

Executive Summary

Environmental Impact Assessment for Construction of Multipurpose Jetty at, Panvel Creek, Villahe Targhar, District Raigad, Maharashtra

Project Proponent

Famous Dredging Corporation

Prepared By



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Accredited By: NABET- Quality Council of India





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SUMMARY AND CONCLUSION

Identification of project & project proponent

M/s Famous Dredging Corporation is engaged in the business of Dredging, Marine and Earthmoving field; having an office premises at Mumbai and work site-work shop at Dist Thane and Belapur, Navi Mumbai.

M/s Famous Dredging Corporation have successfully executed the work for Capital Dredging, Pipeline Trenching, Marine Infrastructure Project, Pipeline Laying, Land Reclamation, Major-Minor Port Development, Infrastructure Developments, Channel Cleaning, Mining/Soil/Earth filling, Bulk Material Handling, Erection of Dams/Power House Projects, Infrastructure Construction and Development, Civil Project and many other related projects.

M/s Famous Dredging Corporation is a company working in marine sector for last 36 years and is having fleet of Dredgers, Barges, and Tugs etc. They are engaged in diversified activities of sand dredging, barging, stevedoring and hiring of cranes and barges.

M/s Famous Dredging Corporation has already using waterfront near Village Targhar in panvel creek for parking of vessels. The present use of waterfront can be enhanced further and has sufficient back up land to develop a Multipurpose Jetty Terminal in view of the locational advantage and business potential.

Considering above potential and locational advantage, M/s.Famous Dredging Corporation, has Proposed to develop Multipurpose Jetty Terminal near Village Targhar, Tal: Panvel, Dist: Raigad.

M/s. Famous Dredging Corporation submitted the application for allotment of said waterfront along with intertidal land to Maharashtra Maritime Board (MMB) and MMB on 2nd November 2019 issued the Letter of intent (LOI) allotting the waterfront of about 100 m along with intertidal area for the development of Multipurpose jetty project in Panvel Creek at village Targhar (Tal. Panvel, District Raigad).

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1.1 Salient Feature of the Proposed Project

The construction of a multipurpose Jetty terminal with Approach cum berthing jetty, has been promoted as special purpose vehicle as a venture of Famous Dredging Corporation. The proposed multipurpose jetty is meant for handling domestic non-hazardous cargo such as bulk, break bulk, container and other cargo with projected throughout of 1.50 lakhs TPA in the initial years to about 10.00 lakhs TPA or more in the later years. The proposed capacity. No hazardous chemicals will be handled for proposed project. The detail of projected cargo handling is as under:

| Projected Annual Cargo | | |
|-------------------------------|---------------------------------|------------------------------------|
| Sr. No. | Particulars | Quantity (In Lakhs Tonnes) |
| 1 | Steel Coils | 2.00 |
| 2 | Bulk Cement/Bagged Cement | 3.00 |
| 3 | Silica Sand | 1.00 |
| 4 | Coarse Aggregate/Fine Aggregate | 3.00 |
| 5 | Other Cargo | 1.00 |
| | TOTAL : | 10.00 |

The infrastructure plan consists of a main berth about 200m away from shoreline connected by approach trestle connecting to the shore line for cargo handling. It is proposed to provide storage area for bulk, container and general cargo along with area for administrative block and utility services for multipurpose jetty and workshop, repair / building bay, stores and utility areas for jetty operations.

Area Statement of Proposed Facilities

| S. No. | Proposed facilities | Approximate Area (m²) |
|---------------|----------------------------|---|
| 1. | Main Berth | 825.00 |
| 2. | Slipway | 2400.00 (partly under water) |
| 3. | Approach | 825.00 |
| 4. | Bulk Cargo | 639.91 |
| 5. | Break Bulk Cargo | 787.80 |
| 6. | Other Cargo | 645.65 |

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| | | |
|-------------------|------------------|-----------------|
| 7. | Working Area | 1192.08 |
| 8. | Fabrication Work | 1201.03 |
| 9. | General Storage | 894.78 |
| 10. | Admin Block | 821.65 |
| 11. | Parking Area | 557.95 |
| 12. | Road Area | 1917.13 |
| 13. | Greenbelt Area | 5015.36 |
| Total Area | | 15000.00 |

**NOTE: The areas given are indicative only*

No dredging is foreseen except in the initial phases dredging that may be required for forming basin in front of the proposed berth or area between deep waters and present waterfront / shoreline.

In future, it is proposed to dredge the entire area in front of the waterfront of about 100.00 m x 200.00 m up to the channel to -3.00 m to have vessel entry and exist at all tides and any time of the day /night.

The reclamation is proposed in the intertidal area for developing additional land area for operations. Total reclamation area will be 5000 m². Reclamation will be carried out using materials from excavated / dredged soil or filling materials from approved borrow pits in the nearby areas. The filling will be done using conventional method in layers of about 300mm to 400 mm and with necessary compaction as practicable.

Water Requirement for the Proposed Project

| Sr.No. | Water Use Category | Construction Phase (m ³ per day) | Operation Phase (m ³ per day) |
|--|--------------------|--|---|
| 1 | Domestic | 3.6 | 3.0 |
| 2 | Curing | 6.4 | -- |
| 3 | Sprinkling | 10.0 | 9.0 |
| 4 | Green Belt | -- | 20.0 |
| Total water requirement (m³ per day) | | 20.0 | 32.0 |

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Power Requirement

The power requirement will be mainly a for both ship repairs / ship building and cargo loading operation which is estimated to be about 300 kVA in the initial stages to about 1.0 MW in future. The power will be arranged through Maharashtra State Electric Distribution Company (MSEDCL).

The DG sets of capacity 75 kVA will be used as a backup power supply, only in case of emergency and available as stand by. No bunkering is planned for supply of fuel to vessels. Therefore, the storage will be limited to fuel required for D. G. sets which will be stored in 100/200 liter drum with fencing around storage area.

Manpower Requirement

Construction phase will generate employment for local people including various subcontractors, electricians, machinists, welders, painters, blasters, riggers, pipe fitters and a number of administrative and managerial staff. The proposed Multipurpose Jetty Terminal will create employment opportunity in skilled and unskilled sectors. Most of the man power required will be procured through the subcontractors, not directly employed by the FDC.

The expected manpower requirement during construction phase is about 80 Nos. Although the workforce requirement will be temporary in nature, it will be met from the local population as far as possible hence there will be positive impact. Local businessmen will get opportunity to supply construction materials. Demands generated from the labour force for basic facilities including eatables etc. will increase the local business activity of the area.

Similar to the construction phase, the operation phase of the Multipurpose Jetty Terminal will also provide opportunities for employment mostly in the skilled and semi-skilled categories. In the initial stage of the operation phase, there will be a requirement of about 130 operational workers, out of which, 30 workers will be deployed directly and 100 workers indirectly. This will enhance the income of the people associated with subcontracting business. All these activities will need support services like food, transport, medical facility etc. ultimately leading to improvement in quality of life of local people.

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Project Cost

The facilities which will be implemented phase wise and the project cost is estimated of INR 1190.00 lacs for phase 1 of development which includes cost of surveys, earthwork, onshore facilities, marine works, utilities such as water, power and sewage treatment, engineering and other miscellaneous costs and contingencies. The details of the Environment Management Plan are given in Chapter 6.

1.2 Environmental Setting of Project area

Panvel is one of the cities in the district Raigad. It is also called the gate of Raigad because Panvel is the first city when you enter in Raigad. It is also one of the most developed cities in the whole Raigad district. Panvel is situated on the banks of the Gadhiriver which flows and connects all the way to the Arabian sea.

Project location is accessible from other parts of Navi Mumbai and from Mumbai by road and rail transport facilities. Belapur railway station lies on the harbour line and SionPanvel Highway passes through Belapur. BEST buses are available from CBD Belapur to Mumbai and NMMT buses are available from Belapur to Vashi, Thane, Dombivali, Kalyan, Badlapur, Uran, Taloja and Panvel.

| Particulars | Details | | | | | | | | | | | | | | | |
|---------------------------|---|--------------|----------|-----------|----|---------------|-------------|----|---------------|-------------|----|--------------|--------------|----|---------------|--------------|
| Name of the Project | Construction of Multipurpose Jetty at Panvel Creek Village TargharDistRaigad | | | | | | | | | | | | | | | |
| Location of the Project | Panvel Creek Village: Targhar, Taluk: Panvel District: Raigad, State: Maharashtra | | | | | | | | | | | | | | | |
| Geographical Coordinates: | The site lies in Raigad district of coastal Konkan division of Maharashtra and the coordinates are: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th style="text-align: center;">Sl.No.</th> <th style="text-align: center;">Latitude</th> <th style="text-align: center;">Longitude</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td style="text-align: center;">18°59'58.04"N</td> <td style="text-align: center;">73°2'1.26"E</td> </tr> <tr> <td style="text-align: center;">2.</td> <td style="text-align: center;">18°59'55.01"N</td> <td style="text-align: center;">73°2'0.00"E</td> </tr> <tr> <td style="text-align: center;">3.</td> <td style="text-align: center;">19°00'1.47"N</td> <td style="text-align: center;">73°1'53.49"E</td> </tr> <tr> <td style="text-align: center;">4.</td> <td style="text-align: center;">18°59'58.44"N</td> <td style="text-align: center;">73°1'52.29"E</td> </tr> </tbody> </table> | Sl.No. | Latitude | Longitude | 1. | 18°59'58.04"N | 73°2'1.26"E | 2. | 18°59'55.01"N | 73°2'0.00"E | 3. | 19°00'1.47"N | 73°1'53.49"E | 4. | 18°59'58.44"N | 73°1'52.29"E |
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| 4. | 18°59'58.44"N | 73°1'52.29"E | | | | | | | | | | | | | | |
| Plot/Survey Nos. | Plot No. 58/1 | | | | | | | | | | | | | | | |

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| Particulars | Details |
|---|---|
| Nearest Highways | Uran Road – 0.03 km Mumbai Pune Expressway-2.75 km |
| Nearest railway station | Bamandongri Railway Station – 2.7 km Seawoods – Darave Railway Station- 2.7 km |
| Nearest Airport | ChhatrapatiShivaji Maharaj International Airport – 20 km Proposed Navi Mumbai International Airport – 0.2 km |
| Nearest town/City | Belapur City - 3.0 km (N) |
| Sea Port | Jawaharlal Nehru Port Trust 9.5 km Nhava Sheva International Container Terminal - Government office-9.15 km |
| Ecologically sensitive zones | None at the project site Nearest Mangroves – 0.33 km (W) Mangroves in Panvel Creek – 0.60 km (E) Mangroves in Nhava Creek – 1.30 km (S) |
| Major water bodies/reservoirs within 10 km radius | Panvel Creek – Abutting Thane Creek – 6.65 km |
| Mud flats | Few Mudflats are present in Panvel Creek |
| Sand dunes | None within 10 km |
| Corals, coral reefs and associated biodiversity | None within 10 km |
| Salt marshes, Turtle nesting grounds, Horse shoe crab habitats, Sea grass beds | None within 10 km |
| Archaeologically important places | As per Archeological Survey of India, no Grade I site is present at the project site KillaBelapur – 0.59 km (N) |
| Protected areas as per Wildlife Protection Act (Tiger reserve, Elephant reserve, Biospheres, National parks, Wildlife | Reserve Forest near Belpada Village-Approx.6.50 km Reserve Forest near Padeghar Village-Approx.4.60 km Reserve Forest Near Jambhulpada-Approx.6.40 km Reserve Forest near Pargaon -Approx. 6.00 km |

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| Particulars | Details |
|--|---|
| sanctuaries, community reserves and conservation reserves) | Reserve Forest near Kharghar -Approx.4.50 km |
| Biosphere Reserves | None within 10 km radius |
| Critically polluted areas as per MoEF notification | Navi Mumbai – 3.51 km |
| Defense Installations and specially those of security importance | Bhabha Atomic Research Center – 11.30 km (NW) |
| Seismicity | The proposed project is located in Seismic Zone III - Moderate Risk Zone as per IS: 1893 (Part 1: 2002) |

1.3 Purpose of the Report

The principal Environmental Regulatory Agency in India is the Ministry of Environment, Forests and Climate Change (MoEF&CC), Government of India. MoEF&CC formulates environmental policies and accords environmental clearance for the projects which attracts EIA notification. As per Environmental Impact Assessment (EIA) Notification dated 14th September 2006, proposed project falls under category- ‘B’ of project activity 7(e) and requires prior Environmental/CRZ Clearance to be obtained from Ministry of Environment, Forest & Climate Change (MoEF&CC) before the commencement of ground activity. The application No: 51887 & proposal No: SIA/MH/IND2/51887 for prior EC (Form-1 and Pre-Feasibility Report) for the proposed project has been submitted to State Expert Appraisal Committee (SEAC) - 1 and same was reviewed by the SEAC in its 184th meeting held during 2th -5th June, 2020 to grant Terms of Reference (TORs) for the preparation of EIA/EMP report. Copy of Minutes of Meeting (MOM) of the SEAC – 1 enclosed as Annexure-I. Since, the project is proposed in the coastal area it attracts CRZ Clearance, as per CRZ notification January 2011 and its subsequent amendments.

The proposed activity is permissible as per CRZ Notification 2011, Paragraph 3 - Sub Paragraph (i) Clause (a) “Those directly related to waterfront or directly needing foreshore facilities”. In this connection, Form-I along with TOR in the prescribed format was submitted to SEIAA, The same was reviewed during 184th meeting of the State Expert Appraisal

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Committee (SEAC-1) held on 4th June 2020. The project was recommended for TOR by Committee.

The proposed activity is permissible as per CRZ Notification 2011, Paragraph 3 - Sub Paragraph (i) Clause (a) “Those directly related to waterfront or directly needing foreshore facilities”. As per the CZMP map, the project falls into CRZ IV B and CRZ II category (CRZ notification, 2011). The multipurpose jetty and approach cum berthing jetty is falling under CRZ IV B and the backup facilities are falling under CRZ II.

Baseline Environment

The establishment of baseline data for different environmental components in the designated study area and at the project site has been conducted by field monitoring / investigation for baseline data generation. The baseline study carried out for the proposed project from December, 2019 to March, 2020 (winter season).

The data generation was carried out covering Ambient Air Quality, Noise Levels, Water Quality, Land Use, Soil Quality, Ecology, Hydrology and Socioeconomic features. Additional data/information regarding geology, ecology, demographic pattern and socio-economic conditions were also collected from secondary sources.

| S. No | Attribute | Stations | Parameters | Monitoring Period |
|-------|-----------------|----------|---|----------------------|
| 1 | AAQM | 5 | PM ₁₀ , PM _{2.5} , SO _x , NO _x , CO | Dec 2019- March 2020 |
| 2 | Noise-24 hrsLeq | 5 | As per Standard ToR | January 2020 |
| 3 | Soil | 5 | As per Standard ToR | January 2020 |
| 4 | Surface Water | 4 | As per IS10500 | January 2020 |
| 5 | Groundwater | 3 | As per IS10500 | January 2020 |
| 6 | Marine Water | 5 | As per Standard ToR | January 2020 |
| 7 | Sediment | 5 | As per Standard ToR | January 2020 |

Ambient Air Quality Monitoring Results

Observations from the data:

PM₁₀: The maximum value for PM₁₀ is observed at AAQM 1 as 70µg/m³ with the minimum value observed at AAQM 04 as 46 µg/m³ during the study period.

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PM 2.5: The maximum value for PM_{2.5} is observed at AAQM 02 as 29 $\mu\text{g}/\text{m}^3$ with the minimum value observed at AAQM 03 & AAQM 04 as 19 $\mu\text{g}/\text{m}^3$ during the study period.

SO₂: The maximum value for SO₂ is observed at AAQM 01, AAQM 02, AAQM 05 as 15 $\mu\text{g}/\text{m}^3$ with the minimum value observed at AAQM 01, AAQM 03 and AAQM 5, as 10 $\mu\text{g}/\text{m}^3$ during the study period.

NO_x: The maximum value for NO_x is observed at AAQM 02 as 27 $\mu\text{g}/\text{m}^3$ with the minimum value observed at AAQM 05 as 12 $\mu\text{g}/\text{m}^3$ during the study period.

CO: The maximum value for CO is observed at AAQM 01, AAQM 02,03, as 1.4 mg/m^3 with the minimum value observed at project site AAQM 03 & AAQM 04 as 0.8 mg/m^3 during the study period.

The results of the monitored data indicate that the ambient air quality of the region is in conformity with respect to residential norms of the National Ambient Air Quality Standards of CPCB with present level of activities. Ambient air quality monitoring results attached as Appendix I of EIA report.

Noise level observations:

The maximum Leq (day) value is found to be 56.2 at ANQM 1 whereas the minimum Leq (day) is found to be 52.3 at ANQM 4 & ANQM 5. However, the maximum Leq (night) is found to be 46.1 at ANQMS whereas the minimum is found to be 42.2 at ANQMS 5. The noise levels are found to be well within the standards of the study area.

Ambient noise level monitoring results attached as Appendix II of EIA report.

Surface Water Quality

The analysis data for the monitoring period of surface fresh water is presented in Table 3.13. Surface water quality monitoring results are attached as Appendix III of EIA report.

The analysis results indicate that the pH values in the range of 7.2 to 7.6, the minimum value was observed at SW 2 and maximum value was observed at SW1

DO was observed to be in the range of 4.6 to 5.7 mg/l. The TDS was observed in the range of 378 to 3540 mg/l, the minimum TDS value was observed at SW1 whereas maximum value was observed at SW4. The chlorides and sulphates were found to be in the range of 49 to

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1517 mg/l and 66 to 340 mg/l, respectively. The calcium & magnesium were found to be in the range of 55 to 131 mg/l and 23 to 158 mg/l, respectively. The surface water quality of SW-2 in accordance with water quality standards falls under Class C. The surface water quality of SW-4 in accordance with water quality standards falls under Class B. Surface Water 1 and 3 in accordance with water quality standards falls Under Below E i.e., Not meeting A,B,C,D,E.

Ground Water Quality

The analysis data for the monitoring period of surface fresh water is presented in Table3.14. Surface water quality monitoring results are attached as Appendix IV of EIA report.

The analysis results indicate that the pH values in the range of 7.6 to 7.9, the minimum value was observed at GW 2 and maximum value was observed at GW1

The TDS was observed in the range of 478 to 550 mg/l, the minimum TDS value was observed at GW2 whereas maximum value was observed at GW2. The chlorides and sulphates were found to be in the range of 44-65 mg/l and 89-930 mg/l, respectively. The calcium & magnesium were found to be in the range of 70 to 77 mg/l and 40-44 mg/l, respectively.

Marine Water observations

pH is an important parameter to determine the acidity or alkalinity and neutral scale. It greatly affects the microbial population as well as the solubility of metal ions and regulates nutrient availability. pH is in the range of 7.2-7.9. The electrical conductivity ranges of 38450 to 46800 mS/cm. Dissolved oxygen is found between range of 4.5-5.9 mg/L. Total dissolved solids detected in range of 24990 to 30540 mg/L.

Marine Sediment observations

It was observed that the sediments are slightly alkaline as their pH is in the range of 7.2 to 8.0. Organic matter present in sediment influences its physical and chemical properties. Coastal sediment analysis shows that the concentration of organic matter is in the range of 0.7-1.2% and organic carbon is in the range of 0.4 – 0.7%. Sediment analysis shows lower values of organic carbon.

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Soil Quality Observations:

Physical Properties of Soil

The physical properties of soil determine the aeration of the soil and the ability of water to infiltrate and to be held in the soil, Color, Bulk density, Water Holding Capacity etc.

The soil being of friable consistency, the bulk density & water holding capacity of the soil is in the range of 1064 to 1156 kg/m³ & 51.4 -55.1 respectively.

b) Chemical Properties of Soil

The collected soil samples were analyzed for various chemical parameters. The parameters selected were pH, electrical conductivity, soluble anions and cations, nutrients and organic carbon content.

pH is an important parameter indicating alkaline and acidic nature of soil. It severely affects the microbial population as well as the solubility of metal ions that regulates nutrient availability. The pH of the soil in the study area is Neutral to slightly alkaline in reaction having pH is in the range of 6.8 - 7.8

The soluble salts were determined from soil extract (1:2). The soluble salts are expressed in terms of electrical conductivity (EC). The (Electrical Conductivity) of the soil extract in the study area is in the range of 0.189 -1.214 mS/cm. which is less than 2 mS/cm indicating no salinity problem to be expected in the soil

CEC is in between 23.5 and 31.4 meq/100g, moreover it can be interpreted that soil has Moderate productivity & high to very high absorption capacity. Table a & b

Most of the important cations present in soluble salts in the soil are Calcium, Magnesium, Sodium, Potassium; it was observed that the concentration levels of Calcium and Magnesium were 82 to 98 mg/kg, 35 to 74 mg/kg & sodium -Potassium 52-124, 12-44mg/kg respectively.

c) Nutrient Status of Soil

Organic matter present in the soil influences its physical and chemical properties. It commonly accounts as one third or more of the cation exchange capacity of surface soil and is also responsible for stability of soil aggregates. Analysis shows that the concentration of organic matter is in the range of 0.7to 1.2 % and total organic carbon is in the range of 0.4 to 0.7 %. Table c) on comparison with the classification made as shown in Tables (c) it was observed that Soil samples are poor fertile to Medium fertile in nature based on organic carbon contents.

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Available phosphorous potassium and nitrogen, of the soil samples are found to be in the range of 37-130, 146-271 & 16.9 -195 kg/ha respectively, It was observed that P₂O₅ content in the soil indicates Medium fertile soil, k₂O content indicate is medium fertile while Nitrogen content in the soil are adequate to classify the soil as poor fertile.

d) Heavy Metal Content in the Soil

The heavy metals occur in the solution as cations and are adsorbed by the negatively charged soil particle. They are held strongly as complex on the surface of clay, alumino silicates, hydrated oxide and humus. In general adsorption increases with pH, heavy metals pollution is serious because it can persist for many decades. The heavy metals also create problems in the nutrient utilization in plant and also marked reduction in chlorophyll content.

Soil samples were also analyzed for heavy metals such as Chromium (Cr), Zinc (Zn), Lead (Pb), Nickel (Ni), Cadmium (Cd), Cobalt (Co), Manganese (Mn), Iron (Fe) and Copper (Cu) and their concentrations are presented. The presence of heavy metals at proper pH enhances the microbial activity. In soil The concentration of heavy metals found in the study area is normal.

Biological Environment

Flora

The study area covers 10 km radius around the project site. This area includes plain areas and hills. The plain areas consist mostly of agricultural land, fallow land, salt pans and urban settlements. During Study period 37 species of trees, 19 species of shrubs, 15 species of herbs, 7 species of climbers and 10 species of grasses were reported in the study area. Species reported are common in the study area, however, RET species not reported in the study area.

Agricultural Crops

Owing to inadequate irrigation facilities most of the agricultural crops are dependent on monsoon. Kharif (early monsoon) crops cover most of the gross cropped area in the region. Paddy is the main Kharif crop of the region. Eleusine coracana (Ragi / Finger millet / Nagli), Paspalum scrobiculatum (kodra / millet) and Panicum meliaceum (Varai / Proso grass) are other Kharif crops. Pulse crops like horse gram (kulthi), black gram (Urad), small fruited dolichos (chavli) etc. are also grown in this season. Agriculture resources in study area are rapidly depleting due to urbanization. Many agriculture fields are being converted into building constructions.

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Mangroves

Mangroves are dominated by *Avicennia marina* with the frequent occurrence of *Sonneratia apetala*, *Aegiceras corniculatum*, *Excoecaria agallocha*, *Acanthus ilicifolius* and rarely *Rhizophora mucronata*.

Along the banks of Ulwe River there is a somewhat continuous and healthier growth of *Avicennia marina* with patches of *Salvadora persica*. At places *Acanthus longifolia* is also seen growing among the *A. marina*. Along the banks of Ulwe River.

Thane creek shows stunted growth of *Avicennia* and over dominance of *Acanthus ilicifolius*. This indicates a secondary succession in mangrove forests after in situ destruction of original mangrove cover.

Fauna in Study Area

The study area is poor in wildlife as there are few good forests in the region and that too away from the project site. In the study area, Hare, Jackals and foxes are recorded adjacent to the rocky hills. Wild Boar is found in scrub jungle. Rat snake, Cobra and Vipers are commonly observed reptile species.

Endangered Species

The study area did not record the presence of any critically threatened plant or animal species.

Marine Ecology

Phytoplankton

Phytoplankton counts recorded during March 2020 at different sampling stations. Total algal population varied between 212 and 610 algal cells/ml. Samples collected at station 1 bottom and station 4 surface showed lowest and highest counts respectively. In general counts were less at bottom. These might be attributed to less penetration of sunlight due to turbid waters.

The phytoplankton population comprised of 3 major groups, namely Bacillariophyceae, Chlorophyceae and Cyanophyceae. The most common genera found were *Nitzschia*, *Navicula*, *Oscillatoria*, *Fragillaria*, *Cosmarium* & *Ulothrix* (3.27). These are generally found in organically polluted water

Zooplankton

Zooplankton counts, recorded during March 2020 at different sampling stations, Density of zooplankton varied between 190 and 440 No/m³. Total three groups of zooplankton were recorded. A large number of zooplankton, recorded at station 4 could be due to the presence of ample amount of phytoplankton in the respective station. Rotifera was rare while Copepoda was dominant. Shannon - Wiener Diversity Index (SWI) observed to vary from 0.45 to 1.84 at stations 2 & 5 respectively indicated low to medium load of organic pollution

Benthos

Total of three macrobenthic groups were obtained from the five sediment samples. Foraminifera was the most diverse group. Species like Triloculina, Ammonia, Lagenella and Florilus were dominant. It was followed by Gastropods. Among the Gastropods, the dominant species were *Litiopa sp.*, *Littorina sp.*, *Morula sp.* and *Oliva sp.* (Table 3-30). The SWI values were observed to vary from 0.48 – 1.00. Generally, distribution of macrobenthos was not homogenous among sampling station.

Socio-Economic Study

Questions were asked to respondents to seek their opinions, perceptions and aspirations regarding the proposed project. Opinions are important vehicle through which one could understand the existing mental attitude of people in general and groups, and community in particular.

- Concerning the sex structure of the respondents, 80 percent of the respondents were males while 20 percent were females.
- The average household size was found to be 4 members.
- Education is one of the keys to success and development and as such, people pay much attention to their educational status. Most of the sample respondents interviewed had some kind of formal education. Nearly three fourth of the respondents had attained education till SSC/HSC, 20 percent of the respondents have education till primary (Class 1-5) as the formal education, also 5 percent of the respondents have completed graduation. Questions were asked about the number of earning members in the family their type of income and their respective jobs. Most of the respondents are private employee working in private sector. Also some peoples

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having self-employed occupation like Motor garage, small shops, fruit and vegetables seller.

- House constitutes the most vital aspect of the basic needs of man and basic amenities form an integral part of the housing facility. Most of the respondent having pacca type house (Cement concrete, Teen roof), Basic amenities are measured through the availability of drinking water facility, toilet, drainage, garbage disposal, electricity, cooking fuel etc. all respondent using LPG Gas for cooking fuel. Municipal Corporation and local Grampanchayat provide drinking water and basic facility.
- Availability of toilet is an important indicator of the sanitation. All respondent are using private own toilet.
- When asked about the most pressing problem faced in surrounding area respondent highlighted the sanitation problem in project area. But still the peoples are happy.
- Questions were asked to respondents to seek their opinions, perceptions and aspirations regarding the project. Opinions are important vehicle through which one could understand the existing mental attitude of people in general and groups, and community in particular.

Many respondents are aware of the project, all respondents are in support of the project, and their only demand is to give the preference to local people for labour contractors, transporters and raw material suppliers etc. in construction phase and job opportunity in operation phase.

Anticipated Environmental Impacts

The impact of activities at the proposed Construction of multipurpose jetty on various environmental components like air, water, noise, land, biological and socio-economic have been assessed and evaluated in this chapter. The evaluation of impacts is done on the basis of severity of the impact on environmental component. The impact is defined as positive if the environmental consequences of the activity are beneficial and vice-versa. The impacts are also defined as reversible if the impacts disappear over a period of time on the ceasing of activity that caused the impact. The impacts are termed as irreversible if the environmental consequences persist in the environment even after the activity ceases. The impacts are also defined in terms of duration over which the impact is expected such as long term or short term impacts.

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Activities in construction phase of the project, which potentially affect the air quality, are transportation of construction materials, exhaust emission from DG sets, vehicles, workboats and construction machineries. Combustion of diesel in various construction equipment could also be one of the sources of air pollution during the construction phase. Emissions from construction equipment, machinery and transport vehicles may also contribute to air pollutants namely SO₂, NO_x, HC and CO. The impact on air environment during the construction phase is not expected to be significant. No demolition activities involved. Hence no major air quality impact envisaged during construction.

The proposed project will generate noise that will be irradiated in the surrounding water. However, there would be piling activity and impulse noise will be generated in the region and therefore marine mammals may be impacted due to underwater noise in and around the project area.

As per the survey close to the proposed site and in the vicinity, no endangered species or wildlife is reported at project site. As well as no mangroves are reported at proposed project site so destruction of mangroves & its impact is ruled out.

Impacts of oil spill due to ship collision are remotely possible. Wastewater generated from utility buildings shall be treated and used for green cover development only. No untreated waste water shall be released into marine waters at any time. Since there will not be additional turbidity in water marine productivity including fish will also be increased

The runoff from the site containing debris, hazardous waste, may have adverse impacts on the water environment especially on nearby marine waters.

The setting up of any kind project would undoubtedly include significant impact on socio-economic and cultural life of the people in the project area. Here, an attempt is made to visualize and discuss such tentative impacts likely to be induced by the project. The likely impacts due to project activity are described below:

The proposed project does not involve any displacement of inhabitants and so issues like resettlement and rehabilitation does not figure.

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There was a growth in indirect jobs and business opportunities to the local and surrounding people such as contractors, transporters and raw material suppliers etc. due to the proposed project in the area.

Demands of community services and create additional employment for the poor strata of society by way of security guard, driver, servant, sweeper, gardener etc. The proposed project is development of multipurpose jetty in existing jetty area.

Proposed project is located in Panvel creek area. In project surrounding area there is no any fishing activity are found, so there is no any direct or indirect impact on fisherman and fishing activities.

Environment Monitoring Plan- Construction and Operation Phase

| Aspects | Parameters to be monitored | Frequency of Monitoring | Locations | Compliance |
|---------------|--|---|---------------|----------------------|
| Air Quality | PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , CO | Twice in a week during entire construction period | Project Sites | NAAQ Standards, 2009 |
| Noise Levels | Day and night noise levels | 24 hrs | Project Sites | CPCB Standards |
| Water Quality | pH, Temp, Salinity, TDS, TSS, DO, BOD, Hardness, Alkalinity, Chlorides, Turbidity, Conductivity, Oil and Grease, Heavy Metals | Once in a month during entire construction period | Project Sites | IS10500: 2012 |
| Soil Quality | pH, Electrical Conductivity, Organic Matter, Organic Carbon, Phosphorous (as PO ₄ ⁻³), Total Kjeldahl Nitrogen, Potassium (as K), Sodium (as Na), Texture, Sand, Clay, Silt, Lead (as Pb) | Once in a month during entire construction period | Project Sites | - |

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| Aspects | Parameters to be monitored | Frequency of Monitoring | Locations | Compliance |
|-----------------------|---|---|--|----------------|
| Marine Water Quality | pH, Temp, Salinity, TDS, TSS, DO, BOD, Hardness, Alkalinity, Chlorides, Turbidity, Conductivity, Oil and Grease, Heavy Metals | Once in a month both for low tide and high tide periods during entire construction period | 3 locations viz. project site, upstream and downstream | - |
| Sediment Quality | Organic C, Organic N, heavy metals | Once in a month during entire construction period | 3 locations viz. project site, upstream and downstream | - |
| Biological Parameters | Phytoplankton, Zooplankton and Benthic Communities | Once in a month during entire construction period | 3 locations viz. project site, upstream and downstream | - |
| STP outlet | pH, BOD, COD, TSS, Oil and Grease | Once in month | - | CPCB Standards |

Additional Studies

HTL/LTL Demarcation

CZMP and HTL/LTL demarcation studies were conducted by an authorized agency, Institute of Remote Sensing Anna University. As per the CZMP map, the project falls into CRZ IV B and CRZ II category (CRZ notification, 2011). The multipurpose jetty and approach cum berthing jetty is falling under CRZ IV B and the backup facilities are falling under CRZ II.

HTL/LTL map in 1:4000 scale superimposing the project layouts is attached as Annexure IV.

Risk Assessment

A risk assessment is a careful examination of consequences resulting from the undesired events that could cause harm to people or property, so that sufficient precautions can be taken. Workers and others have a right to be protected from harm caused by a failure to take

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reasonable control measures. Risk assessment of proposed shipyard is intended to provide a thorough understanding of the nature of the risks involved and to provide meaningful risk management and reduction guidance to the yards. Risk involved in proposed Multipurpose Jetty project is evaluated in terms of the following areas:

- Environmental and Geographical Risks
- General Site Conditions & Housekeeping
- Site Safety
- Yard equipment
- Theft & Personnel
- Emergency Response Plans
- Fire-Fighting Systems
- Permit to Work Systems
- Atmospheric Monitoring and Control of Industrial Gases
- Launching and Sea Trials
- Quality Assurance/ Quality Control
- Management of subcontractors

A Multipurpose Jetty Terminal's risk exposure can be broadly divided into two categories:

- Those to which the Multipurpose Jetty terminal/Storage yard is exposed.
- Those to which the vessel berthed at Jetty terminal is exposed.

PROJECT BENEFITS

Maharashtra Maritime Board (MMB), the nodal state government agency to develop the ports in the state of Maharashtra, has laid down various policies, for development through private participation as Greenfield – All Weather Ports, MMB terminals, Captive Terminals, Multipurpose Terminal & Shipyards.

Employment Generation during Construction Phase

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Construction phase will generate employment for local people including various subcontractors, electricians, machinists, welders, painters, blasters, riggers, pipe fitters and a number of administrative and managerial staff. The proposed Multipurpose Jetty Terminal will create employment opportunity in skilled and unskilled sectors. Moreover fabrication industries are entirely based on the order received by the concerned yard not a yearlong activity. If the order is more the employment opportunity is also more, if the order is less the employment opportunity is also less. Hence most of the man power required will be procured through the subcontractors, not directly employed by the M/s. Famous Dredging Corporation.

The expected labour force required during construction phase is to the tune of about 80 Nos. Although the workforce requirement will be temporary in nature, it will be met from the local population as far as possible hence there will be positive impact. Local businessmen will get opportunity to supply construction materials. Demands generated from the labour force for basic facilities including eatables etc. will increase the local business activity of the area.

Employment Generation during Operation Phase

Similar to the construction phase, the operation phase of the Multipurpose Jetty Terminal will also provide opportunities for employment mostly in the skilled and semi-skilled categories. This will enhance the income of the people associated with subcontracting business. All these activities will need support services like food, transport, medical facility etc. ultimately leading to improvement in quality of life of local people.

Environmental Management Plan

The Environmental Management Plan (EMP) provides an essential link between predicted impacts and mitigation measures during implementation and operational activities. EMP outlines the mitigation, monitoring and institutional measures to be taken during project implementation and operation to avoid or mitigate adverse environmental impacts, and the actions needed to implement these measures.

The EMP comprises a series of components covering direct mitigation and environmental monitoring, an outline waste management plan and a project site restoration plan. Therefore, environmental management plan has been prepared for each of the above developmental activities.

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During construction phase, all precautionary measures shall be taken for dust suppression, prevention of marine water contamination and noise reduction, etc. The effect on environment during construction phase will be localized, temporary and reversible in nature. Further, operation stage of the multipurpose jetty will usually involve handling of cargos/vessels which may lead to vehicular emission of air pollutants into atmosphere, accidental oil spillage, leakage in cement carrying pipeline, etc.

Dust suppression arrangements should be regularly used to avoid the dust emissions. All construction machines should be well maintained and use appropriate air pollution control equipment as required.

Ambient air quality should be regularly monitored at critical locations near construction sites before start of work and during the execution of work so that increased ambient load can be estimated. If the levels are crossing the permissible values, immediate mitigatory measures need to be adopted.

To lessen the gaseous emissions necessary steps must be followed such as only vehicles having PUC shall be allowed, well-equipped handling & transportation facilities shall be provided throughout the construction phase.

Wastewater Management

An average of 80 construction workers will be deployed per day during the construction phase. Temporary toilets will be provided to the construction workers. The sewage from the same will be treated in portable STP. The estimated quantity of wastewater generated will be 2.5 KLD.

Since there will not be any manufacturing involved in the operation phase, the source of wastewater generation will only be from the domestic usage. The estimated quantity of wastewater generated will be 2.5 KLD which is proposed to be treated in a Sewage Treatment Plant (STP) of capacity 5 KLD. The treated wastewater will be used for greenbelt. The sludge from the STP will be collected, stored and used as manure for greenbelt development within the premises.

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Solid Waste Management

The solid waste in the proposed project could also be generated mainly from three sources viz. institutional/ office waste, domestic/kitchen waste and waste from material handling in cargos, etc.

During the construction phase, for an average of 80 workers, total 40 kg/ day of solid waste will be generated which will be segregated at source to organics and recyclables. The estimated quantity of solid waste generate during the operation phase will be 65 kg/day, out of which 26 kg/ day will be biodegradable waste and 39 kg/day will be non-biodegradable waste. The biodegradable waste is proposed to be treated in an organic converted within the site and the leftover from the outlet of the converted after treatment will be used as manure in the garden. The non-biodegradable waste will be disposed off to the dumping ground.

Organic Waste Converter (OWC)

Organic waste generated will be treated in organic waste converter and will be used as manure.

Hazardous Waste Management

No hazardous solid/liquid is proposed to be handled during construction stage. Hazardous waste will be generated in the form of used oil, batteries, spillage of oil etc. during operation phase which will be disposed off as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 by handing over to authorize agents approved by MPCB.