EXECUTIVE SUMMARY Of ENVIRONMENT IMPACT ASSESSMENT (EIA)

For

Environment and CRZ Clearance for Expansion and Modernization of Existing PNP Port

(Received Terms of Reference from MoEF&CC, Delhi in March 2018)

At

Village: Shahabaj, Dharamtar Creek, Tehsil- Alibaug, Dist -Raigad, Maharashtra.

PROPOSED BY

PNPMARITIME SERVICES PVT. LTD.

PREPARED BY

Mahabal Enviro Engineers Pvt. Ltd. Pollution monitoring, Engineers & Contractors in Environmental Management

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INTRODUCTION

PREAMBLE

The importance of ports and its related infrastructure plays a vital role in the growth of a nation and its economy. Indian Ports sector plays a crucial role in increasing the country's Gross Domestic Product (GDP). About 95% by volume and 70% by value of the country's international trade is carried on through maritime transport.

The transportation sector is a strong factor in terms of economic and regional balanced development, as well as also having a great influence on national integration to the world economic market. India has a rich history of trade across seas. Ports constitute an important economic activity in coastal areas. Ports are also important for the support of economic activities in the hinterland since they act as a crucial connection between sea and land transport. In terms of load carried, seaway transportation is the cheapest and most effective transportation system compared to other systems. Industries require a safe and cheap means of exporting finished goods and importing raw materials. Hence the majority of industries in the world are located in the coastal belts, in the vicinity of major ports. These industries in turn, influence the lives of the employees and indirect benefactors. Maharashtra State has a coastline of 720 km with two major and 48 minor ports.

PNP Maritime Services Pvt. Ltd. (PNP), has proposed an expansion into allweather multipurpose port, which is located in western bank of Dharamtar creek at Dharamtar, Shahabaj village, Raigad, Maharashtra State. The CRZ Clearance was obtained in 2003 from MoEF vide Letter No. J-16011/38/2001-IA III dated 6/10/2003 .PNP port has existing facility with three (3) unloading berths (32 m length & 10 m width for handling of bulk cargo) and one (1) berth is fixed to shore crane for handling of steel coil performing Lighterage operations since more than 20 years and handles upto four (4) MTPA of cargos.

At present PNP handles coal, steel coils and fine cement; totalling to a volume of approximately 4 MTPA. PNP proposed to increase the cargo handling capacity from 5.0 MTPA to 19 MTPA through modernization and expansion of the current port operations in order to cater the increasing business demands.

NEED FOR EXPANSION

PNP Port is the only minor port in Maharashtra with a tri modal connectivity. The port provides options for further hinterland movement of cargo to its clients by road, rail and sea route. **This optimizes the client logistics and also provides them with reduction in their carbon foot print.** The port is actively being used for Coastal movement of cargo, thereby reducing

pollution and saving in fuel consumption and costs for the country. The port cargo handling generates significant revenue in terms of Customs duties, wharfage and various other taxes for the Central Government, State Government and Local Government bodies.

Presently, PNP Dharamtar port handles dry bulk (coal, cement) and break bulk (steel coils) cargo. These cargoes are being handled at existing basic berth-like structures in a non-mechanized manner and evacuated via road as well as rail. The major volume handled is coal, which includes captive (institutional) as well as stock and sale coal. A small amount of cement is handled which is captive to the cement plant nearby. The existing port contains very basic facilities for handling and storage of these cargoes in an area of 60 Ha.

As per the GoI Make in India initiatives, PNP Maritime Services Pvt Ltd, envisages an increase in captive as well as commercial cargo and thus plans to augment the port capacity by modernizing/ mechanizing and expanding the port. PNP is also looking at handling liquid bulk in future. For this purpose, PNP will be acquire additional land of 135 ha which is adjacent to the existing port, and has thus developed a master plan comprising of layout for berths for cargo handling, mechanized material handling system, storage yard, rail and road infrastructure and evacuation plan. In addition to this, the port is a tri-modal port with rail facility; Dharamtar has an approved rail siding. The land proposed for expansion is land with/without scrub, partly barren land. The land for expansion of PNP port is not inhabited hence no rehabilitation and resettlement issues are foreseen in the present development.

PROJECT LOCATION

PNP port is located on the western bank of Amba River (i.e. Dharamtar creek) about 25 nautical miles (nm) from Mumbai Port Lighterage area and 18 nm from JNPT (Jawaharlal Nehru Port Trust) Port. It is around 14 nm from the inner anchorage and 25 nm from the outer anchorage. Its Google location is 18^o 41' 59" N latitude and 73^o 01' 33" E longitudes. Location of the PNP port is presented in **Figure 1.**

CONNECTIVITY ASPECT

The site is well connected with the SH No. 88 which connects to NH 66 at a distance of 4 km. Alibaug town is at 20 km distance from the site and 75 km from Mumbai. Nearest Railway station is Pen at 8.5 km and nearest Airport is Mumbai at 90 km. The site is having existing Rail connectivity so no new connectivity is required. The main railway which passes along the boundary of the port connects Pen station to Rashtriya Chemical and fertilizers' (RCF). The railway line ends at Thal. This railway line is developed and owned by RCF. PNP has developed 2 railway sidings inside the port area. The cargo that is evacuated by rail is mainly coal. The major centres in the hinterland are Mumbai, Nasik,

Amravati and Bhusaval. There is direct rail connectivity from the port to these hinterland centres.

PROJECT DEVELOPMENT PLAN

The present expansion of PNP Port comprise of Eight (8) berths for handling dry bulk cargo, two (2) Iron and steel handling berths, four (4) berths for handling liquid cargo and 200 m of container berth with the capacity of 19 MTPA of Cargo.

Existing Capacity/ Area	5.0 MTPA (Coal, Sulphur, Cement, Slag, Rock Phosphate, Bauxite, Steel Coils,) Existing Area: 60 Ha
Proposed capacity / Area	 5.0 MTPA to 19 MTPA along with modernization of the current port operations. The import cargo handled is primarily coal, which is shipped by rail/road to various power stations in the hinterland. The other cargo consists of Sulphur, Bulk Cargo, rock phosphate, MOP, DAP, Urea, Break Bulk cargo, Agro commodities, Clinker, Dolomite, Limestone, Pyroxenite, Iron ore Cement, Slag, Rock Phosphate, Bauxite, Steel Coils, Bitumen, timber, Tiles, Mill scales, Cotton, liquid cargo (Non-Hazardous) and Port Based Industries etc. PNP is in the process of acquiring another 135 ha (In addition to existing area)

EXISTING & PROPOSED PROJECT DETAILS



Figure 1: Project location

Executive Summary



Figure 2: Connectivity from project site to NH 66

NEED FOR THE DEVELOPMENT

The expansion and modernisation of PNP port will meet the capacity requirements of Maharashtra State and in turn is expected to boost the economy of State and the region. The close proximity of the port to National/Regional road and rail transport network is a major advantage for development of PNP Port.

The proposed project proposal falls under activity no. **7(e) of Category 'A'** (Ports, harbours, break waters, dredging) of Schedule to the EIA Notification 2006 based on the cargo handling capacity proposed at the Port is 19 MTPA, wherein these facilities require prior Environmental Clearance from the Ministry of Environment, Forests and climate change (MoEF&CC), Government of India based on an EIA study conducted as per the Terms of Reference approved by the Expert Appraisal Committee (EAC). The project also requires CRZ Clearance under the CRZ Notification, 2011 as the above proposed activities fall in CRZ IA, IB and III Zones. **The proposal was considered in 122nd MCZMA Meeting (Item No. 25 dt. 30.10.2017) and as per the MoM the project is recommended from CRZ point of view to MoEF&CC, Delhi.**

This EIA study has been prepared as per the Terms of Reference (ToR) approved by the EAC of MoEF&CC as issued by MoEF& CC vide letter No 10-70/2016-IA-III on 22nd March 2018.

PNP MARITIME SERVICES PVT. LTD. has appointed the following reputed consultants for various studies:

- Marine Biodiversity Assessment: Department of Life Science, Mumbai University, Mumbai.
- **Detailed Project Report:** BMT Consultants India Pvt. Ltd., Ahmedabad.
- HTL, LTL & CRZ Demarcation Study: The Institute of Remote Sensing (IRS), Anna University, Chennai
- **Detailed Traffic Report:** GMD Consultants, Mumbai.

The distances to the identified HTL were measured with respect to the known points such as survey plot boundaries and transferred to the base map. Existing land use and landform in the project area have been used for the identification of CRZ categories.

The proposed port development is permissible in CRZ subject to conditions as per the CRZ Notification 2011 as it requires waterfront and foreshore facilities.

PROJECT HIGHLIGHTS

✤ EXISTING INFRASTRUCTURE

The existing port facility has been developed in an area of 60 ha. The layout of existing port is shown in **Figure 3**. The port land is bound by waterfront on the right, railway on south and a small nala (creek) on the northern side. The berths are located alongside the waterfront; followed by backup area for storage of the cargo. The existing port at Dharamtar has four (4) jetties (shown in **Figure 4**) that are operational (Berth 1 to 4). Out of that, Berths 1-3 are block jetties used for handling bulk cargo and Berth 4 has mooring dolphins. There is a fixed ship to shore crane for handling of steel coils as shown in **Figure 4**.

PNP handled around 3.8 MTPA (\sim 4 MTPA) of cargo in Financial Year (FY) '16. This included: 3.2 MTPA coal, 0.56 MTPA steel coils & 0.03 MTPA other cargo (cement, bauxite, slag)

Of these, 1.71 MTPA of cargo, mainly coal, was evacuated by rail while 1.25 MTPA of coal, cement and steel coil cargo was evacuated by road.

• STORAGE AREAS

Coal storage areas are behind the jetties and along the railway line. Considering the parcel sizes of 25,000 T for each trader, coal is stored in small plots. For storage of steel coils, shed is available behind berth 4, on the west side of the railway plot.

• EXISTING UTILITIES AND STRUCTURES

Utilities available with the port include:

- ⁻ Admin building
- Customs building
- Gate complex
- Repair shed
- Substation building
- [–] Railway control room
- Weighbridges
- Overhead water tank
- DG set

• EQUIPMENT DETAILS AVAILABLE AT SITE

Equipment	Current	Lifting/ Carrying	Bucket
Description	Strength	Capacity	capacity
Excavators	16	2 ton	2.5 m ³
Payloaders	7	3 ton	3.0 m ³
Payloaders	13	5 ton	4.5 m ³
Fixed Ship Shore Crane	1	30 ton	

• WATER SUPPLY

Currently the water requirement of the port is being sourced from MIDC water supply scheme. There is an existing overhead water tank of 1 lakh litres. Total 73 KLD (33 KLD for Domestic and 40 KLD for Dust Suppression) water will be required during operation phase.

• POWER REQUIREMENTS

At present the port is getting power from the State Board. Besides, there are two diesel generator sets of 80 kVA and 160 kVA each available for backup power supply. During operation phase our demand will be 6.7 MW and DG set of 500 kVA will be provided.

✤ <u>PROPOSED INFRASTRUCTURE</u>

• MARINE SIDE INFRASTRUCTURE

The details of the berths to be developed are as follows:

- 8 bulk berths
- [–] 2 Iron & Steel product berths
- [–] 4 berths for handling of liquid cargo
- [–] 200 m of container berth

• LANDSIDE INFRASTRUCTURE

- STORAGE AREAS: Coal moved by road: The storage for coal to be evacuated by road will be located near the berths. An area of 15 ha will be provided. The internal roads will be 15 m wide for circulation. Water sprinklers will be provided along the internal roads for dust suppression.
- Coal moved by rail: The storage will be located along the proposed railway siding. A 17 ha area will be proposed. 15 m wide road will be planned between the plots. Each plot will have direct access to the railway sidings.
- Iron and steel products: Existing shed and open area will be used for storage of iron and steel products.
- Port based industry: Plot for port based industry will be developed on the western end of the port. 40 acres of area is proposed for the port based industry. This plot has access to railway and road.
- Cement silos: A dedicated 5 ha area is provided for development of cement silos in future.
- Liquid tank: Liquid tank farm facilities along with loading bays planned near the new waterfront on the north-west end of the port. The tank farms will be connected to the berths via pipelines running along the approach trestle.
- **Containers:** around 6 ha of storage will be provided for handling of containers.
- **Bulk cargo:** 3.5 ha of area will be provided for storage of bulk cargo.
- Truck parking: Around 3 ha of area will be provided for truck parking.



Figure 3: Existing Layout





PROPOSED PROJECT DETAILS

Sr. No.	Description	Details
1	Area of Land owned by proponent ashore	Existing: 60 Ha Proposed: 135 Ha (In addition to existing area)
2	Width of Channel	The Amba river has a width of 500 m at the Dharamtar Jetty and gradually widens to 900 m at Mankule, located 4.3 nm to the downstream.
3	Water Frontage available	2000 m
4	Existing cargo loading ramps	3 unloading Berths of 31 meters length & 10 m width for handling of bulk cargo.1 berth is fixed to shore crane for handling of steel coil.
5	Proposed Cargo handling Jetty	 8 bulk berths 2 Iron & Steel product berths 4 berths for handling of liquid cargo 200 m of container berth
6	Dredging Quantity	 Dredging in front of berths to 5.3 m CD Dredging required is upto the existing channel approx. 200 m from existing 3 m to 5.3 m CD to accommodate the new barges, Dredging Quantity estimated is 10,00,000 m³ and that will be used in our Port development Non-CRZ area
7	Population	740 Nos. (Staff, workers , visitors)
8	Water Requirement	73 KLD (MIDC + Tanker water)
9	Solid Waste	148 kg/d
10	Power Requirement	 During construction phase: 2,000 kVA During operation phase: 6.7 MW Source of power Supply: MSEDCL & DG set (during emergency)
11	DG Set Capacity	1 x 80 KVA, 1 x 160 kVA (existing) & 1 x 500 kVA (proposed)
12	Sewage Treatment Plant	STP will be provided of 50 KLD capacity. The treated water will be used for flushing, Gardening and dust suppression within the port premises.
13	Total Project cost	Rs. 1,058.34 Crore



BASELINE ENVIRONMENT

The baseline environmental status of the study region has been collected by the study team to ascertain the present environmental conditions around the proposed site. The study region for baseline data generation has been confined to 10 km radius around the project site.



Figure 6: Study Area (10 km radius)

SITE SETTING

The proposed PNP Port is located on the right bank of Amba River (i.e. Dharamtar creek) about 25 nautical miles (nm) from Mumbai Port Lighterage area and 18 nm from JNPT Port. It is around 14 nm from the inner anchorage and 25 nm from the outer anchorage. The land proposed for expansion is land with/without scrub, partly barren land.

The site is well connected with the SH No. 88 which connects to NH 66 at a distance of 4 km. Alibaug town is at 20 km distance from the site and 75 km. from Mumbai. Nearest Railway station is Pen at 12.75 km and nearest Airport is Mumbai at 90 km. The site is having existing Rail connectivity so no new connectivity is required.

DATA SOURCES

Data was collected covering one season i.e. winter season (Dec 2016–Feb 2017). The study team has collected the secondary information as well as the primary information on various environmental attributes. Information on existing

environmental conditions has been gathered from several sources including: Site surveys and field experiments to gather the information on Meteorology, Air Quality, Water Quality, Marine water and sediment quality, Noise Quality, Soil Quality, Land, Biological and Socioeconomic environment. The Environmental Key aspects of prevailing baseline environmental qualities are as follows:

METEOROLOGY:

1. Temperature

The daily minimum and maximum temperatures were recorded on-site during the aforesaid monitoring period and the same is depicted in Table 4-4. Maximum and Minimum temperatures observed during study period are 32.5°C and 23.2°C respectively.

2. Wind speed and direction

During the monitoring period, the daily mean wind speed measured on-site varied between 9.1 m/s in Dec 17, 9.5 m/s in Jan 2018 and 9.4 m/s in Feb, 2018. The overall mean wind speed during the period was 9.3 km/hr. The wind rose diagrams indicate that the predominant wind directions are from North-East for the entire period.

The predominant wind direction is NW in January to May. It gradually shifts towards south west and by June it becomes NW to SW. During the months of June, July and August, the wind blows from SW directions. From September the wind direction starts changing and by December, again the predominant sector becomes NE direction.

3. Rainfall

The average annual rainfall in the **Raigad district is about 2,924.19 mm** (from year 2000 to 2017). On an average, the project area district has about 95 rainy days per year.

4. Humidity

The humidity is generally high throughout the year. During the monsoon months i.e. June to September, humidity ranges from 81% to 90%. During rest of the year, humidity varies from 58% to 80%. The average humidity observed over the year is 73%.

AMBIENT AIR QUALITY

Air quality was measured at seven locations in the study area considering the prevalent upwind and downwind directions. Concentrations of particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide, oxides of nitrogen, carbon monoxide were measured. The average ambient Air Quality Status in Study Area is given below:

Sr. No	Location	ΡM ₁₀ (μg/m ³)	PM _{2.5} (μg/m ³)	SO ₂ (μg/m ³)	NOx (µg/m³)	CO (mg/m ³)	#AQI
1	Project site	90.3	42.8	13.0	15.8	1.2	90
2 At Dherand Village		60.5	32.1	9.2	12.5	1.2	61
3	At Pezari village	50.9	25.5	8.5	10.8	0.9	51
4	At Pen village	71.2	35.2	20.1	27.8	1.0	71
5	At PNP Automobile, Wadakhal Naka	76.9	37.7	26.0	31.7	1.3	77
6	At Dhakte Shahapur Dhakte village	51.8	29.0	8.6	11.6	0.6	52
7	At Mothe Bhal village	47.7	24.9	8.5	10.6	0.7	48

AMBIENT AIR QUALITY STATUS (AVERAGE)

(AQI: Good (0-50); Satisfactory (51-100); moderately polluted (101-200); Poor (201-300); Very Poor (301-400); Severe (401-500))

The salient observations of the average results and their compliance to the 24 hourly average NAAQ standards are as follows:

- The peak PM_{10} and $PM_{2.5}$ values are observed at project site and are below standard of 100 μ g/m³ and 60 μ g/m³ respectively.
- The Sulphur dioxide levels monitored at all the locations conforms to the standard of 80 μ g/m³, with highest value of 26.0 μ g/m³.
- The Oxides of Nitrogen levels monitored at all the locations also complies with the stipulated standard of 80 μ g/m³ with highest value 31.7 μ g/m³.
- The Carbon monoxide levels also complied with the stipulated standards of 2.0 mg/m³, The CO levels at all the locations were within the stipulated limit.
- AQI has been calculated for entire study period and it can be seen that the air quality is **satisfactory at six (6)** monitoring locations and is **good at one (1)** monitoring location.

NOISE QUALITY

In order to have an idea about the existing ambient noise in the study area, monitoring of ambient noise level was carried out at seven (07) representative locations in the study area using a suitable portable sound level meter. It is observed that day and night time equivalent noise levels at all the locations are within CPCB standards for Industrial, residential and commercial zones.

- During day time noise levels (Ld) ranged between 52.8 to 54.5 dB (A) and at night equivalent noise levels (Ln) ranged between 42.8 to 44.2 dB (A) in **residential zone**.
- During day time equivalent noise levels (Ld) 72.6 dB(A) and at night equivalent noise levels (Ln) 66.4 dB(A) in **Industrial zone**
- **In commercial area**, during day time equivalent noise levels (Ld) 63.2 dB (A) and at night equivalent noise levels (Ln) 54.2 dB(A).

WATER QUALITY

In order to get an idea about the water quality in the region, analysis of water was done from surface and ground water sources for various parameters. Surface and ground water samples were collected and analysed at 5 locations each.

The groundwater samples were collected from wells, which were being used by the local people for their consumption. The groundwater quality results of all the stations were compared with the permissible limits of Criteria for Raw Water Used for organized Community Water Supplies (Surface and Ground Water) Primary Parameters as per Annexure 4 of MoEF - EIA guidance manual for Ports and Harbors, MoEF, 2010. The pH value of the water samples are ranging from 6.50 – 8.11, which is within the permissible limit of 6.5 to 8.5. The total hardness ranges from 133- 175 mg/l, which indicates the softness of water. Low Calcium and Magnesium values are also attributable to soft nature of water. The concentration of anions namely chlorides, sulphates are well within the permissible limits. The concentration of heavy metal is low, indicating absence of any metal pollution source. The water is also not concentrated with bacteriological population.

The surface water was collected from ponds /lakes in the study area. pH of the water is ranges from the 7 - 9 in all samples which indicates the water level is slightly alkaline in nature. Total coliform were recorded 14 MPN/100ml from water samples at Dhakte shahapur village and 14 MPN/100ml at Dherand village. This two samples result shows contamination of the water.

Marine Water Sample

Marine water quality was monitored at seven selected locations in and around the proposed activities of port. Marine Surface water samples and depth samples were collected using a Niskin Sampler and preserved in two litres of jerry plastic cans and transported to laboratory for analysis. **Marine water quality is in the range expected for marine coastal waters (Water quality criteria class SW-IV)**.

LAND USE/LAND COVER BASED ON THE SATELLITE IMAGE:

The total area considered for land use study is 31425 ha (~10 km radius). Of this, agricultural land and hilly land area is contributing about 25.8% and 25.5% respectively, 15.2% is vegetation, Open land and human settlements is contributing about 7.5% and 8.5% respectively and water body is contributing around 4.3% of the area. The rest is distributed among mangroves (2.8%), Marshy area (3.5%), Tidal flats (6.8%).

Class name	Area in Ha	Area in km ²	Area %
Agricultural land	8107.3	81.1	25.8
Built up area	2664.6	26.6	8.5
Hilly area	8026.7	80.3	25.5
Mangroves	888.5	8.9	2.8
Marshy Area	1103.2	11.0	3.5
Open land	2372.1	23.7	7.5
Tidal flats	2142.4	21.4	6.8
Vegetation	4763.1	47.6	15.2
Water body	1357.2	13.6	4.3
TOTAL	31425.1	314.3	100

FLORA AND FAUNA

A detailed study on flora and fauna was carried out at various locations within the study area. Sampling locations were selected after the reconnaissance of the whole study area which includes **15** sampling points for the terrestrial vegetation and 6 for mangrove vegetation assessment.

Proposed area falls under Konkan Region of Maharashtra. And ecosystem composition within the study area is not very complex. Around 52 Nos. of trees species, 27 Nos. of shrubs, 17 Nos. of climbers and 29 Nos. of Herbs were recorded during the study period. Around 9 Nos. of Mangroves and 15 Nos. of Associated Mangroves were recorded during the study. A total number of 58 species of birds were identified during the study period.

Common domestic animals observed during the survey are Bos indicus (Cow), Babalus babalis (Buffalo), Capra domesticus (Goat), Felis domesticus (Cat), Canis familiaris (Dog), Sus domesticus (Pig), Funambolus palmarum (Three striped Squirrel). Equus cabalus (Horses) were also noticed during the survey. The common rodents are Common Mus booduga (rat) and Bandicoota indica (Field rat) while reptiles observed are Calotis versicolor (Garden Lizard) and Common Metanochelys lrijuga (Skin). Species of butterflies observed in the study area are Danaus genubia (stripped tiger), Ixias Marianne (white orange tip), Cepora nerissa (common gull), Tirumala limniace (blue tiger), Parantica aglea (glassy tiger), Eurema hecabe (common grass yellow), Euploea core (common crow), Pachliopta aristolochiae (common rose), Pachliopta hector (crimson rose), and Junonia lemonias (yellow pansy).

MARINE ECOLOGY

The sampling for phytoplankton and zooplankton was done at 7 sampling locations. The phytoplankton includes a wide range of photosynthetic and phototrophic organisms. Marine phytoplankton is mostly microscopic and unicellular floating flora, which are the primary producers that support the pelagic food-chain.

Phytoplankton initiates the marine food chain, by serving as food to primary consumers like zooplankton, shellfish and finfish. The dominant genera of phytoplankton are skeletonema, thalassiosira, navicula, peridinium, rhizosolenia, thalassiothrix, thalassionema, nitschia, cyclotella and guinardia are recorded in the dharamtar creek. The average chlorophyll values of estuarine were found to be 6.0 mg/m³, for phaeophytin as 3.8 mg/m³. These values suggest moderately high primary production potential in estuarine water body. Phytoplanktons in the study area are principally composed of one-celled diatoms, cyanophytes, coccolithophorids, chlorophytes and dinoflgellates. Diatoms and dinoflagellates were the dominant community.

Zooplanktons are ubiquitous in distribution form, a vital link for turnover of organic matter and transfer from primary producers like copepodsto secondary consumers like fishes. The rate of zooplankton production can be used as a tool to estimate the exploitable fish stock of an area. The predominant groups of Zooplanktons in the study area include Copepods, Sagitta, Myriads, Naupilli besides larval forms of gastropods, polychaetes, and others. Biomass of zooplankton was fairly high. The major group classifications include, copepods, lucifer, larvae of decapods and group of larval fish. Copepods dominated the population. Groups like ctenophores, polychaetes, gastropods and cladocerans were also present.

Sediment samples were collected from the same locations which were selected for phyto and zooplanktons. Benthic macrofauna was represented by members of polycheata, nematoda, coelenterata, crustacea, gastropoda, mollusca, and foraminifera.

Macrobenthic biomass was found in the range of $5.12 - 23.89 \text{ g/m}^2$ in the study area. An average biomass of 13.83 gm/m^2 was recorded during the present study. Group diversity was also found to be moderately high. Intertidal macrobenthic biomass was high, 188 g/m^2 . Group diversity was also moderately high. The intertidal organisms included cardium, cyprea, katelysia, meretrix, paphia and foraminifers, etc.

SOIL QUALITY:

The soil quality monitoring location will help to assess the soil quality of the project area, the physico-chemical and fertility characteristics of the soils within the study area were examined by obtaining soil samples from selected points and subsequent analysis of the same. Samples were collected from six (06) locations evenly distributed within the 10 km zone to understand the soil characteristics of the study area.

pH of soil ranged between 7.7 (S5) to 9.2 (S1) indicating alkaline soil. Water retention capacity varied from 66% (S2) to 78% (S5) and Organic content in the soil is varied from 28.2% (S1) to 44.7% (S4) indicates high fertility of the soil in this areas.

TRAFFIC SURVEY

Traffic survey was carried out on SH 88 (Alibaug-Pen), Mumbai Goa Road & Masad Bede Road. The traffic survey was conducted to ascertain the present traffic scenario along the above mentioned roads to evaluate traffic impact that will result from proposed expansion/development. The two key components of study included in the assessment were, the present Scenario and impact on traffic due to the proposed development. The survey was carried out for 24 hours in order to find out the existing traffic flow and thus to understand the residual capacity of the road.

Traffic surveys are necessary to gather base data information about existing traffic and travel pattern on surrounding roads. Road network within 5 km radius from the project location is considered for traffic study.

Based on preliminary analysis, it was observed that:

- **On Alibag Pen Road** the peak morning traffic was observed between 9 and 10 am (1154 PCU) and peak evening traffic was observed between 6 to 7 pm (1417 PCU).
- **On Mumbai Goa Road** the peak morning traffic was observed between 9 and 10 am (1920 PCU) and peak evening traffic was observed between 6 to 7 pm (2358 PCU).
- **On Masad-Bede Road** the peak morning traffic was observed between 9 and 10 am (41 PCU) and peak evening traffic was observed between 6 to 7 pm (50 PCU).

Traffic forecasting is done using trip generation rates which are developed to estimate the number of trips generated from proposed expansion unit. An overall trip distribution was developed for the site after a review of the existing travel patterns in the area. The volume of traffic generated / attracted will have a defined pattern of distribution both for entry and exit. The traffic on road network within 5 km radius was analyzed and results indicated that the existing roads are adequate to handle the additional traffic load considering the present Level of Service (LoS) and the following are the major infra projects that will reduce the increasing traffic impact.

- Eight laning of Alibag Pen Road (Virar- Alibaug Multimodal Corridor)
- Vadkhal Flyover
- Four laning of Mumbai Goa Road

SOCIO-ECONOMIC ENVIRONMENT

As mentioned the proposed project is located in the Raigad district. The study area comprises of about 96 villages. Total population of the study area as recorded in 2011 census is 1, 33,098. SC and ST categories constitute about 3% and 7% of the population respectively. Literacy rate is around 76%. Working population constitute 56% of the total population. Among the total working population Main and marginal workers constitute 76% and 23% of total population respectively. The proposed port is likely to have positive impact on the socio economic conditions of the region.

The social infrastructure in the region is likely to improve due to the creation of job opportunities and avenues for income generation. People will have income due to direct as well as indirect employment.

IMPACT ANTICIPITATED

Potential Impacts and Mitigation Measures of various Project Activities during <u>CONSTRUCTION PHASE</u>

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
1	Dredging	Marine water and marine ecology	 Reduced water quality by increase in turbidity and reduced dissolved oxygen due to suspension of sediments Change in marine water quality due to aqueous discharges (oily waste, sanitary wastes) from dredgers, barges and workboats 	 Emphasis on using best available technology/ Equipment's Check turbidity levels with baseline levels as reference during entire monitoring programme Use of Silt curtains to minimize spreading of silt plume Proper planning and scheduling on the dredging and disposal to avoid strong wind, current and tides that will further add to widen the effect of spreading of sediments Ensure that slop tanks shall be provided to barges/ workboats for collection of liquid/ solid waste 	Dredging Contractor and PNPMSPL

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
				 Discharge of waste into sea shall be prohibited Oil Spill control measures shall be adopted Marine environmental monitoring as per environmental monitoring programme shall be initiated one week prior to commencement of dredging and shall be carried out during the entire dredging period. Testing and analyzing the water column at upstream and downstream from all the dredging activities. 	
		Mangrove area	Impact on nearby mangrove	 Mangroves are located on both the banks of the creek and as per the studies, no significant impact is envisaged. Water quality monitoring will be carried out near mangrove areas during dredging 	Dredging Contractor and PNPMSPL

Executive Summary

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
2	Construction of proposed Jetties	Marine water quality	 Impacts during civil works activities like driving of piles, construction of berth / approach way, movement of construction equipments etc. will have high potential to disperse the fine grained sediments in to the water, thus increasing the particular load which in turn can adversely influence the photosynthetic activity further affecting the marine life. Change in marine water quality due to aqueous discharges (oily waste, sanitary wastes) from barges and workboats Construction phase operations may also lead to potential impacts due to resuspension and settlement of sediments, increased turbidity decreasing the light penetration and low 	 Preventing runoff from the C site containing construction materials, debris, construction P waste and excavated earthen materials to prevent impacts on the water environment especially on nearby marine water resources using drainages Check turbidity levels with baseline levels as reference during entire monitoring programme Discharge of waste into creek and streams will be prohibited Oil Spill control measures will be adopted Ensure that slop tanks will be provided to barges/ workboats for collection of liquid/ solid waste. 	Construction Contractor/ PNPMSPL

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
			photosynthetic activity, and, loss of benthic habitats due to disturbance of the bottom sea floor.		
3	Material transport and construction activities	Air Quality	 Exhaust emissions from vehicles/DG set Windblown dust during material movement Fugitive dust during material unloading, site preparation 	 All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards Construction equipment and transport vehicles will be periodically washed to remove accumulated dirt Providing adequately sized construction yard for storage of construction materials, equipment tools, earthmoving equipment, etc. Movement of material will be mostly during non-peak hours. Water sprinkling will be carried out to suppress fugitive dust Use of tarpaulin covers and speed regulations for vehicles engaged in transportation 	

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
				• Environmental awareness program will be provided to the personnel involved in developmental works	
		Disturbance to Natural Drainage pattern	 Impact to natural flow of runoff due to change of drainage course 	 Adequate storm water drainage system will be provided with settling ponds 	
		Vegetation and Strain on existing infrastructure	• Loss of vegetation (if any)	 The land proposed for development is a land with scrub/without scrub and barren land. So, no loss of vegetation is envisaged. 	
		Noise	 Noise from following activities Vehicles transporting construction material Diesel run engines Machinery Pile driving activities during construction of cargo berths 	 Noise levels will be maintained below threshold levels stipulated by Central/ State Pollution Control Board CPCB/SPCB Procurement of machinery / construction equipment will be done in accordance with specifications conforming to source noise levels less than 75 dB (A) 	
				 Well-maintained construction equipment, which meets the regulatory standards for 	

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
				 source noise levels, will be used Noise attenuation will be practised for noisy equipment by employing suitable techniques such as acoustic controls, insulation and vibration dampers High noise generating activities will be scheduled at daytime (6.00 am to 10 pm) to minimise noise impacts Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. Ambient noise levels will be monitored at regular intervals 	
4	Solid Waste Management	Soil quality	Impacts due to disposal of solid waste on ground without treatment	 Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. General refuse generated on- site will be collected in waste 	PNPMSPL

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
				 skips and separated from construction waste. Burning of refuse at construction sites will be prohibited. 	
5	Water Resources	Water Pollution	 Impact to the surface of water body 	 Required water for construction activities will be sourced from Tanker water supply. Avoid/minimise the loss during conveyance Optimized utilization of the water Care will be taken to prevent the runoff from the construction site to the nearby natural streams, if any Sewage generated from labour colony will be treated in STP & treated water will be used for dust suppression measures. 	PNPMSPL
6	Handling of hazardous materials	Human safety and property loss	• Fire due to handling of Hazardous substances	 Hazardous materials such as lubricants, paints, compressed gases, and varnishes etc., shall be stored as per the prescribed/approved safety 	PNPMSPL

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
				 norms. Medical facilities including first aid shall be available for attending to injured workers 	
7	Fishing	Fishermen and fishing villages	 Impact on fishing due to Construction works 	 Interactions will be initiated with the fishing community before commencement of work Path of incoming vessel traffic to be delineated and communicated to fishermen. Avoidance of activities impacting shore areas during fish breeding period (June & July) 	PNPMSPL

Potential Impacts and Mitigation Measures of various Project Activities during OPERATION PHASE

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
1	Cargo handling, DG sets, storage areas & Transportati on vehicles	Air Quality	 Emissions from DG sets (during Power failure), Vehicular emissions Emissions from Cargo Handling 	 Provision of Material Handling Cranes have been considered using grab unloaders or clamp-shell buckets which shall feed cargo to closed conveyor system for cargo movement between the jetty / berth to stock yard. Use of low sulphur diesel fuel is proposed Wind screens will be effectively used to reduce fugitive dispersion Regularization of truck movement Use of tarpaulin covers to avoid fugitive dust Speed regulations for vehicles engaged in transportation Control measures during loading and unloading activities of coal and other cargo to minimise SPM 	PNPMSPL

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
				 concentrations (use of water foggers) Stock piles, excavated earthen materials etc. shall be managed with water sprinkling to avoid dust /soil being airborne from the specific site Greenbelt Development Installation of conveyers for handling of cargo such as Coal 	
		Noise	• Due to equipment handling and vehicular movement	 Acoustic Barriers and Enclosures Personal Protecting Equipment (PPE) Greenbelt Development 	PNPMSPL
		Traffic Addition	 Cargo movement from/to port 	 A dedicated road network for the movement of trucks. Regularization of truck movement 	PNPMSPL
2	Cargo and Oil spills	Marine water quality and ecology	 Change in marine water quality 	• Wastewater/ sewage have a potential to pollute marine water or soil, if disposed untreated. However the treatment of sewage in STP	PMPMSPL

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
				 will minimize the impact & increase availability of water for greenbelt development. In case of any cargo spillage during transfer from/to ships, it will be attempted to recover the spills. Oil spill control equipment such as booms / barriers will be provided for containment and skimmers will be provided for recovery. 	
3	Water Supply	Water Resource	Impact on existing water resource	 Water requirement 73 KLD during operation phase and this water will be met from MIDC water supply and Tanker water supply from nearby villages. Water treatment plant, storage and distribution network will be developed. 	PMPMSPL/ Port Operator

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
4	Wastewater Discharge	Water Quality	• Impact due to discharge of runoff from container storage and sewage from port and port premises	 Separate Collection and treatment for oil and grease for runoff from workshop area, truck parking etc. Sewage treatment plant will be constructed within port area and port colony area Treated wastewater from STP will be used for irrigating the greenbelt 	PNPMSPL
5	Solid waste Management	Groundwater and Soil quality	• Impact due to disposal of solid waste on ground without treatment	 An integrated solid waste management plan is proposed for port and associated facilities Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. 	PNPMSPL
6	Handling of hazardous wastes	Fire accidents due to products handling	Human life and loss of property	 Hazardous materials if any will be stored as per the prescribed/approved safety norms. Hazardous wastes (used oil) will be sent to 	PNPMSPL

Sr. No.	Activity	Components likely to be impacted	Impacts	Mitigation Measures	Responsible Agency
				 MPCB/CPCB approved recyclers. Medical facilities including first aid will be available for attending to injured workers Emergency alarms, provision of fire hydrant system and fire station. Recovery of spills to the extent possible. 	
7	Operation of port	Socio-economic conditions of the	During operational phase, the p Nos. Local people will be given	oort is likely to generate direct empl n preference based on their qualifi	oyment of 450-500 cation and skill set.
		region	Together with this employme economic conditions of the are facilities that will be developed a	nt potential, project will help to a with better schooling, communic as a part of overall economic develop	enhance the socio ation and transport ment of the region.

ENVIRONMENT MANAGEMENT PLAN

Measures which will be adopted to reduce the magnitude of negative impacts from the proposed project during the construction and the operation phase are discussed below in the Environment Management Plan.

Sr. No.	Environmental Components	Mitigation Measures
1.	Ambient Air Quality	 To reduce impacts from exhausts, emission control norms will be enforced / adhered. All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards Adequately sized construction yard for storage of construction materials, equipment tools, earthmoving equipment, etc. will be provided. Movement of material will be mostly during nonpeak hours. Water sprinkling will be carried out to suppress fugitive dust Environmental awareness program will be conducted for provided to the personnel involved in
2.	Noise	 Noise will be maintained below threshold levels stipulated by the Central/ State Pollution Control Board (CPCB)/SPCB Procurement of machinery / construction equipment will be done in accordance with specifications conforming to source noise levels of less than 75 dB (A) Well-maintained construction equipment, which meets the regulatory standards for source noise levels, will be used Any equipment emitting high noise, wherever possible, will be oriented so that the noise is directed away from sensitive receptors Noise attenuation will be practiced for noisy equipment by employing suitable techniques such as acoustic controls, insulation and vibration dampers
		• High noise generating activities will be scheduled at daytime (6.00 am to 10 pm) to minimize noise

Environmental Management Plan during <u>CONSTRUCTION PHASE</u>

Sr. No.	Environmental Components	Mitigation Measures
		 impacts Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. Ambient noise levels will be monitored at regular intervals
3	Water	 Required water for construction activities will be sourced from through tanker water supply from the nearby villages. Loss of water will be avoided/minimize during conveyance Use of water will be optimized
4.	Land	 Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. General refuse generated on-site will be collected in waste skips and separated from construction waste. Burning of refuse at construction sites will be prohibited. All control measure will be taken to avoid contamination of groundwater during the
5	Marine Environment	 Sediment is a leading cause of impaired water; construction activities can affect the water quality. Best management practices (BMPs) will be conducted during construction phase of the project. Use of Silt curtains to minimize spreading of silt plume. Proper planning and scheduling for construction phase to avoid strong wind, current and tides that will further add to widen the effect of spreading of sediments. Runoff from the site containing construction materials, debris, construction wastes and excavated earthen materials will not be release to the marine area to prevent impact on nearby marine water resources. The construction debris generated during construction phase is very minimum and that will be utilized at site (outside CRZ) for site formation/levelling/ Road filling wherever possible.

Sr. No.	Environmental Components	Mitigation Measures
		 Turbidity levels will be checked with the baseline as reference during the entire monitoring programme Discharge of untreated waste into creek and streams will be prohibited Oil Spill control measures will be adopted Ensure that slop tanks will be provided to barges/ for collection of liquid/ solid waste Marine environmental monitoring as per environmental monitoring programme will be undertaken for timely detection of deviations from the baseline-to enable corrective measures.
6	Fishing and Fishing villages	 Interactions will be initiated with the fishing community before commencement of work Path of incoming vessel traffic will be delineated and communicated to fishermen. Activities impacting shore areas will be avoided during fish breeding period (June & July)
7	Safety Measures	 Adequate drinking water, toilet and bathing facilities will be available at the port premises. Personal protective and safety equipment will be provided. First aid facility for construction workers will be available. Regular health checkup for the staff and workers will be mandatory. Regular pest control will be done on site. Educational and awareness program with respect to firefighting and safety measures will be organized for staff and workers. Training to workers in safety will be organized (twice a Year) by the Safety Officer

Environmental Management Plan during Operation Phase

Air environment: The major source of air pollution will be dust from Cargo handling and emissions from DG sets and vehicles. Use of low sulphur diesel, regularization of truck movement, use of tarpaulin covers, use of grab unloaders or clamp-shell buckets, closed conveyor can avoid dust emission in atmosphere. Speed regulations will be imposed on vehicles engaged in transportation. Control measures during loading and unloading activities of coal and other cargo to

minimise PM concentrations will be in place. Stock piles, excavated earthen materials etc. shall be managed with water sprinkling to avoid dust /soil being airborne from the specific site.

Material Handling Cranes have been considered using grab unloaders or clampshell buckets during cargo handling from barges to the jetty / berth. The aim is to make use of Grab unloaders or clamp-shell buckets to reduce dust, spillage, handling loss etc. during cargo discharging from the barges at Jetties.

Liquid tank farm facilities along with loading bays are planned and will be connected to the berths via pipelines running along the approach trestle.

Noise Environment: The major noise sources will be machinery and DG set. The employees working near the noise generating sources will be provided with earplugs/PPE. The additional extensive greenbelt proposed to be developed around the plant will also help in attenuating the noise levels further.

Marine water Environment: Sewage have a potential to pollute marine water or soil, if disposed untreated. However the treatment of sewage in STP will minimize the impact & increase availability of water for flushing, greenbelt development/ dust suppression measures. In case of any cargo spillage during transfer from/to ships, it will be recovered to the possible extent. Oil spill control equipment such as booms / barriers, skimmers, absorption pads etc. will be provided for recovery of spilled oil. The Oil spill contingency plan will be framed to provide quick response to oil spill for efficient recovery. In the Coal handling yard, proper drains are provided to collect the runoff coming from the coal stock yard during the monsoon. The same is being passed through the settling ponds to arrest any course particle/ material entering the creek and then the supernatant will be discharged to storm water drains.

- Ships will be prohibited from discharging waste-water (except treated sewage), bilge, oil wastes, etc. into the near-shore as well as harbour waters.
- As a mitigation measure for spillages an Oil spill Contingency Plan will be prepared and implemented.
- Storage areas will be protected using garland drains so as to avoid mixing of runoff from these areas.
- A comprehensive greenbelt will be developed within the premises as per CPCB guidelines.
- Native species for plantation and creation of perching sites for birds for birds will be promoted.

• Regular monitoring of the local area will be done to inspect any residual impacts on ecology or marine environment caused by the project operation.

Water Environment: Water requirement will be 73 KLD during operation phase and that will be met from MIDC water supply scheme at the project site or Tanker water supply. Sewage treatment plant will be constructed within port area and port colony area. Treated wastewater from STP will be used for flushing, greenbelt or dust suppression measures.

Land Environment The existing port facility has been developed in an area of 60 Ha. The proposed development of PNP port is planned in an area of total 195 Ha which now comprises of land with/without scrub, partly barren land. PNP is in process of acquiring additional 135 Ha of land in addition to existing 60 Ha of area. The land for expansion of PNP port is not inhabited hence no rehabilitation and resettlement issues are foreseen in the proposed development.

All air emission control systems will be installed and operated to comply with the CPCB/MPCB norms. Sewage treatment plant system will be installed and operated to comply with the norms. All the solid waste will be disposed as per norms. Hence there will not be any adverse impact on land environment due to the present proposal.

Hazardous wastes (used oil from DG etc.) will be sent to MPCB/CPCB approved recyclers. Medical facilities including first aid will be available for attending to injured workers Emergency alarms, provision of fire hydrant system and fire extinguisher will be installed. Effective Disaster Management Plan (DMP) which covers onsite and offsite emergency plans. Oil Spill Contingency Plan will be in place to combat an accidental oil spill and containment and recovery of the spilled oil to the extent possible will be the preferred/approach. Dust suppression measures such as water foggers, etc. will be used and will be set at effective height to cover maximum stockpile area.

Green belt development: Green belt development will further enhance the environment quality through limitation of air emissions, attenuation of noise levels, balancing eco-environment, prevention of soil erosion and creation of aesthetic environment.

Occupational Safety & Health

During operational phase, the port is likely to generate direct & indirect employment of 450-500 Nos.

Rules and Safety guidelines as stipulated in the Indian Factories Act, 1948 will be followed. Risk assessment will be carried out in the yard on a regular basis. The goal for each risk assessment session is to identify hazards, determine risk ratings and controls and to review the implementation of risk controls from previous risk assessment sessions. Assessed risks and steps for prevention and control of loss / damage due to accidents will be communicated to employees through hoardings, boards, posters and internal company communications. Control room will be provided at Admin & Main building. First Aid Centres will be established at different strategic locations.

ENVIRONMENTAL MANAGEMENT AND MONITORING

In order to achieve all the set goals, a highly committed Environmental Management Cell with a highly qualified and experienced person in the field of Environmental Management of port will be considered for the position of Senior Manager for Environmental Management along with adequate supporting staff.

The major duties and responsibilities of Environment Management Cell are:

- To implement the environmental management plan (EMP)
- Risk identification and control of environmental problems
- Evaluate the efficacy of the EIA, mitigation measures, as stipulated in the EMP.
- Coordination with MoEF and other central/state pollution control boards for prevention and Control of pollution.
- To assure regulatory compliance with all relevant rules and regulations
- To ensure regular operation and maintenance of pollution control devices
- To initiate environmental monitoring as per approved schedule
- Review and interpretation of monitoring as per approved schedule
- Review and interpretation of monitoring results and corrective measures in case of monitored results deviate from the specified limit
- Maintain log of public complaints regarding environmental issues and the action taken (if any)

The effective implementation and close supervision by the environmental management cell to mitigate the environmental impacts, which are likely to arise due to operation phases of the project could be achieved through a suitable institutional mechanism. A budget of Rs. 103 Lakh (capital cost) & 121.5 Lakh/year (O&M cost) has been earmarked for the Environmental Management Plan and Environmental Monitoring Plan to address all environmental management requirements.