Proposal No.: IA/MH/NCP/291282/2022 **File No: 10/23/2022-IA-III** **Project no.: AESPL/INF-E/21-22/EIA/002**

Executive Summary of Draft Environmental Impact Assessment Report and Environment Management Plan

Proposed Development of Master Plan for Expansion of Dighi Port, by Dighi Port Limited at Taluka Shrivardhan and Taluka Murud, District Raigad, Maharashtra

Project Nature	:	Proposed Expansion of Dighi Port.
Project Category	:	7(e) Ports, harbors, break waters and dredging
Project Capacity	:	Cargo handling capacity 140 MMTPA
ToR Details	:	ToR letter dated 7th Nov 2022

Baseline Study: Summer 2025 (Mar-May 2025)

April 2026

Environmental Consultant
Aditya Environmental Services Pvt. Ltd., Mumbai
QCI- NABET Accredited EIA Consultancy Organization,
Certificate No.: NABET/EIA/25-28/RA 0397 dated 29th April 2025, valid up to 1st May 2028

Baseline Environmental Data
AESPL laboratory (CPCB Recognized and NABL Accredited; TC-7085)
Plot P-1, MIDC Commercial Plots, Mohopada, P.O Rasayani, Tal. Khalapur, Dist Raigad-410222

1.1 Introduction:

The proposal is for the development of Master Plan (Expansion) of Dighi Port at Agardanda (North Terminal), Taluka Murud, and Dighi (South Terminal), Taluka Shrivardhan, District Raigad, Maharashtra by Dighi Port Limited (DPL). The port was notified as a non-major port by the Government of Maharashtra under the Indian Ports Act, 1908. Initially developed by Balaji Infra Projects Limited through a concession agreement with the Maharashtra Maritime Board, DPL was later acquired by Adani Ports and Special Economic Zone Ltd. (APSEZ) in February 2021 under the Insolvency and Bankruptcy Code (IBC), 2016.

APSEZ, a leading port operator in India, proposes to expand the port's cargo handling capacity to 140 MMTPA through modifications in berth configuration and implementation of a master plan.

The project falls under Category A, Schedule 7(e) of the EIA Notification, 2006 (as amended), and is also governed by the CRZ Notification, 2019. Accordingly, prior Environmental and CRZ clearances are required. Draft EIA-EMP report complying with the Standard Terms of Reference (ToR) issued by MoEFCC (April 2015) and the specific ToR granted on 7th November 2022 has been submitted for Public Hearing.

1.2 Previous clearance:

DPL has obtained the following statutory permissions for development of Dighi port.

1. CRZ recommendation from Maharashtra Coastal Zone Management Authority (MCZMA) vide letter dated 23rd June 2005.
2. Environment Clearance from Ministry of Environment Forest and Climate Change (MoEFCC) vide letter dated 30th September 2005 for development of 2 berths including strengthening of existing berth and breakwater on south side and 3 new berths on the north side along with creation of backup area and other associated facilities to cater to all kinds of cargoes like dry, project, container, liquid, and LPG etc.
3. EC Corrigendum on 26th December 2005 for clarification regarding Phase I involving development of 4 new multipurpose berth and strengthening and upgrading of existing (one number) berth.
4. Subsequently EC Corrigendum was issued on 25th June 2012 to treat the EC issued on 30th September 2005 as EC and CRZ clearance and also DPL was permitted to handle LPG as per the corrigendum letter.
5. Further corrigendum to EC and CRZ clearance was issued on 27th January 2022 mentioning the berth dimensions.
6. EC and CRZ clearance for Balance Work (1 berth on north terminal with back up land and one breakwater on south terminal) vide EC identification no. EC25A3501MH 5165331N, File no. 10-8/2005-IA.III dated 23rd February 2026.

1.1 Project Description:

DPL plans to develop the port into a multi-cargo port with world-class infrastructure as well as investing in the development of rail and road evacuation infrastructure for seamless and efficient cargo movement and requirements like navigation parameters, number of berths, cargo handling facilities, operational parameters, etc. Detailed components of master plan proposal is given in table below:

Details of the Project: Development of Master Plan of Dighi Port

Sr. No.	Component	As per EC, CRZ Approval dtd.30th Sept 2005 and dtd. 23rd Feb 2026	Proposed Expansion	Cumulative after expansion
a)	Total Quay length	5 multipurpose berths having total quay length of 1625 m (975m North+650m South), 2 berth on south side and 3 berths on north side	North proposed is 1525m South proposed 3850m	7000 m (Northside:2500-m Multipurpose berth South side:4500 m multipurpose)
b)	Single point mooring (SPM)	-	2 SPM's	2 SPM's
c)	Cargo handling	23.65 MMTPA	116.35 MMTPA	140 MMTPA
d)	Breakwater length	1400 m on south side	3200m on north side and reclamation bund of 7100m behind the berths	4600 m (1400 on south side and 3200 on north side)
e)	Total reclamation	141 Ha	304 Ha (North side: 160 Ha. + South side: 144 Ha.)	445 Ha
f)	Total land acquisition	139.5 Ha	Not proposed	139.5 Ha
g)	Total area of the project	280.5 Ha	304 Ha	584.5 Ha
h)	Total capital dredging	-	60 million M^3	60 million M^3
i)	Total water requirement	1.4 MLD	50 MLD	51.4 MLD
j)	Power requirement	240 MW	700 MWh/day	900 MWh/day
h)	Type of cargo	All kinds of dry cargo (coal, bauxite, Fertilizer and Fertilizer raw material, molasses, cement, clinkers, Iron, Steel, sugar, project cargo, break bulk, container cargo, POL, LPG, all types of chemicals and other miscellaneous cargo	Handling and storage of multipurpose cargo including coal, iron ore, bulk, break bulk, general cargo, project cargo, dry cargo, container, RO-RO, ship/special vessel building, Cutter suction Dredger (CSD assembling unit), ship repair, fertilizers and raw materials, automobiles and other non-hazardous cargo. Liquid/gas/cryogenics up to -160°C to liquid cargo including class A, B, C, petroleum product, excluded petroleum products, non-classified chemicals and petroleum products, other hazardous , toxic and non- hazardous chemicals, crude etc.	

Source: Pre-feasibility report.

1.1.1 CRZ Compatibility

National Centre for Sustainable Coastal Management (NCSCM) carried out field investigations in February 2023 for demarcation of High Tide Line (HTL), Low Tide Line (LTL), and Ecologically Sensitive Areas (ESAs) as per CRZ notification 2019 and their amendments. CRZ status report along with CRZ maps of 1:4000 scale and 1:25000 scale covering 7 km radius of the study area are prepared and index map of the same is given as Annexure.
CRZ Classification and applicable clauses as per CRZ notification 2019 w.r.t. project:

Sr. No.	Proposed Activities	Classification of CRZ as per CRZ notification 2019	Category/ Clause of permissible activity as per CRZ notification 2019
1	Approach Channel	CRZ IB, CRZ III (NDZ), CRZ IVA, CRZ IVB	5.1.2 (i) (e), 5.3(i), 5.4(ii)(d)
2	Breakwater (North Side)	CRZ IB, CRZ III (NDZ), CRZ IVB	5.1.2 (ii), 5.3(i), 5.4(iii)
3	Proposed Berths	CRZ IB, CRZ III (NDZ), CRZ IVA, CRZ IVB	5.1.2 (ii), 5.3(i),5.4(iii)
4	Proposed Reclamation & Port Backup area	CRZ IB, CRZ III (NDZ), CRZ IVA, CRZ IVB	5.1.2 (i) (a) and (ii), 5.3(i),5.4(ii)(a)

1.2 Waste Management

Construction Phase

- Dredged Material (~60 Mm^3): ~30–32 Mm^3 to be utilized for reclamation.Remaining material to be disposed at an offshore location (~18 km away) identified through modelling studies.
- Solid Waste : The generated waste will be collected and disposed as per Solid Waste Management Rules, 2026.

Operation Phase

Non-Hazardous Waste

- Solid Waste : Segregation at source using color-coded bins. Biodegradable waste treated in Organic Waste Converters (OWC); manure used for landscaping. Non-biodegradable waste sent to authorized recyclers.
- Maintenance Dredging : Disposal at designated offshore location (~18 km away).
- Ship-generated Waste (as generated): Managed as per MARPOL guidelines.

Hazardous Waste

- Used/Spent Oil : Send to approved recycler.
- Process Waste, ETP Sludge, Contaminated Rags, Chemical Sludge: Disposed at Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDF).
- Oil-contaminated Sludge / Filters / Tank Bottom Waste: Sent for co-processing in cement industries.
- Pig Waste (Liquid Terminal Operations): Processed using hydraulic press. Liquid fraction sent for co-processing in cement industries.

- E-waste & Battery Waste: Sold to authorized recyclers.

- Biomedical Waste: Disposed through authorized Common Biomedical Waste Treatment Facility (CBWTF).

1.3 Water Requirement & Wastewater Management

Construction Phase

Water requirement during construction phase is estimated ~1.0 MLD. Sourced from Water supplied through tankers (bowsers).

Operation Phase

- Existing approved water supply: 2.0 MLD from Kudki Dam. 1.4 MLD utilized for port operations. 0.6 MLD supplied to nearby villages (Dighi, Harvit, Kudgaon) as per agreement with Maharashtra Jeevan Pradhikaran (MJP). Additional water requirement to be met through proposed modular seawater desalination plants of 50 MLD capacity to be developed in phases, based on actual demand.
- Long-Term Water Demand (30-Year Master Plan)
  Total projected demand: ~50 MLD
  North side development: ~20 MLD
  South side development: ~30 MLD

Wastewater Management

- Existing: 2 STPs (15 KLD each) at North and South terminals.
- Proposed: Total 2 MLD STP capacity and ETP of 5 MLD capacity
  0.9 MLD (North Terminal)
  1.1 MLD (South Terminal)
- Treated wastewater to be reused for greenbelt and non-potable applications.

1.4 Description of the Environment:

Baseline environmental studies were carried out by AESPL in Summer season 2025 (March to May 2025) in 10 km radius of the study area. Traffic studies were conducted by FP Project Management. Mathematical model studies was conducted by DHI (India) Water and Environment Pvt. Ltd. Additionally, to comply the specific ToR condition, Marine Biodiversity studies were also conducted through National Institute of Oceanography (NIO, Goa).
Baseline studies were carried out for various environmental aspects as per EIA Notification, 2006.

- **Land Environment:** Survey of India toposheet numbers E43G15, E43G16, E43H3 and E43H4 covers the study area around proposed project site. Land use land cover studies are classified in eight categories, total mapped area is 1,154.38 sq.km. out of which, water bodies covering about 845.45 sq.km (73.24 %), scrubland, 88.88 sq.km (7.70 %), barren land 87.29 sq.km (7.56 %) whereas built-up land occupies 3.77 sq.km (0.33 %) and other classes.

  Soil Quality: Soil samples were collected at 10 locations and analyzed within study area to represent different land-use patterns. The soil in the study area is predominantly clayey in texture. The pH is neutral, indicating no significant acidity or alkalinity concerns. Soil electrical conductivity falls within an average range.

Nutrient analysis shows that potassium and organic carbon levels are low, while phosphate levels range from moderately sufficient to sufficient. Overall, the soil is deficient in key macronutrients, and appropriate fertilization measures will be required to enhance soil quality

- **Micro-Meteorology:** During the study period hourly wind speed, wind direction, ambient temperature, relative humidity, rainfall were collected. The wind is predominantly flows from Northwest to Southeast with maximum wind speed of 15.4 m/s. Relative humidity ranges from 26.4% to 98.4% and Average annual rainfall varies from ~3000 to 3200 mm.
- **Ambient Air Qulaity:** Ambient air quality monitoring was conducted at 10 locations;
  - Concentration of PM_{10} was varying from 55.7µg/m^3 to 68.5 µg/m^3.
  - Concentration of $PM_{2.5}$ was varying from 18.4 µg/m^3 to 29.3 µg/m^3.
  - Concentration of SO_2 was varying from 13.2µg/m^3 to 25.5 µg/m^3.
  - Concentration of NO_2 was varying from 17.4µg/m^3 to 28.3 µg/m^3.
  - Concentration of CO was varying from 0.4 mg/m^3 to 0.6 mg/m^3 .
  - Concentration of NH_3 was varying from 18.2 µg/m^3 to 25.9 µg/m^3 .

Benzene, O_3, BaP, Pb, As, Ni parameters found to be below detectable limits. Analysis results were compared to NAAQS, 2009 and observed that air quality are well within the prescribed standards.

- **Ambient Noise:** Ambient Noise levels were monitored at 10 locations. Data at site was observed within specified limits during Daytime (Lday 61.5 dB(A)) and Nighttime (Lnight 60.8 dB(A)). Noise levels in the study area were within prescribed CPCB standards of daytime and night time.
- **Traffic studies:** Traffic surveys were conducted in accordance with IRC guidelines continuously for 24 hrs. by videography method. Classified Traffic Volume Count was conducted at 3 locations and Turning Movement Survey was conducted at 1 location within 5 Km radius of Dighi Port to assess current traffic levels on all important roads. The peak traffic is observed between 09:00 hours and 10:00 hours. The total traffic is 2555 nos. (vehicles) or 1971 PCU. From the analysis it is found that most of the traffic is two-wheelers (about 53%), followed by cars comprising about 34%. Goods vehicles and Passenger vehicles comprises 5.4% and 94.6% of the total traffic, respectively.
- **Water Quality:** Groundwater samples were collected at 9 locations and analyzed. Analysis results were compared with IS10500:2012 and found within prescribed standards except Microbiology parameters i.e. Coliform and *E.coli*. Surface water samples were collected at 5 locations, analysis results compare with CPCB standards which reveals that surface water mainly falls under classification C (Drinking water source with conventional treatment followed by disinfection) and E (Irrigation, industrial cooling or controlled waste disposal).
- **Biological Environment:** An ecology and biodiversity survey conducted across representative habitats in the study area recorded 51 tree species, 30 shrubs, 17 herbs, 4 climbers, and 3 epiphytes, with no species listed in the *Red Data Book of Indian Plants*. Faunal assessment identified 11 mammals, 2 reptiles, 1 amphibian, 127 bird species, and 5 insect species, including 13 Schedule I species under the Wildlife Protection Act, 1972. Migratory

birds were observed in mudflat areas. Phansad Wildlife Sanctuary, its notified ESZ is about 5 Km away from site and Eco-sensitive areas (Bhalgaon, about 6 Km away from site).

- **Marine Environment:**

  Baseline marine studies were conducted across 30 subtidal locations and 20 intertidal transects. Marine biodiversity assessment was also assessed by the NIO. Sampling covered Phytoplankton, Zooplankton, Benthic biota & observed macro-flora/fauna. The proposed site is devoid of mangroves, with the nearest mangroves are present at distance of 180 m near Dighi village.

  Marine Water Quality: As per the analysis it was observed that marine water quality is good and unpolluted. Salinity levels are observed with minimal freshwater inflow. Elevated suspended solids are attributed to seasonal variation and natural upwelling. Dissolved Oxygen and BOD levels support healthy aquatic life, while nutrient levels are mostly low, with slightly higher nitrates in open sea due to natural causes.

  Sediment Quality: Sediments in the estuary are predominantly muddy-silty, while coastal areas show sandy and gravelly textures. Sediment characteristics are consistent with historical trends and support moderate to good biological productivity.

  Marine Biodiversity:
  - Microbiology: Higher microbial counts in sediments indicate localized anthropogenic influence at some locations.
  - Phytoplankton: 36–55 genera recorded; abundance increases towards coastal and creek regions.
  - Zooplankton: Distribution varies, with higher abundance in creek areas, indicating productive zones.
  - Benthos: Dominated by polychaetes, gastropods, and crabs, showing moderate to high diversity with some dominant species. Average biomass and abundance are 31.5 g/m^2 and 389 no./m^2, respectively.

  Fisheries: Raigad district has a 250 km coastline, supporting 195 fishing villages and 45 fish landing centers. The study area includes 14 landing centers from Murud and Shrivardhan talukas. Fishing activities include both traditional and mechanized methods.

- **Socio-economic studies:** The study area falls under Raigad district from Maharashtra state, total 5 talukas (Shrivardhan, Murud, Tala, Mhasala and Roha) parts covered in 10 km radius study area.
  Census analysis indicates slow population growth in the study area, with a decadal growth rate of 1.88%, significantly lower than 19.3% for Raigad district. The male population slightly increased from 47% (2001) to 48% (2011), while the female population decreased marginally from 53% to 52%. The sex ratio declined slightly from 1080 to 1074 females per 1000 males.

Average household size has reduced (4.83 in 2001), indicating a shift towards nuclear families. The child population (0–6 years) shows a notable decline (–24.14%), likely due to smaller family size and migration trends.

The population density in the study area (310 persons/km^2) is lower than the district average (368 persons/km^2), though it shows an increasing trend. SC/ST population has shown gradual growth.

The study area comprises a total of 2,442 fishing families across 9 villages, indicating a strong dependence on fisheries for livelihood. Approximately 37% of these families fall under the Below Poverty Line (BPL) category, reflecting a notable level of economic vulnerability. Dighi village has the largest fishing community, with 576 families and a population of 2,763, while Mandad has the smallest fishing population. The gender distribution is relatively balanced, with 51% males and 49% females.

Based on the studies carried out and the nature and scale of project, the likely environmental impacts are identified and measures for mitigation of these impacts are suggested.

1.5 Environmental Impacts and suggested mitigation measures:

Construction Phase

1.5.1 Air Environment

- **Potential impacts:**
  - Exhaust emissions from vehicles and vessels transporting the construction materials.
  - Fugitive dust from berth development, material handling, storage, and movement.
- **Mitigation measures:**
  - Development of designated construction yards for material storage and equipment.
  - Tin sheets of adequate height at the site boundary and around labour colony.
  - Scheduling material transport during non-peak hours.
  - Speed control of on-site vehicles to minimize dust generation.
  - Regular tyre washing of construction vehicles while going outside the port.
  - Periodic water sprinkling to suppress dust.
  - Environmental awareness training for construction personnel.
  - PPE for construction workers
  - Mitigation measures will be taken at RMC plant as per MPCB guidelines.
- Responsibility: Construction Contractor / DPL

1.5.2 Noise Environment

- **Potential impacts:**
  - Noise from transportation vehicles and diesel-operated construction machinery.
- **Mitigation measures:**
  - Compliance with CPCB/MPCB prescribed noise standards.
  - Use of equipment with noise levels below 85 dB(A).
  - Regular maintenance of machinery.
  - Adoption of noise control measures (acoustic enclosures, insulation, dampers).

- Scheduling of high-noise activities (e.g., piling, drilling) to minimize disturbance.
- Provision of PPE (earplugs, earmuffs) to workers.
- Periodic ambient noise level monitoring.
- Responsibility: Construction Contractor / DPL

1.5.3 Marine Environment (Construction Activities & Dredging)

- **Potential impacts:**
- Temporary loss of benthic organisms due to dredging and breakwater construction.
- Minor shoreline alterations (area largely stable as per historical analysis).
- Disposal of dredged spoils due to capital dredging may affect marine environment
- **Mitigation measures:**
- Natural regeneration of benthic communities over time.
- Long-term shoreline monitoring using high-resolution satellite imagery (up to 30 years).
- DPL proposes to reuse 32 Mm^3 dredged material for reclamation. Balance will be disposed of at site 18 km away identified after extensive modelling studies conducted by DHI.
- Responsibility: Construction Contractor / DPL

1.5.4 Water Environment

- **Potential impacts:**
- Increased turbidity due to dredging activities.
- **Mitigation measures:**
- Use of silt curtains to contain suspended sediments.
- Preference for suction dredgers over bucket dredgers.
- Installation of sediment traps for dewatering fines.
- Avoidance of dredging during storm conditions.
- Responsibility: Construction Contractor / DPL

1.5.5 Traffic and Transportation

- **Potential impacts:**
- Increased traffic load due to movement of construction materials.
- **Mitigation measures:**
- DPL is in discussion to lay railway line from Roha to Dighi Port. The augmentation of connecting roads will be taken up suitably as port becomes operational.
- Protection and maintenance of internal roads during construction.
- Responsibility: Construction Contractor / DPL

1.5.6 Solid Waste Management

- **Potential impacts:**
- Soil contamination from improper disposal of solid and hazardous waste (e.g., waste oil, paint drums) generated during construction and MSW generated from labour colony.
- Health and hygiene risks to workers and nearby communities.
- **Mitigation measures:**
- Provision of color-coded bins for waste segregation.
- Designated areas for collection and segregation of inert and hazardous waste.
- Prohibition of open burning of waste.

- Safe storage of hazardous waste in covered areas with impervious flooring and leachate collection systems.
- Disposal of Hazardous waste as directed by MPCB.

Operation phase:

1.5.7 Air Environment

- **Potential impacts:**
- Emissions from loading/unloading equipment, DG sets, and Vehicular movement .
- Fugitive dust from cargo handling, storage, and spillages.
- **Mitigation measures:**
- Installation of vacuum collectors at dust-generating sources.
- Use of enclosed/covered conveyors (slurry, pneumatic, screw conveyors).
- Scientific stacking and management of cargo piles.
- Regulation of truck movement within premises.
- Regular cleaning of cargo spills.
- Development of greenbelt for dust attenuation.
- Responsibility: DPL

1.5.8 Noise Environment

- **Potential impacts:**
- Noise from cargo handling equipment, vehicular movement, and ship loading/unloading.
- **Mitigation measures:**
- Installation of acoustic barriers and enclosures.
- Provision of PPE (earplugs, earmuffs) to workers.
- Greenbelt development for noise attenuation.
- Traffic regulation within port premises.
- Responsibility: DPL

1.5.9 Marine Environment

- **Potential impacts:**
- Impact on marine environmental quality due to maintenance dredging
- Deterioration of marine water quality due to vessel movement.
- Risk of accidental cargo and oil spills.
- Pollution due to runoff and discharge of untreated sewage/effluent.
- **Mitigation measures:**
- Dredge spoil will be disposed off at 18 km away identified site after extensive modelling studies conducted by DHI, thus impacts predicted to be localized and not significant at disposal site.
- Sewage and solid waste from the vessels will be manged as per MARPOL guidelines.
- Implementation of an Oil Spill Contingency Plan.
- Immediate recovery of cargo spills during handling.
- Deployment of oil spill control systems (booms, barriers, skimmers).
- Construction of toe walls and drains connected to settling ponds for runoff management.
- Existing STPs (15 KLD each) at North and South terminals.

- Proposed installation of 2 MLD STP and 5 MLD ETP for future needs.
- Quick response protocols for containment and recovery.
- Reuse of treated wastewater for greenbelt development.
- Responsibility: DPL

1.5.10 Socio-Economic Environment

- Positive impacts:
- Employment generation: ~500 jobs during construction.
- Operational phase: ~500 direct and ~2000 indirect jobs.
- Preference to local workforce based on skills.
- Improvement in regional socio-economic conditions.
- Responsibility: DPL

1.6 Analysis of alternate site

Alternate Site: The proposed expansion is site-specific, as it pertains to the existing operational Dighi Port with established marine infrastructure, navigational channels, breakwaters, and hinterland connectivity. Hence, no alternative site is considered.

Alternate Technology: The master plan will adopt best available, environmentally friendly technologies to ensure sustainable port development.

1.7 Additional Studies:

Safety and risk assessment studies have been conducted for chemicals to be stored and handled onsite. Systematic study based on ALOHA has been carried out. Emergency response disaster management plan is already in place and being implemented by Dighi Port, the same will be updated to accommodate master plan. The precautions to be taken and recommendations for safe operations are mentioned.

Various studies were also carried out using specialized models. The details are as described below:

- **Mathematical Modeling Studies:** The tide in Dighi Port is mainly semi-diurnal, with a tidal range of about -4.1m. The current speed can reach to a maximum value of 1.28m/s, 1.39m/s and 1.19m/s respectively at the surface, mid-depth, and near bottom. The measured current magnitudes are stronger during ebb tide (towards SE) compared to the flood tide (towards NNW). The significant wave height during the measurement period reaches a maximum value of 0.87m with an average value of 0.36m, and peak wave period ranges from 2 to 14s with an average value of 6s predominantly approaching from West (270°) direction.

- **Hydrodynamic Model:** 2-dimentsional hydrodynamic model has been set-up to simulate the water level and current pattern at Dighi Port with the baseline and Master Plan layouts. The simulation is carried out under the influence of tide, wind and river discharge and calibrated using measured water level and currents at ADCP location, along with discharge data in each transects. The model findings reveal that no variation of water level with the proposed Master Plan layouts.

- **Wave Transformation Model:** A MIKE 21 Spectral Wave (SW) model is applied to transform the 20-year wave climate from offshore to berth location of the Dighi Port with Baseline and Master Plan layouts.

- **Wave Tranquility Modelling:** The MIKE 21 Boussinesq Wave (BW) model is used to evaluate the wave tranquility with the Baseline and Master Plan layouts. The non-cyclonic (operational) wave ranging from 1 to 2m and wave period ranging from 8 to 20s coming from every possible direction at Dighi Port are simulated to predict the wave disturbance at various port facilities.

  The proposed breakwaters with the corresponding layout attenuates the incident waves and produces a good tranquil condition at berth and basin areas. The higher wave height at the berth locations is predicted mainly from WNW and NW directions which are 2.23 % of annual occurrence.

- **Environmental Design Parameters:** Based on the long-term model studies, the environmental design conditions are derived for various return periods using probability distribution. The findings of the design parameters with proposed layouts at Dighi Port are as follows:

- Design wind speed with 50- and 100-yr return period is 30 and 33m/s respectively.
- Design tide level with 50- and 100-yr return period is 2.14 and 2.15m respectively.
- Storm surge level with 50- and 100-yr return period is 2.1 and 2.4m respectively.
- Sea level rise with 50- and 100-yr return period is 0.23 and 0.43m respectively.
- Design significant wave height at south breakwater with 50- and 100-yr return period is 3.91 and 4.13m respectively, with corresponding wave period (Tp) is 14s.
- Design significant wave height at north breakwater with 50- and 100-yr return period is respectively as 2.71 and 2.8m, with corresponding wave period (Tp) is 14s.

- **Wave downtime Assessment:** The downtime assessment at north and south berths with Baseline and Master Plan layouts is evaluated based on the wave exceedance probability estimation. By and large, the annual wave downtime is higher for north berth pockets when compared with south berth pockets is lesser for Master plan layout.

- **Sedimentation Assessment:** The annual siltation rates predicted from the sediment transport modelling with the proposed Dighi Port development are between 0.6m/yr and 2m/yr in the outer and inner channel respectively; and up to 1.2m/yr at the berthing area. The annual dredging quantity is estimated for all the proposed layout conditions consist of outer channel, inner channel, turning circle, basin and berthing facilities. The predicted quantities for respective layout for Master Plan layout, the total dredging quantity is predicted to be 14.6 Mm^3/year.

- **Shoreline Change Assessment and Prediction:** The historical shoreline changes for 10-year period 2013-2022 are examined using remote sensing and GIS techniques. The analysis indicates that the shoreline at the project area is observed to be stable except the

zone-01 located at north of Dighi port. Similarly, in south of Dighi port, shoreline is stable and not subjected to any erosion or deposition, since the rocky cliffs and headlands have protected the coastline. The Murud-Janjira fort, is also stable due to man-made bulwark's structure and natural rocky features. The future shoreline changes are predicted over north

and south stretch for 30-yrs using LITPACK modelling for the baseline and masterplan layout conditions.

- **Oil spill Modelling and Response:** Four oil spill scenarios are modelled for two possible spill locations (approach channel and turning circle) within the Dighi Port limits, by altering the wind direction (southwest and northwest). Each event is initiated with a constant Tier 2 type spill with a quantity of 5000 m^3 (3 particles per 2 minutes for 20 hr.) discrete spill particles whose advection, dispersion and weathering will be computed over a 5-day period.

  Spill at Approach Channel: At this location, two scenarios were simulated by considering the southwest and northwest winds. The spread of spill is higher at this location due to its exposure to open sea conditions.

  Spill at Turning Circle:

  Two scenarios were simulated by considering the southwest and northwest wind conditions. The spreading of the spill at this location can affect the port area and vessel movement within the port. The spill needs to be arrested as soon as possible, and the response team needs a critical response time of 30 mins to implement the mitigation measures.

  The Tier 2 type of spill is likely to be greater in which mitigation measures should be taken as soon as possible within first few hours of the spill as the spill spreads up to 1.5 km within 1 hour duration. It indicates that the critical response time at approach channel is between 45 min to 1 hour.

- **Drainage Pattern and Flood Modelling:** Flood model is carried out for all the layout conditions for 1:100-year rainfall event of 24-hour duration. The model results predicted as below:

  At Agardanda, the maximum flood depth in the port backup area is 2.3m near berth N1; 1m near berth N2; 0.16m near berth N3 and 0.29m near berth N4 to N7.

  At Dighi, the maximum flood depth in the port backup area is ranging from 0.9 to 1.2m near berth S1 and S2; and 0.76m near berth S3 to LB1.

- **Recirculation study for Intake and Outfall for Desalination Plant:** A recirculation study was conducted for the proposed desalination plant under the Dighi Port Master Plan, which envisages a total water demand of 50 MLD (20 MLD for the north side and 30 MLD for the south side). For assessment, a 30 MLD seawater desalination plant drawing 75 MLD of seawater was modeled at three potential intake and outfall locations. The study indicates that Location-1 (outside south breakwater) and Location-3 (near north breakwater head) show minimal recirculation, with excess salinity of only 0.2 PSU and 0.3 PSU, respectively, at the intake. In contrast, Location-2 (near liquid berth LB2) shows higher recirculation

with 1.8 PSU excess salinity. Based on these findings, Locations 1 and 3 are identified as the most suitable options, ensuring efficient operation with minimal intake-outfall interference

1.8 CSR Activities:

Adani foundation's mission is to play the role of a facilitator for the benefit of the people is in the fields of education, community health, and promotion of social and economic welfare and upliftment of the people in general." Adani foundation is working in the study area in the field of Education, Livelihood Development, Water conservation, Health etc.

CSR expenditure during last three years on various activities (Amount in Lakhs)				
Sr. No	**Activity**	**2023-24**	**2024-25**	**2025-26**
1	Education	16.84	32.60	27.75
2	Community Health	42.77	139.79	54.04
3	Sustainable Livelihoods	17.37	6.71	12.71
4	Community Development	-	13.70	2.55
5	Climate Action	-	4.29	4.8
6	Admin	1.89	2.05	7.2
	Total	**78.87**	**199.14**	**109.05**

1.9 Project Benefits:

Infrastructure & Connectivity:

Dighi Port is designed to handle Panamax and partially loaded Capesize vessels for container, liquid, bulk, multipurpose, LPG, and LNG cargo. The port has strong road connectivity via NH-753F, NH-548A, SH-95, NH-66, and other regional roads. A proposed 35 km rail link from Dighi Port to Roha (Konkan Railway), to be developed by Maharashtra Maritime Board and Rail Vikas Nigam, will further enhance cargo movement. Supporting infrastructure such as housing, transport, and healthcare facilities is expected to develop in the region.

Employment Potential: The project will generate approximately 500 direct and 2,500 indirect employment opportunities, with preference to local communities. Additional employment will arise from transportation, ancillary industries, and associated economic activities.

Key Benefits:

- Promotes regional economic growth and supports state development initiatives
- Enhances logistics efficiency and port capacity
- Boosts local industries, transport, and ancillary businesses
- Encourages skill development and livelihood opportunities in nearby villages
- Supports domestic manufacturing and trade
- Generates both skilled and unskilled employment
- Strengthens social infrastructure through ongoing CSR initiatives in education and health

1.10 Environmental Management Plan:

The effective implementation and close supervision of the environmental management to mitigate the environmental impacts, which are likely to arise due to the construction and

operation phases of the project could be achieved through a suitable institutional mechanism. The environment management plan consists of Greenbelt, Occupational health and Safety etc., Apart from these the designed inbuilt components such as Air pollution abatement measures, water and wastewater treatment measures, Storm water management Plan, Stockyard runoff management plan, Noise abatement measures, Solid and hazardous waste management measures etc., which will ensure effective environment management.

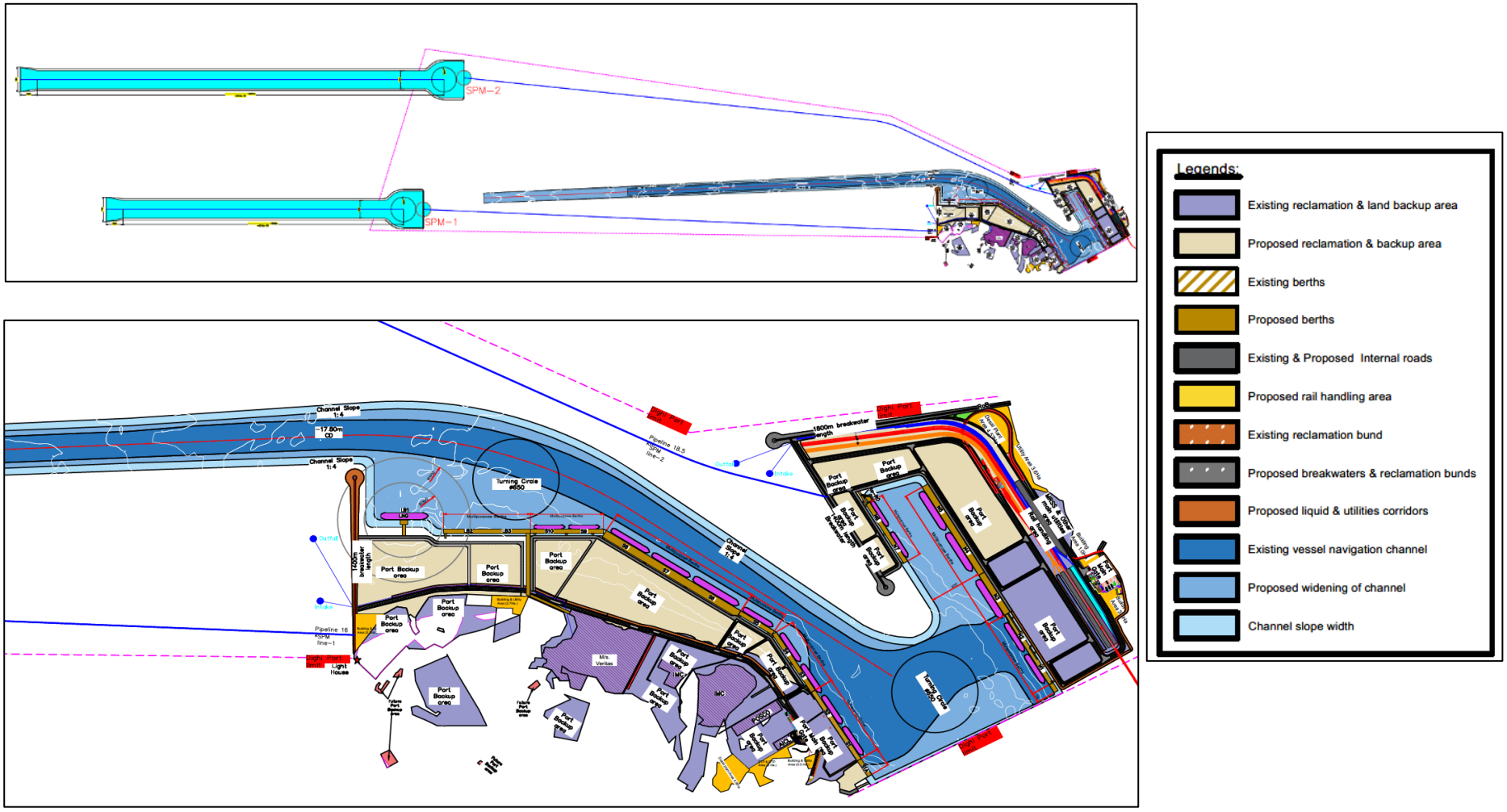
To enhance and protect local ecology, a green belt of ~69 hectares (existing 7.4 ha + proposed 61.6 ha) will be developed using native species, within the port. The design includes tall evergreen species along the periphery and dwarf native species inside, ensuring effective environmental screening and ecological balance.

The capital outlay for environmental control & management measures estimated during construction
phase is to be Rs 204.15 lakhs and recurring cost is 99.10 lakhs per annum. During operation phase the estimated capital cost is 942.0 Lakhs and recurring cost will be 542.17 lakhs per annum.

1.11 Conclusion:

Various studies for the proposed master plan (expansion) of Dighi Port, Maharashtra has revealed that the upcoming activities of ports will have some minimal impacts during operation phase. All other impacts of the project will remain far below acceptable limits after necessary mitigation as described and suggested in draft EIA-EMP report. The major impacts will also be brought under acceptable limits by implementing the required hazard prevention and control measures as suggested in the draft EIA-EMP report. Thus, it has been concluded that there would not be any major impacts on environment due to the development of master plan by Dighi Port limited.

Annexure I: Project layout



Annexure II: CRZ map