

“EXECUTIVE SUMMARY”

FOR

DEVELOPMENT OF A GREENFIELD PORT AT

VADHAVAN, DISTRICT –PALGHAR, MAHARASHTRA

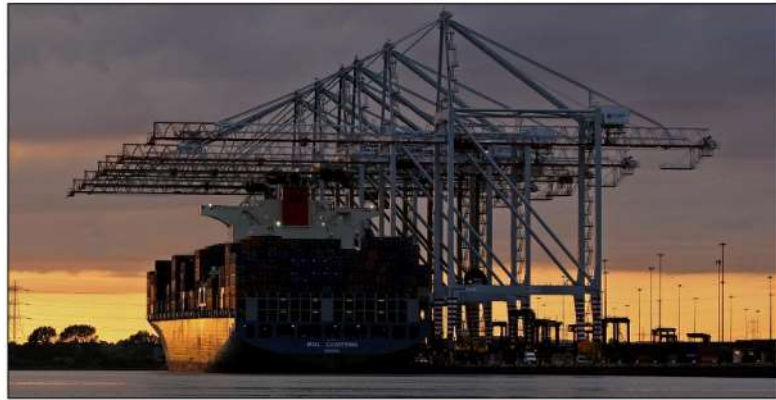
(Project Area: 17,471 Ha out of which 16,900Ha is port limit & 571Ha outside port limit; Water front area: 15363.5Ha; Reclamation area: 1448Ha; Berth area: 63.5Ha; Reclamation quantity: 200Mcum with marine borrow pit located offshore of Daman coast at 50km from port)

Terms of Reference (ToR) obtained by MoEF&CC vide no. 10-52/2020-IA.III dated 7th October, 2020 and Additional ToR obtained dated 2nd June, 2023.

STUDY PERIOD: MARCH TO MAY 2021

Monitoring done by M/s. Excellent Enviro Laboratory & Research Center (Air & Noise); M/s. Envirocare labs Pvt. Ltd. (Soil & Water)
(NABL approved & MoEF&CC recognized firms)

(Project or Activity Category ‘A’ Schedule- 7e – Ports & Harbors ≥ 5 million TPA of cargo handling capacity, As per EIA Notification, 2006 and amendments thereof)



PROPOSED BY
JAWAHARLAL NEHRU PORT AUTHORITY AND MAHARASHTRA MERITIME BOARD



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1.1 Introduction

Jawaharlal Nehru Port is administered by the Jawaharlal Nehru Port Authority, Major port under Ministry of Ports, Shipping and waterways Government of India. The port was developed to relieve pressure on Mumbai Port, then the pre-eminent port of India.

The Jawaharlal Nehru Port Authority (JNPA) at Navi Mumbai is a premier container handling Port in India accounting for around 50% of the total containerized cargo volume, across the major ports of India. Commissioned on 26th May 1989, in less than three decades of its operations, JNPA has transformed from a bulk cargo terminal to the premier container port in the country. Ranked 26th among the top 100 Container Ports in the world, JNPA is connected to over 200 ports in the world.

Major exports from Jawaharlal Nehru Port are textiles, sporting goods, carpets, textile machinery, boneless meat, chemicals and pharmaceuticals. The main imports are chemicals, machinery, plastics, electrical machinery, vegetable oils and aluminium and other non-ferrous metals. The port handles cargo traffic mostly originating from or destined for Maharashtra, Madhya Pradesh, Gujarat, Karnataka, as well as most of North India.

As part of Sagarmala Programme, more than 574 projects (Cost: Rs. 6.01 Lacs Cr.) have been identified for implementation, during 2015-2035, across the areas of port modernization & new port development, port connectivity enhancement, port-linked industrialization and coastal community development. To fill the demand gap, 2 new major ports are planned which will bring in significant capacity expansion. The locations of these new ports are deliberated after detailed origin-destination study of cargo commodities and there are mainly three levers that propel the need for building new ports: New port locations have been identified based on the cargo flow for key commodities and the projected traffic: Greenfield ports are proposed to be developed at

- Vadhavan (Maharashtra)
- Paradip Outer Harbour (Odisha)

Vadhavan Port is planned to be developed by JNPA (Jawaharlal Nehru Port Authority) and MMB (Maharashtra Maritime Board) to handle the additional traffic. Vadhavan is a Greenfield site located along the west coast of India, at the North tip of Maharashtra which is about 150 km north of JN Port.

Approval of the Govt. of India Cabinet Ministry proposal for setting up a major Port at Vadhavan, with due concurrence of the Ministry of Environment, Forest & Climate Control (MoEF&CC), was obtained on 19th February 2020. The MoPSW issued a Notification under Section 3(8) read with Section 5(2) of the Indian Ports Act, 1908 and Section 2(q) of the Major Ports Act, 1963, inter alia, declaring the port proposed to be set up at Vadhavan as a ‘Major’ port (“said Project”), with immediate effect. Pursuant to the exchange of communication between the MoEF&CC, the Central Pollution Control Board (“CPCB”) and the MoPSW, on 08.06.2020, the MoPSW, inter alia, called upon JNPA to “...take further necessary action for development of Major Port at Vadhavan accordingly.” On 20th July 2020, JNPA submitted an online proposal to the MoEF&CC, inter alia, seeking Terms of Reference (“TOR”) to obtain an Environment Clearance Certificate (“EC”) for the “Development of Greenfield Port at Vadhavan, District Palghar, Maharashtra”, as mandated by the Notification 14th September 2006 published by the MoEF&CC (“EIA Notification”), and the subsequent amendments thereto.

After duly considering the aforesaid proposal and the detailed presentation made by JNPA, the Expert Appraisal Committee for Infrastructure, CRZ and other miscellaneous projects (“EAC”) in its 241st Meeting, inter alia, recommended the grant of TOR in respect of the said Project on 25th - 26th August 2020, respectively. Accordingly, on 7th October 2020, the MoEF&CC approved the TOR for the said Project for preparation of an EIA/ EMP report including condition to obtain NOC from Dahanu Taluka Environment Protection Authority (DTEPA), a monitoring body constituted by MoEF on 20th June, 1991. As per ToR all the studies were completed and submitted to DTEPA.

JNPA through the amendment proposal applied to the MoEF&CC, inter alia, seeking amendment in TOR for the change in reclamation quantity from 86.88Mcum to 200Mcum. Also, as per revised CWPRS layout, the location of the port was changed from onshore to offshore port. Considering the substantial amount of reclamation requirement, it was decided to extract the fill material through marine borrow pit as against the earth filling borrowed from land location and in view of ecological sensitivity of the region, the change of location is proposed to borrow material from Offshore. The marine borrow pit is identified in the offshore of the Daman coast about 50 km from the port site at a depth varying from 20 m to 25 m.

Accordingly, EAC after deliberation in its 324th meeting held on 19-21st April 2023, inter alia, recommended the proposal for amendment in ToR vide No. 10-52/2020-IA.III (Proposal no. IA/MH/NCP/295375/2022) dated 2nd June, 2023.

The Dahanu Taluka Environment Protection Authority (DTEPA) has granted JNPA permission to establish and develop the Vadhavan port in the Dahanu Taluka on 31st July 2023, based on draft EIA report submitted to them.

1.1.1 Brief Description of Nature, Size, Location of the Project

The proposed port is located at near Dahanu, abutting northern boundary of Palghar district of Maharashtra at co-ordinates Latitude 19°55.8'N and Longitude 72°39.6'E.

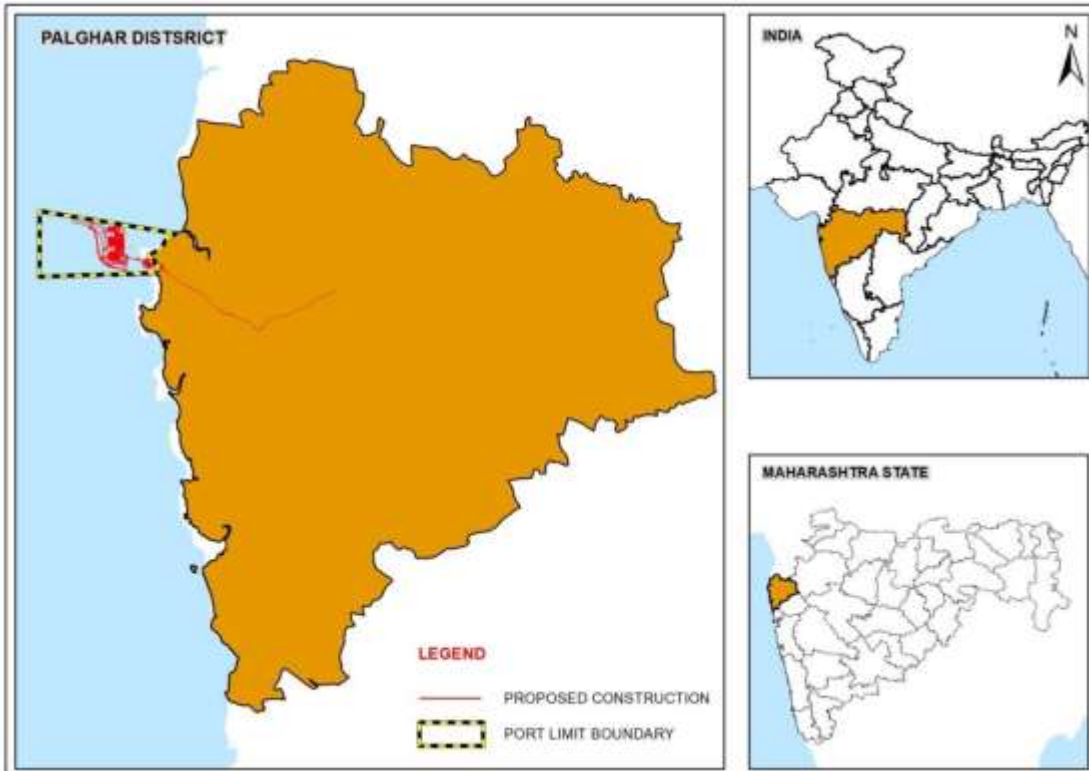


Figure 1 Location of project site

The port limits is as shown in below figure.

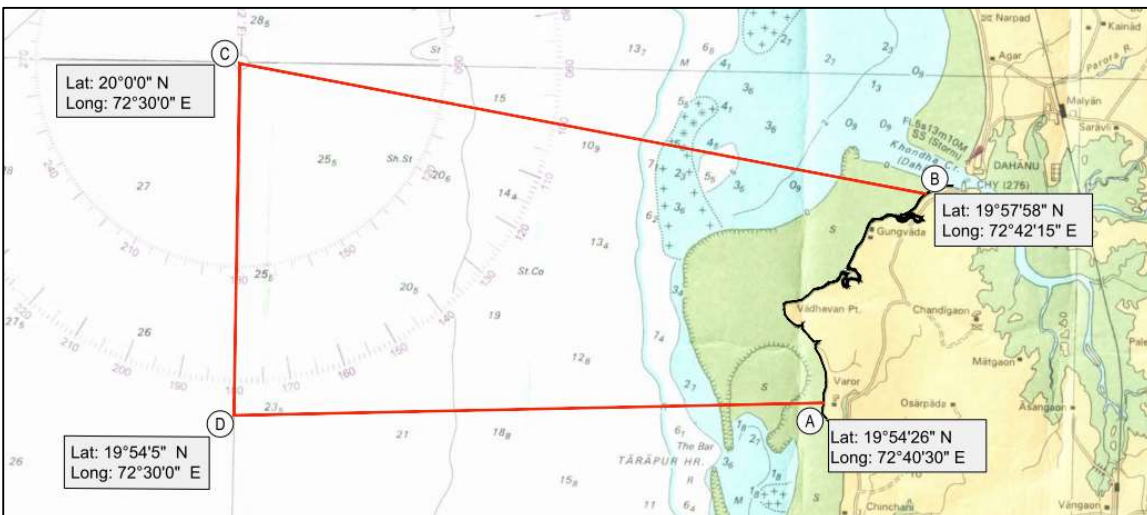


Figure 2 Port Limit of project site

A natural water depth of around 20.0 m below CD is available at 10 km from Vadhavan point and 15 m contour is available at a distance of 6 km which will allow safe voyage and mooring for the new generation vessels. As deep-water depth is available from 6 to 10 km, new generation vessels calling for deep draft can be planned with minimal cost on dredging.

Vadhavan can also be positioned as a hub port in the Arabian Sea catering to the container traffic of east coast of Africa, India's west coast, and countries in the Persian Gulf reversing the present picture. Deep draft, access to large hinterland of west and north west India, good evacuation possibility by rail and road network, one km. long container terminals with large container yards and landlord port development model are likely to attract major private operators to open their container terminals in Vadhavan port and call their container vessels of 16,000-24,000 TEUs capacity and then aggregate/distribute their containers from Vadhavan port, given advantages of economies of scale and thrust by the container shipping lines to reduce operating costs to remain competitive.

JNPA has been assigned the responsibility to develop Vadhavan port as a major port on landlord port development model. Port site has natural and strategic advantages to become a mega port and has prospect of achieving throughput of 300 million Tonnes.

The purpose of this Environmental Impact Assessment Study is to obtain Environment Clearance (including CRZ Clearance) for development of Greenfield Port at Vadhavan. The port is planned to be located on reclaimed land on inter tidal zone at Vadhavan. This project is a “Greenfield” project and it is proposed to be constructed in such a way that, it will have minimal impact to the environment, fishery activities, mangroves and locals.

The proposed development plays a significant role in strengthening connectivity along the Maharashtra coastline and enhancement in economy of Maharashtra.

1.2 Need and advantages of Vadhavan Port

Existing ports in the area have strong customer base, infrastructure, connectivity and logistics services along with long years of experience. However, over the period of time, existing ports will reach their operational capacity and due to expansion constraints. The congestion at these ports has already caused serious concerns especially in ports like JNPA and MbPA. Ports in the region are facing following 4 major restrictions for capacity expansion;

- Unavailability of waterfront to create new Jetties/Terminals (JNPA, AHPPL-partially)

- Located further away from the route considered unproductive for shipping lines to divert (Kandla, Dahej)
- Heavy siltation/tidal issues rendering cost of expansion of infrastructure extremely high (Hazira, Dahej)
- Legal & Regulatory issues embedded in the 30 years' concession agreement restricting expansion (Mundra and Pipavav)

There is no other container port planned in near future in the hinterland by respective state government. Vadhavan having the highest potential with modern facilities, deep draft and no capacity constraints in the initial years is expected to gain a large share in the traffic. It has been envisaged that Vadhavan will be the largest container port in Maharashtra catering to Northern, Western and Central India.

Some of the salient features of Vadhavan are as follows;

- Futuristic Container Terminals with deep draft to cater largest container vessels available even on the design board;
- Proximity to hinterland clusters including upcoming Dedicated Freight Corridor (DFC) and DMIC corridor resulting in lower inland evacuation cost to the hinterland;
- Port is developed at a location of deep draft that would provide channel availability without recurring dredging. This would reduce maintenance cost of port, impacting favourable tariffs for container handling.
- This will have state of art cargo handling system with minimal environmental impact.

The landlord-based development model of Vadhavan from beginning is likely to attract global container terminal operators. A combination of transparency due to government initiation and deep draft would increase attractiveness of Vadhavan port for developers compared to other ports in the region.

1.3 Project Vision:

The vision of JNPA is to develop a state-of-art Port which shall be in line with the International Standards. The port will be developed in two phases. In this model, basic infrastructure of the port necessitating upfront investment such as, breakwater, rail and road linkages, power, water lines and common infrastructure and services will be developed by the port/ SPV whereas all cargo handling infrastructure will be developed and operated by the agencies which are awarded the concessions.

1.4 Applicable Legal And Policy Framework

Prior to the implementation of the project, Port as a whole needs to get clearances from various regulatory bodies at State level and National level. The most important government departments and institutions responsible for environment protection and management in India are:

- i) Ministry of Environment & Forests and Climate Change (MoEF& CC)
- ii) Central Pollution Control Board (CPCB)
- iii) State Pollution Control Board (SPCB)
- iv) Local bodies – Corporations, Municipalities, Gram Panchayats

The EIA for the Vadhavan Port has been carried out conforming to the requirements of September 14, 2006 Notification issued by MoEF & CC, Government of India (GoI).

Table 1 Important Acts & Rules for Environmental Protection in India

Legal Requirement	Compliance/Application
The Environment (Protection) Act, 1986 and subsequent amendments	An Act to provide for the protection and improvement of environment and the prevention of hazards to human beings, other living creatures, plants and property
Dahanu EZA Notification, 1991 and subsequent amendments	Notification for Ecological Fragile Area (EZA) 1991. Approval from DTEPA authority.
Forest (Conservation) Act, 1980, and The Indian Forest Act, 1927, And Forest (Conservation) Act, 2022	Act to provide for the conservation of forests and all related aspects of Development
Wildlife (Protection Act), 1972	Act to provide the protection of wildlife
The Air (Prevention & Control of Pollution) Act, 1981 and subsequent amendments	An Act to provide for the prevention, control and abatement of air pollution, include the preservation of the quality of air and control of air pollution; relates to the issue of the Air Consent (CFO) for the Stack and DG set emissions that are likely to be installed in the project site
The Water (Prevention & Control of Pollution) Act, 1974 and subsequent amendments	An Act to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, for the establishment, relates to the issue of the Water Consent (CFO) for the water requirement for the day to day project operations and daily unit wise waste generation

Legal Requirement	Compliance/Application
The Public Liability Insurance Act, 1991	An Act to provide for public liability – insurance for the purpose of providing immediate relief to the persons affected – in terms of responsibility and finances
Biological Diversity Act, 2002	Aimed at conservation of biological resources and associated knowledge as well as facilitating access to them in a sustainable manner and through a just process
Environmental Impact Assessment Notification-2006 and subsequent amendment	Imposing certain restrictions and prohibitions on new projects or activities, or on the expansion or modernization of existing projects or activities based on their potential environmental impacts, being undertaken in any part of India, unless prior environmental clearance has been accorded in accordance with the objectives of National Environment Policy
Coastal Regulation Zone Notification, 2019	An act to empower the State and the central government authorities to take measures for protecting and improving the quality of the coastal environment and preventing, abating and controlling environmental pollution in the coastal areas of India
The Noise Pollution (Control & Regulation) Rules, 2000 and subsequent amendments	Deciding the levels of noise at various areas or zones defined as industrial, residential, commercial and silence zone during day and night times
Solid Waste Management rule, 2016 as amended	This is applicable to port project related traffic movement. Details will be provided in the combined document.
The Hazardous Wastes (Management and Handling) Rules, 2016 as amended	Although no such cargo is included as of now, this is applicable to port project related traffic movement. Details will be provided in the combined document.
Ancient Monuments and Archaeological site & Remains act, 1958	Act to provide conservation of cultural and historical remains found in India
Land Acquisition Act, 1894 & 1989	Set out rule for acquisition of land by Government. This being a core Social impacts GoI is now formulating a new Land acquisition replacing an Act that is older than 1947, the independent India
National Resettlement and Rehabilitation Policy, 2003	All social issues related to land acquisition, resettlement and rehabilitation

1.5 PROPOSED VADHAVAN PORT INFRASTRUCTURE

Vadhavan Port is planned to be developed by JNPA (Jawaharlal Nehru Port Authority) and MMB (Maharashtra Maritime Board) as Joint Venture Project with equity share of 74% & 26% respectively. The port will be developed in two phases. The proposed port is to be developed on landlord model with the port terminals to be developed on PPP basis. In this model, basic infrastructure of the port necessitating upfront investment such as, breakwater, rail and road linkages, power, water lines and common infrastructure and services will be developed by the port/ SPV whereas all cargo handling infrastructure will be developed and operated by the agencies which are awarded concessions through global tender in an open and transparent manner by the port.

The development of port is envisioned to have the following components:

JNPA (Landlord)

Inside Port

- Breakwater of total length 10.14 km
- Dredging 6.98 M cum in Phase-1 and 21.5 Mcum in Phase-2
- Port craft/ Tug berth of 200 m.
- Total Reclamation area inside the port 1448 ha. with 1162 ha. in Phase-1.
- Road inside the port 32 km
- DFC rail yard 227.5 ha.
- Buildings with area of 23,500 m²
- Pavement inside port.

Outside Port

- Land acquisition 571 ha. (For road and rail connectivity)
- External road connectivity of 33.4 km, 120m wide corridor
- Rail linkage area length 12 km 60 m wide corridor
- Water pipeline from Surya river which is about 22 km from port site
- Power line from PGCIL line/Tarapur Boisar power station 20 km from port

Concessionaire (Operator)

- Container terminals including storage yard, equipment, terminal pavements, drainage, utilities networks etc., with total berth length of 9000 m (4 terminals in Phase-1 and 5 terminals in Phase 2 each of 1000 m length) capable of handling vessels of 24,000 TEU and above with 24,000 TEU design container vessels.

- Multipurpose berths of 1000 m (4 berths each of 250 m) including equipment, storage yard/ shed
- 1 Ro Ro berth of 250 m including storage and onshore facilities
- 4 Liquid cargo terminals including pipelines and tank farm

1.6 CONNECTIVITY ASPECT – RAIL AND ROAD CONNECTIVITY

Vadhavan is 12 km away from Vangaon Railway Station along Mumbai-Surat Western Rail Link and will be linked to DFCC line at New Palghar Station. The port location is 33.4 km away from NH 48 and 22 km away from Vadodara Expressway from Port. All roads will be merging with the road connecting port to the NH-48 and Mumbai Vadodara expressway.

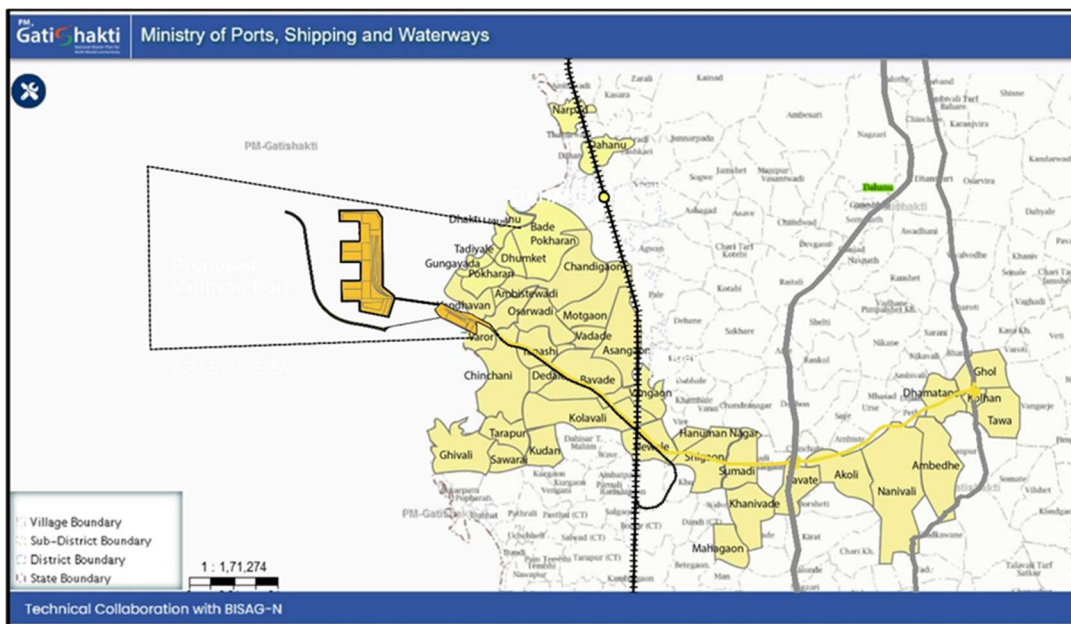


Figure 3 Port Connectivity

1.7 SITE SPECIFIC SURVEY

1.7.1 Oceanographic investigations

The wind speeds measured during the study period varies from 0.2 knots to 4.0 knots with most of the wind blows from 0-45° N.

Wave climate in the area is dominated during SW monsoon period (June to September). The maximum significant wave height observed in the entire period is 1.19 m and the minimum of 0.14 m. Currents are significant in the project area.

The current speeds in general are observed within the range of 0.00 knots to 2.60 knots with the dominant speeds observed in the range of 0.20 knots to 1.60 knots.

Site specific tide measurements were carried out for the proposed development. The observed tidal range was about 3.5 m during spring tide and 1.7 m during neap tide.

1.7.2 Bathymetry Survey

The bathymetric survey covered the proposed port limit with an area of 169 sq.km extending 18.4 km from the shore into the sea and about 7 km along the shore. Water depths within survey area range between a minimum of 0.0 m recorded in the Eastern end and maximum of 25.3 m at North West corner of the survey area. Rock outcrops appear in some places as high as 3 to 4 m above the adjoining seabed levels in the area. The '0' m contour is about 2.1 km from the shoreline at the NE corner, curving outwards for up to 4.9 km and then inwards. 5 m contour lies at about 3.5 km west of Vadhavan point. 10 m contour starts on the north side from about 4.5 km west of Vadhavan point and runs towards south. At its nearest point, the 15 m contour lies 1.5 km west of 10 m contour on the northern side, running in the S-SE direction. 20 m contour lies at about 10 km from Vadhavan point

1.7.3 Geophysical Survey

Shallow seismic survey was carried out and the water depths are overlaid on the isopach contours to understand the minimum navigable depth that can be achieved by dredging in the study region. The shallow geological successions within the window examined by the digital data within the surveyed area are described as Silty clay/sand and Weathered bedrock. Silty clay/sand is recorded as the surficial layer in survey corridor in depths of more than 15 m and is interpreted as comprising silty clay/sand. The survey reveals predominant rocky seabed with buried channel comprising of soft clay over sand/gravel or highly weathered rock.

Side Scan Sonar Survey classifies the seabed into following categories such as Soft silty clay, Highly weathered rock /sand /gravel and Basalt rock. The seafloor appeared to be clear of any debris other objects which are likely to be hazardous or otherwise obstruct anchoring and operations in the port.

1.7.4 Geotechnical Survey

The geotechnical investigation was carried out to assess and confirm the sub soil data. Geotechnical investigation for marine areas was carried out through 61 boreholes. Additionally, 70 boreholes were carried out for proposed rail and road connectivity areas. Specific borehole data has been utilized to prepare soil profiles to study the distribution of the sub strata and assess the geotechnical conditions of the component. Since the port facilities are proposed to be located on the reclaimed land, the topographic investigations were carried out for the external rail and road connectivity to the port along the proposed corridor.

1.7.5 Breakwater

Tarapur Atomic Power Station (TAPS) is located some 11 km to the south of the proposed port site and numerical modelling studies had been carried out by CWPRS to assess the impact of port development on the power station intake/outfall. Based on the outcome of the studies, no impact was found with the proposed alignment.

The final layout of the breakwater and revetment/ reclamation bund has been arrived at through the wave tranquillity and hydrodynamic modelling studies completed by CWPRS. These studies are reported in the following documents:

- Model Studies for Tidal Hydrodynamics and Siltation for the revised layout of Phase-1 and Master Plan development of port at Vadhavan, Technical Report No 5968 (Nov. 2021)
- Model studies to assess the impact of proposed Capital Dredging on Tidal Hydrodynamics and siltation for development of port at Vadhavan, Technical 5970 (Nov. 2021)
- Model studies for assessment of wave tranquillity for Modified final layout of Vadhavan port, Technical Report No 5971 (Nov. 2021)
- Report on Impact of Breakwaters and Transport Carrier on the Erosion/ Accretion for the Vadhavan Port, Maharashtra by National Centre for Coastal Research (NCCR) & Indian National Centre for Ocean Information Services (INCOIS) (September 2023)

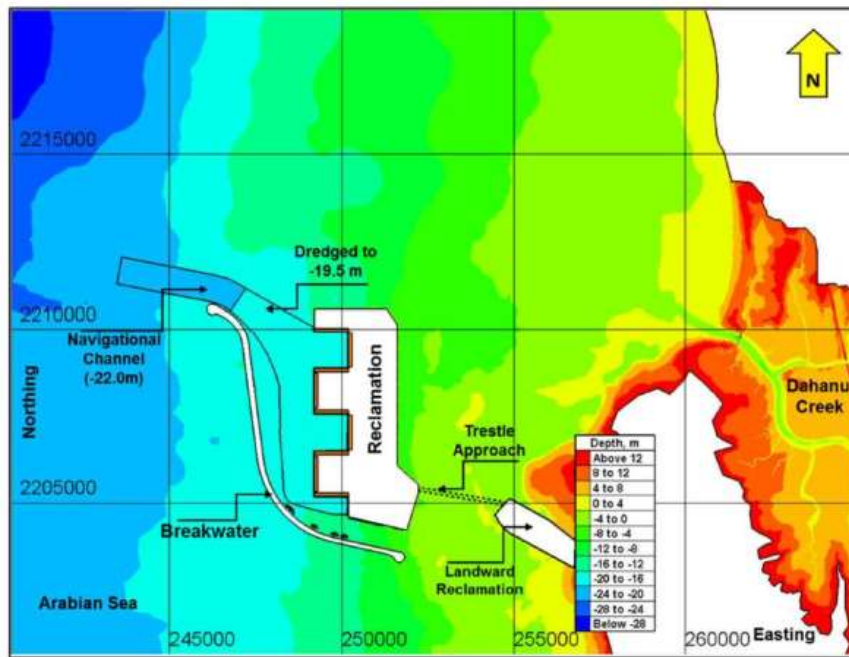


Figure 4 Breakwater alignment for Vadhavan Port

1.7.6 Traffic Study

The summary of the traffic projection for the proposed Vadhavan port is as below;

Table 2 Vadhavan Port's Container Traffic Projections (mn TEUs)

Commodities	FY21	FY25	FY30	FY35	FY40	FY45	FY50
Container Cargo (mnTEUs)	0.0	0.9	6.5	14.1	23.2	31.3	39.4
(MTPA)	0.0	11.16	78	169.2	278.4	375.6	472.8
Edible Oil	0.0	0.4	1.0	1.1	1.2	1.3	1.4
Chemical	0.0	0.6	0.9	1.0	1.1	1.2	1.3
Bulk Liquid	0.0	2.7	3.1	3.8	4.2	4.7	5.2
Fertilizer	0.0	0.9	1.0	1.2	1.2	1.3	1.4
General cargo	0.0	1.5	2.4	3.5	4.6	5.9	7.2
Coastal Cargo	0.0	1.0	1.7	2.4	3.2	4.1	5.0
Other Liquid	0.0	0.0	2.3	4.5	4.5	4.5	4.5
Total		18.26	90.52	186.7	298.6	414.2	498.5
Ro-Ro ('000 Vehicles)	0.0	20.9	49.5	76.8	169.0	195.9	227.1

1.7.7 Port Operation & Functional Requirement

One of the main factors that influence the layout and sizing of the port facilities and therefore the costs is the size of ships for different commodities, dimensions and the design of berth, the basin, the approach channel. This, in turn will influence the layout and alignment of the breakwaters, required at a particular port. Based on the outcome of ship size analysis for container traffic, the design ship sizes considered, and berth required for development of Vadhavan port have been carried out.

1.7.8 Container Storage and Gate Capacity

Container yard capacity is defined as the potential maximum throughput of containers handled inside the container yard. The container storage yard capacity requirement for Master Plan (Phase 1 and Phase 2) is 2,20,08,735 TEU/year. Gate capacity analysis is essential feature to get essence of seamless inward and outward traffic movement including major share of trucks having containers. The number of exit lanes required for Phase 1 is 6 lanes and in Master plan is 17 lanes.

1.7.9 Other Cargo Capacity

The berth capacity for other cargoes have been assessed taking into consideration the proposed facility and handling arrangement. The basic data pertaining to traffic, design ship sizes, handling rates and berth occupancy, for the development of the Vadhavan port has also been carried out.

1.7.10 Approach Trestle Capacity & Port Crafts Berth

The road truck movements to/from the marine and rail terminals on the offshore reclamation has been evaluated to establish the requirements for the road connection to the offshore reclamation. Based on calculations the approach trestle capacity in Master plan 1,12,825 PCU/day is expected.

1.7.11 Buildings

The terminal administration building will be required to house the terminal operator's management, security, admin, and customer service personnel. Typical users/uses of the administration building shall include;

- Terminal Administration, Customer Service, Quay Crane and Marine Operations Building, Gate Equipment Control, IT/Server, Gate Control Clerks, Offices, Shipping Lines Offices, and Terminal Security and Communications Hub, Port Fire Station, Rail Master Building, Residential Colony for Staff and Social Infrastructure.

1.7.12 Cargo Receipt and Evacuation

At Vadhavan Port, the cargo receipt and evacuation will be primarily through road and rail. The estimated proportions for different commodities to be brought in/ taken out through rail and road.

Based on the study, almost 13,441 trucks (71,661 PCUs) are expected in the year 2030, increasing to about 34,284 truck (186,348 PCUs) movements in 2040. It is proposed to provide an 8-lane road with a capacity of 173,000 PCU.

The evacuation of cargo through rail is expected to be 33.8 % (31.5% through DFCC and 2.3% through IR) of the total cargo resulting in 184 rake movements per day.

1.7.13 Port Master Plan

The final master plan layout incorporates the following:

- 9 container terminals each with a straight 1,000m long marginal quay. 7 terminals have the container storage yard located directly behind the quay apron whilst for two of the terminals the container yard is located about 1km behind the quay.
- A total of four multi-purpose berths each 250 m long at the southern end of the reclamation
- Four liquid bulk berths located on the leeside of the breakwater
- A Ro-Ro berth at the south-west end of the offshore reclamation with adjacent vehicle parking
- Small craft (pilot boats and tugs) and coastguard berths at the southern end of the reclamation.

- Additional berths for small craft may also be provided at the northern end of the reclamation if required.
- Rail terminal located along the eastern side of the offshore reclamation
- Onshore reclamation for liquid bulks storage and administrative facilities.

The recommended master plan layout is mentioned below;

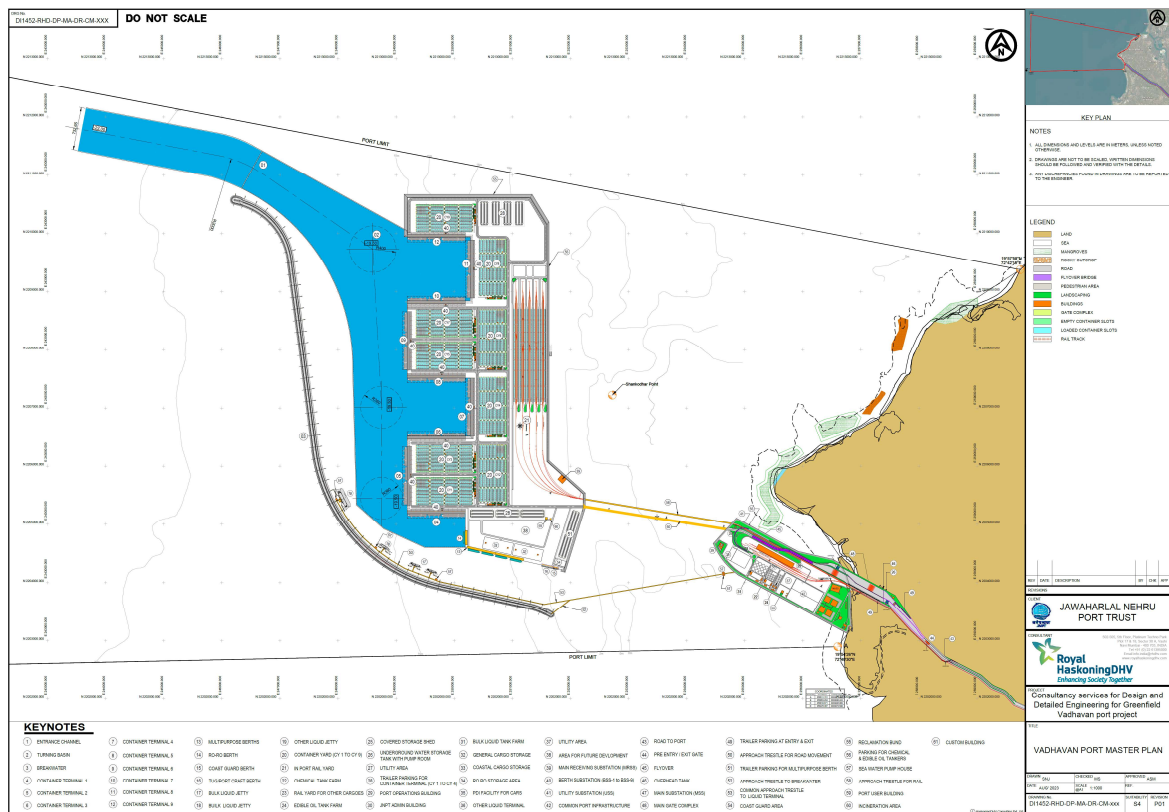


Figure 5 Recommended Master layout of port

CWPRS carried out hydrodynamic modelling of this layout. The results indicate the following:

- Maximum cross current at the harbour entrance of 2.55m/s reducing to 1.3m/s at the expected ship stopping point
- Maximum currents at the turning areas less than 0.4m/s in a S-N direction
- Currents in the dredged basins between reclamation fingers less than 0.05m/s
- Currents longitudinal to the berths at the ends of the reclamation fingers less than 0.2-0.4m/s
- The total quantum of siltation in the dredged areas will be about 8.45 M cum.

Water depth in the channel is around 17 to 18 m depth below CD. +2.0 m tidal advantage has been considered as the MSL is about +2.8 m CD. The maximum velocities at harbour

entrance, stopping distance and turning circle are 2.6 m/s, 1.2 m/s and 0.3 m/s respectively. The maximum current strength at berths is about 0.05 m/s. The annual siltation in the dredged areas will be about 6.45 M cum during Phase-1 development.

The diameter of the sheltered turning circle with tug assistance is 700 m. The main emphasis while developing the port layout is given to balance the cost of dredging and reclamation land area developed. It is estimated that approximately 200 million cum of reclamation material would be required for the proposed port development.

The existing reports on wave tranquility, hydrodynamics, shoreline change assessment, and shoreline morphology study were analyzed and shoreline change analysis was carried out by NCCR. The following were the outcomes of the study:

1. The maximum significant wave height in the port basin is 1.0m in the Final Master Plan Layout as compared to 2.5 m height offshore.
2. The Tidal Hydrodynamic and Siltation study finalized the Master Plan Layout for favorable operation and maneuvering conditions with minimum effect on the morphology. The maximum current strengths at container terminals are within 0.15 m/s and flow approaches at an angle varying between 4° and 7° along oil berths and Other Liquid terminals. These hydrodynamic conditions allow the bypassing of sediments towards the North of the port area.
3. The shoreline morphology study reveals that a net transport of about 0.07 Mm³ is transported just North of the proposed port area. Although Northerly transport is not fully hindered, maintenance dredging of the port can be utilized for nourishment in the North of the port. A minimum of 0.15 Mm³ of sand shall be used for nourishment of the North which will be dredged from the port basin as a part of maintenance dredging.
4. The littoral drift and shoreline evolution comparing the original shoreline and proposed port indicates an insignificant effect on the adjacent shoreline.
5. The shoreline change analysis by NCCR suggests that a stretch of 2.4 km of the study area is in a moderate to high erosion state for long-term analysis. The construction of the port breakwater is likely to reduce erosion in the south.

1.7.14 Capital and Maintenance Dredging

The dredged volume of 7.01 M cum comprising of soil and rock is required to be dredged. The rocks that might encounter while dredging is envisaged that the rock strength shall vary from 6 to 51 MPa with an average of 19 MPa.

Based on the mathematical model studies on siltation, the estimate the likely rate of annual siltation for Phase 1 reveal that, the average rate of siltation in the dredged areas will be about 6.45 million cum. The siltation rates are not uniform over the area under consideration and seems to vary based on the prevailing hydrodynamic conditions. The dredged material in channel and harbour basin would be disposed at the designated dumping site offshore.

The location of the disposal site which is in deep water (beyond 25 m contour). The disposal site is spread over an area of about 20 sq. km and the depth of dumping will be restricted to only 0.5 m.

1.7.15 Borrow Material for Reclamation

The reclamation quantity expected from the project is 200 Mcum. The quantity of reclamation is much greater than the dredging quantity which in turn is dependent on the suitability of dredged material for reclamation, it is considered that additional reclamation will be carried out by the material sourced from marine borrow pit. JNPA has identified a borrow pit off shore Daman coast at around 50 km into sea from the proposed Vadhavan port for obtaining sand for creating reclaimed land at the proposed Vadhavan port. The marine sand will be dredged using Trailing Suction Hopper Dredger (TSHD) and the sand will be transported and dumped at the reclamation location.

1.7.16 Green Port Initiatives

The proposed port at Vadhavan aims to provide long-term commitment, strong policy push, innovation, and alignment of interests and business philosophies along with serious investment in technologies, systems, and manpower in order to achieve this objective set out in developing the vision of the port by JNPA. These sustainable solutions will range from analysis of climate change risk and resiliency at the planning stage for; (i) Renewable energy, (ii) Alternative energy sources, (iii) Cold Ironing / Shore power supply, (iv) Efficient port operations, (v) Other green initiatives and thereby achieving reduction in carbon footprints and energy costs during the operations phase.

1.8 ENVIRONMENTAL INFRASTRUCTURAL ATTRIBUTES

1.8.1 POWER SUPPLY

The required electrical system for the project will consist of:

- The incoming electrical supply at 80 MVa level.
- 220/33 kV substations containing transformers, switchboards, control equipment, etc. to supply the electrical power to various parts of the site at the required voltage levels of 11kV or 6.6 kV & 0.415 kV.
- Control and Monitoring systems.

Two locations of the nearest 220 kV source from PGCIL line/ Tarapur Power Boisar and Dahanu are identified to be provided by MSETCL. The PGCIL line/Tarapur Boisar power station located at 20 km away from Vadhavan site by overhead 220 KVA HT Line to Vadhavan port site.

1.8.2 Water demand

Daily water demand for the Phase 1 development is estimated to be around 6.8 MLD (million litres per day) and for the master plan phase, the anticipated demand is at 13.3 MLD. Out of this the potable water demand for port usage is 1.8 MLD in Phase 1 and 2.8 MLD in master plan phase, with the balance being the demand for raw water and supply to port township. A static storage of raw water of 1-day storage is provided for the port while half a day storage is provided for the township.

The water source identified for the port operations is Surya River about 22 km (approx.) away from the proposed Vadhavan Port. Maharashtra Jeevan Pradhikaran (Government of Maharashtra) will be facilitating the required water supply to Vadhavan Port.

1.8.3 Waste Water Management Plan

The sewerage system is limited to the areas wherever office buildings, canteens, and other operational buildings are constructed. For the isolated buildings where the quantity is negligible, it is proposed to setup STPs of required capacity with Sequential Batch Reactor (SBR) Technology is proposed to be installed. During monsoon months, the sludge will be stored separately in a storage structure with adequate capacity. The treated water will be

recirculated for gardening and non-drinking purposes. The sludge from the treatment plant will be processed and converted into Biomass used as manure.

The ships will not be allowed to discharge their sewage in the port complex. As per MARPOL convention, the ships are now required to have STP on board.

1.8.4 Solid Waste Management

The solid waste generation will be basically from 2 sources – cargo handling and the garbage/ human waste. It is estimated to be 2000kg/day of Municipal waste generation from port operations, which shall be disposed off as per the Municipal Solid Waste Management Rules 2016 and the amendments thereof.

The cargo envisaged at the port is primarily container cargo. The garbage and human waste generation will be minimal and is proposed to be disposed off using the normal measures. The garbage will be carried through covered trucks and disposed at the designated dumping grounds in the locality. The port will have solid waste processing and disposal mechanism for management of wastes generated within the port.

1.8.5 CRZ DETAILS

Preparation of Local Level Coastal Regulation Zone Map for the Proposed Greenfield Vadhavan Port at Vadhavan Village, Dahanu Taluka, Palghar District, Maharashtra State by Superimposing on Approved CZMP as per CRZ Notification 2019 is prepared by Institute of Remote Sensing (IRS), Chennai (October 2023).

The proposed details viz Approach Trestle, Breakwater, Navigational Area, Offshore Reclamation Area, Sheltered Area within Vadhavan Port Limits lies in CRZ-IVA and Reclamation Area near Shore lies in CRZ-IB, CRZ-III (200m to 500m from HTL), CRZ-III (No Development Zone), CRZ-IVA and outside CRZ areas as per approved CZMP (Map nos: MH 95, 97, 98 & 99).

The reclamation area near shore in within Vadhavan Port Limits lies in CRZ-IB, CRZ-III (200m to 500m from HTL), CRZ-III (No Development Zone), CRZ-IVA, and outside CRZ areas as per approved CZMP (Map nos: MH 95, 97, 98 & 99).

The remaining Area where there is no development proposed within Vadhavan Port Limits lies in CRZ-IA, CRZ-IA (50m Mangrove Buffer Zone), CRZ-IB, CRZ-III (No Development Zone), and CRZ-IVA areas as per approved CZMP (Map nos: MH 95, 97, 98 & 99).

The proposed Road and Rail Alignment for the port connectivity lies in CRZ-IB, CRZ-III (200m to 500m from HTL), CRZ-III (No Development Zone) and Outside CRZ areas as per approved CZMP (Map nos: MH 95, 97, 98 & 99).

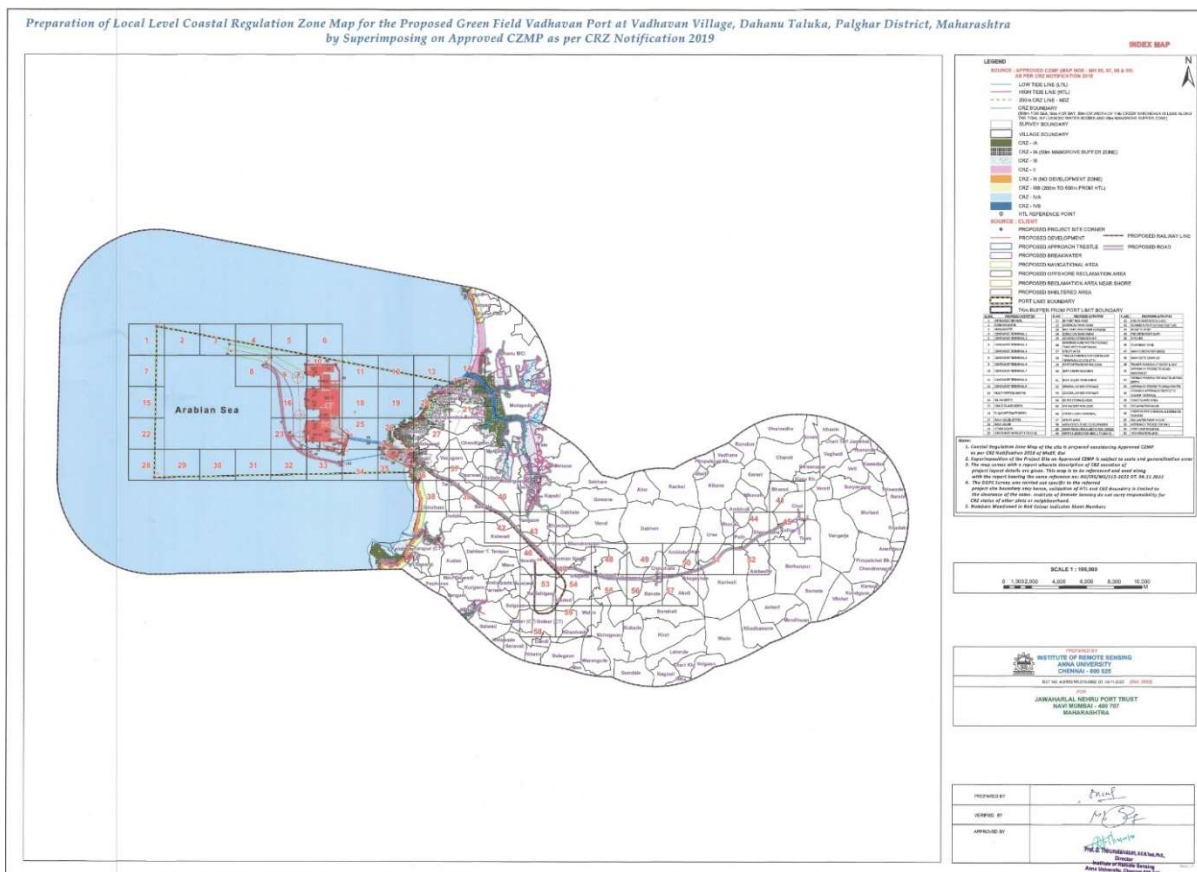


Figure 6 CZMP MAP

1.9 SOCIO ECONOMIC IMPACT ASSESSMENT

There is no land acquisition involved for the port estate onshore facilities, as the land requirement is mostly accommodated on reclaimed land of approximately 1448 Hectares in the inter-tidal area adjacent to the coast.

Vadhavan port is located at 12 km distance from the main rail link and upcoming dedicated freight corridor for rail connectivity and is 33.4 km from the Mumbai - Delhi NH-48. Accordingly, land acquisition is required for the rail and road right of way (ROW), with a corridor width of 160 m over a length of 12 km where both the road and the rail tracks are

required, and a corridor width of 120 m over the remaining length of approximately 22 km where only road connectivity is required. The major acquisition of land that is to be done is agricultural land.

Proper Resettlement & Rehabilitation will be undertaken as per the guidelines prepared for addressing the issues limited to this project for resettlement and rehabilitation of the PAPs. The policy has been developed based on the National Highways Act 1956 and The Right to Fair Compensation and Transparency in LA RR Act, 2013. The resettlement and rehabilitation (R&R) benefits shall be extended to all the Project Affected Families (PAF) whether belonging to below poverty line (BPL) or non-BPL.

Action Plan for Fishermen

The JNPA/VPPL will prepare a Fisher-folks Compensation Policy (FCP) for VPPL project in consultation with all stake holders and fishermen community and a Fisher-folks Compensation Committee (FCC) will be set up by JNPA/VPPL with Dy. Chairman, JNPA as the Chairman, and members from Fishing Community, Department of Fisheries, Revenue, MMB, Police, Fisheries Scientist and JNPA/ VPPL officers as its members (or extended to Maharashtra Fisherman Compensation Policy, 2023)

1.10 BASELINE ENVIRONMENTAL STATUS

Field investigations were undertaken for collecting the existing baseline environment for air, water, noise, soil, ecological and socio-economic conditions. A study area of 10 Km radius from the project site is identified to establish the present environmental conditions. The main aim of the EIA study is to identify the critical environmental attributes which will be affected and have adverse impacts on the surrounding environment due to the proposed project. The field data generation is undertaken during the pre-monsoon season of March 2021 to May 2021.

1.10.1 Ambient Air Quality

The status of the ambient air quality in the study area was established by carrying out monitoring for air quality parameters like PM_{2.5}, PM₁₀, SO₂, NO_x, O₃, Pb, etc. at 8 locations in the study area. All the parameters are within the NAAQs standard limit.

Ambient PM₁₀ levels

The Average PM₁₀ levels at various stations covered under the ambient air quality monitoring survey ranged from 52.3 to 61.7 µg/m³ which is well below the permissible limits (100 µg/m³)

specified for industrial areas by CPCB/ MoEF&CC.

The suspended particulate matter (PM₁₀) is average minimum as 52.3 µg/m³ near Bada Pokharan Grampanchayat and average maximum of 61.7 µg/m³ at Dahanu Khadi Bridge, Near Ganesh Mandir

Ambient PM_{2.5} levels

The Average PM_{2.5} levels at various stations covered under the ambient air quality monitoring survey ranged from 20.5 to 29.6 µg/m³ which is well below the permissible limits (60 µg/m³) specified for industrial areas by CPCB/ MoEF&CC.

Ambient SO₂ levels

The Average SO₂ levels at various stations covered under the ambient air quality monitoring survey ranged from 22.3 to 25.3 µg/m³ which is well below the permissible limits (80 µg/m³) specified for industrial areas by CPCB/ MoEF.

Ambient NO_x levels

The Average NO_x levels at various stations covered under the ambient air quality monitoring survey ranged from 27.3 to 30.2 µg/m³ which is well within the permissible industrial area (80 µg/m³) as specified by CPCB.

Other Parameter

It is observed that Lead, Benzene, Benzo-Pyrene, Ammonia and Ozone were found to be below the detectable limits during the field survey

1.10.2 Noise Environment

The monitoring for noise level was carried out for 72 hours using a portable sound level meter. Noise levels were recorded at a 1 hour interval. The L equivalent (Leq) was Calculated for the day and night time readings. The noise monitoring was carried out for eight different locations and the results obtained were compared to the standards prescribed by the Noise Pollution (Regulation and Control) Rules, (Year 2000) and amendments thereof.

The noise level around project area is a minimum of 59.5 dB (A) at Near Z.P. School, Matgaon and maximum 63.9 dB(A) near Near Bada-Pokharan Grampanchayat during day time & a minimum of 44.1 dB(A) at Near Z.P. School, Matgaon and maximum 51.8 dB(A) near

Near PHC, Tarapur during Night time. All the noise monitoring results were found to be within the acceptable limits for all the locations.

1.10.3 Water Environment

Surface water and ground water monitoring was carried out within 10 km radius of project area. Total 3 Water samples each collected from the nearest locations of project area and the samples were analyzed for various parameters to check the Quality of water.

Surface Water

The total dissolved solids (TDS) ranges from 900mg/l to 965 mg/l. Conductivity ranges from 1640 to 1754 $\mu\text{s}/\text{cm}$. The value of EC and TDS are correlated to the ratio of 0.55, which depicts the water is freshwater in nature and suitable for agricultural activities.

Chlorides values are less than 400mg/l and higher towards the sea side. The proposed project is not anticipated to have any impact on the surface water quality except increase in turbidity temporarily during construction.

Ground water

It is observed that all the values are in range and without any organic contamination. BOD ranges between 4.5 – 5.5 mg/l, DO ranged from 1.7-1.9 mg/l. Also, values of Ammonical Nitrogen are less than 4mg/l, hence there is no possibility of sewage contamination. All other parameters are within the limit.

The quality of ground water is generally alkaline and is good for domestic except high nitrate concentration in wells. For irrigation point of view the ground water falls in medium to high salinity and it should be irrigation with proper soil and crop management practices. The quality of ground water in basaltic lava flows is comparatively better than in alluvial sediments. Localized nitrate contamination is observed in rural areas.

1.10.4 Ecological Environment

The proposed Vadhavan port is planned to construct on reclaimed area off Vadhvan and the core site may have intertidal/benthic fauna. The region in the 1km radius range contains intertidal area and the Vadhavan village. It comprises of shrub lands, small agricultural Farms,

households and other construction and rest is of open areas and barren land. Coastal area of in 1 km radius comprises a vast patch of Suru trees and sparse patches of mangroves

The list of species of plants and animals generated during the survey were processed and compared with the IUCN red data list and Maharashtra state protected species listings and it was observed that no species encountered during the survey in areas between 0-5 km of the project site represented rare, endangered, critically endangered or legally protected status.

Marine Flora and Fauna

The marine studies were conducted at Maharashtra as well as Daman region by CSIR – National Institute of Oceanography and Biodiversity Study for The Proposed Burrow Pit Region In Arabian Sea by Zoological Survey of India (ZSI).

The shore vegetation includes shrubs and ground covered with grasses. Sea grasses are absent on the site. Cnidarian community comprised of sand anemones, *Aiptasia* sp., *Zoanthus* sp., *Zoanthus sansibaricus*, *Zoanthus vietnamensis*, *Palythoa* sp. *Palythoa mutuki* and presence of hydrozoan colonies were recorded from the study area. Small annelids were present on the lateral margins of the rocky patches. *Asterina lorioli* and *Antedon* sp., were also recorded from the rocky crevices, which represent the echinoderm community. Stone crabs and Porcelain crabs were recorded from the rock regions. Molluscan community comprised of gastropods, such as *Indothais* sp., *Thais* sp., *Gyrineum natator*, *Cantharus spiralis*, *Indothais sacellum*, *Nerita* sp. *Octopus vulgaris* were observed from the tidal pool regions. Majority of the aforementioned organisms were observed from the rock region of Shankodar area.

There were only 12 species of fauna and one species of flora was recorded by NIO (June 2023) at Shankodhar point over a period of two days during the low tide. The number of organisms within the given area were abundant supporting the fact that Shankodhar point is biologically rich. The rocky outcrops at Shankodhar point serves as a habitat for variety of organisms including the barnacles, molluscs, hydroids, and corals. In addition to this, a school of three dolphins were sighted in the subtidal area of the Shankodhar point indicating the presence of cetaceans in the vicinity of Shankodhar point. Among other organisms recorded at Shankodhar point, the solitary cup coral *Paracyathus profundus* is listed under Schedule I list of protected animals under the Wildlife Protection Act (1972).

Zoological Survey of India in its technical report mentioned that there is no significant nesting/ breeding grounds for any endemic or threatened marine species observed in the proposed sand mining area.

Impact Assessment of Proposed Sand Mining on the Marine Fisheries and Fisher Community of Daman Union Territory was conducted by ICAR-Central Marine Fisheries Research Institute, Mumbai Regional Station, ICAR-CMFRI.

Conclusion and recommendations of CMFRI report

- The offshore sand borrow method is the most environmentally acceptable method of obtaining the required fill material. The site is selected with a view to achieving the smallest and least persistent environmental impact as possible.
- Impact of removal of 1 m of bed is not expected to create a significant physical impact, the maximum possible impact will be from the temporary raising of the turbidity levels during dredging operations. The distance and depth at which dredging takes place will ensure that this activity will in no way have an impact on coastal stability.
- As the marine borrow pit location far away from the coastal region approximately 50 - 60km with high tidal range and associated strong currents, the concentration of the sediment plume gets weakened immediately during the dredging activity.
- Sea bed at site is completely flat and does not contain any reefs or habitats such as seagrass bed, coral reef etc. as evinced by the detailed bathymetric survey.

1.11 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The potential impacts on the environment from the proposed project are identified based on the nature of the various activities associated with the project implementation and projects operation (impacts during construction phase and operation phase).

Anticipated marine environmental Impacts

The anticipated environmental impacts due to the activities related to the construction, operation and post operational phases of the proposed port project were identified and described as below;

Port construction and intertidal area reclamation

- Impact of dredging and disposal
- Environmental impact of breakwater system
- Impact of shipping operations on marine environment
- Air pollution from port operations
- Noise and light pollution
- Impact on marine cetaceans

- Impact of cargo handling
- Hazardous materials and oil
- Ship and boat generated wastes
- Introduction of non-native species into marine environment
- Oil spill

Mitigation measures

Table 3 - Environmental Impacts and Mitigation Measures - Construction Phase

Sr. No.	Environmental Parameters	Impact Attributes	Degree of Impacts	Mitigation Measures	Implementing Organization
1	Physiography	Disturbance in relief feature	Mild	– Will be achieved by systematic planning and designing of the project activities.	Promoter, Client, etc.
2	Land resources	Change in land-use for rail & road	Mild	– Will be achieved by systematic planning and implementation.	Promoter, Client, etc.
3	Human resources	No adverse impact	Negligible	– Will be achieved by systematic planning and resources.	Promoter, Client, etc.
4	Ecological resources – Flora & Fauna	No impact anticipated to threatened or endangered plant species. Mild impact on marine species which will be mitigated.	Mild	– Cutting of larger girth size trees are avoided by suitably adjusting the road / rail alignment, if required. – Replantation of trees will be done with the indigenous plant species as per the guidelines of MoEFCC – Greenbelt shall be developed around the site.	Promoter, Forestry Dept. involving NGOs and local people.
5	Environmental aesthetics values	Removal of trees shall have impacts on landscape & aesthetic values of the area	Mild	– Loss of vegetation will be kept minimum as far as possible during site clearance. In case of any loss the same will be compensated by rehabilitation and	Promoter through prospective contractor

Sr. No.	Environmental Parameters	Impact Attributes	Degree of Impacts	Mitigation Measures	Implementing Organization
				restoration of the tree species that shall be affected.	
6	Utility infrastructural facilities	Removal of utility line like electrical & poles, telephone poles, transformer, HT & LT lines, if any	Nil	--	--
7	Sub-surface hydrology	No wells and hand pumps are existing in project area	Negligible	<ul style="list-style-type: none"> Whenever possible, care is taken to avoid its relocation by judicious engineering road design. Temporary alternative water sources will be provided in case drinking water means are affected. 	Promoter through prospective contractor
8	Religious places	--	--	--	--
9	Geology	Not much affected	Negligible	<ul style="list-style-type: none"> Systematic planning and implementation during the construction and dredging. Reclamation will be done with systemic planning and least disturbance to the natural geology. 	Promoter through prospective contractor
10	Surface water	Contamination from solid wastes and sewage generated due to construction labour camp Surface runoff from the ship terminal and	Mild	<ul style="list-style-type: none"> Installations of lavatory for construction workers out of CRZ area and provision for composting the domestic refuse. 	Promoter through prospective contractor

Sr. No.	Environmental Parameters	Impact Attributes	Degree of Impacts	Mitigation Measures	Implementing Organization
		parking facility.			
11	Air quality	Short-term deterioration of air quality due to generation of fugitive dust. Dredging activities and other construction activities leading to fugitive emission.	Moderate	<ul style="list-style-type: none"> - Trucks carrying soil, sand, stone, will be covered to avoid spilling. - Fugitive dust sources will be sprayed with water to suppress dust. - Emissions from vehicles & machinery will be checked regularly & maintained properly to confirm to National and State Emission Standards Barriers during construction activities such as dredging will be installed. 	Promoter through Prospective Contractor (PC)
12	Noise level	Increased noise levels due to project activities, dredging, blasting etc.	Moderate	<ul style="list-style-type: none"> - All the equipment's will be duly lubricated, maintained in good working condition to minimize noise levels. - Stationary construction equipment's will be placed as far as possible from dense habitation. - Green belt barrier. - Provision of protection devices (ear plugs) to be provided to the workers operating in the vicinity of high noise generating machineries. 	Promoter through Prospective Contractor (PC)
13	Ecological resources – Flora & Fauna	According to IUCN red list data of threaten	Moderate	<ul style="list-style-type: none"> - Necessary steps will be undertaken to reduce the impact on the reserve forest areas that support 	Promoter through Prospective Contractor (PC)

Sr. No.	Environmental Parameters	Impact Attributes	Degree of Impacts	Mitigation Measures	Implementing Organization
		species 4 species was recorded as Near Threaten. But these 4 species was observed at Chinchani beach which is 5 km away from the project site.		majority of the avian diversity	
14	Land use	Impact on local land use is anticipated	Negligible	<ul style="list-style-type: none"> Proper management planning will be achieved. 	Promoter through Prospective Contractor (PC)
15	Construction workers camp	Impacts on community health	Mild	<ul style="list-style-type: none"> Supply of safe drinking water to the construction camp. Provision of adequate drainage system to avoid undesirable water logging. Provision of hygienic facilities to construction workers camp is made. A system of regular disposal of domestic waste & sewage. 	Promoter through prospective contractor (PC)
16	Accident hazards and safety	Short term impacts from road accidents. Impacts from accidents during handling and use of Construction machinery.	Mild	<ul style="list-style-type: none"> Proper traffic diversion and management during construction. Construction Safety measures will be employed. Proper warning signs will be used at construction site. Workers will be provided with PPE's Regular Training will be given to the Workers for Safety 	Promoter through prospective contractor (PC)

Table 4 - Environmental Impacts and Mitigation Measures - Operation Phase

Sr. No.	Project Related Issues	Actions to be Taken	Responsible Organisation
1	Prevention of Road side Squatters or indirect Urban Sprawls	<ul style="list-style-type: none"> ➤ Involve land use planning agencies like the Revenue Department at all levels during operation stage. ➤ Plan and control development activity. ➤ Removal, cleaning of squatter and temporary hutments of construction workers once construction activities has been completed. 	P & C in consultation with the Grampanchayat.
2	Road Safety and Traffic Management	<ul style="list-style-type: none"> ➤ Adequate number of proper & legible signs will be installed along the road. ➤ Prepare and administer a monitoring system on road/ accidents. 	P & C in consultation with Traffic Police.
3	Air Quality	<ul style="list-style-type: none"> ➤ Monitor periodically ambient air quality at selected sites. ➤ Confinement and absorption of the pollutants at source by creating vegetation along the length. ➤ Enforcing different control measures to check pollution (e.g. catalytic converters, unleaded petrol, proper serving etc.) ➤ Provision of green belt areas 	P & C in consultation with MPCB
4	Noise level	<ul style="list-style-type: none"> ➤ Monitor periodically ambient noise level at selected sites. ➤ Minimization of use of horns near sensitive locations/ silence zones with the help of sign boards at proper places. ➤ Provide noise barriers with plantation. 	P & C in consultation with MPCB
5	Water Quality	<ul style="list-style-type: none"> ➤ Monitor periodically water quality for establishing the change of water quality, if any, and assessing its potentiality of surviving aquatic flora and fauna and for irrigation use. 	P & C and MPCB
6	Soil Characteristics	<ul style="list-style-type: none"> ➤ Periodic monitoring of soil quality at specified distance for assessing contamination by vehicular spills, operation of machineries, handling of chemicals 	P & C and MPCB

Sr. No.	Project Related Issues	Actions to be Taken	Responsible Organisation
		<ul style="list-style-type: none"> ➤ Checking the overflow of spillage from the carriageway by promoting growth of vegetation cover along the road shoulders and preventing overflow to green belt. 	
7	Maintenance of Avenue trees	<ul style="list-style-type: none"> ➤ Plantation will be undertaken by the concession company on an aggressive note along the whole stretches on the both sides of the road. ➤ No mangroves will be cut or affected due to port construction. The port layout is planned in such a manner that mangroves will be unaffected. 	P & C in consultation with authorities and forest Department
8	Human Health and Safety	<ul style="list-style-type: none"> ➤ Vulnerable stretches, which are prone to accidents, will be identified. ➤ Adopt Safety measures and other control measure during Operation of the facility. <ul style="list-style-type: none"> ◆ Installing proper road signs, marking along the whole stretch in the form of cautioning, informatory and mandatory signs of gantry mounted overhead sizes. ◆ Installing fire safety measures, electrical safety measures, Personal protective Equipments and other work-safety measures. ◆ Incorporation of On-site Emergency Preparedness, Off-site Emergency Plan, Disaster Management Plan 	P & C in consultation with MPCB. Public Health Department.

1.12 PROJECT BENEFITS

- The development is envisaged to play a significant role in strengthening connectivity along the Maharashtra coastline.
- Enhancement in economy of Maharashtra.
- Substantial positive impact on socio-economic profile of VadHAVAN, in Particular, and Dahanu, in general, both in terms of overall employment and skill development of local workforce.
- Direct as well as indirect employment potential is envisaged.

- Probable augmentation in infrastructure resources such as transport, Communication, health facilities & other basic facilities.

1.13 ENVIRONMENTAL MANAGEMENT PLAN:

The EMP is prepared for Construction and Operation phase of the project. Budget Environmental Management Plan is as follows

Construction Phase: Port Area

Capital cost: 302 Lakhs

O & M Cost per Annum: 172.35 Lakhs

Operation Phase for Port Area

Capital cost: 403 Lakhs

O & M Cost per Annum: 113.50 Lakhs

Operation phase Rail-Road:

Capital cost: 222.12 Lakhs

O & M Cost per Annum: 73.17 Lakhs

Operation Phase – Residential Area

Capital cost: 212 Lakhs

O & M Cost per Annum: 55 Lakhs

Corporate Environment Responsibility Budget

As per the MOEFCC Memorandum dated 1st May, 2018 JNPA has proposed an amount of INR 190 Crores under Corporate Environment Responsibility (CER).

1.14 PROJECT COST:

The estimated project cost is INR 76,220 Crores