SUPPLEMENTARY INFORMATION PACKAGE

Mersin Port Phase II Extension, Turkey

FINAL
JULY 14, 2023

People to count on.
Knowledge to build with.

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Abbreviations

Abbreviation	Definition
CESMP	Construction Environmental and Social Management Plan
CIA	Cumulative Impact Assessment
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EMH	East Med Hub
ESAP	Environmental and Social Assessment Plan
ESDD	Environmental and Social Due Diligence
ESIA	Environmental and Social Impact Assessment
ESP	Environmental and Social Policy
EU	European Union
GET	Green Economy Transition
GHG	Greenhouse Gas
IFC	International Finance Corporation
MESKİ	Mersin Water and Sewerage Administration
MIP	Mersin Uluslararası Liman İşletmeciliği A.Ş. (Mersin International Port Management Inc.)
MoEUCC	Ministry of Environment, Urbanization and Climate Change
PR	Performance Requirement
PS	Performance Standard
TCDD	Turkish State Railways
TEU	Twenty-foot Equivalent Unit
TURKSTAT	Turkey Statistical Institute
WWTP	Wastewater Treatment Plant

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Reliance on Report

This report has been prepared by BTY [Consultancy Group Inc.] (BTY) at the request of European Bank for Reconstruction and Development (EBRD) and International Finance Corporation (IFC) on the Mersin Uluslararası Liman İşletmeciliği A.Ş. (Mersin International Port Management Inc.) (MIP) and for their information.

This report has been prepared in accordance with the scope of BTY's engagement with Mersin Uluslararası Liman İşletmeciliği A.Ş. (Mersin International Port Management Inc.) (MIP) and is subject to the terms of that appointment. This report is for the sole use of the EBRD, IFC and MIP.

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The report is based on outcome of site studies, desktop review and public data assessments conducted within the scope of the Supplementary Information Package (SIP) and information and data provided by MIP.

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1.0 *Introduction*

The European Bank for Reconstruction and Development (EBRD) and International Finance Corporation (IFC) are considering financing Mersin Uluslararası Liman İşletmeciliği A.Ş. (Mersin International Port Management Inc.)'s (MIP) Mersin Port Expansion Project, which is called East Med Hub 2 (EMH2) (the Project). BTY has been mandated as the advisor to complete the Supplementary Information Package (SIP).

According to the EBRD's and IFC's Environmental and Social Policies, and their associated Performance Requirements (PRs) and Performance Standards (PSs), a project of this type (Category A) and scale requires a full Environmental and Social Impact Assessment (ESIA).

An Environmental Impact Assessment (EIA) Report has been prepared and approved in accordance with the Turkish national EIA regulation under the title "Additional Filling and Construction of a New Cruise Port" to Mersin Cruise and Container Port located in Turkey's Mersin Province, Akdeniz District, Mersin Port. In addition to the EIA, Environmental and Social Due Diligence (ESDD) studies have been conducted and a Gap Analysis report has been prepared against EBRD's Performance Requirements 1-8 and 10 and IFC's Performance Standards requirements for the Project. The Gap Analysis outlined that further assessment is needed to benchmark the project against international standards and good practice, relevant EU substantial environmental directives and Lenders' requirements and to structure the project to comply with Lenders' standards, in regard to:

- A cumulative impact assessment
- Clarification on the Project Associated Facilities Information
- Supplemental Air pollution impact assessment and modelling and greenhouse gas (GHG) calculation
- A climate change risk assessment
- Supplemental Noise and vibration impact assessment and modelling
- Supplemental Marine impact assessment
- Traffic impact assessment and Traffic Management Plan
- Social impact assessment and Stakeholder Engagement Plan
- Dredging Management and Monitoring Plan
- Revision of ecosystem evaluation report
- Construction Environmental and Social Management Plan
- Assessment of labor/working conditions against Lenders' requirements

This Supplementary Environmental and Social Information Package presents results of these supplementary studies and will form a part of the disclosure package together with:

- National EIA
- Non-Technical Summary
- Environmental and Social Action Plan

The Mersin International Port has been operational for decades and is Turkey's one of the largest multipurpose port by total tonnage and import-export container throughput. It is positioned as the main gateway for central and eastern Turkey's foreign trade and has been considered as an important contributor to Turkey's economic growth. MIP provides services to ships that transport containers, dry and liquid bulk freight, general cargo, project cargo, Roll In-Roll Out, passengers and livestock. The port also provides the full range of maritime and terminal services.

The EMH2 Project is the second phase of the EMH Phase 1 (EMH1) Project which was completed in 2016, having increased the container handling capacity of the port by 800,000 Twenty-foot Equivalent Unit (TEU) to 2.60 million TEU. The EMH2 is to expand the existing the container terminal located in the Akdeniz District of Mersin, Turkey, due to operational efficiency needs. In the initial phase of EMH2 (the Project), the capacity of the port will be increased, including a 380-meter extension of the existing dock towards the sea and provide a total EMH quay length of 880 meter accommodating simultaneous berthing for 2 x 400-meter container vessels. Total handling capacity of MIP will increase from 2.6 million TEU to 3.6 million TEU, corresponding to an increase of around 35%. The secondary stage of the expansion has to do with operations and is not conceptually included in this assessment.

The Project's construction phase is going to take 28 months, existing port operating alongside with the expansion works. The port will be under MIP's operation terms for 22 years.

2.0 *Project Description*

Mersin International Port was established in the 1950s by TCDD and rent in 2007 for 36 years to MIP. MIP was established in partnership with Akfen Holding and PSA International. In 2017, the Australian Fund Company IFM joined as a shareholder. The land is owned by TCDD and the Treasury. The current shareholders structure is as follows:

- 51% - PSA International
- 39% - IFM Investors
- 10% - Akfen Holding

Having acquired the right to operate the port, MIP has made investments to improve the capacity of the port to provide services in land and marine areas.

In 2009, "EIA Positive" decision was secured for the construction of additional filling areas with a total area of 123,677 m^2 for Mersin International Cruise and Container Port and the construction works started in 2014 (Phase I). However, the construction of the area of 27,912 m^2 has been completed and it has been put into operation. For the remaining 95,765 m^2 area, the construction of the filling areas was abandoned as a result of the detailed engineering studies carried out at the plan approval stage.

Phase I works have been completed and terminal has been operational since 2016.

In 2019, MIP decided to expand the port capacity with additional investment within the scope of Phase II - extension of existing EMH1 terminal of Mersin International Port-, in order to use the docks inside the port more effectively, to increase the port throughput capacity and to accommodate call of large vessels, with view for Mersin International Cruise and Container Port will be the most important port to meet the demands of international logistics companies in the Eastern Mediterranean region. Mersin Port will increase its service capacity in the Eastern Mediterranean and will make a significant contribution to the increase in Turkey's maritime trade and foreign currency revenues.

The Project has been evaluated within the scope of Annex-I (List of Projects for which EIA will be implemented, Article - 9 Waterways, Ports and Shipyards - b) Commercial ports, piers, wharves and dolphins where sea vehicles weighing 1.350 DWT and over can dock) and Annex-II (List of Projects for Which Selection-Screening Criteria shall be Applied, Article - 31 Infrastructure Facilities - m) Dredging projects where 50,000 m^3 and above material is planned to be extracted) of the National EIA Regulation published in the Official Gazette dated 25.11.2014 and numbered 29186.

Final version of EIA Report (2020) prepared and approved in accordance with Turkish EIA Regulation covers "Additional Filling and Construction of a New Cruise Port" to Mersin Cruise and Container Port located in Mersin Province, Akdeniz District, Mersin Port. For this purpose, dredging operations in order to provide draft depth of 17.5 m that will berth to the port and shortening of the main breakwater by 100 m in terms of ship navigation safety are included in the project scope and the EIA positive decision. However, the shortening of the main breakwater is not included in the proposed loan from EBRD and IFC.

Mersin International Port is regarded as one of the leading ports not only in Turkey but also in the Eastern Mediterranean, due to its geographical location, capacity, wide hinterland as well as the advantages provided by the convenience of multi-mode connection to domestic and international ports. Mersin Port, which has a total port area of 112 hectares, has 21 docks and can provide loading and unloading services to nearly 30 ships at the same time depending on their sizes.

Figure 1: Mersin International Port

The project is located in the Akdeniz district of Mersin province.

Figure 2: Port Location

Mersin International Port, one of the most important economic focal points of Mersin and Turkey, is among the 100 largest container ports in the world. Acting as the gateway to mutual trade with 190 countries, Mersin International Port is also one of the leading ports in Turkey with the total amount of cargo handled.

As the general setting of the Project Area; there are Atatürk Park and congress hall, commercial areas and Mersin Marina in the west of the project area; other berthing areas related to Mersin Port in the east; Akdeniz District Center, residential areas, and state institutions in the north and the Mediterranean in the south. In the east of the project area, there is a free zone, fuel terminal and park. There is also a fishing port in the port and a military port nearby.

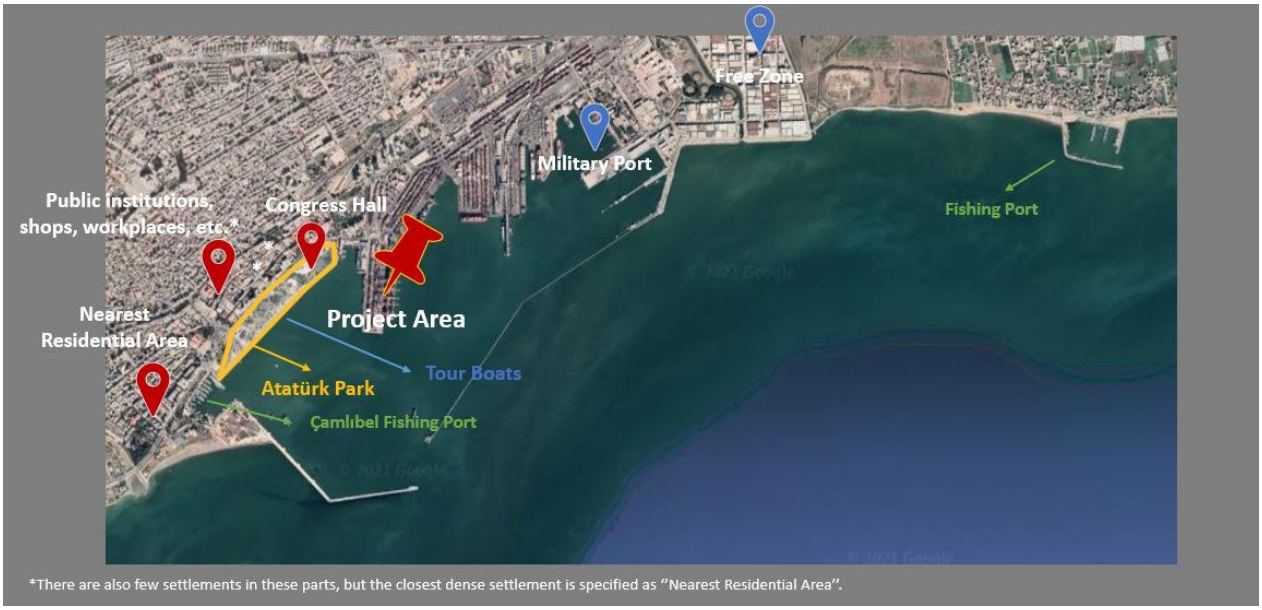


Figure 3: Project Area Large Scale

In the port, all kinds of cargo types such as container, general cargo, project cargo and freight services such as dry and liquid bulk, direct bulk from ship to container are provided. In addition, passenger and Ro-Ro ships are accepted.

Mersin Port, which has a total port area of 112 hectares, has 21 docks and can provide loading and unloading services to nearly 30 ships at the same time depending on their sizes. The following pie chart shows the annual capacity for each category 2 million 10 thousand TEU Containers and 3284 vessels handled in 2020. In 2020 the total container handling capacity in Turkey was 11.6 TEUs.

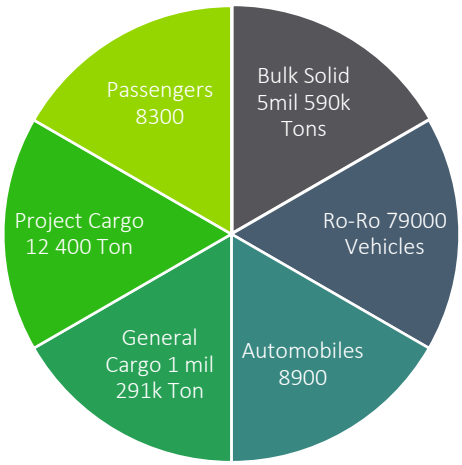


Figure 4: Handling Capacity of MIP

**Project Cargo represents one-off special cargo for specific projects (e.g., blades of wind turbines)*

The new docks, which will be created with the completion of additional filling areas on the site, will significantly increase the port's ship acceptance capacity.

The current and future the Port characteristics in terms of physical characteristics are provided in the following Table.

Table 1: Planned and Existing Port Characteristics

	Existing Operations				Future Operations after Extension			
	Berth No	Usage	Length	Depth	Berth No	Usage	Length	Depth
Docks that will be changed within the scope of the project	1	Passenger	150 m	-9.60 m	1,2,3	Passenger, General Cargo and Ro-Ro	734 m	-10.0 m
	2,3	General Cargo	275 m	-10.0 m	4	General Cargo and Ro-Ro	368 m	-17.0 m
	4,5,6	General Cargo and Ro-Ro	500 m	-15.80 m	5,6	General Cargo and Ro-Ro	500 m	-17.0 m
Docks that will not be changed within the scope of the project	7	Ro-Ro	42 m	-9.0 m	7	Ro-Ro	42 m	-14.0 m
	8,9,10,11	Ro-Ro, General Cargo, Container	675 m	-14.0/-12.0/-12.0/-10.0 m	8,9,10,11	Ro-Ro, General Cargo, Container	675 m	-14.0 m
	12,13	Container and Bulk Cargo	310 m	-12.0 / -10.0 m	12,13	Container and Bulk Cargo	310 m	-15.5 m
	14	TMO dock	275 m	-10.0 m	14	TMO dock	275 m	-13.0 m
	15	TMO dock	275 m	-13.0 m	15	TMO dock	275 m	-13.0 m
	16	General Cargo and Bulk Cargo	80 m	-8.60 m	16	General Cargo and Bulk Cargo	80 m	-9.5 m
	17,18,19	Cruise Port	495 m	-12.0 m	17,18,19	Cruise Port	495 m	-14.0 m
	20,21	General Cargo and Bulk Cargo	255 m	-11.5 m	20,21	General Cargo and Bulk Cargo	255 m	-14.0 m

The Project will start with the extension of piled docks 4, 5 and 6 by 380 m and will provide quay length of total 880 m.

In the first stage, approximately 99,500 m^2 of sea filling up to 270 m width will be made, and a blockwork quay will be created for military and cruise ships to dock on the west side of the extended part. At this stage, the container berth docking area and ship maneuvering circle depth will be dredged to 17.60 m, the west dock depth 10 m and the existing approach channel depth 18.50 m. Also, approximately 3 million 300 m^3 of dredging will be done to serve mega ships.

In the second stage, the dining hall and administrative buildings will be demolished and moved to the B gate side. In this destroyed area, filling and blocky dock works will continue and approximately 77,500 m^2 sea filling will be made. In other words, a total of around 177,000 m^2 of sea filling will be done (for the detail please refer to Section 2.1).

As a result of all these works, the current container handling capacity from 2.6 million TEU will increase to 3.6 million TEU.

2.1 Project Components

According to the EIA Report, project activities are grouped under four main headings which are:

I. Extension of Bert through additional filling (i. construction of a 880 meter quay for the extension of the existing berth and an office building; ii. 28 ha yard for container berth)
II. Relocating the Existing Cruise Port
III. Dredging Operations

The forth components in EIA was Shortening of Breakwater. We note that, “Shortening of the Main Breakwater” is not included in the scope of Supplementary Studies of EMH2 Project, as this component of the Project is out of the scope of the loan by IFC and EBRD. The loan by IFC and EBRD entails: i. construction of a 880 meter quay for the extension of the existing berth and an office building; ii. 28 ha yard for container berth; iii. new cruise terminal; iv. dredging up

to 38 m; and v. superstructures including cranes and other equipment. The construction of the new office building & dining hall will be completed approximately in 12 months.

I. Extension of Bert through additional filling:

It is an area of approximately 164,490 m^2. It is planned to fill the front and west of the dock no. 1, in front of the docks no. 2 and no. 3, and the area in front of the previously filled area of 27,912 m^2. The activities included in that component will be filling of the berth and the construction of an office building and superstructures including the cranes and other equipment required for the operation of the berth.

Figure 5: Additional Filling Area

Stones to be used as filling materials will be hard, solid, made of massive and dense rocks, resistant enough to abrasion, frost, water and weather effects, without absorption feature, without cracks and fractures. For this reason, the stones to be used in the filling will not cause pollution of sea water and will be from rocks that do not deteriorate and decompose from external effects. The mineralogical, chemical, and physicochemical properties of the material will not impact the current quality of the sea and will comply with the General Technical Specification developed by Ministry of Transportation and Infrastructure.

Filling materials of various categories will be brought to the construction site by trucks from an operating quarry selected by the EPC contractor. A pool will be created in the filling area, starting from the filling border first. In this way, turbidity in the sea will be limited to the filling area.

II. Relocating the Existing Cruise Port

In the scope of expansion Project, a new cruise port will be constructed by filling an area of 11,845 m^2 right next to the existing cruise port (80 m to the west). The total of this area with the filling area mentioned above is 176,335 m^2. In other words, a total area of 176,335 m^2 will be filled in the project (please see **Error! Reference source not found.**).

Figure 6 Current and New Cruise Port

The existing cruise port will be relocated due to the new filling works; thus, won't be functional anymore. Therefore, during construction, alternative Ro-Ro berths (please see Figure 7) will be serving as a cruise port, temporarily. The selection of the berth to be utilized among those alternatives as cruise port shall be under the jurisdiction of the port authority, in close collaboration with the cruise operator and with coordination facilitated by the MIP.

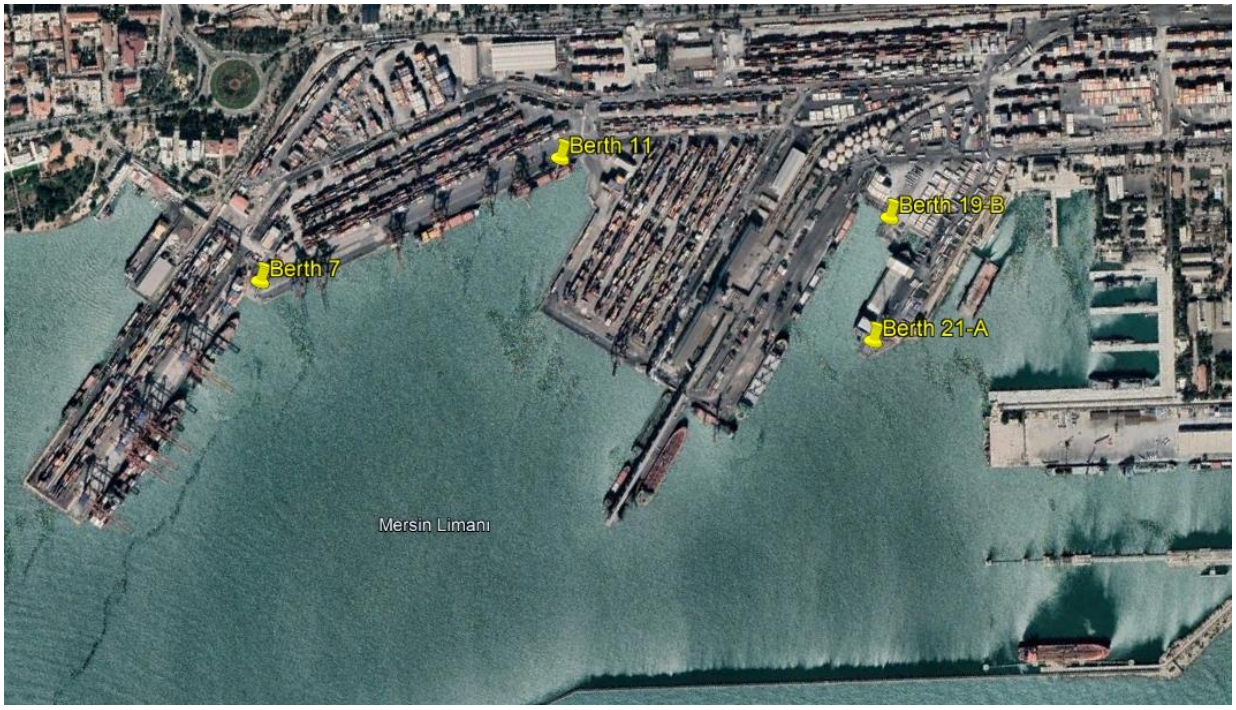


Figure 7 Alternative Berths to be used as temporary Cruise Port during Construction

III. Dredging Operations

The purpose of the dredging is to increase the operating water depth of the harbor and the approaching channel by removing accumulated sedimentation in the bottom and for the safe approach of the larger vessels.

At this stage, the container berth docking area and ship maneuvering circle depth will be dredged to 17.60 m to the east from backfilled area, the west dock to the depth of 10 m and the existing approach channel to depth of 18.50 m. Within the scope of the project, it is planned to conduct a total removal of 3,297,000 m^3 of sediment in a total area of 2,094,705 m^2.

All dredging works including removal, handling and disposal of the seabed material will follow the requirements of the "Dredging of Marine and Inland Waters Regulation" issued by Turkish Ministry of Transport, Maritime Affairs and Communications on the Official Gazette dated 09.08.2016 - No 29314, as well as other relevant Turkish Legislation as such "Regulation on Environmental Management of Dredging Material" on the Official Gazette dated 14.01.2020 – No 31008 and "Management of Waste Regulation" on the Official Gazette dated 02.04.2015 - No 29796.

The dredging works will be planned and managed in line with international good practice as per OSPAR Commission guidelines, EBRD Performance Requirements 1, 3 and 6 and IFC Performance Standards 1,3 and 6.

Figure 8: Dredging Area

Ministry of Environment and Urbanization and Climate Change (MoEUCC) has determined a dumping area in the Gulf of Mersin in Memorandum of Dredging and Dumping Activities Implementation and Authorization Transfer, at a distance of approximately 3 miles from the shore for dredging activities.

The depth of the dumping area varies between 40.5 - 54.2 meters according to the current bathymetry map and the dumping activity into the sea will be mainly within the area between 42-54 m depth band.

Figure 9 Location of the Dumping site

The details of the Monitoring of Dredging operations are provided in the Dredging Management and Monitoring Plan of the Project, where the monitoring activities will be evaluated in three main approaches as routine monitoring with bathymetric surveys, disposal monitoring with a tracking system and post-disposal monitoring 30 days after the disposal activities are completed. Further details are provided in the Dredging Management and Monitoring Plan.

Shortening of the Main Breakwater

As a continuation of EMH1 project (large scale dredging project performed between 2015-2016 at the same area with EMH2), MIP shortened the existing Breakwater 100 meters. Shortening of the Breakwater is not a project component of EMH2 but has been included in the Project local EIA together with EMH2 for the completion of breakwater shortening environmental permitting process. The construction activities for shortening the breakwater have been completed in June 2021.

Therefore, the shortening of this breakwater was not included in Supplementary Studies for EMH2 as a project component however below points will be considered by MIP with regards to the shortening of this breakwater and its relation to the execution of EMH2:

- It has been determined that as a result of MIP shortening the breakwater there will be changes on the wave characteristics, including wave height, under specific weather conditions.
- The magnitude of the impacts as a result of these changes on the tour boats, fishing boats and the coastal structures in the Port area cannot be quantified because of the uncertainties on weather conditions.
- According to the information on Technical DD of the Project, in line with the records provided by MIP, weather-related disruptions were documented, with approximately 3.5 days of downtime in 2020. This represents a slight increase compared to previous years: 3 days in 2016, 2 days in both 2017 and 2018, and 2 days in 2019. MIP also reported that the total downtime, including mechanical issues, for different types of cranes in 2020 ranged between 0.2% and 0.4%, equivalent to 1.4 days, excluding mobile harbor cranes. MIP suggested that the shortening of the breakwater may have contributed to some of the weather-related downtime in 2020. Importantly, MIP clarified that they have not experienced any specific economic losses as a result of this downtime up to the present time.
- Upon completion of the EMH2 project, it is predicted that the new project structures will act as a breakwater and reduce the waves for the aforementioned areas.
- MIP has developed a Livelihood Restoration Plan which includes commitments to mitigate/compensate for livelihood impacts to 3rd party boats, and define a regular independent monitoring program to verify impacts which also includes mitigation/compensation measures for Breakwater Shortening, as well as other impacts.
- MIP will subsequently monitor the conditions until EMH2 is completed and, will update the livelihood restoration plan when necessary.

- There would need to be a compensation audit at the end of EMH2 construction to confirm a) any livelihood restoration measures were effective and b) EMH2 has mitigated any impacts as planned.

2.1.1 Project Area of Influence

The impact area of the project for construction and operation phases of the Project will be defined by the diffusion and emissions and pollutants discharged into receiving media and the disturbance cause on the environmental components together with the socioeconomic changes imposed on the communities. Thus, the boundaries of the Project Area of Influence (AoI) will be defined by:

1. The diffusion area of the noise emissions during construction and operation (see section 3.7)
2. The diffusion area of the air emissions during construction and operation (see Section 3.6)
3. The dredged area and dump area boundaries and their vicinity of 2 kms (See Section 3.8.2.1)
4. The settlement areas (both with commercial and residential characteristics) around the port area (See Section Error! Reference source not found.).
5. The settlement areas along the traffic route during construction for the transport of the construction material (See Section 3.8.2.2a)

2.2 Associated facilities

The existing waste reception facility at the MIP will be extended to have the capacity for the increased capacity of the Port. The previous capacity of the Waste Reception Facility is 750 m^3. In 2021, each 35 m^3 capacity, additional 2 liquid waste tanks have been built and the tanks are operational since 2021 December.The impact of the construction of these two additional tanks will be minimal compared to the extension of the Port and be managed through existing management system procedures of the MIP.

An operating quarry will be contracted for the supply of the filling material meeting the filling material quality and quantity demand of the Project. This quarry will not be solely dedicated for the Project and is and will be operating independent of the Project. Therefore, it is not considered as an associated facility.

2.2.1 Gate Project

MIP is carrying out a "gate project" concurrently with the extension project. With this project, it is aimed to separate the port traffic from the city traffic and to shorten the waiting times for the trucks. This project is expected to have positive effects on the Air Quality impacts of the Project, not only by separating the port traffic from the city; also, by allowing faster truck movement and away from the city, more contained within the port area. Relocating the reserved entrance gate will also allow a possibility of the increase in the utilisation of the rail yard by also installing more eRTGs; thus, allowing a possibility of more railway transportation rather than truck transportation compared to the existing situation.

For the project, MIP cooperates with other project stakeholders (Mersin Governorship, TCDD, General Directorate of Highways, State Hydraulic Works, Mersin Metropolitan Municipality, Akdeniz Municipality, Naval Forces Command, National Real Estate, Veterinary Medicine, Coast Guard, and other stakeholders).

The Project includes Construction of New Veterinary Facility (currently completed), Construction of TCDD Flyover Bridge, DSI Water Crossing Bridge and Box-Culverts, Construction of Port Connection Road and Fencing, Relocation of Existing Powerline (Completed), Relocation of Existing KALYAK and Fuel Line, Construction of a Junction and Construction of New Gate Facilities.

When this project is completed, Gate B will be opened to personnel entrance, and Gate C will be completely closed. Trucks entrances and exits will be connected directly to gate D via a 12-lane road and no truck entry and exit will be made from other gates. Project layout and design studies are currently being carried out.

This new junction project, which is a part of Gate Project is independent of the MIP extension Project addressing the existing traffic issues and will be executed with or without of the Extension Project. Therefore, it is not considered as

an Associated Facility according to EBRD's Policies. Whereas, IFC considers the Gate Project as an Associated Facility as per the institutions' respective policies. Therefore Gate Project is summarized here.

The existing traffic conditions from D400 Intersection towards Gate B is shown in below figures below. The trucks trying to enter the Port through Gate B follows that route on D400 and cause long waiting queues.

Figure 10: Current traffic flow towards city center and port

Figure 11: Traffic flow on D 400 towards port

With the Gate Project, MIP will divert the entrance to the Port at D400 Intersection (TOKİ roundabout) which is in 1.3 km east of entrance gate D. Certain entrance procedures such as OCR (Optical Character Recognition), weighing, pre-gate operations (document control) will take place on these 1.3 km section of travelling distance of the trucks entering the Port that will speed up the entrance procedures and the traffic entering the Port will be isolated from the main road.

The proposed lay out that roundabout is presented below:

Figure 12: Proposed modified roundabout at D400 intersection

With this modification the traffic on D400 towards city center will be decreased since the traffic to the Port will be isolated from the city center direction as can be seen below:

Figure 13: Proposed Traffic flow on D 400 towards port

According to the data provided by the Highways Traffic Volume Map taken from the Highways General Directorate, estimated traffic loads on the D400 towards city center without the Gate Project is 1262 vehicles at peak on the D400

section providing access to MIP is calculated according to the Highways Traffic Volume Map taken from the Highways General Directorate.

Together with the Gate Project, the railway crossing (north of gate D) will be eliminated through a flyover. This will prevent the queue of vehicles coming from free-zone (south of gate D) waiting at the crossing and thus eliminating the entrance to gate D.

Figure 14: Previous Situation at the entrance of the Gate D

Figure 15: Proposed Situation at the entrance of the Gate D

Figure 16: Proposed Situation – looking from north

According to the recent information received from MIP, the Gate Project was started on 27.04.2022 by the commencement of the Construction of the New Veterinary Facility and construction of other gate project elements mentioned above are still in progress.

Currently, 80% of the construction of the Flyover Bridge, Connection Road and fencing works is completed. Figures showing the current status is below:

Figure 17 Current Status of Construction Works for TCDD Flyover Bridge

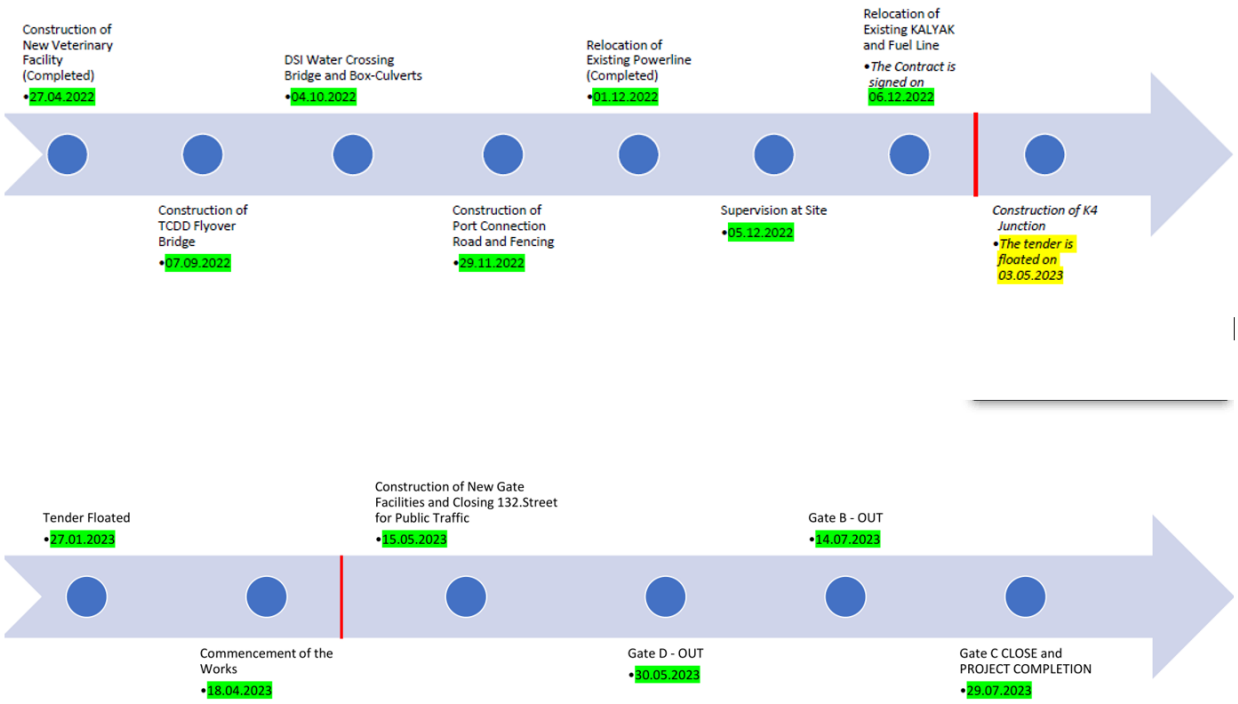
Figure 18 Current Situation of Connection Roads and Fencing Works

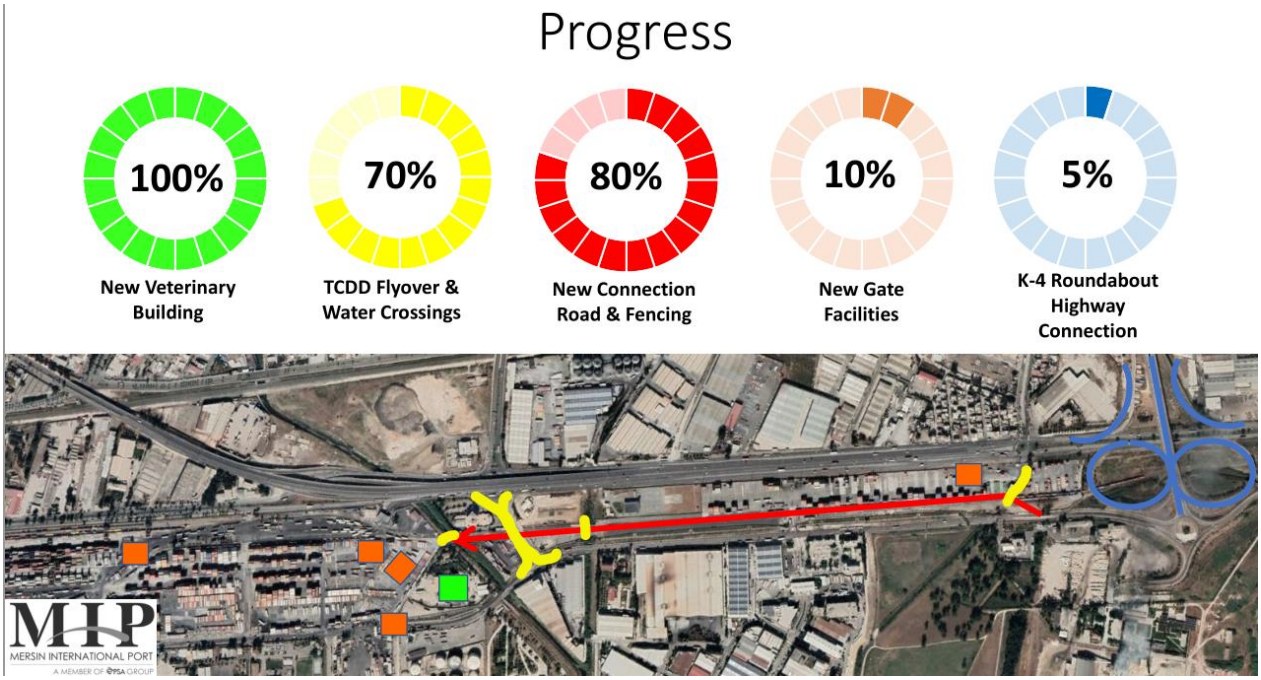
Regarding other components of the gate project, the recent information is as below:

- Demolition of existing veterinary building is completed in January 2023 and Building new veterinary building is completed.
- Relocation of existing powerline is completed in February 2023.
- Relocation of existing KAL-YAK has been completed in April 2023. Relocation works of existing fuel line are 50% completed.
- The Gate facilities for General Cargo will be operational soon.
- Construction of water crossings (bridges and culverts) by DSI are in construction, close to completion.

After the completion of the Gate Project, the entrances to the Port will be only through Gate D and the exist will be through Gate D, Gate B and possibly Gate C. This will ensure to prevent the congestion of vehicles trying to enter the Port through Gate B which currently causes high traffic on İsmet İnönü Boulevard towards city center. The Gate Project is expected to be completed in July – August 2023.

Overall progress summary provided by MIP is below:





In addition, MIP will increase the number of admission boxes at Gate D to a minimum of eleven which will decrease the number of vehicles thus, the waiting queue at Gate B entrance. Also, there will be additional parking lots inside the port to eliminate the queuing.

2.3 Project Workforce and Schedule

According to the information provided by MIP, 40-60 personnel (average estimate for the entire duration including subcontractors, the actual number will depend on the Contractor's schedule and methodology) will be employed construction phase of the project and approximately additional 500 personnel will be employed during the operation phase.

The schedule of the project stated is given below for the construction phase. For the operation phase, since the operating right of the port was taken over by MIP on May 11, 2007 for 36 years, the operating period for the activity owner is limited to this period. At the end of this period, port activities will not be terminated, and port activities will continue for a long time with an extension of the time or a new tender.

The tentative Project schedule is given below.

- EMH2 Construction: 10.2023 – 02.2026 (approximately 28 months)
- Dredging Work: 10.2023 – 04.2024 (approximately 6 months)
- New Dining Hall Construction: 10.2023 – 10.2024 (approximately 12 months)

Detailed breakdown of the construction works will be defined by MIP in consultation with the contractors.

2.4 Consideration of alternatives

The project is an extension of an existing operating Port. Therefore, alternatives in terms of site settings at different locations are not valid however construction and design alternatives have been assessed.

Zero Project

A feasibility study has been completed to increase the Port Capacity without new berth (Zero Project). “Zero” project is not an option as all the quays are occupied. This has resulted in construction of EMH2 as an extension to the current port operations.

The design and construction methodology alternatives selected with the aim of increased sustainability and minimized social impact.

This included,

- identifying that construction materials could be sourced locally to reduce the energy required for transportation,
- design optimization to reduce materials required in construction,
- re-use of existing materials at site,
- consideration of construction methods which limit social impact.

Container Quay – Pile Reduction

MIP’s EMH1 development was designed to require a row of 6 no. steel tubular piles to support the deck structure of the container berth. Through design optimization efforts, Project was able to reduce the number of piles in the row to 4. This reduction in the total number of steel tubular piles in the project from 600 to 400, has the following 4 main impacts:

- a reduction in CO_2 production during manufacture,
- a reduction in transportation,
- a reduction in the energy required to install (drive) the piles,
- a reduction in noise pollution during construction activities.

Re-use of existing armour rock

The design has been developed such that existing armour rock, found in the revetment on the Southern end of EMH1, can be re-used in the construction of revetment under the extended container quay.

This will reduce the necessity to produce, deliver and install additional rock material during the construction of the extension of the terminal.

Sourcing of local material for reclamation

During the concept stage of the project, local quarries were contacted to discuss availability of the material specified for reclamation. It was confirmed that this material can be sourced locally (within a 50 km radius) of the port, vastly reducing the distance required to deliver reclamation materials.

Within the tender documentation, the Contractor has also been urged to consider marine delivery methods to further reduce the impact of material delivery on the road network around the port. The final choice of the hauling routes will be finalized before construction and will be included in the construction stage Traffic Management Plan.

Sustainable Concrete

Whilst the use of concrete in construction is unavoidable, the design has made every effort to limit its use and the impact it has on the environment where possible.

This included the optimization of cross sections of concrete elements during the design process and the adoption of environmentally sustainable concrete.

Specifically, modifications have been made to the design reinforced concrete mixes with the aim of substantially reducing negative environmental impacts from reinforced concrete and increase its sustainability.

These modifications include,

- the sourcing of locally produced cement to reduce the distance between cement plant and batching plant,
- the maximization of the use of cement replacement products (such as GGBS),
- optimization of the cross-sectional area of reinforcement steel required in each element.

3.0 *Environmental Impacts of the Project*

An overarching framework for the impact assessment has been developed as outlined below.

3.1 Identification and Assessment of Baseline components

The term "baseline component" is composed of the physical (such as air, soil, land use, water resources), biological (such as habitats and species) and social environment (such as individuals and communities) that may be affected by the Project and its associated activities.

"Sensitivity Level" represents the sensitivity and the capacity of the baseline components to accommodate the changes that the Projects may bring about.

While defining the sensitivity of the baseline component the following criteria described in Table below has been used.[1]

Table 2: Baseline Component Sensitivity

Sensitivity Level	Description
High	Low capacity to accommodate the changes the Projects may bring about.
Medium	Medium capacity to accommodate the changes the Projects may bring about.
Low	High capacity to accommodate the changes the Projects may bring about.
Negligible	Very high capacity to accommodate the changes the Projects may bring about.

3.2 Identification and Definition of Magnitude of Potential Impacts

Potential environmental and social impacts are identified and then assessed by considering their different characteristics to define the magnitude of the impacts.

The criteria used to describe different characteristics of the environmental and social impacts of the Project have been presented in the following (Table 3).

Table 3: Impact Characteristic for the Definition of Magnitude[2]

CharacteristicsCharacteristics	Level	DescriptionDescription
Spatial Coverage	Areal	Impacts occurring in the Project Boundary.
	Local	Up to 2km of the Project boundary. Includes nearby settlement areas
	Regional and beyond	Beyond 2 from Project boundary. Includes several districts and beyond up to national boundaries.
Temporal Coverage	Short term	Less than 2 years
	Medium term	Up to 5 years
	Long term	Beyond 5 years and irreversible
Intensity	Low intensity	Changes can be adapted by the baseline components

[1] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf, HE-DMRB-SE LA 104 Revision 1 Environmental assessment and monitoring (formerly HA 205/08, HD 48/08, IAN 125/15, and IAN 133/10). Revision 1, ,
Institute for Environmental Management and Assessment (IEMA). Guidelines for Environmental Impact Assessment. England. 2004.

[2] Spatial and temporal coverage criteria is defined for the Project considering the whole Port area and the period of construction (approx. 2 years)

CharacteristicsCharacteristics	Level	DescriptionDescription
	Medium intensity	Changes result in exceedance of the natural capability of baseline components to adapt change and result in damage to the environmental and socioeconomic components.
	High intensity	Changes result in major disturbance to environmental/socioeconomic components and ecosystems.
TypeType	Negative/Adverse	Impacts that need to be mitigated
	Positive	Impacts that could be enhanced

For assessing the overall magnitude of the impact based on the aforementioned evaluation criteria, the following matrix has been developed (Table 4) for the definition of the impact magnitude.

Table 4: Prediction of Magnitude of Impact (same prediction levels are valid for adverse or beneficial impacts)

Spatial Coverage	Temporal Coverage	Intensity	Magnitude of Impact	
Areal	Short term	Low	Negligible	Negligible
	Medium term	Low	Low	Low
	Long term	Low		
	Short term	Medium		
	Medium term	Medium		
	Long term	Medium		
	Short term	High	Medium	Medium
Local	Short term	Low	Low	Low
	Medium term	Low		
	Long term	Low		
	Short term	Medium	Medium	Medium
	Medium term	Medium		
	Long term	Medium		
Regional	Short term	low		
		Medium		
	Medium term	low		
		Medium		
	Long term	low		
		Medium		
Areal	Medium term	High	high	High
	Long term			
Local	Short term			
	Medium term			
	Long term			
Regional	Short term			
	Medium term			
	Long term			

3.3 Significance of Impacts

Common criteria used to evaluate significance include[3]:

1. The magnitude of the predicted effect and
2. The sensitivity of the receiving environment/baseline components.

[3] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

Below table is produced for defining the significance of the impact considering various levels of magnitude of impact and sensitivity of baseline component.

Table 5: Predicting Significance of Impacts

Sensitivity of Baseline Component	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major	Medium	Minor
Medium	Major	Medium	Minor	Negligible
Low	Medium	Minor	Minor	Negligible
Negligible	Low	Negligible	Negligible	Negligible

3.4 Significance of Residual Impacts

After impact significance assessment, mitigation measures are determined for each adverse impact. Afterwards, magnitude and significance of residual impacts is determined using the same methodology, where residual impacts can be defined as any impact that would remain after implementation of the proposed mitigation measures.

The applied mitigation measures are expected to result in "Minor" or "Negligible" residual impacts.

3.5 Cumulative Impact Assessment

Cumulative impacts are defined by IFC as *"the impacts that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as "developments") when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities."*[4]

According to IFC, cumulative impact assessment (CIA) is the process of:

- analyzing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen valued environmental and social components (VECs) over time, and
- proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

IFC proposes a six-step approach for CIA study (Figure 19) which has been used for the CIA of the Project. The CIA study is provided in Section 3.11.

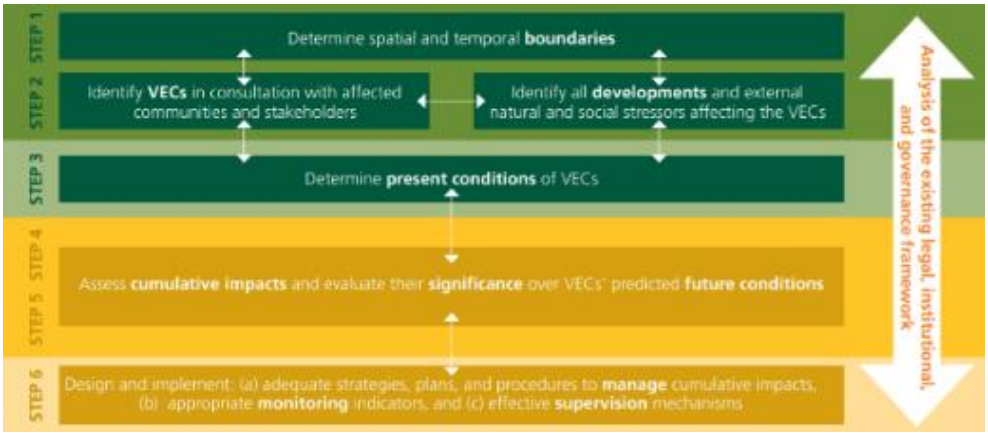


Figure 19: IFC CIA Approach

[4] IFC, 2013, Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets

3.6 Air Emissions Impact Assessment

In order to characterize the existing ambient conditions in the port area and surroundings and evaluate the potential impact of the Phase II expansion projects and to recommend relevant mitigation measures, the air emission impact assessment process was conducted with the AERMOD software for both construction and operation phases considering the baseline sampling conducted the dates between 02.04.2021 and 02.05.2021. Modeling studies were carried out for both construction phase dust emissions (PM10, PM2.5) and operation phase NO2, SO2, CO, PM2,5 and VOC emissions.

The results of the modelling study were compared with national and international standards including recommendations outlined in the IFC Environmental, Health, and Safety (EHS) Guidelines, National Regulation on the Control of Air Pollution Originating from Industrial Activities (RCAPOI) , EU Council Directive 2008/50/EC and WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide.

The section below represents summary of the findings, detailed studies, modeling results and the report, please refer to Appendix – 1.

Air quality regulation and standards Air emissions covering the project location should not exceed the pertinent standards. Accordingly, National RCAPOI and international limits are listed in below table.

Table 6: National and International Requirements

Parameters	Period	Units	National (RCAPOI) Limits		EU	WHO
			2019-2023	After 2024		
NO2	1 Hour (not to be exceeded more than 18 times a calendar year)	µg/m3	250	200	200	200
	Calendar year		40	40	40	40
PM10	24 hours (not to be exceeded more than 35 times a calendar year)	µg/m3	50	50	50	50
	Calendar year		40	40	40	20
PM 2.5	24 Hour	µg/m3	-	-	50	25
	1-Year		-	-	40	10
PM Deposition	STL	mg/m^{2}day	390	390	-	-
	LTL		210	210	-	-
VOC	Hourly	µg/m3	280	280	-	-
	STL		70	70	-	-
SO2	Hourly	µg/m3	350	350	350	-
	Daily		125	125	125	20
	Annual		20	20	-	-
CO	Maximum 8-hour average	µg/m3	10000	10000	10000	-

Besides, limits for Benzene, Toluene, Ethylbenzene and Xylene are listed below.

Table 7: National and International Requirements

Parameters	Period	EU (µg/m3)	WHO (µg/m3)	OSHA PEL[5]
Benzene	1 Year	5	-	-
Toluene	Weekly	-	260*	-
Ethylbenzene	8-Hour	-	-	435 mg/m3
Xylene	8-Hour	-	-	435 mg/m3

* Toluene limit value is for weekly period, but lack of the weekly model output, daily results are compared.

[5] United States Department of Labor, Occupational Safety and Health Administration, Permissible Exposure Limits

To compare the baseline results with the above required standards, the limits are chosen in line with the WHO standards, EU Standards, national RCAPOI Limits, and lastly OSHA PEL where the standards of others are not available. The chosen values, - in line with EBRD PR3, IFC PS 3 the most stringent of all applicable, are colored with orange in the related tables. Hereinafter, the chosen limits will be named as “Project Standards” within tables.

3.6.1 Baseline

National EIA has used for setting air quality baseline the data obtained form national air quality monitoring station in Mersin province located 700 m away from the port where continuous SO2, NO2, CO, O3 and PM10 measurements are conducted. In order to determine project background air quality, baseline survey has been undertaken in April 2021 by BTY and Sigma Environmental Laboratory. It should be noted that results achieved during the survey could have been impacted by the reduced road traffic and economic activities due to the lockdowns. Also, since the second half of the measurement period coincided with Ramadan, lower than normal air emission level may occurred at the time of the survey.

Figure 20: Air Quality Sampling Points

As it is seen in the above tables, the baseline sampling has been conducted for following 14 locations.

Table 8: Coordinates of the Sampling Location

Location	Coordinates	
1	646090.15	4074606.83
2	643918.89	4075090.60
3	644238.53	4072399.11
4	644129.86	4075738.36
5	641487.58	4074668.27

Location	Coordinates	
6	644429.29	4074528.37
7	645457.19	4073632.40
8	646365.20	4077688.78
9	645489.46	4074181.06
10	646295.70	4074491.49
11	644665.55	4073495.21
12	644817.25	4073578.36
1 (for PM10 and 2.5)	643599.38	4074887.68
2 (for PM10 and 2.5)	646043.26	4074554.29

Table 9: Baseline Results

Location	Baseline Results (µg/m3)								
	NO_2	SO_2	VOC	Benzene	Toluene	Ethylbenzene	Xylene (m,p,o)	PM10	PM2.5
1*	<17.24211	<21.57114	ND	<0.857248	<0.765808	<0.893940	<4.38869	29.15	8.19
2*	<17.24528	<21.57511	ND	<0.857406	<0.765949	<0.894104	<4.38949	30.64	8.32
3	<17.24647	<21.57659	ND	<0.857465	<0.766002	<0.894165	<4.38980		
4	<17.24449	<21.57411	ND	<0.857366	<0.765914	<0.894063	<4.38929		
5	<17.24568	<21.57560	ND	<0.857425	<0.765967	<0.894124	<4.38959		
6	<17.25123	<21.58255	ND	<0.857701	<0.766213	<0.894412	<4.39101		
7	<17.25004	<21.58106	ND	<0.857642	<0.76616	<0.89435	<4.39070		
8	<17.24727	<21.57759	ND	<0.857504	<0.766037	<0.894207	<4.39000		
9	<17.24409	<21.57362	ND	<0.857346	<0.765896	<0.894042	<4.38919		
10	<17.24449	<21.57411	ND	<0.857366	<0.765914	<0.894063	<4.38929		
11	<17.24806	<21.57858	ND	<0.857544	<0.766072	<0.894248	<4.39020		
12	<17.25242	<21.58403	ND	<0.857760	<0.766266	<0.894474	<4.39131		

*The first and second locations are different for PM10 and PM2.5 measurements.

Besides, for the 1,2,3 and 7 locations PM deposition amount are 147.80, 264.49, 91.59, 164.86 µg/m3, respectively.

When the baseline results are compared with the requirements, it is seen that the baseline values are below the required standards, except the PM deposition. For the second location, PM deposition amount exceeds the Long Term Limit (LTL) stated in the National (RCAPOI) Limits for relevant parameter (see Table *6*). Also, in the EIA Report of the project, it is stated that the PM amount is above the national limits whereas the SO2 amount is lower than the national limits in 2018. According to the Mersin City Air Quality Assessment Report published in 2013, the major source of the PM10 is traffic of the city since the increases happens early in the morning and end of the working hours, and it was expected the PM10 amount will be problematic for Mersin after the year 2018[6]. According to the Dark Report 2020 published by the of Right to Clean Air Platform, Turkey , the NO2 amount in the project location is high for the first quarter of 2020 (pre-pandemic) while it is moderate for the second quarter (for the pandemic), as it is seen in the below figure (the project location is represented by green pin)[7].

The baseline findings indicate that the air quality in the city is influenced by both direct and indirect activities associated with the port. Direct activities, such as vessel operations and cargo handling, contribute to air pollution. However, the Mersin International Port (MIP) has made efforts to mitigate its impact by electrifying lifting equipment, specifically RTGs. These port activities are interconnected with other urban sources like general traffic and industrial processes. Addressing air pollution in port cities requires a comprehensive approach that considers both direct and indirect emissions sources.

[6] Mersin Air Quality Assessment Report 2013, KENTAIR Project, available at: https://webdosya.csb.gov.tr/db/destek/icerikler/mers-n_raporu-20191127113305.pdf

[7] Dark Report 2020 Air Pollution and Health Impact, Right to Clean Air Platform, 2020, available at: https://www.temizhavahakki.com/wp-content/uploads/2020/09/Dark-Report-2020Vfinal.pdf

Overall, these findings emphasize the importance of closely monitoring and managing air quality during the Project implementation. Relevant mitigation measures should be implemented to address the elevated PM deposition and NO2 levels. It is crucial to ensure that the Project does not exacerbate existing air pollution issues, particularly regarding PM10 and NO2. By adhering to environmental regulations and employing effective monitoring strategies at the nearest sensitive receptors which are discussed in the next Section of this report.

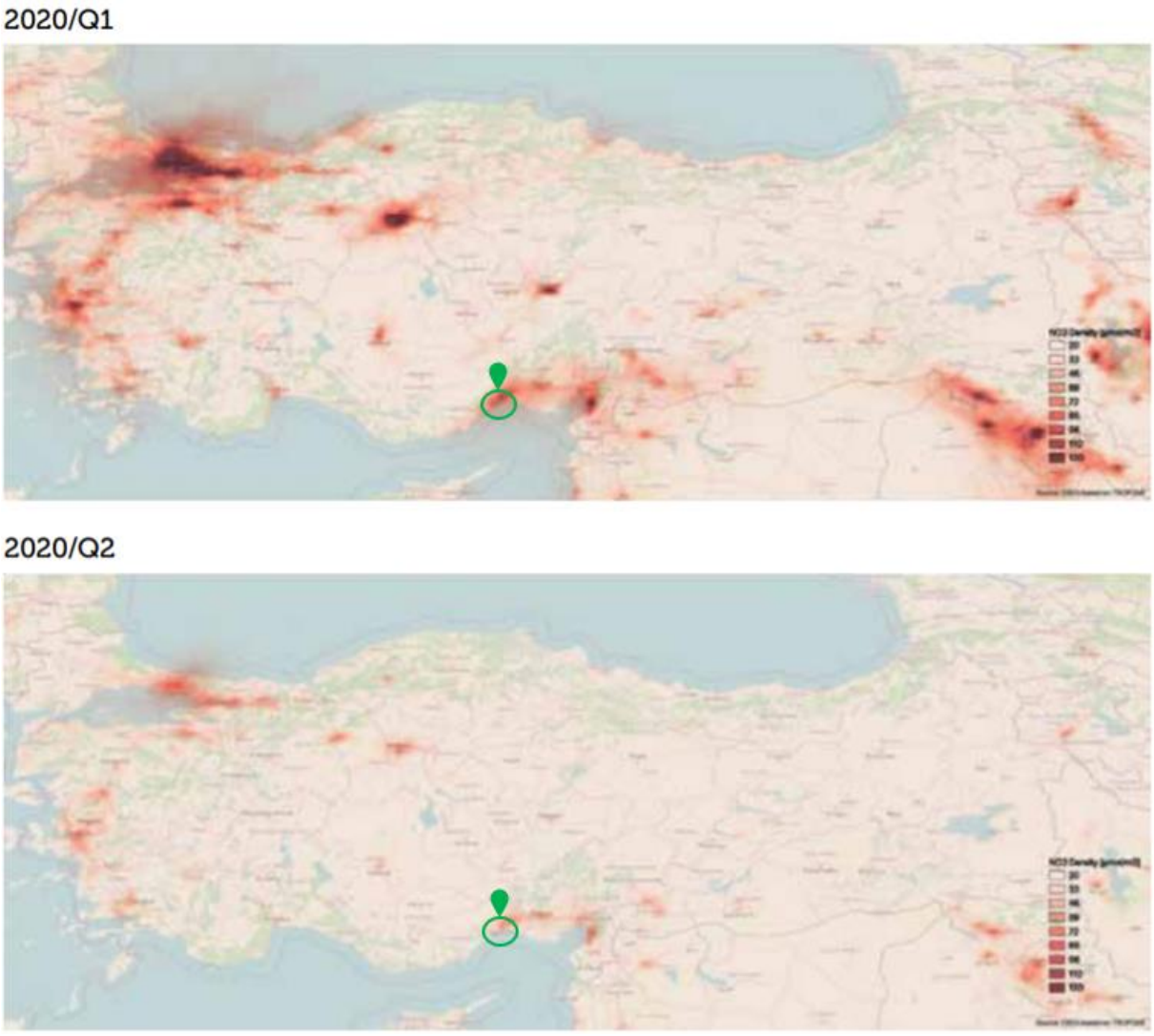


Figure 21: 2020 NO2 Density[5]

Verification of the survey undertaken by BTY and Sigma Environmental Laboratory against long term monitoring at the station at Mersin Province could not be undertaken, as the Mersin Province station was not operational since April 2019. This has been noted by Mersin Branch of Chamber of Environmental Engineers affiliated to Union of Chambers of Turkish Engineers and Architects[8].

3.6.2 Impact Assessment for Construction

During the construction phase, the emission source will be : earthworks (mainly related to reconstruction of Gate B and local access roads) operation of the onshore and offshore construction machinery (including dredging vessels) and stockpiling , loading and unloading of materials. .

[8] 2019 Mersin Air Quality Assessment Report, https://www.cmo.org.tr/genel/bizden_detay.php?kod=101661&tipi=68&sube=11

During the earthworks as total, emission will be released as a result of following activities specific to the project:

- Excavation
- Load on trucks
- Transportation
- Unloading filling material
- Engines of construction equipment and vehicles

During dredging, main emission source will be dredging vessels.

According to the pertinent standards, the dust generated by earthworks was calculated as 1.72 kg/h whereas the emissions from dredger vessel[9] was calculated as 201.28 kg/h for NOx, 51.28 kg/h for SOx, 3.85 kg/h for PM10 and 3.59 kg/h for PM2.5. Besides, for engines of construction equipment, total NOx emission was calculated as 0,227099 kg/h. For emission factor calculation, assumptions and emission of other parameters, see Appendix – 1, Air Quality Modelling Report.

Results of the air modelling for construction phase are given in below table and figures.

[9] The vessel emissions have been calculated based on Emission Factor Table 3-2, Chapter 1.A.3.d of the 2019 EMEP / EEA Emission Factors; Tier 1 EFs for ships using marine diesel oil / marine gas oil.
BTEX emissions are calculated from average hydrocarbon rates of Table 3-18 of the same source.
Fuel consumptions are obtained from Table 3-4 of the 2019 EMEP / EEA Emission Factors.

Table 10: Construction Phase Maximum Air Pollution Contribution Values (APCV) Determined from the Modeling Studies

Parameter	Averaging Period	Maximum APCV and Coordinates (X,Y)	Project Standards (µg/m3)
NO2 (µg/m3)	Hourly	96.94 (643639, 4080431)	200
	Annual	1.17 (646460, 4074088)	40
PM10 (µg/m3)	Daily	22.21* (645947, 4074088)	50
	Yearly	1.45* (646204, 4073883)	20
PM2,5 (µg/m3)	Daily	2.22 (645947, 4074088)	25
	Yearly	0.145 (646204, 4073883)	10
PM Deposition (mg/m2day)	STV	11.7 (645947, 4074088)	390
	LTV	0.79 (646204, 4073883)	210
SO2 (µg/m3)	Hourly	41.16 (643639, 4080431)	350
	Daily	3.02 (642454, 4079878)	125
	Annual	0.49 (646460, 4074088)	20
CO (µg/m3)	Maximum 8-hour average	3.17 (642454, 4079878)	10000
VOC (µg/m3)	Hourly	5.75 (643639, 4080431)	280
	Daily	0.42 (642454, 4079878)	70
Benzene	Annual	0.013 (646460, 4074088)	5
Toluene	Daily	0.007 (642454, 4079878)	260**
Ethylbenzene	Maximum 8-hour average	0.0067 (642454, 4079878)	435 (mg/m3)
Xylene	Maximum 8-hour average	0.00175 (642454, 4079878)	435 (mg/m3)

*Results of PM10 modelling, which are illustrated in Figure 20 and Figure 21, where red color shows the maximum modeled concentration point (reads 22.21 µg/m³) , where the legend shows the maximum average values of PM10 daily and yearly, which are in compliance with the relevant standards as shown by the table above.

**Toluene limit value is for weekly period, but lack of the weekly model output, daily results are compared.

According to air quality modelling results, it is seen that during the construction phase, the air quality standards are met for each parameter.

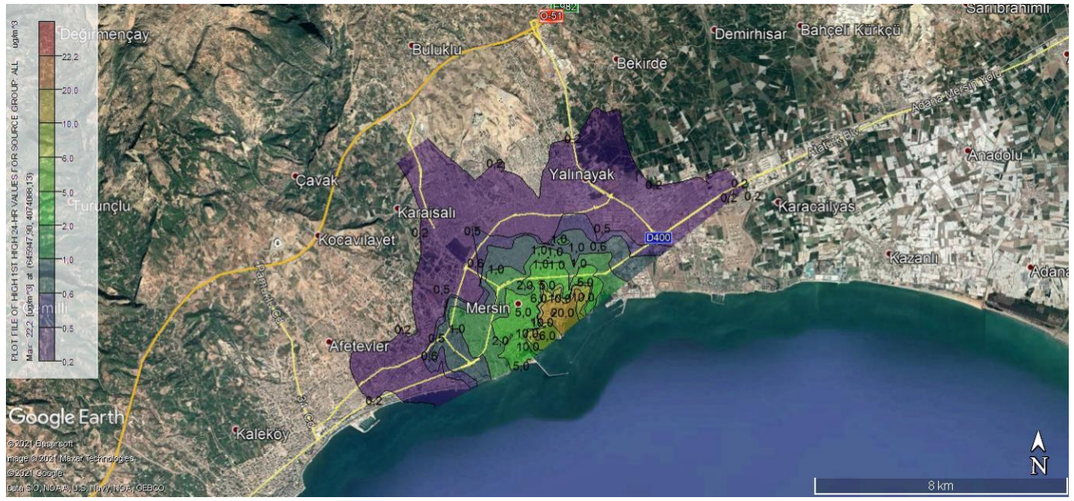


Figure 22: Daily Average Maximum APCV of PM10

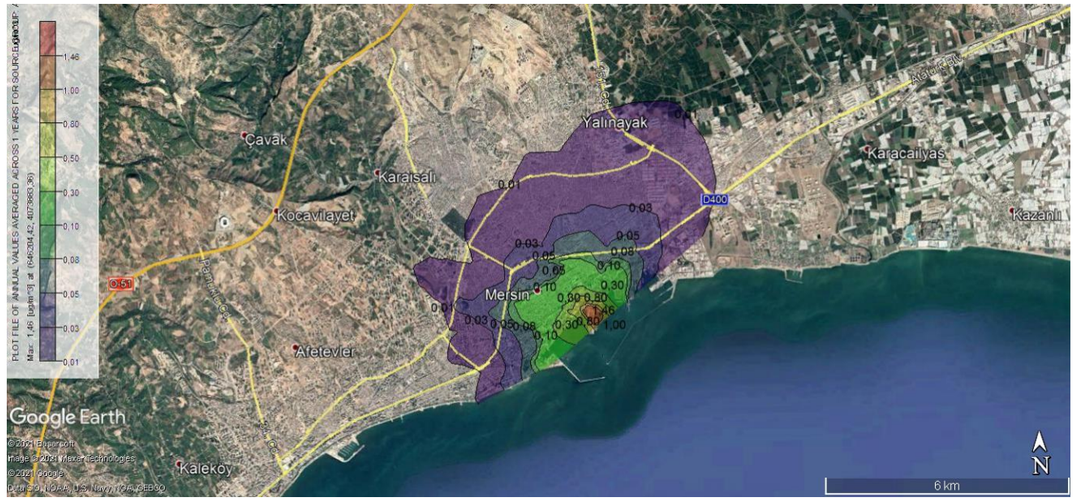


Figure 23: Yearly Average Maximum APCV of PM10

During the construction periods, there will be monthly monitoring of the two nearest sensitive receptors, which is shown by below map, along with the locations of maximum yearly concentrations for NO2 SO2 PM10 and PM2.5.

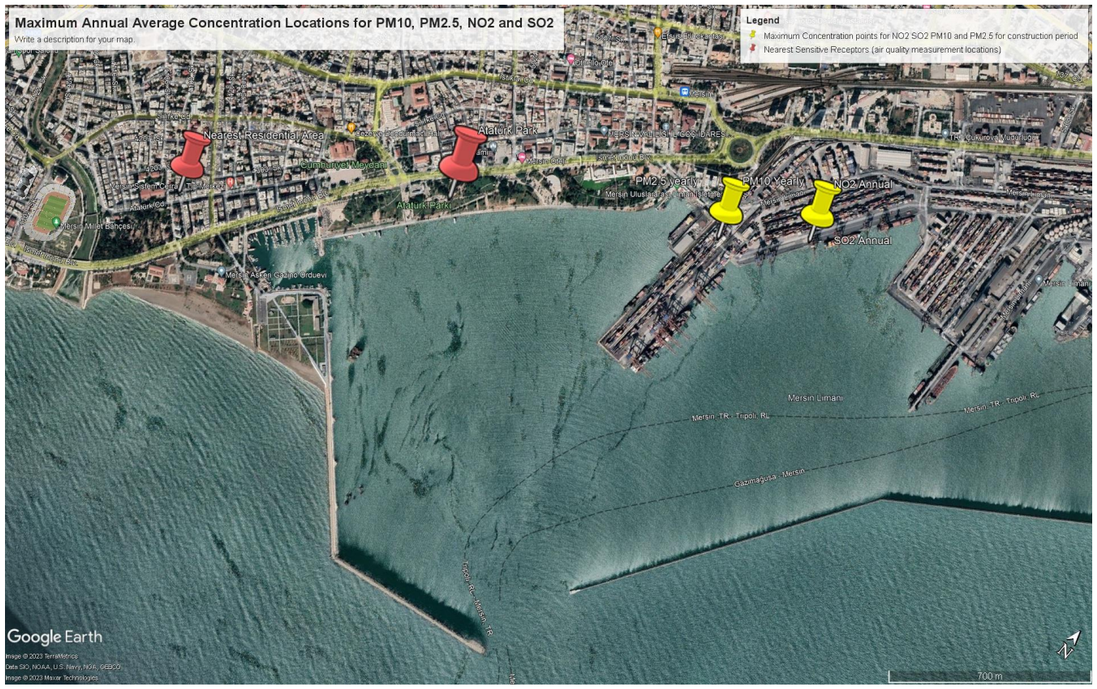


Figure 24 Monthly Air Quality Measurement Points & Air Quality Model Maximum Yearly Concentration Locations

Table 11: Air Impact Assessment for Construction

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Air Pollution	• Limited excavation, construction of new buildings at Gate B area, and unpaved roads, • Load on trucks • Unloading filling material • Engines of construction equipment • Dredging vessels operation	People	Dust emission	Construction	Medium (for the general community around the port and employees)	Local	Short Term	Low	Negative	Low	Minor	• Comply with CESMP, AQMP, TMP • Precautions will be taken against sources of air pollution such as excavation works, movement of vehicles specifically on unpaved roads and exhaust emissions. • Roads will be maintained in good condition. • Unnecessary speeding will be prevented to reduce dust formation. • Under dry air conditions, water will be sprayed regularly in the roads close to the settlements during dry weather to prevent generation for dust. • For dredging, all vessels will be in good condition and well maintained • Monthly monitoring of SOx, NOx, PM2,5 and PM10 at sensitive receptors (Ataturk Park and residential buildings located nearest to works) will be undertaken by the Contractor.	Low	Local	Short Term	Low	Negative	Low	Minor
2	Air Pollution	• Vehicles and Construction equipment	People	Exhaust emissions	Construction	Medium (for the general community around the port and employees)	Local	Short Term	Low	Negative	Low	Minor	• Exhaust systems of all vehicles/ equipment will comply with the exhaust emission limits identified in the Exhaust Gas Emission Control Regulation–OG:30004 dated 11.03.2017 • Maintenance of vehicles/equipment will be carried out regularly as recommended by the manufacturer • Engines will not be left in operating mode when they are not in use. • Usage of new and well-maintained equipment	Low	Local	Short Term	Low	Negative	Low	Minor

3.6.3 Impact Assessment for Operation

During the operation phase, there will be three main emission sources which are vessel emission (from additional vessel traffic) , truck traffic emission (from additional HGV bringing and taking out the cargo from the port area inland) and cruise port emission. An air quality modelling study was performed for the operation period, taking into account all the emissions generated by those emission sources above.

Vessel Emission

Since the emission occurs from current ship calls to the port and their emissions on receptors are already included in the baseline measurements as presented above, only future emission sources were considered in the modelling process.

Moreover, MIP has gone beyond typical port practices by electrifying the cranes (specifically for cargo handling equipment, RTGs) including regeneration technology Inclusion of battery powered Prime Movers, over the years, along with a couple of other low carbon option implementations, such as provision of shore power on for a limited number of vessels (limited to weekly 3 vessels) and improving operational efficiencies, as provided in Technical DD of the Expansion Project. Those implementations allow us to conclude that the cargo handling equipment will be mostly electric powered and therefore will not impact the air quality at the source. As a result, no new source of emission is considered in the air quality model in terms of cargo handling equipment.

It is planned that project will serve weekly 3 new vessel after expansion is done. Since vessel types will change according to liner types, as a general approach, an average vessel type was considered in order to represent all vessels to calculate emissions.

A general presentation of the vessels approaching the Port is provided in the following Table.

Table 12: The Vessels approaching the Port

	Liner	Service	Frequency	LOA (M)
Current Services	The Alliance	MD3	Weekly	368
	MSC-ZIM	INDIA MED	Weekly	325
	HL-CMA-COSCO	GEM	Weekly	300
	MSK-SEAGO	ME3	Weekly	300
	CMA CGM	NCLEVANT	Weekly	294
	MSK-SEAGO	NESM	Weekly	272
Potential Services	MSC	TIGER	Weekly	395
	CMA CGM	MEX	Weekly	366
	CMA CGM	BEX	Weekly	300

General assumptions for calculating emissions are,

- Vessel : CSCL Indian Ocean
- Super Slow Power : 11,360 kWh
- Stack Height : 80 m from sea level

The vessel emissions have been calculated based on Emission Factor Table 3-2, Chapter 1.A.3.d of the 2019 EMEP / EEA Emission Factors, Tier 1 Efs for ships using marine diesel oil / marine gas oil.

In line with a number of assumptions, emissions were calculated as 165 kg/h for NOx, 42.03 kg/h for SOx, 3.15 kg/h for PM10 and 2.94 kg/h for PM2.5. For assumptions, emission factor calculation and other parameters' emission, see Appendix – 1.

It should be noted that additional vessel traffic related to MH2 construction are container vessels. This group of vessels globally is the fastest to adopt changing sustainability requirements and therefore the modeling presents worst case scenario.

In addition in December 2022 MEPC (IMO's Marine Environment Protection Committee) has adopted amendments to designate the Mediterranean Sea, as a whole, as an Emission Control Area for Sulphur Oxides and

Particulate Matter, under MARPOL Annex VI. In such an Emission Control Area, the limit for sulphur in fuel oil used on board ships is 0.10% mass by mass (m/m), while outside these areas the limit is 0.50% m/m. The amendment is expected to enter into force on 1 May 2024, with the new limit taking effect from 1 May 2025. As this compulsory change in regards to sulphur content of the fuel was not incorporated into air quality modeling for the project, the modeling presents the worse case scenario.

Because of the relocation of cruise port, it is expected that emission distribution will change. In order to model the changes in distribution of the pollutants, cruise emission values are taken as same with other vessels.

Truck Traffic Emission

Additional road traffic related to expanded capacity of the port will be 828 trucks daily and 35 trucks hourly . Based on this , emissions were calculated as 0.2741 kg/h for NOx, 0.1176 kg/h for SO_2, as summarized below.

Table 13 Truck Exhaust Emission Calculations for new trucks during operation period

Pollutant	Emission Factor	Fuel consumption (g/h)	Emission Per Vehicle (kg/h)	Area	
				Number of Vehicle	Total Emission (kg/h)
NOx	32629 g/tonnes fuel	240	0,007831	35	0,2741
CO	10774 g/tonnes fuel	240	0,002586	35	0,0905
PM	2104 g/tonnes fuel	240	0,000505	35	0,0177
SO_2	14 g/kg fuel	240	0,00336	35	0,1176
VOC	3377 g/tonnes fuel	240	0,00081	35	0,0284

As above table suggests, among other emission sources during operational period, the pollution contribution from those new trucks is relatively small. We note that, according to the national legislation published in the Official Gazette dated 30.12.2016 and numbered 29934, namely, "*Regulation On Type-Approval Of Motor Vehicles And Engines With Regard To Emissions (Euro 6) From Heavy Duty Vehicles*" engines of all HGVs operating in Turkey must comply with Euro 6 standards.

According to the Technical DD of the Project, the existing rail yard is capable of being expanded by lengthening the terminal tracks when the reserved entrance gate is relocated, and the utilisation of the yard can be increased by assigning additional eRTGs to the terminal. However, during this air quality study, this possibility is not taken into account. Because of the complexity of the project and air quality software limitations, operation phase emissions were addressed in 3 scenarios.

Scenario 1: In this scenario, it is assumed that total weekly vessels produce emissions during whole year without stopping. While this scenario is capable to calculate more accurate hourly emissions, it gives worst case scenario for long term emissions such as daily and yearly. (The graphics are presented only for this scenario)

Scenario 2: In this scenario, it is assumed that weekly 3 vessel visit the port and every vessel comes inside in different day. Also, it is assumed that vessels emission sources work 6 hours during their visit.

Scenario 3: Apart from the capacity increase of vessels, in this scenario emission dispersion changes resulting from relocating of the cruise port. For three scenarios, the parameters comply with the project standards.

The results and graphics are presented in below table and distribution figures for only the first scenario are presented in Appendix 1.

Table 14: Operation Phase Air Pollution Contribution Value Determined from the Modeling Studies

Parameter	Averaging Period	Maximum APCV and Coordinates (X,Y)	Project Standards
NO2 (µg/m3)	Hourly	180.96 (642454, 4079878)	200
	Annual	2.18 (646847, 4074149)	40
PM10 (µg/m3)	Daily	0.39 (642454, 4079878)	50
	Yearly	0.06 (646847, 4074149)	20
PM2,5 (µg/m3)	Daily	0.36 (642454, 4079878)	25
	Yearly	0.064 (646847, 4074149)	10
SO2 (µg/m3)	Hourly	76.82 (642454, 4079878)	350
	Daily	5.29 (642454, 4079878)	125
	Annual	0.92 (646847, 4074149)	20
CO (µg/m3)	Maximum 8-hour average	5.48 (642454, 4079878)	10000
VOC (µg/m3)	Hourly	10.72 (642454, 4079878)	280
	Daily	0.73 (642454, 4079878)	70
Benzene (µg/m3)	Annual	0.025 (646847, 4074149)	5
Toluene (µg/m3)	Daily	0.007 (642454, 4079878)	260*
Ethylbenzene (mg/m3)	Maximum 8-hour average	0.01 (642454, 4079878)	435
Xylene (mg/m3)	Maximum 8-hour average	0.052 (642454, 4079878)	435

The results presented in the Table 13 demonstrate that that the operational air emissions will not exceed project standards . Only one parameter maximum hourly NO_2 emissions are close to reaching maximum emission values set as project standards. The maximum hourly average concentration location of NO2 is presented in the map below:

Figure 25 Hourly Average Maximum Concentration of NO2

Below map also shows where the maximum hourly NO2 concentration during operation period occurs relative to the Project Location.

Figure 26 Location of Hourly Average Maximum Concentration of NO2 versus Project Area

The scenario for the air quality modeling includes three ships approaching to the port or two ships berthing and one ship approaching at the same time with decreased engine power. This represents the worst-case scenario. As a mitigation measure, it is recommended that MIP monitors the air quality at the locations where the modelled pollutant concentrations are close to the limits defined by the project standards. There is the installation of infrastructure for Cold Ironing (Onshore Power Supply for the vessels or "OPS") within the scope of Project. If exceedances are observed, MIP will have the infrastructure for OPS (onshore power supply) at the port available for all kinds of vessels berthing at the Port. The OPS will provide power to the berthing ship during loading/unloading operations.

As a result of assessment of air quality impacts due to operation activities of the Project, it is concluded the maximum average concentrations will be within the Project Standards. However, there is a certain air pollution contribution from vessels, truck traffic and cruise port emissions, that needs to be managed properly by the MIP during construction and operation phases of the Project. For this, periodical monitoring on the nearest sensitive receptors for PM10, PM2.5, NO_2 and SO_2 is an essential part of the air quality impacts management.

The air quality impacts and mitigation measures are provided in the table below with the residual impacts. After air quality mitigation measures are applied, the residual impacts are determined to be low, which are tabulated below.

Table 15: Air Impact Assessment for Operation

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Air Pollution	• Port's Operation (cargo handling etc.)	People	Vessel Emission	Operation	Low (for the general community around the port)	Local	Long Term	Low	Negative	Low	Minor	• Usage of Fuel which comply with MARPOL requirements. • As a mitigation measure, it is recommended that MIP monitors the air quality at the locations where the modelled pollutant concentrations are close to the limits defined by the project standards. If exceedances are observed, MIP will use OPS (onshore power supply) at the port, the infrastructure of which is already installed. • Mersin Vessel Traffic Services Instruction which regulates the local vessel traffic in Turkish ports will be fully in force. MIP will advice and/or instruct the ships about their speed in order to ensure the safe maintenance of traffic, and less air emissions, will be given by MIP (limiting the ship maneuvering speed limit to a maximum of 6 knots unless there is an emergency.)	Low	Local	Long Term	Low	Negative	Low	Minor
2	Air Pollution	• Port's Operation (cargo handling, logistic etc.)	People	Truck Traffic	Operation	Low (for the general community around the port)	Local	Long Term	Low	Negative	Low	Minor	• Usage of Fuel which comply with national and international requirements. • Completion of Gate Project to decrease traffic emission from waiting trucks, to relieve congestion in the city traffic by separating the port traffic from the city and to contain air pollution	Low	Local	Long Term	Low	Negative	Low	Minor

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
													more within the port borders rather than the city. • Prepare a set of rules/ code of conduct that needs to be followed by logistics companies and the drivers, which relates specific requirements: no idling etc.							

3.7 Noise Emissions Impact Assessment

3.7.1 Land Noise Impact Assessment

In order to evaluate the impact of noise and vibration due to the construction and operation activities, a noise modelling and analysis study and vibration calculation study were undertaken covering the Project area and its surroundings.

The purpose of the impact assessment is to characterize the existing ambient conditions at each of the proposed sites and evaluate the potential impact significance at surroundings and to recommend relevant mitigation measures. The anticipated activities at each site were modelled using the CadnaA acoustical software. The predicted impacts were compared against the ambient criteria established for each critical location.

Noise impacts were assessed in accordance with the recommendations outlined in the IFC Environmental, Health, and Safety (EHS) Guidelines which is based on the Guidelines for Community Noise, World Health Organization (WHO), 1999 and local legal legislation intact in Republic of Turkey, Regulation on Assessment and Management of Environmental Noise (RAMEN).

Vibration impacts were assessed in accordance with the vibration damage criteria defined in BS 5228-2:2009 international standard document.

In order to evaluate the significance of impact from the project, magnitude of impact and responsivity of the receptors need to be identified throughout the project area.

Magnitude of impact is a parameter defined as characteristics of impact and project. On the other hand, responsivity is defined as characteristics of receptors.

a. Significance of Impact, Noise

The category of *significance* is identified based on the combinations of *magnitude* and *responsivity* of receptors.

Table 16: Determination of Impact Significance

Magnitude of Impact	Responsivity of Receptor		
	Low	***Medium***	***High***
No Impact	No Impact		
Negligible	Negligible		Minor
Small	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
Large	Moderate	Major	

b. Magnitude of Impact

Magnitude of impacts was determined as a combination of the extent and the scale of impact.

Table 17: Determination of Impact Magnitude

Extent	Scale				
	No Impact	*Neg.*	*Small*	*Medium*	*Large*
Single	*No impact*	Negligible			Small
Site		Negligible	Small	Medium	Large
Local		Small	Medium	Large	
Regional		Medium	Large		

c. Extent of Impact

The impact extent characterizes spatial distribution of the given impact. The impact extent categories are detailed in table below.

Table 18: Categories of Impact Extent

Category of impact extent	Criteria
Single	Possible noise impact on a single building.
Site	Possible noise impact on 5 - 10 buildings.
Local	Possible noise impact on 10 - 100 buildings.
Regional	Possible noise impact on 100 - 1000 buildings

d. Scale of Impact

The scale of noise impact is the measure of how much noise is accumulated over limiting values at receptor locations. Noise impact receptors are residential, office, institutional, educational, health centers and commercial buildings.

Scale of noise impact is evaluated according to exceedance level. Any increase that occurs with respect to WHO's Guidelines limit values or baseline noise levels (more than 3 dBA) will be noted down as exceedance. Criteria identifying the scale of noise impact during the operation of the Project are detailed in the table below.

Table 19: Criteria for evaluation of the Scale of noise impact on receptorsCategory of Impact Scale	Exceedance from WHO noise limits	
	Daytime*	Nighttime*
No impact	<1	<1
Neg.	1-3	1-3
Small	3-5	3-5
Medium	5-10	5-10
Large	>10	>10
* Daytime: 07:00 – 22:00; Nighttime: 22:00 – 07:00		

The above methodology employed by the Noise Modelling Company, should be acknowledged as a product of their own expertise and experience, as it is not derived from any established international standard or methodology. We note that the evaluation of noise impact scale is subject to a high degree of subjectivity, as perceptions and individual sensitivities can vary significantly.

e. Responsivity of Receptors

The second component for evaluation of impact *significance* is *responsivity* of a possibly affected receptor.

Responsivity is an integral characteristic comprising of:

- Importance characteristics of the affected receptor and
- Sensitivity of the affected receptor to the given impact.

The category of responsivity is identified based on the combinations of *importance* and *sensitivity* of receptors in accordance with the *responsivity* matrix..

Table 20: Determination of Responsivity of Receptors

Importance	Sensitivity		
	Low	*Medium*	*High*
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium		High

f. Importance of Receptors

In general, evaluation of *importance* of the affected receptors is based on their properties as follows:

- Protected status
- Policy of the regional government
- Stakeholders' opinion
- Economic value
- Special features of ecosystems, such as resistance to change, rarity, adaptability, diversity, and fragility, ability for recovery
- Importance of individual components as environmental components, etc.

If one of the above constraints could be considered as relevant for any receptors, importance can be evaluated as medium or high subjectively. Otherwise, the importance is considered low.

g. Sensitivity of Receptors

Sensitivity of a receptor can be explained as the usage of the specific buildings.

Table 21: Designation of Sensitivity of Receptors

Sensitivity	Receptor
Low	High ability to recover the initial properties and functions, minor changes of spatial and dynamic indicators. Office Buildings, farm buildings, industrial or commercial facilities.
Medium	Limited / low ability to recover the initial properties and functions. Measures to minimize disturbance to ecosystems are required. Residential Buildings, hotels.
High	Lack of ability to recover the initial properties and functions. Irreversible disturbances may be caused by minor impacts. Recreational facilities, educational facilities, and health care centers.

h. Vibration Assessment Criteria

Since construction vibration damage criteria gathered from relevant documents is the damage criteria indeed, vibration impacts will be assessed accordingly. If any receptor exposes to any limit exceedance according to damage criteria it means total impact is severe in terms of vibration and if there is not any exceedance it means total impact is none or negligible.

Vibration assessment criteria are given in table below.

Table 22: Criteria for evaluation of the Scale of vibration impact on receptors

Category of impact scale	PPV (mm/sec)
No Impact	<0,14
Negligible	<0,3
Small	<1
Medium	<10
Large	>10

Here it is presented only summary information based on WHO. For all studies, modeling results and the acoustical report, please refer to Appendix – 2.

3.7.2 Underwater noise and vibration

Sounds can have a variety of effects on aquatic life, ranging from subtle to strong behavioral reactions such as startle response or complete avoidance of an area. It is well documented that short and impulsive sounds such as those produced from pile driving strikes, seismic air guns and military sonar can cause behavioral reactions by fishes and cetaceans (whales, dolphins and porpoises; see OSPAR 2009 for example) up to distances of several tens of kilometers from the sound sources.[10]

The main goal of the Marine Directive is to achieve Good Environmental Status of European Union (EU) marine waters by 2020. The Directive defines Good Environmental Status (GES) as:[11] "The environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive".

To help Member States interpret what GES means in practice, the Directive sets out, in Annex I, eleven qualitative descriptors which describe what the environment will look like when GES has been achieved.

Descriptor 11: Energy incl. Underwater Noise

"Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment".

The restrictor has two indicators:

11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds — Proportion of days and their distribution within a calendar year over areas of a determined surface, as well as their spatial distribution, in which anthropogenic sound sources exceed levels that are likely to entail significant impact on marine animals measured as Sound Exposure Level (in dB re 1µPa2.s) or as peak sound pressure level (in dB re 1µPapeak) at one meter, measured over the frequency band 10 Hz to 10 kHz (11.1.1).

The impact that is addressed by this indicator is "considerable" displacement. This means displacement of a significant proportion of individuals for a relevant time period and spatial scale. The indicator is addressing the cumulative impact of sound generating activities and possible associated displacement, rather than that of individual projects.

11.2. Continuous low frequency sound — Trends in the ambient noise level within the 1/3 octave bands 63 and 125 Hz (center frequency) (re 1µPa RMS; average noise level in these octave bands over a year) measured by observation stations and/or with the use of models if appropriate (11.2.1). (Ambient noise)

Currently, it is not possible to accurately identify the exact levels of ambient noise caused by human activities that would prevent the marine environment from achieving Good Environmental Status (GES). What causes the marine ecosystem to not be at GES is mainly due to a lack of understanding regarding the impacts of increased ambient noise on the marine ecosystem. The Marine and Coast Task Support Group ("TSG") in European Commission cannot therefore advise on a level of ambient noise that could be set as a target for this indicator. Still, shipping is considered as one of the largest contributors to low frequency ambient noise.

Specific to the Project: The piling, dredging and filling (construction) would need to be evaluated under indicator 11.1 and shipping (operation) would be evaluated under indicator 11.2.

Since the evaluation needs to be done for the project (not cumulative) and there is no ambient monitoring data for the region a habitat-based risk assessment approach is used for the impact assessment by focusing on the sensitivity of the habitat and habitat features to the underwater noise.

[10] https://dredging.org/documents/ceda/downloads/2011-11_ceda_positionpaper_underwatersound.pdf
[11] https://ec.europa.eu/environment/marine/good-environmental-status/descriptor-11/index_en.htm

In the Biodiversity Management Plan ("BMP") of the Project, Underwater sound generation during construction and operation is evaluated as one of the impacts adversely affecting the biodiversity values in the construction area, namely fish species, monk seal and sea turtles.

Underwater sound production from construction work may cause female sea turtles not to nest or to leave their nesting areas, as too much underwater sound production can cause sea creatures to fail to lay eggs and/or avoid nesting.

Biodiversity Management Plan sets out mitigation measures to minimize underwater noise during construction and operation. Responsible parties, timing, frequency of the monitoring of mitigations and verification methods are defined within BMP.

3.7.3 Baseline

3.7.3.1 Land Noise

Noise impacts should not exceed the levels presented in table below or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site. WHO states cumulative noise level limits which depend on the background noise levels. In the determination of WHO's limits, background noise levels are taken into consideration.

Table 23: WHO Noise Thresholds

Receptor	Daytime (07:00 – 22:00)	Nighttime (22:00 – 07:00)
Residential areas	55	45
Commercial/industrial area	70	70
Indoor spaces such as classrooms	35	-
Source: Guidelines for Community Noise, World Health Organization (WHO), 1999		

In addition to WHO, comparisons were made according to national regulations, please refer to Appendix 2 for the detailed comparisons.

For the current port operations, under the National Occupational Health and Safety Law No. 6331, noise exposure measurements should be conducted every two years according to MIP's risk assessment as a minimum; however, they are carried out once a year by MIP.

In this project, existing noise climate conditions can be considered as cumulative noise consisting of background noise and current operation of the port. In other words, baseline noise results for this expansion project are inclusive with current operation. The receiver locations were selected depending on the sections of the possibility of having potential noise impact from the facility. Along the project field, 5 different receiver locations were selected to conduct noise impact assessment to predict the potential impact of construction and operation phases.

Figure 27: Receiver Locations

Table 24: Receivers Properties

No	Comments	Extent	Sensitivity	Importance	Distance to the project border (m)	Coordinate, X	Coordinate, Y
1	Government Building	Local	Low	Low	60	646094.00 m E	4074053.00 m N
2	Business Center	Local	Low	Low	50	646337.00 m E	4074533.00 m N
3	Educational Building	Local	High	Medium	260	646636.00 m E	4075012.00 m N
4	Residential Building	Local	Medium	Medium	2100	650187.00 m E	4075205.00 m N
5	Recreational Area	Local	High	Medium	10	645951.00 m E	4073852.00 m N

Background environmental noise measurements were conducted between 21 - 23 April 2021 at 5 different locations. All the selected locations baseline noise climate is representative for the closest receiving bodies and the measurements were conducted for 48 hours. Results of baseline noise measurements are presented in the table below. Detailed information regarding both measurement types (receiver and source) are presented in Appendix 2.

Table 25: Noise Measurement Results

Location	Classification of the building	Time of the day for the useuse of the building	Lday 07:00-22:00 (dBA)		WHO Limits	Lnight 22:00-07:00 (dBA)		WHO Limits
			First Day	Second Day		First Day	Second Day	
Receiver 1	Government Building	Day time-btw 9:00-18:00	62.6	62.0	70	59.3	62.0	70
Receiver 2	Business Center	During day-closed after 9 pm	65.9	66.1	70	60.3	62.5	70
Receiver 3	Educational Building	Day time-btw 9:00-18:00	65.0	65.8	55	58.3	57.7	45
Receiver 4	Residential Building	House	49.4	49.3	55	47.6	49.1	45
Receiver 5	Recreational Area	Park	57.7	56.1	55	54.9	56.3	45

As can be seen from the background measurement results, WHO limits are exceeded for receptors 3 and 5 during the day and 3, 4, 5 during night. The major source for the increased baseline measurements at Receiver 5 are likely to be resulting from the Port operations.

It is believed that elevated noise values observed could be due to high traffic density, urban area and an already operating port where baseline studies have been carried out. The findings indicate that the existing noise levels in this environment are already at significant levels, likely due to the combined effects of all noise sources.

3.7.3.2 Underwater Noise and Vibration

No baseline data is available on the current level of underwater noise and vibration. However, since the Project area is already an operating Port and there are other ports, fishermen and similar marine structure in the vicinity, it is assumed that there is elevated underwater noise and vibration in the area.

According to the Biodiversity Management Plan, the port has been defined as being in a critical habitat area with high biodiversity values present. The port lies close to legally protected and internationally recognized areas. The project site is connected to this area species connectivity and sits in a broad continuous habitat that support foraging of Critically Endangered and Endangered monk seals, sea turtles and other fish species. Some species that are present in the project area are endemic and restricted range, and the diversification from wider populations demonstrates the importance of the unique local ecosystem that is present.

The project site sits outside of the legally protected and internationally recognized area, but the boundaries of this area have been formed to reflect threats and do not relate to the presence of high biodiversity values. The project site itself is comprised of modified habitat.

3.7.4 Impact Assessment Construction

3.7.4.1 Land Noise and Vibration

a. Land Noise

Potential sources of noise impact in the Mersin Port expansion project during the construction phase can be outlined as:

- Construction activities at sensitive receptors
- Truck activities related to construction works
- Pile driving

- Crane activities

Machine and equipment information are gathered from the delivered documents from client and fundamental construction necessities. However, acoustical data and operation conditions of the pile driving are not clear. Thus, following statements are assumed to be valid for pile driving;

- Pile driving only operational for daytime (it is nearly impossible to conduct pile driving activities at dark)
- Considering preparation time and operational difficulties (unexpected geological formations, wind etc.) which are gathered from field experiences, 4 pile driving per hammer per day and 2 operational hammers will conduct pile driving
- Every pile takes 30 minutes to be driven

As a final note for construction noise modelling; dredging ships will be modeled as area sources using a source database of 85 dBA at 1 meter of distance. Since acoustical data is missing for dredging ships, health and safety regulations' highest allowed noise levels are used.

According to defined impact assessment methodology in Appendix 2, the entire receiver points' final impact significances for construction phase are calculated and determined.

Table 26: Construction Noise Measurement and Impact Assessment Results

Construction Impact Assessment WHO Limits

Receivers	Distance (m)	Source Leq (dBA)		Baseline Leq (dBA)		Cumulative Level (dBA)		Limit Value (dBA)		Limits WHO Exceedance	Magnitude Of Impact			Responsivity			Impact Significance
		Ld	Ln	Ld	Ln	Ld	Ln	Ld	Ln	Max	Scale Of Impact	Extent	Impact Mag	Importance	Sensitivity	Responsivity	
R1	320	60.0	59.7	62.3	60.9	64.3	63.3	65.3	63.9	0.0	No Impact	Local	No Impact	Low	Low	Low	No Impact
R2	840	59.6	60.0	66.0	61.6	66.9	63.9	69.0	64.6	0.0	No Impact	Local	No Impact	Low	Low	Low	No Impact
R3	1400	56.5	57.6	65.4	58.0	65.9	60.8	68.4	61.0	0.0	No Impact	Local	No Impact	Medium	High	High	No Impact
R4	4360	31.3	32.7	49.3	48.4	49.4	48.5	55.0	51.4	0.0	No Impact	Local	No Impact	Medium	Medium	Medium	No Impact
R5	175	56.9	57.2	57.0	55.7	59.9	59.5	60.0	58.7	0.8	No Impact	Local	No Impact	Medium	High	High	No Impact

Construction Impact Assessment RAMEN Limits

Receivers	Distance (m)	Source Leq (dBA)			Limit Value (dBA)			Limits RAMEN Exceedance
		Lday	Levening	Lnight	Lday	Levening	Lnight	Max
R1	320	60,0	59,5	59,7	70,0	65,0	60,0	-
R2	840	59,6	59,7	60,0	70,0	65,0	60,0	-
R3	1400	56,5	57,0	57,6	70,0	65,0	60,0	-
R4	4360	31,3	32,0	32,7	70,0	65,0	60,0	-
R5	175	56,9	56,6	57,2	70,0	65,0	60,0	-

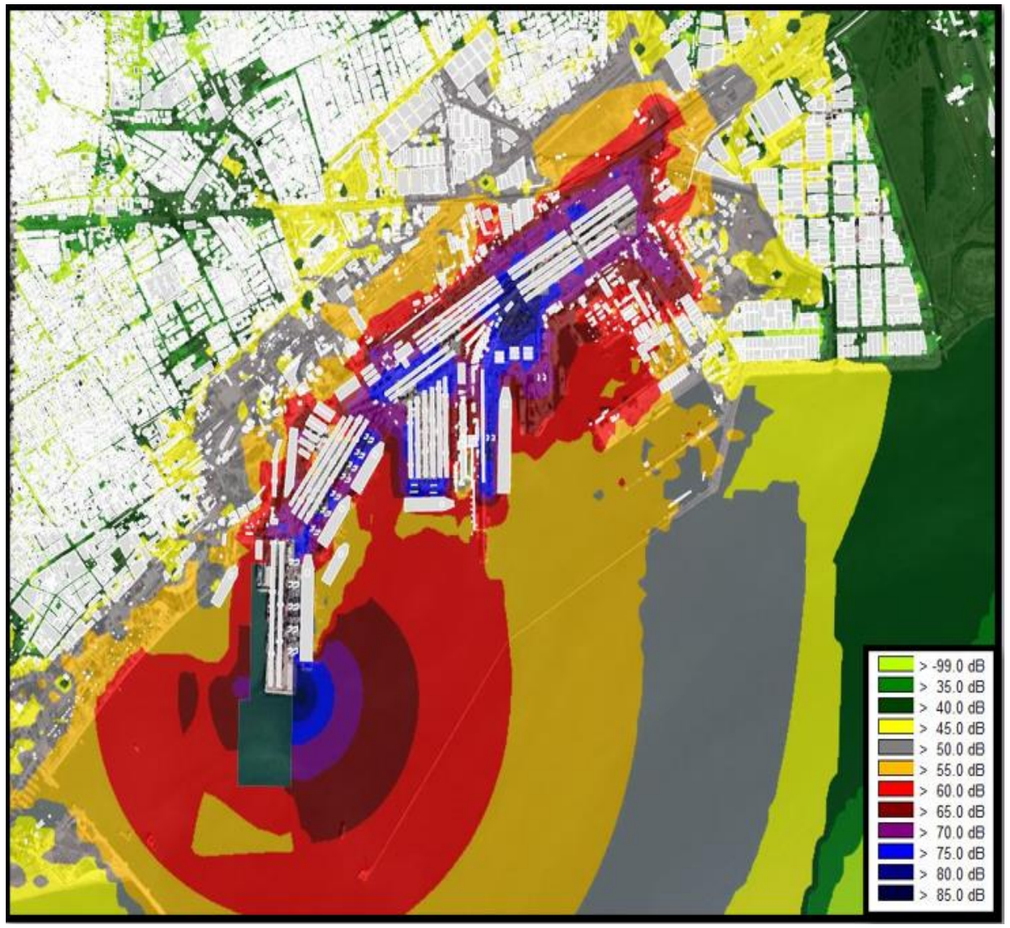


Figure 28: Construction – Noise Map Lday

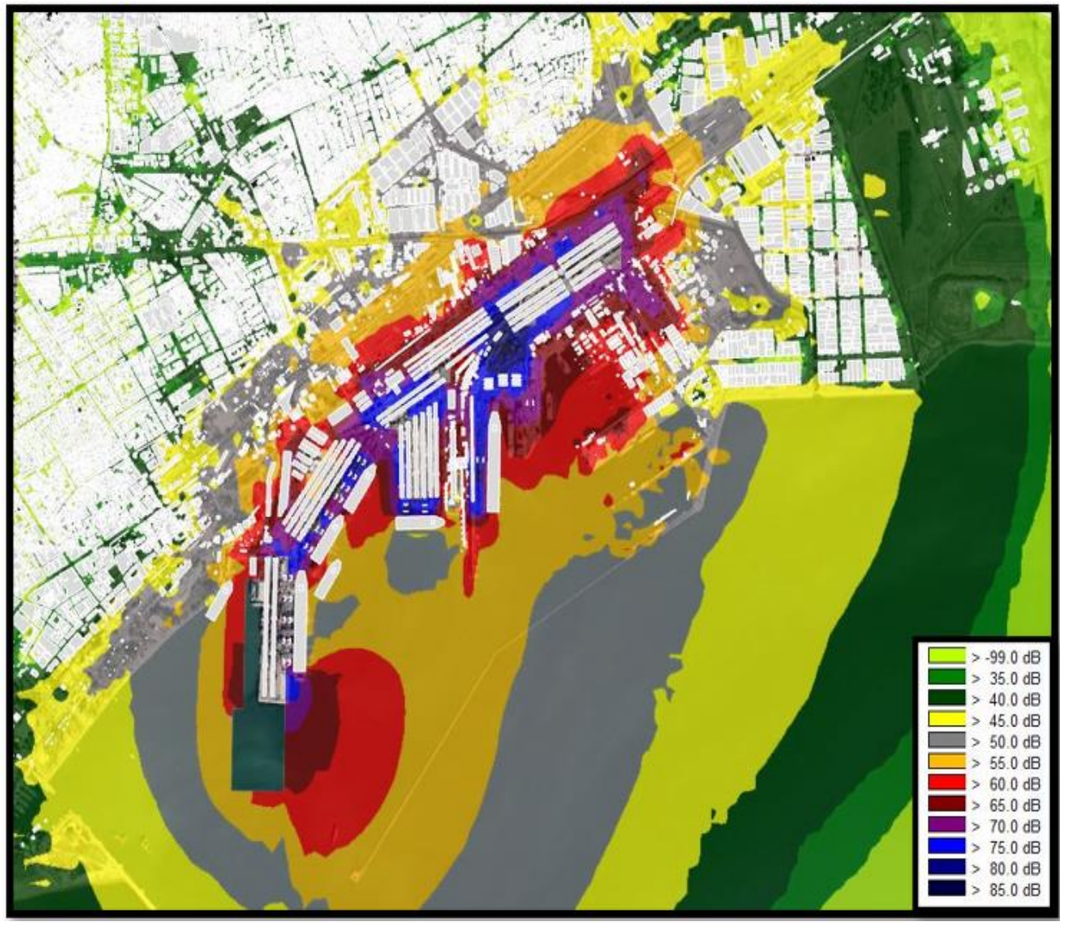


Figure 29: Construction – Noise Map Lnight

As can be seen from the Tables and Figures above no noise impact is foreseen during construction.

b. Vibration

For the vibration, during construction period regarding to the distances of the main construction area major vibration source for receptors are pile driving activities.

In order to simulate maximum vibration that may occur at receptors, calculations and assessment are conducted in terms of environmental vibration sourced from pile driving activities. Experimental reference values are used gathered with similar activities in order to calculate the vibration impact from piling.

Reference vibration values of the piling are reduced according to distance and relevant impact classes are assigned where necessary.

Construction vibration calculations are carried out for two scenarios; one is for main construction and second is for pile driving. The reason to separate vibration calculations for construction to two scenarios is distances and reference vibration levels are different for different operations.

Table 27: Construction Vibration Levels at Receivers

Receiver	Main Construction		Pile Driving	
	Distance (m)	PPV (mm/s)	Distance (m)	PPV (mm/s)
R1	320	0.0196	760	0.0250
R2	840	0.0046	1235	0.0120
R3	1400	0.0021	1750	0.0071
R4	4360	0.0004	4400	0.0018
R5	175	0.0485	615	0.0343

Even though vibrational limits defined in RAMEN is 10 mm/s for discontinuous vibration, vibration limiting value defined in the legal framework of this project is 0.14 mm/s for residential locations. This limiting value is also equivalent to the “No Impact” impact scale in the defined methodology for the project. In order to be on the safe side evaluation are conducted accordingly. Calculations show that safe distance before vibration levels comes under the 0.14 mm/s level is 90 meters for main construction activities and 250 meters for pile driving activities. Thus, according to the vibration calculation results no impact is expected from constructional vibration activities as long as necessary precautions are taken and proper warnings are delivered, since there are no receivers detected closer than safe distances to the construction activities according to information shared with Frekans by MIP.

The nesting areas of sea turtles in the vicinity of the Port are investigated and listed in the Marine Ecosystem Evaluation Report of the Project in detail. Among those nesting locations, special attention is drawn to Kazanlı Beach, which is one of the important nesting locations of sea turtles located 10 km eastern of the Project site as a sensitive receptor. MIP needs to guarantee that no construction activities will be held closer than safe distances to the sensitive receptors, as the project site sits in a broader continuous habitat with high biodiversity values, including connection with species across the boundary of legally protected and internationally recognized areas, although the project site sits outside of the legally protected and internationally recognized area. Nesting of priority species has been recorded in close proximity to the project site.

3.7.4.2 Underwater Noise and Vibration

The main sources of underwater noise and vibration are piling, filling and dredging activities.

The impact assessment for the underwater noise created from these activities would require availability of:

- data on baseline underwater noise and vibration levels,

As stated in section 3.7.3.2, there is no baseline data available on the underwater noise and vibration in the Project Area.

- data on the noise and vibration to be generated

Piling and dredging activities are expected to create noise on a short-term during construction. This increase will be intermittent for piling during pile driving and be continuous for dredging during material dredging and sailing for dumping. A summary of the underwater noise levels created by various marine activities is presented below.

Table 28: Underwater Noise Levels for various activities

Sounds in the aquatic environment						
Sound source	Source level at 1m	Bandwidth	Main energy	Duration	Directionality	Source
Explosives	272dB-287dB re 1µPa zero-to-peak	2Hz-~1kHz>	6Hz-21Hz	~1ms	Omni-directional	1)
Seismic air gun arrays	220dB-262dB re 1µPa peak- to-peak	5Hz-100kHz	10Hz-120Hz	10ms-100ms	Downwards	2)
Pile driving	220dB-257dB re 1µPa peak-to-peak	10Hz >-20kHz	100Hz-200Hz	5ms-100ms	Omni-directional	1), 2)
Echosounders	230dB-245dB re 1µPa rms	11.5kHz-100kHz	Various	0.01ms-2ms	Downwards	2)
Low-frequency military sonar	240dB re 1µPa peak	0.1kHz-0.5kHz	-	6s-100s	Horizontally focussed	3)
Sperm whale click	236dB re 1µPa rms	5kHz-40kHz	15kHz	100µs	Directional	4)
Mid-frequency military sonar	223dB-235dB re 1µPa peak	2.8kHz-8.2kHz		0.5s-2s	Horizontally focussed	1)
Sparkers, boomers, chirp sonars	204-230 dB re 1µPa rms	0.5-12kHz	Various	0.2ms	Downwards	2)
Harbour porpoise click	205dB re 1µPa peak-to-peak	110kHz-160kHz	130kHz-140kHz	100µs	Directional	5)
Shipping (large vessels)	180dB-190dB re 1µPa rms	6Hz >-30kHz	<200Hz	Continuous	Omni-directional	1)
TSHD	186dB-188dB re 1µPa rms	30Hz>-20kHz	100Hz-500Hz	Continuous	Omni-directional	6), 7)
Snapping shrimp	183dB-189dB re 1µPa peak-to-peak	<2kHz-200kHz	2kHz-5kHz	Milliseconds	Omni-directional	8)
CSD	172dB-185dB re 1µPa rms	30Hz>-20kHz	100Hz-500Hz	Continuous	Omni-directional	6), 7)
Construction and maintenance ships	150dB-180dB 1µPa rms	20Hz-20kHz	<1kHz	Continuous	Omni-directional	1)
Drilling	115dB-117dB re 1µPa (at 405m and 125m)	10Hz-~1kHz	<30Hz-60Hz	Continuous	Omni-directional	1)

As can be seen from that Table the noise created by the Piling is considerably higher than the dredging activities.

- data on biological sensitivities.

The impact significance will be in correlation with the biological sensitivities and biologically critical period.

We note that, priority biodiversity feature species (PBF) are determined as some fish species, sea turtle and the monk seal as identified in the Marine Evaluation Report. The report also states that the Project area where the construction activities will occur does not have an abundance of any of those species, thus indicating the impact will be limited on those species if observed in the area during construction. In addition to that, marine mammals are not known to be using the area for breeding or feeding except for less likely possibility of travelling through.

As for the biologically critical period, there will be fish species laying eggs and breeding in the area during spring period, specifically from April to June. Also, sea turtles which have been observed in the vicinity of the Project area from time to time have nesting periods between June – September.

According to the Marine Ecosystem Evaluation Report, underwater noise may have different effects on different PBF species. For the fish species, the important period is the breeding period where underwater noise may adversely affect the presence and quantity of eggs, young and mature individuals in this period when the abundancy of marine species start to increase. For the sea turtles, underwater noise from construction activities may cause females not to nest or to leave their nesting areas. The Biodiversity Management Plan of the Project sets out mitigation measures to minimize those impacts.

In the light of the presented information above it can be concluded that the impacts of underwater noise and vibration from construction activities will be short term and will not be significant for mammals and fishes with the following mitigation measures:

1. Minimization of marine construction activities during spring (the breeding season of most fishes, April to June according to Biodiversity Management Plan) In other words, taking into account the possibility of finding nests in the areas filled during the construction works, the filling works will be carried out especially in the rocky areas in the spring months if possible, as stated in the Biodiversity Management Plan),
2. Using the pier piles that have the qualifications to produce minimum noise
3. Filling will be done by a ramp at the water level to minimize the noise
4. Filling will be done right after dredging to ensure that the species have left the area already during dredging. We note that, priority biodiversity feature species (PBF) are determined as some fish species, sea turtle and the monk seal which are all fast-swimming species as identified in the Marine Evaluation Report.
5. Minimizing the number of the piles from 6 to 4 during design review
6. Observers will be employed during offshore piling and dredging activities to detect the presence of mammals, fishes and turtles, and allow for these species to vacate the area. This is also one of ESAP item.
7. Use soft-start/slow ramp-up during pile driving and dredging activities to allow time for PBF species to vacate the area

Table 29: Noise Impact Assessment Construction

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Land Noise	Construction activities at sensitive receptors Truck activities related to construction works Pile driving Crane activities	People	Noise Pollution	Construction	Low (for the general community around the port)	Local	Short Term	Low	Negative	Low	Minor	Time management of heavy machinery (operating them when the background level is maximum) Turning off any unnecessary equipment that may cause noise propagation As long as possible limiting simultaneous usage of the equipment with higher sound power levels Inform public regarding the construction plans, including efforts to minimize noise, and establish procedures for prompt response and corrective action regarding noise complaints as part of SEP	Low	Local	Short Term	Low	Negative	Low	Minor
2	Vibration	Main construction and pile driving	People	Vibration	Construction	Low (for the general community around the port)	Local	Short Term	Low	Negative	Low	Minor	no construction activities will be held closer than safe distances to the sensitive receptors (90 meters for main construction activities and 250 meters for pile driving activities)	Low	Local	Short Term	Low	Negative	Low	Minor
3	Underwater Noise and Vibration	Piling, filling and dredging activities	Aquatic creatures	Underwater Noise and Vibration	Construction	Low since there is not any sensitive benthic and fish species	Local	Short Term	Low	Negative	Low	Minor	The mitigation measures are defined for the priority biodiversity feature species (fish, monk seal and sea turtles) Minimization of marine construction activities during spring (the breeding season of most fishes are April-June) Using the pier piles that have the qualifications to produce minimum noise Filling will be done by a ramp at the water level to minimize the noise Filling will be done right after dredging to ensure that the species have left the area already during dredging Minimizing the number of the piles from 6 to 4 during design review	Low	Local	Medium Term	Low	Negative	Low	Minor

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
													Allocate well maintained equipment Observers will be employed during offshore piling and dredging activities to detect the presence of mammals, fishes and turtles, and allow for these species to vacate the area Use soft-start/slow ramp-up during pile driving and dredging activities to allow time for sensitive PBF species to vacate the area							

3.7.5 Impact Assessment Operation

3.7.5.1 Land Noise and Vibration

a. Land Noise

Potential sources of noise impact in the Mersin Port expansion project during operation can be outlined as:

- Truck activities related to operation
- Operation activities
- Operation duration of ships, marine activities

Operational noise impact of the project was evaluated with all machine and equipment working at full power. The machinery and equipment with the corresponding quantities are as follows:

- Mobile Crane (5)
- Tractor (96)
- Excavator (11)
- Loader (6)
- Forklift (90)
- STS Crane (4)
- e-RMG (24)

Other acoustical sources are: different zones of container operations, main road, truck traffic, truck traffic exits, shift change location, workshop, truck traffic out of the port, STS alarm, STS horn, STS operator cabin, STS machine room, RTG alarm, RTG operator cabin, RTG machine room, RTG horn, which have been considered to be specific penetrating noise sources while modelling.

Noise emissions from container stacking is not included in the modelling. The mitigation measure regarding container stacking noise is provided in noise impact assessment table. According to defined impact assessment methodology in the Appendix 2, the entire receiver points' final impact significances for operation phase are calculated and determined.

Table 30: Operation Noise Measurement Results

Receptor	Distance (m)	Source Leq (dBA) (estimated trough modelling)		Baseline Leq (dBA)		Cumulative Level (dBA)		Limit Value (dBA)		Limits WHO Exceedance	Magnitude of Impact			Responsivity			Impact Significance
		Ld	Ln	Ld	Ln	Ld	Ln	Ld	Ln	Max	Scale of Impact	Extent	Impact Mag	Importance	Sensitivity	Responsivity	
Receptor 1	60	61.0	61.5	62.3	60.9	64.7	64.2	65.3	63.9	0.3	No Impact	Local	No Impact	Low	Low	Low	**No Impact**
Receptor 2	50	59.5	60.3	66.0	61.6	66.9	64.0	69.0	64.6	0.0	No Impact	Local	No Impact	Low	Low	Low	**No Impact**
Receptor 3	260	56.8	57.9	65.4	58.0	66.0	61.0	68.4	61.0	0.0	No Impact	Local	No Impact	Medium	High	High	**No Impact**
Receptor 4	2100	31.3	32.7	49.3	48.4	49.4	48.5	55.0	51.4	0.0	No Impact	Local	No Impact	Medium	Medium	Medium	**No Impact**
Receptor 5	10	58.7	59.8	57.0	55.7	60.9	61.2	60.0	58.7	1.0	No Impact	Local	No Impact	Medium	High	High	**No Impact**

Operation Impact Assessment RAMEN Limits

Operation Impact Assessment RAMEN Limits

Receptor	Distance (m)	Source Leq (dBA)			Limit Value (dBA)			Limits RAMEN Exceedance	Baseline + 5 dBA		Baseline +5 dBA Exceedance Max
		Lday	Levening	Lnight	Lday	Levening	Lnight	Max	Lday	Lnight	
Receptor 1	60	60,9	61,2	61,5	65,0	60,0	55,0	0,0	67,3	65,9	-
Receptor 2	50	59,4	59,8	60,2	65,0	60,0	55,0	0,0	71,0	66,6	-
Receptor 3	260	56,5	57,1	57,6	65,0	60,0	55,0	0,0	70,4	63,0	-
Receptor 4	2100	31,3	32,0	32,7	65,0	60,0	55,0	0,0	54,3	53,4	-
Receptor 5	10	58,7	59,3	59,8	65,0	60,0	55,0	0,0	62,0	60,7	-

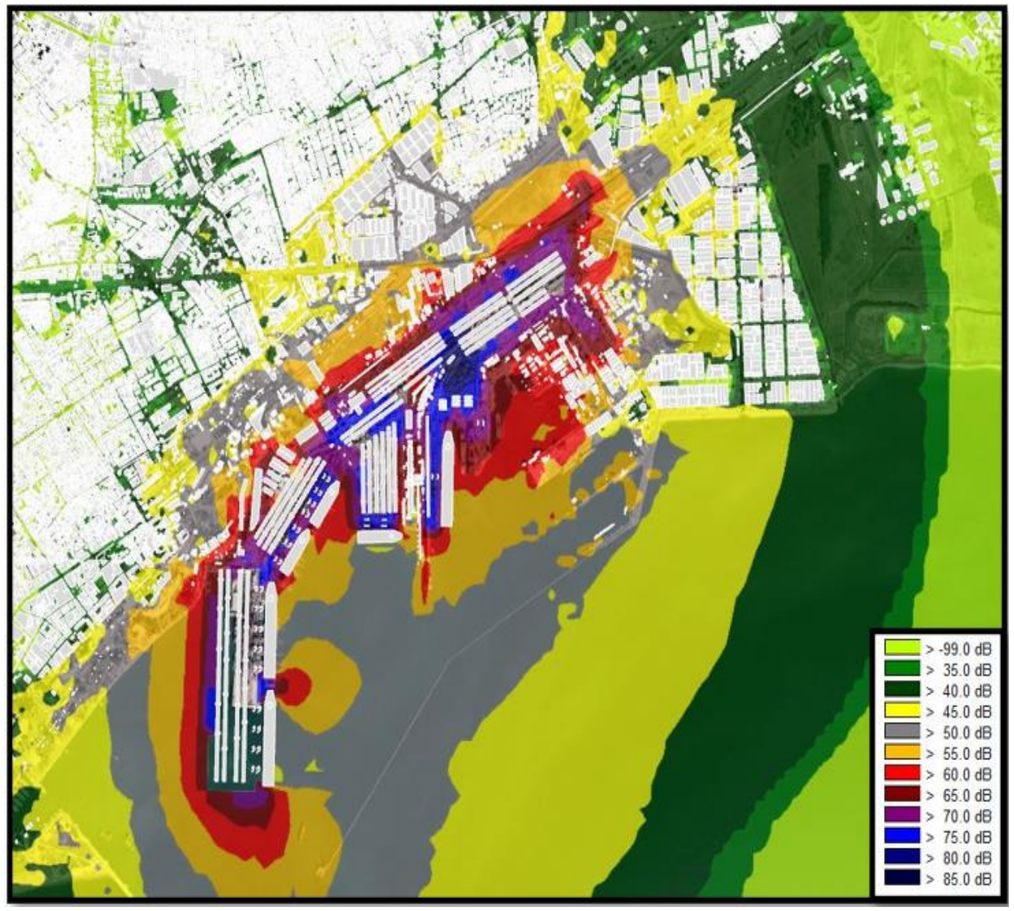


Figure 30: Operation – Noise Map Lday

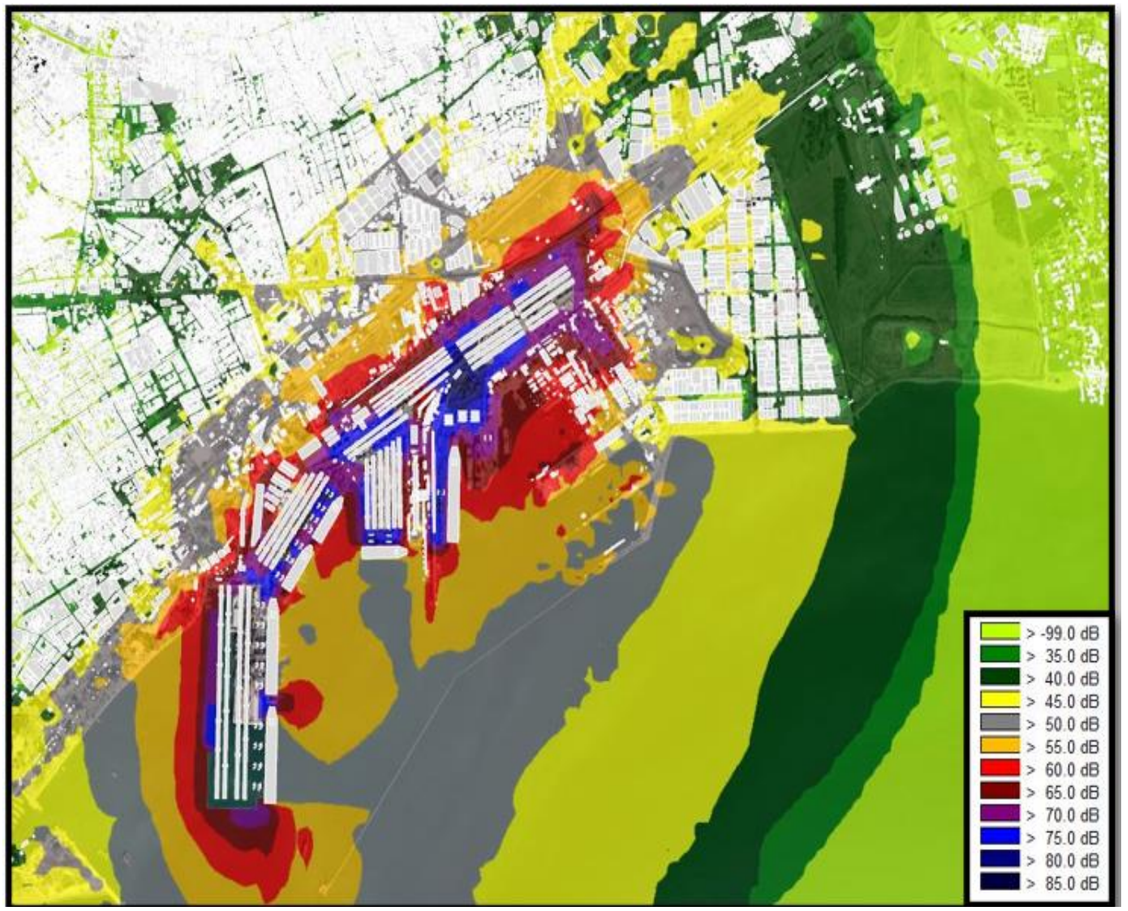


Figure 31: Operation – Noise Map Lnight

When the results of the operation period noise model are evaluated separately for each receiver, there are exceedances lower than 1. Referring to Table 19 an exceedance lower than 1 dBA is considered as No Impact.

A limit increase of 0.3 is envisaged for Receptor 1 (Government Building), but this exceedance applies to the noise level calculated for the night. This exceedance will have no effect because there are no people using Receptor 1 after 6 p.m. Likewise, the exceedance for the Receiver 5, which corresponds to Ataturk Park, falls during the evening hours and is expected to affect users to a minimum."

Referring to Table 19 an exceedance lower than 1 dBA is considered as No Impact.

Considering these facts, the impact associated with noise created during routine operation of the Port is evaluated as No Impact.

b. Vibration

Operational vibration risks mostly consisting of operating vibration from stationary machine and equipment. According to the ISO 10816-3 standard, the maximum vibration level that a machine can produce before damage itself is 15.5 mm/sec peak. While determining and evaluating operational vibration this information is used as reference.

Calculations were carried out according to the limiting vibration levels of ISO 10816 vibration estimation standard for machines and equipment. Reference vibration levels for the weakest mounting conditions accepted and calculations were conducted for the worst possible case.

Table 31: Operational Vibration Levels at Receivers

Receiver	Main Construction		Pile Driving	
	Distance (m)	PPV (mm/s)	Distance (m)	PPV (mm/s)
R1	81	0.0073	760	0.0250
R2	95	0.0057	1235	0.0120
R3	320	0.0009	1750	0.0071
R4	2200	0.0001	4400	0.0018
R5	220	0.0016	615	0.0343

Even though vibrational limits defined in RAMEN is 10 mm/s for discontinuous vibration, vibration limiting value defined in the legal framework of this project is 0.14 mm/s for residential locations. This limiting value is also equivalent to the “No Impact” impact scale in the defined methodology for the project. In order to be on the safe side evaluation are conducted accordingly. Calculations show that safe distance before vibration levels comes under the 0.14 mm/s level is 15 meters for operation activities. Thus, no impact is expected from operational vibration activities since, there are no receivers detected closer than safe distance to the project area according to information shared with Frekans by MIP.

MIP needs to guarantee that no machine or equipment will operate closer than safe distance to the receiving bodies.

3.7.5.2 Underwater Noise and Vibration

There is an existing underwater noise due to existing traffic and operational impacts.

The marine traffic will be composed of the vessels approaching and berthing at the MIP, cruise port services and the tag boat services provided by MIP.

During the operation phase of the project, the number of ships that will berth to the port and their characteristics will increase. For this purpose, a ship maneuver risk assessment report has been prepared. As a result of the risk assessment, it was determined that the project did not contain an unacceptable risk, provided that some measures were taken. These recommended measures must be followed throughout the project.

The traffic increase for the tag boat services will be minor and is not expected to create impacts to be addressed.

With the implementation of the project, the current container acceptance (handling) capacity of the port will increase from 2.6 million TEU (Twenty-foot Equivalent Unit) to approximately 3.6 million TEU, and the current stocking capacity will increase from 2.1 million TEU to 2.9 million TEU. The current and post-project capacity information of the port is given below.

The current annual capacities of the port are given below.

- Container Handling Amount: 2.600.000 TEU / Year
- General Cargo + Bulk Solid + Bulk Liquid Handling Amount: 10.000.000 Tons / Year
- Number of Loaded / Unloaded Vehicles: 100.000 Units / Year (Truck, Automobile, etc.)
- Number of Incoming / Outgoing Passengers: 34.000 Person / Year
- Container Stuffing / Unloading: 280.000 TEU / Year

With the realization of the project, the increasing capacity amounts are given below.

- Container Handling Amount: 3.600.000 TEU / Year
- General Cargo + Bulk Solid + Bulk Liquid Handling Amount: 15.000.000 Tons / Year
- Number of Loaded / Unloaded Vehicles: 150.000 Units / Year (Truck, Automobile, etc.)
- Number of Incoming / Outgoing Passengers: 50.000 Person / Year
- Container Stuffing / Unloading: 400.000 TEU / Year

An average of 5000 vessels is expected to berth (an increase of approximately 13%) at the port with increased capacity upon completion of the project.

With this increase of vessels approaching and berthing at the Port, the underwater water noise as a result of the operation will increase.

Global institutions like International Marine Organization has been working on guidelines defining the means for reducing underwater noise such as design changes in propellers, hull form, onboard machinery, and operational aspects[12] Over the coming years the travelling ships are expected to create less underwater water noise as they would be required to follow this and similar guidelines.

MIP will measure the existing ambient underwater noise levels to set up the current baseline and will monitor the underwater noise levels after the completion of the construction.

[12] https://wwwcdn.imo.org/localresources/en/MediaCentre/HotTopics/Documents/833%20Guidance%20on%20reducing%20underwater%20noise%20from%20commercial%20shipping,.pdf

Table 32: Noise Impact Assessment Operation

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Land Noise	Truck activities related to operation Operation activities Operation duration of ships, marine activities	People	Noise Pollution	Operation	Low	Local	Long term	Low	Negative	Low	Minor	The main issue in Mersin Port noise mitigation should be identifying the source of noise and implementing the effective noise reduction technique on the source. Therefore a noise map shall be established, and noise monitoring program will be developed and implemented to monitor the noise levels in the sensitive receptors. • a noise monitoring program specifically targeting the sensitive receptors to monitor day and night time ambient noise levels in the project area • establish procedures for prompt response and corrective action regarding noise complaints as part of SEP • Following implementation of the Project develop noise map, continued noise monitoring (particularly at night time at 2-3 chosen sensitive locations) and noise management plan in line with Good International Practice, such as Good Practice Guide on Port Area Noise Mapping and Management (https://www.ecoports.com/assets/files/common/publications/good_practice_guide.pdf) • Disclose the noise map and noise management plan to public; • Using existing grievance/comments on environmental performance gather grievances specific to noise emissions; follow up noise complaints with verification against	Low	Local	Long term	Low	Negative	Low	Minor

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
													continuous noise monitoring; Provide training to lashers, crane operators and any other relevant staff on undertaking operations to limit noise emissions form container stacking and other activities.							
2	Vibration	Stationary machine and equipment	People	Vibration	Operation	Low	Local	Long term	Low	Negative	Low	Minor	No machine or equipment will operate closer than safe distance to the receiving bodies (15 meter for operation)	Low	Local	Long term	Low	Negative	Low	Minor
3	Underwater Noise and Vibration	-	Aquatic creatures	-	Operation	Low	Local	Long term	Low	Negative	Low	Minor	Measure the existing ambient underwater noise levels to set up the current baseline and monitor the underwater noise levels after the completion of the construction	Low	Local	Long term	Low	Negative	Low	Minor

3.8 Marine Impact Assessment

3.8.1 Baseline

3.8.1.1 Marine Water Quality

Legislative Requirements

National requirements

The Ministry of Agriculture and Forestry has executed various policy development tasks to be compatible with the EU Water Framework Directive for ecosystem-oriented management of Turkey's water and natural resources and biological protection of the diversity, and for provision of sustainable environmental and economic benefits of water basins[13]. In that respect, the national legislation has presented sea water quality criteria in two legislative documentations:

- By Law on Definition of environmental targets for surface water bodies, Official Gazette dated 21.07.2020 and no: 31192.
- Regulation on Surface water quality Official Gazette dated 30.11.2012 and no: 28483 and amended on 15/4/2015.

This legislation describes the relevant competent authorities to monitor the surface water (including coastal waters but not open sea water) quality and identify the stressors and if required develop strategies and requires definition of the wastewater discharge standards to water medium in line with the Environmental Quality Standards defined by this legislation.

The quality criteria set for coastal waters (up to 1 nautical mile, 1852 m from the cost) by these legislative documentations are:

Table 33: Water Quality Classes by National Legislation

	Parameter	Water Quality Class			
		I (very good)	II (good)	III (medium)	IV (poor)
Aegean – Mediterranean	Dissolved Oxygen (mg O_2/L)	≥ 7	6	5	< 5
	TP (µg/L)	< 5	5-7	7,1-11	> 11
	NO_x (µg/L) *	< 5	5-10	10,1-20	> 20
	Oil and grease (mg/L)	< 0,2	0,3	0,5	> 0,5

The national legislation defines discharge water criteria and the general sea water criteria through Regulation on the Control of Water Quality on Official Gazette dated 31.12.2004 and no 25687 and amended several times being the latest on 14/1/2020.

The table 4 of this legislation defines the general seawater quality criteria as:

Table 34: General Seawater Quality by National Legislation

Parameter	Value	Description
pH	6.0-9.0	-
Color and turbidity	Natural	Less than a value that would not affect the normal level of photosynthesis activity for the natural aquatic life at the measured depth more than 90 %
Floating substance	-	No floating oil and similar liquid, and solid waste and similar.
Suspended Solids (mg/L)	30	-

[13] https://www.tarimorman.gov.tr/SYGM/Belgeler/kamag/Rehber_Dok%C3%BCman_%C3%87evresel_Hedefler.pdf

Parameter	Value	Description
Dissolved oxygen (mg/L)	More than 90% of saturation	Dissolved oxygen values should be monitored through various depths
Degradable organic pollutants	-	After dilution, not above any value that would hinder the dissolved oxygen value stated above
Crude oil and derivatives (mg/L)	0.003	Should be evaluated in water, biota and sediment and preferable not to exist
Radioactivity	-	Not above natural activity levels defined for the subject sweater medium. No artificial radioactivity.
Productivity	-	Protect the seasonal productivity level of the subject seawater medium
Toxicity	None	
Phenols (mg/L)	0.001	
Copper(mg/L)	0.01	
Cadmium, (mg/L)	0.01	
Chromium, (mg/L)	0.1	
Lead, (mg/L)	0.1	
Nickel, (mg/L)	0.1	
Lead (mg/L)	0.1	
Mercury, (mg/L)	0.004	
Arsenic, (mg/L)	0.1	
Ammonium, (mg/L)	0.02	

For the receival of the wastes from ships the regulation on The Receival of Wastes from Ships (dated 26 December 2004 and Official Gazette no 25682) in force. This regulation is prepared based on MARPOL 73/78 Convention which is rectified by Turkey as declared by Official Gazette no 20558 and parallel to the requirements Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues - Commission declaration.

International Requirements

The Water Framework Directive (Directive 2000/60/EC) lays down a strategy to fight against the pollution of water, including adopting specific measures against pollution by individual pollutants or groups of pollutants presenting a significant risk to or via the aquatic environment. For those pollutants, measures should aim at the progressive reduction and, for priority hazardous substances, as defined in Article 2(30) of the Directive, at the cessation or phasing-out of discharges, emissions and losses. The relevant provisions in the Directive regarding territorial and/or coastal waters have to be taken into consideration to ensure proper coordination of the implementation of the two legal frameworks.

The Environmental Quality Standard Directive (Directive 2008/105/EC) establishes requirements for the chemical status of surface waters including marine waters defining an Environmental Quality Standard (EQS), which is the maximum allowable concentration of a contaminant not causing harm. The EQS is based on the lowest toxic effect observed for aquatic organisms during testing in the laboratory with standard organisms. Environmental Quality Standards for “Priority Substances and certain other pollutants” can be found in Annex I to the EQS Directive.

Council Directive 91/271/EEC concerning urban wastewater treatment was adopted on 21 May 1991 to protect the water environment from the adverse effects of discharges of urban wastewater and from certain industrial discharges.

Table 35: Requirements for discharges from urban wastewater treatment plants subject to Articles 4 and 5 of the Directive

The values for concentration or for the percentage of reduction shall apply.

Parameters	Concentration	Minimum percentage of reduction (')	Reference method of measurement
Biochemical oxygen demand (BOD5 at 20°C) without nitrification (2)	25 mg/1 0_2	70-90 40 under Article 4 (2)	Homogenized, unfiltered, undecanted sample. Determination of dissolved oxygen before and after five-day incubation at 20°C ± 1°C, in complete darkness. Addition of a nitrification inhibitor
Chemical oxygen demand (COD)	125 mg/1 0_2	75	Homogenized, unfiltered, undecanted sample Potassium dichromate
Total suspended solids	35 mg/1 (3) 35 under Article 4 (2) (more than 10 000 p.e.) 60 under Article 4 (2) (2 000-10 000 p.e.)	90 (3) 90 under Article 4 (2) (more than 1 0 000 p.e.) 70 under Article 4 (2) (2 000-10 000 p.e.)	Filtering of a representative sample through a 0,45 |m filter membrane. Drying at 105 °C and weighing Centrifuging of a representative sample (for at least five mins with mean acceleration of 2 800 to 3 200 g), drying' at 105 °C and weighing
(') Reduction in relation to the load of the influent. (2) The parameter can be replaced by another parameter: total organic carbon (TOC) or total oxygen demand (TOD) if a relationship can be established between BODS and the substitute parameter. (3) This requirement is optional.			

Recommended sanitary wastewater management strategies by IFC Environmental, Health, and Safety (EHS) Guideline[14]s include: ·

- Segregation of wastewater streams to ensure compatibility with selected treatment option (e.g. septic system which can only accept domestic sewage); ·
- Segregation and pre-treatment of oil and grease containing effluents (e.g. use of a grease trap) prior to discharge into sewer systems; ·
- If sewage from the industrial facility is to be discharged to either a septic system, or where land is used as part of the treatment system, treatment to meet applicable national or local standards for sanitary wastewater discharges is required. ·
- Sludge from sanitary wastewater treatment systems should be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety, and conservation and long-term sustainability of water and land resources

Environmental, Health, And Safety Guidelines Ports, Harbors, And Terminals[15] of IFC requires that stormwater and sewage from port facilities should be managed according to the recommendations provided in the General EHS Guidelines.

Additional recommendations specific to stormwater and wastewater from port facilities include the following:

[14] https://www.ifc.org/wps/wcm/connect/3d9a54ae-c44c-488d-9851-afeb368cb9f9/1-3%2BWastewater%2Band%2BAmbient%2BWater%2BQuality.pdf?MOD=AJPERES&CVID=ls4Xbfn
[15] https://www.ifc.org/wps/wcm/connect/ddfac751-6220-48e1-9f1b-465654445c18/20170201-FINAL_EHS+Guidelines+for+Ports+Harbors+and+Terminals.pdf?MOD=AJPERES&CVID=lD.CzO9 requir

• Avoid installing storm drainage catch basins that discharge directly into surface waters;

• Install filter mechanisms (e.g., draining swabs, filter berms, drainage inlet protection, sediment traps and sediment basins) to prevent sediment and particulates from reaching the surface water;

• Install oil/grit or oil/water separators in all runoff collection areas;

• Regularly maintain oil/water separators and trapping catch basins; and

• Manage recovered, contaminated solids or liquids in accordance with the general and hazardous waste guidance in the General EHS Guidelines.

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes.

The MARPOL Convention was adopted on 2 November 1973 at IMO. The Convention includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations - and currently includes six technical Annexes. Special Areas with strict controls on operational discharges are included in most Annexes.

Annex I Regulations for the Prevention of Pollution by Oil (entered into force 2 October 1983). Covers prevention of pollution by oil from operational measures as well as from accidental discharges; the 1992 amendments to Annex I made it mandatory for new oil tankers to have double hulls and brought in a phase-in schedule for existing tankers to fit double hulls, which was subsequently revised in 2001 and 2003.

Annex II Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (entered into force 2 October 1983). Details the discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk; some 250 substances were evaluated and included in the list appended to the Convention; the discharge of their residues is allowed only to reception facilities until certain concentrations and conditions (which vary with the category of substances) are complied with.

In any case, no discharge of residues containing noxious substances is permitted within 12 miles of the nearest land.

Annex III Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (entered into force 1 July 1992). Contains general requirements for the issuing of detailed standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions, and notifications.

For the purpose of this Annex, “harmful substances” are those substances which are identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code) or which meet the criteria in the Appendix of Annex III.

Annex IV Prevention of Pollution by Sewage from Ships (entered into force 27 September 2003). Contains requirements to control pollution of the sea by sewage; the discharge of sewage into the sea is prohibited, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than three nautical miles from the nearest land; sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nautical miles from the nearest land.

Annex V Prevention of Pollution by Garbage from Ships (entered into force 31 December 1988). Deals with different types of garbage and specifies the distances from land and the way they may be disposed of; the most important feature of the Annex is the complete ban imposed on the disposal into the sea of all forms of plastics.

Annex VI Prevention of Air Pollution from Ships (entered into force 19 May 2005). Sets limits on sulfur oxide and nitrogen oxide emissions from ship exhausts and prohibits deliberate emissions of ozone depleting substances; designated emission control areas set more stringent standards for SOx, NOx and particulate matter. A chapter

adopted in 2011 covers mandatory technical and operational energy efficiency measures aimed at reducing greenhouse gas emissions from ships.

Directive 2019/883 of The European Parliament describes the requirements on port reception facilities for the delivery of waste from ships, amending Directive 2010/65/EU and repealing Directive 2000/59/EC. This directive requires as a summary: Member States shall ensure that an appropriate waste reception and handling plan is in place and has been implemented for each port following ongoing consultations with the relevant parties, including in particular with port users or their representatives, and, where appropriate, local competent authorities, port reception facility operators, organisations implementing extended producer responsibility obligations and representatives of civil society.

Member States shall ensure that the descriptive and operational information as listed the Directive from the waste reception and handling plan on the availability of adequate port reception facilities in their ports and the structure of the costs is clearly communicated to the ship operators, is made publicly available and is easily accessible, in an official language of the Member State where the port is located and, where relevant, in a language that is internationally used:

The operator, agent or master of a ship which falls within the scope of Directive 2002/59/EC bound for a Union port shall complete truly and accurately the form set out in Annex 2 to the Directive ('advance waste notification') and notify all the information contained therein to the authority or body designated for this purpose by the Member State in which that port is located:

The master of a ship calling at a Union port shall, before leaving that port, deliver all its waste carried on board to a port reception facility in accordance with the relevant discharge norms laid down in the MARPOL Convention.

Member States shall ensure that the costs of operating port reception facilities for the reception and treatment of waste from ships, other than cargo residues, are covered through the collection of a fee from ships.

The cost recovery systems shall provide no incentive for ships to discharge their waste at sea. To this end, the Member States shall apply all of the principles in the design and operation of the cost recovery systems as detailed in the Directive.

Port area

Physical Characteristics

The basic properties that determine the physical characteristics of seawater are pressure, temperature, salinity, density, light and sound permeability. Physical properties can be measured throughout the water depth by placing pressure, temperature, conductivity and pH sensors on the CTD device. CTD stands for conductivity, temperature, and depth, and refers to a package of electronic devices used to detect how the conductivity and temperature of water changes relative to depth. The CTD is an essential tool used in all disciplines of oceanography, providing important information about physical, chemical, and even biological properties of the water column. A CTD is a series of small probes that can be deployed independently or incorporated into a variety of observing platforms such as remotely operated vehicles, gliders, or fixed observing buoys (https://oceanexplorer.noaa.gov/technology/ctd/ctd.html).

The results obtained from the CTD measurements performed in the study area on 11.10.2018 and 12.10.2018 as part of EIA are summarized below:

In the CTD measurements carried out on 11.10.2018, the sea water temperature values of the project area vary between 25.95°C and 26.43°C on the surface, while it remains between 26.44°C and 26.56°C on the sea floor. Considering the salinity change of sea water in the measurements of the same date; The salinity values at the sea surface range between 36.10 and 39.35 psu, and between 39.59 and 39.64 psu on the sea floor. While the density values on the sea surface varied between 1023.80 and 1026.19 kg/m^3, the highest density value (1026.43 kg/m^3) on the sea floor was reached at the CTD-05 station at a depth of 16.09 m. Sea water conductivity at the project site varies between 55.86-61.09 mS/cm and sound velocity values vary between 1538-1543 m/s.

In the CTD measurements carried out on 12.10.2018, it was observed that the sea surface temperature values varied between 20.20 °C - 26.44 °C, while these values on the sea floor varied between 26.47-26.54 °C. Salinity values were observed as 37.56–44.55 psu at the surface and 39.53–39.65 psu at the bottom. While the sea water density values in the project area vary between 1024.96-1032.01 kg/m^3 at the surface, it is between 1026.36-1026.42 kg/m^3 at the bottom. At the project site, the seawater conductivity value varies between 36.91-61.06 mS/cm, and the sound velocity values vary between 1532-1543 m/s.

In the CTD measurement studies carried out, it was determined that the physical properties of sea water reflect the characteristic profile of the season and these values do not have a compelling effect on the project conditions.

Biochemical Characteristics

MIP has taken 6 samples of sea water on 30.03.2021-08.04.2021 for operational control. The samples were taken from below sampling points all of which are within port area:

Point 1: outside breakwater (surface),

Point 2: outside breakwater (bottom 6m),

Point 3: inside breakwater, eastern side (surface),

Point 4: inside breakwater eastern side (bottom 7m),

Point 5: inside breakwater western side (surface),

Point 6: inside breakwater western side (bottom 7m)

The summary table for these analyses are provided below together with the National Legislation limit values for general sea water quality. The corresponding limits for the parameters that are listed in Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards are also provided. Not every parameter in the European Directive is covered by the Regulation on the Control of Water Quality.

Table 36: Summary table of sea water analysis

PARAMETER	UNIT	National Legislation Limit value	AA-EQS as an annual average value EU Directive	MAC-EQS maximum allowable concentration EU Directive	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6
pH	-	6.0-9.0			8.5	8.4	8.4	8.5	8.5	8.5
DISSOLVED OXYGEN	mg/L O2	-			5.33	9.12	9.93	8.77	8.65	8.70
COLOR	Pt-Co	natural			< 5	< 5	< 5	< 5	< 5	< 5
BLUR/TURBIDITY	NTU	natural			5.8	6.4	4.5	4.5	4.6	6.9
DEGRADABLE ORGANIC POLLUTANTS	mg/L	-			< 2	< 2	< 2	< 2	< 2	< 2
SUSPENDED SOLIDS	mg/L	30			4.8	5.9	5.1	3.7	5.2	6.1
AMMONIA	mg/L	0.02			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
PRODUCTIVITY (chlorophyll a)	µg/L	-			<50	<50	<50	<50	<50	<50
ARSENIC	µg/L	100			<1	<1	<1	<1	<1	<1
COPPER	µg/L	10			1.3	<1	1.5	3.3	4.3	2.9
MERCURY	µg/L	4	0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ZINC	µg/L	100			6.5	<1	10.9	23.9	18.6	2.2
CADMIUM	µg/L	10	0.2	≤ 0,45 (Hardness Class 1) 0.45- 1.5 for other classes	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
CHROMIUM	µg/L	100			<1	<1	<1	<1	<1	<1
LEAD	µg/L	100	7,2	N/A	<1	<1	<1	<1	<1	<1
NICKEL	µg/L	100	20	N/A	1.5	1.1	1.9	4.5	3.9	3.0
TOXICITY (ZSF)	-	Not to exist			<4	<4	<4	<4	<4	<4
CRUDE OIL AND OIL DERIVATIVES	mg/L	0.003			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TOTAL PHENOL	mg/L	0.001			0.0001	0.0001	0.0002	0.0001	0.0001	0.0001

According to 2019 Mersin Environmental Status Report (2020) by Ministry of Environment and Urbanization, Mersin Bay Sea water quality was evaluated as "medium/weak" quality, considering all parameters together, regarding National Water Pollution Control Regulation (numbered 25687 and dated 31.12.2004)

Considering the baseline sampling results, the baseline sensitivity level for Marine Water Quality at the port area is “medium” and the results show no existing pollution indications and with a Class I/Class II quality, in accordance with the same national regulation. [16]

Dump site area

As part of the dredging management plan preparation sea water quality samples have been taken from dump site for monitoring parameters as per National Dredging Management Regulation. The monitoring study in the discharge area before the dumping activity was carried out on March 3, 2020; was conducted by an expert from the accredited laboratory assigned through the Central Laboratory Determination System for seawater sampling from the surface and measurement of physicochemical parameters at 5 points determined in and around the discharge area.

There are no national limits for the listed parameter. There are trigger limits defined by Australian and New Zealand Water Guidelines[17] however defined for specific regions. Therefore, no parameter-based comparison of the measurement results with the pre-defined criteria could be performed. However, referring to general quality criteria Table 34 for some parameters the sea water in the project area (dumping area) is Class I/Class II.

These parameters however will need to be monitored after the dredging is completed as per the National Regulation on Dredging (see Section 3.8.2.1).

Table 37: Dredging Management Plan Measurements

Station	Temperature(°C)	Salinity (psu)	Sechii Disk (SD, m)	Dissolved Oxygen (mg/l)	Dissolved Oxygen %	TOC (mg/l)	Chly-a (µg/l)	Total Phosphorus (µg/L)	Total Suspended Solids (mg/l)
1	16.28	38.5	13.0	8.1	107		0.53	5.6	
3	29.90	39.2	10.5	6.15	100,2		0.18	3.4	

The disposal of dredged materials in coastal waters and ports into the marine environment with appropriate techniques is a widely applied method in the world.

As previously done in Phase1, there was a need to dispose solid dredging material (sediment of different grain length) to the appropriate marine area outside the port. There are dump sites that the Ministry of Environment and Urbanization gave disposal permit. The locations of these dump sites were determined through field studies, chemical analyses, sonar and bathymetric studies, and "sediment transport modeling" results using characteristics of the region. All the results and analyses obtained, past study results in the region were evaluated together with the discharge criteria requested by the Ministry.

In the selection of dump site areas, pollution and geochemical properties of the dredging area bottom material, dump site bottom structure, water column hydro-chemical properties and possible negative effects of the dredged material were evaluated. Pollution and geochemical analyses and toxicity tests requested within the scope of the regulation were carried out by authorized laboratories.

Dump sites have been selected in the west direction, outside the fish migration route, in the field without bottom flora (light intensity< less than 10, relative to the surface); in depth range of 30-50 meters. Species that require special protection has not been observed/reported.

Since the light permeability (Seki disc Depth) in the dump site and the surrounding waters (depth:25-50 m) varies between 5-20 m seasonally, the light intensity reaching the bottom is very inadequate for the vegetative growth,

[16] https://webdosya.csb.gov.tr/db/ced/icerikler/mers-n_2019_cevre_durum_raporu-20210329174614.pdf
[17] https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants

and since the territorial waters are poor by the nutrients, there is no benthic flora (sea meadows, posedonia) at the bottom. Therefore, the selected dump sites lay outside the fish spawning, breeding ground and potential hunting grounds. The spawning ground of sea turtles migrating to the Kazanlı coast is approximately 16 km away; the current regime of the region is east-west, northwest. Therefore, it is very unlikely that it will be affected by turbidity in the temporary and limited area, which can be caused by disposal activity.

As a result, in the selection of dump site, the criteria such as distance from the shore, remaining outside the coastal fish breeding and feeding area and the minimum depth of 30 meters (where the intensity of sunlight drops below 5%) were considered for the protection of biodiversity.[18]

The decree on dredging and disposal activities and subsidiarity [19] describes the location of the disposal sites. The dumping site for the Project is listed in this decree.

Baseline Sensitivity

The baseline sensitivity level for Marine Water Quality at both port and dumping area is medium with no existing pollution indications and with a Class I/Class II quality.

3.8.1.2 Chemical Sediment Characteristics

Dredging is the removal of sediments and debris from the bottom of water bodies. It is a routine necessity in waterways around the world because sedimentation—the natural process of sand and silt washing downstream—gradually fills channels and harbors. Dredging often is focused on maintaining or increasing the depth of navigation channels, anchorages, or berthing areas to ensure the safe passage of boats and ships. Vessels require a certain amount of water in order to float and not touch the bottom. Within the scope of the project, it is planned to conduct a total of 3,297,000 m^3 dredging in a total area of 2,094,705 m^2. There are four dredging areas and elevations of dredging vary according to these areas.

According to the latest information received from MIP, the dredging process is intended to start on October 2023 and to be completed on April 2024, so it will take 6 months in total.

[18] Phase 1 Dredging Management Plan and subsequent monitoring plans
[19] https://webdosya.csb.gov.tr/db/cygm/icerikler/genelge-20200220084653.pdf

Figure 32: Dredging Areas

The following table summaries the widths, lengths, current and post-dredging depths, surface area and the volume of solid material to be dredged in the four dredging areas.

Table 38: The physical features of the dredging areas

Area No.	Widths (m)	Lengths (m)	Current depth (m)	Post-dredging depth (m)	Average Dredging Depth (m)	Surface Area (m^2)	Volume of Dredged Material (m^3)
1	350	1080	7.6-16.0	17.6	1.10	326,180.107	794,457.60
2	400	1210	4.4-8.9	10.0	3.10	496,412.035	748,715.20
3	270	3300	17.3-17.7	18.5	1.10	935,255.132	1,287,392.13
4	700	700	16.1-17.5	17.6	1.10	336,858.285	466,435.26
Total						2,094,705.56	3,297,000.19

a. EIA Phase Characterization

i. Compliance with National Legislation

There are two regulations valid in Turkey relevant for the evaluation of dredged material for disposal:

1. Waste Management Regulation; that would be referred to confirm the potential for beneficial use of the dredged material or define the dredged material as hazardous and;

2. Regulation on Environmental Management of Dredging Material; that would be referred for the dumping of the dredged material at sea.

The samples taken from the dredging area were analysed according to the **Waste Management Regulation.** According to the results of the analysis, it is stated that the dredging material sample is;

- Slightly basic, moist and predominantly inorganic,
- *Risky due to its asbestos content*,

- Not acutely toxic in ecotoxicity analysis,
- Acutely non-hazardous for aquatic organisms living in environments and
- With the heavy metal composition not at a level that may pose a risk according to the regulation.

However, it was concluded that the samples were hazardous because they contain white asbestos minerals, and the code of the waste was evaluated as "17 05 05 * Dredging Sludge Containing Hazardous Material".[20] I This would prevent the dredged material to be used on land.

In order to dispose the dredged material to sea a "Dredging Environmental Management Plan" has been drafted in accordance with the **Regulation on Environmental Management of Dredging Material.**

A sampling campaign has been organised to collect sediment and got them analysed for the parameters listed in Regulation on Environmental Management of Dredging Material, namely:

- Cd (mg/kg)
- Pb (mg/kg)
- As (mg/kg)
- Cr (mg/kg)
- Cu (mg/kg)
- Ni (mg/kg)
- Zn (mg/kg)
- Hg (mg/kg)
- Total PCB (µg/kg)

The analysis results showed that the dredged material content is in line with the limits defined in this regulation and the dredged material can be dumped at the dump site defined by the MoEUCC.

The detailed results of the measurements area provided in the Dredging Management Plan which is an Appendix to this Report (please refer to Appendix 3).

ii. Benchmarking with OSPAR Guidelines

The sampling campaign structure has been compared with OSPAR[21] requirements in the following Table.

Table 39: The comparison of international requirements, local regulations and the project applications

OSPAR Requirements[22]	National Regulation	The Project
30 for 2,000,000 m^3 extra 10 per million m^3 for > 2,000,000 m^3 *Therefore, around 40 samples should be taken for 3.297.000 m^3 for the project.*	**Number of sediment samples:** 15 for 1,000,000 m^2 For activities over 1,000,000 m^2, the number of samples per 200,000 m^2 is increased by one. *Therefore, 20 samples should be taken for 2.094.705 m^2.* **Number of core samples for the beneficial use:** 5 for 1,000,000 m^2 For activities over 1,000,000 m^2, the number of samples per 500,000 m^2 is increased by one. *Therefore, 7 samples should be taken for 2.094.705 m^2 for the project.*	20 of the samples taken from the dredging area are sediment samples. The number of core samples is 18. In addition, core samples were taken at 2 points in total in and around the dumping area. The coordinates of these 40 sample points are given below.

[20] Later, these samples were analyzed according to Annex-2B of the Regulation on the Landfill of Wastes and according to the analysis results, they are in the standard of non-hazardous waste storage facilities.
[21] https://www.ospar.org/work-areas/eiha/dredging-dumping, OSPAR Guidelines for the Management of Dredged Material at Sea (Agreement 2014-06)
[22] https://www.ospar.org/work-areas/eiha/dredging-dumping, OSPAR Guidelines for the Management of Dredged Material at Sea (Agreement 2014-06)

OSPAR Requirements[22]	National Regulation	The Project
• grain size analysis (by laser or sieving methods) • percent solids (dry matter) • density/specific gravity • organic matter (as total organic carbon)	Total amount of dredging material Composition of dredging material	3,297,000 m^3 area will be dredged. The details of the composition (grain size analysis) are given in the plan. The percent dry weight and total organic carbon were measured for each sample. No information about the specific gravity and density of the dredging material.
• Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn) • Polychlorinated biphenyl (PCB) congeners* • Polycyclic aromatic hydrocarbons (PAHs)* • Tri-Butyl tin (TBT) compounds and their degradation products* • Arsenic (As)* *: The obligation depends on the situation.	• Cd (mg/kg) • Pb (mg/kg) • As (mg/kg) • Cr (mg/kg) • Cu (mg/kg) • Ni (mg/kg) • Zn (mg/kg) • Hg (mg/kg) • Total PCB (µg/kg)	All parameter listed by national legislation have been measured together with PAH, TOC, PCB
If the potential impacts of the dredged material to be deposited cannot be adequately assessed on the basis of the chemical and physical characterization, biological measurements should be carried out. The selection of an appropriate suite of biological test methods will depend on the particular questions addressed, the level of contamination at the dredging site and the degree to which the available methods have been standardized and validated.	It is essential that dredging and dumping activities do not harm biological diversity. If the pollution values in the sediment layer do not exceed the limit values, ecotoxicological analyzes (acute toxicity tests) are not required.	The pollution values in the dredging area sediment samples are below the limit values in accordance with the Dredging Environmental Management Plan. However, in the EIA process, it is necessary to carry out geo-chemical, pollution and non-toxic analysis and experiments in order to determine the beneficial use of the sediment samples (solid material to be dredged) taken from the dredging area. Hence, ecological toxicity and acute toxicity tests on fish were carried out on composite sediment samples. The main component of the solid material to be dredged is inorganic chemical substance (~ 95%), the pollution level is

OSPAR Requirements[22]	National Regulation	The Project
		low and the toxicity test results are "negative".

1. Sampling Stations

According to the OSPAR Guidelines, the following table gives an indication of the number of separate sampling stations required to obtain representative results, assuming a reasonably uniform sediment distribution in the area to be dredged:

Table 40: OSPAR and UNEP requirements for the sampling[23]

Amount Dredged (m^3)	Number of Stations
Up to 25,000	3
25,000 – 100,000	4 – 6
100,000 – 500,000	7 – 15
500,000 – 2,000,000	16 – 30
>2,000,000	extra 10 per million m3

Within the scope of the project, it is planned to conduct a total of 3.297.000 m^3 dredging in a total area of 2.094.705 m^2. Therefore, around 40 samples should be taken in accordance with the OSPAR requirements.

On the other hand, the table below shows the number of sampling stations in accordance with the Regulation on Environmental Management of Dredging Material and according to this table, a minimum of 20 sediment samples and 7 core samples should be taken for the project.

Table 41: Local requirements for the sampling

Dredging Area (m^2)	Minimum Number of Sediment Samples to be Taken	Number of Drilling / Core Samples to be Taken for Beneficial Use
< 25,000	3	1
25,000 – 100,000	5	2
100,000 – 500,000	8	3
500,000 – 1,000,000	12	4
>1,000,000	15*	5**
*: For activities over 1,000,000 m^2, the number of samples per 200,000 m^2 is increased by one. **: The number of core samples per 500,000 m^2 is increased by one for activities over 1,000,000 m^2.		

Within the scope of the project, samples were taken from 38 points from the dredging area by authorized experts and sampling reports were prepared. The coordinate information of the sampling points in the dredging area is given below. 20 of the samples taken from the dredging area are sediments and 18 of them are core samples. In addition, core samples were taken at 2 points in total in and around the dumping area. When the number of samples are compared to the international and local requirements, the project sampling numbers is compatible with both requirements in terms of sample numbers for the declared volume of sediment to be dredged.

Table 42: The coordinates of the sampling stations (first one is for sediments; second one is for core samples)[24]

Station no.[25]	Coordinate
1-7906	N36 47 41.0 E34 38 12.4
2-7927	N36 47 46.1 E34 38 03.1
3-7949	N36 47 34.5 E34 37 57.9
4-7904	N36 47 22.5 E34 37 55.0

Core Station no.	Coordinate	Depth (m)
KRT-01	N36 47.488 E34 37.842	7
KRT-02	N36 47.557 E34 37.979	7
KRT-03	N36 47.497 E34 38.047	8
KRT-04	N36 47.535 E34 38.209	8

[23] The distribution and depth of sampling should reflect the size of the area to be dredged, the amount to be dredged and the expected variability in the horizontal and vertical distribution of contaminants.
[24] There are no stations in the approaching channel
[25] Although the depths of each of these samples are not listed separately, it is stated that they vary between 8-17 meters.

Station no.[25]	Coordinate
5-7946	N36 47 32.5 E34 38 10.4
6-7941	N36 47 13.4 E34 38 08.7
7-7979	N36 47 10.0 E34 38 14.3
8-7905	N36 47 01.3 E34 38 48.7
9-7993	N36 47 07.6 E34 38 44.3
10-7973	N36 47 08.8 E34 38 33.4
11-7943	N36 47 17.8 E34 38 16.5
12-7914	N36 47 21.4 E34 38 26.8
13-7988	N36 47 31.2 E34 38 30.7
14-7948	N36 47 48.7 E34 38 36.8
15-7913	N36 47 57.1 E34 38 34.7
16-7996	N36 47 55.7 E34 38 28.4
17-7967	N36 47 39.3 E34 38 22.4
18-7935	N36 47 27.7 E34 38 14.2
19-7944	N36 47 37.4 E34 38 16.3
20-7918	N36 47 40.2 E34 38 07.8

Core Station no.	Coordinate	Depth (m)
KRT-05	N36 47.642 E34 38.215	8
KRT-06	N36 47.679 E34 38.131	8
KRT-07	N36 47.415 E34 37.949	7
KRT-08	N36 47.381 E34 38.104	7
KRT-09	N36 47.251 E34 38.047	10
KRT-10	N36 47.131 E34 38.248	10
KRT-11	N36 47.794 E34 38.567	8
KRT-12	N36 47.794 E34 38.544	8
KRT-13	N36 47.994 E34 38.604	7
KRT-14	N36 47.686 E34 38.580	7
KRT-15	N36 47.633 E34 38.338	15
KRT-16	N36 47.203 E34 38.774	15
Dökü 01 (dump.)	N36 41.449 E34 34.259	42
Dökü 02 (dump.)	N36 42.287 E34 36.313	37
KRT-16-2	N36 47.127 E34 38.739	12
KRT-14-2	N36 47.870 E34 38.420	15

2. Physical Properties

According to the OSPAR Guidelines, physical analyses are important because they help to indicate how the sediment may behave during dredging and deposit operations and indicate the need for subsequent chemical and/or biological testing. It is strongly recommended that the following determinations be carried out:

- Grain Size Analysis
- Percent Solids (Dry Matter)
- Density / Specific Gravity
- Organic Matter (as Total Organic Carbon)

Although the Regulation on Environmental Management of Dredging Material does not list the physical parameters to be specifically measured, it does require that the Dredging Environmental Management Plan to include the total amount and average composition of the dredging material.

For the determination of the composition of the dredged material, analysis results of the core samples taken for Phase – 2 and records of deep drilling samples for Phase - 1 period were used together. Dredging up to 12-13 meters will mainly be carried out on fine-grained soft solid material (sea sediment with low sand content, high clay content) with similar "inert" properties with geo-morphological features. Since this soft layer is dredged during Phase-1, dredging in areas deeper than 13 m will be done on the solid-hard consistency (high sand content, hardened) substrate. Dredging Environmental Management Plan specifies the composition and grain size distributions of the solid material to be dredged separately within the 4 dredging areas specified previously. The composition of the dredging area is given below.

Table 43: The composition of the dredging area (Phase 1[26] and Phase 2)

Depth	Composition
Between 0 – 9 m	Sea water
Between 9 – 13 m	Very soft clay
Between 11 – 16 m	Solid clay
Between 16 – 19 m	Very hard silty pebbly clay

For Phase 2, the percent dry weight was also measured for each sample and ranged from 40-67%. In addition, total organic carbon percentages were determined separately for each sample. The values for sediment samples vary between 6.60% and 11.98%, while for core samples they range between 0.58% and 3.84%.

When the physical properties specified in the EIA Report and Dredging Environmental Management Plan are compared with the features to be specified within the scope of international and national requirements, it can be seen that they are generally compatible as they provide information on Grain Size, Percent Solids (Dry Matter) and Organic Matter (as Total Organic Carbon) specified above from OSPAR guidelines. However, for the Phase 2 period, *no information was found regarding the specific gravity and density of the dredging material.* Therefore, the samples were not able to be compared in terms of that parameter with the OSPAR guidelines.

3. Chemical Properties

According to the OSPAR and UNEP Guidelines, the following trace metals should be determined in all cases: Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn). Also, the following organic/organo-metallic compound should be determined: Polychlorinated biphenyl (PCB) congeners, Polycyclic aromatic hydrocarbons (PAHs), Tri-Butyl tin (TBT) compounds and their degradation products and Arsenic (As) (Arsenic is in listed by UNEP as to be measured).

However, the determination of PCBs, PAHs and TBT compounds and its degradation products will not be necessary in circumstances where the sediments are very unlikely to be contaminated with these substances. The relevant circumstances are:

[26] Phase 1 dredging activities were carried out between December 2014 and March 2016.

- sufficient information from previous investigations indicating the absence of contamination is available;
- there are no known significant sources (point or diffuse) of contamination or historic inputs;
- the sediments have very low amounts of fine material;
- the content of total organic carbon is low.

Sufficient information for chemical characterisation may be available from existing sources. In such cases new measurements may not be required of the potential impact of similar material in the vicinity, provided that this information is still reliable and has been obtained within the last 5 years.

On the other hand, Regulation on Environmental Management of Dredging Material mandates the following parameters to be measured: Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn), Arsenic (As) and Total PCBs. In addition, for these parameters, the limit values to be applied in the disposal of dredging material into the sea are determined. The basic pollution criteria (UNEP, 2005; IMO, 2005; HELCOM, 2020) applied by the Mediterranean and EU member states for dredging activities and their applicability were taken into account in the determination of the limit values announced by the regulation.

The laboratory analysis campaign performed as per the Waste Management Regulation includes PAH and TOC measurements as well.

4. Biological Properties

According to the OSPAR Guidelines, if the potential impacts of the dredged material to be deposited cannot be adequately assessed on the basis of the chemical and physical characterization, biological measurements should be carried out. The selection of an appropriate suite of biological test methods will depend on the particular questions addressed, the level of contamination at the dredging site and the degree to which the available methods have been standardized and validated. Additionally, according to the national regulations, it is essential that dredging and dumping activities do not harm biological diversity and if the chemical pollution values in the sediment layer do not exceed the limit values, ecotoxicological analyzes (acute toxicity tests) are not required.

iii. Benchmarking with International Legislation

The following legislative limits have been used for benchmarking and detailed comparison is provided in the Dredging Management Plan in Appendix 3.

- Canadian Council of Ministers of the Environment (CCME) Interim Sediment Quality Guidelines (ISQG) for the Protection of Aquatic Life
- Australia & New Zealand Environment & Conservation Council (ANZECC) Guidelines for Fresh and Marine Water Quality, Volume 1 – The Guidelines. 2000
- Dutch Contaminated Land, 2000. Dutch Target and Intervention Values for Contaminated Soils (the New Dutch List). NB: these are not intended for use with marine sediments but provide valuable guidance
- Long et al., 1995. Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments
- Germany Action Level (WSV-HABAK, 1999) DS < 20 µm
- Spain Action Levels (CEDEX 1994) mg/kg DS < 63 µm

As can be seen in the Dredging Management Plan there are high number of exceedances in Chromium and Nickel measurements when compared with the trigger values the international legislation and guidelines.

The results do not present any PCB pollution.

b. Additional Sampling and Analysis after EIA phase

After the completion of EIA phase additional sampling has been performed for the following purposes:

- To analyse the sediment characteristics at the approaching channel
- To repeat the chromium analysis recorded as exceeding local legislation and laboratory error
- Have TBT measurements at selected locations
- Additional sampling has been performed at the approaching channel of the dredging area.

The results of these sampling confirm high results for Nickel and present lower than EIA phase results for Chromium.

c. Further Actions taken

Good industry practice and international benchmarking applications suggest further studies in the case of exceedances of trigger values or maximum limits for disposal.

Since the material to be dredged show high number of nickel exceedances of trigger and maximum guideline values and scattered number of exceedances in trigger and maximum guideline values in other parameters further studies (See Dredging Management Plan) are performed by an expert to confirm that the dumped material will not contaminate the water column and the dump area sediment.

This study explains that a study (DIPTAR by TUBITAK) was carried out to establish a basis for the specific limit values to be used in the national regulation, separately for each different sea in turkey (Marmara, Mediterranean and Black Sea) as it is difficult to set a generalized limit set for the chemicals in sediments as natural occurrence of each region would be different. The DIPTAR study results have not been published, only used to set the limits for the regulation and therefore the measured high values cannot be compared to the results of the DIPTAR samples.

Metal levels measured in surface sediments were evaluated in the study. It is not possible to determine the background values (from pre-industrial period) of metals using metal levels measured in composite sediments obtained from core samples.

According to the study, Project's Phase 1 and Phase 2 luminous bacteria (vibrio fischeri) and fish toxicity tests were performed in the sediments in 2014-2015 and 2019, respectively are compatible with Good International Practices such as EPA, OSPAR and/or ANZEC. In particular, the negative results of the bio-experiment with the "eluate" phase (pollutant from the sediment to the water) are evaluated as being negative, and there will be no accumulation of pollution that will show toxic properties directly on microorganisms by mixing the solid dredge material and disposing into the sea.

The results of that study shows in summary that, since there is no industrial activity and solid/liquid waste input directly affecting this dynamic coastal area in the Gulf region, the metal values measured in the sediment samples taken in and outside Mersin Port are close to the natural characteristics of the region and organic matter pollution is low.

Due to the geological characteristics of the region, the total metal values measured in the sediment samples are high and the inactive natural metal level (ground/background value) of the region sediment layer is also high and similar features have been observed in coastal areas from Iskenderun Bay to Marmaris.

In summary, the results of the study is as follows:

- Heavy metal (Cd, Pb, As, Cr, Cu, Ni, Zn and Hg) and total PCB concentration values are low in the in-port and approach channel sediment layer and are below the limit values set for Mediterranean region dredged material in the national regulation.
- It is concluded that heavy metals are low in the in-port and approach channel sediment and are below the limit values set for Mediterranean region; higher levels of Cr and Ni mostly derived from the adjacent landmasses. acute toxicity tests of sediment samples were "negative", the results of the chemical analysis

are consistent with the results of the pollutants and toxicity test conducted in 2014 prior to Phase-1 dredging activity. Hg and Pb showed minimal enrichment, while Cd, As, Cu, Zn generally exhibited moderate enrichment. Significant enrichments were observed for Cr and Ni due to geological characteristics. All enrichment factor of metals were supported by the Cf values. (Contamination factor: a factor frequently utilized in studies assessing heavy metals in sediment)

- Correlation test results demonstrated that positive relations between Cr, Ni and Fe were originated from geological characteristics (chromite deposits).
- In addition, acute toxicity tests of sediment samples with low pollution values were "negative". The dredge material (the bottom sediment caused by settlement of inorganic minerals) has been reported to have no toxic properties.
- According to the results obtained, the main component of the dredge material is natural inorganic minerals (on average 95%); the biogenic total organic matter component is low (on average 5%).
- The results of the chemical analysis obtained are consistent with the results of the pollution analysis and toxicity test conducted in 2014 prior to Phase-1 dredging activity (2015-2016) in the same area. During Phase-2, the results of contaminant levels and acute toxicity tests indicated that the bottom dredging in the port area will be in the lower sediment layer of the elderly and pollution values under the current sediment layer previously dredged.
- It is natural that the elderly layers under the current sediment dredged during Phase-1 period have lower pollution values in Phase-2 period. In the past 5 years, it has been observed that there is no terrestrial pollution input that directly affects the hardened clay layer at the base. According to the measurement results of the last five years; there is no significant change in the water quality and trophic properties of the disposal area. The announced disposal area in the bay fully meets the criteria for determining the new disposal area.
  Post-Phase-1 period monitoring results showed that the benthic life re-developed in a period of 6-12 months and achieved good quality zoo-benthic habitat characteristics. After Phase-2 dredging/disposal activity, it is evaluated that the disposal area will reach the natural characteristics of zoo-benthic habitat structure in a similar time.

3.8.1.3 Biological Characteristics of the Sediment

Biodiversity assessment has been prepared based on the existing site information and data obtained from the baseline investigations to minimize impact resulting from the proposed activities.. More specifically, the aim is that the proposed activities dodo not impact the ecosystem health which is the key value that requires management for the duration of the proposed activities.

The direct zone of influence is not expected to go beyond the physical boundary of Mersin International Port and approaching channel. Therefore, Mersin International Port, approaching channel and buffer zone surrounding this channel are defined as Area of Influence (AoI). This area is determined as 2.5 km diameter in the marine ecosystem evaluation report.

Figure 33: Project impact area, marine ecosystem evaluation report

The field surveys in scope of marine ecosystem evaluation were conducted in December 2018 and April 2021 in the Port Area. A field study was carried out in December 2018 to identify the biotopes/habitats in the project area and to determine the biodiversity; In April 2021, biodiversity indexes and cluster analysis applications were performed in the biotopes determined in the December 2018 study, which allowed for comparative assessment of biodiversity.

The biodiversity survey for the approach channel then has been completed in March 2022. According to the Marine Ecosystem Assessment Report, the findings regarding the possible impacts of dredging activities in the approach channel is summarized below:

-For monk seal: Along with the planned berthing channel, it has been determined that the coastal area, which will be affected by the currently used port structures, is currently used intensively in terms of many commercial, industrial, and recreational activities. Considering the usage principles, it has been determined that the "desolation" condition, which is the most important phenomenon necessary for the seals to continue their breeding, sheltering and feeding behaviors, has completely disappeared long ago. In addition, a priority hunting habitat was not determined in the detailed habitat map study. It is estimated that the dredging activities (approaching channel) and the introduction of the deepened channel will not cause any change in terms of seals.

-For Sea turtles: With the berthing channel planned to be built, ships with a deeper draft will be accepted to the port. These ships are planned to be larger in size than those currently using the port. However, there is no study showing that larger tonnage ships will have a negative impact on sea turtle mobility and migration routes. On the contrary, it has been shown that small-scale and fast-moving watercraft are the ones that occur in the marine environment and cause injury or death to sea turtles. In this respect, in order to minimize sea turtle injuries and deaths, speed limit should be applied for small vessels (utility boats, recreational boats, etc.) rather than large tonnage vessels approaching the port. It should be mandatory to have an injury prevention cage in front of the propellers of fast watercraft. It should be ensured that the activities to be carried out to open a berthing channel do not coincide with the period of intense migration. (April and end of August-beginning of September)

Science based studies have been carried out to evaluate the effects of the transactions to be carried out within the scope of Mersin Port Expansion Project on the marine ecosystem. These include detection of marine life (macro and microalgae, zooplanktonic species, benthic species, and fish) within the port area and its immediate surroundings; biodiversity assessment (biodiversity indexes and clustering analysis) considering macro flora (macro algae and phanerogams) and macro fauna (invertebrates and vertebrates) and habitat identifications.

The rare, sensitive, endemic, protected species and conservation status of marine species in the field of study have been defined. Further, the construction works to be carried out at sea and the effects that may occur during the operating period were defined and interpreted. Moreover, the effects of the construction and operation activities on marine ecosystems and marine life were evaluated.

There are 2 main habitat structures in AoI which are coastal and marine.

1. The coastal structure consists of breakwaters, large cliffs, and dock legs. The dominant biotope in coastal areas is the rocky biotope formed by rock fragments and dock feet (concrete) used to form docks and breakwaters. The rocky biotope is an "artificial reef" due to its subsequent man-made formation; nevertheless, this structure creates caves, cavities and dark environments offered by natural rocky formations.

2. In the marine biotope structure, different ground structures (sandy, rocky, mud etc.) and the presence of biological life models associated with them were observed. According to underwater dives and observations carried out in the field of study; It is understood that the region has a marine bottom structure consisting of coastal rocky areas and then mud fields as it goes deeper from the coast.

Mud floor structure dominates moving away from the coast and breakwater. This area has the characteristics seen throughout the ports and shelters. Since the wave effect is very limited, it is formed by the accumulation of very fine-grained material that has been transported to the port base over the years, regardless of the depth. Although this structure is used by species that buried and mix sludge – sand, a remarkable turbidity occurs in the smallest movement in the water column (small water inputs, variable currents, propeller effect, etc.).

As a result, the area is home to biological elements specific to the natural rocky biotopes of the Mediterranean Sea, where subsequent dock and breakwater structures show "artificial reef" properties; nevertheless, it has been determined that mud biotope, which is dominated by turbidity throughout the year, is widespread within the port area.

In order to create phytoplanktonic and zooplanktonic species lists of the Mersin International Port Area, together with literature evaluations, samples were taken from two stations. These stations are provided in table below.

Table 44: Sampling Stations

Station	Coordinates	Description	Habitat
Station #1	36°47'38.03"K 34°38'13.64"D	Sampling area 500 m. from the coast	Reef
Station #2	36°47'13.03"K 34°38'19.01"D	Sampling area about 1 km from the coast	Sludge/mud

Underwater Visual Counting (SGS) technique was applied to determine macro biodiversity with biotope structure and condition information. During these studies, imaging techniques (Sea and Sea Underwater Imaging System) were also used to prepare inventory marine macroflora and macrofauna species in biotope and plant communes. Moreover, Underwater Visual Counting methods were applied by fishing nets and diving to determine fishing efficiency, species richness and the overall habitat structure and condition of these areas.

The species lists are provided in Appendix Marine Ecosystem Assessment Report.

According to Marine Ecosystem Assessment report the Important Biodiversity Elements in the Project Area are *Merluccius merluccius, Labrus viridis, Umbrina cirrose, Dentex dentex, Raja clavate Epinephelus aeneus, Dicentrarchus labrax, Pomatomus saltatrix, Sciaena umbra, Psetta maximus and Hippocampus hippocampus.*

Only *Umbrina cirrosa (Shi Drum*) and *Epinephelus aeneus (White grouper)* have been observed in the field surveys, the rest have been selected from literature. As can be seen in below table which includes details of these species including conservation status, biology, and human use, both of them are commercial fishery.

Table 45: Important Biodiversity Elements in the Project Area According to Marine Ecosystem Assessment Report

NAME	IUCN STATUS	HUMAN USE	BIOLOGY	OBSERVATION
Merluccius merluccius (European hake	LC -	highly commercial	Found usually between 70 and 370 m depth. Adults live close to the bottom during daytime but move off-bottom at night. Adults feed mainly on fish (small hakes, anchovies, pilchard, herrings, cod fishes, sardines, and gadoid species) and squids. The young feed on crustaceans (especially euphausiids and amphipods). Are batch spawners.	Literature
Labrus viridis (Green Wrasse)	VU	-	Marine; reef associated. Adults are found in littoral zone, near rocks and eel-grass beds. Oviparous, distinct pairing during breeding. Males build dish shaped nests and guard the eggs.	Literature
Umbrina cirrosa (Shi Drum*)*	VU	minor commercial; experimental aquaculture; gamefish	Marine; demersal; depth range 0 - 100 m Found over rocky and sandy bottoms in coastal waters. Juveniles enter estuaries. Feed on bottom invertebrates.	Observation
Dentex dentex (Common dentex)	VU	Commercial for fisheries and aquaculture, gamefish	Marine; benthopelagic; depth range 0 - 200 m. Inhabit hard bottoms (rock or rubble) down to 200 m depth. Usually found in shallow water less than 50 m deep. Adults' solitary; young gregarious. Young fish caught with traps. Feed on fish, mollusks and cephalopods. Important food fish.	Literature
Raja clavate (Thornback ray)	NT	commercial; gamefish	Marine; demersal; depth range 5 - 1020 m Inhabits shelf and upper slope waters. Reported depth ranges varies, from 10-300 m, and from 300-577 m in the eastern Ionian Sea: most common in coastal waters between 10-60 m depth. Tolerates low salinities. Found on mud, sand and gravel bottoms, rarely on rougher bottoms. Nocturnal species. Feeds on all kinds of bottom animals, preferably crustaceans and fishes. Undertakes migrations with mean distances of 54-117 km per month; shows a clear annual migration cycle, moves from deeper offshore waters (10-30 m) in autumn and winter to shallower areas (<10 m) in spring. Young are non-migratory, inhabiting inshore nursery grounds	Literature
Epinephelus aeneus (White grouper)	NT	commercial; experimental aquaculture; gamefish	Marine; brackish; demersal; oceanodromous; depth range 20 - 200 m.	Observation

NAME	IUCN STATUS	HUMAN USE	BIOLOGY	OBSERVATION
			Adults are found on rocky or mud-sand bottom; juveniles have been taken in coastal lagoons and estuaries	
Dicentrarchus labrax (European seabass)	LC	Commercial for fisheries and aquaculture, gamefish	Marine; freshwater; brackish; demersal; oceanodromous; depth range 10 - 100 m. Adults' manifest demersal behavior, inhabit coastal waters down to about 100 m depth but more common in shallow waters. Found in the littoral zone on various kinds of bottoms on estuaries, lagoons and occasionally rivers. They enter coastal waters and river mouths in summer but migrate offshore in colder weather and occur in deep water during winter in the northern range. Young fish form school, but adults appear to be less gregarious. Feed chiefly on shrimps and mollusks, also on fishes. Juveniles feed on invertebrates, taking increasingly more fish with age. Adults piscivorous. Spawn in batches	Literature
Pomatomus saltatrix (Bluefish)	VU	highly commercial; commercial aquaculture; gamefish; usually bait	Marine; brackish; pelagic-oceanic; oceanodromous; depth range 0 - 200 m Occur in oceanic and coastal waters. They are most common along surf beaches and rock headlands in clean, high-energy waters, although adults can also be found in estuaries and into brackish water. Small fish may be found in shallow coastal waters at least 2 m depth, in schools pursuing and attacking small fishes. Adults are in loose groups, often attacking shoals of mullets or other fishes and destroying numbers apparently far more than feeding requirements. Feed on other fish, crustaceans and cephalopods. Migrate to warmer water during winter and to cooler water in summer. Popular game fish	Literature
Sciaena umbra (Brown meagre)	NT	commercial	Marine; brackish; demersal; depth range 1 - 200 m. Occurs in shallow coastal waters mainly on rocky and sandy bottoms, often entering estuaries and more active at night. Also inhabits caves and reefs. Feeds on small fishes and crustaceans. SCUBA diving observations suggest this to be a very calm fish with remarkable buoyancy control and an ability to move without much apparent effort. Marketed fresh and frozen; in Turkey, otoliths are ground to a powder and used as remedy for urinary tract infections	Literature
Psetta maximus (Turbot)	NE	Commercial for fisheries	Marine; brackish; demersal; oceanodromous; depth range 20 - 70 m.	Literature

NAME	IUCN STATUS	HUMAN USE	BIOLOGY	OBSERVATION
		and aquaculture, gamefish public aquariums	Adults live on sandy, rocky, or mixed bottoms, rather common in brackish waters. Feed mainly on other bottom-living fishes (sand-eels, gobies, etc.), and, to a lesser extent, on larger crustaceans and bivalves. Batch spawner. Spawning season is between April and August; pelagic eggs.	
Hippocampus hippocampus (Short snouted seahorse)	DD CITES: Appendix II: International trade monitored	minor commercial; aquarium: show aquarium	Marine; demersal; non-migratory; depth range 0 - 60 m. Inhabits dense, complex habitats as well as patchy, relatively open, and sparse habitats of coastal areas. Found on soft bottoms amongst rocks and algae, on sparsely vegetated areas, and in coastal lagoons with strong oceanic influences. Mimics the green or yellow coloration of plants allowing it to hide among the vegetation. This ability likely plays a role in seahorse feeding strategy and in predator avoidance. Makes limited daily movements within very restricted home ranges (0.7-18.1 m2). May over-winter in deeper water. Adult dispersal over large distances is probably caused by strong wave action during storms or when it anchors itself to floating debris. Is thought to live for 3-5 years. Because of its short generation time and multiple breeding cycles during each spawning season, resilience is thought to be high.	Literature
Source: https://www.fishbase.se/search.php Downloaded on 10 May 2021 The IUCN Red List of Threatened Species.				

3.8.1.1 Existing Wastewater Treatment facilities

At MIP premises waste collection from vessels is carried out by providing land service to the ships. Within the scope of the "Regulation on Receiving Waste from Ships and Control of Wastes from Berthed Ships"; Petroleum and petroleum-derived solid and liquid wastes (bilge water, dirty ballast, sludge, oil, etc.), hazardous liquid wastes (vegetable oils, palm oil), wastewater and garbage wastes are collected. Bilge water, sludge, waste oil, etc. taken from ships. At the waste receiving facility, it is taken into separate fixed tanks and temporarily stored. Ultimately the liquid hazardous wastes are disposed to licensed hazardous waste companies and the waste records will be kept by MIP. MIP is responsible for delivering all hazardous wastes to licensed hazardous waste companies.

The Waste Reception Facility located in the port area is a facility which was licensed by the Ministry of Environment and Urbanization:

- Bilge water, sludge, waste oil within the scope of MARPOL 73/78 ANNEX I,
- Wastes within the scope of MARPOL 73/78 ANNEX II (vegetable oil, palm oil),
- Sewage within the scope of MARPOL 73/78 ANNEX IV,
- Garbage in the scope of MARPOL 73/78 ANNEX V,
- Waste within the scope of MARPOL 73/78 ANNEX VI are taken from vessels.

It is forbidden by National Legislation to discharging ballast water by vessel in the port, Vessels can only take ballast water for stabilization.

The bilge water to originate from the vessels which will berth to port in the operation phase will be stored in line with the provisions of the Regulation on Waste Reception from Vessels and Control of Wastes" in the existing waste acceptance plant, the fractions purified after undergoing a chemical treatment shall be given to the existing sewage system, the oily wastes to form shall be sent to the licensed disposal plants.

After the bilge water, sludge water taken from the ships are separated, they are treated in the chemical treatment system at the waste receiving facility, and the wastewater obtained is discharged into the sewage system in the port within the framework of the "Water Pollution Control Regulation".

There is no ballast water collection facility in Port. Vessels can get ballast water to their tanks in Port, but it is prohibited by Ministry of Transport and Infrastructure and Port Authority for vessels to discharge their ballast water to sea. MIP informs vessels of this requirement. Vessels discharge their ballast water to sea while sailing on international waters.

According to the Ballast Water Management Convention the Port should have a ballast water management system (BWMS) for emergency discharge and where the ballast water tank repair and cleaning is carried out. The Port does not have a ballast water tank for that purpose as it is not permitted by the National Legislation.

The bilge waters are discharged by the vessel directly into tank and temporarily stored at the Waste Reception Facility, after separation and treatment, it is sent to energy recovery facilities licensed by the Ministry of Environment and Urbanization.

There is an already existing stormwater collection and drainage system within the existing operational port. This stormwater collection system has a physical separation an oil separator before discharging to the sea.

In the scope of expansion project, water collection and drainage channels will be constructed for collection and discharge of rain waters. An effective drainage system will be built around the buildings and facilities to be built in the port area in order to prevent the adverse effects of possible surface waters during rainy seasons. A mechanical separation of waste and run off water will be conducted by drainage system; howebiological,gical or chemical treatment of run-off water will not be the case. The domestic waste waters to occur in the construction and operation phases shall be discharged to the existing city sewage system. The storage, transportation and disposal processes shall be performed in compliance with the provisions of "Waste Management Regulation", "Regulation on Control of the Pollution Caused by Hazardous Substances in Water and its Surrounding", "Regulation on Control of Waste Oils" and provisions of the "Regulation on Waste Reception from Vessels and Control of Wastes".

Sewage taken by sewage truck from vessels is discharged to the sewerage system. Permits have been in place as of 29.12.2020. In addition to that, the connection quality control license of the workshop treatment plant has been renewed. The following diagram summarizes the wastewater receival and treatment routes for the wastewater received from vessels.

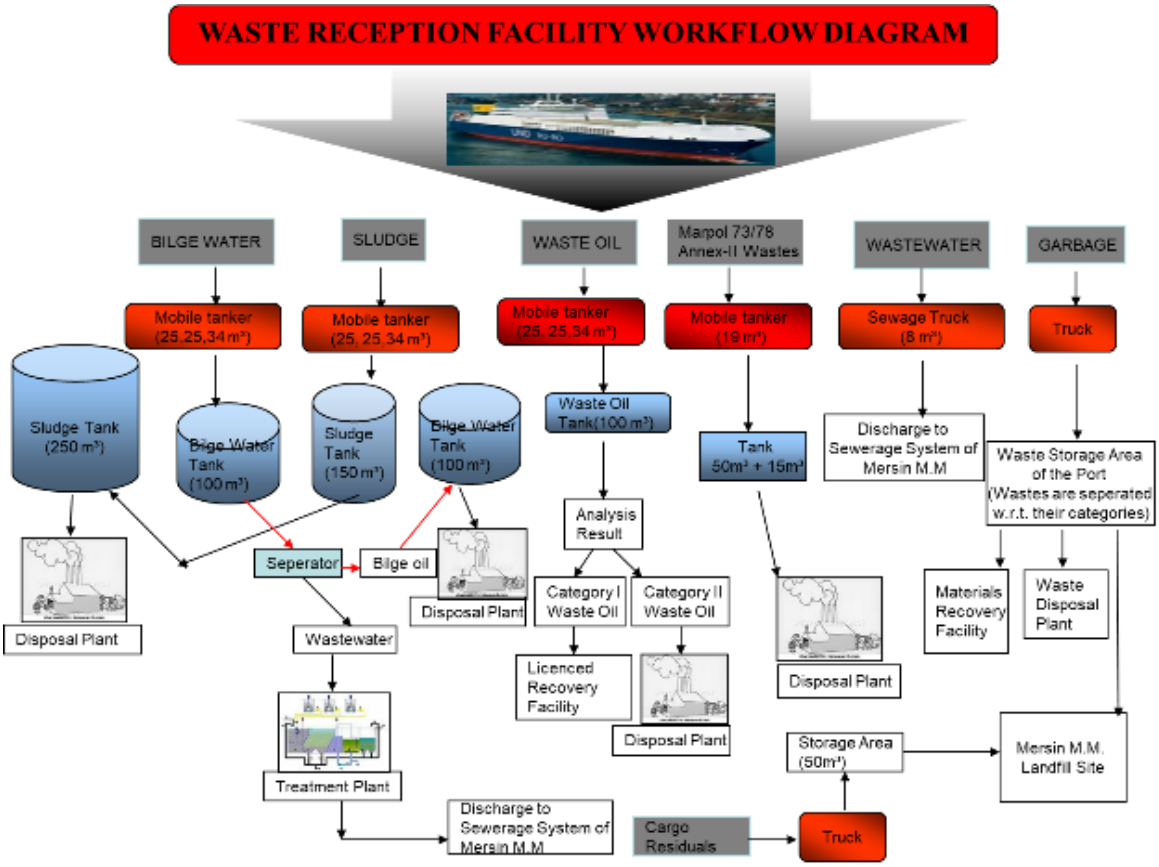


Figure 34: MIP Licensed Waste Receiving Facility Flow Diagram

The previous capacity of Waste Reception Facility was 750 m^3. In 2021, each 35 m^3 capacity, additional 2 sludge waste tanks have been built.

3.8.2 Assessment of Impacts on Marine Environment

3.8.2.1 Dredging and Construction Impacts

a. Impacts on Sediment

According to the EIA, the summary of the results of monitoring of the previous dredging activities during and post dredging is below:

•During the disposal activity, it was observed that the turbidity in the surface waters disappeared within 15-20 minutes after the discharge ship opened its doors and emptied into the predetermined area.

•Nutrient enrichments in the water column occurred for a very short time and the effect was rapidly diluted and decreased.

•There was no negative impact on coastal areas during and after the dredging and disposal activity and no reported complaints/ visual effects.

•After the disposal operation, significant metal pollution was not observed in the surface sediments at the base of the disposal area and its immediate surroundings, and the disposal area is compatible with the low concentrations of organic pollutants measured in surface sediments.

•No effect of the dredging/disposal activity on fish stocks has been observed.

•Biota pollution (organic and metals) studies were carried out in October 2016 (after the end of the dredging/disposal operation). Red-mullet fish (mullus barbatus) was caught by trawling in the disposal area and its

immediate vicinity and the presence of prominent metal and organic pollutants in its tissues was investigated. It has been observed that there is no heavy metal and organic pollutant bio-accumulation due to both terrestrial and disposal activity in red-mullet, which is of economic importance in the region. It has been observed that this disposal activity has no long-term/chronic negative effect on aquatic life.

•According to the benthic ecological index study, the area is classified as "very good" and "good" according to the disposal area benthic ecological index study carried out 12 months after the disposal activity. The species, known as the pollution indicator, did not form dense populations.

•After the disposal activity, the slope of the sea floor in the disposal area remained at natural limits.

•The fact that organic pollutants and metals that pass from the sediment to the "eluate" phase are very low indicated that there will be no high levels of pollutants in the sea water and there will be no high accumulation and biotransformation in the food chain in the aquatic environment. These experiments and measurements were performed during Phase 1.

• Metals, TOC, organic contaminant were also measured in eluate phase (water soluble pollutants coming from sediment).

As a result, during the disposal of the bottom dredge material dredged from Mersin port in-port and approach channel within the scope of Phase-1 to the disposal area located 11 km away from Mersin Port, no environmental/ecological negative effects in the monitoring studies and post-mortem were observed in the dredging, disposal, and surrounding areas.

According to the study performed by an expert for the expansion project on the sediments, all these observations and measurements which have been done during Phase 1 (summarized above) is expected to be observed similarly for the dredging activities of the Expansion Project.

b. Impacts on Marine Ecology

Dredging impacts marine organisms negatively through entrainment (the unintentional removal of organisms by the suction field created by hydraulic dredgers), habitat degradation, noise, remobilization of contaminants, sedimentation, and increases in suspended sediment concentration (Todd et al., 2014). As per the Ecosystem Evaluation Report in Appendix 4 following can be stated:

- Liaison with local fishers, review of existing data and field surveys indicates that there is no vegetated habitat within the site. The project activities are not expected to have severe impact on benthic communities or habitat given the lack of vegetated habitat within Mersin International Port. The area had already been dredged 5 years ago.

- Area of Influence will not extend beyond the limit of Mersin International Port and approaching channel in which dredging activities were conducted 5 years ago.

- The habitat studies undertaken across the Mersin International Port area indicated that the dredging area lies within an area of fine sediment and that no seagrass is located within the site. In this study, marine angiosperms such as *Posidonia oceanica*, which formed sea meadows within the harbor area, were not found.

- According to the Biodiversity Management Plan of the Project, the port has been defined as being in a critical habitat area with high biodiversity values present. The port lies close to legally protected and internationally recognized areas. The project site is connected to this area species connectivity and sits in a broad continuous habitat that support foraging of Critically Endangered and Endangered monk seals, sea turtles and other fish species. The project site sits outside of the legally protected and internationally recognized area, but the boundaries of this area have been formed to reflect threats and do not relate to the presence of high biodiversity values. This is clearly demonstrated by the presence of sea turtle and monk seal nests within and outside of the protected area in vicinity to the port site. Irrespective of the value within the port, at a landscape/seascape level, the port sits within a broad area that is defined as critical habitat as a whole.
- Dredging can have significant impacts on benthic marine organisms through mechanisms such as

sedimentation and reduction in light availability as a result of increased suspension of sediments (Fraser et al., 2017). Although benthic organisms will be negatively affected in the construction works of the planned port, the environment is expected to be restored shortly and there will be no negative impact during the operating period.

- Maintaining suspended sediment concentrations below 44 mg/L and for less than 24 hours would protect 95% of fish from dredging-related mortality. Implementing seasonal restrictions during peak reproduction and recruitment periods further protects species from dredging impacts (Wenger et al. (2018).

- Management strategies suggested for the Project will minimize the dredging impacts of coastal development on fish and fisheries).

- As determined in field studies, biotope differentiation is rare in Mersin International Port and its immediate vicinity. In addition, factors such as natural environment deterioration, ship traffic and intensive use, negatively affects biodiversity.

- Foreign fish infestation is a common phenomenon in the region.

- As per the Ecosystem Evaluation Report, it is concluded that the planned Mersin International Port activities will not put significant pressure on the fish species determined in the area. Sediment will not have a significant impact on the fish species and fishing activities of the region.

- Moreover, the presence of similarly qualified sites in a very large area, including the immediate vicinity of the project site, indicates that there are sufficient marine habitats to meet the ecological demands of all aquatic species, especially fish species.

- There is no fertile area within the field of activity, which is used quite often as a feeding, nesting, and sheltering area for fish, but there are suitable areas around it. The desktop and field studies conducted for AoI indicate that Project area is not an important spawning ground, nursery area or foraging area for any protected species.

- Depending on the structure of the substance in the dredged area, it is possible to spread pollutants, nutrients, and organic substances into the environment A variety of harmful substances, including heavy metals, oil, TBT, PCBs, and pesticides, can effectively lock seabed sediments in ports and harbors. Dredging processes have the potential to cause contamination and/or poisoning by releasing these pollutants into the water column. This will eventually lead to habitat loss and direct kill of marine life. A Dredging Management Plan was prepared to mitigate these impacts.

- The project area, within Mersin International Port, is a highly disturbed crowded precinct that is unlikely to support the foraging and/or breeding habitat for marine mammals and sea turtles. The approaching channel, however, is determined to be close to the migration routes of the sea turtles which might be adversely affected by the dredging activities to open the channel during construction and during operation. For this impact, it should be ensured that the activities to be carried out to open a berthing channel do not coincide with the period of intense migration during construction. In order to minimize sea turtle injuries and deaths, a speed limit should be applied for small vessels (utility boats, recreational boats, etc.) rather than large tonnage vessels approaching the port. It should be mandatory to have an injury prevention cage in front of the propellers of fast watercraft, during operation phase, as stated in Marine Ecology Assessment Repot

- Dredging can impact marine mammals, but impacts are species- and site-specific and vary with the type of dredging equipment. In general, the evidence suggests that when management practices are implemented, the impacts are most likely masking and short-term behavioral changes, as well as changes in prey availability (Todd et al., (2014).

- Project area does not represent key or critical habitat as the Ecosystem Evaluation Report.

- The species with high potential to use the area and its immediate environment according to habitat and niche suitability are listed in the marine ecosystem evaluation study as Priority Biodiversity Feature Species (fish, sea turtles and monk seal).

Considering conservation status of these PBF species, namely *Merluccius merluccius*, *Labrus viridis*, *Umbrina cirrose*, *Dentex dentex*, *Raja clavate* (Thornback ray), *Epinephelus aeneus* (The white grouper), *Dicentrarchus labrax* (The European bass), *Pomatomus saltatrix* (The bluefish), *Sciaena umbra*, *Psetta maximus* and *Hippocampus hippocampus* species along with PBF species as global range as monk seal and sea turtles; and to protect their populations and habitats, an action plan has been presented in Marine Ecosystem Assessment Report. In this action plan, it is aimed to ensure that there are no-net-loss in the populations or natural habitat and net-gains in Critical Habitat of the species and that all personnel are aware of the importance of species protection.

For this purpose: limiting project activities to designated areas to prevent direct impacts, monitoring the availability and population status of species in the marine ecosystem of the Project site and training studies have been proposed. Continuous monitoring is a part of mitigation measures. In addition to the surface water quality monitoring, fauna observations are required.

It is useful to cooperate with institutes and universities to request guidance in case of possible accidents. METU Institute of Marine Sciences; Mersin University, Faculty of fisheries; İskenderun Technical University, Faculty of Marine Sciences and Technology are the nearest stakeholder instructions.

Table 46: Biodiversity Monitoring and Reporting Summary

Purpose	Monitoring	Action
Dredging		
Benthic Communities and Habitat	Daily visual monitoring of turbid plume	Verbal notification to dredging manager on the distribution extends of the plume. Dredging schedule revisions in accordance with the plume distribution extensions and arrangement of silt curtains accordingly.
	Physical monitoring via vessel if plume is confirmed to extend beyond the project boundary.	Written notification to dredging manager if the plume is confirmed to extend beyond the boundary. Cease operation till the plume settles and review the dredging schedule as required
Marine Fauna	Daily inspections of the observation and shut-down zones prior to commencement of works.	Written notification to METU Institute of Marine Sciences; Mersin University, Faculty of fisheries; İskenderun Technical University, Faculty of Marine Sciences and Technology within 24 hours of notification of trapped or injured fauna. The specified actions in the Dredging Management and Monitoring Plan will be fully applied especially regarding sea turtles by the Dredging Contractor and MIP to protect BPF species. . Project induction with environmental training shall be given to staff. Observation sheets shall be on board of the vessel to record turtles. Procedure shall be developed for the event when turtle approaches (see Dredging Management and monitoring Plan)
	Continuous (hourly) visual observations by dedicated site personnel during all marine activities.	Immediate notification to dredging manager of any injured or trapped and visibly distressed fauna.
	Monitoring of populations of fish species and other ecosystem component s during construction and operation	Monitoring the availability and population status of species in the marine ecosystem of the project site every six months during

Purpose	Monitoring	Action
		construction and every year during operation by an expert having PhD degree on hydro-Biology by appropriate scientific means.
Dredging equipment	Equipment checks for invasive species.	All vessels and associated equipment will be either sourced from the Mediterranean region and/or will be cleaned before use. • If any vessels are sourced from outside the defined area that possess risk of introducing invasive alien species, a risk assessment will be undertaken in consultation with biodiversity consultant/hydro-biologists prior to entry into project area.
Dumping		
Benthic Communities and Habitat at the Dump site	Water quality monitoring	The dredged material will be dumped to areas determined and announced by the MoEUCC as in the Phase1. The location preference of these dump sites is because they do not have any sensitivity such as sea meadow, the bad condition of benthos, the level of turbidity etc. All pollution and geochemical properties of the dredging area bottom material, dump site bottom structure, water column hydro-chemical properties and possible negative effects of the dredged material were evaluated in this selection process. Dump sites have been selected in the west direction, outside the fish migration route, in the field without bottom flora (light intensity< less than 10, relative to the surface); in depth range of 30-50 meters. Species that requires special protection has not been observed/reported. As these areas are announced dump site areas and there are other possible discharge activities, water quality measurements will be made before and after the disposal of the dredged material
Postconstruction		
	SGS monitoring for marine flora and fauna	Considering that the bottom structure of the area to be dredged is mud, the benthic species in the region will start to use the area again and intensively within 1 year. SGS monitoring is suggested for post construction period to confirm this.

The daily inspections as a part of monitoring during dredging and dumping activities will be implemented throughout the dredging activities on site.

As per Biodiversity Management Plan, there were academic correspondences regarding priority biodiversity values; mammals (monk seal) and sea turtles.

In summary, the dredging activities are mentioned to cause a turbidity in the short term, which is not expected to cause a permanent habitat loss on the fish. As for the monk seal, it is advised by the academics that there is no monk seal caves observed nearby the dredging area. As for the sea turtles, it is advised to secure the dredging area before dredging activities start from the sea turtles if observed any; and relocate the ones found inside of the area,

as the dredging location might be a feeding place for the sea turtles since there are fisherman boats. Also it has been stated that the dredging activities in the approach channel should not coincide with the migration season of the sea turtles.

The biodiversity Management Plan covers mitigation measures to be followed during dredging activities for different kind of habitats and biodiversity elements as different elements are suggested to be affected in different ways from the dredging activities, majorly in the short term, to be expected to recover in the long term. The Biodiversity Management Plan is enclosed in Appendix 4 of this Report with the Marine Ecosystem Evaluation Report.

Table 47: Marine Biodiversity Impact Assessment Construction

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Marine Biodiversity	Dredging	Benthic Communities and Habitat	Damage on benthic habitats -direct loss by removal or burial	Construction	Medium	Areal	Short Term	High	Negative	Medium	Medium	Follow surface water quality monitoring requirements to protect benthic communities and habitat outside the expected impact zone.	Medium	Areal	Short Term	Low	Negative	Low	Minor
2	Marine Biodiversity	Dredging & disposal	Benthic Communities and Habitat	-indirect impacts from the effects of sediments introduced to the water column by the dredging and disposal	Construction	Low	Local	Short Term	High	Negative	High	Medium	Surface Water Quality Regulation Annex-5 Table 2-Quality Criteria according to The General Chemical and Physiochemical Parameters of Continental Surface Water Resources and Table 3-Parameters in coastal waters receiving environment quality criteria in terms of general chemical and physiochemical parameters should be monitored monthly during construction. The mitigations specified in the Dredging Management and Monitoring Plan will be fully implemented.	Low	Local	Short Term	Low	Negative	Low	Minor
3	Marine fauna	Dredging	Fish	Turbidity & sediment cloud - sedimentation and reduction in light availability	Construction	Medium	Local	Short Term	Medium	Negative	High	Major	anti-turbidity curtains should be considered by the Dredging Contractor as outlined in the Dredging Management Plan to prevent turbidity in the vicinity of dredging area if the turbidity levels reach unacceptable levels and the conditions are suitable for deployment. Daily visual monitoring of turbid plume Physical monitoring via vessel if plume is confirmed to extend beyond the project boundary.	Medium	Local	Short Term	Low	Negative	Low	Minor
4	Marine Biodiversity	Dredging	Marine habitats & marine fauna	Dredging processes have the potential to cause contamination and/or poisoning by releasing these pollutants into the water column	Construction	Medium	Local	Short Term	Medium	Negative	High	Major	Dredging Management Plan detailing water quality monitoring requirements will be implemented. Dredging Management Plan is prepared to mitigate the risks of dredged material diffusion into aquatic environment	Medium	Local	Short Term	Low	Negative	Low	Minor

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
													MIP will ensure not to coincide the dredging works with the migration seasons of the turtles (during April and at the end of August) for the approach channel dredging activities. Monitoring of the sediment quality as per Dredging Management Plan							
5	Marine Biodiversity	Dredging	Marine flora and fauna	During dredging, low-level contaminants given to the water column can accumulate in marine animals and plants and can also be transferred through the food chain to fish and marine mammals through bioaccumulation	Construction	Medium	Local	Long term	Medium	Negative	High	Major	Provide sediment samplings to the relevant authorities before discharging so that uncharacterized dredged material shall not be discharged. Monitoring of the sediment quality as per Dredging Management Plan.	Medium	Local	Short Term	Low	Negative	Low	Minor
6	Marine Biodiversity	Filling & dredging activities	Fish & planktons	Elevated turbidity of seawater during filling can negatively affect the respiratory mechanisms of aquatic creatures, especially by sticking to the gill systems of fish. Sedimentation and reduction in light availability	Construction	Medium	Local	Short Term	High	Negative	High	Major	For any filling work to be done from land, a set should be drawn first by completing the fillings in the sections that form the boundaries of the filling area in the sea, and then the section between this set and the coastal part should be filled. Thus, the turbidity effect that will occur during the filling will be eliminated because the connection with the sea is lost. Filling and dredging work should not be carried out in unsuitable* wind and wave conditions. Otherwise, sedimentary clouds can quickly spread to remote locations. *Unsuitable wind and conditions are defined using general directorate of meteorology data and Beufort scales. If the wind speed is above 17 knot and 8 m/sec, it is called fresh breeze namely strong wind. It corresponds to wave height that exceeds 2m.	Medium	Local	Short Term	Low	Negative	Low	Minor

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
													(https://www.mgm.gov.tr/FILES/genel/makale/beaufort.pdf)							
7	Marine Biodiversity	Dredging and Filling activities	Sea turtles	Habitat alteration, disturbance Injury/death of adult turtles going to the nesting areas on the beach or injury/death of offspring moving towards the sea, Loss or damage to nesting habitat and/or nests, Man-made formations that may cause injury or death on nesting turtles and hatchlings and/or prevent turtles from nesting, Pollution and mess leading to injury, death or reduced quality of life, Off-duty activities of the workforce that cause nuisance through hunting and/or harassment and also result of potential use of lights/fires.	Construction	High	Local	Short Term	High	Negative	High	Major	Potential impacts on sea turtles that may overlap with the project will be avoided/minimized through mitigation measures to be implemented during construction activities and also reflected in the Dredging Management Plan, as such dredging works will be planned considering the sea turtle movement in the area during the two migration seasons; the first in April (pre-breeding) and the second in August-September (post breeding/spawning). In particular, dredging activities should not coincide with the migration season of sea turtles during the dredging activities in the approaching channel.	Medium	Local	Short Term	Low	Negative	Low	Minor
8	Marine Biodiversity	Dredging and Filling activities	Marine life-all	Turbidity	Construction	Medium	Local	Short Term	High	Negative	High	Major	Silt curtains should be used to prevent or reduce the effects of the	Medium	Local	Short Term	Low	Negative	Low	Minor

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
													sand cloud that will be during the dredging operations. For this purpose, the circumference of the ship, where the activity will be carried out during dredging, should be closed circularly with these silt curtains. With curtains from the sea floor to the surface, the turbidity during dredging will only be effective in this area and will not spread to the environment. Daily visual monitoring of turbid plume will be performed. Verbal notification to dredging manager on the distribution extends of the plume will be forwarded. Dredging schedule revisions in accordance with the plume distribution extensions and arrangement of silt curtains accordingly will be made. Continuous monitoring and training of the personnel about biodiversity conservation during project activities are a part of mitigation measures will be performed. The visual monitoring by an expert with PhD degrees is recommended in the Marine Ecosystem Evaluation Report.							
9	Marine Biodiversity	Dredging and Filling activities	Marine fauna	Noise, turbidity, and mechanical effects	Construction	Medium	Local	Short Term	High	Negative	High	Major	The spring period (March, April, May and early June) is known as the breeding period, when marine biological activity is highest. During these periods, filling should be at minimum levels. During this period, when the density of marine life begins to increase, noise, turbidity and mechanical effects can negatively affect the presence and quantity of eggs, young and adult individuals. The construction work will have a minimal impact on the marine ecosystem in late autumn and winter, when biological activity is lowest.	Medium	Local	Short Term	Low	Negative	Low	Minor

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
10	Marine Biodiversity	Dredging and Filling activities	Marine mammals	Impacts to marine cetaceans during dredging and/or piling, including: •direct vessel strike •underwater noise. The receiving environment is a transportation area with regular large vessel movements.	Construction	Medium	Local	Short Term	High	Negative	High	Major	If piling is proposed, a "soft start" procedure will be employed to warn off potential fauna in the project area. Implementation of measures within this document to ensure marine fauna are protected, including fauna observers and shutdown zones. During all dredge activities, observation and shut-down zones will be implemented as follows: • Observation zone: if any marine fauna enters this zone, the Dredging Contractor will be notified. • Shut-down zone will extend to the limit of the site boundary and if any marine fauna enters this zone during activities, all works will cease until the fauna has departed the area of their own accord.	Medium	Local	Short Term	Low	Negative	Low	Minor
11	Marine biodiversity	Dredging	Introduction of pests and Invasive species	Introduction of marine pests via biofouling on the vessel hull. Potential impacts include: -Establishment of non-native marine pest species; -Competition for food and space with native species; -Predation on native species; and/or -Elimination of native species; -Introduction of pests and diseases.	Construction	Medium	Local	Long Term	High	Negative	High	Major	All vessels and associated equipment will be either sourced from the Mediterranean region and/or will be cleaned before use. If any vessels are sourced from outside the defined area that possess risk of introducing invasive alien species, a risk assessment will be undertaken in consultation with biodiversity consultant prior to entry into project area.	Medium	Local	Short Term	Low	Negative	Low	Minor

c. Impacts on Water Quality

Domestic wastewater will be delivered to the existing city sewerage system. Permission for this was obtained from the General Directorate of Mersin Water and Sewerage Administration (MESKİ).

Any direct discharge from the dredging vessels or vessels transporting construction material will not be allowed to discharge water into the sea. They will use the existing waste reception facility of MIP.

Any disposal of solid waste from the dredging vessels or vessels transporting construction material will not be allowed to discharge water into the sea. They will use the existing waste reception facility of MIP.

There is an already operational stormwater collection and drainage system with physical separation and oil separators due to the Phase-1 Port operations. In the scope of expansion Project, water collection and drainage channels will be constructed for collection and discharge of rain waters. An effective drainage system will be built around the buildings and facilities to be built in the port area in order to prevent the adverse effects of possible surface waters during rainy seasons. A mechanical separation of waste and run off water will be conducted by drainage system; however, biological or chemical treatment of run-off water will not be the case. The domestic waste waters to occur in the construction and operation phases shall be discharged to the existing city sewage system. The storage, transportation and disposal processes shall be performed in compliance with the provisions of “Waste Management Regulation”, “Regulation on Control of the Pollution Caused by Hazardous Substances in Water and its Surrounding”, “Regulation on Control of Waste Oils” and provisions of the “Regulation on Waste Reception from Vessels and Control of Wastes”.

The dredging and filling works will create the sediment to be disturbed and sediment sand and materials to be dissolved into the water column. This will create turbidity increase in seawater column and potential changes in the marine water quality as a result of the chemical content of the dredged and disturbed sediment to dissolve in the water column.

Table 48: Marine Water Quality Impact Assessment Construction

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Marine Water Quality	Discharge of Wastewater Disposal of solid wastes	Marine water	Deterioration on Marine Water Quality	Construction	Medium	Local	Short Term	Low	Negative	Low	Minor	Domestic Wastewater will be Discharged through Connection Municipality Sewerage System. Discharges from Vessels will be through Existing Waste Receiving Facility Construction Environmental Social Management Plan (CESMP) to include provisions for the avoiding solid waste disposal and wastewater discharges to sea from dredging vessels.	Medium	Local	Short Term	Low	Negative	Low	Minor
2	Marine Water	Dredging, piling and filing	Marine Water	Deterioration on Marine Water Quality through the diffusion of dredged and disturbed sediment material into water column	Construction	Medium	Local	Short Term	High	Negative	High	Major	Dredging Management Plan No identified ecological Sensitivities Competent Dredging Company Phase 1 sediment modelling for dumping show no diffusion of sediment during dumping to sensitive receptors	Medium	Local	Short Term	Low	Negative	Low	Minor

3.8.2.2 Operational Impacts

a. Impacts on Sediment

According to the additional study performed by an expert, Prof. Dr. Filizr Küçüksezgin, Post-Phase-1 period monitoring results showed that the benthic life re-developed in a period of 6-12 months and achieved good quality zoo-bentic habitat characteristics. After Phase-2 dredging/disposal activity, it is evaluated that the disposal area will reach the natural characteristics of zoo-bentic habitat structure in a similar time. Therefore, no operational impacts are expected regarding sediments.

b. Impacts on Marine Ecology

As the project site is an existing operating port, there are potential impacts to all other environmental assets during the operational period.

There are no direct impacts on biodiversity, apart from the possibility of accidental encountering/occurrence of mobile species such as sea turtle and monk seal. The Biodiversity Management Plan sets out mitigations during operation to minimize those impacts.

The manageability of water quality at this stage will have an impact on benthic life and benthic habitat.

Table 49: Marine Biodiversity Impact Assessment Operation

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Marine Biodiversity	Marine traffic	Marine water	Deterioration on Marine Water Quality	Operation	Medium	Local	Long Term	Medium	Negative	High	Medium	Sea water quality in post-construction monitoring should be within the limits of "Low contaminated water (Class II) water quality)" in Surface Water Quality Regulation Annex-5 Tables 2 and 3.	Medium	Local	Long term	Low	Negative	Low	Minor
2	Marine Biodiversity	Continuous turbidity due to marine vessel fans, propellers	Benthic fauna and habitats	Benthic species	Operation	Medium	Local	Long term	Medium	Negative	Low	Minor	Considering that the bottom structure of the area to be dredged is mud, benthic species in the region will begin to intensively use the area again within 1 year. Post construction SGS monitoring during operation is proposed to confirm this.	Medium	Local	Long term	Low	Negative	Low	Minor

c. Impacts on Water Quality

There is no direct impact expected to the water quality specifically on the Marine Environment from the port operations, due to the mitigations below:

During operation, no direct discharges to the sea will be allowed.

Domestic wastewater will be delivered to the existing city sewerage system. Permission for this was obtained from the General Directorate of Mersin Water and Sewerage Administration (MESKİ).

Any direct discharges from the vessels will not be allowed to discharge water into the sea. They will use the existing waste receiving facility of MIP.

Any disposal of solid waste from vessels will not be allowed to discharge water into the sea. They will use the existing waste receiving facility of MIP.

Table 50: Marine Water Quality Impact Assessment Operation

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Marine Water Quality	Discharge of Wastewater Disposal of solid wastes	Marine water	Deterioration on Marine Water Quality	Operation	Medium	Local	Long Term	Medium	Negative	High	Medium	Domestic Wastewater will be Discharged through Connection Municipality Sewerage System. Discharges and solid wastes from Vessels will be through Existing Waste Receiving Facility Operational controls and procedures are in place to prevent disposal and discharge to the sea by the Competent Authority.	Medium	Local	Long term	Low	Negative	Low	Minor

3.9 Traffic Impact Assessment

3.9.1 Baseline

The access to the MIP is through land, sea and railway.

Marine Access

Mersin port is the largest port in the region and is one of the important ports of Turkey in terms of the number of vessels and the 2.60 million TEU throughput capacity .. In the below Figure, the number of ships berthing between 2008 and 2020 is given. Between 2008 and 2020, an average of 3,690 ships per year berthed at the port.

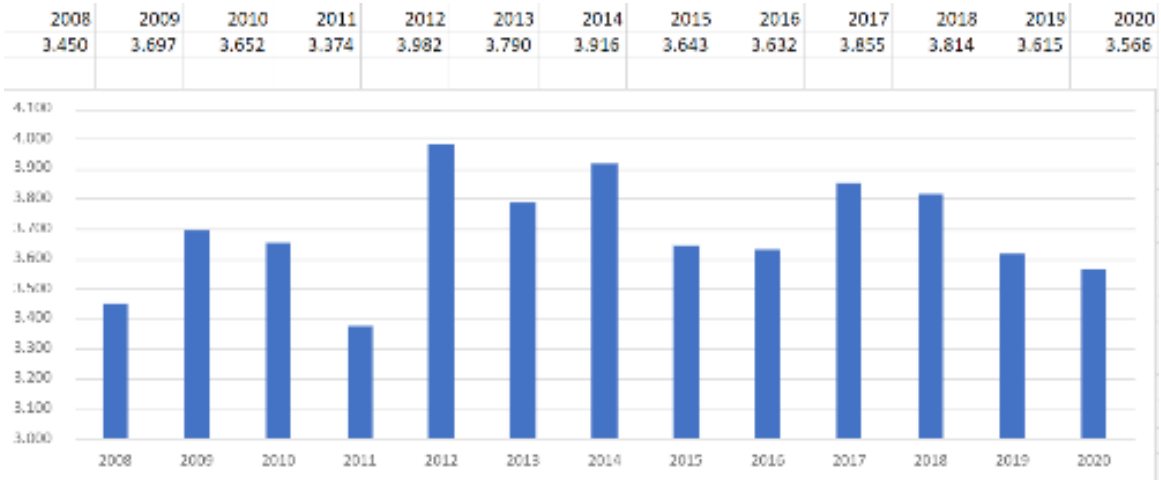


Figure 35: The Number of Ships Docking to the Port between 2008-2020

The largest vessel to dock in the port is the Maersk EEE series ships. The length of the ship is 400 m, and the draft is -16 m.

Land Access

MIP is connected to Gaziantep, Kayseri, Kahramanmaraş through D 400 Motorway. The annual average daily traffic load in 2019 (pre-pandemic) and 2020 (with pandemic) at this Motorway is presented in the following figures which are taken from the Highways General Directorate. According to the maps, it is seen that the annual daily traffic load has fluctuating between the 2019-2020 due to ongoing pandemic, but the density share represented by red, pink, orange colors line in the figures has not changed. A peak number of 1262 vehicles on the D400 section providing access to MIP is calculated according to the Highways Traffic Volume Map taken from the Highways General Directorate and given below Figure. In the figure, the numbers represent the type of vehicles, from top to bottom respectively as; number of cars, medium load commercial vehicles, buses and trucks, trucks with trailers and the bottom raw gives the total number of cars in the unit of total vehicle/day.

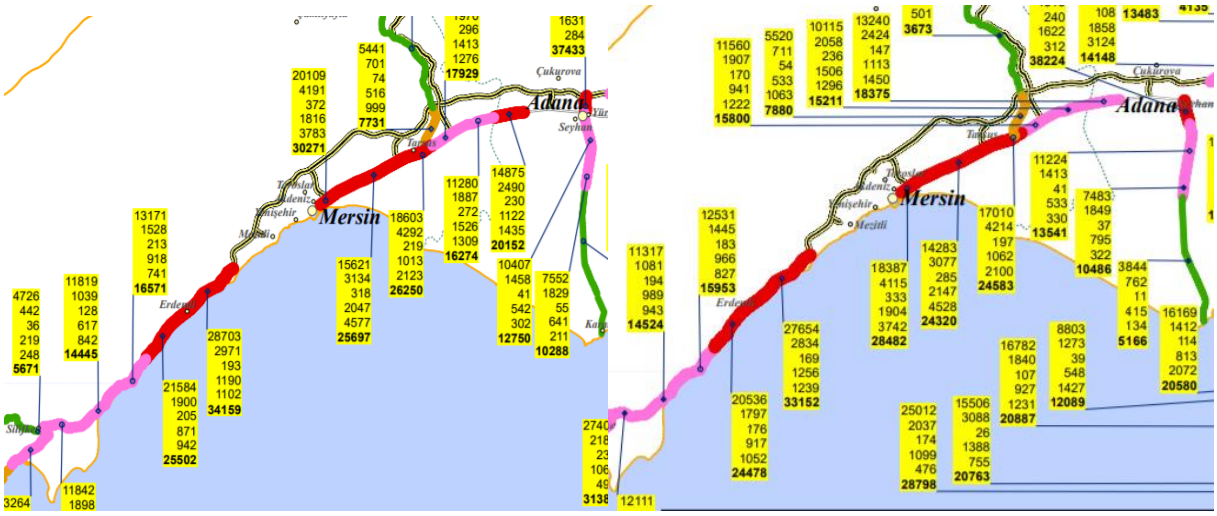


Figure 36: Traffic Loads on D 400 in 2019 and 2020 respectively

The land traffic at the MIP terminal is composed of the inbound and outbound land vehicle traffic and the in-port traffic during the unloading and loading of the vessels and mostly ferry type cruise ships..

The area adjacent to the Project area from the land side consists of concrete and asphalt roads and has a direct connection to the highway. There are 4 entrances within the Mersin Port: Only personnel and civilian vehicles can enter through Gate A, there is no truck entrance. Gate B and Gate C are the gates through which trucks and trailers enter and exit. Gate D is an entrance gate for conventional cargoes and RORO trucks and is located near to the free zone side. In addition, there is an E gate that provides direct access from the port to the free zone.

Figure 37: Gates of Port

The inbound and outbound traffic routes through these gates are presented in following figure. Accordingly, some signages to direct gates are located on the roads. It is noted that the design and signage on the roads are only under responsibility of the city and the General Directorate of Highways.

Figure 38: Inbound and outbound traffic at MIP for lend vehicles

During the site visit performed by the Consultants in January and April of 2021 for the purposes of Environmental and Social Due Diligence it was observed that the HGVs arriving at and leaving the port did not mix with the city's traffic. . However, it was observed that the approach to gate B is taken via city access route by some trucks. . Also, due to the large volumes of the HGVs sometimes two or all three lanes of the road are taken by the vehicles transporting the goods into and out of the port, restricting vehicles coming from other directions other directions from entering the city center. Stakeholders noted that the line of the trucks can sometimes reach 5 km .

At the point shown with the red arrow where MIP trucks are parked and leave to enter the Port area, there is increased traffic accident risk with the already waiting trucks to enter the MIP.

Below are pictures of trucks in ques on the inbound road to enter the Port.

Figure 39: Trucks in the que to enter the Port

MIP started to carry out a "gate project" concurrently with the extension project. With this project, it is aimed to separate the port traffic from the city traffic and to shorten the waiting times for the trucks. For the project, MIP cooperates with other project stakeholders (Mersin Governorship, TCDD, General Directorate of Highways, State Hydraulic Works, Mersin Metropolitan Municipality, Akdeniz Municipality, Naval Forces Command, National Real Estate, Veterinary Medicine, Coast Guard, and other stakeholders). The details of the Gate Project in Section 2.2.1.

Rail Access

The project area is located very close to Akdeniz District Centre. With the presence of TCDD (Republic of Turkey State Railway)'s railway line in the north of MIP Port, there is a railway connection to Istanbul via Konya - Eskişehir and to the eastern provinces of the country via Adana as shown in the following Figure.

In addition, there is a Railway Terminal inside port which is composed of four lines. With three RTG assigned to the railway terminal, loading and unloading operations can be performed at these four railway lines simultaneously. Direct loading and loading can be done to the train wagons with the existing 5 railway connection to the berths. The Port services are also provided in terms of loading and loading from the wagon to the container.

Figure 40: Connecting Railways to the Port

Baseline Sensitivity

The sensitivity of the baseline component for land transportation is characterized with the current condition of the traffic on the routes approaching to the Port. Since there is already high traffic load on these routes the sensitivity of the component is medium.

The sensitivity of the baseline component for marine traffic is medium because of already existing operational marine traffic at port in a relatively restricted area.

The sensitivity of railway transportation is low with the currently available capacity of the railway.

The impact assessment table together with the mitigation measures for the traffic impacts during construction is presented below.

3.9.2 Construction Phase Impacts and Mitigation Measures

The traffic during construction works will result from the transportation of the construction material to the Terminal Site. There are three means of transportation of the construction material to site by land, rail or sea.

The exact proportion of the use alternative transportation means will be decided by the selected EPC contractors.

In case, the filling material for the berth extension will be transported by land; the Project timeline does not allow for licensing a new quarry therefore an operating quarry will be used for the supply of the filling material. An operating quarry will be identified for the supply of the filling material on condition that the supplies filling material will be meeting the Project quality criteria.

An estimated 350-400 trips per day to the quarry are foreseen between hours of 20:00 and 06:00 in order to reduce congestion in and around the port to avoid rush-hours. .

If it is assumed that 1 truck will make 4 trips in average daily, the required approximate number of trucks is calculated;

- 400 trips / 4 trips / 1 truck = 100 trucks/days.

Increase of traffic volume calculation of filling construction is given below.

- (Difference in the vehicle volume / Existing) x 100

  = 100/30271 x 100

  = 0.3333%.

The details of the use of seaways for the transportation of construction equipment and materials is not known at the moment. However, it is estimated the filling and dredging works will create additional vessel movement at the berth and approaching area.

The details of the use of railways for the transportation of construction equipment and materials is not known at the moment. However, it is estimated the filling and dredging works will create additional railway traffic.

Table 51: Traffic Impact Assessment Construction

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Traffic	Project works using existing land transport infrastructure	Local communities	Damage on existing infrastructure	Construction	Medium	Local	Short	Medium	Negative	Medium	Minor/ Medium	Consider options of access for the construction traffic to enter the Port. A Stakeholder engagement Plan and Grievance Mechanism Procedure will be prepared and implemented during all phases of the Project. The Traffic Management Plan will be implemented during construction phase of the Project. A continuous stakeholder engagement process and grievance mechanism will be in place about infrastructural requirements of the Project. Existing roads (i.e., paving) which will be used during the Project works will be Improved before the construction works and maintained in good condition. The access roads which are used and damaged will be improved to minimum pre-construction level. All damaged existing infrastructure including roads will be compensated in accordance with the Turkish legislation and IFI requirements.	Low (with the alternative access and not using rural roads)	Local	Short	Low	Negative	Low	Low
2	Traffic	Use of existing rail transportation structures at the Port	Existing operations and infrastructure	Damage to existing structure and adverse impact on existing operations increasing safety risks.	Construction	Low	Local (only increased traffic at the port is considered)	Short	Low	Negative	Negligible	Negligible	A Traffic Management Plan will be prepared and implemented during all phases of the Project. Prepare detailed schedules and onsite traffic routes for the construction material movement in the Port. Set speed limits for the vehicles transporting construction material in the port from the rail terminal and the berth to the construction area.	Low	Local	Short	Low	Negative	Low	Minor

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
													Provide training to the construction personnel on the traffic management							
3	Traffic	Use of existing marine transportation structures at the Port	Existing operations and infrastructure Cruise Passengers	Damage to existing structure and adverse impact on existing operations increase safety risks.	Construction	Medium	Local	Short	Medium	Negative	Medium	Medium	A Traffic Management Plan will be prepared and implemented during all phases of the Project. Prepare detailed schedules and onsite traffic routes for the construction material movement in the Port.	Medium	Local	Short	Low	Negative	Low	Minor
4	Traffic	Transportation and vehicle traffic	Local communities, roads	Community health and safety- Traffic accidents, generation of dust and exhaust emission, disturbance of roads etc.	Construction	Low/Medium	Local	Short	Medium	Negative	Medium	Minor/ Medium	A Traffic Management Plan will be prepared and implemented during all phases of the Project. All relevant mitigation measures provided in this table related to “Traffic and infrastructure” will be taken for prevention of CHS impacts resulting from construction traffic. Mitigation measures will be included in Traffic Management Plan for the hazardous material (i.e., oil, fuel) spills in the roads and dust/exhaust emissions from the vehicles and machinery. A continuous stakeholder engagement process and grievance mechanism will be in place about transportation activities and traffic requirements of the Project. Local community will be informed during the public participation meetings and when required about the routes and roads to be used by the trucks/vehicles, the Project works which will create additional traffic load (i.e., scheduled concrete works, transportation) and other relevant information which will affect traffic access of local community.	Low	Local	Short	Low	Negative	Low	Low

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
													Unnecessary horn and sirens will be prohibited in the access roads. Limits will be adopted for trip duration and driver rosters will be arranged in order to avoid overtiredness. Routes widely used by the communities will be avoided and working times of the day will be limited to reduce risk of accidents. The speed limits will be set for the public roads and Project roads and they will be announced to the drivers. Adequate number of road signs will be placed in the Project site and access roads after permission from the local authorities. It will be ensured that emergency response process will be adequately implemented in case of n traffic accident. Drivers which transport solid, liquid, gas fuel and other hazardous materials including wastes will have approved certificates. Regular maintenance of vehicles and machinery will be ensured. Warning signboards will be placed in settlements (at entrance, exit and locations where pedestrian movement is busy such as schools), sensitive areas, archaeological areas. Parking in above mentioned sensitive areas will be prohibited except emergency cases. Training on driving skills including safe driving will be provided to all drivers including the subcontractors.							

#	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
5	Traffic	Traffic resulting from dredging and filling operations	Fisheries	Access Limitation	Construction	Low/Medium	Local	Short	Medium	Negative	Medium	Minor/ Medium	Implement SEP Implement Grievance Mechanism Consult and agree access needs/ co-ordinate activities or agree alternative routes for fishermen during filling and dredging works if practical.	Low	Local	Short	Low	Negative	Low	Low

3.9.1 Operation

The operation phase traffic of the MIP extension project will be composed of marine, rail and land traffic.

The marine traffic will be composed of the vessels approaching and berthing at the MIP, cruise port services and the tag boat services provided by MIP.

During the operation phase of the project, the number of ships that will berth to the port and their characteristics will increase. For this purpose, ship maneuver risk assessment report has been prepared. As a result of the risk assessment, it was determined that the project did not contain an unacceptable risk, provided that some measures were taken. These recommended measures must be followed throughout the project.

The traffic increase for the tag boat services will be minor and is not expected to create impacts to be addressed.

With the implementation of the project, the current container acceptance (handling) capacity of the port will increase from 2.6 million TEU (Twenty-foot Equivalent Unit) to approximately 3.6 million TEU, and the current stocking capacity will increase from 2.1 million TEU to 2.9 million TEU. The current and post-project capacity information of the port is given below.

The current annual capacities of the port are given below.

- Container Handling Amount: 2.300.000 TEU / Year
- General Cargo + Bulk Solid + Bulk Liquid Handling Amount: 10.000.000 Tons / Year
- Number of Loaded / Unloaded Vehicles: 100.000 Units / Year (Truck, Automobile, etc.)
- Number of Incoming / Outgoing Passengers: 34.000 Person / Year
- Container Stuffing / Unloading: 280.000 TEU / Year

With the realization of the project, the increasing capacity amounts are given below.

- Container Handling Amount: 3.600.000 TEU / Year
- General Cargo + Bulk Solid + Bulk Liquid Handling Amount: 15.000.000 Tons / Year
- Number of Loaded / Unloaded Vehicles: 150.000 Units / Year (Truck, Automobile, etc.)
- Number of Incoming / Outgoing Passengers: 50.000 Person / Year
- Container Stuffing / Unloading: 400.000 TEU / Year

An average of 5000 vessels is expected to berth (an increase of approximately 13%) at the port with increased capacity upon completion of the project.

The maximum design vessel to berth in the port is the Maersk EEE series ships. The length of the ship is 400 m, and the draft is -16 m.

With the increased capacity of the port in terms of Container, passengers, vehicles and general cargo, there will be an increase in the inbound and outbound rail and land traffic of the port.

It has to be emphasized that there is already congestion at the routes approaching to the port as detailed in section 3.9.1. MIP is already considering a road junction project to address the existing traffic congestion problem.

According to the information received from MIP, project layout and design studies are currently being carried out.

The existing traffic conditions from D400 Intersection towards Gate B is shown in below figures below. The trucks trying to enter the Port through Gate B follows that route on D400 and cause long waiting queues.

Figure 41: Current traffic flow towards city center and port

Figure 42: Traffic flow on D 400 towards port

With the Gate Project, MIP will divert the entrance to the Port at D400 Intersection (TOKİ roundabout) which is in 1.3 km east of entrance gate D. Certain entrance procedures such as OCR (Optical Character Recognition), weighing, pre-gate operations (document control) will take place on these 1.3 km section of travelling distance of

the trucks entering the Port that will speed up the entrance procedures and the traffic entering the Port will be isolated from the main road.

The proposed lay out that roundabout is presented below:

Figure 43: Proposed modified roundabout at D400 intersection

With this modification the traffic on D400 towards city center will be decreased since the traffic to the Port will be isolated from the city center direction as can be seen below:

Figure 44: Proposed Traffic flow on D 400 towards port

According to the data provided by the Highways Traffic Volume Map taken from the Highways General Directorate, estimated traffic loads on the D400 towards city center without the Gate Project is 1262 vehicles at peak on the D400 section providing access to MIP is calculated according to the Highways Traffic Volume Map taken from the Highways General Directorate.

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Together with the Gate Project, the railway crossing (north of gate D) will be eliminated through a flyover. This will prevent the queue of vehicles coming from free-zone (south of gate D) waiting at the crossing and thus eliminating the entrance to gate D.

See section 2.2.1 for details on the Gate Project.

This proposed project will in fact be minimizing the adverse impacts of increased operational traffic as a result of the EMH2 Project.

Table 52: Traffic Impact Assessment Operation

	Component	Project Actions Which Create Impact	Receptor	Project Impact	Project Phase	Baseline Sensitivity of the Component	Impact Magnitude Assessment					Impact Significance	Mitigation Measures	Baseline Sensitivity of the Component	Magnitude of Residual Impact					Impact Significance
							Spatial	Temporal	Intensity	Type	Magnitude				Spatial	Temporal	Intensity	Type	Magnitude	
1	Traffic	Increased Marine Traffic with the increased berth capacity and Shortened breakwater	Port Operations	Increased marine traffic and approaching bigger vessels resulting increased risk of collusion	Operation	Low	Local	Long Term	High	Negative	High	Medium	Ship Maneuver Risk Assessment Study Implementation of the mitigation measures in the Ship Maneuver Risk Assessment Study Updated Marine Operations Plans with the increased traffic. Implement SEP specifically with the Port associated stakeholders including fisheries	Low	Local	Long term	Low	Negative	Low	Minor
2	Traffic	Increased land traffic	Port operations/Neighboring Community/rail operations	Increased traffic, community health safety risks: traffic accidents, noise, vehicles emissions, dust	Operation	Low	Local	Long Term	High	negative	High	Medium	New Gate Project Implementation of SEP and consultation with the communities Monitor the efficiency of the Junction Project If the junction Project is not effective, consider provision of parking space for the approaching trucks SEP to address the increases on the railway	Low	Local	Long term	Low	negative	Low	Minor

3.10 Climate change impacts

Directive 2014/52/EU of The European Parliament and Of The Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment requires to assess the impact of projects on climate (for example greenhouse gas emissions) and their vulnerability to climate change.

For that purpose the following section describes:

- Impact of the project on climate in terms of GHG Emissions
- The major climate hazards identified for the project and the mitigation measures proposed in the design.

Furthermore Green Energy Transition (GET) items identified for the Project in line with EBRD GET Handbook are presented as part of this section.

The presented information contains outputs of other studies conducted for the project as referred in relevant sub sections.

3.10.1 Green House Gas Emissions Analysis

The following information on Green House Gas Emission Analysis of the Project has been completed as part of the Technical Due Diligence process of the Project. [27]

Introduction

This sections sets out the potential changes in GHG emissions that could be expected following the development of EMH2a. The assessment has considered the aspects that are:

1) specific to Phase 2a i.e. the increment in emissions that might be expected due to the increase in capacity at the Port enabled by EMH2a, and
2) the embedded benefits of EMH2a i.e. the benefit due to the inclusion of low-carbon technology in terms of avoided emissions.

Review of prior work

As part of the technical due diligence review, evidence of prior work or estimates of potential GHG impacts was requested. Based on the responses, no prior GHG estimates were identified by MIP.

Assessment purpose

The assessment presented here aims to identify:

- Whether EMH2a leads to a change in emissions greater than 25,000tCO2 (which is the threshold defined in lender standards and EP4).
- The potential avoided emissions associated with various interventions that are proposed.
- The potential avoided emissions associated with modal shift due to increased capacity in the Port.
- Whether the potential benefits in terms of GHG emissions meet the criteria for emission reductions set out in GET compared to potential alternative scenarios.

Scope and methodology

This assessment includes the following emission sources (with the Port as the entity being considered):

27 Mersin International Port (MIP) Technical Due Diligence Report for the Phase 2 Expansion of Mersin International Port, ARUP , 13th of October 2021

- Scope 1 emissions: emissions associated with the use of diesel or marine fuels associated with the operation of the Port and specifically with EMH2a. These are emissions associated with combustion in engines of port-owned vehicles and machinery.
- Scope 2 emissions: emissions associated with the consumption of electricity (produced elsewhere) that power port-owned equipment and machinery.
- Scope 3 emissions: emissions associated with the movement of goods to and from the port. This focuses mainly on the land-side imports and exports to and from the port which move by either road or rail. An assessment has also been made of the impact on transport in the hinterland if the capacity enabled by EMH2a happened elsewhere. Emissions from potential road/ship modal shift have not been quantified as this would require a more complex modelling approach and broader scope than the port.

GHG emissions associated with each of the sources set out above have been considered. For each source, activity data has been identified via data requests to MIP. This is then combined with emission factors to calculate GHG emissions. For simplicity, a single year future year (idealised as 2023) has been used to calculate GHG emissions.

For avoided emissions (from low-carbon equipment or modal shift), a base case scenario was derived to estimate what the emissions would have been if the interventions had not been implemented or if expansion didn't occur at Mersin as proposed for Phase 2a. Further detail is presented in the following sections and in the assessment summary.

Data sources and limitations

No new input information has been created as part of this assessment, and it is reliant on the existing information available about both the historic and future expected characteristics of the Port and EMH2a.

For Scope 1 and 2 emissions, historical energy use data (from the Business and Financial data set) was provided and projections for energy use associated with EMH2a were also provided via a separate RFI.

Detailed information on future import and export mix is not available. Therefore, in order to estimate the potential change and/or benefit in modal shift associated with EMH2a, data on container origin/destinations was used to define freight travel patterns and average container travel distances. These have then been applied to the increment in freight capacity enabled by EMH2a over and above the current Port operations. These are subject to uncertainty and are explained in more detail in the assessment.

Emission rates for grid electricity (320gCO2/kWh) were used from the IFI Approach to GHG Accounting for Energy Efficiency Projects (using the consumption emission factor). Emission rates for fuel (2.7kgCO2e/litre) and freight transport were used from EIBs Project Carbon Footprint Methodologies (which originate from IPPC default factors, COPERT, Ecotransit and UK BEIS data).

Current Port Emissions – Scope 1 and 2

Emissions

For context, emissions associated with the current Scope 1 and 2 activities have been calculated based on the available project information. This includes the whole port, including container operations. The emissions are calculated based on the recorded electricity and fuel consumption, multiplied by the relevant emissions factor. The calculated emissions are presented in the Table 53.

Key aspects:

- Total emissions over the last three years of operations are relatively steady at between 29,000-31,500tCO2 per year. The proportion associated with Container activities is roughly two-thirds of the total.
- Scope 1 emissions are the larger fraction, with TTs being the key sources followed by Marine sources.

- Scope 2 (electricity emissions) are mainly due to the reefer platforms and cranes.
- Electricity consumption has increased between 2018-2020 due to some electrification projects for various cranes across the existing ports (which can also be seen in the Fuel – RTGs section of the table also).

Reduction efforts

MIP has electrified many aspects of its lifting equipment in recent years. Information was provided on the benefit of this particularly aspect of operations specifically for RTGs. Based on the information provided about increments to fuel and electricity use across 15 cranes, the benefit was calculated as follows:

- Total diesel consumption (previous case) – 1.48m litres of fuel = 3,950 tCO2e/year
- Electrification – 2.32m kWh = 743 tCO2e/year

This represents a significant reduction in carbon terms, and we consider this to be in line with expectations since Turkey's grid electricity emission factor is fairly low (on a global average basis) at 320gCO2e/kWh and therefore emission associated with an equivalent level of diesel use are lower.

Table 53 *Current Port Emissions – Scope 1 and 2, tCO2e*

Reefer Platforms	3,531	4,272	4,726
Conventional	614	799	727
Terminal Building	946	1,068	935
Terminal Lighting	408	374	418
Other Terminal Infrastructures	1,705	1,205	1,093
Scope 2 subtotal	**10,976**	**12,138**	**12,296**
Fuel			
RS (Reach Stackers)	2,881	3,514	4,075
Ro-Ro	13	222	187
Forklifts	388	419	329
Conventional vehicles	2,526	3,174	3,001
Others	329	547	677
Marine	3,651	3,564	2,773
Fuel	11,467	12,293	12,765
Container Total	**20,401**	**23,023**	**23,857**

Future Port Emissions – Scope 1 and 2

Total emissions

Future emissions predicted specifically for EMH2a have been calculated based on the estimated energy use predicted by MIP as provided to us in the RFI. This is presented in Table 54 and is estimated at just under 11,000tCO2e, below the 25,000tCO2e threshold in lenders' standards.

Key aspects are:

- Most emissions associated with EMH2a are associated with Scope 2 due to the decision to move to mostly electric equipment. The predicted emissions are approximately half of the current container-related emissions across the Port.
- Most emissions are associated with the increased reefer capacity and new cranes. Utilization is assumed by MIP to be between 75 and 85%.
- Shore power is provided for some vessels (2 military vessels, 8 tugboats and 5 small marine vessels as per RFI 15), and some of the prime movers are anticipated to be battery powered.
- New administration/operations building will be more energy efficient that existing building.

Potentially avoided emissions

MIP has made several choices for Phase 2a which in terms of low-carbon options go beyond what might be considered 'typical' for a port. These are:

- Electrification of the cranes, including regeneration technology Inclusion of battery powered Prime Movers (although this investment is still to be fully confirmed)
- Provision of shore power on for a limited number of vessels
- Improving operational efficiencies (e.g. more twin lifts and increase stack by quay)

EMH2a will include LED lighting however this can no longer be considered as anything other than typical.

To calculate the base case Table 55 presents a scenario where specific interventions had not been included in the proposed design (e.g. if developed elsewhere, to 'typical' standards). In this base case, it is estimated that emissions would be around 3,000 tCO2e higher – in other words, Scope 1 and 2 emissions associated with EMH2a are around 20% lower than might otherwise have been expected.

This is based on the following assumptions:

- Where the cranes would use diesel instead of electricity, the increment in emissions would be 50% of that seen for other cranes in the Port. Not included is any additional benefit from regeneration in the cranes which would further limit emissions. This is considered a conservative estimate.
- That the prime moves are all powered by diesel rather than a split between diesel and .An equivalent number of kWh would be required for the berthed vessels, and these would use their onboard engines operating at 600gCO2e/kWh (which is likely to be very optimistic).

For the new building, no specific information or projections are available. However, on the basis that the international requirements are adopted (net zero carbon), then there it is considered unlikely that there would be an increase in emissions over the current case and likely a small benefit.

Based on the analysis presented, it is therefore considered likely that the interventions proposed for EMH2a have limited GHG emissions by more than the 15% (as, in addition, many interventions will benefit from future grid electricity decarbonisation which is not accounted for in this assessment).

Note also that since MIP has chosen to use mainly electricity-based equipment, this also represents a reduction in air pollutants, and future benefits in terms of decarbonisation of Turkey's electricity grid which will reduce emissions associated with the Port's Scope 2 emissions.

Table 54 Future EHM2a Emissions Scope 1 and 2, tCO2e/yr

Activity	Predicted

Power	
Quay Cranes	1,283
Automated-RMG (aRMG)	1,608
Reefers	4,315
Lighting	95
Shore Power	606
Prime movers	981
Scope 2 subtotal	**8,887**
Fuel	
Prime movers	1,978
Scope 1 subtotal	**1,978**
Total	**10,865**

Table 55 Base case emissions , tCO2e/yr

Activity	Predicted
Power	
Quay Cranes	1,283
Reefers	4,315
Lighting	95
Scope 2 subtotal	**5,693**
Fuel	
Automated-RMG (aRMG)	3,508
Shore Power	1,136
Prime movers	3,955
Scope 1 subtotal	**8,599**
Total base case emissions	**14,292**

Capacity related changes in hinterland transportation

EMH2a will increase the total amount of containers that can be handled across the Port. By increasing capacity, more vessels will be attracted to the Port and this could change patterns of marine freight movements (in addition to simple increases in demand) in the following potential ways:

- Imports/exports that would currently be processed at other ports may now occur at MIP
- Imports/exports that are currently received at other ports and then transported by road to Mersin ports' hinterland may now be processed at Mersin and therefore have shorter distances to travel by road. Supressed demand may also be unlocked, e.g. instead of Iskenderun (the closest port, approximately

200km away and operating at 50% capacity) and reduce the land transport of 1.1 m TEU from alternative ports, either via rail or via truck.

In reality, all of these effects are likely to some degree and no detailed analysis has previously been undertaken to consider the potential changes in freight movements across the whole freight system. To understand the dynamics of the system, a modelling approach which takes account of supressed demand, travel patterns and economics would be required, which is not practicable at this stage. Therefore the assessment provided here is only indicative and subject to error.

For aspect 1) There are likely small benefits and disbenefits in terms of marine movements to Mersin that would otherwise travel to alterative locations, however these changes are likely to be a small part of vessels' overall travel distances and assumed to balance out. Therefore they are not considered any further in this assessment.

It is clear that any modal shift from road to sea results in lower emissions than would be expected if freight is only moved by road (52gCO2e/tkm by road, 8.2-18.9gCO2/tkm by ship). It is not clear from the available data whether this currently occurs and may also be subject to supressed demand. However it is assumed that this would be small; in any case a benefit would likely result.

However for 2) an initial assessment has been undertaken on potential effects on movements across the hinterland in terms of GHGs emissions if the expansion occurs at Mersin vs other reasonable alternatives (in this instance, Iskenderun). This is based on the increase in capacity delivered by Phase 2a otherwise being catered for at other ports and that the pattern of supply and demand remains the same as currently observed at Mersin. It is recognised that at least part of this may be associated with induced demand (movements that wouldn't happen if Mersin didn't expand), however it is assumed that this would be minor given the economic growth assumptions in the hinterland.

Future Port Emissions – Modal Shift

EMH2a will increase the total amount of containers that can be handled across the Port. The rail yard provides a more efficient method of bringing goods to and from the port than by road, on a tonne-km basis, and this is demonstrated by the relevant emission factors for freight (52gCO2e/t.km for road vs 20.3gCO2e/t.km for rail – note that the road value is likely to be on the low-end of estimates and a higher assumption would increase the modal shift benefit. For example, the UK value is 77gCO2e/t.km).

The existing rail yard is capable of being expanded by lengthening the terminal tracks if the reserved entrance gate is relocated, and the utilisation of the yard is able to be increased by assigning additional eRTGs to the terminal. However, as requested, in considering the potential effects on modal shift that EMH2a potentially offers, this has been excluded in the assessment and a 50/50 – Road/Rail split has been assumed.

The specific future origin/destinations of containers in the hinterland of the Port is not known since this will be dependant on market demand. Therefore, an analysis of movements in 2020 by road and rail was used. The number of TEUs to/from each destination was used to calculate the total distance (and then weight, based on an average gross weight of 20 tonnes) of containers moved in 2020. From this an average TEU-km ratio could be determined as follows:

- Total emissions associated with road freight to and from the port is calculated as 132,000tCO2e in 2020, the average tkm per TEU by road was 2,251
- Total emissions associated with rail freight to and from the port is calculated as 5,750tCO2e in 2020, the average tkm per TEU by rail was 3,449

The above figures could be used to produce an in depth assessment of how a modal shift might impact the figures presented later in this section. However, as mentioned, the consideration for the calculations follows an assumption of a 50/50 modal split between road and rail.

On the basis that the future mix of origins/destinations for containers would be the same as in 2020, this then allows the total emissions associated with land-side freight to be estimated. A modal split of

50/50 road/rail has been assumed for the purpose of this analysis.

The assessment predicts that in the as-planned scenario (considering all the entire spare capacity is diverted to Iskenderun), emissions associated with land-side movements of containers is 101,654tCO2e.

The results are presented in Table 57 and show that distribution from Mersin (rather than Iskenderun) to service increased demand could potentially result in lower GHG emissions over alternatives (by around 30%). This is subject to some error since in reality increases in capacity in different locations might drive different patterns of imports and exports from economic drivers and further modelling would be required to fully understand this impact. However this initial analysis suggests that, given the demand in Mersin's hinterland, it would result in fewer emissions than if that demand had to be delivered from other locations.

It is noted that this analysis is only indicative: to understand the dynamics of the system, a modelling approach which takes account of supressed demand, travel patterns and economics would be required, which is not practicable at this stage.

Table 56 Calculations of landside freight distribution – EMH2a – Scope 3

2020	Exports	Imports	Total
Road TEUs	414,594	191,449	606,043
Empty Road TEUs	50,040	168,872	218,912
Rail TEUs	414,594	191,449	606,043
Empty Rail TEUs	50,040	168,872	218,912
	Road	Rail	Total
Total tkms (mil)	2,053	2,053	4,106
Total tCO2e/yr	106,756	41,676	148,432
Phase 2a	Road	Rail	Total
Total Laden TEUs	415,274	415,275	830,550

Total Empty TEUs	150,495	150,495	300,990
Total tCO2e/yr	73,112	28,542	101,654

Table 57 Calculations of alternative landside freight distribution – Scope 3

	Road	Rail	tCO_2e
Mersin Phase 2a			
tkms (mil)	1,406	1,406	
tCO2e/yr	73,112	28,542	101,654
Iskenderun			
tkms (mil)	2,098	2,098	
tCO2e/yr	109,096	42,589	151,685

Table 58 Assumptions Used for the Scope 3 GHG emissions analysis

Road/Rail Modal Split	50/50
Average Mass (t) of Laden TEU	20
Average Mass (t) of Empty TEU	2.2
Distances	Consistent With MIP Data
Impact (CO_2e) per tkm for Rail Travel	20.3t
Impact (CO_2e) per tkm for Road Travel	52t
Average Distance Travelled to/from Mersin	163km
Average Distance Travelled to/from Iskenderun	243km

Summary

The assessment presented in this section has considered the historical GHG emissions associated with Mersin Port, and then future scenarios specifically for Phase 2a. The assessment has considered:

- For Scope 1 and 2 emissions: The planned EMH2a emissions compared to a theoretical case where the some of the more challenging improvement projects proposed are not implemented (mid-case) or not implemented at all (equivalent to an 'elsewhere' scenario);
- For Scope 3 emissions: the impact from distribution of products to and from the hinterland via road and rail for the planned EMH2a case, a mid-case where this is not achieved and a theoretically 'if developed elsewhere' scenario where an equivalent amount of capacity is instead used in other competing ports.

To determine the extent to which GHG are minimised in EMH2a, a comparison has been made to a base case, where capacity is instead delivered at an alternative location not using modern technologies. In all scenarios, it is assumed that the full increment of capacity planned for EMH2a is achieved. The assumptions used are as follows:

Table 59 Assumption for Scope 1 and 2 Emissions

	EMH2a	Base case
Scope 1 and 2		
Electrification of cranes	Yes	No
Prime movers	Part-electrified	Diesel
Shore power	Yes	No
Low carbon lighting	Yes	Yes
Scope 3		
Hinterland transport	Increased modal split for rail, from Mersin	Split road and rail, from Iskenderun

EMH2a will potentially result in between 32% fewer emissions compared to the base case, for the Scope 1-3 emissions included.

Table 60 GHG assessment summary table

Aspect	Scope 1	Scope 2	Scope 3
Baseline scenario	8,599	5,639	151,685

With project scenario, EMH2a	1,978	8,887	101,654
Difference, absolute	%53,404		
Difference	32%		

3.10.2 Climate Change Considerations

Climate Change considerations have been subject to an independent review during the Technical Due Diligence of the Project. Following sections presents the outputs of this review. [28]

Mersin International Port (MIP) Technical Due Diligence Report for the Phase 2 Expansion of Mersin International Port

The following table provides a list of the physical climate hazards and related hazards (such as erosion) that have the potential to impact the project and associated port operations and identifies how these hazards will be affected by climate change. A high-level risk assessment has then been undertaken for the project, identifying the potential direct and indirect impacts that these hazards could have on the project and associated operations in the face of climate change and the interventions undertaken as part of the project to address these impacts.

Full details of the risk assessment are provided in the table overleaf, the key risks identified to the project associated with climate (and non-related) hazards are as follows:

- The potential compounded impact of high wind speeds and increased wave height on the quay and associated infrastructure (medium risk).
- The potential impacts of extreme heat on electrical equipment and port workers (medium risk).

Operations at EMH2a can also be considered dependant on the climate vulnerability of other supporting infrastructure. No assessment of these potential risks has currently been undertaken. An independent review of interdependencies associated with the project is provided in Table 61.

The climate hazard review undertaken for the project has been informed by the following sources:

- Button, M., Davey, O. and Leitch, A. (2021), Resilience4Ports: Gateways to a resilient future. Resilience Shift, UK.
- Demircan, M. et al (2017) Climate change projections for Turkey: Three Models and Two Scenarios. Turkish Journal of Water Science & Management, Volume 1 (1).
- IPCC (2014) AR5 Climate Change 2014: Impacts, Adaptation and Vulnerability.
- Karaca, M. and Nicholls, R.J. (2008) Potential Implications for Accelerated Sea-Level Rise for Turkey. Journal of Coastal Research, Volume 24 (2).

[28] Mersin International Port (MIP) Technical Due Diligence Report for the Phase 2 Expansion of Mersin International Port, ARUP , 13th of October 2021

• Özdemir, E.T. et al (2017) Devastating extreme Mediterranean cyclone's impacts in Turkey, Natural Hazards, Volume 87 (1).

• Republic of Turkey Ministry of Environment and Urbanisation (2018) Seventh National Communication of Turkey under the UNFCCC.

• The Port Authority of NY&NJ (2018) Climate Resilience Design Guidelines (V1.2).

• Scott, H. et al (2013) Climate change adaptation guidelines for ports.

• World Bank (2021) Climate Change Knowledge Portal: Turkey

Table 61 Project climate hazard review

Climate hazard	Predicted change	Potential impacts on project		Project interventions *(as per current design)*	Overall potential risk to project
		Direct	***Indirect***		
Sea level rise	Global mean sea level rise is predicted to increase by between. 0.43m (0.29-0.9m, likely range, RCP2.6) and 0.84m (0.61-1.10m, likely range, RCP 8.5) by 2100 relative to 1986-2005.	• Increase risk of nuisance flooding across the port and direct damage as a result of flooding to port assets (e.g. yard assets, equipment, terminal building, electrical networks). • Increased likelihood of backflow from drainage outfalls. • Potential corrosion of railway tracks and equipment from	Damage to connecting infrastructure in the port leading to disruption of port operations. Port service delays. Damage to port reputation and brand. Higher insurance premiums for losses and claims associated with disruption and damage.	An allowance of 0.34m for sea level rise has been applied to design still water levels and appears to be considered in other aspects of the design. This is not explicitly addressed in the wave agitation modelling.	**Low risk** (some measures incorporated within the design)
Storm surge	Increase in frequency and intensity of storm surges in coastal areas in Turkey.	• Increased risk of flooding across the port and direct damage to port assets (e.g. yard assets, equipment, buildings, drainage and electrical infrastructure). • Damage to berths and vessels (noted that this is likely only applicable to smaller vessels).		A maximum storm surge height of 0.5m has been adopted for the project. This has been considered in calculating the design water levels for multiple civil marine structures. No evidence has been provided at this stage to demonstrate that the	**Low risk** (some measures incorporated within the design)
High speed wind & waves	Increase in winter wind speed increases in Turkey.	• Increased risk of topping of containers in yard and damage to reefers. • Increased risk of downtime during high speed wind events (>20m³ /s) as cranes cannot operate. • Increased risk of damage to equipment and storage areas,		Wind speed is identified in the climate drivers table provided by MIP as having a potential significant impact on general sea operations and a moderate impact on land operations, equipment and storage areas.	**Low risk** (thresholds for equipment in relation to wind speed are not likely to be exceeded on a regular basis)

Climate hazard	Predicted change	Potential impacts on project		Project interventions *(as per current design)*	Overall potential risk to project
		Direct	***Indirect***		
	Potential increase in wave height as a result of increase in winter wind speeds and increased storminess This potential increase will likely be compounded by sea level rise.	• Increased risk of wave height increases that leads to direct disruption and downtime in land and sea operations or damage to structures with associated impacts on operations		The modelling undertaken for the impact of wind speeds on wave heights and port infrastructure appears to have only utilised historical data and does not account for the future impacts of climate	**Medium risk** (associated with potential risks to the quay and associated structures during extreme events)
Extreme precipitation	Increase in number of days with heavy precipitation in Mediterranean region. This indicates that there will be an increase in the frequency and intensity of extreme rainfall events	• Increased risk of localised flooding during concentrated downpours which can overwhelm drainage systems. • Disruption to and damage port assets (e.g. drainage infrastructure, yard assets, storage areas and	Damage to connecting infrastructure in the port leading to disruption of port operations.	The drainage design has incorporated 30% additional climate allowance for extreme (1 in 100-year) events for the drainage network.	Low risk (some measures incorporated within the design)
Extreme heat	Increase of up to 50 days in the number of hot days (Tmax>35°C) in 2040-2059 in vicinity of Mersin (Under the RCP 8.5 emissions scenario).	• Increased risk of summer electricity overloads which could affect electrical equipment. • Potential increased demand on reefers due to increase in refrigeration requirements for containers.	Port service delays. Damage to port reputation and brand.	Design documentation considers historical temperature data and no explicit consideration to the impact of increasing temperatures has been provided	Medium risk (associated with reliance of project on electrical equipment and potential impacts on workers)
			Changes in wider agricultural production which could affect trade flows through the port		
Wildfires	Future wildfire risk is predicted to increase in the Mediterranean associated with dry and hot weather.	• Damage of destruction of assets as a result of wildfire events.	Damage to connecting infrastructure in the port leading to disruption of port operations.	Design documentation does not appear to consider increased risk of wildfire as a result of climate change. However, project does have procedures in place	Low risk (based on existing procedures in place to deal with fire events)

Climate hazard	Predicted change	Potential impacts on project		Project interventions *(as per current design)*	Overall potential risk to project
		Direct	***Indirect***		
Hurricanes and cyclones		• Increased risk of flooding across the port and direct damage to port assets (e.g. yard assets, equipment, buildings, drainage and electrical infrastructure). • Damage to berths and vessels (noted that this is likely only applicable to smaller vessels).	Damage to connecting infrastructure in the port leading to disruption of port operations. Port service delays.	Design documentation does not appear to address the risk of hurricanes and cyclones, this is likely because they are determined as low risk events within Turkey.	Low risk (As the occurrence of hurricanes/cyclones in Turkey is very low risk)
Drought and water stress	Increase in duration and intensity of droughts in Turkey Decrease in annual precipitation and potential increase in evapotranspiration placing additional stress on water resources in Turkey.	• Increased risk of power outages to power plants that may require water for cooling. • Vessels that berth at project will require access to water resources and if this is not immediately available it could affect port	Damage to port reputation and brand. Higher insurance premiums for	Design documentation does not appear to have addressed the risks associated with drought and water stress.	Low risk (assuming that alternative water sources can be accessed by the port if required)
			Changes in wider agricultural production which could affect trade flows through the port		
Erosion	Coastal erosion anticipated to increase as a result of increased sea level rise, storm surges and waves and coastal flooding.	• Increased risk of erosion and scour of foundations can affect pilings and shorelines.	Damage to pilings and shorelines.	Scour protection has been incorporated into the design for the quay.	Low risk (associated with quay)
Extreme mass movement	Changes to frequency and magnitude of mass movement events (e.g. of rock and soil debris) as a result of climate change.	• Increased risk of damage and disruption to assets.	Damage to connecting infrastructure in the port leading to disruption of port operations.	Design documentation does not appear to address the risk of mass movement, this is likely due to the developed nature of the area surrounding	Low risk (associated with developed nature of the area surrounding the port)

Table 62 outlines the potential impacts that climate hazards will have on the port system. Operations at EMH2a can also be considered dependant on the climate vulnerability of other supporting infrastructure systems. Understanding these interdependencies enables a more in- depth understanding of the climate-related risks that affect the port system.

In accordance with the Resilience4Ports report (published in 2021) systemic interdependencies have been determined considering the following systems – energy, port community, energy, logistics and distribution and shipping. It is recommended that MIP engage with relevant stakeholders as part of their contingency and emergency planning to mitigate any potential risks associated with these critical supporting systems.

Table 62 Potential impacts of climate hazards on interdependent infrastructure systems associated with EMH2a

	Port community (Labour)	Logistics & Distribution systems (Road and Rail)	Energy	Shipping
Climate hazard				
Sea level rise		Permanent inundation of roads/railways within and around port.	Permanent inundation of electrical substation and associated infrastructure	Permanent inundation of port facilities results in vessels being unable to berth.
Storm surge	Temporary safety risks to port workers and operators.	Temporary inundation of roads/railways within and around port as a result of storm surges and increased wave heights.	Temporary disruption to maintenance and fuel delivery services to the ports as a result of storm surges and increased wave heights. Temporary flooding of electrical substations and associated infrastructure.	Temporary disruption to vessels looking to berth at the port as a result of storm surges, high speed winds and increased wave heights.
High speed winds & waves		Temporary damage to overhead infrastructure associated with road/railways within and around port.	Temporary disruption to overhead electrical infrastructure as a result of high speed winds.	
Extreme precipitation	Temporary public health risks to workers as a result of overload of drainage systems.	Temporary flooding of roads/railways within and around port.	Temporary flooding of electrical substations.	
Extreme heat	Temporary heat stress implications for port workers and operators.	Temporary buckling and heating of railway tracks and roads within/around port.	Temporary outages at electricity substations due to excessive demand and associated disruption to electrical equipment.	

Wildfires	Temporary safety risks to port workers and operators.	Temporary disruption to roads/railways around the port.	Temporary damage to electrical substation and associated infrastructure.	Temporary disruption to vessels looking to berth at the port as a result of wildfire and hurricane/cyclone events.
Hurricanes and cyclones			Temporary flooding of electrical substations and associated	
Drought and water stress	Lack of readily available water resources for port workers and operators seafarers on incoming vessels.		Temporary damage to power plants as a result of reduced water availability for cooling.	Lack of readily available water resources for seafarers on incoming vessels.

3.10.3 Design Considerations

During design the design of port facilities, the following 4 main impacts of Climate change are often considered.

1. Increased **wave agitation** (generally as result of increased storm activity),
2. An increase in the intensity and period of **precipitation events**,
3. An increase in **mean sea level**,
4. Interaction of increased **wind speeds** with structures.

The above effects of climate change have been incorporated into the MIP Phase 2 extension design in the following ways:

Wave Agitation

Wave agitation is not considered as part of this design scope as this is significantly reduced by the presence of extensive breakwaters to the Southeast and Southwest of Mersin International Port (MIP). Design wave heights (for the 50-year design life of the project) within the port are taken from oceanographic reports previously commissioned by MIP.

Precipitation Events

An increase in the intensity and period of precipitation events has been incorporated into the design of the surface drainage system of the extended terminal. The design also incorporates the existing EMH1 terminal area, which is to be converted moving forward.

All surface water drainage networks are sized to contain rainfall runoff volumes below ground, with the aim of preventing flooding of the yard and minimizing impact on terminal operations during periods of rainfall. The following were targeted when designing the drainage networks as these are generally the typical minimum requirements when targeting 'future proof' drainage design.

a) no surcharge of the network due to rainfall during 1 in 2-year return period events.

b) no flooding of the yard due to rainfall up to 1 in 25-year return period events.

c) Allowable flooding to take place during the 1 in 100-year return period events.

d) Allowable flooding taking place during the 1 in 100-year return period events plus 30% climate change can be safely managed.

For case d) a 30% increase to the current 1-100yr IDF rainfall profile has been assumed conservatively, as a sensitivity check to ensure any flooding of the terminal would be manageable. Resulting flooding is limited to certain areas of the port and is completely eradicated no more than 60 minutes after the cessation of such a rainfall event.

Mean Sea Level

An allowance of 0.34m is applied to the design still water levels to account for the predicted effects of global sea level rise.

This is based on the RCP8.5 emission scenario outlined in the Fifth Assessment Report (AR5) of the United Nations Intergovernmental Panel on Climate Change (IPCC), for a design life of 50 years from an assumed start of operations in 2022 (i.e., 0.44m – 0.10m = 0.34m from the figure below).

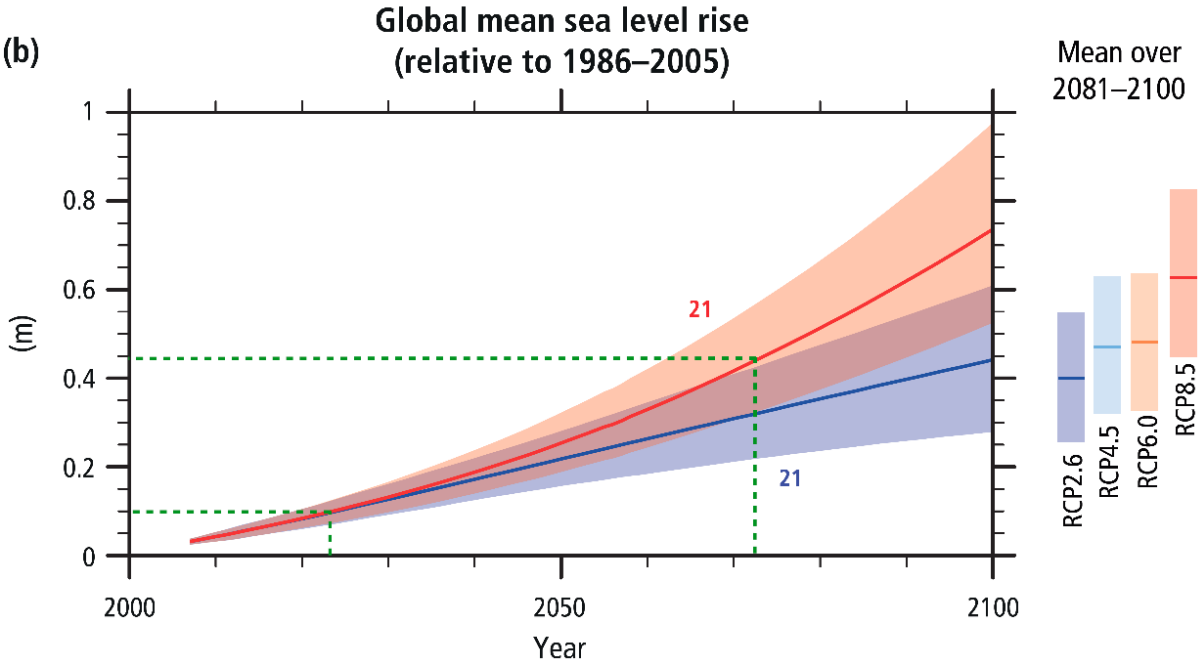

Figure 45: Global mean sea level rise with the adoption of the RCP8.5 scenario - IPCC report

Wind Speed

As no permanent structures have been designed as part of this scope of work, an increase in wind speed because of the effects of climate change has not been considered.

The strongest winds in Mersin are observed to be from the SW-SE range. The distribution of the winds throughout the year is irregular, however, strong winds with a long duration take place usually during winter and spring.

3.10.4 Green Energy Transition (GET) Items

This section presents the output of the Get Energy Transition Items identification as part of the Mersin International Port (MIP) Technical Due Diligence Process for the Phase 2 Expansion of Mersin International Port.[29]

GET finance eligibility

In line with the EBRD GET Handbook 2019 (the 'Handbook') the GET approach explicitly recognises three categories of potential projects, as follows:

1. Climate change mitigation (reduction of greenhouse gas [GHG] emissions
2. Climate change adaptation (enhancement of climate change resilience)
3. Other environmental benefits (including improved resource efficiency, reduced local pollution, improved resilience, and restoration of ecosystems.

Annex 5.3 of the Handbook provides more detailed guidance on principles of GET finance for eligible transport projects and specific requirements for port projects. This includes a list of port elements that could represent potential investments that are GET available. Table 63 summarises the list of port elements provided in the

[29] Mersin International Port (MIP) Technical Due Diligence Report for the Phase 2 Expansion of Mersin International Port, ARUP , 13th of October 2021

Handbook and indicates their relevance to the project. This indicates that there are elements incorporated as part of the project that are eligible for GET finance.

Table 63 : Review of eligibility for GET finance based on Annex 5.3

Port element	Relevance to project*
Electric cargo handling equipment	**Relevant** – Project will include electrification of all cargo handling equipment (powered by local grid).
Silt curtains	**Relevant** – Project proposes to use silt curtains to manage the environmental impact of dredging.
Shore-side power for berthed vessels	**Relevant** – Shore power is being provided on the West Berth for military vessels, small marine vessels and tugboats.
Hybrid engines and electric-powered vessels	Not relevant at this stage. See Section 9.2 for information on potential enhancements.
Beneficial re-use of dredged materials	
Vehicle booking systems (VBSs)	
Enhanced sustainable remediation measures (e.g. Bioremediation, chemical oxidation and stablisation)	

**Port elements are identified as relevant to the project where they are located within the red line boundary of the Phase 2a works*

GET finance categories

Category 1 - Climate change mitigation

An activity is considered to mitigate climate change if it contributes to 1) reducing GHG emissions into the atmosphere, or 2) sequesters GHG emissions from the atmosphere. The project can be considered under the first category (reduction of GHG emissions into the atmosphere).

For maritime projects, projects can achieve 100% GET finance if an improvement of at least

15% can be demonstrated in GHG emissions as a result of the project. In line with Annex 7 of the Handbook, this reduction will take account of Scope 1, 2 and Scope 3 emissions associated with modal shift. See section 3.10.1 for a review of potential GHG emissions due to Phase 2a, which indicate that a potential reduction of more that 15% can be demonstrated.

Category 2 – Climate change adaptation

Step 1 – Context of climate change vulnerability in project region

Table 61 provides an overview of the climate hazards relevant to the project and the interventions undertaken as part of the project to address these hazards.

Step 2 – Statement of intent of the EBRD to address climate resilience

No explicit statement regarding the intent of the project to address climate resilience has been identified at this stage. Interventions have been incorporated into the design to account for the impacts of climate change on specific hazards (sea level rise and flood risk) which could be interpreted as an indication that the project is seeking to address climate resilience.

Step 3 – Link between climate vulnerability context and project activities

Table 61 provides an overview of the climate hazards relevant to the project and a summary of the interventions undertaken as part of the project to address a number of these hazards. However, this has identified that there are a number of potential issues highlighted in the technical design review (refer to Section 12 for further information) that could affect the potential for the project to address the local climate vulnerability context.

The project has been identified as having the potential to reduce weather-related disruption and damage within the extent of the Phase 2a development as well as across the wider port, and transport system (at a local, regional and potentially global scale). 64 outlines the potential benefits for the project to reduce weather-related disruption at different scales.

64 Review of potential benefits to reduced weather-related disruption associated with the project

Scale of benefit	Potential for benefits associated with project
Terminal (Phase 2a)	Design of terminal accounts for sea level rise, increasing resilience to some climate- related impacts, but there is a significant lack of assurance relating to other impacts, particularly when considered cumulatively (see Section 9.2 for details).
Mersin Port (Full extent)	The Phase 2a project will provide additional capacity to the project which as a result should provide additional flexibility in port operations during extreme weather events and minimise downtime.
Wider transport system	The Phase 2a project will provide additional capacity within the marine transport system and could provide additional resilience to the wider transport system in the event that other ports/facilities are unable to operate during extreme weather events.

<u>At a terminal scale</u>

As described in The Technical Due Diligence Report , the project includes some interventions to enhance climate resilience, but at present there is a lack of assurance relating to both more regular met-ocean events and their impact on disruption (likely a low risk) and also more extreme met-ocean events and their impact on damages and disruption (likely a medium risk). Both these risks are likely to increase with climate change, but likely remain at similar risk levels.

As such, no potential van be defined at this time define potential benefits at this scale. Further assurance from the port could indeed show that these benefits are realised and allow the benefits to be quantified.

<u>At a port scale</u>

The port is likely to be subject to met-ocean events concurrently to the proposed terminal, and it is therefore challenging to make a case that the issues at a terminal scale do not transfer to a port scale.

Furthermore, at this stage the information provided by MIP on the downtime of existing port operations indicates that MIP have not recorded any specific economic losses as a result of downtime to date.

As such, at this time it is not feasible to meaningfully confirm or quantify the potential climate adaptation benefits of additional port capacity and the associated flexibility in operations.

At a wider transport system scale

At this scale, there is more certainty that the additional capacity provided by the project could have the potential to deliver climate resilience benefits to the transport system, compared to a counterfactual where the port could, in the future, be operating near capacity and therefore not provide redundancy in the wider system.

To quantify this benefit, a more considered study of the regional transport system would be required, which is beyond the scope of this assessment.

Conclusion

There is the potential for some resilience benefits, but further work is needed to establish that that Phase 2a and indeed the port can response to potential climate hazards it may be exposed to in the future.

The following physical resilience outcomes have been identified as not applicable to this project: Increased availability of water and/or energy, increased agricultural potential and improvements to human health and/or productivity.

Category 3 – Other environmental benefits

A project activity is considered to have other environmental benefits if it results in a materially positive environmental outcome that is not primarily related to climate change mitigation or climate change adaptation. Table 65 presents a list of possible other environmental outcomes and how these relate to the project. Benefits associated with air quality are likely to be similar in scale and nature to those associated with GHGs (excluding any emissions from vessels themselves), given the plans for electrification of much of the equipment in EMH2a.

Table 65 Review of potential other environmental benefits associated with the project

Category	Relevance to the project
Sustainable and efficient water use and wastewater management	**No relevant** – Project has not provided evidence for a quantifiable reduction in water use compared with the pre-project baseline.
Sustainable and efficient use of materials and resources	**Relevant** – Noted that new port building is proposed to be designed to using LEED, BREEAM or similar methodologies and include solar PV renewable energy generation. Information has not been provided at this stage to enable quantification of this benefit.
Pollution prevention and control	**Relevant** – Project will reduce local carbon and pollutant emissions associated with a modal shift and increase in port capacity.
Projects that increase the resilience of ecosystems to avoid or reduce the degradation of ecosystems	**Not relevant** – Due to spatial constraints associated with the project, minimal opportunities for ecosystem enhancement has been identified.
Environmental technology development, environmental policy and management	**Not relevant at this stage** – See Section 8.3 for an overview of potential enhancements that could be implemented in relation to environmental technological development and innovation.

3.11 Cumulative impact assessment

During the socioeconomic baseline data collection and media search activities to projects at the vicinity of the MIP impact area have been identified as planned by Municipality area (See below Figure):

1. Millet Bahcesi Park at the existing amusement part nearby the fisheries
2. Yacht Marina at Fisheries area

Since no detailed information on these projects in terms schedule, magnitude, construction and operation philosophy a high-level cumulative impact assessment is performed considering the common Valued Ecosystem components that would be impacted the concurrent construction and operation of these Projects. The below table presents the valued ecosystem components that might be impacted by the execution of MIP extension project together with these above listed projects. Framework management actions are also proposed.

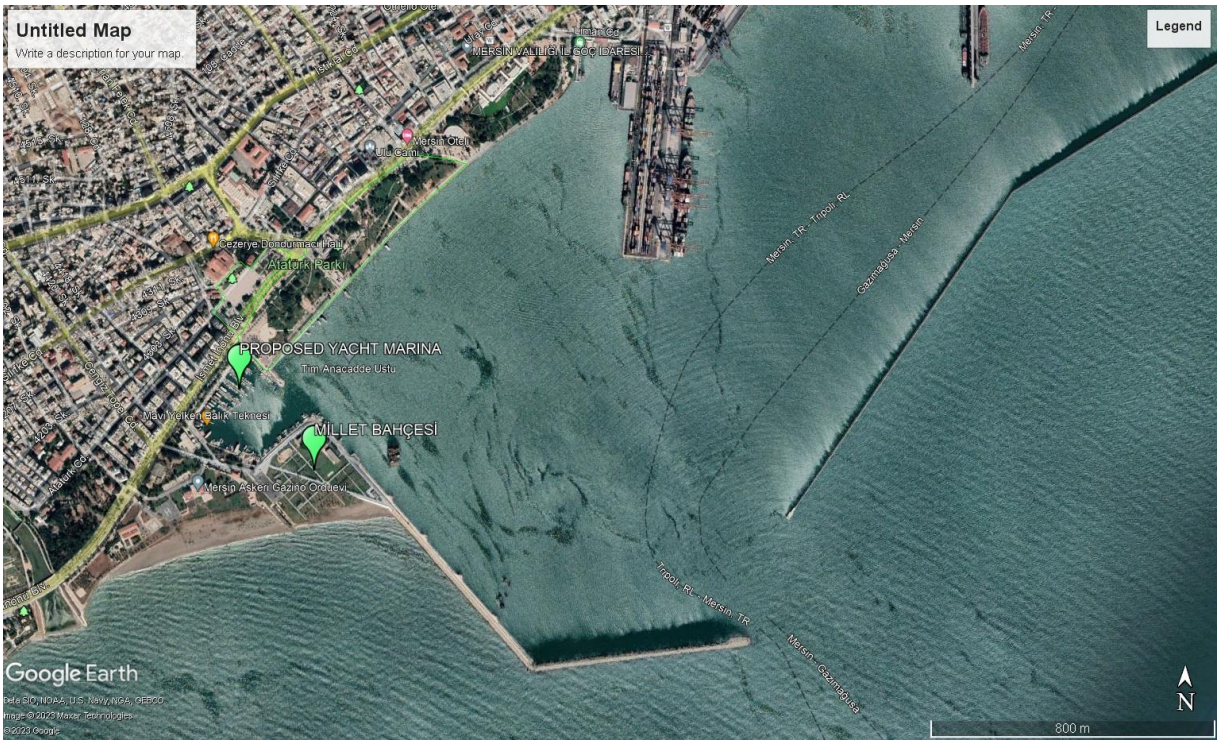

Figure 46: Proposed Millet Bahçesi (Public Park) and the Yacht Marina

Table 66: Qualitative Cumulative Impact Assessment

	Common Valued Ecosystem Component						Mitigation Measures
Project	Marine Ecosystem	Marine Water	Air Quality	Noise Quality	Community Health and Safety	Socioeconomic Status	
Millet Bahcesi (National Garden)		Construction Discharges to Sea	Construction Emissions to air	Construction Noise emissions	Construction Traffic Operation Traffic	Livelihood impact at fisheries due to access limitations during the construction of Millet Bahcesi.	Implementation of SEP Consider avoiding the construction schedules to overlap

	Common Valued Ecosystem Component						Mitigation Measures
Project	Marine Ecosystem	Marine Water	Air Quality	Noise Quality	Community Health and Safety	Socioeconomic Status	
Yacht Marina at Fisheries area	Construction dredging and filling at sea Use of same dump area at sea	Construction Discharges to Sea	Construction Emissions to air	Construction Noise emissions	Construction Traffic Operation Traffic	Livelihood impact at fisheries Community concerns on the dredging at the similar areas. Community concerns on the potential use of same dump area ta sea	Implementation of SEP Consider avoiding the construction schedules to overlap Consider avoiding dredging schedules to overlap Communicate in the case of use same dump area for dredged material for monitoring of the dump area and respond to public grievances on dredging. Communicate with the Project owners and the Authorities on the Management of increased operational traffic at the area. Note that the traffic is already a concern at the MIP and surroundings.

APPENDICES

Appendix 1: Air Quality Sampling and Modelling Results

Appendix 2: Noise Sampling and Modelling Results

Appendix 3: Dredging Management and Monitoring Plan

Appendix 4: Revised Ecosystem Evaluation Report (MIP's Document) & Biodiversity Management Plan

Appendix 5: Traffic Management Plan for Construction Stage

Appendix 6: Construction Environmental and Social Management Plan (CESMP)

Appendix 7: Social Impact Assessment Report

Appendix 8: Stakeholder Engagement Plan

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