical displacement of persons in and around the Project Area.

VIII.3 Grievance Mechanism

In accordance with WB policies, a process will be established by which people who deem that they have been adversely affected by the Project during planning, construction or operation can bring grievances to the Project for consideration and, if required, resolution.

Managing grievances, including avoiding and minimizing them as well as their timely and effective resolution, is an integral part of a sound stakeholder engagement strategy. Experience shows that significant numbers of grievances arise from misunderstandings, and that such grievances can be avoided, or their numbers reduced, through proactive and consistent engagement with communities. Engagement also helps anticipate and review community concerns to prevent them from escalating into grievances. A project-specific Grievance Mechanism (GM) is beneficial in addressing community and individual concerns and complaints before they escalate beyond control.

MUSKI has an already established GRM. Within that, MUSKI will be responsible for overall implementation of the GM to ensure that all stakeholder comments, suggestions and objections are addressed promptly and sensitively. Therefore, the GM will enable receiving comments/grievances both in English and Turkish to be able to serve to all potential stakeholders of the Project. The GRM will be in accordance with the provisions of the WB standards.

Any grievance related to this Project will be evaluated and responded. Grievances/suggestions may be received via the following:

- Notification of grievances by hotline “185” and “153”,
- The grievances received via the MUSKI website,
- Receipt of grievances at meetings,
- The grievances received via other means such as Presidency’s Communication Center (CIMER).
- By filling in and conveying of grievance forms that will be available at project site and neighborhood headman's office
- Through MUSKI representative of the Project:
    - Contact Person: Emine Başaran Tamer
    - Phone: +90 535 107 40 57
    - Toll free number: 444 48 01
    - Address: Orhaniye Mah. Uğur Mumcu Bulvarı No:41 Menteşe/MUĞLA
    - E-mail: emine.basarantamer@muski.gov.tr

MUSKI will additionally ensure that a grievance mechanism is available for those working in the project; MUSKI project staff and workers of contractors during construction and operation of sewerage system and wastewater treatment plant in Oren. MUSKI should assess grievance and suggest solutions for employees of contractors and subcontractors to construct an internal grievance mechanism which is easily accessible for all workers. The formal grievance mechanism procedures will be prepared by MUSKI. Any grievance related coming from the employees will be evaluated and responded MUSKI has to meet the requirements of national legislation on social benefits, wages.

The formal grievance mechanism procedures will be prepared by MUSKI. This internal and external grievance mechanism will focus on both stakeholders and public. All complaints received are collected in the PIU complaints mechanism section, which consists of the staff of MUSKI. Afterwards, received complaints are recorded in the database and stored. Then, PUB GM Officer, communicates with the person who made the complaint, in order to confirm that the complaint is delivered in seven days by telephone or e-mail. After that, he/she prepares the draft response and submits it to the Project Management approval. Following the response, the Complaint / Complaint Form is updated according to the outcome of the process and the complainant gets the result within 5 days Complaints follow-up process, recorded in the monitoring and evaluation system. At the end, MUSKI should inform the statistics of the complaints to ILBANK. Complaints / feedback received will be resolved within a certain time period as specified in the national law and the ”Beyaz Masa” system of the MUSKI. Basic steps in a grievance mechanism are explained in the Figure VIII.9.

If complainant’s request that their names are not included on the registration form, especially for GBV/SEA survivors, this request will be fulfilled.

Direct and contracted workers also have the opportunity to benefit from other grievance mechanisms such as CIMER that are used nation-wide and which is accessible for every employee.

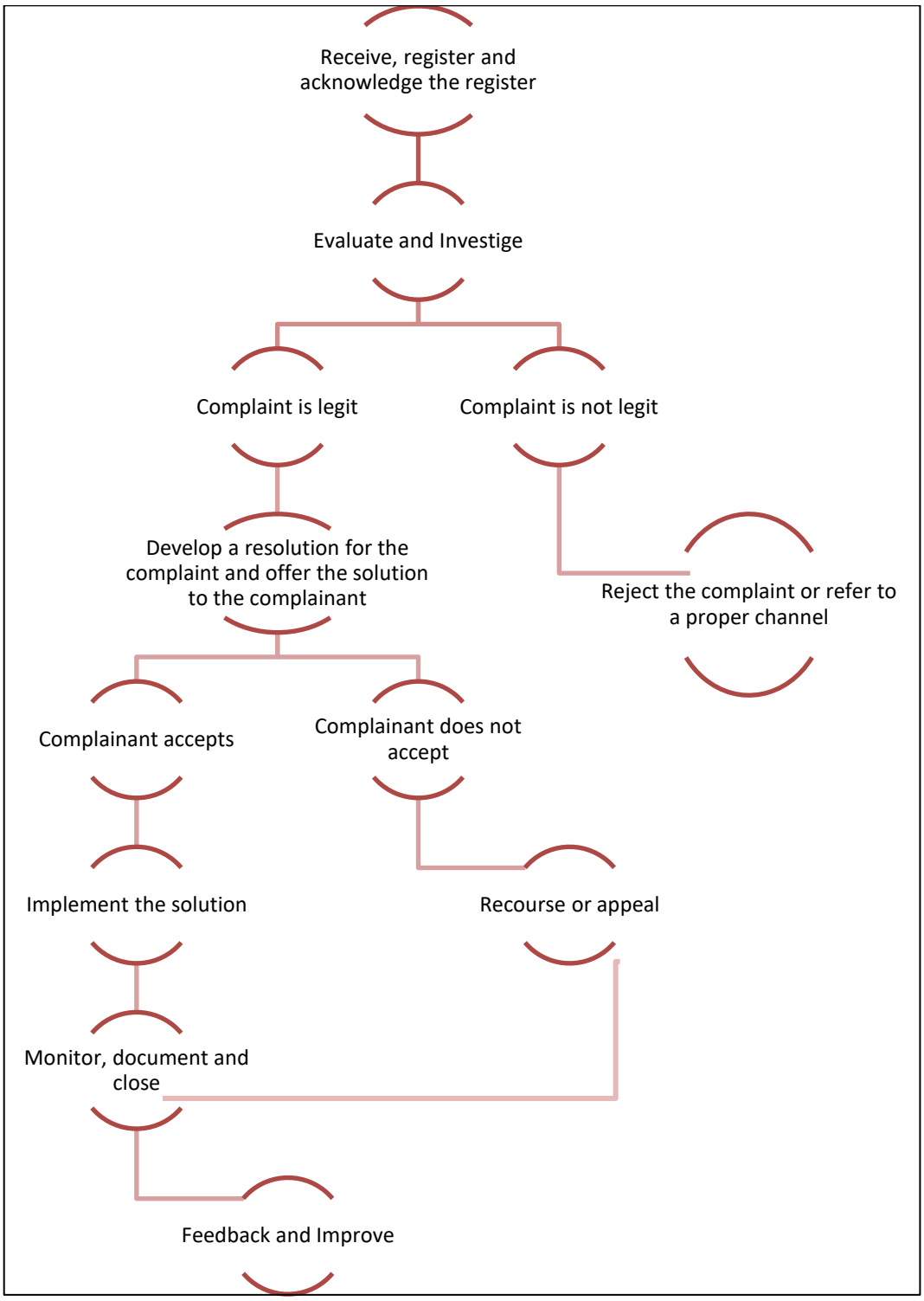


Figure VIII.9 Sample Grievance Mechanism

Table VIII.2 presents the minimum key elements of a grievance mechanism that could be used by Construction Contractor is presented below table:

Table VIII.2 Grievance Redress Mechanism

Level	Relevant Authority	Means of Application	Parameters to be identified	Activities	Duration
1	**MUSKI** **Contact Person:** Emine Başaran Tamer **Phone:** +90 535 107 40 57 **Toll free number:** 444 48 01 **Address:** Orhaniye Mah. Uğur Mumcu Bulvarı No:41 Menteşe/MUĞLA **E-mail:** emine.basarantamer@muski.gov.tr	• Face to face application, • Phone call, correspondence, • e-mail, • online application, • correspondence	• Name and surname of the Complainant; • Subject of the Grievance; • Location of the Grievance; • Contact details (phone/mobile number, address, e-mail etc.); • Organization name (if related) • Date &time	The question or complaints are assessed. The person is provided with feedback. If not resolved, it is directed to legal ways.	15-30 days
2	**Construction Contractor Office** **Contact Person*:** **Phone*:** **Address*:** **E-mail*:**	• Face to face application, • phone call		The question or complaints are assessed. The person is provided with feedback. If not resolved, it is directed to legal ways.	30 days

* This section will be updated when the contractor is awarded.

MUSKI and Construction Contractor should have separate free phone lines for receiving the grievances.

IX. REFERENCES

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