REDI PORT LIMITED

Ref.No: RPL/Admn/100 /2017
July 12, 2017

Dr. Vinod K. Singh
Ministry of Environment
Forest and Climate Change
Jor Bagh Road
New Delhi-110 003

Respected Sir,

Subject : Environmental/CRZ Clearance for Expansion of Redi Port, Vengurla Taluka, Sindhudurg District, Maharashtra– Request for Environmental/CRZ Clearance– reg.

Reference:
1. Minutes of 15th meeting of Expert Appraisal Committee (infra-2) held on May 01, 2017.
2. Minutes of 15th meeting of Expert Appraisal Committee (infra-2) held on April 12, 2017.
3. Minutes of 12th meeting of Expert Appraisal Committee (infra-2) held on December 26, 2016.

With reference to the minutes of EAC meeting mentioned hereabove, we are herewith submitting the clarifications for the queries sought and request you to consider the subject project in the next upcoming EAC meeting.

Thanking you,

Yours sincerely,

(N.N.PAL)
Chief Executive Officer

Encl.: As stated above

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CIN : U63032MH2007C172907

Clarifications for the queries raised by EAC (Infra-2) in its 12th meeting held on 26-28 December, 2016

1 Status of Stage – I Forest Clearance

The proposed development will be over an area of 98 ha is within the already notified limits of the port. Out of 98 ha, 64.22 ha of land is planned to be reclaimed for the port development purpose and remaining 33.78 ha is the onshore land. As per the concession agreement with Maharashtra Maritime Board (MMB), the land for port expansion shall be provided by Government of Maharashtra.

The sea area of 64.22 ha is proposed to be reclaimed is within the Redi port limits declared by MMB. Onshore land of 33.78 ha is government land.

Breakup of government land: 33.78 ha

- Redi village, Vengurla Taluk : 3.86 ha
- Kanyal village, Vengurla Taluk : 29.92 ha

Government of Maharashtra advised MMB to procure the land as per procedure of Forest Act, 1980. MMB submitted the forest application in May, 2013 and various staged of forest clearance is given below:

Date	Events
May 15, 2013	Submission of Forest application to Deputy Conservator of Forest, Sawantwadi
July 04, 2013	Proposal sent to Chief Conservator of Forest, Kolhapur
October 30, 2013	Proposal verification at Nagpur Forest Office sought additional details
December 11, 2013	Submission of additional details to DCF, Sawantwadi
February 20, 2014	DCF forwarded the additional details to CCF, Kolhapur
February 21, 2014	CCF's office, Kolhapur forwarded to Nagpur Forest Office
February 26, 2014	Nagpur Forest Office sought some more additional details including compensatory afforestation (CA) land and biotic report
March 20, 2014	Submission of additional details
July 08, 2014	Submission of biotic report
2014-2016	Identification of alternate land and approval by state forest department
2016	Finally approved by state forest department and recommended to central level

Chief conservator of forests (CCF), Mantralaya has recommended the proposal to Additional Principal Chief Conservator of Forest, MoEF&CC, Nagpur for diversion of forest land to non-forestry purpose. The letter from CCF is enclosed as **Appendix A.**

2 Tabular statement indicating details of (a) existing facilities as per existing EC obtained; (b) proposed additional facilities; (c) total capacity after expansion to be provided

(a) Existing Facilities	
Number of jetties	Two (02)No.s
Backup area	8 ha
Cargo handling capacity	1 MTPA
Type of cargo being handled	Iron Ore

Proposed Expansion Facilities (Phase I and II)		
Length of Northern Breakwater	Phase I – 0 m Phase II – 100m	
Length of Southern Breakwater	Phase I – 860m Phase II – 1800m	
	Phase I	Phase II
Rock Bund	2150 m	Phase I facility will suffice Phase II requirement
Diameter of Turning Circle	460 m	
Depth at Turning Circle (below CD)	(-) 14.5 m	
Number of Berths	Two (02) Nos	3 Nos. (Cumulative)
Depth at Berthing area	(-) 13.9 m	(-) 13.9 m
Dredging Quantity	3.36 MCM[1]	-
Reclamation Quantity	5.5 MCM (0.93 MCM of dredged material and remaining will be sourced from borrow material.	
Dredge Spoil Disposal	2.43 MCM will be disposed at identified offshore dredge spoil disposal site located in (-)25m to (-)30 m.	
Approach Channel		
Length	4565 m	Phase I facility will suffice Phase II requirement
Width	165 m	
Depth	(-) 15.1 m	
Cargo handling capacity		
Existing cargo handling capacity	1 MTPA	
Proposed cargo handling capacity upto Phase II	13.74 MTPA	
Type of cargo proposed to be handled	Coal, Iron Ore and General cargo	
Total cargo handling capacity after commissioning of Expansion facility	14.74 MTPA	

3 Copy of existing environmental clearance to be submitted

Redi port, which is identified for expansion into an All Weather Multipurpose Port by Maharashtra Maritime Board (MMB) is located in Redi Village, Vengurla taluka, Sindhudurg district of Maharashtra State. Redi port (fair weather port) has existing facility with two working jetties performing lighterage operations since more than 50 years.

As Redi port is an ancient port being operated since 50 years, there is a valid Consent To Operate (CTO) issued by Maharashtra Pollution Control Board (MPCB), same is enclosed as **Appendix B**.

4 Dispersion modelling for the dumping of the additional dredge materials shall be carried out. The study report shall be incorporated. Coordinate of dumping ground

Capital dredging is required to create navigation channel, turning circle and berthing areas. During Phase I and Phase II expansion, the dredging volume is estimated at about 3.36 MCM and about 0.93 MCM of the dredged material will be used for reclamation. Remaining quantity of dredged material will be disposed off at the designated offshore area between 25 m to 30 m contour which has been identified based on the mathematical modelling studies.

[1] MCM: Million Cubic Meter

The selection of a disposal site in sea depends on several factors, which can be broadly classified into environmental and economical considerations. The major economic factors are volume of dredged material and distance of the disposal site. The environmental considerations are the characteristics of the material, short-term fate of the dredged material and the initial deposition pattern of the material in the bottom. These factors in turn determine the long-term movement of the disposed material from the disposal site. Generally, coarse material quickly settles to the bottom, while fine material is removed during its descendent to the bottom and transported by currents to adjoining areas. The disposed material will settle down depending on its own bulk size and grain size with different settling velocity. Hence, the environmental conditions at the location of the disposal site should be such that it is not subjected to high near-bottom current velocities which would cause the disposed material to return to areas of interest like the approach channel. Moreover, the shuttle distance between the disposal site and the areas of dredging should not be too large, as this would increase cost of disposal and consequently the dredging cost. Hence, the selection of the disposal site has to be the result of a balance between the environmental factors and economy of cost. The dredge spoils will be disposed through a hopper or suitable dredger at the disposal site. The impacts due to disposal of dredged material such as the spreading of turbidity at disposal location, suspension and re-suspension of sediment in the bulk of water column, settlement on the bed after a certain residence time have been assessed by conducting detailed mathematical modelling studies.

4.1 Mathematical Model Study for Identification of Suitable Disposal Location

The fate of dredge spoil dumped offshore depends on a number of parameters like prevailing ocean currents, wind, characteristics of dumped materials, dumping method and location etc. The seasonal variations, frequency of dumping, environmental conditions at the time of individual dumping, total dumped quantity, etc. The variability of environmental conditions and sediment characteristics make the exact prediction of the deposition areas very difficult. Because of these reasons, it is essential to assess the environmental conditions like underlying hydrodynamics and wind patterns during different seasons, the likely sediment characteristics, and the general dumping pattern from the dredge log or from previous case studies. Keeping these points in mind, the following methodology was adopted for the present study.

a) Bathymetry preparation for the model domain – Bathymetry is the primary input for setting up hydrodynamic model and affects the local hydrodynamics and the settling pattern of the dumped material. Bathymetry was prepared from the available survey data for the site and augmented with data from secondary sources.

b) Analysis of seasonal variations of environmental conditions – Since the dredging and dumping operations are going to be a long term process, it is essential to carry out the simulation for different environmental conditions representing various seasons. Since carrying out the simulation for an year is impractical, the environmental conditions was schematised with combinations of typical current and wind pattern.

- Current and Tide measurements – Current and tide measurement were carried out at site for a period of 16 days during November – December 2009. This data was used for model set up and calibration.

- Wind data – Wind data for the study area obtained from the available literature (IMD climatology atlas) and analysed for seasonal variations. The profile of wind induced currents are different from the currents of other origin and plays an important role in

the dispersion of suspended dredge materials and can be important in deciding the fate of dumped materials.

c) Analysis of sediment characteristics – The fate of the dumped material largely depends on the characteristics of the sediments. The available data on the grain-size distribution in sediment was analysed to arrive at representative sediment type for the study area.

d) Dredging and dumping characteristics – The hopper load, bulk density, dumping duration, dumping frequency, etc. are required to simulate the long term behaviour of the dredge spoil dumping..

e) Model set-up and calibration (Hydrodynamic flow model) – Hydrodynamic flow model was set up and calibrated with the available data. Once the model is calibrated, different scenarios were simulated corresponding to different seasonal flow conditions.

f) Model set-up (Particle Analysis) - PA module of Mike21 suite of software was set up with the underlying hydrodynamic flow model results, dredging parameters and sediment characteristics. PA module simulates the fate of the dumped spoil and provides the plume concentrations and deposition patterns of the dumped spoil.

g) Interpretation of the simulated results.

Input Data

Port Layout and Dredging quantity

The layout of Redi port has a harbour basin opening towards northwest protected by a southern breakwater. A single lane navigational channel of width 165m, dredged to a depth of (-) 15.1m and (-) 14.5m in the turning circle of diameter 460 m is proposed. The Phase – II layout of Redi port is illustrated in Figure 4-1.

The port is located on the Redi headland, taking advantage of the natural submerged rock outcrops which are present along the proposed breakwater alignment. The proposed developmental activities of Redi Port necessitate deepening of sea bed which requires capital dredging and associated disposal of the dredged materials. Dredging will be carried out during Phase I development only.

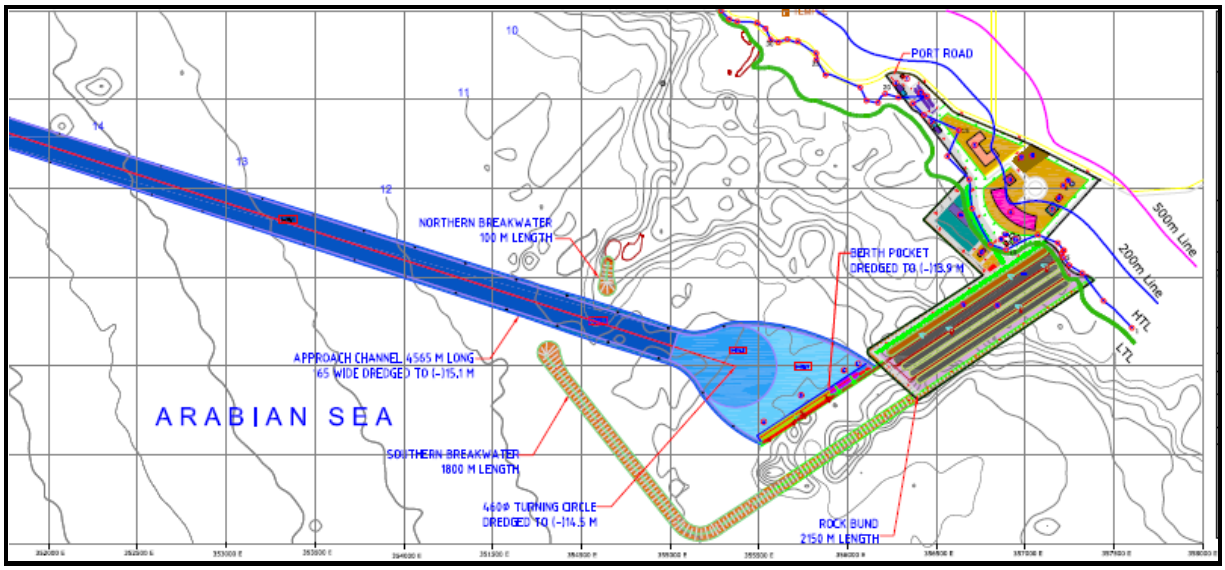


Figure 4-1: Phase – II layout of Redi Port

The amount of dredging for Redi port is estimated to be about 3.36 MCM, 0.93 MCM will be used for reclamation and remaining will be dumped offshore. Following dredging parameters for Redi were considered for the model study.

Hopper volume	-	10000 m^3
Solids in dredge spoil	-	70%
Bulk density of dredge spoils	-	1580kg/ m^3
Mass of solids per dumping	-	11060 ton
Duration of Dumping	-	5 minutes
Rate of Dumping	-	2212 ton/minute
Number of Dumping per day	-	8 nos @ 3hrs interval

Bathymetry

The bathymetry of the study area is reconstructed by digitising the Naval Hydrographic Office (NHO) chart No's 2043 and 22, blended with ETOPO - I data and site specific bathymetry survey by M/s Indomer Coastal Hydraulics (P) Limited (INDOMER), Chennai. Other bathymetric features like dredge channels and breakwaters were considered.

The general bathymetry of the study area has been prepared from the above data, covering an area of 65x50 km and extending from the coast to beyond 70m contour off the coast as presented in Figure 4-2. The region from 5m to 12m contour in the sea consists of offshore islands, scattered outcrops, bedrocks and a highly variable water depth. The observed variation in water depth in the near-shore is very steep, particularly around the islands and the outcrops. The coastline is oriented from north-north-west (NNW) to south-south-east (SSE) and is mainly characterized with rock cliff formation and isolated perched beaches between the headlands. Deepwater contours are parallel to the coastline.

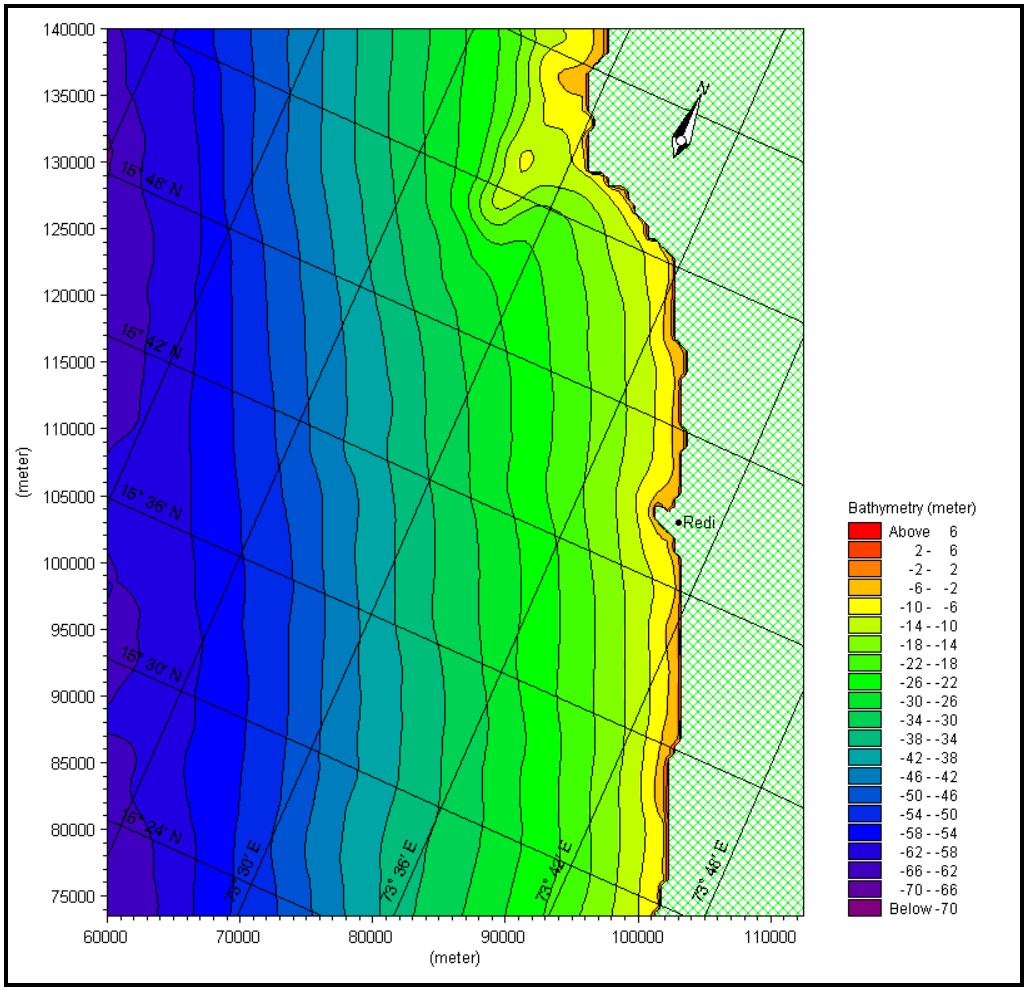


Figure 4-2: Bathymetry (with respect to MSL) of Model Domain

Tide

Tide measurement at the site was carried out during November 2009 for about 16 days duration by INDOMER. The measured tide show maximum spring tide range of 2.6m and neap tide range of 0.5. The reference tide level in the study stretch is as follows

Mean high water spring	-	2.2m
Mean high water neap	-	2.2m
Mean sea level	-	1.4m
Mean low water neap	-	1.4m
Mean low water spring	-	0.7m

The measured tide variation at site is presented in Figure 4-3.

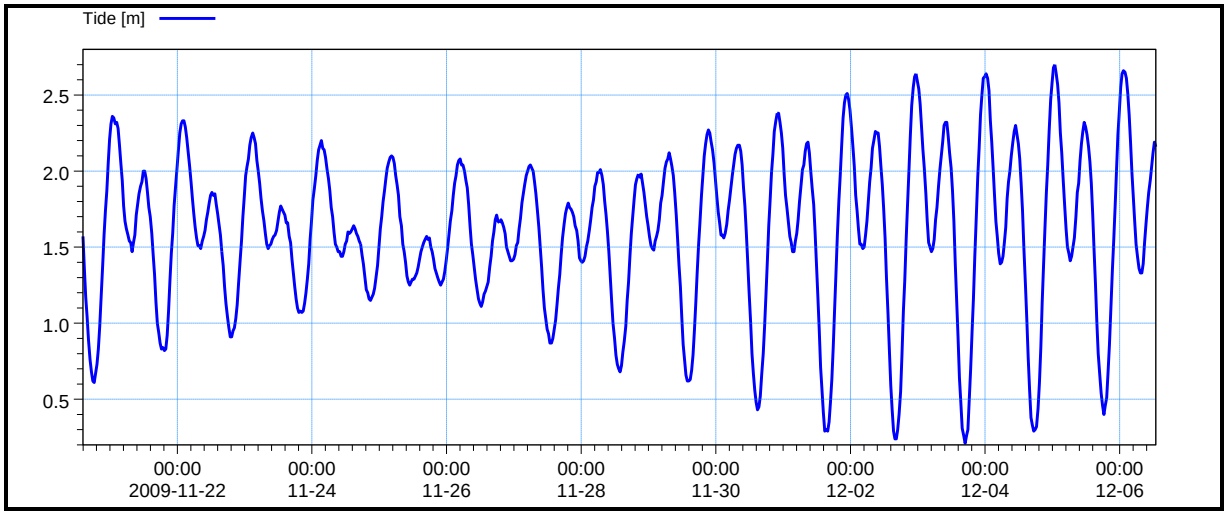


Figure 4-3: Measured tide (w.r.t CD) at Redi

Current

Current measurement was carried out by INDOMER at the site for 16 days at water depth of 10m positioned at 2 m below the surface. Predominant direction of current flow during the period of observation was north westerly. The maximum current speed recorded during the observation period is about 0.3m/s. The observed current shows very weak tidal currents superposed on comparatively stronger currents of non-tidal origin.

The current pattern at the study stretch is mainly influenced by the general monsoon climate. Strength of tidal current along the coast is weak and does not influence the current direction in general. The general current direction at site is south easterly during May to September and north westerly during October to February. Current speeds during transitional periods (February to April) are low and direction varies.

Seasons

Based on the observations and published data, monthly mean environmental states were prepared as shown in Table 4-1. It is obvious from the table that there exists certain combinations of current and wind conditions and that can be used in the preparation of simulation scenarios.

Table 4-1: Monthly Mean Environmental States

Month	Current		Mean Wind Speed (m/s)	Predominant wind Direction
	Direction	Average Speed (m/s)		
January	North-West	0.1 - 0.25	1.6	N,NW
February	North-West	0.1 - 0.25	1.6	NW,NNW
March	South-East	0.1- 0.25	1.9	NW,NNW
April	South-East	0.1- 0.25	2.0	NW,NNW
May	South-East	0.15 – 0.5	2.5	WNW,NW
June	South-East	0.15 – 0.5	2.0	SW,WSW
July	South-East	0.15 – 0.5	2.9	WSW,W
August	South-East	0.15 – 0.5	2.5	WSW,W
September	South-East	0.1- 0.25	1.6	W, WNW
October	South-East	0.1- 0.25	1.4	NW,NNW
November	North-West	0.1- 0.25	1.3	NNW, N
December	North-West	0.1- 0.25	1.3	NNW, N

Sediment Grain Size Distribution

Since the dredged materials come from the subsurface region, the grain size distributions should preferably be adopted from a subsoil sample. Grain size distribution over the study area has been collected from the available bore logs MBH-6, MBH-8, MBH-9, & MBH-10 taken during the bathymetry survey which falls in and around dredging area. The locations of the bore holes in the dredging zone are presented in Figure 4-4. Grain size distribution graph for a typical bore hole (MBH-8) is presented in Figure 4-5.

From the analysis of the bore log data, it is noticed that the predominant portion of the sediment sample is composed of sandy-silt, except for a small fraction of clay.

Two types of grain size distribution, which are representative of the dominant sediment types at the site were derived from the available bore log and grab sample data. Type-I sediment has grain size distribution composed of sandy-slit with fraction of clay content which is presented in Figure 4-6. Type -II sediment has sediment composition of clayey silt. The grain size distribution of Type-II sediment is presented in Figure 4-7.

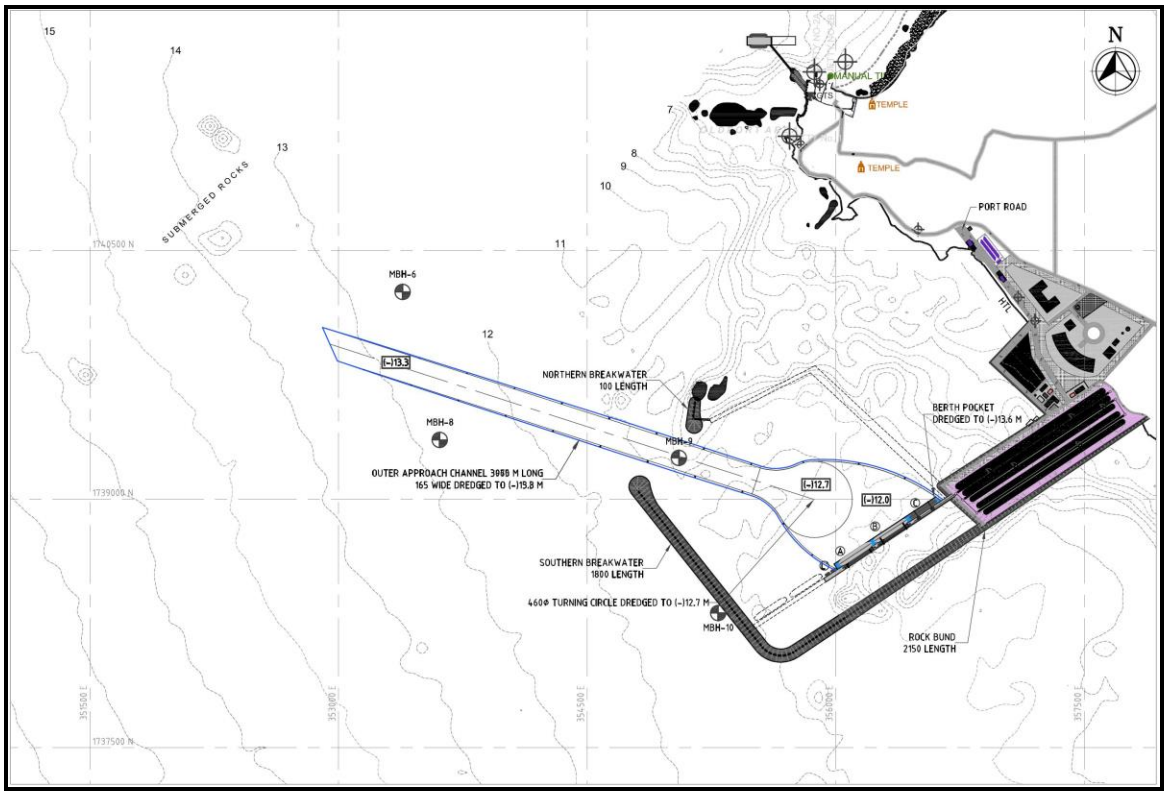


Figure 4-4: Bore Hole Locations in the Dredging Zone

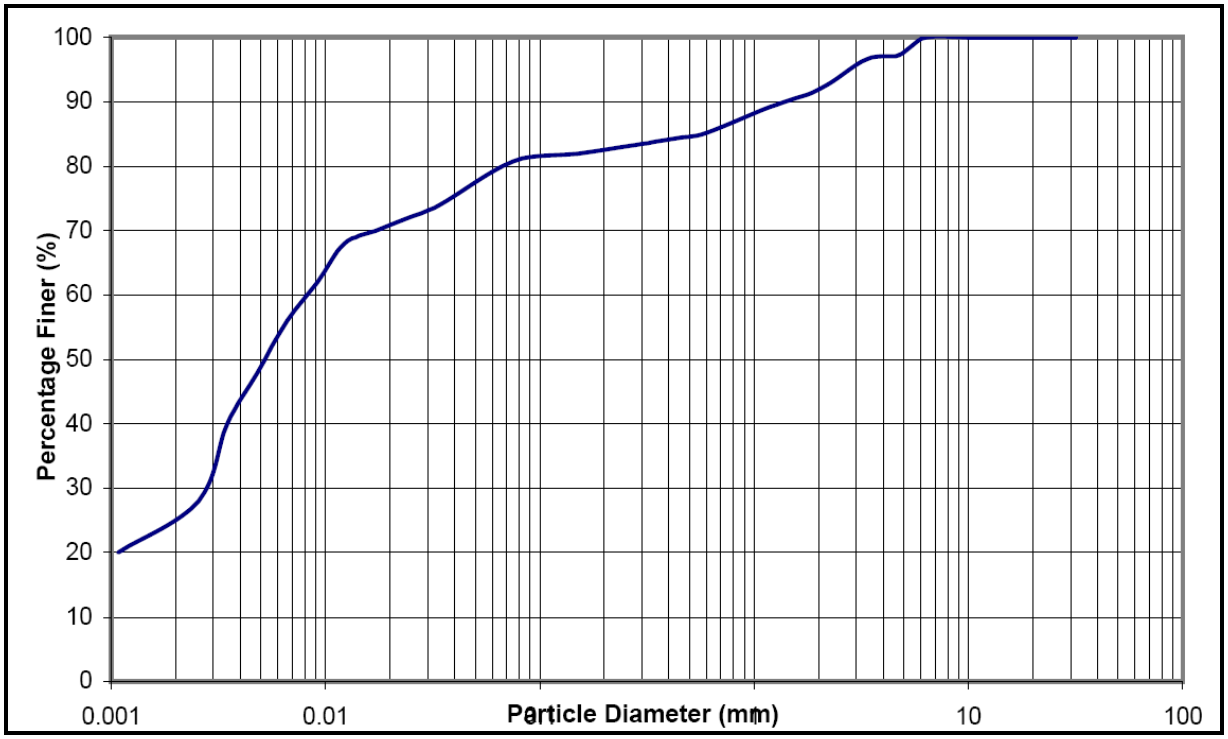


Figure 4-5: Grain Size Distribution Graph for MBH-8 at 8.3 -8.8m

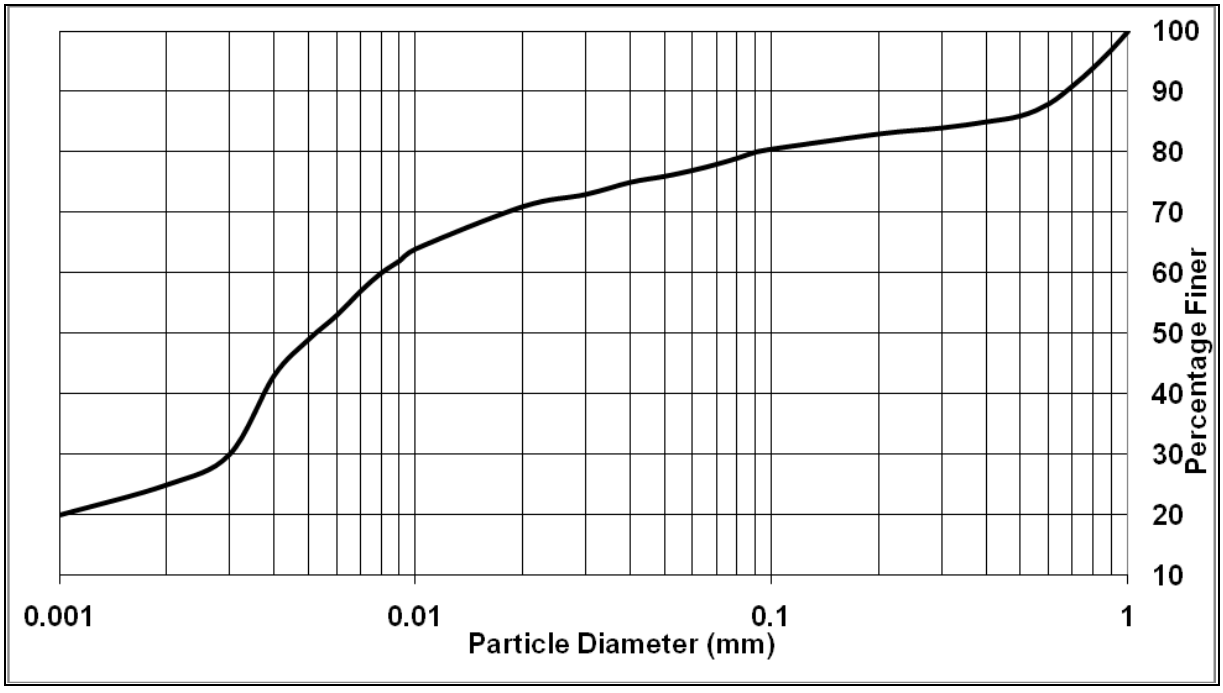


Figure 4-6: Grain Size Distribution of Type-I Sediment

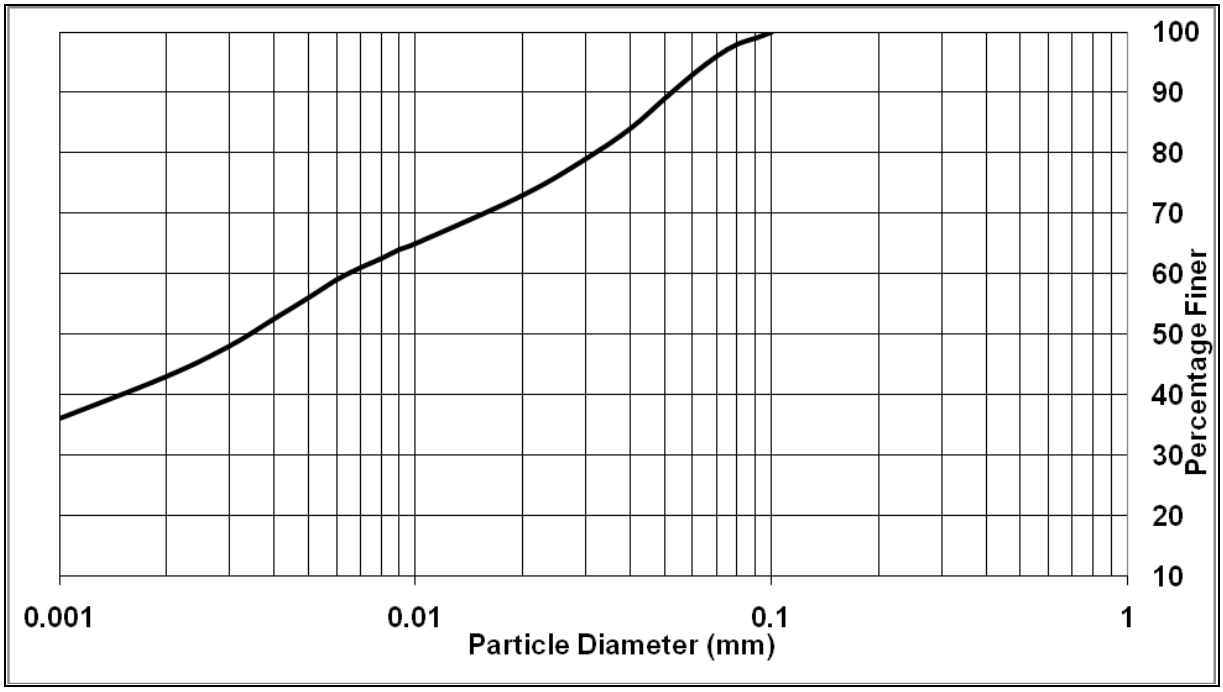


Figure 4-7: Grain Size Distribution of Type-II Sediment

Hydrodynamic model

In order to establish the local circulation pattern, a site-specific hydrodynamic model was set up using hydrodynamic (HD) module of Mike-21.

The HD module is the basic module in the MIKE 21 suite of software, which provides the hydrodynamic basis for the computations of all other modules like sediment transport, particle tracking, etc. The HD module simulates water level variations and flows in response to a variety of forcing functions like wind, tides and waves. The model can include the effect of the bottom shear stress, wind shear stress, Coriolis force, momentum dispersion, sources and sinks and wave radiation stresses. Based on the study requirement, the parameters have been introduced in to the model.

The governing equations for the coastal circulation are the two-dimensional shallow water equations. These are obtained by vertically integrating the three- dimensional Navier Stoke's equations of motion making the following assumptions,

- The flow is incompressible
- The flow is well mixed
- Vertical acceleration is negligible

Simulation of hydrodynamics is based on these non-linear vertically integrated 2-D equations of conservation of mass and momentum which are presented below.

$$\frac{\partial \zeta}{\partial t} + \frac{\partial p}{\partial x} + \frac{\partial q}{\partial y} = \frac{\partial d}{\partial t}$$

$$\frac{\partial p}{\partial t} + \frac{\partial}{\partial x}\left(\frac{p^2}{h}\right) + \frac{\partial}{\partial y}\left(\frac{pq}{h}\right) + gh\frac{\partial \zeta}{\partial x} + \frac{gp\sqrt{p^2+q^2}}{C^2 \cdot h^2} - \frac{1}{\rho_w}\left[\frac{\partial}{\partial x}\left(h\tau_{xx}\right) + \frac{\partial}{\partial y}\left(h\tau_{xy}\right)\right] - \Omega q$$

$$- fVV_x + \frac{h}{\rho_w}\frac{\partial}{\partial x}\left(p_a\right) = 0$$

$$\frac{\partial q}{\partial t}+\frac{\partial}{\partial y}\left(\frac{q^2}{h}\right)+\frac{\partial}{\partial x}\left(\frac{pq}{h}\right)+gh\frac{\partial \zeta}{\partial y}+\frac{gq\sqrt{p^2+q^2}}{C^2\cdot h^2}-\frac{1}{\rho_w}\left[\frac{\partial}{\partial y}\left(h\tau_{yy}\right)+\frac{\partial}{\partial x}\left(h\tau_{xy}\right)\right]+\Omega p$$

$$-fVV_y+\frac{h}{\rho_w}\frac{\partial}{\partial y}\left(p_a\right)=0$$

The following symbols are used in the equations:

h(x,y,t)	water depth (=ζ-d, m)
d(x,y,t)	time varying water depth (m)
ζ(x,y,t)	surface elevation (m)
p,q(x,y,t)	flux densities in x- and y- directions ($m^3/s/m$) = (uh,vh); (u,v) = depth averaged velocities in x- and y- directions.
C(x,y)	Chezy resistance ($m^{1/2}/s$)
g	acceleration due to gravity (m/s^2)
f(V)	wind friction factor
$V,V_x,V_y(x,y,t)$	wind speed and components in x- and y- direction (m/s)
Ω(x,y)	Coriolis parameter, latitude dependent (s^{-1})
$p_a(x,y,t)$	atmospheric pressure ($kg/m/s^2$)
ρ_w	density of water (kg/m^3)
x,y	space co-ordinates(m)
t	time(s)
$\tau_{xx},\tau_{xy},\tau_{yy}$	components of effective shear stress

Hydrodynamic circulation pattern of the study area was set up for the green-field condition to allow the calibration of the model with the measured current. Tidal elevation at Karwar and Devgarh were used for boundary conditions to induce the flow. Several trial runs of hydrodynamic model were made varying eddy viscosity, bottom friction, time step, etc., to get a stable solution that matches with the observed current at site. Model bathymetry was prepared with 500m grid resolution covering an area of 65 x 60km.

The simulated current speed from the model is compared with the observed current (Figure 4-8) which indicates a good agreement between the observed and the simulated current, and hence the model is considered as calibrated.

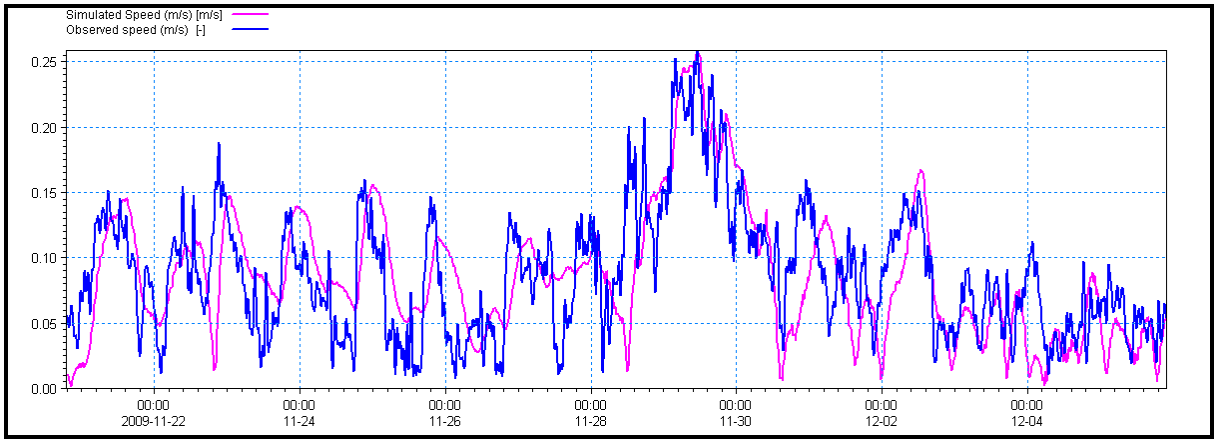


Figure 4-8: Comparison between Simulated and Observed Current

In order to simulate the dredge spoil dumping operation, duration of which may span over a year, it is essential to simulate the hydrodynamic conditions for each seasons. Since the physical oceanographic observations cover only 15 days in November, the data was applied

with appropriate environmental condition to represent other seasons in a year. Two sets of current speeds were considered to cover all possible hydrodynamic conditions throughout the year with two current directions, namely northerly and southerly, for each set of current speeds. These scenarios correspond to the fair weather having maximum current speed 0.25m/s and monsoon conditions with current speed 0.4m/s. Higher current speed exceeding 0.5m/s is expected for shorter duration during the monsoon ranging from 24 – 48 hours which is mainly driven by wind.

Four set of hydrodynamic simulations with the calibrated model were carried out. Hydrodynamic scenarios are named as follows for convenience.

- Scenario – I N : Hydrodynamic flow with observed current, Northerly flow
- Scenario – I S : Hydrodynamic flow with observed current, Southerly flow
- Scenario – II N : Hydrodynamic flow with strong current, Northerly flow
- Scenario – II S : Hydrodynamic flow with strong current, Southerly flow

Simulated Results

The hydrodynamic simulations were carried out for all the 4 hydrodynamic scenarios. Comparison of the results from these simulations shows that the simulated flow patterns at the dumping grounds is not affected significantly by the port development and remains almost same.

Scenario – I N & S

Current vectors depicting the typical flow patterns in the model area for the observed current speed are presented in the Figure 4-9 & Figure 4-10.

Scenario – II N & S

Current vectors depicting the typical flow pattern in the model area is presented in the Figure 4-12 & Figure 4-11.

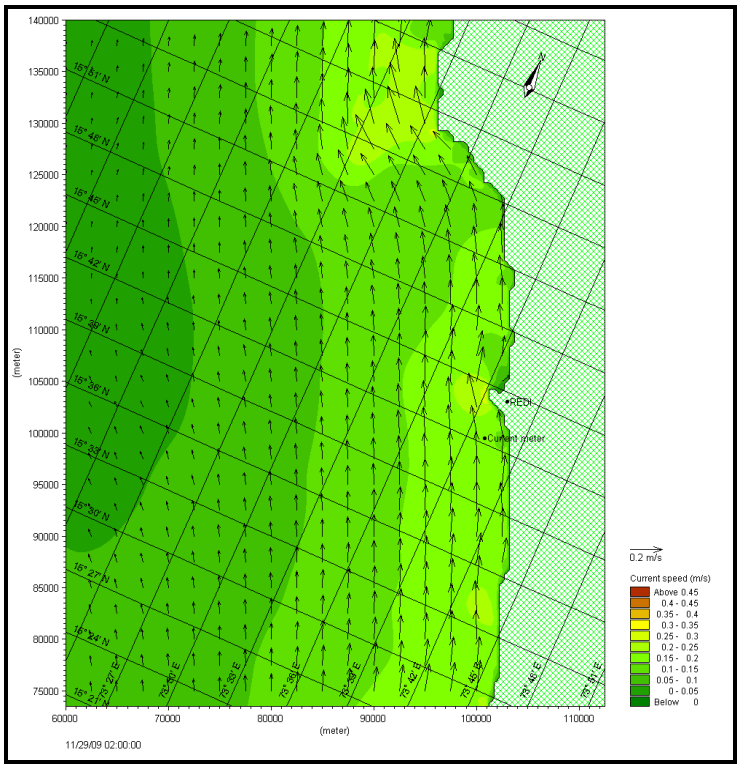


Figure 4-9: Circulation pattern during fair weather (Northerly flow)

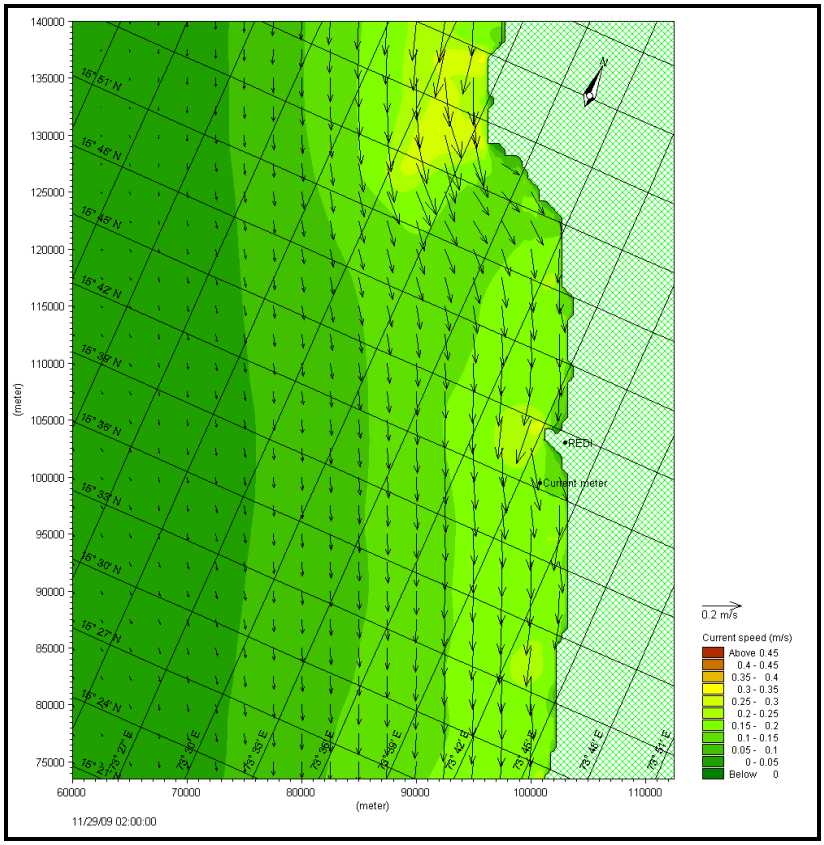


Figure 4-10: Circulation pattern during fair weather (Southerly flow)

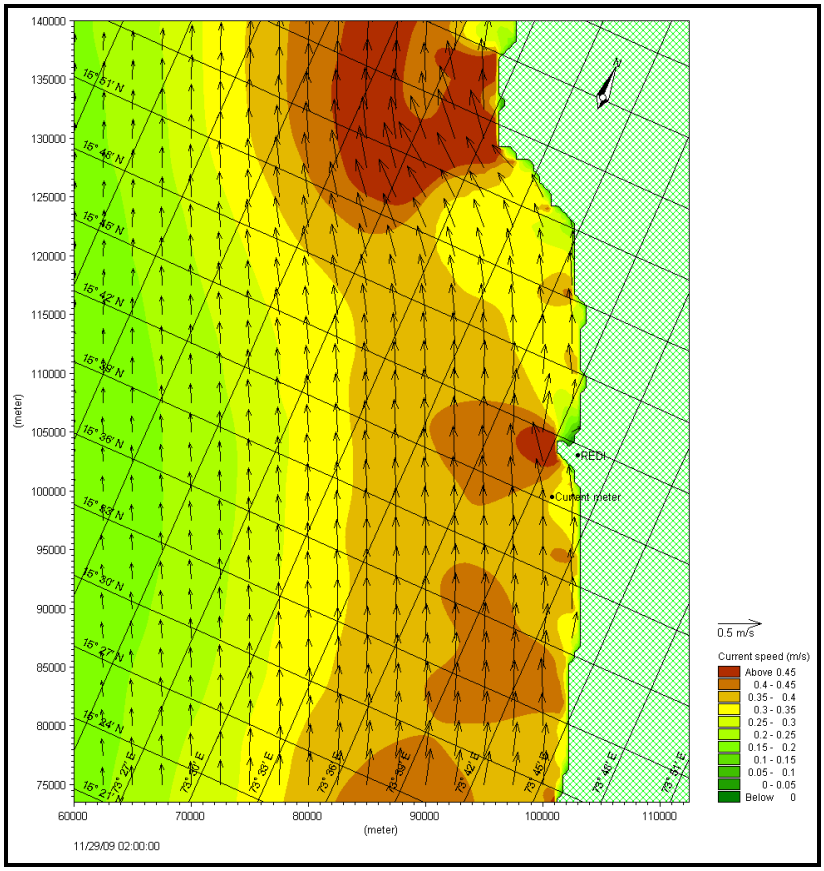


Figure 4-11: Circulation pattern during monsoon (Northerly flow)

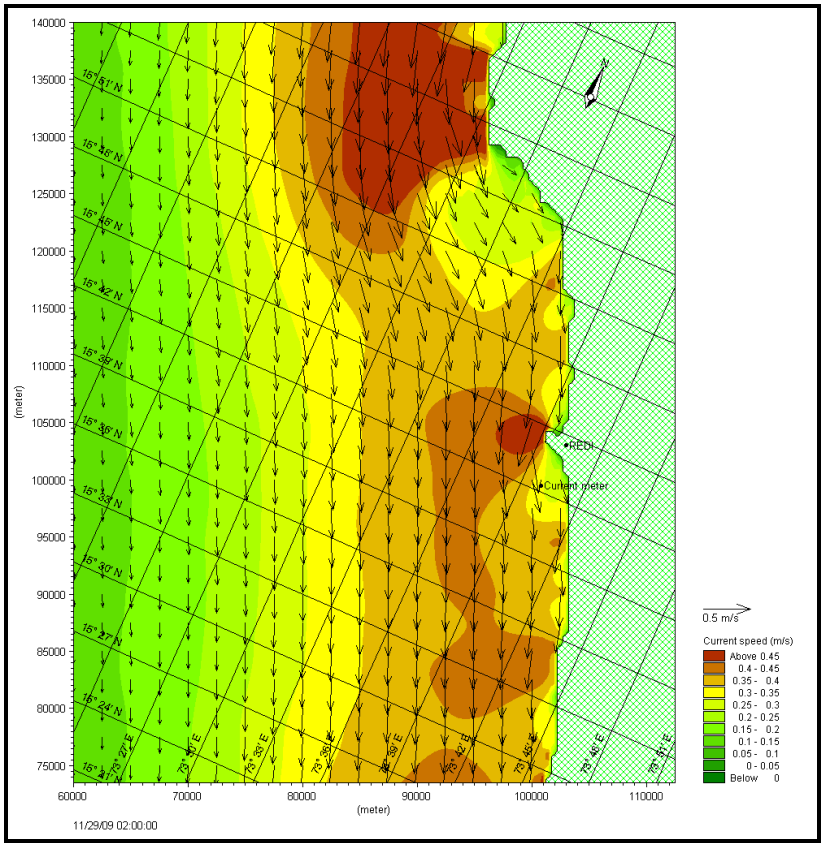


Figure 4-12: Circulation pattern during monsoon (Southerly flow)

Dredge Spoil Disposal Location

The analysis of the simulated results indicates modification in the flow pattern in the vicinity of the port. Hence two alternatives for dumping site (designated as dumping area – A & B) is identified at water depth ranging from (-) 25 to (-) 30 m as prospective location for dredge spoil dumping, where current flow is almost uni-directional during each season and are sufficiently away from the port. The prospective sites for the dredge spoil dumping are presented in Figure 4-13.

Particle Analysis Model

The Particle Analysis (PA) module of Mike 21 suite is used to simulate the transport and dispersion of dredge spoil in the open sea. The particle flow in PA analysis is divided into Lagrangian discrete parcels representing a large ensemble of small packets. The movement of each particle is influenced by the physical/chemical processes of the coastal flow. Once the particle is released in the water body, their discrete path and mass are followed and recorded as function of time relative to the reference grid system fixed in the space. The Lagrangian discrete parcel scheme calculates the displacement of each particle as the sum of an advective deterministic component and an independent, random Markovian component, which statistically approximates the random chaotic nature of time averaged tidal mixing.

The model requires information about the underlying hydrodynamics and wind apart from the sediment characteristics to simulate the flow of particles. The results of hydrodynamic simulations along with the seasonal wind were used to track the dredge spoil dumped in the designated coastal environment. As discussed in the earlier section, two types of sediments were considered for simulating the particle movement. Based on these combinations, a run matrix for PA was made as shown in Table 4-2. The location of dumping was varied within in the dumping ground for each dumping operation to get a realistic simulation.

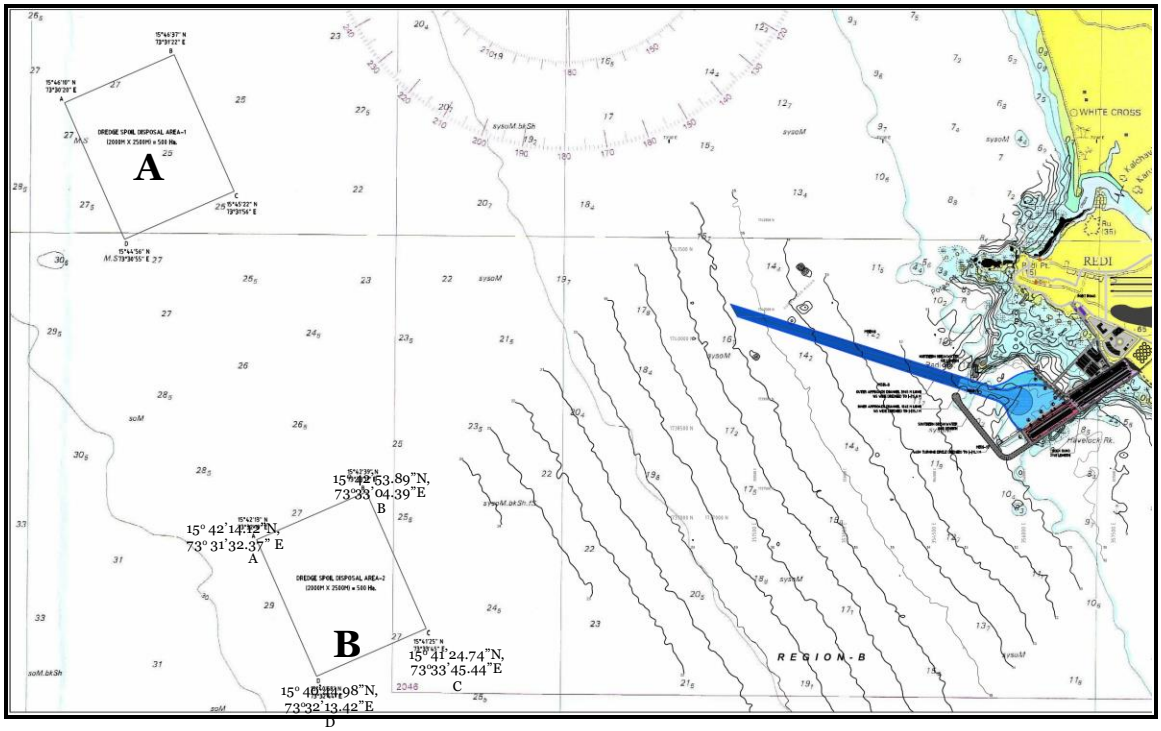


Figure 4-13: Alternative Locations for Dredge Spoil Dumping

Table 4-2: Run matrix for Particle Analysis (PA)

Run No	HD Scenario	Dumping Area	Sediment Type	Representative months	Season
1	Scenario – I N	Area – A	Type – I	November – February	Fair weather
2	Scenario – I N	Area – B	Type – I	November – February	Fair weather
3	Scenario – I N	Area – A	Type – II	November – February	Fair weather
4	Scenario – I N	Area – B	Type – II	November – February	Fair weather
5	Scenario – II S	Area – A	Type - I	May - September	SW monsoon
6	Scenario – II S	Area – B	Type - I	May - September	SW monsoon
7	Scenario – II S	Area – A	Type - II	May - September	SW monsoon
8	Scenario – II S	Area – B	Type - II	May - September	SW monsoon
9	Scenario – I S	Area – A	Type – I	March, April, October	Transitional & NE Monsoon
10	Scenario – I S	Area – B	Type – I	March, April, October	Transitional & NE Monsoon
11	Scenario – I S	Area – A	Type – II	March, April, October	Transitional & NE Monsoon
12	Scenario – I S	Area – B	Type – II	March, April, October	Transitional & NE Monsoon
13	Scenario – II N	Area – A	Type - I	Occasional	-
14	Scenario – II N	Area – B	Type - I	Occasional	-
15	Scenario – II N	Area – A	Type - II	Occasional	-
16	Scenario – II N	Area – B	Type - II	Occasional	-

Simulated Results

Simulation studies for dredge spoil disposal were carried out with various parameters as shown in Table 4-2. Simulations were carried out for 15 days for each of these scenarios. The total quantity of material dumped during these simulations is 2.43 MCM.

Typical figures of deposition patterns at the end of each simulation are shown in Figure 4-14 to Figure 4-16. Typical sediment plume concentration at 15 minutes and 1 hour after dumping is shown in Figure 4-17 & Figure 4-20.

It is observed from the simulated scenario that the spreading of dredge spoil is driven by the prevailing current rather than any other environmental scenario. Though larger spreading of deposited dredge spoil is noticed during strong currents, they settle in deeper water without being carried towards the shore or navigation channel. The findings of particle tracking simulations are presented in the following section.

Spreading of Sediment

Both the sediment types considered in this study are composed of significant portion of fines along with fraction of sand or clay content which differentiate the sediment in composition. Following are the findings of the Particle tracking simulation:

- The spread of the sediment is controlled by the direction of the current flow and the influence of wind on the dispersion of sediment is negligible.
- Dominant portion of the dredged spoil settles within designated area with traces of spoils reaching up to 3-6 km from the point of dumping during fair weather season.
- The fines (clay or silt) are carried longer to a distance greater than 6 km before they finally settle.
- Occasional strong currents coinciding with the monsoon carry the fine dredge spoil (clay or silt) over a distance of 15 to 20 km from the disposal site before they finally settle.
- The depositional trend along the 20-25m contour and the sediments do not spread towards the shore.
- High average sediment concentrations have been observed immediately after dumping.
- It is observed that the major portion of sediments settle within 2 hours from the time of dumping, and sediment concentrations in the water column falls back close to the ambient values.
- The sediment plume travels parallel to the shore, without affecting the coastline.

Recommendation and Interpretation from Simulated Results

The sediment plume travel parallel to the coast controlled by the current and settle within (-) 25 to (-) 30m contour without being carried over to the coast. Dominant portion of sediment settles within 2 hours of dumping, and well within the designated area. Though occasional strong currents tend to carry the finer portion of sediments farther, they settle along (-) 25 to (-) 30m contour. The behaviour of sediment plume and deposition pattern at both the dumping locations is found to be similar. So selection of the final location for dumping depends mainly on the environmental conditions at the time of dredging and the distance from the dredging areas.

Considering the prevailing environmental scenario and the predominant direction of current flow, ***Dumping area – B*** is the prospective site for dredge spoil dumping. The coordinates of the dumping area is given below in geodetic coordinates (WGS84 Datum).

A – 15° 42’14.12”N, 73° 31’32.37” E
B – 15° 42’53.89”N, 73° 33’04.39”E
C – 15° 41’24.74”N, 73° 33’45.44” E
D – 15° 40’44.98”N, 73° 32’13.42”E

The simulation results of Dumping Area- B are given from Figure 4-14 to Figure 4-20.

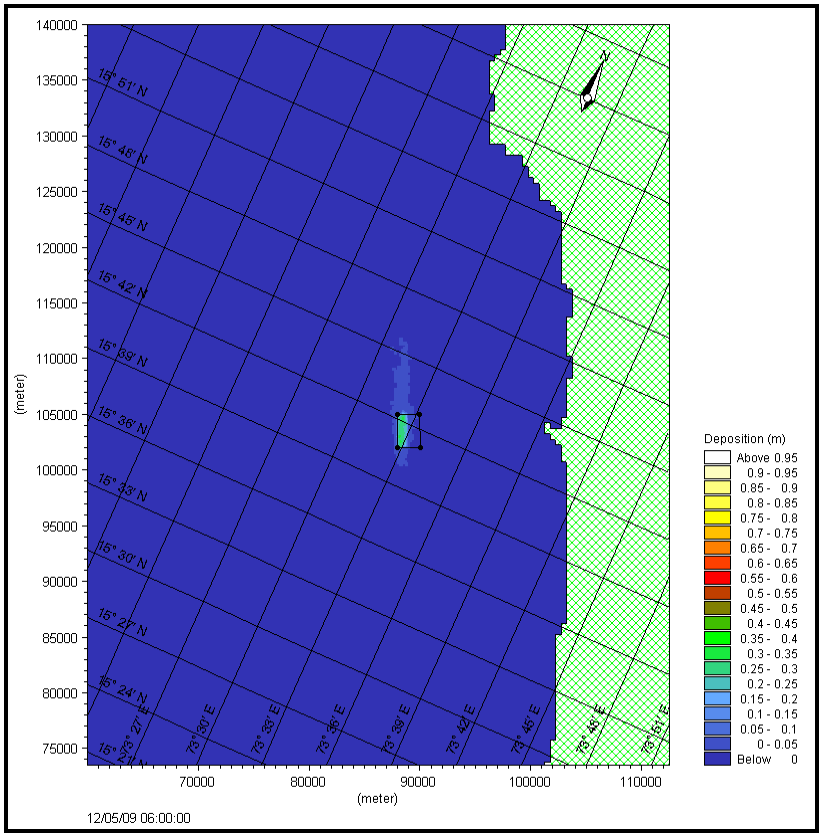


Figure 4-14: Deposition Pattern for PA (Normal current (N); Type – I sediment; dumping area – B)

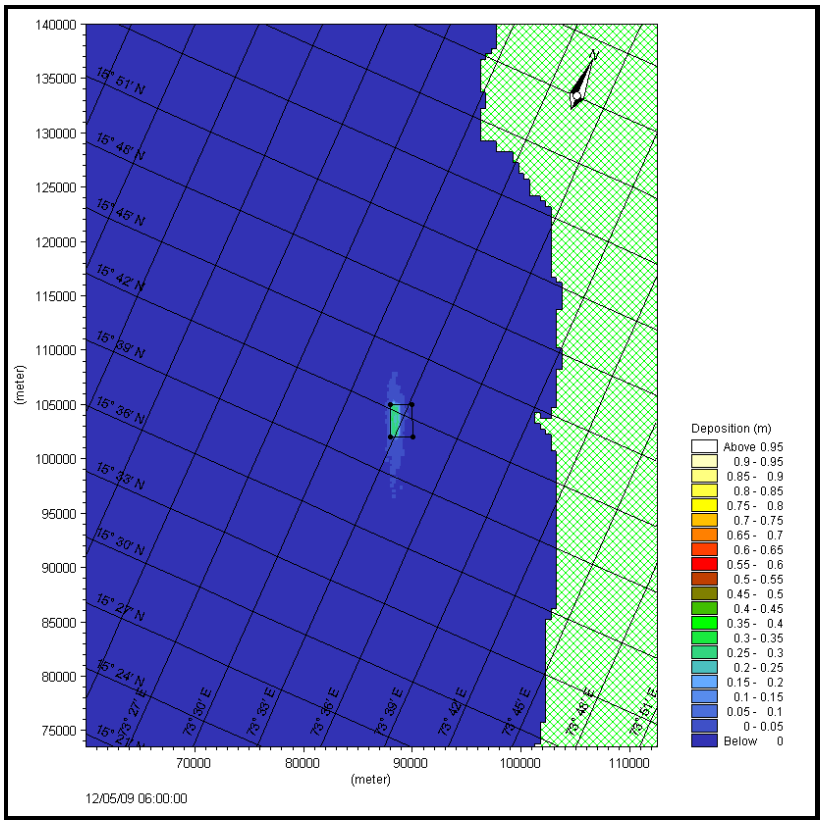


Figure 4-15: Deposition pattern for PA (Normal current (S); Type – I sediment; dumping area – B)

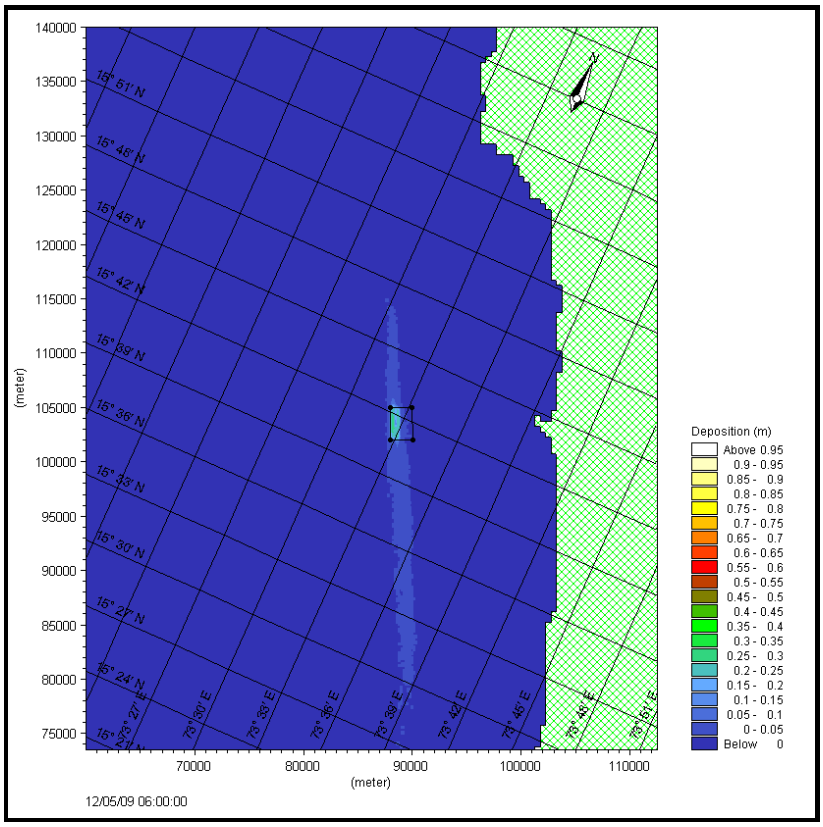


Figure 4-16: Deposition pattern for PA (Strong current (S); Type –I Sediment; dumping area – B

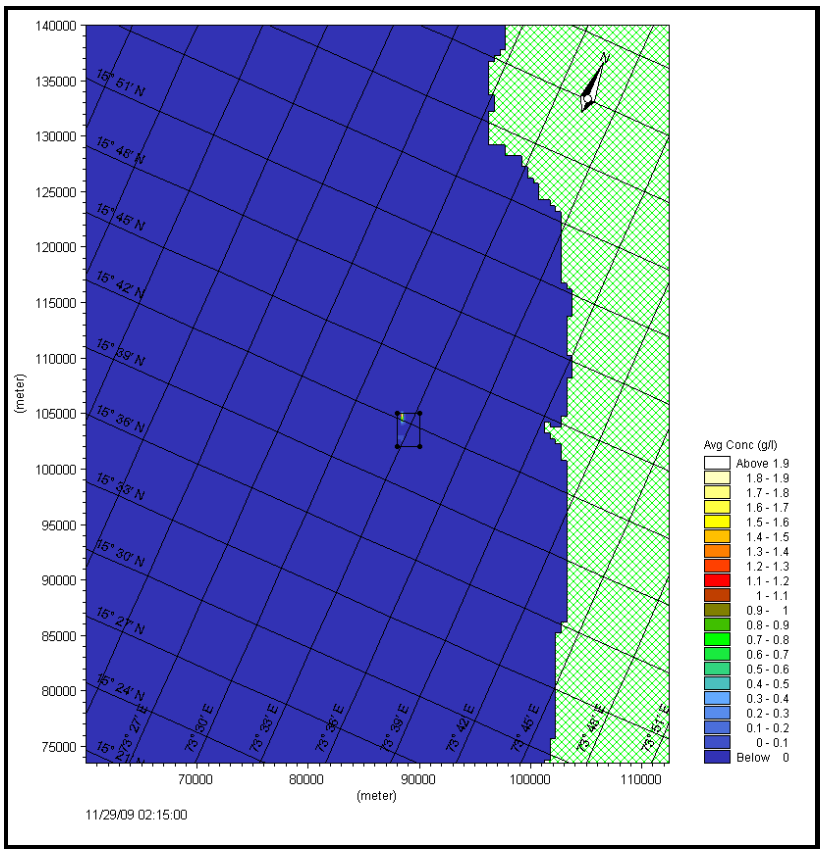


Figure 4-17: Typical averaged concentration at dumping area – B for normal current with fine sediment 15 minutes after dumping

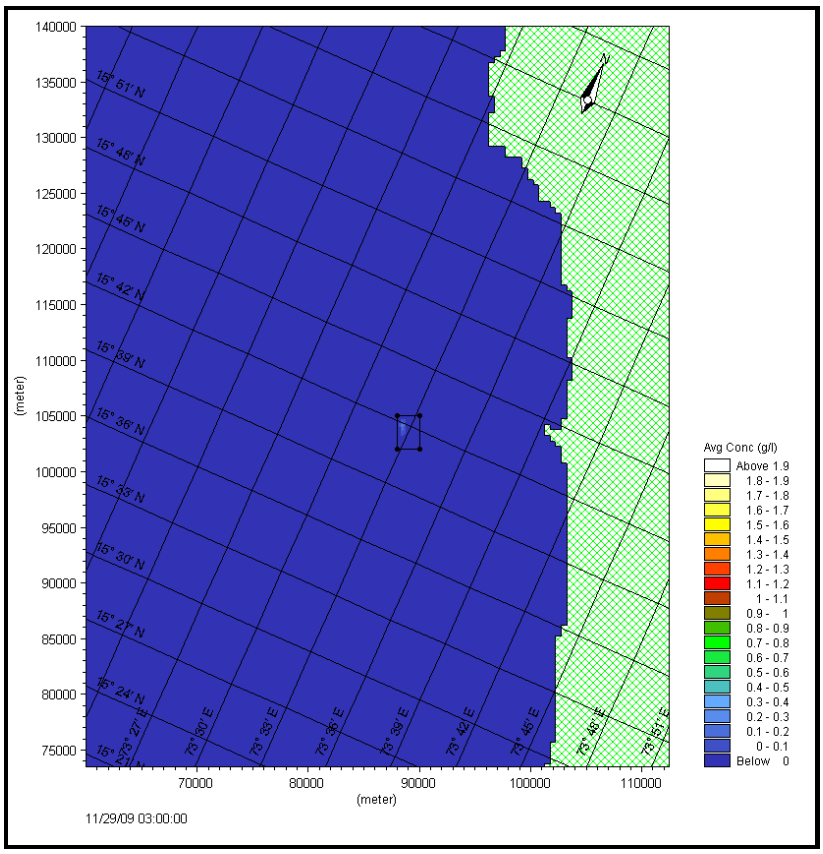


Figure 4-18: Typical averaged concentration at dumping area – B for normal current with fine sediment 1 hr after dumping

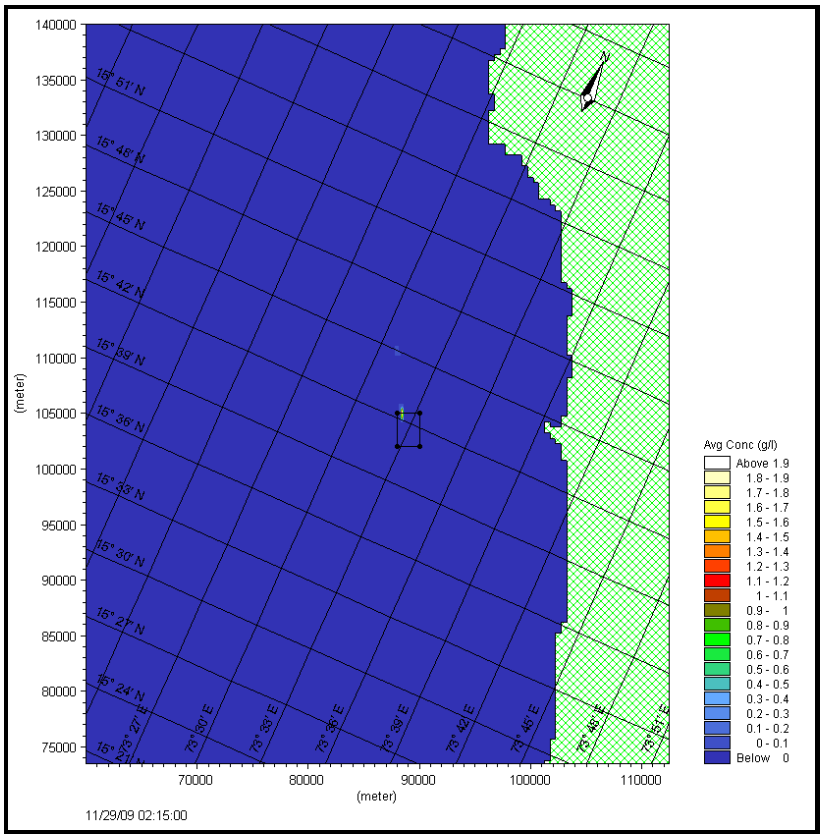


Figure 4-19: Typical averaged concentration at dumping area – B for strong current with fine sediment 15 minutes after dumping

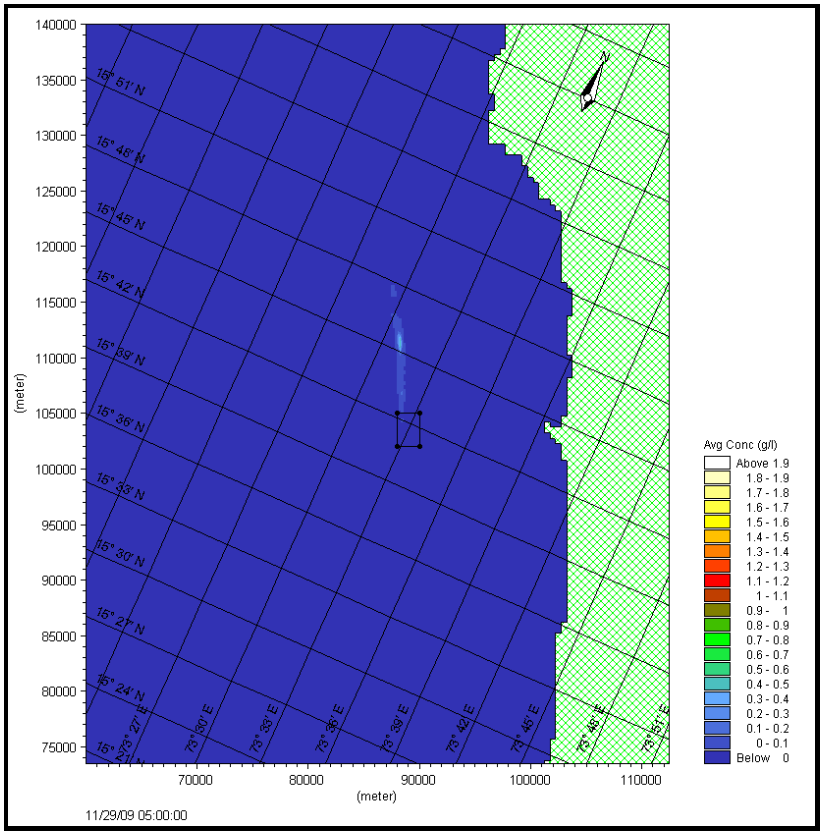


Figure 4-20: Typical averaged concentration at dumping area – B for strong current with fine sediment 3hr after dumping

5 Details of the air pollution control measures to be undertaken for the Dry bulk cargo handling berth.

Dust suppression equipment will be provided for efficient control of dust pollution on environment during storage and handling of Coal and Iron ore at berth and stockyard. An efficient dust suppression system will contain dust particles before it is airborne.

A common system consisting of suitable pump, storage tank, nozzles for dust suppression at discharge / feeding points of belt conveyors have been proposed at each transfer tower for efficient dust control system. In addition to above suitable spray system shall also be provided at ship unloader, stockyards & wagon loading station. Dust control is envisaged at following locations:

- Ship unloader discharging onto hoppers
- Stockyards
- Discharge and feeding points of conveyors
- Wagon loading system
- Sprinklers / nozzles as discussed below will be provided to control dust emission at various points or areas.

Ship Unloader: Fixed cone nozzles will be placed at receiving hoppers.

Cone Nozzles at Hopper

Belt Transfer Points (in Transfer Towers): Fixed cone nozzles, at regular intervals, will be mounted on skirt area and provided on discharge hoods of conveyors. Nozzles will wet cargos such as coal and iron ore along entire width of conveyor.

Covered Conveyor

Stockyard: Water sprinkling system at high pressure with swivelling type nozzles will be installed to cover entire stockpile. Nozzles will be installed on pipes at different levels from ground. Nozzles will be installed along stockpile at regular intervals to cover stockpile height and width. While stacking / reclaiming Coal nearest two sprinklers will be operated to control dust generation due to discharge / reclaiming. At other areas of stockpiles, two sprinklers at a time will be operated sequentially to control dust generation due to winds.

Water Sprinklers/Dust Suppression at stockyard

6 Layout map of greenbelt proposed around the dry bulk cargo berth

The greenbelt development plan is as follows:

- Greenbelt development is proposed along the entire landward boundary of Redi Port area. In addition, tree cover will be developed along the dry bulk storage areas.
- The greenbelt area proposed to be developed is about 13 ha (32 acres).
- Greenbelt of around 25 m wide will be developed around the boundary.
- Greenbelt will be developed along the stockyards.
- The tree species to be used for the green belt development will be in line with the local ecology (indigenous species).

The greenbelt development plan is shown below:

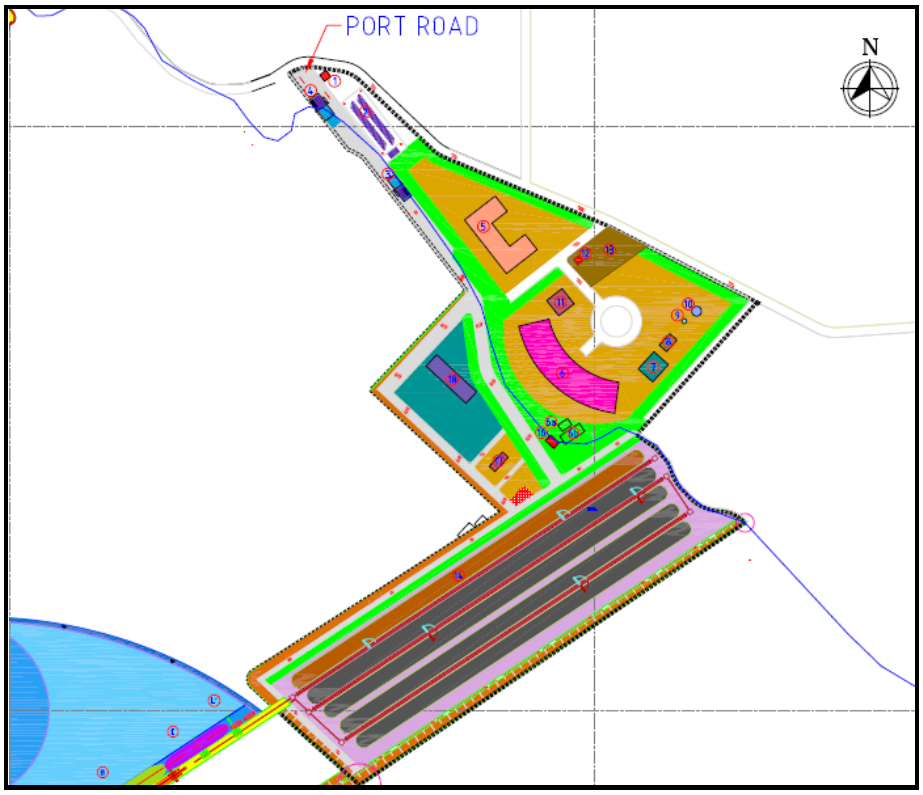


Figure 6-1: Greenbelt Development Plan

7 Issues raised during public hearing and commitments made by the project proponent in the form of tabular chart with financial budget for complying with the commitments made

Date of Public Hearing : September 12, 2011

Venue : Redi Port Staff Colony, Near Jilla Parishad Purna Primary School, Sukalbhat No.2, Redi, Vengurla Taluka, Sindhudurg District.

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
1.	Mrs. Tendulkar, Sarpanch, Grampanchayat, Redi	She submitted her say in writing on behalf of Grampanchayat, Redi and requested that due care shall be taken not to desettle the local villagers. The sacred temples in the nearby villages shall be safeguarded and local people from the villages should be given preference in the employment process. The Grampanchayat should be taken in to confidence in the decision making process. The water from the Kanyal lake would not be made available to the "Redi Port" and the project proponent should arrange their own water supply. The authorities should need to be vigilant about the health hazards. 5% share of the profit should be transferred to the Redi Grampanchayat as a development fund. Medical facilities should be provided free of cost. Local people should be actively involved and preferably made shareholders.	• Area proposed for development of Phase I and Phase II of Redi port expansion is 98 ha. In this 55.5 ha will be reclaimed land. Remaining land of 42.5 ha proposed for development is land with scrub/plantation and land without scrub, barren and sandy areas. The land identified for the development of the port will be provided by Maharashtra Maritime Board (MMB) as per the concession agreement. The land is not inhabited hence no rehabilitation and resettlement issues are foreseen in the present development. • RPL is well committed to social responsibility and till date RPL donated `. 3.55 Lakhs for renovation of various temples in Redi village. RPL shall provide necessary assistance in safeguarding the sacred temples in Redi Village. • Preference will be given to local people for the direct and indirect employment opportunities created by port authorities depending upon their educational qualification and skill set. • Water requirement shall be met from Tilari canal. Kanyal (Redi) Lake water will not be

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
			used to meet the water requirement for the port expansion. • Corporate Social Responsibility (CSR) fund of `.10.0 Crores provision is made by RPL and this fund will be allotted and spent on the activities/measures in consultation with Redi Village Grampanchayat over a period of Five years. • One primary health centre in the Redi village will be strengthened as a part of CSR Activities.
2.	Shri. Kamruddin Mohamad Isak Shaikh, Redi, Tal:- Vengurla, Dist:- Sindhudurg	He was of the opinion that the promoters of the proposed project had not made a detailed survey of Geo-graphical implication of the plan. He pointed out that the survey No. Of the 98 Hect. Area was not disclosed. The access roads to the port, the details of the acquired land were not disclosed. The Konkan railway has no plan to bring Redi village under their proposed network system. The mining activity was carried out in this area since 1954. There is no separate road for the project. The private road has been acquired by the "Maharashtra Maritime Board". The road conditions have become miserable because of existing mining activity. Presently if the port does not have any new land for roads, how can it go for expansion plan? Presently mining companies and 500 peoples from nearby villages were using water from Kanyal lake for their livelihood. The project proponent falsely claim that the land to be barren and rocky. The issue of noise pollution due to truck movement is very serious. He again pointed out that how much sea land would be reclaimed is not clear. Also import and export of toxic material will harm the	• Area proposed for development of Phase I and Phase II of Redi port expansion is 98 ha. In this 55.5 ha will be reclaimed land. Remaining 42.5 ha Govt. land under survey Nos. 15 & 58 is expected to be allotted to us by the State Government. • A road of 4.5 km is proposed which will start from the southern side of the existing port and connects the proposed port expansion area and passes along Redi, Tinarewadi and Kanyaalwadi villages and connects the existing road near Moujekanyal village. The proposed road will require 44 acres of land for 40m wide. This includes both private and Government land. • A new railway line connection from konkan railway near to Sawantwadi Road Railway station to the port will be developed. The distance is 17 km, which is nearest point to the port. • Water requirement shall be met from Tilari canal. Application is being filed with

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
		environment. The company has already made huge profit but villagers have not benefited from it. He requested to the Chairman that permission should not be granted to the project unless these matters are sorted out. If not, there will any option but to approach to the Court or Green Tribunal for justice. Everyone wants progress but not at the cost of de-settlement and pollution.	Maharashtra Jeevan Pradhikaran (MJP). Kanyal Lake will not be used to meet the water requirement for the port expansion. • Dedicated two lane road network during Phase-I with a provision for six lane roadway based on future needs will be developed. Also new railway link will provide connectivity to Konkan railway line. These proposed dedicated rail/road connectivity will minimise the traffic congestion/traffic load on the existing road and thereby reducing the truck movements and noise pollution. • Proposed Redi port expansion is planned to handle the dry bulk cargo such as Coal and iron Ore and General cargo. The same will be handled with due care. Accidental spills, if any will be recovered. • As apart of CSR, RPL has carried out the following activities in the vicinity of the port - Medical camp in Redi Village - Funds towards renovation of temples. - Fund towards facility improvement at Government Primary School - Fund towards improvements of medical facilities in Redi village. - Free medical dispensary established in the Redi village. • Land identified for the development of the port will be provided by MMB. Land is not inhabited hence no rehabilitation and resettlement issues are foreseen in the present development.

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
3.	Shri. Dayanand Krushnaji	The project proponent should clarify the ownership right of the local people. The villagers had received notices claiming that the land belongs to project proponent. The villagers are purposely misled. The local people should be given employment.	• The project proponent has purchased the land from the MMB (Government land), RPL is not aware of the notices to local people. • Preference will be given to local people for the direct and indirect employment opportunities created by port authorities depending upon their suitability as regards to educational qualification and skills.
4.	Shri. BalKanyalkar, Village:- Kanyal, Tal:- Vengurla, Dist:- Sindhudurg	We agree with the demand put forth in the written say submitted by the Sarpanch, Redi Grampanchayat. We too received notices for land acquisition. The road passing near M/s. Tata Metallic is currently being used by the project proponent for transportation. We suggested an alternative route, but project proponent is not responding. The land should not be acquired but it should be taken on lease for certain period as per the current market rates. The water of Kanyal lake is being used by M/s. Tata Metallic Ltd. Due to continuous use the water by the companies, last year supply of water for the villagers drastically reduced and created drinking water problems for the villagers. Everyone wants progress but not at the cost of de-settlement of villagers, temples and pollution.	• The project proponent has purchased the land from the MMB (Government land), RPL is not aware of the notices to local people. • Road suggested by local people was studied by a team of PWD, revenue officials and Tehsildar team and found not feasible due to many reasons. • A road of 4.5 km is proposed which will start from the southern side of the existing port and connects the proposed port expansion area and passes along Redi, Tinarewadi and Kanyaalwadi villages and connects the existing road near Moujekanyal village. The proposed road will require 44 acres of land for 40m wide. The land belongs to both private and Government land. The land required for road/rail corridor is 90 acres. • The land required for the proposed rail/road corridor belongs to both Government and private owners. Land Acquisition will be carried out by the Government as per the Land Acquisition Act and policy of the State

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
			Government. • Water requirement shall be met from Tilari canal. Kanyal Lake will not be used to meet the water requirement for the port expansion. • No resettlement is envisaged for the proposed expansion plan. • Necessary pollution control measures will be adopted and followed as a part of Environmental Management Plan.
5.	Shri. Ajit Subhash Sawant, Ex. Speaker, Vengurla Nagararishad, Vengurla, Dist:- Sindhudurg	He expressed his views stating that not a single house of villagers, temple or any person should be de-settled to establish the project. The water of Kanyal lake should not be used by project proponent. Local people should be given jobs in the project. Land acquisition should take place willingly and not forcefully. Reclamation work in the sea will pose serious threat to the costal area; hence bunds should be erected to prevent the sea water entering the village. The port should be developed by the Government and not by the private companies. In past affected villagers have not received any funds for the development of this area from the existing mining activities. Project proponent should reserved 5% of their profit for the development of villages in this area.	• The land identified for the development of the port will be provided by Maharashtra Maritime Board (MMB) as per the concession agreement. The land is not inhabited hence no rehabilitation and resettlement issues are foreseen in the present development. • Water requirement shall be met from Tilari canal, application is bieng filed with Maharashtra Jeevan Pradhikaran (MJP). Kanyal Lake will not be used to meet the water requirement for the port expansion • Preference will be given to local people for the direct and indirect employment opportunities created by port authorities depending upon their educational qualification and skill set. • The land required for the proposed rail/road corridor belongs to both Government and private owners. Land Acquisition will be carried out by the Government as per the Land Acquisition Act and policy of the State

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
			Government. • Reclamation is proposed towards seaward side. During reclamation, bunds will be constructed around the planned reclamation areas, wherein the solids will be allowed to settle and the supernatant water will be directed into sea through appropriate channel. However, as a part of EMP, water quality monitoring in and around the port area is proposed. • Considering the importance of ports and its related infrastructure in the growth of a nation and Maharashtra state, Maharashtra Maritime Board (MMB) planned to develop Redi port through PPP model. Redi Port Limited (RPL), a special purpose vehicle (SPV) formed for the expansion/ development of Redi Port on Build, Own, Operate, Share and Transfer (BOOST) basis. MMB which is a government body holds 11% stake in Redi Port. • Corporate Social Responsibility (CSR) fund of `. 10.0 Crores provision is made by RPL and this fund will be allotted and spent on the activities/measures in consultation with Redi Village Grampanchayat.
6.	Shri. Sandesh Parkar, Secretary, NCP, Kankavali, Dist:- Sindhudurg	The local population is deeply troubled by the pollution caused due to the existing projects. This port is originally operated by Gogate and now is being operated by Redi Port Ltd. The company has made huge profit but villagers have not prospered and Govt. has obtained few percentage of Royalty from the company. They have systematically dislodged local	• The proposed Redi port expansion is planned to handle the dry bulk cargo such as Coal and iron Ore and General cargo. Necessary pollution control measures will be adopted and followed as a part of Environmental Management Plan. • Proper compensation to Mai Shirsat. Mr.

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
		business like Hotel run by Mai Shirsat and establishment of Shri. Vasta. The company has not given justice to these people then how they will fulfil the demands of villagers in future? Further he raised the question how much of the sea land will be reclaimed? What about impact of reclamation on local fisherman's business? M/s. Tata Metallic Ltd. is already using the available water then from where the company will intake water for their domestic purpose? What precautionary measure will be taken to avoid the pollution arising from import & export activities and vehicle movement? What rate will be paid for acquisition? The officers present here should stay in Redi village for a couple of days to understand the pollution problems and to gauge the effect of the project. Before organising the public hearing, people were not taken into confidence by extending dialogues and welfare was not considered and they further suggested that overall planning of the project should be made by considering villagers opinion.	Vast has already been given adequate compensation and the issue is settled. • The area proposed for development of Phase I and Phase II of Redi port expansion is 98 ha. In this 55.5 ha will be reclaimed land. • Reclamation is proposed towards seaward side. During reclamation. bunds will be constructed around the planned reclamation areas. Wherein the solids will be allowed to settle and the supernatant water will be directed into sea through appropriate channel. In the vicinity of proposed expansion area, fishing trawlers enters the sea through Keruvada creek, Terekhol river which are located > 3.0 km along the coast from the proposed expansion area. There will not be any disturbance to the movement of the fishing trawlers/fish crafts during the construction and operation of the port as the activities will be confined to the port area and are almost 3 km away from the route followed by fishing trawlers entering into the sea. In order to avoid any hindrance, marker buoys will be installed to make aware of the port construction and operation activities. • Water requirement shall be met from Tilari canal, application was filed with Maharashtra Jeevan Pradhikaran (MJP). Kanyal Lake will not be used to meet the water requirement for the port expansion. • To avoid pollution, the following mitigation measures shall be followed: - Use of covered conveyors

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
			- Dust suppression measures such as water sprinkling at Ship unloader discharging onto hoppers, Stockyards, Belt Transfer points, Discharge and feeding points of conveyors. - Scientific and regulated stacking of cargo piles - Regularization of truck movement - Use of tarpaulin covers and speed regulations for vehicles engaged in transportation - Greenbelt Development • The land required for the proposed rail/road corridor belongs to both Government and private owners. Land Acquisition will be carried out by the Government as per the Land Acquisition Act and policy of the State Government. • Advertisements regarding the date of public hearing and venue and project, detail etc, were given in Newspapers in local and English Languages as per the procedure for conduct of public hearing given in the EIA Notification 2006 (as amended). Public Hearing was conducted by MPCB as per the procedures and the proceedings of the same were forwarded to respective authorities.
7.	Shri. Shankar Kambali, Ex. MLA, Shiroda, Tal:-Vengurla, Dist:-Sindhudurg	We object to the village named "Reddi" used the display board of the public hearing in a wrong manner, which led to confusion. It should be "Redi". The proposed land acquisition shown in the EIA report is of 10 Kms radius, hence it seems that Redi Village will disappear from the map of the Sindhudurg	• Name of the port was immediately corrected in local language on the display board during Public Hearing itself by the port authorities and apologised to the local people for the typographical error of village name on the display board.

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
		district due to this project. The people like Mai shirsat and Shri. Vasta have been driven out and their livelihood has been taken away. Project proponent claims that they will complete their project within 5 years, but already 3 years have completed how such a huge project will be completed within remaining 2 years? The access road should be made through the area where there is no human habitation. He requested the project proponent not to harass the people by planning the access roads through human habitation. The fruits of progress should reach the common man. Siddeswar temple is religious place to the villagers and outsiders too, hence there should not be any re-settlement of this temple.	• As per MoEF regulations, 10 km radius is considered as study area for conducting EIA study and the same was presented in the Draft EIA report. 10 km radius map is not meant for land acquisition. • Proper compensation to Mai Shirsat. Mr. Vast issue has already been resolved. • As mentioned in the Draft EIA report, the commissioning of the Phase I port will be in a period of 24 months from construction start / Financial Closure. Phase II within 24 months from the Phase I commissioning. Construction works shall be commenced after receipt of necessary statutory approvals. • Alternative analysis was carried out to select the road alignment which has minimum disturbance to settlements. The road corridor alignment/route has been selected prudently so that minimal Resettlement and Rehabilitation is ensured. • Corporate Social Responsibility (CSR) fund of `. 10.0 Crores provision is made by RPL and this fund will be allotted and spent on the activities/measures in consultation with Redi Village Grampanchayat over a period of 5 years. • RPL is well committed to social responsibility and till date RPL donated Rs. 3.55 Lakhs for renovation of various temples in Redi village which includes Siddeswara temple also. No displacement of Siddeswara temple is envisaged due to proposed

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
			expansion.
8.	Shri. Vishwas Naik. Redi, Tal:- Vengurla. Dist:- Sindhudurg	We requested Maharashtra Government to develop this port on its own but it was handed over to private company, He further requested not to relocate and de-stabilise the local population. The saline land near the coast should be acquired by the collector and report should be sent by the collector to the state Government.	• Considering the importance of ports and its related infrastructure in the growth of a nation and Maharashtra state, Maharashtra Maritime Board (MMB) planned to develop Redi port through PPP model. Redi Port Limited (RPL), a special purpose vehicle (SPV) formed for the expansion/development of Redi Port on Build, Own, Operate, Share and Transfer (BOOST) basis. MMB which is a government body holds 11% stake in Redi Port. • The land identified for the development of the port will be provided by Maharashtra Maritime Board (MMB) as per the concession agreement. The land is not inhabited hence no rehabilitation and resettlement issues are foreseen in the present development.
9.	Shri. Vasant Kesarkar, Sawatwadi, Dist;- Sindhudurg	The EIA report is not very clear about various information related to this area. The farmers in this area have lots of problems. We do not want the local population driven out of their own land. We would like to have the answers to our queries in writing, many matters are not yet clear- what is the survey No. of the acquired land? Where is the railway station going to come up? The local youths should be given employment. Workers hired on contract basis should be absorbed as permanent employees. We have submitted a written say in this regard.	• The land identified for the development of the port will be provided by Maharashtra Maritime Board (MMB) as per the concession agreement. The land is not inhabited hence no rehabilitation and resettlement issues are foreseen in the present development. • Responses to the Public Hearing minutes will be provided in the Final EIA report. • The area proposed for development of Phase I and Phase II of Redi port expansion is 98 ha. In this 55.5 ha will be reclaimed land. Survey numbers of 42.5 ha of land are 15 & 58.

S.No.	Name and Place of the Speaker	Public Views and Comments	Response of RPL
			• Nearest point from Konkan railway line to the port will be developed. • Preference will be given to local people for the direct and indirect employment opportunities created by port authorities depending upon their educational qualification and skill set.
10.	Mrs. Mai Shirsat, Redi, Tal:- Vengurla, Dist:- Sindhudurg	M/s. Redi Port Ltd. has been extremely unjust to me. The hotel, run for so many years was pulled down. I was harassed by the company and asked to leave the place. I want justice.	• She continues to stay, where she was. No harm was done to her by anybody. • Proper compensation to Mai Shirsat, since her house is right in the middle of the port and therefore, hazardous.
11.	Shri. Sudarshan Gawandi, Redi, Tal:- Vangurla, Dist:- Sindhudurg	None of the queries raised until now, have been satisfactorily answered by the project proponent.	• Proponent answered the queries all together after hearing the public views. No query remained unanswered.
12.	Shri. Vasta, Redi, Tal:- Vengurla, Dist:- Sindhudurg	The hotel activity run by me was shut down, but no compensation has been given. The hotel was established in 1962 but in spite of FIR, lodged with the police, the compensation has not reached us.	• Adequate compensation was paid and issue settled.
13.	Shri Rajan Teli, MLA, Kankavali, Tal:- Sindhudurg	We have failed to receive any satisfactory answers from the company. Justice should be meeted to all concerned parties. The state government wants to bring prosperity to this area and not harass the local people. The council of Minister has approved irrigation project in this area and hence company should take participation to bring the water from this project to proposed site through pipeline and also to supply drinking water to the people in this area free of cost. The Chairman should invite the representatives and arrive at an acceptable solution. Promises given by the company should be submitted in writing. The pending compensation should be paid within 15 days.	• Water requirement shall be met from Tilari canal. Kanyal Lake will not be used for meeting water requirement for the port expansion.

8 The project proponents were advised to give the latest status on availability of Government land and send a copy of the minutes of the EAC meeting of 2013. Whether the MoEF had earlier said that unless the Government land is made available to the project they will not be in a position to accord final approval.

The proposed development will be over an area of 98 ha is within the already notified limits of the port. Out of 98 ha, 64.22 ha of land is planned to be reclaimed for the port development purpose and remaining 33.78 ha is the onshore land. As per the concession agreement with Maharashtra Maritime Board (MMB), the land for port expansion shall be provided by Government of Maharashtra.

The sea area of 64.22 ha is proposed to be reclaimed is within the Redi port limits declared by MMB. Onshore land of 33.78 ha is government land.

Breakup of government land: 33.78 ha

- Redi village, Vengurla Taluk : 3.86 ha
- Kanyal village, Vengurla Taluk : 29.92 ha

Government of Maharashtra advised MMB to procure the land as per procedure of Forest Act, 1980. MMB submitted the forest application in May, 2013 and various staged of forest clearance is given below:

Date	Events
May 15, 2013	Submission of Forest application to Deputy Conservator of Forest, Sawantwadi
July 04, 2013	Proposal sent to Chief Conservator of Forest, Kolhapur
October 30, 2013	Proposal verification at Nagpur Forest Office sought additional details
December 11, 2013	Submission of additional details to DCF, Sawantwadi
February 20, 2014	DCF forwarded the additional details to CCF, Kolhapur
February 21, 2014	CCF's office, Kolhapur forwarded to Nagpur Forest Office
February 26, 2014	Nagpur Forest Office sought some more additional details including compensatory afforestation (CA) land and biotic report
March 20, 2014	Submission of additional details
July 08, 2014	Submission of biotic report
2014-2016	Identification of alternate land and approval by state forest department
2016	Finally approved by state forest department and recommended central level

Chief conservator of forests (CCF), Mantralaya has recommended the proposal to Additional Principal Chief Conservator of Forest, MoEF&CC, Nagpur for diversion of forest land to non-forestry purpose. The letter from CCF is enclosed as **Appendix A**.

Copy of the minutes of the EAC meeting of 2013 is enclosed as **Appendix C**.

9 Proponents were advised to submit an on site disaster management plan and dovetail it with the off site management

plan after including all cargo handled including Hazardous chemicals

9.1 Onsite Emergency Plan

9.1.1 Formulation of Disaster Management Plan and Emergency Services

The assessment of the risks and hazards leads either to improvements being made at the installation in the form, for example, of additional safeguards or better procedures, or the decision being taken that the risk is sufficiently small to be accepted.

The Disaster Management Plan must be related to the final assessment and it is the responsibility of the RPL management to formulate it. The plan will include the following elements.

- Assessment of the magnitude and nature of the events foreseen and the probability of their occurrence
- Formulation of the plan and liaison with outside authorities, including the emergency services
- Procedures for raising the alarm and communication both within and outside the port
- Appointment of key personnel and their duties and responsibilities (organizational structure)
- Emergency Control Centre
- Action on site and Action off site

9.1.2 Organization Structure

The first few minutes after the incident / accident are invariably the most critical period in prevention of escalation. Therefore, the personnel available at or near the incident site (and often responsible for or carrying out that particular activity) and on a round the clock basis play a vital role in an emergency. This concept is made use of in nominating the KEY PERSONS.

In each hazardous location it is necessary to nominate a functionary as the *"Incident Controller"* who is invariably a shift-in-charge of the facility. The Incident Controller tackling the emergency in real terms requires support from various other services e.g. fire & safety, medical services, security, engineering, administration, technical services covering communication, transport and personnel functions, etc. A KEY PERSON for each one of these services, therefore, should be nominated.

The "SITE MAIN CONTROLLER" (SMC) will be the Unit In-charge. The various controllers selected to carry out the work will co-ordinate with the SMC through the functional KEY PERSONS at the incident site. The KEY PERSONS will generally be at the site of incident and the CONTROLLERS will report at the EMERGENCY CONTROL CENTRE.

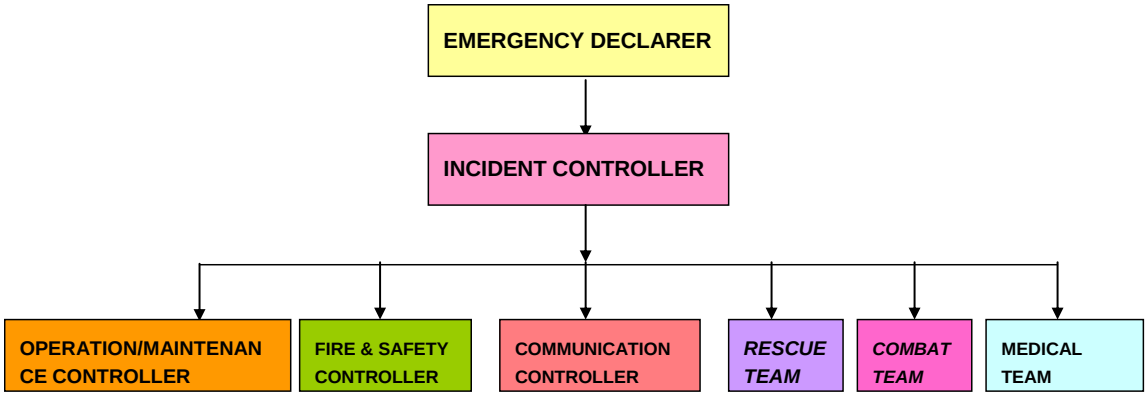
The duties and responsibilities of various KEY PERSONS AND CONTROLLERS will be written down ensuring no grey areas or overlapping responsibilities.

Various Controllers will be drawn from the organisation and clear-cut responsibilities will be spelt out for the following controllers:

- Operation Controller
- Maintenance Controller
- Fire and Safety Controller
- Communication Controller
- Environment Controller

A Succession chart will be developed as above nominating second-line controller who would act as controller in the absence of any of the above officials.

An emergency organisation chart is as follows:



9.1.3 Roles and Responsibilities of Emergency Team

i) Site Main Controller (In-charge)

- To access the extent and magnitude of the damage and by maintaining communication with the Site Incident Controller (SIC).
- To determine how far the emergency control plan can be extended
- Prepare action for monitoring and controlling the emergencies
- To decide whether any section / process / area to be shut down / isolated in the event of any accident
- To finalise the means of evaluation and explore the possibilities of taking help from offsite sources
- Review the fire fighting operations in consultation with Safety Coordinator
- Co-ordination with the safety officer regarding evacuation and shelter rehabilitation aspects
- Arrange for restoration and normalcy in consultation with Incident Controller
- Announcement of conclusion of emergency
- Issuance of authorised statements and ensures that all evidences of the incident are preserved.

(ii) Site Incident Controller (Shift in-charge)

- Establish Emergency Control Centre and inform SMC
- Ensure availability of Controllers/Team members
- Priority decisions for strategy for development of resources for incident control
- Periodic assessment of actual disaster zone and resource deployment (own / external)
- Periodic status report of SMC
- Seek help for:
  - Fire Fighting
  - Medical Aid
  - Rescue
  - Transport
  - Traffic Arrangement
  - Law and Order
- Inform the following authorities about the incident through zonal/sector authorities:
  - District Collector
  - Superintendent of Police
  - District Environmental Engineer
  - District Health Officer

  - Inspector of Factories
  - Neighbouring Installations
- Establish contacts with the following, through controllers:
  - Superintendents of nearby hospitals
  - Chief Fire Officer of nearby fire services
  - Insurance Company
  - Establish First Aid Centre through Safety Coordinator
- Establish Information Centres

9.1.4 Emergency Co-ordinators

Logistics Coordinator: The duties and responsibilities in the event of any emergency include:

- Report at the affected area to the SMC & SIC
- Arrange to attend all maintenance jobs as instructed by SIC
- Ensure that all essential services like power, water etc are maintained without interruption
- Ensure adequate manpower availability at the affected area
- Reporting all the incidents to SIC
- Arrange for all the tools, materials at the site of emergency

Communication Coordinator: Responsibilities include:

- Report to SMC & SIC
- Removal of non essential personnel from the emergency area in consultation with SIC
- Contact with SIC and arrange for necessary facilities
- Control over entry and maintain law & order and arrange for police help in consultation with SMC
- Liaison with external agencies in consultation with SMC
- Co-ordination of transportation requirements for moving personnel for first aid, evacuation, rehabilitation etc.
- Maintenance of inventory systems in the Emergency Control Centre

Safety Coordinator: Responsibilities include:

- Immediate Reporting to SIC
- Co-ordination with Security officer and security personnel
- Ensure availability of all safety equipments at site
- Co-ordination of all rescue operations
- Co-ordination of availability of first aid to all injured personnel
- Advice to SIC on fire fighting operations
- Ensure availability of necessary antidotes/ medicines in case of toxic release

9.1.5 Communication

An essential component of any emergency preparedness programme is the communication links for gathering information needed for overall co-ordination e.g. emergency control centre with in-house as well as outside emergency services. Too much reliance on the telephone system Fixed lines/ Mobile phones is risky as it can soon be overloaded in an emergency situation. A computer with internet and printer facility and photocopying machine, wireless networks, fax, intercom units are recommended for higher reliability.

- Help line numbers will be setup for emergency related queries

The description of the tasks and responsibilities, reporting place, etc. for each key functionary will be, as far as possible, so drafted as to reduce the communication needs between the

interacting groups and permit good mutual understanding and well co-ordinated independent actions to tackle emergency situations.

9.1.6 Emergency Control Centre

The emergency control centre should be established separately for port and should be equipped with the following:

- An adequate number of external telephones. If possible, one should accept outgoing calls only, in order to bypass jammed switchboards during an emergency.
- An adequate number of internal telephones, Radio equipment/pager system.
- A layout plan of the facility showing.
- Location of possible spillage/fire points.
- Sources of safety equipment and other fire-fighting system elements.
- Escape Routes.
- A nominal roll of employees at the facility.
- A list of KEY PERSONNEL with addresses, telephone numbers, etc.
- An adequate number of personnel protective/safety equipment available on site / back up in warehouse or with other member groups of mutual aid programme.
- Locations of various fire fighting arrangements at the facility.

9.1.7 Alarm Systems

The emergency (due to fires or spillages) should be initiated by the first person noticing it by activating the fire alarm from the nearest call-point or by contacting the fire control room immediately on the internal telephone in case of any emergency.

If in the opinion of the shift in-charge in consultation with the fire safety officer, the severity of the emergency is such that it can primarily be coped with by RPL's own resources (aided by fire fighting appliances from the fire brigade, if required) the siren code for ONSITE CRISIS will be sounded through the hooter. The siren codes for distinguishing between an ONSITE & OFFSITE CRISIS will be clearly established.

The onsite/ offsite siren codes should be informed to the neighbouring population of the facility.

9.1.8 Mutual Aid Scheme

Assistance in terms of equipment and manpower will be taken from the neighbouring installations under a Mutual Aid Scheme / Zonal Disaster Management Plan.

9.1.9 Assembly Points

Shifting or evacuating facility personnel during an onsite crisis will be done to a predetermined assembly point in a safe part of the facility. The assembly points identified are at port administration building and medical aid centre.

9.1.10 Onsite Emergency Plan and Rehearsals

Once the emergency programme is finalised, it should be made known to all personnel so that each one knows his or her role in the event of an emergency. The plan will be regularly tested through the rehearsals, at a regular frequency and updated accordingly.

9.1.11 Spillage and Contingency Plan

The purpose of this plan is to identify, prevent and control all probable spillages in port for safe and healthy working of port personnel and machinery.

Probable materials for Spillage:

- Electrical equipment area (Transformer oil and cable filling compounds)
- Cargo spills
- Oil spill during bunkering of tugs and port crafts
- Liquid and solid wastes
- Water and Steam

Spillages in the Port can lead to:

- Causing loss of property
- Interfaces with safe moving of personnel
- Damage to equipment when left unattended
- Health hazard i.e., toxic when released in air or mixes with the main port drain system and further to town drain
- Fire hazard

Prevention of Spillage:

Routine checks of the system have to be made to ensure that no leak or spill starts. Any minor leakage has to be reported to the concerned person (Shift In-charge, Operation & Maintenance team member). Leakage has to be arrested in the shortest possible time. Necessary arrangements have to be made to collect the leakage and to store in proper place.

In case of spillage the following measures would be adopted:

- Oil spill on the land should be properly cleaned using absorbents, cotton waste, sand, saw dust etc.
- The collected oil is disposed to SPCB/CPCB authorized agency.
- Oil spill on the port premises should be properly cleaned using absorbents, cotton waste, sand, saw dust etc., and the materials used for cleaning should be incinerated.
- Major oil spills can be taken to oil water separator and the same to be reused depending on the quality.

9.1.11.1 Oil Spill Contingency Plan

The phase II expansion of Redi Port will not handle any liquid cargo, however accidental oil spills may occur during bunkering and ship accidents etc. The Port will be equipped with necessary modern equipment to contain and recover oil spills. In addition, RPL will develop a customised Oil Spill Contingency Plan to cope with any accidental oil spill during bunkering. The contingency plan will be prepared by RPL in consultation with the Department of Ports, Government of Maharashtra.

In case of an oil spill, immediate steps would be taken to contain and control the spill. An Oil Spill Contingency Plan will outline the steps to be taken before, during and after a spill. In the present case, an Oil Spill Contingency Plan covering the following will be prepared:

- Hazard Identification
- Vulnerability Analysis
- Risk Assessment
- Response Actions.

Hazard Identification: All conditions which can lead to an oil spill will be identified and necessary information to react to a spill under different conditions will be studied.

Vulnerability Analysis: Vulnerability analysis will help to identify the resources and communities which could be affected due a spill and accordingly they can be informed or

quick measures can be taken so that it results in minimum damage. Information on the following will be collected as a part of vulnerability analysis:

- Public safety officials
- Schools, nursing homes, hospitals and prisons in the area
- Recreational areas
- Special events such as festivals and when they occur
- Ecologically sensitive areas specially areas susceptible to oil or water pollution.

Risk Assessment: Based on hazard identification and vulnerability analysis, the extent of risks involved will be assessed.

Response Actions: Response actions will provide information on all the immediate actions that will be taken in the event of a spill. It will have information on the following:

- Measures to prevent further flow of oil
- Measures to prevent ignition
- Agencies responsible for clean-up effort
- Information on the extent of spill
- Measures to contain spill to a limited area
- Measures to remove oil
- Measures to dispose the spilled oil.

Mock drills will be carried out to test the effectiveness of the contingency plan.

9.1.12 Disaster Management Plan for Cyclones/Floods

Flooding frequency is recorded in Vengurla taluka of the district, however project study area is not falling in any of the flood prone villages. Strict enforcement of flood zone regulations need to be done to prevent constructions of any type within 200 m of the riverbanks.

Community awareness should be built up so that people respond effectively to the flooding. Persons living in the low lying parts of floodplains, areas below unsafe. Some aspects of flood planning and response are:-

- Issuing warnings at the local levels
- Participating in flood fighting by organizing work parties to repair
- Embankments or clear debris from drainage areas, pile sandbags
- Stockpile needed materials
- Facilitating agricultural recovery
- Planning emergency supplies of flood and clean drinking water
- To conduct trainings on search and rescue for Search and Rescue
- Terms formed at District, Taluka and Village level from time to time

In line with the Disaster Management Plan of Sindhudurg District, RPL will develop a customised DMP to cope during disasters from natural calamities such as rough weather conditions, cyclones, Tsunami and floods, etc. Proper planning can reduce the potential damage from disasters in terms of losses to human lives, port assets, and environmental damage and rehabilitation costs. The DMP for Cyclones and Tsunami will be prepared by RPL in consultation with the Department of Ports, Government of Maharashtra.

The rough weather operations will be controlled in three stages:

- Green Status – The operations of loading / unloading will be carried out as planned.
- Yellow Status – This is an alert stage indicating possibility of rough weather. Still operations can be continued with all emergency precautions
- Red Status – Emergency situations or rough weather; operation will be suspended.

Activities controlled by in-charge of emergency operations. The vessel / tanker are to be moved to safe anchorage or will be advised to proceed to sea.

The main components of the DMP for cyclones will include the following:

- Pre-Disaster (or Pre-Cyclone) Plan
- On (or During Cyclone) Disaster Plan
- Post (or After Cyclone) Disaster Plan

Pre-Cyclone Plan

Pre-Cyclone Measures: Port will maintain and exchange information continuously with the local IMD authorities at Vengurla for continuous updates of meteorological conditions in general and emerging / predicted weather phenomenon such as cyclones in particular. Upon issue of a cyclone warning by the IMD, the management would immediately initiate the Pre-Cyclone Measures. The Department of Ports and District Collector of Sindhudurg would be informed of the imminent cyclone. All Port officials dealing with operations and disaster management will be informed.

Pre-Cyclone Exercise: On signalling of a cyclone alert, the Control Room will be manned 24 hours a day for disaster management. The 'Weather Signals' depending on the data available about the cyclone and it's threat perception will be informed to all personnel. The marine side operations will be regulated as per the rough-weather classification and will be continued with all emergency precautions. The different personnel of Port would assume their roles and responsibilities as previously identified for disaster management. The standby arrangement for power supply will be checked. Pre-identified 'Rescue Centres' will be kept in readiness. A pre-alert will be issued regarding suspension of all operations in case of emergency and to await instructions regarding the same. All Port Crafts and Ships will be fully secured inside the harbour area. Communication system including standby arrangement will be tested for working condition. Vehicles involved in rescue operations will be checked for working condition. Port crafts to be engaged in rescue will be kept in readiness. The safety in the project area will be ensured.

During Cyclone Plan: The emergency alarm siren will be raised as per the 'Alarm System'. All personnel will be evacuated except essential operational personnel and personnel dealing with disaster management. The cargo handling operations will be suspended. The vessel will be moved to safe anchorage or will be advised to proceed to sea. Power supply will be disconnected and alternative power supply will be restored in essential operational areas. Port Crafts and Tugs will continue to be in readiness for rescue.

Post Cyclone Plan: This would be the rescue and rehabilitation stage after passing of the cyclone. The damages would be assessed and rehabilitation work initiated to restore operations at the earliest. The records of the events during the cyclone will be maintained and reviewed for possible enhancements to the DMP.

9.1.13 Management Plan during Tsunami

The management plan for likely emergency of Tsunami is addressed below:

Characteristics: Tsunamis are a series of enormous waves created by an underwater disturbance such as an earthquake, landslide, volcanic eruption, or meteorite. A tsunami can move about 500 miles per hour in the open ocean. Once the wave approaches the shore, it builds in height. The topography of the coastline and the ocean floor will influence the size of the wave. There may be more than one wave and the succeeding one may be larger than the one before. Tsunami waves and the receding water are very destructive to structures. The Tsunami warning is issued on earthquake having intensity of more than 6 on Ritcher scale.

Documentary Record to be maintained

- Port Authority shall prepare and maintain the following documents:
- A tsunami hazard map graphically shows damage-prone areas with expected degrees of damage caused by possible tsunami
- A map showing inundation depth and probable inundation areas of port area shall be prepared.
- Evacuation maps shall be prepared and placed in the port premises
- Display of evacuation route on inundation maps

Warning/Confirmation

Early warnings/confirmation from the following sources shall be carefully examined:

- Meteorological Station
- TV and radio News

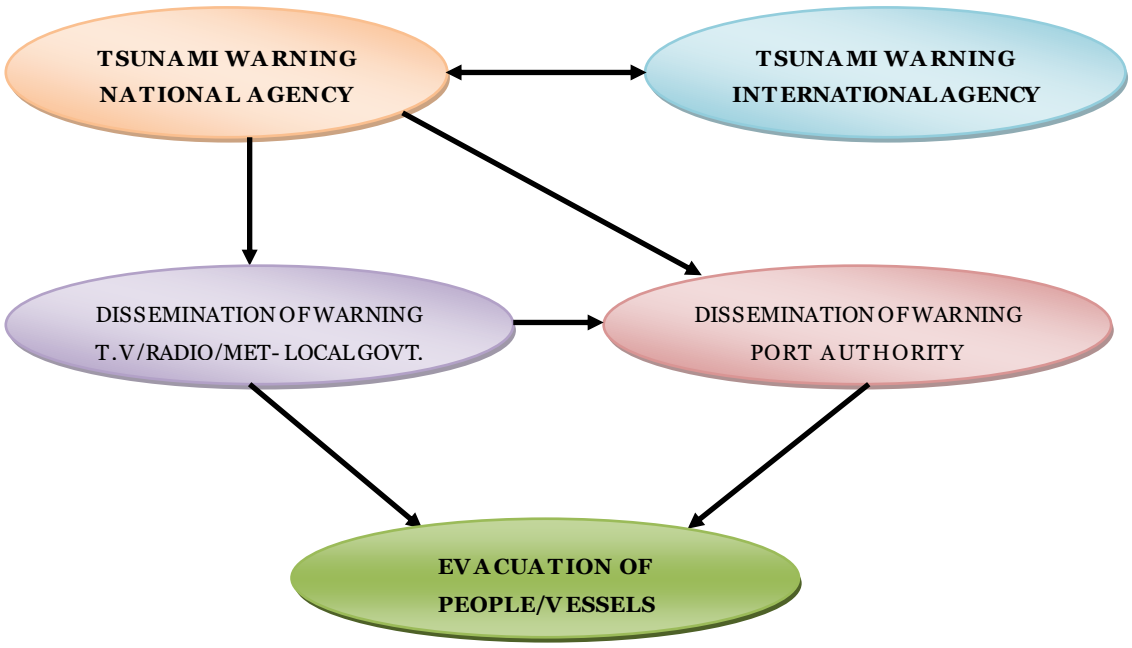


Figure 9-1: Tsunami Warning and Evacuation

Dissemination of Tsunami Warning

Port authorities shall have multiple channels for receiving early warning, including a direct channel from national meteorological agency. When an early warning was received by port shall disseminate to the personnel including those in vessels, in and around the site. Communication shall be made through telecommunications, loud speakers and siren.

Onsite Action Plan

- Alarm system to be initiated
- Through Signal Station informs all the ships to evacuate from the berth to open sea. Signal Station keeps in touch with all vessels on VHF.
- Move tugs and launches to safe areas or deep water anchorages
- Crew to wear life jackets.
- Cease cargo operations immediately.
- Arrange transport to evacuate to safer inland areas
- Keep sand bags ready
- Ensure proper secure of the cargo handling equipment and the shore cranes.
- Evacuation of Personnel and cordoning off the area
- Treatment of injured personnel

Evacuation

- Atleast one or two evacuation places such as high rise building shall be identified within Port (Administrative building and Medical Aid Centre)
- The evacuation place shall be safe and have enough space to accommodate the expected people
- The evacuation place shall be clearly identifiable and route shall be clearly indicated on map
- Vessels shall be evacuated from the jetty area
- Counter measures against Tsunami that can be taken up by ships as given in below Table

Table 9-1: Ship Action Policy against Tsunami[2]

Tsunami Forecast		Time until tsunami arrival	Ship Action				
			Moored ships at Berth		Anchored ship, buoy-moored ship	Navigating Ship	
			Large Ship, Medium ship (Cargo handling / working ship)	Small Ship (Port crafts)		Large Ship, Medium ship	Small Ship
Tsunami Warning	Major tsunami (3m, 4m, 6m, 8m >10m)	Short	Halt cargo handling, land evacuation	Land evacuation	Use engine	Offshore evacuation	Offshore evacuation/ Land evacuation after berthing
		Medium	Halt cargo handling, offshore evacuation/land evacuation	Landing and lashing/ land evacuation (in some cases, offshore	Use engine/ offshore evacuation		Offshore evacuation/ Landing and lashing after berthing (in some cases, land evacuation)

[2] Source: Japan association of marine safety, 2004

Tsunami Forecast		Time until tsunami arrival	Ship Action				
			Moored ships at Berth		Anchored ship, buoy-moored ship	Navigating Ship	
			Large Ship, Medium ship (Cargo handling / working ship)	Small Ship (Port crafts)		Large Ship, Medium ship	Small Ship
				evacuation)			
		Long	Halt cargo handling, offshore evacuation	Landing and lashing (in some cases, offshore evacuation)	Offshore evacuation		Offshore evacuation/ Landing and lashing after berthing
	Tsunami (1m, 2m)	Short	Halt cargo handling, land evacuation/ Strengthen mooring	Land evacuation	Use engine	Offshore evacuation	Offshore evacuation/ Landing and lashing after berthing
		Medium	Halt cargo handling, offshore evacuation/land evacuation/ Strengthen mooring	Landing and lashing/ land evacuation (in some cases, offshore evacuation)	Use engine/ offshore evacuation		Offshore evacuation/ Landing and lashing after berthing (in some cases, land evacuation)
		Long	Halt cargo handling, offshore evacuation/ Strengthen mooring	Landing and lashing (in some cases, offshore evacuation)	Offshore evacuation		Offshore evacuation/ Landing and lashing after berthing
Tsunami Advisory	Tsunami warning (0.5 m)		Halt cargo handling, Strengthen mooring/ offshore evacuation	Landing and lashing/ offshore evacuation	Attention to conditions (in some cases, offshore evacuation/ use of engine)	Offshore evacuation	Landing and lashing/ Offshore evacuation/strengthen mooring
Notes			-	Offshore evacuation is suggested if there is a sea area where even small ships are safe against tsunami outside the jetty and if there is adequate time for evacuation	Sea areas where rapid tsunami currents are anticipated should be investigated beforehand	-	

NOTES:

Time until tsunami arrival:

- Short: Little time is available for evacuation after tsunami warning (until a ship is under safe conditions such as offshore evacuation, landing and lashing etc.).
- Medium: Between long and short.
- Long: Adequate time is available for evacuation after tsunami warning (until a ship is under safe conditions such as offshore evacuation, landing and lashing etc.).

Land evacuation: Crew members take refuge in a high land area because evacuation by ship is anticipated to involve a high degree of risk. Also prevent the outflow of ships and exercise safety precautions regarding dangerous goods.

Offshore evacuation: Ships evacuate to deep and wide offshore area outside the jetty (if there is no time for offshore evacuation, ships should wait).

Landing and lashing: Crew members land small ships such as port crafts/tug boats and lash them to prevent from being washed away by tsunami.

Use of engine: Crew members start the engine of an anchored ship to drive, if necessary.

Attention to conditions: Although crew members do not take evacuation measures, they pay attention to changing conditions and take measures for ship safety until the cancellation of tsunami advisory.

9.1.14 Recommendations for Implementation of Off-site Emergency Plan

- Emergency control centre will be the focal point to co-ordinate emergency activities. Emergency control centre would be equipped with adequate number of equipment mentioned under heading “Emergency Control Centre”.
- Succession or second-line controllers would be named for assuming responsibilities in case disaster occurs in absence of principal co-ordinators.
- Hot line would be provided between Port and Fire Brigade at Vengurla.
- RPL would make arrangement for coded siren system or through some other suitable means to alert people in surrounding areas in case of off-site crisis.

A summarised version of action procedures detailing the “Role of Essential Staff in Major Emergency” would be issued in a flip chart like booklet form to all concerned persons (officers and supervisors) at work places and also to senior officers of the civic administration.

9.1.14.1 District Disaster Management Committee

The District Level Disaster Management Committee is set up for major off-site emergencies along with Port Officers. This committee would comprise of the following members:

The Collector	Chairman
The District Superintendent of Police	Member
The Chief Executive Officer, Zilla Parishad	Member
The Additional Collector	Member
The Resident District Collector	Member-Secretary
The Commissioner of Police (if any)	Member
The Chief Fire Officer	Member
The District Health Officer	Member
The District Agriculture Officer	Member
The Civil Surgeon	Member
The Executive Engineer, P.W.D.	Member
The Executive Engineer, Irrigation Department	Member
The Executive Engineer, Minor Irrigation	Member

Division	
The Executive Engineer, M.S.E.D.C.	Member
The Executive Engineer, MWSSB	Member
The Divisional Manager, Railways	Member
The Regional Transport Officer	Member
The Regional Manager, M.S.R.T.C.	Member
The District Publicity Officer	Member
The District Supply Officer	Member
The Local Station Director, A.I.R.	Member
The Local Station Director, Doordarshan	Member
The District Commandant, Home Guards	Member
The Divisional Forest Officer	Member
Sub-divisional Officer(s)	Member
The Local Assistant Engineer, P & T Department	Member
The Defence Units	Member
District Level NGOs representative	Member

10 The project proponents were advised to prepare a detailed biodiversity impact assessment report and management plan through the NIOS or any other institute of repute on marine, braches water and fresh water ecology and biodiversity. The report shall study the impact on the rivers, estuary and the sea and include the intertidal biotopes, corals and coral communities, molluscs, sea grasses, sea weeds, subtidal habitats, fishes, other marine and aquatic micro, macro and mega flora and fauna including benthos, plankton, turtles , birds etc. as also the productivity. The data collection and impact assessment shall be as per standard survey methods

Centre for Advanced Studies in Marine Biology (CASMB), Annamalai University was engaged for preparation of biodiversity impact assessment report and management plan and same is attached as **Appendix D.**

Additional Clarifications Raised by EAC during its 15th meeting held on 12-14 APRIL, 2017

11 Certified compliance report on the environmental conditions stipulated in the existing EC from the Regional Office, Nagpur.

Redi port, which is identified for expansion into an All Weather Multipurpose Port by Maharashtra Maritime Board (MMB) is located in Redi Village, Vengurla taluka, Sindhudurg district of Maharashtra State. Redi port (fair weather port) has existing facility with two working jetties performing lighterage operations since more than 50 years. No environmental clearance was existing for the port under MMB.

Earnest John Group has entered into a 50-year concessional agreement including five years construction period with the Maharashtra Maritime Board (MMB) on February 25, 2009 to develop Redi Port into an all-weather multipurpose port through Build, Own, Operate, Share and Transfer (BOOST) mode of privatization. Redi Port Limited (RPL), a special purpose vehicle (SPV) formed for the development of Redi Port.

Redi port limited after getting approval of Detailed Project Report (DPR) from MMB, submitted application for Environmental Clearance in the year 2010 and since then proposal is under various stages of approval.

12 The status for transfer of forest land as per Forest Conservation Act 1980 and why should this EAC consider the issue in parallel without waiting for forest clearance. A justification as to why should this committee consider the case for appraisal when the 128th committee has held that further consideration would be possible only when land comes under the possession

As per following MoEF&CC Office Memorandum's:

1. No.J-11013/41/2006-IA.II(I) dated December 02, 2009
2. No.J-11013/41/2006-IA.II(I) dated September 09, 2011
3. No.J-1103/41/2006-IA.II(I) dated May 18, 2012

The proposal for environmental clearance will not be linked with forest clearance even if it involves forestland and as these clearances are independent to each other and would in any case need to be obtained as applicable to such projects before starting any activity at site.

At the stage of consideration of proposals for EC in respect of projects involving forestland, the project proponent would inform the respective EACs about the status of their application for forestry clearance along with necessary supporting documents from the concerned Forest Authorities. It will clearly be informed to the EAC whether the application is at the State level or at the Central level. The EAC will take cognizance of the involvement of forestland and its status in terms of forestry clearance and make their recommendations on the project on its merits. After the EAC has recommended the project for environmental clearance, it would be processed on file for obtaining decision of the Competent Authority for grant of environmental clearance. In the cases where the Competent Authority has approved the grant of environmental clearance, he proponent will be informed of the same and a time limit of 12 months, which may be extended in exceptional circumstances to 18 months, a decision on which will be taken by the Competent Authority, will be given to the proponent to submit the

requisite stage-I forestry clearance. The formal environmental clearance will be issued only after the stage-I forestry clearance has been submitted by the proponent.

All the above three mentioned office memorandums are attached as **Appendix E**, in light of the above MoEF&CC office memorandum's, EAC can consider the project for recommendation of Environmental Clearance.

13 Notarized affidavit of undertaking stating, no construction activity has commenced at the site and Project Proponent undertakes that the construction works will be commenced only after obtaining all necessary clearances from statutory authorities

Notarized affidavit as required is enclosed as **Appendix F**.

14 The committee also noted that the EIA report has been prepared by experts which are not QCI accredited. The project proponents should explain.

The EIA report was prepared by L&T-RAMBOLL Consulting Engineers Limited which are QCI, NABET accredited for Ports and Harbours Sector. Majority of the functional area experts are approved by QCI, NABET only few experts applications are under review by QCI, NABET for approval at the time of EIA report submission. Later on those experts were approved by QCI.

15 The treatment to marine Ecology and biodiversity is not complete. Only phytoplankton and zooplankton have been listed. The project may have a significant impact on marine ecology. An impact assessment based marine biodiversity management plan for sub-tidal, intertidal, coastal, marine and estuarine habitats shall be drawn up to the satisfaction of the State Biodiversity Board and implemented through the project cycle. The management plan would include a robust monitoring and conservation plan for all components of the marine biota including corals and coral communities, Molluscans, sea grasses and sea weeds, marine mammals draft management plan shall be submitted.

Centre for Advanced Studies in Marine Biology (CASMB), Annamalai University was engaged for preparation of biodiversity impact assessment report and management plan and same is attached as **Appendix D.**

16 Point-wise reply of comments/observations on the representation received from Conservation Action Trust vide letter dated 11.04.2017

Clarifications on Comments for the Expansion of Redi Port, Redi Village, Vengurla Taluka, Sindhudurg District (Maharashtra) by Conservation Action

Trust, 5, Sahakar Bhavan, 1st Floor, LBS Road, Narayan Nagar, Ghatkopar (W), Mumbai –400086

16.1 The TOR granted for the proposed expansion project has expired. A fresh proposal for TOR should be submitted rather than seeking environmental clearance.

The chronology of reference events taken 'place during the EC process.

1. MoEF&CC issued ToR approval vide Letter No: 11-15/2010-IA.III in May, 2010

2. As per MoEF circular No.J-11013/41/2006-IA.III dated March 22, 2010- validity of ToR approval is for 2 years for submission of EIA/EMP reports after public hearing.

3. Approached MPCB in March, 2011 for Public hearing but due to confusion on Sindhudurg moratorium they did not accept and after explaining about moratorium applicability etc., MPCB accepted application in May, 2011.

4. Public hearing date was announced in August, 2011 and hearing conducted in September, 2011.

5. Public hearing minutes were released by MPCB in February, 2012.

6. Redi Port has submitted our Final EIA/EMP report to MoEF&CC and MCZMA in May, 2012.

7. After submission of documentation to MCZMA, 1st appraisal meeting taken in November, 2012.

8. After Several meetings and submission of clarifÌcations, MCZMA recommended project in October, 2013 which is more than one year from submission of documentation to MCZMA.

9. MoEF&CC did not take up appraisal meeting due to lack MCZMA clearance and Sindhudurg moratorium.

10. Redi Port have written letters to MoEF&CC to consider our project in EAC meeting vide letters dated December 10, 2013, January 16, 2013 and October 24, 2013 along with MCZMA recommendation

11. Our project was considered at MoEF in November, 2013 as documents were submitted within validity of ToR and appraised the project.

12. EAC appraisal meeting held on November 21, 2013 sought for land possession which is being pursued at the Government of Maharashtra.

13. MMB have been approaching Government of Maharashtra for transfer of land to Redi Port, where confusion on ownership of land i.e., either revenue department or Forest department arose. In the year 2013, finally government of Maharashtra declared to obtain the land from forest department as per laid down procedure.

14. Since then, Redi Port has been following the forest land transfer procedure.

15. Redi Port is now been able to complete the process regarding obtention of alternate land in lieu of forest land to be handed over to us by the Forest Department in Redi and Kanyal villages.

16. Chief conservator of forests (CCF), Mantralaya has recommended the proposal to Additional Principal Chief Conservator of Forest, MoEF&CC, Nagpur for diversion of forest land to non-forestry purpose.

17. EAC considered the project in its appraisal meetings held on December 26, 2016 and April 12, 2017 and sought some clarifications.

18. RPL has submitted the Final EIA report within validity of 2 years to MoEF&CC and MCZMA and accordingly appraisal meetings have taken place.

16.2 Illegal mining is on-going in the Redi area. The illegal mining and the transportation of the minerals have impacted the marine biodiversity and mangroves in the area.

The proposed Redi port expansion is planned to handle the dry bulk cargo such as Coal and iron Ore and General cargo. Necessary pollution control measures will be adopted and followed as a part of Environmental Management Plan. The land identified for expansion of Redi Port does not entail mangroves. Therefore no mangroves will be destroyed by the expansion of the port.

There are no biosphere reserves or national parks or sanctuaries or other protected areas within 10 km radius of core area. There are no Mangroves or mangrove forests within the core area or proposed project area. Mangroves and their associated species are observed near Keruvada Creek at a distance of 3.6 km towards north and near Terekhol River at a distance of 3.3 km towards SE. Except for the presence of a few mangroves represented by *Avicennia officinalis*, *Excoecaria agallocha* and *Rhizophora mucronata* in and along the banks of the Terekhol River and Keruvada Creek, there are no mangrove forests within the study area.

As of now, transportation of mined iron ore is majorly carried out by road due to existing redi port can perform only fair weather operations. Once the Redi port expansion takes place it will become "All Weather Deep Water Port" by which road transportation will be considerably decreased and air pollution due to vehicular activity will be decreased. The trucks will be engaged in road transportation of port cargo will be covered and village roads may be avoided.

16.3 The silt and dust from the opencast iron ore mine has polluted Kalane river and is also destroying farmers' fields where they grow cashew nut, mango, banana, paddy and vegetables.

Present proposal is expansion of Redi port into "All weather deep water port" with mechanised handling of cargo. No mining activity will be involved.

16.4 The existing Redi port directly transfers the minerals from the truck into the ship at the jetty. This open dumping has led to the contamination of the marine water by the mined ore. This method has adversely impacted the corals, mangroves, beaches, and the livelihood of the fishermen. The dispersion of particles has impacted the fishing villages present near the port forcing them to leave their occupation.

Present proposal is expansion of Redi port into "All weather deep water port" with mechanised handling of cargo.

Cargo handling and storage operations: A fully mechanized ship loading/unloading system is planned at the berths. The major components of the mechanised ship loading/unloading system are: Ship Gantry type unloaders, loaders Telescopic chutes, Wagon loaders, Wagon Tipplers, and connected covered conveyor system.

The impact of air quality due to fugitive emissions from dry bulk cargo such as Iron Ore and Coal handling has been studied using the Industrial Source Complex, Short Term (ISCST3) dispersion model based on Steady State Gaussian Plume Dispersion, developed by US Environmental Protection Agency (US EPA).

The resultant concentrations PM10 and PM2.5 at all monitoring stations are found to be well within the National Ambient Air Quality Standards (NAAQS), 2009. From the predicted GLCs and the corresponding resultant concentrations, it can be concluded that there is no significant increase over the baseline levels.

16.5 The land required for the proposed expansion is partly a forest land. From the additional documents submitted by the project proponent, it is understood that the transfer of the 33.78 ha of forest land has not been approved under the FCA.

Status of forest clearance was discussed in Clarification no.1

16.6 For the compensatory afforestation, the project proponent has identified 90 acres of land in Chiplun to be transferred to the Forest Department. This too is under process. Apart from this, the site proposed for compensatory afforestation is 200km away from the project area.

Chief conservator of forests (CCF), Kolhapur insisted Redi port to buy the land at Tilari area for the compensatory afforestation. Redi port approached various owners / brokers of different land in Tilari area and verified the status of land in Forest office and found that most of land comes under forest.

Redi port efforts to get alternate land at Tilari project area did not succeed due to one or other reasons and our last attempt to acquire land in the village Pal was also did not materialize due to some ownership issues of the said land. Redi Port observed that all the owners are not willing to sell the land and it will be difficult to sub-divide the land. Redi Port have now requested to DCF, Sawantwadi to give us the letter stating that there is no suitable land available in Dodmarg / Tillari Project area as an alternate land.

In response to Redi port request to allow to purchase alternate land anywhere in Maharashtra which is suitable to the Forest Department, Mr. M. K. Rao, CCF permitted to purchase the land at Chiplun with the concurrence of the Chief Conservator of Forest (CCF), Kolhapur and DFO, Chiplun. Our team identified land in Chiplun and the same has been approved by DFO, Chiplun and same was approved by state forest department and recommended to central level

Chief conservator of forests (CCF), Mantralaya has recommended the proposal to Additional Principal Chief Conservator of Forest, MoEF&CC, Nagpur for diversion of forest land to non-forestry purpose

16.7 The EIA of the proposed expansion states, 'The land identified for Expansion of Redi port (up to phase II development) into an all-weather multipurpose port is proposed to be developed in an area of 98 ha (242 acres). And further ahead it is stated, ''The master plan of Redi Port expansion contains five phases comprises of Ten (10) berths with a capacity of 34 MTPA of cargo'. The Phase V expansion is proposed till 2033. This clearly shows that the project proponent

has not revealed the actual land area to be required for the expansion. The project should be considered in entirety and not on a piecemeal basis.

The present expansion of port is planned in two phases i.e., Phase I (5.16 MTPA) and Phase II (13.74) MTPA development of Redi Port comprises of Three (3) berths for handling dry bulk cargo, general cargo and development of navigation and back up facilities.

The master plan of Redi Port expansion contains five phases comprises of Ten (10) berths with a capacity of 34 MTPA of cargo. Port expansion is planned on phased manner based on the business demand and requirements, further expansion and line of cargo will be decided and appropriate statutory clearances will be taken up.

16.8 The EIA states, 'Out of this 98 Ha, 55.5 ha of land is planned to be reclaimed for the port development purpose. Remaining 42.5 ha resembles of an elevated highland falling Under survey no. 15 and 58.' The reclamation for the proposed project will have an adverse effect on the marine biodiversity of the area, corals, mangroves, Terekhol river [flowing south of proposed project site] and Keruvada creek [flowing north of proposed project site].

Reclamation is proposed towards seaward side. Predominantly the port land proposed to be reclaimed is an intertidal zone towards sea.

The area proposed to be reclaimed does not contain corals, mangroves and any other sensitive species. Reclamation will be carried out judicial planning. Reclamation bunds shall be constructed which will act as barrier towards Keruvada Creek located at 3.6 km, north and southern breakwater will act barrier towards Terekhol river located at 3.3 km towards south. Also minimum required retention time of return water in the reclamation area will be ensured.

There are no biosphere reserves or national parks or sanctuaries or other protected areas within 10 km radius of core area. There are no Mangroves or mangrove forests within the core area or proposed project area.

The area proposed to be reclaimed is shown in **Figure 2**

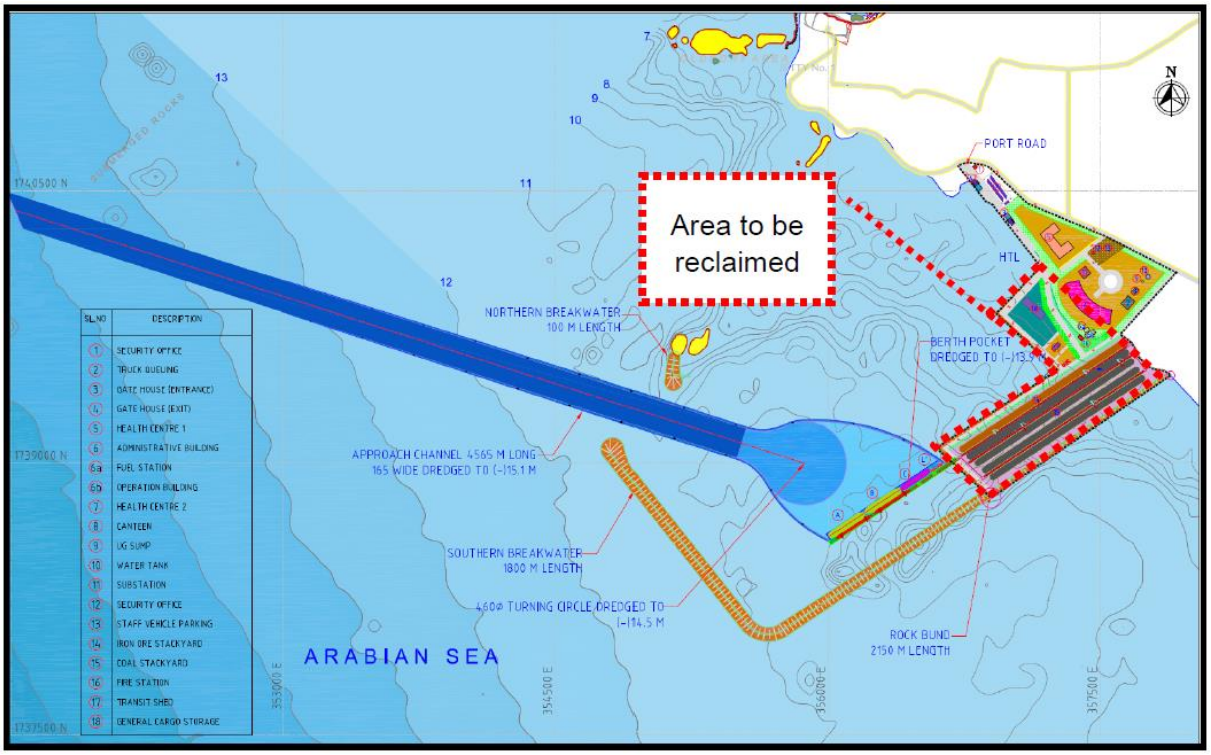


Figure 2: Area Proposed for Reclamation

16.9 The project proponent has proposed a Southern breakwater of 860m length [Phase I], 1800m [Phase III and a rock bund of 2150m length. The construction of breakwater will block the north-south shore currents and affect the transportation of sediments along the coast. This will further cause erosion in the north and south areas around the proposed project site. The source for procuring the material for the breakwater and rock bund has not been disclosed by the project proponent.

The shoreline/coastline changes such as erosion/accretion is usually expected when the natural setting if disturbed by construction of breakwaters or dredging a channel to deepen locally the seabed, causes imbalance in sand movement along the coast. In the proposed development, a rock bund of 2150 m length, 1800 m length of southern breakwater and 100 m of northern breakwater will be constructed which may have impact on existing coastline/shoreline.

Littoral Drift/Sediment Transport

The major geomorphologic features along the study stretch includes headland, bay, pocket beach, wave cut cliff, rock outcrops, offshore islands, submerged bedrock and gently raising low peaked hills. The rocky islands and submerged bedrocks are located offshore within 1 to 2 km from shore and are possibly part of the detached portions of coastal headlands. The coastal stretch has exposed beach and buried bedrock under beach sand. Wagle (1990) describes beach rocks as mostly buried in the near shore area extending 1 to 2 km with isolated patches of rock outcrops along central west coast of India. These bedrocks are exposed in the intertidal zone and have been instrumental in reducing the wave energy leading to low sediment transport along this stretch.

Influence of Redi headland on sediment transport

The Redi is a cliffed headland sandwiched with a creek at the north and river Terekhol at the south. The near shore zone up to 10m water depth off Redi has an offshore island, rock out crops and submerged bedrocks, which allows negligible long shore transport. Redi headland is wave cut cliff dominantly made of laterite, which do not contribute sediment to the coastal process of the region. The presence of headlands along this coast splits the coast into different sediment cells within which the long shore sediment transport is confined.

This was also confirmed by NIO (1997) based on their studies along the coastal stretch of Redi, which concluded that the coastal stretch of Redi has negligible long shore sediment movement. This was based on the water sample analysis around the Redi which indicated suspended sediment distribution at the surface ranging from 1.7 to 10.01 mg/l in the surface and 4.8 to 19.7 mg/l in the bottom. Since no new development activities have come up after the survey, it is presumed long shore sediment transport rate at the site has remained the same.

Long shore Sediment Transport

Long shore sediment transport is initiated when waves approach obliquely to the shore. The cycle of sediment transport by the waves to and from the coast is continuous which has aided in keeping the equilibrium of the coastline balanced over the geological times. Any change to the sediment transport cycle leads to imbalance to the shoreline dynamics. In the normal condition, the shoreline undergoes oscillation due to wave and wave induced current. The predominant quantity of sediment transport along shore takes place within the depth of closure. Coastal structure similar to groyne or a breakwater connected to the land when introduced into the sea can obstructs the sediment transport resulting in accretion of sediment in the direction of flow leading to imbalance in the shadow region causing erosion.

The proposed coastal stretch for Redi port development as discussed in the previous sections has negligible sediment transport taking place along the coast. Hence the changes caused by the construction of proposed breakwaters to the adjacent coastline are negligible.

Mitigation Measures

- Regular monitoring of Shoreline using satellite imageries
- Marine water quality and sea bed monitoring will be carried out during the maintenance dredging also.

The shoreline/coastline changes such as erosion/accretion is usually expected due to marine structures such as breakwaters, groynes etc. In order to assess the impact of construction of proposed breakwater on the adjacent coast, a site specific prediction of shoreline changes is carried out. The regional coastline of approximately 26 km is selected for modelling. The offshore waves (BMO hindcast data) are transformed to near-shore using *STWAVE model* (Steady state spectral wave model, CERC, U.S.Army Crop's) and the same has formed the basis for subsequent shoreline modelling. The shoreline change simulations are executed with *GENESIS model* (Generalised model for simulating shoreline change, CERC, U.S.Army Crop's), the brief methodology and results are presented in this section.

GENESIS model

This model is designed to simulate the long-term shoreline changes due to various engineering interventions to the coast. The alongshore extent of a typical modelled reach can be in the range of 1 to 100 km and the time frame of a simulation can be in the range of 1 to 100 months. Coastal structures such as groynes, breakwaters, seawalls and jetties and beach nourishment can be represented in the model. The model also accommodates wave

diffraction by long groins and offshore breakwaters and wave transmission through breakwaters. Wave conditions, which drive the model, consist of wave height, period, and direction and can originate from multiple independent generation sources. GENESIS simulates shoreline change produced by spatial and temporal differences in alongshore sand transport.

GENESIS considers longshore sediment transport due to breaking waves only. The dynamic equation or the statement of the longshore sand transport rate, Q is

$$Q = H_b^2 C_{g,b}(a_1 \sin 2\theta_b - a_2 \cos 2\theta_b \frac{\partial H_b}{\partial x})$$

Where H_b is the breaking wave height, $C_{g,b}$ is the breaking wave group velocity, x is the longshore direction, and θ_b is the angle of breaking waves referenced to the shore perpendicular direction. The first term considers sediment transport generated by the longshore component of the breaking wave energy flux.

$$a_1 = \frac{K_1}{16(s-1)(1-p)(1.1416)^{5/2}} \qquad a_2 = \frac{K_2}{8(s-1)(1-p)\tan\beta(1.1416)^{7/2}}$$

The second term modifies the transport rate to account for longshore gradients in breaking wave height. K1 and K2 are the two dimensionless calibration factor for controlling the long shore sediment transport and offshore wave breaking.

Depth of Closure

Depth of closure is the offshore depth beyond which beach profiles taken over time at a given site coincide. Seaward of this depth the sediment transport is negligible. Depth of closure applies to the open coast where wave and wave induced current are the dominant sediment transporting mechanism.

Generally constant profile shape moves in the cross-shore direction between the berm and this limits (depth of closure), implying that sediment transport is uniformly distributed over the active portion of the profile. The closure depth for the coastal stretch is identified by using the generalised relation of Nicholls et al.,(1996),

$$\text{Closure depth } d = 2.28H_{s,12hr/year} - \frac{68.5H^2_{s,12hr/year}}{gT_s^2}$$

Where
$H_{s,12hr/Year}$ is the annual wave height exceedance for 12 hour
Ts is the significant wave period
g –acceleration due to gravity

Model Inputs

- Bathymetry for the coastal stretch – Bathymetry is the primary input for setting up shoreline evolution model. Bathymetry for the study is prepared from the available survey data for the site and is augmented with data from secondary sources.
- GENESIS shoreline change model requires long-term wave data for the simulation of the shoreline evolution. The model uses hind-cast offshore wave data acquired from the BMO (British Met Office), U.K global wave model data for the port location.
- Initial shoreline position, an essential input to simulate shoreline evolution, is extracted from the satellite imagery of the project site.

Genesis model for Redi coast was setup with 26 km of digitized shoreline at 50m grid spacing. Wave input data required for Genesis was obtained by transforming the deepwater waves using STWAVE. The proposed breakwaters were introduced into the model as groins and the model were simulated for five year to assess the shoreline behaviour.

Results

Figure 3 and **Figure 4** presents the predicted shoreline at the end of five year with the expansion of Redi Port. It is observed from the simulated result that the expansion of Redi port does not induce any significant change to existing shoreline dynamics of the region. The simulated results show that the shoreline towards south of south breakwater has an annual depositional trend in the range of 2 – 2.3 m/year (five year average) in the immediate vicinity which diminishes over 600m and the shoreline towards the north has a negligible erosion.

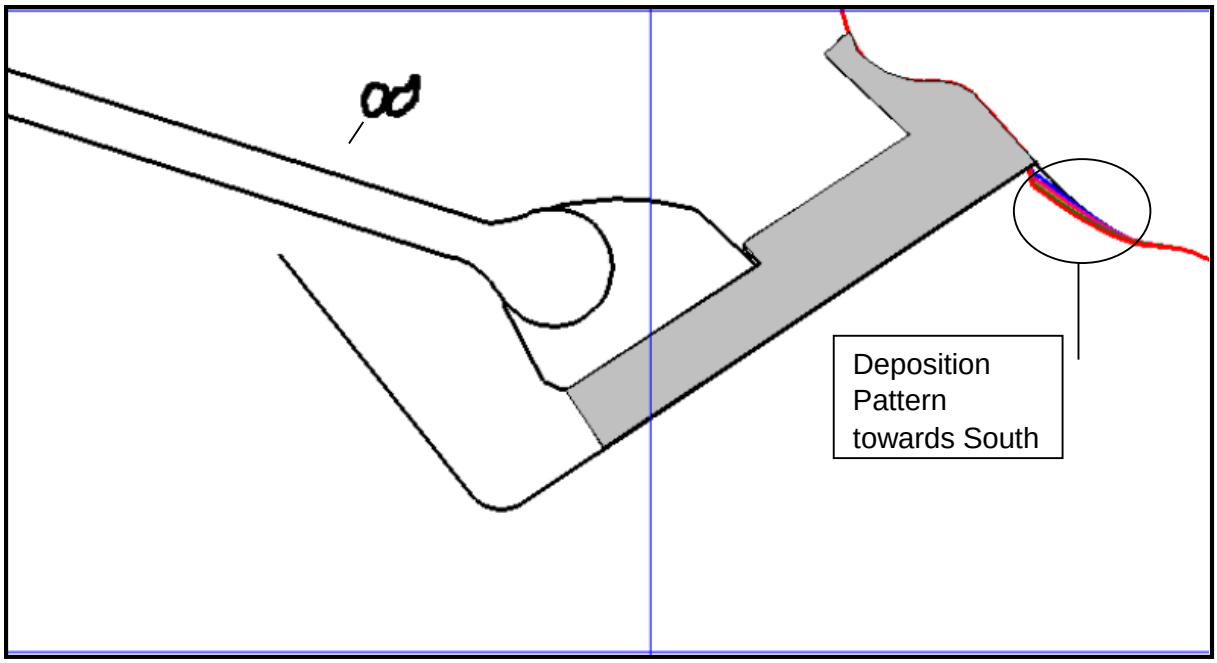


Figure 3: Predicted shore line changes due to break water construction

It is observed from the simulated results that there is no influence of breakwater on the Terekhol river mouth.

Hence, change in morphodynamics of the confluence point is insignificant. In addition to that, the mathematical modelling studies for the Dredging and Disposal have been conducted in order to understand the fate of dredged spoil at river mouth. The study reveals that there is no movement of dredged spoil towards the river mouth during dredging and disposal.

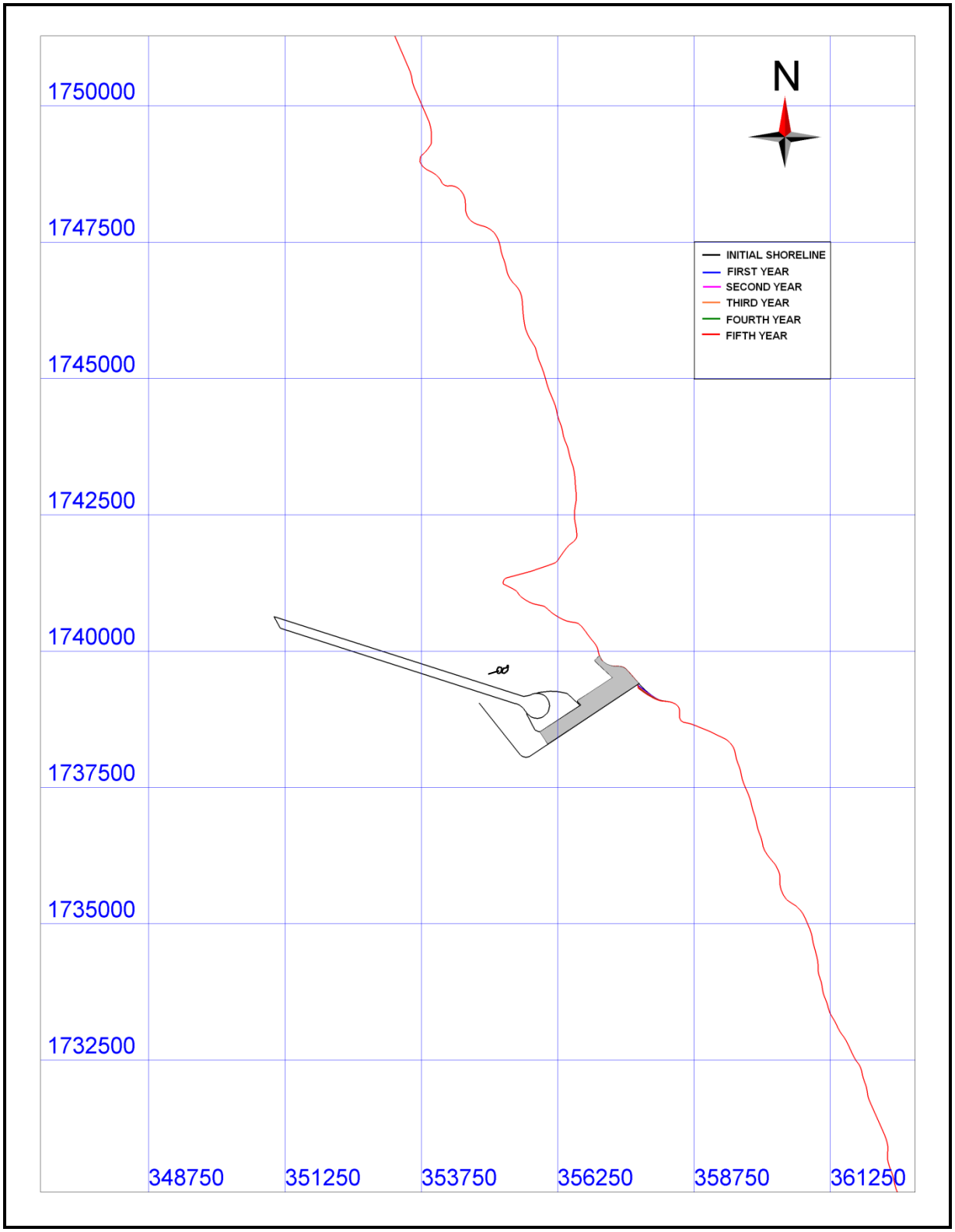


Figure 4: Predicted Shoreline Evolution during Operation of Redi Port – 26 km Coastal Stretch

Continuous monitoring of shoreline with the help of high resolution satellite imageries during operation phase will be carried out.

Stones and aggregates required for construction of breakwaters will be sourced from approved quarries near Sunurli village which is at a distance of 30 km from Redi port, same information was provided in EIA report.

16.10 The project proponent has stated that erosion will be managed by sand nourishment, geotube, groynes, or seawall. The construction of seawall will accelerate erosion in the surrounding area. Moreover, the project proponent has not specified the source from where the sand will be sourced to manage the erosion.

The shoreline/coastline changes such as erosion/accretion is usually expected due to the construction of marine structures such as breakwaters, groynes etc. The natural setting if disturbed by construction of breakwaters or dredging a channel to deepen locally the seabed, causes imbalance in sand movement along the coast. In the proposed development, a rock bund of 2150 m length, 1800 m length of southern breakwater and 100 m of northern breakwater will be constructed which may have impact on existing coastline/shoreline.

GENESIS (Generalized Model for Simulating Shoreline Change) is used to examine long term shoreline change due to the proposed breakwater and its impact on the river mouth. The study is carried out in the presence of proposed breakwaters designated as northern (100m) and southern (1800 m) breakwater extending into the sea. It is observed from the simulated result that the expansion of Redi port does not induce any significant change to existing shoreline dynamics of the region. The simulated results show that the shoreline towards south of south breakwater has an annual depositional trend in the range of 2 – 2.3 m/year (five year average) in the immediate vicinity which diminishes over 600m and the shoreline towards the north has a negligible erosion. It is observed from the simulated results that there is no influence of breakwater on the Terekhol river mouth.

The impact of the present proposal is very negligible on the Shoreline modification, hence the any imbalance in sand movement along the coast is not envisaged and in addition continuous monitoring of Shoreline using satellite imageries will be carried out and mitigation measures will be taken if at all warranted. In case of sand bypassing, accreted sand will be bypassed to eroding stretches.

16.11 In the 81st MCZMA Meeting held on 26.04.2013, the project proponent had stated in reply to the query on Seasonal sediment flow around the proposed port/ Sedimentation study' that 'The coastal stretch of Redi Port has negligible Long shore sediment movement'. This will change once the proposed project is constructed.

GENESIS (Generalized Model for Simulating Shoreline Change) is used to examine long term shoreline change due to the proposed breakwater and its impact on the river mouth. The study is carried out in the presence of proposed breakwaters designated as northern (100m) and southern (1800 m) breakwater extending into the sea. It is observed from the simulated result that the expansion of Redi port does not induce any significant change to existing shoreline dynamics of the region. The simulated results show that the shoreline towards south of south breakwater has an annual depositional trend in the range of 2 – 2.3 m/year (five year average) in the immediate vicinity which diminishes over 600m and the shoreline towards the north has a negligible erosion. It is observed from the simulated results that there is no influence of breakwater on the Terekhol river mouth.

16.12 In the 84th MCZMA Minutes held on 30.08.2013, the query was sought by the authorities on the 'Anticipated loss of benthic forms from proposed dredging area'. The project proponent in their reply

had stated 'During dredging, sessile forms are removed along with sediments and mobile species tend to move away and are likely to increase species diversity in areas adjoining dredging site. Further, studies carried out during dredging and post-dredging in other coastal areas, it was observed that due to movement of mobile species and transfer of nutrients during dredging, there will be an increase in species diversity and density in areas adjoining dredging site.' The project proponent fails to take into account the disturbance and destruction which the dredging will cause on the marine life. The increase in turbidity will cause loss of the diversity. Furthermore, the loss of the stationary life forms would be permanent in nature, which the project proponent has failed to consider.

Capital dredging and construction of approach channel, breakwaters and cargo berths will result in disturbance to marine ecology.

Turbulence – Changes in Dissolved Oxygen (DO) Levels: During dredging, oxygen demanding compounds, nutrients and sediments from the sea bed enter into water column. Since concentrations of oxygen-demanding compounds are normally much higher in pore water than in water column, it will cause a drop in oxygen concentration. Nutrients may stimulate primary production when light and temperatures are sufficient; and may cause eutrophication problems when released in favourable conditions. DO levels in bottom sediments, which are usually low would increase during dredging period. Changes in DO levels and noise are likely to result in localised and short-term impacts on marine ecology.

Removal of Benthic Communities associated with Bottom Sediments: Dredging would result in removal of benthic communities associated with bottom sediments. During dredging, sessile forms are removed along with sediments and mobile species tend to move away and are likely to increase species diversity in areas adjoining dredging site. Further, it is observed that due to movement of mobile species and transfer of nutrients during dredging, there will be an increase in species diversity and density in areas adjoining dredging site.

To mitigate impacts on marine ecology, measures such as selection of equipment and dredgers, environmental monitoring and regulating activities based on monitoring results will be adopted.

Smothering Effect Due to Settling of Sediment: Settlement of the suspended sediments can result in the smothering or blanketing of sub-tidal communities and / or adjacent intertidal communities. Presently, the marine biota in Indian Coast is already subjected to considerable changes in turbidity due to large-scale littoral movement, which is a recurring regular natural phenomenon. Therefore, it would be able to withstand localised turbidity induced during the dredging.

Centre for Advanced Studies in Marine Biology (CASMB), Annamalai University was engaged for preparation of Biodiversity Impact Assessment Report and Management Plan and same was submitted.

16.13 Form 1 is not uploaded on the MoEFCC website.

Online uploading of Form-1 was initiated from year 2014 onwards and Form-1 application for Redi Port Expansion was submitted in the year 2010.

16.14 In the table 'Environmentally Sensitive Areas within 15km from Port Boundary' [in the EIA] under the Areas which are important or

sensitive for ecological reasons the project proponent has stated 'Nil'. The fact that mangroves are present 3.5km away from the proposed project site near Terekhol river and Keruvada creek has not been disclosed. Mangroves are categorised under the eco-sensitive areas, as CRZ IA under the CRZ Notification 2011.

There are no biosphere reserves or national parks or sanctuaries or other protected areas within 10 km radius of core area. There are no Mangroves or mangrove forests within the core area or proposed project area. Mangroves and their associated species are observed near Keruvada Creek located at 3.6 km towards north and Terekhol River located at 2 km towards SE.

Except for the presence of a few mangroves represented by *Avicennia officinalis*, *Excoecaria agallocha* and *Rhizophora mucronata* in and along the banks of the Terekhol River and Keruvada Creek, there are no mangrove forests within the study area. A comparative list of all Mangrove plant species of the study area was prepared based on the plant species collected during the study period and presented in EIA report.

16.15 It is also stated that fishing villages are located in the study area. The livelihoods of the fishing community will be further affected by the proposed project.

The fishing villages/fish landing centres in the study area and their proximities from the proposed port site are given in **Table 2.** Fishing village map is shown in **Figure 5**.

Table 2: Details of Fish Landing Centres/ Fishing Villages within the Study Area

S. No	Name of the Fish Landing Centre / Fishing Village	Distance from Port (km)	No. of Boats	Population
	Redi	1.45	22	218
	Keruvada	2.9	Data Not Available	3594
	Shiroda	4.3	129	1421
	Aronda	4.1	62	422
	Adwali Tank	6.0	8	193
	Mochemad	7.3	13	187
	Muth	8.6	64	803
	Querim	3.3	10	198
	Harmal	9.4	42	532

Source: Fishery Census of India (2003) & Marine Fisheries Profile of Goa (2005)

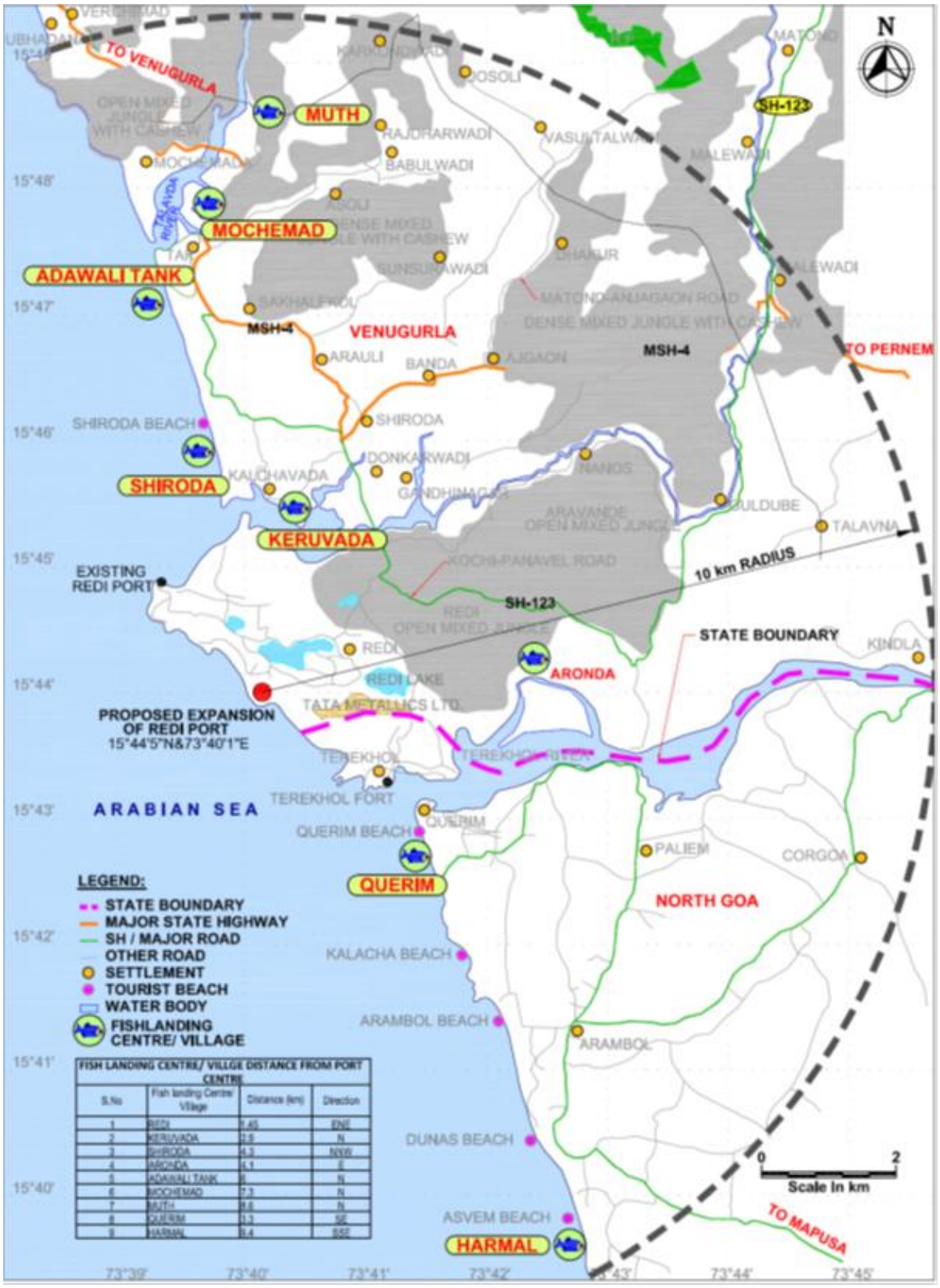


Figure 5: Fishing Villages in Study Area

Fishing activity will not be disturbed during construction and operation phases. However, signboards will be placed at the construction activities in order to make fishermen aware of the on-going activities and necessary marker buoys will be installed. Also Interactions will be initiated with the fishing community before commencement of construction works. The activities involved in operation phase will be confined to the project area and hence no hindrance to fishing is anticipated. Consultation programme with the nearby fishing

communities shall be held and if any problems facing by the fishermen shall be noted and resolved within short time. In the vicinity of proposed expansion area, fishing trawlers enters the sea through Keruvada creek, Terekhol river which are located > 3.0 km along the coast from the proposed expansion area. There will not be any disturbance to the movement of the fishing trawlers/fish crafts during the construction and operation of the port as the activities will be confined to the port area and are almost 3 km away from the route followed by fishing trawlers entering into the sea. Thus no significant impacts are anticipated on local fishing activities with the proposed expansion project.

There will be a demand for skilled, semi-skilled and unskilled work force during the construction and operational phase of the Port expansion and it is imperative that mostly local people would be employed based on their skills and educational qualifications. The employment potential from the construction phase of the proposed port is estimated as 1500 persons. The expected direct employment will be 300 persons during operation phase. The proposed project will have positive impact on socio-economic condition of the region overall. With the addition of this employment potential, the indirect employment will be increased by many folds.

16.16 There is excessive mining ongoing in the area for bauxite and iron ore deposits. This mining had vastly affected the forests of the region. In fact, a moratorium was imposed by the MoEF on 12th August 2010 to review the LOR and LEC granted for projects in the Ratnagiri-Sindhudurg region. The Sawantwadi-Dodamarg where mining is ongoing forms part of the Western Ghats eco-sensitive region. The excessive mining in the area has led to respiratory disorders impacting the health condition of the villagers.

The present proposal is Expansion of existing Redi Port only, NO mining activity is involved.

16.17 The proposed project involves storage facility for dry bulk cargo [Coal, Bauxite, Iron Ore]. The storage, transfer and movement of coal will cause the release of coal dust, hazardous substances, effluents in the surrounding environment. This will cause impact the ecosystem of Keruvada creek, Terekhol river, and the marine biodiversity of the area. The clearance if granted will facilitate more mining in the region.

The impact of air quality due to fugitive emissions from dry bulk cargo such as Iron Ore and Coal handling has been studied using the Industrial Source Complex, Short Term (ISCST3) dispersion model based on Steady State Gaussian Plume Dispersion, developed by US Environmental Protection Agency (US EPA).

The proposed handling of bulk cargo is only through covered conveyor belts upto the storage areas and transport through vehicles is not envisaged. The model simulations have been carried out for dispersion of particulate matter from the handling of cargo and cargo storage areas/stockyards.

Meteorological Data: Project site specific meteorological data was generated during the study period by installing an automatic weather monitoring station. The parameters like wind speed, wind direction and temperature have been taken based on the primary data generated.

Stability Classification: Stability class can be estimated from wind speed and radiation. Stability classes are classified into A: Extremely unstable, B: Moderately unstable, C: Slightly

unstable, D: Neutral, E: Slightly stable, F: Moderately stable. Hourly stability is determined by wind direction fluctuation method as recommended by CPCB (PROBES/70/1997-1998).

Model Results:

Model simulations have been carried using the hourly Triple Joint Frequency data viz., stability, wind speed, mixing height and temperature. Short-term simulations have been carried to estimate concentrations at the receptors to obtain an optimum description of variations in concentrations over the site in 10.0 km radius covering 16 directions. The maximum incremental Ground Level Concentrations (GLCs) of Particulate Matter due to fugitive emissions from port operation activities are superimposed on the maximum baseline concentrations of respective air quality parameters recorded during study period to arrive at the likely resultant concentrations during the operational phase of the port.

The incremental and the resultant concentrations of PM_{10} are given in **Table 3** below and the Isopleth corresponding to the incremental concentration is shown in **Figure 6**.

Table 3: Resultant 24 Hourly Concentrations of PM_{10} due to Operation of Project

S. No.	Name of the Location	Baseline Data* ($\mu g/m^3$)	Incremental Conc. ($\mu g/m^3$)	Resultant Conc. ($\mu g/m^3$)	NAAQ Standards (Industrial, Residential, Rural, Ecologically Sensitive Area and Other Area) ($\mu g/m^3$)
1.	Redi	31.8	1.5	33.3	100
2.	Terekhol	29.7	4.0	33.7	100
3.	Existing Redi Port	29.6	11.2	40.8	100
4.	Keruvada	29.9	3.2	33.1	100
5.	Shiroda	34.6	1.3	35.9	100
6.	Nanos	27.7	1.3	29	100
7.	Paliem	35.0	1.6	36.6	100
8.	Arambol	34.8	1.1	35.9	100
9.	Asoli	32.1	1.2	33.3	100
10.	Talavna	29.8	0.2	30	100
11.	Corgoa	33.3	0.8	34.1	100
12.	Kindla	28.4	0.3	28.7	100

The incremental and the resultant concentrations of $PM_{2.5}$ are given in **Table 4** below and the isopleth corresponding to the incremental concentration is shown in **Figure 7**.

Table 4: Resultant 24 Hourly Concentrations of $PM_{2.5}$ due to Operation of Project

S. No.	Name of the Location	Baseline Data* ($\mu g/m^3$)	Incremental Conc. ($\mu g/m^3$)	Resultant Conc. ($\mu g/m^3$)	NAAQ Standards (Industrial, Residential, Rural, Ecologically Sensitive Area and Other Area) ($\mu g/m^3$)
1.	Redi	15.0	0.6	15.6	60
2.	Terekhol	11.3	1.6	12.9	60

S. No.	Name of the Location	Baseline Data* ($\mu g/m^3$)	Incremental Conc. ($\mu g/m^3$)	Resultant Conc. ($\mu g/m^3$)	NAAQ Standards (Industrial, Residential, Rural, Ecologically Sensitive Area and Other Area) ($\mu g/m^3$)
3.	Existing Redi Port	10.6	4.5	15.1	60
4.	Keruvada	13.1	1.3	14.4	60
5.	Shiroda	16.9	0.5	17.4	60
6.	Nanos	11.2	0.5	11.7	60
7.	Paliem	16.8	0.6	17.4	60
8.	Arambol	16.9	0.4	17.3	60
9.	Asoli	13.8	0.5	14.3	60
10.	Talavna	12.9	0.1	13	60
11.	Corgoa	15.2	0.3	15.5	60
12.	Kindla	11.6	0.1	11.7	60

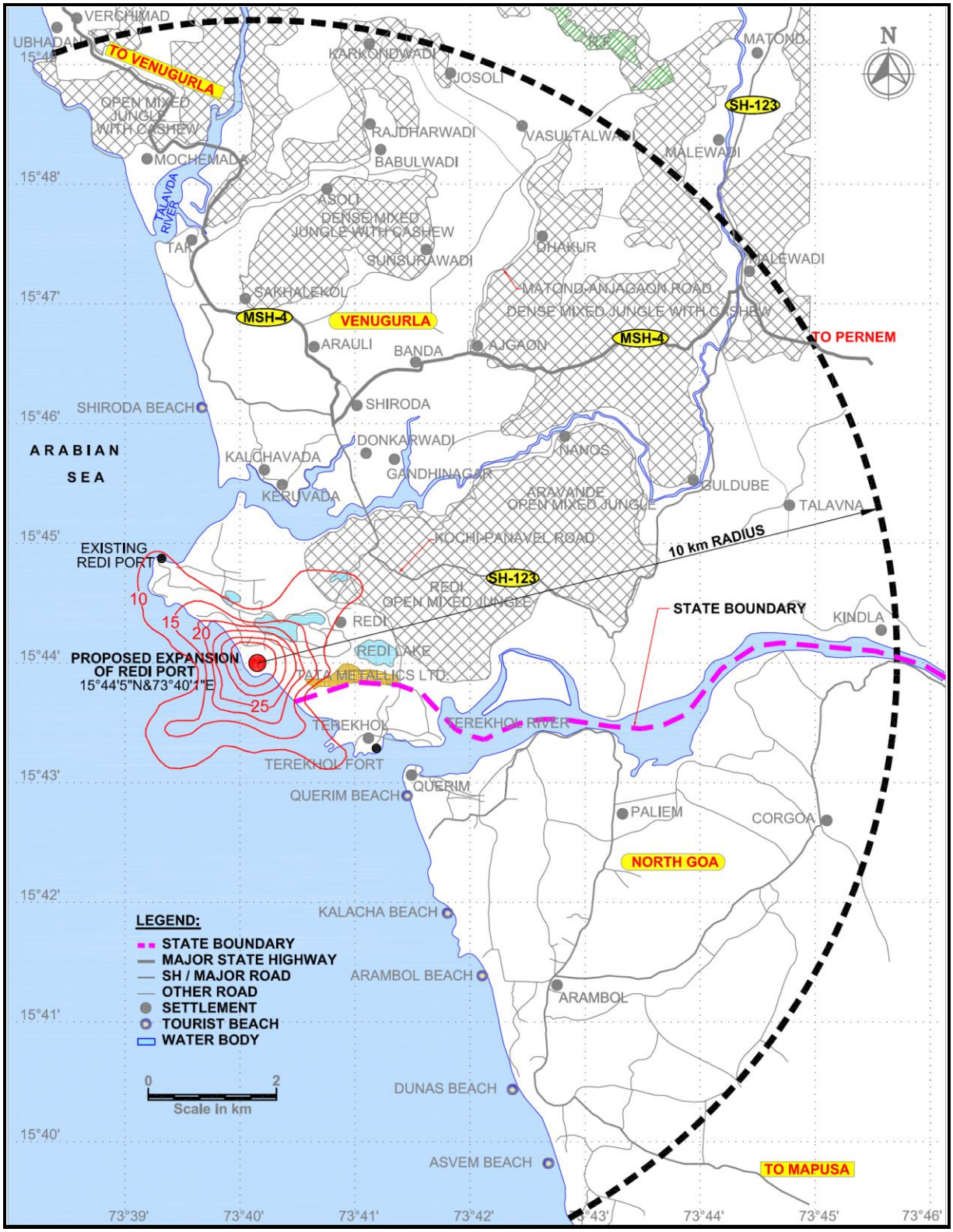


Figure 6: Isopleths Covering 10 km for PM_{10}

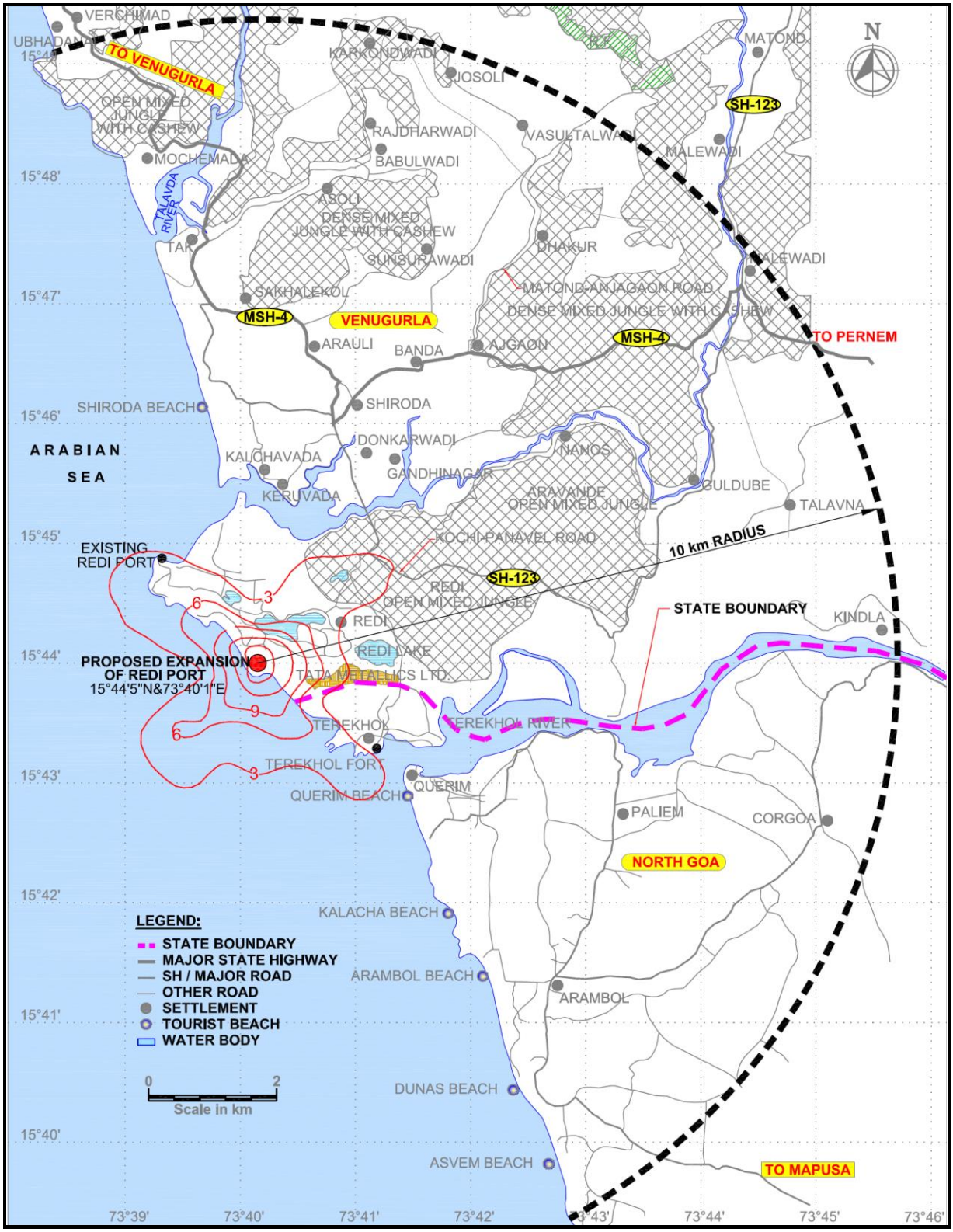


Figure 7: Isopleths Covering 10 km for $PM_{2.5}$

The resultant concentrations PM_{10} and $PM_{2.5}$ at all monitoring stations are found to be well within the National Ambient Air Quality Standards (NAAQS), 2009. From the predicted GLCs and the corresponding resultant concentrations, it can be concluded that there is no significant increase over the baseline levels.

Mitigation Measures

- Water sprinkling will be carried out at cargo storage areas as well as transfer points of conveyors
- Greenbelt of adequate width will be developed around the cargo storage areas in particular and along the boundary of port area to minimise the likely impacts due to air pollution
- Ambient air quality monitoring will be carried out regularly at selected locations in the predicted maximum impact zone in order to check and compare the predicted concentrations with the measured concentrations..

As there are no manufacturing or processing facilities within the port area, the activities such as unloading, loading and storage of cargo; local conveyance of cargo by conveyers; transit by rail or road may not have impacts on Flora & Fauna beyond a short distance of about one km from the port.

In order to mitigate the impact on mangrove area due to fugitive dust emission from stockyards, green belt along the stockyards and along the boundary is proposed in Port area which will act as a buffer. In addition to that the dust suppression system at the stockyards will be provided.

Mitigation/ Mangrove Conservation Measures

- Awareness will be given to workers in the port about the importance of mangroves and their conservation
- Discharge of wastes/waste water during the port construction and operation would not be allowed
- Illegal cutting of mangroves for firewood by workers during the construction and operation phases of port would be strictly prevented

Centre for Advanced Studies in Marine Biology (CASMB), Annamalai University was engaged for preparation of biodiversity impact assessment report and management plan and same will be implemented.

17 Submit details of Iron ore/other cargo handled year-wise for the last 4 years and also between 1993/94 and the highest in pre 1994 period

Redi port was with Maharashtra maritime board (MMB) and use to handle only iron ore in fair weather conditions i.e., during October to May of the year. Remaining time the jetties were idle. There were no records with MMB of iron ore handling between 1993 and 1994 period. Moreover, in 1994 EIA notification minor ports are exempted from Environmental Clearance. After Redi port Limited formed in 2009, RPL applied for environmental clearance of expansion of Redi port in the year 2010.

Details of iron ore handled during last four years are as follows:

2013-14	2014-15	2015-16	2016-17
22.24 (Tons)	15.69 (Tons)	13.35 (Tons)	3.94 (Tons)

Appendix A

Letter from CCF to ACCF recommending the project for Forest Clearance

Government of Maharashtra

By Speed Post

No.FLD-14A16/CR-213/F-10
Revenue and Forest Department,
Room No.456/461 Annex,
HutatmaRajguruChowk,
Madam CamaMarg,
Mantralaya, Mumbai-400 032
Dated: 12/07/2016

To,

The Additional Principal Chief Conservator of Forests (C),
Government of India,
Ministry of Environment, Forests & Climate Change,
Regional Office (WCZ),
Ground Floor, Eastern Wing,
New Secretariat Building ,Opposite Old VCA Stadium,
Civil Lines, Nagpur-440001

Sub.:- Forest Land- Sindhudurg
Diversion of 33.78 ha identified forest for development of Redi Port at Redi & Kanyal, Tal. Vengurla, Dist Sindhudurg.

Sir,

Regional Port Officer, Vengurla, Maharashtra Maritime Board, Dist Sindhudurg has initiated the project for diversion of 33.78 ha forest land for development of Redi Port at Redi & Kanyal, Tal. Vengurla, Sindhudurg district. The details of land proposed for diversion are as under:-

Village	Taluka	Dist.	Sur. No	Legal Status	Area in Ha.
Redi	Vengurla	Sindudurg	15	Identified Forest	3.86
Kanyal			58		29.92
Total Area in Ha.					**33.78 Ha**

2. The project has been initiated by Regional Port Officer, Vengurla, Maharashtra Maritime Board, Dist Sindhudurg for development of Redi Port. User Agency has proposed the construction road, security office, Administrative building & guesthouse, health centre, canteen cum port dispensary with toilet blocks, UG sump, water tank, substation, switchyards, vehicle parking, fuel station, operating building, fire station, green belt and open space in this project. Total non-forest area (Government sea area) involved in this project is 292.00 ha. B:C ratio of the project is 1:1.38. Land use layout plan is enclosed in the proposal.

3. Maharashtra Maritime Board (MMB) has identified potential sites for development of all weather multipurpose Port. Redi port, which is an existing minor port operated by MMB is

identified to be developed as an All Weather Multipurpose Port by MMB is located in Redi Village, Vengurla taluka, Sindhudurg district of Maharashtra State. Redi Port (fair weather port) has existing facility with two working jetties performing lighterage operations since more than 40 years and handles upto two Million Tons Per Annum (MTPA) of iron ore.

4. Earnest John Group has entered into a 50-year concessional agreement including five years construction period with MMB on February 25, 2009 to develop Redi Port into an all weather multipurpose port through Build, Own, Operate, Share and Transfer (BOOST) mode of privatization. Redi Port Limited (RPL), a Special Purpose Vehicle (SPV) has been formed for the development of Redi Port. The expansion is proposed towards 4 km south of existing port. Redi Port development into all weather multipurpose port is proposed in five stages, which will run upto 25 years. The immediate development is planned upto phase II. Proposed expansion will handle 5.16 MTPA in phase I and 13.74 MTPA in Phase II.

5. The Chief Executive Officer, Maharashtra Maritime Board, Mumbai vide letter No. MMB/Planning-3/Redi Port Ltd/Master Plan/2468 dated 20/10/2011 has informed that the Master Plan for development of Redi Port has been approved at the 61st Board meeting of MMB held on 20/09/2011. A copy of 61st board meeting of MMB is enclosed in the proposal. Maharashtra Coastal Zone Management Authority (MCZMA) has recommended the proposal subject to specific & general conditions for expansion of Redi Port vide letter No. CRZ 2012/CR 148/TC 4, dated 24/10/2013.

6. Collector & District Magistrate, Sindhudurg and Deputy Conservator of Forests, Sawantwadi have certified that no alternate alignment is possible and the forest land required is the barest minimum.

7. There are 1703 trees of various species and girth class in the area proposed for diversion. Girth wise break up in cms is as under-

Below 30	**31/ 45**	**46/ 60**	**61/ 75**	**76/ 90**	**91/ 105**	**106/ 120**	**121/ 150**	**151/ 180**	**Above 180**	**Total**
80	162	223	391	407	262	121	37	13	7	1703

8. There is no violation of Forest (Conservation) Act, 1980 as certified by the Deputy Conservator of Forests, Sawantwadi.

9. The Deputy Conservator of Forests, Sawantwadi has certified that the proposed project is beyond 10 Km from the protected area.

10. The area belongs to eco-value class I and dense forest.

11. The User Agency has submitted an undertaking to defray the cost of Net Present Value of the forest land proposed for diversion.

12. The Archeological Department and Deputy Conservator of Forests, Sawantwadi have certified that proposed project is not likely to affect any monuments site of cultural, historical, religious, archeological or recreational importance.

13. The area involved does not form part of any existing National Park, Wildlife Sanctuary and Nature Reserve etc.

14. The Divisional Forest Officer, Chiplun has certified that 36.00 ha. non forest land in Gut No. 92/2pt (area-19.00 ha) and Gut No. 93 (area-17.00 ha) at village Tiwre Gheraprachitgad, Ta. Sangameshwar, Dist. Ratnagiri proposed for alternative Compensatory Afforestation is contiguous & suitable for management purpose and it is free from encroachment and encumbrances. Afforestation works can not be taken in this area as the area already has tree cover however the proposed land is acceptable as per Government of Maharashtra letter dated 27/08/2014 as the area is included in the Eco Sensitive Zone of Chandoli National Park.

Hence, the compensatory afforestation scheme will be implemented by Divisional Forest Officer, Sangli on the equivalent degraded forest land available at village Vadgaon Tal. Tasgaon Dist. Sangli comptt. No. 176, Gut / Sur No. 511, area 13.78 ha and at village Aravde Tal. Tasgaon Dist. Sangli comptt. No. 153, Gut / Sur No. 558, area 20.00 ha. Divisional Forest Officer, Sangli has certified that the proposed degraded area is free from encroachment and is suitable for compensatory afforestation. scheme & KML file is uploaded on web portal and also enclosed in the proposal.

15. The Divisional Forest Officer, Chiplun has certified that the private area / non forest area proposed for Compensatory Afforestation is neither deemed Reserve Forest under the Maharashtra Private Forests (Acquisition) Act, 1975 nor has been identified as "Forests" as envisaged in the interim order given by the Honorable Supreme Court dated 12/12/1996.

16. Three alternatives have been explored by the User Agency. Out of 3 alternatives, alternative 2 is selected because the area adjoining and just south of existing Redi lighter age port is not prone to submergence during high tide. This area is divided of thick vegetation except a few coconut trees, herbs and shrubs. There are no water bodies in this area, there is no habitation present in this area and hence, no rehabilitation and resettlement issues are anticipated. Justification of three alternatives explored is enclosed in the proposal.

17. Maharashtra Pollution Control Board has approved the project subject to certain conditions vide letter No. BO/JD(APC)/EIC No. KP-17826-16/R/CC-7102 dated 26/05/2016.

18. User Agency has submitted the compliance under Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Rights) Act, 2006. A copy of the gram sabha resolution and proceeding book is enclosed in the proposal.

19. User Agency has certified that the project will start only after clearance is granted under Environment Protection Act & Environment Impact Assessment Act, 1994.

20. Biotic impact study report is enclosed in the proposal.

21. The Principal Chief Conservator of Forests (HoFF), Maharashtra State, Nagpur has recommended the proposal subject to the conditions, given in his specific recommendations, under Section-2 (ii) of the Forest (Conservation) Act, 1980. His specific recommendations are enclosed in the proposal.

22. In the circumstances explained in above paragraphs and enclosures, the State Government recommends that the said forest land may be allowed to be diverted for the non-forestry use on the conditions proposed by the Principal Chief Conservator of Forests (HoFF), Maharashtra State, Nagpur. The matter may kindly be placed before Government of India for its approval under Section-2 (ii) of the Forest (Conservation) Act, 1980 and the same may please be obtained and communicated to this Government at earliest.

Yours faithfully,

(VirendraTiwari)
Chief Conservator of Forests (Mantralaya)

Encl: A) Set of case papers
b) **The following documents are enclosed**:-
1. Prescribed form as per Rules.
2. Certificate regarding minimum demand for forest land for the project
3. Area Statement
4. Index map of suitable scale
5. Commitment from the Applicant for defraying the cost of exploitation as well as cost of compensatory plantation.
6. User Agency has given an undertaking of Net Present Value.
7. Brief note of the project from the project authority
8. Map of non forest land for compensatory afforestation
9. Site Inspection Report by Deputy Conservator of Forests, Sawantwadi
10. Certificate that there is no violation of Forest (Conservation) Act, 1980
11. Certificate in Part V.

Copy to:
1) Secretary (Tribal), Tribal Development Department, Mantralaya, Mumbai.
2) Additional Principal Chief Conservator of Forests and Nodal Officer, Maharashtra State, Nagpur, with reference to his letter No. : Desk-17/NC/II/ID 12304/(21)/600/16-17, dt.23/06/2016
3) Additional Principal Chief Conservator of Forests (CAMPA), Maharashtra State, Nagpur
4) Chief Conservator of Forests (T), Kolhapur
5) Collector, Sindhudurg
6) Deputy Conservator of Forests, Sawantwadi
7) Divisional Forest Officer, Chiplun
8) Regional Port Officer, Vengurla, Maharashtra Maritime Board, Dist Sindhudurg
9) Select File F-10.

Appendix B

CTO issued by MPCB

12AA

MAHARASHTRA POLLUTION CONTROL BOARD

Phone : 24010437/24014701/24020781
Fax : 24024068/24023516
Website: http://mpcb.gov.in.
E-Mail: jdair@mpcb.gov.in

KALPATARU POINT, 3rd Floor,
Sion-Matunga Scheme Rd. No.8,
Opp. Sion Circle, Sion (East),
Mumbai-400 022.

RED/SSI
Consent No: BO/JD(APC)/EIC No: KP-17826-16/R/CC- 7102 Date: 26/05/2016

Consent to Operate under Section 26 of the Water (Prevention & Control of Pollution) Act, 1974 & under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981 and Authorization/ Renewal of Authorization under Rule-5 of the Hazardous Wastes (Management, Handling & Transboundry Movement) Rules, 2008.
[To be referred as Water Act, Air Act and HW (MH&TM) Rules respectively].

CONSENT is hereby granted to,

M/s. Redi Port Ltd,
S.No: 17 & 14, Village: Redi,
Tal: Vengurla, Dist: Sindhudurg.

located in the area declared under the provisions of the Water Act, Air act and Authorization under the provisions of HW(MH&TM) Rules and amendments thereto subject to the provisions of the Act and the Rules and the Orders that may be made further and subject to the following terms and conditions:

1. **The Consent to Operate is granted for a period upto – 30/11/2018.**

2. **The Consent is valid for all Weather Cargo handling on existing port only.**

[There shall not any modernization or expansion of existing jetty without obtaining clearance from competent authorities. There shall not be handling any Hazardous waste and item other than above].

3. **CONDITIONS UNDER WATER ACT:**

(i) The daily quantity of trade effluent from the factory shall be **Nil.**
(ii) The daily quantity of sewage effluent from the factory shall not exceed **3.0 m^3.**
(iii) **Trade Effluent Treatment:** N.A.
(iv) **Trade Effluent Disposal:** N.A.

(v) **Sewage Effluent Treatment:** The applicant shall provide comprehensive treatment system as is warranted with reference to influent quality and operate and maintain the same continuously so as to achieve the quality of treated effluent to the following standards.

(1)	Suspended Solids	Not to exceed	100	mg/l.
(2)	BOD 3 days 27° C.	Not to exceed	100	mg/l

(vi) **Sewage Effluent Disposal:** The treated domestic effluent shall be soaked in a soak pit, which shall be got cleaned periodically. Overflow, if any, shall be used on land for gardening / plantation only.

(vii) **Non-Hazardous Solid Wastes:**

Sr. No.	Type of waste	Quantity	Treatment	Disposal

There shall be generation of any solid waste.

(viii) **Other conditions:** The industry shall monitor effluent quality regularly.

4. The applicant shall comply with the provisions of the Water (Prevention & Control of Pollution) Cess Act, 1977 (to be referred as Cess Act) and Rules there under: The daily water consumption for the following categories is as under:

Domestic	5.0 CMD
Industrial processing generating Bio-Degradable waste water	0.0 CMD
Industrial processing generating Non-Bio-Degradable waste water	..
Industrial Boiler/ Cooling etc.	0.0 CMD
Any other and gardening/ spraying	10.0 CMD

The applicant shall regularly submit to the Board the returns of water consumption in the prescribed form and pay the Cess as specified under Section 3 of the said Act.

5. CONDITIONS UNDER AIR ACT:

(i) The applicant shall install a comprehensive control system consisting of control equipments as is warranted with reference to generation of emission and operate and maintain the same continuously so as to achieve the level of pollutants to the following standards:

A) Control Equipment:

1) Dust containment cum suppression system in the area shall be provided.
2) Industry shall construct metal roads and RCC Pucca flooring in the area.
3) System for regular cleaning and wetting of the floor area shall be provided within premises.
4) Fixed pipeline should be installed for sprinkling of water and to ensure that total plot area is covered with adequate water tank of compatible storage.
3) There shall not any secondary (fugitive) emissions.

B) Standards for Emissions of Air Pollutants:

(i) SPM/TPM Not to exceed **100 mg/Nm^3**

(ii) SO_2 Not to exceed **4.0 kg/day**

(iii) **The applicant shall observe the following fuel pattern:-**

Sr.No.	Type of Fuel	Quantity
1.	Diesel	200 Ltrs/ Day

(iv) **The applicant shall erect the chimney(s) of the following specifications:-**

Sr.No.	Chimney attached to	Height in Mtrs.
1.	D.G.Set (100 KVA)	3.0- above the roof.

(iv) Conditions for D.G. Set (100 kva):

a. Noise from the D.G. Set should be controlled by providing an acoustic enclosure or by treating the room acoustically.
b. Industry should provide acoustic enclosure for control of noise. The acoustic enclosure/ acoustic treatment of the room should be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on higher side. A suitable exhaust muffler with insertion loss of 25 dB (A) shall also be provided. The measurement of insertion loss will be done at different points at 0.5 meters from acoustic enclosure/room and then average.
c. Industry should make efforts to bring down noise level due to DG set, outside industrial premises, within ambient noise requirements by proper sitting and control measures.
d. Installation of DG Set must be strictly in compliance with recommendations of DG Set manufacturer.
e. A proper routine and preventive maintenance procedure for DG set should be set and followed in consultation with the DG manufacturer which would help to prevent noise levels of DG set from deteriorating with use
f. D.G. Set shall be operated only in case of power failure.
g. The applicant should not cause any nuisance in the surrounding area due to operation of D.G. Set.
h. The applicant shall comply with the notification of MoEF dated 17.05.2002 regarding noise limit for generator sets run with diesel.

(v) **Standards for Ambient Air Pollutants:**

(i)	Suspended Particulate Matter [SPM]	Not to exceed	500 ug/m^3
(ii)	Respirable Particulate Matter [RSPM] [Size less than 10 micrometer]	Not to exceed	250 ug/m^3
(iii)	Sulphur Dioxide (SO_2)	Not to exceed	120 ug/m^3
(iv)	Oxides of Nitrogen (NOx)	Not to exceed	120 ug/m^3

(vi) The applicant shall provide ports in the chimney/(s) and facilities such as ladder, platform etc. for monitoring the air emissions and the same shall be open for inspection to/and for use of the Board's Staff. The chimney(s) vents attached to various sources of emission shall be designated by numbers such as S-1, S-2, etc. and these shall be painted /displayed to facilitate identification.

(vii) The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standard in respect of noise to less than 75 dB(A) during day time and 70 dB(A) during night time. Day time is reckoned in between 6 a.m. and 10 p.m. and night time is reckoned between 10 p.m. and 6 a.m.

(viii) **Other Conditions:**

1) The industry should not cause any nuisance in surrounding area.
2) The industry should monitor stack emissions and ambient air quality regularly.

6. CONDITIONS UNDER HAZARDOUS WASTE (MH &TM) RULES, 2008:

(i) The applicant shall handle hazardous waste as specified below:-

Sr. No.	Type of Waste	Quantity	Disposal
Industry shall not generate any Hazardous Waste			

7. Whenever due to any accident or other unforeseen act or even, such emissions occur or is apprehended to occur in excess of standards laid down, such information shall be forthwith Reported to Board, concerned Police Station, office of Directorate of Health Services, Department of Explosives, Inspectorate of Factories and Local Body. In case of failure of pollution control equipments, the production process connected to it shall be stopped.

8. General conditions:

(i) The applicant shall bring minimum 33% of the available open land under green coverage/ plantation. The applicant shall submit a yearly statement by 30th September every year on available open plot area, no. of trees surviving as on 31st March of the year and no. of trees planted by September end.

(ii) The applicant shall provide for an alternate electric power source sufficient to operate all pollution control facilities installed by he applicant and operate the same in case of power failure to maintain compliance with the terms and conditions of the consent. In the absence of same, the applicant shall stop, reduce or otherwise, control production to abide by terms & conditions of this consent regarding pollution levels.

(iii) **The applicant shall make an application for renewal of the consent at least 60-days before the date of the expiry of the consent.** The applicant shall not change or alter quantity, quality, the rate of discharge, temperature or the mode of the effluent / emissions or hazardous wastes or control equipments provided for without previous written permission of the Board.

(iv) The firm shall submit MPCB, the Environmental Statement Report for the financial year ending 31st March in the prescribed Form-V as pre the provisions of rule-14 of the Environment (Protection) (Second Amendment) Rules, 1992 before 30th September every year.

(v) The applicant shall install a separate meter showing the consumption of energy for operation of domestic and industrial effluent treatment plants and air pollution control system. A register showing consumption of chemicals used for treatment shall be maintained. The applicant shall also submit a comparative statement of designed power and chemical consumptions vis-a vis actual power and chemical consumption along with Environmental statement.

(vi) Separate drainage system shall be provided for collection of trade and sewage effluents. Terminal manholes shall be provided at the end of collection system with arrangement for measuring the flow. No effluent shall be admitted in the pipes/sewers down- stream of the terminal manholes. No effluent shall find its way other than in designed and provided collection system. Neither storm water nor discharge from other premises shall be allowed to mix with the effluents from the factory.

(vii) The applicant shall provide facility for collection of environmental samples and samples of trade and sewage effluents, air emissions and hazardous wastes to the Board staff at the terminal or designated points and shall pay to the Board for the services rendered in this behalf. An inspection book shall be opened and made available to the Board's officers during their visit to the applicant.

(viii) The industry shall ensure that fugitive emissions from the activity are controlled so as to maintain clean and safe environment in and around the factory premises.

(ix) The applicant shall maintain good house keeping and take adequate measures for control of pollution from all sources so as not to cause nuisance to surrounding area / inhabitants.

9. This Board reserves the right to amend or add any conditions in this consent and the same shall be binding on the Applicant.

10. **This consnet is issued as per submission of concession agreement between Maharashtra Martitime Board and M/s. Redi Port Ltd, dt: 26/02/2009.**
11. **This issued without prejudice to any review of copetant authority in respect of statutary compliance / including requirement of Environment Clerance / CRZ Clearance.**
12. **This consnet should not be construed as exemtion from obtaining necessary NOC / Permission from any other Govt. Agencies.**
13. **Applicant shall not take effective steps towards modernization or expansiopn of existing jetty without obtaining clearance from competant authorities.**

14. **The applicant shall submit the Bank Guarantee of Rs. 1.0 Lakhs (drawn in favour of Regional Officer, MPCB Kolhapur within 15-days valid for the period upto 31/03/2019 towards operation and maintenance of pollution control system so as to achieve the consented standards.**

15. **Industry shall submit Board Resolution by 31/05/2016 from Company Board, towards increase in CI by Rs. 11.0 Crs without obtaining consent to Establish form MPC Board thus violates the provisions of Environmental laws and in future, they will not do such violations. Industry shall submit BG of Rs. 1.0 Lakhs towards it's compliance.**

16. **The total Capital investment of industry is Rs. 18.06 Cr (Previous CI of Rs. 5.07Cr).**

For and On Behalf of the
Maharashtra Pollution Control Board,

Maharashtra Pollution Control Board Mumbai

(V.M.Motghare) 25/5/16
Joint Director (Air Pollution Control)

To,
M/s. Redi Port Ltd,
S.No: 17 & 14, Village: Redi,
Tal: Vengurla, Dist: Sindhudurg.

Copy to:

1) Regional Officer, MPCB, Kolhapur.
2) **Sub-Regional Officer, MPCB, Ratnagiri** - ***They are directed to obtain BG as per condition no: 14 & 15 and ensure the compliance of consent conditions.***
3) Chief Accounts Officer, MPCB, Mumbai

Received Consent fee of –

Sr. No.	Amount	DD. No.	Date	Drawn On
1	Rs. 50,000/-	766095	24/09/2015	Corporation Bank
2	Rs. 50,000/-	766363	30/10/2015	
3	Rs. 1,00,000/-	786207	16/04/2016	

4] Cess Branch, MPCB.

Appendix C

Minutes of the EAC meeting held on November 21, 2013

Minutes

The Minutes of the 128th Meeting of the Expert Appraisal Committee for Projects related to Infrastructure Development, Coastal Regulation Zone, Building/Construction and Miscellaneous projects held from 20th – 23rd November, 2013 in the Conference Hall, MMTC, Scope Complex, Lodhi Road, New Delhi.

1. Opening Remarks of the Chairman.

The Chairman welcomed the members to the 128th meeting of the Expert Appraisal Committee.

2. Confirmation of the Minutes of the 127th Meeting of the EAC held on 28th -30th October, 2013 at New Delhi.

Minutes of the 127th Meeting of the EAC held on **28th -30th October, 2013** at New Delhi were confirmed.

In item 4.26 'Environmental and CRZ Clearance for expansion of Port facility at Hazira, Surat, Gujarat by M/s Essar Bulk Terminal Ltd [F.No.11-46/2011-IA-III]', the "two turning of 600 sqm' shall be added as project component instead of 'a turning circle of 600 sqm' and conditions at (i) , (iii), (v), (xiii) and (xiv) shall be replaced with the following:

(i) Project Proponent shall appoint a consultant to look after and advice on the transportation of dangerous chemicals. Sensors for early detection of leakage of propylene and butadiene shall be provided at berths along with water sprinklers.

(iii) Natural drainage system shall be maintained so that there is free flow to the existing mangroves. Mangrove plantation in 500 ha of land in consultation with GEC/Forests Department, Government of Gujarat.

(v) Hazardous chemicals except the permissible Petroleum products shall not be stored within CRZ area. All the construction, storage shall be as per the CRZ Notification, 2011.

(viii) The hazardous wastes generated shall be collected and disposed as per rules, disposable wastes shall be sent to authorized TSDF. MoU in this regard shall be submitted to the Ro, MoEF along with the six monthly monitoring report.

(xiv) The dredging materials shall be utilised for reclamation and excess shall be disposed at the site identified by CWPRS.

3. Consideration of old Proposals

3.1	**CRZ Clearance for Pedder Road Viaduct, Maharashtra by M/s MSRDC [F.No.11-42/2010-IA.III]** As presented by the Project Proponent, exponential increase of the daily traffic count over the years on the Pedder Road led to congestion and added to the pollution

	(ii) Approval of the State or Union territory Tourism Department shall be obtained. *(iii) The project proponent shall not undertake any construction within 200 metres in the landward side of High Tide Line and within the area between Low Tide Line and High Tide Line;* *(iv) All conditions stipulated by MCZMA shall be strictly complied with.* *(v) The water requirement shall be met from Maharashtra Jeewan Pradhikaran as committed.* *(vi) The sewage after treatment shall be recycled for plantation / flushing.* *(vii) Green belt of minimum 15 m width shall be provided all along the boundary.* *(viii) The total covered area on all floors shall not exceed 33 percent of the plot size i.e., the Floor Space Index shall not exceed 0.33 and the open area shall be suitably landscaped with appropriate vegetal cover;* *(ix) The overall height of construction up to the highest ridge of the roof, shall not exceed 9metres and the construction shall not be more than two floors (ground floor plus one upper floor);*
4.6	**CRZ Clearance for construction of Beach Resort in Mahabalipuram village of ThirukalukundaramTaluk, Kancheepuram district by M/s VGS Estates Pvt. Ltd. [F.No.11-35/2013-IA.III]** ***The Committee decided to defer the project, since the project proponent did not attend the meeting.***
4.7	**CRZ Clearance for construction of Beach Resort in Kanathur village and Vadapatinam village of CheyyurTaluk, Kancheepuram by M/s V.G. Park Beach Resorts Pvt. Ltd. [F.No.11–34/ 2013- IA.III]** ***The Committee decided to defer the project, since the project proponent did not attend the meeting.***
Meeting Chaired by Shri Anil Razdan	
4.8	**Environmental and CRZ clearance for expansion of Redi Port, VengulaTaluka, Sindhudurg Dist., Maharashtra by M/s Redi Port Ltd. [F.No.11-15/2010-IA.III]** As presented by the project proponent, the proposal involves expansion of existing facilities at Redi, in Vengurlataluk of Sindhudurg district, Maharashtra ($15^0$44'05" N Latitude and 73^0 40'01" E Longitude). Redi Port (fair weather port) has existing facility with two working jetties performing lighterage operations since more than 40 years and handles up to two MTPA of iron ore. The project includes development of 1 container berth - 1770 m, 3 dry bulk berths - 900 m, 4 multipurpose

berths- 670 m and 1 LNG/ Liquid berth and 1 Molasses berth. The expansion of port is planned in two phases i.e., Phase I and Phase II to handle 13.74 MTPA of cargo; the development plan comprises of three (3) berths for handling dry bulk cargo, general cargo and development of navigation and back up facilities. The proposed development will be over an area of 98 ha is within the already notified limits of the port. Out of 98 ha and 55.5 ha of land is planned to be reclaimed for port development and remaining 42.5 ha is onshore land. Road/rail connectivity will be developed for the port; a road 4.5 km to connect Terekhol road and a rail line of ~17 km to connect Konkan railway line will be developed. The total land area requirement for the road/rail corridor development is about 90 acres. In terms of the concession agreement with Maharashtra Maritime Board (MMB), the land for port expansion shall be provided by Government of Maharashtra.

A Southern breakwater of length 860 m connected to a rock bund of length 2150 m is proposed in the initial phase to maintain the required tranquility in the harbor basin. The turning circle is designed so as to handle 60,000 DWT vessels with a diameter of 460m and dredged depth of (-) 12.7 m. The approach channel is proposed to have a length of 3070m and width of 165m with a dredge depth 0f (-) 13.3m. The initial development phase will require sand dredging of 1.82 million $m^{3.}$ The land available behind the waterfront is partially low lying and the ground level will have to be raised by backfilling with earth and murum with proper compaction to + 4.0 MCD. There will be reclamation also behind the berths.

The water requirement upto Phase II expansion of port is 310 m^3/day will be met from Tilari canal and the necessary treatment facilities will be provided. The total estimated quantity of capital dredged material is about 3.36 MCM; 0.93 MCM of dredged material will be used for reclamation and remaining material will be disposed off in the designated offshore area between (-) 25 m to (-) 30 m depth.

The EIA has been prepared by L&T-RAMBØLL based on TOR approved by MoEF and addresses all issues pertaining to marine, terrestrial and socio-economic aspects of the project. A hydro-dynamic study of the effect of dredge material dumping, shoreline changes has been carried out which suggests that there shall not be any significant impact on the shoreline abutting the project. The issues raised during the public hearing held on September 12, 2011 have also been addressed in the final EIA report which contains an Environment Management Plan covering all the above aspects. A fugitive dust modelling study has been carried out which suggests ground level concentrations to be well within the National Ambient Air Quality Standards.

The CRZ mapping of the proposed locations including demarcation of HTL and LTL has been carried out by NIO which suggests that the development area falls within CRZ I (B), CRZ III and CRZ IV. The project development area does not fall or contain any environmentally sensitive areas as specified in CRZ Notification.

The project was examined by the EAC in its meeting held in April, 2010 and finalized ToR including conduct of Public Hearing.

The EAC noted that the precise details of land purportedly allotted by the Government of Maharashtra for the port were not available and land was not yet in the possession of the proponent. The EAC decided that the proposal shall be

	considered once the land comes under the possession of the proponent. The EAC advised the Project Proponent to superimpose the layout map with port boundary on the Google map along with state boundary and the nearby creek system. The map should show the river and the existing port and the layout of the proposed port superimposed on the same map.
4.9	**Finalization of ToR for expansion of storage tanks in existing terminal at Port Exim Park area, Visakhapatnam, Andhra Pradesh by M/s East India Petroleum Pvt. Ltd. [F.No.11-18/2013-IA.III]** ***The EAC noted that the proposed expansion is within the Port of M/s Visakapatinam Port Trust. However the project proponent has not made any MoU with the Port regarding the proposed expansion. Therefore, the EAC deferred the project and advised the Project Proponent to submit the MoU.***
4.10	**Finalization of ToR for development of all weather deep water port in Hugli Estuary, West Bengal by M/s. Amma Lines Pvt. Ltd. [F.No.11-58/2013-IA.III]** As presented by the Project Proponent, the project involves development of an all weather deep water port in Hugli Estuary, West Bengal. The location of the project site is the Western bank of Hugli Estuary, Latitude 21^0 40'N, Long 87^0 50' E. The proposed cargo facility in Phase –I will be Coal- 12 MMTPA, Iron ore -8 MMTPA, Container -12 MMTPA and in the final Phase Coal- 48 MMTPA, Iron ore -36 MMTPA and container -120 MMTPA. The project consists of construction of Berths with associated structures at water depths up to 9 m. Capital & maintenance dredging will be required to maintain a depth of 9 mts. Approach channel of 300 m x 250 m , Dock basin – 60 m wide is planned. Coal & iron ore will be stacked in the stack yard areas. Facilities will be provided for collection treatment and disposal of solid and liquid waste. The requirement of fresh water is 275 CMD and Sea water is 2100 CMD. Electricity will be provided by the SEB. The Project Proponent indicated that he intends deploying a unique methodology of port development in the sea. ***The EAC after deliberation advised the Project Proponent to submit the justification for site selection, the alternatives considered, connectivity to main land and the likely impacts on the estuary and neighbouring areas and to present a comprehensive scenario which can be examined before finalising the ToR.***
4.11	**Finalization of ToR for development of a deep water port at Astaranga Area, Puri, Odisha by M/s. Navayuga Engineering Co. Ltd. [F.No.11-60/2013-IA.III]** Chaired by Shri M. L. Sharma As presented by the Project Proponent that the Government of Orissa (GoO) desired to develop the Astaranga Port into a full-fledged all weather multi-user port through private investment on Build, Own, Operate, Share and Transfer (BOOST) terms and signed a Concession Agreement with Navayuga Engineering Company Limited on November 22, 2010 for the development of a port at Astaranga, Puri District. Land area to an extent of 1578.269 ha required for the port development is agreed to be made

Appendix D

Marine Biodiversity Management Plan

MARINE DIVERSITY MANAGEMENT PLAN

EXPANSION OF REDI PORT,
VENGURLA TALUK, SINDHUDURG DISTRICT, MAHARASHTRA

(JUNE 2017)

PREPARED BY

ANNAMALAI UNIVERSITY
FACULTY OF MARINE SCIENCES
CENTRE OF ADVANCED STUDY IN MARINE BIOLOGY
(CASMB)
PARANGIPETTAI - 608 502
TAMIL NADU

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF EXHIBITS

Marine Diversity Conservation Management Plan

1 Introduction

As a part of major initiative to propel the economic growth, the Government of Maharashtra is aggressively working on the improvement of import/export capabilities of the sea ports along the coast of the State. In tune with the various major initiatives, Maharashtra Maritime Board (MMB) has identified potential sites/locations (where minor ports are being operated by MMB) for development of All Weather Multipurpose Ports. Redi port is being operated by MMB since around 40 years located in Redi Village, Vengurla taluka, Sindhudurg district of Maharashtra State.

Earnest John Group has entered into a 50-year concessional agreement including five years construction period with MMB on February 25, 2009 to develop Redi Port into an all-weather multipurpose port through Build, Own, Operate, Share and Transfer (BOOST) mode of privatization. Redi Port Limited (RPL), a special purpose vehicle (SPV) formed for the development of Redi Port. The expansion development is proposed towards 4 km south of existing port. Redi Port development into all-weather multipurpose port is proposed in five stages viz. Phase I, Phase II, Phase III, Phase IV and Phase V which will run upto 25 years. The immediate development is planned only upto Phase II.

The project was accorded CRZ recommendation by Maharashtra Coastal Zone Management Authority (MCZMA) and application for Environmental/CRZ clearance is submitted to Ministry of Environment, Forests and Climate Change (MoEF&CC). Project was reconsidered by respective Expert Appraisal Committee (EAC) in its 12th meeting held on 26th- 28th December, 2016. During the appraisal, EAC raised some queries and one of it is as follows:

"A detailed marine diversity conservation management plan based on possible environmental impacts shall be drawn up and implemented as suggested by the National Institute of Oceanography or any other institute on marine ecology. The plan should include the management of marine and intertidal biotopes, corals and coral communities, sea grasses and sea weeds, sub tidal habitats, fishes, other marine flora and fauna (Micro, macro and mega) including turtles, birds and marine mammals as also productivity."

Accordingly, RPL approached Centre for Advanced Studies in Marine Biology (CASMB), Annamalai University, a reputed academic and research Institute, to prepare the Marine Diversity Conservation Management Plan as suggested by EAC, MoEF&CC. This report was prepared by collecting secondary data/literature pertaining to the project region and primary data collected specific to the project study area i.e., within 10-15 km radius.

2 Project Location

The existing port at Redi village is located along the Konkan Coast in Vengurla taluk of Sindhudurg district, Maharashtra (15°44'05" N Latitude and 73°40'01" E Longitude). The site lies 85 km north of Goa and 150 km south of Ratnagiri. The site is about 2.5 nautical miles north of Goa border. At present there are Two (2) jetties functioning at the port that are being used for lighterage operations. The expansion of Redi Port is proposed towards 2.0 km south of existing port.

The location of existing port and expansion are shown in **Figure 1**.

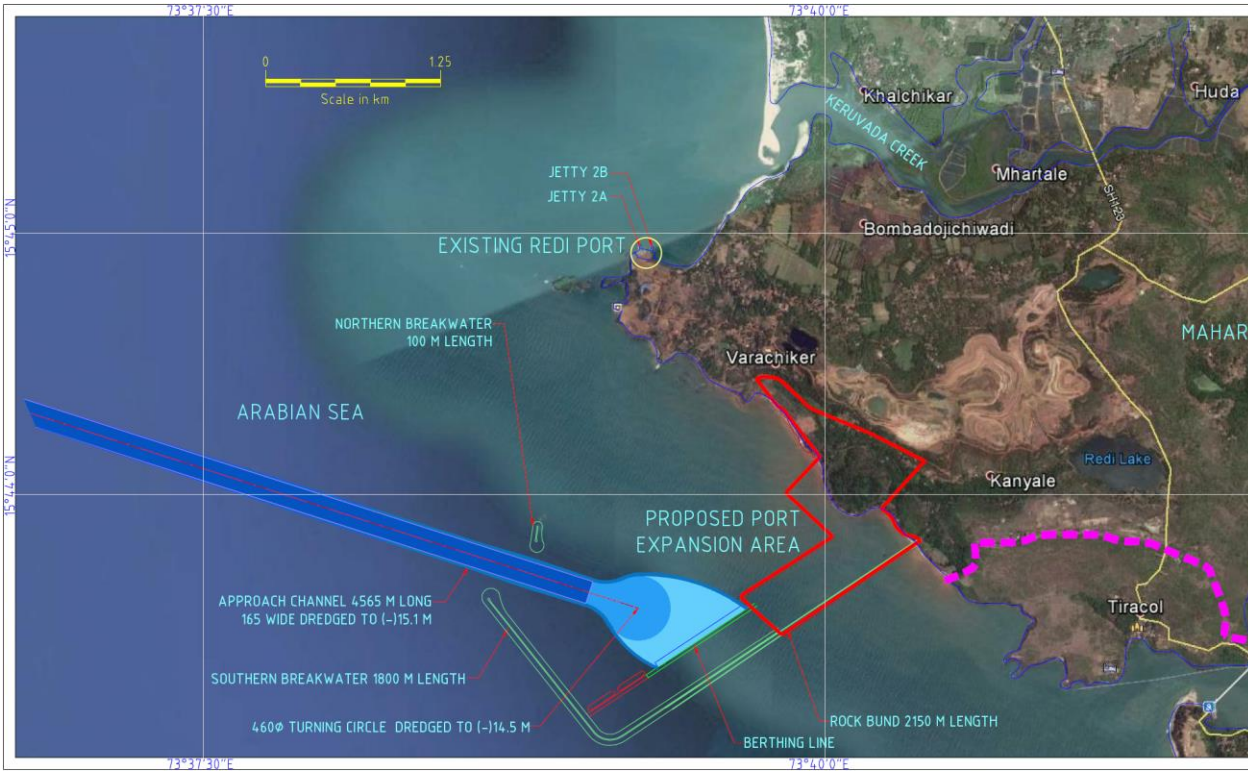


Figure 1: Redi Port Location

3 Project Facilities

3.1 Existing Facilities at Redi Port

The existing facilities at Redi are limited to lighter age operations for exporting iron ore and handles upto 1 MTPA. The existing port at Redi has two jetties that are operational (Jetty 2A and Jetty 2B) and one jetty (Jetty 1) was devastated. The two jetties that are functional operate from October to May when the weather is favourable. Rest of the period, when monsoon strikes Redi, the jetties will be put to maintenance. Jetty 2A and 2B are used to load the barges of capacity 1000 DWT with iron ore that later unloads into mother ship anchored in deeper sea (Transhipment operation). The barges are loaded at a rate of 7000 to 8000 tonnes per day that even goes upto 15000 tonnes per day during peak period. An area of 8 ha is available as backup area for iron ore storage.

3.2 Salient Features of Proposed Development

S. No	Parameter	Description
1.	Land Area	98 ha (242 acres)
2.	Cargo handling capacity	Phase I: 5.16 MTPA (Coal: 2.40 MTPA; Iron ore: 2.76 MTPA Phase II*: 13.74 MTPA (Coal: 7.50 MTPA; Iron ore: 4.89 MTPA; general cargo: 1.35 MTPA)
3.	Cargo Storage	Coal: 29.39 ha; iron ore: 8.47 ha; General cargo (Steel products, Agricultural produce, Fertilisers, Sugar, POL, Molasses and LNG/LPG): 4.78 ha
4.	Cargo handling equipment	Gantry Grab Unloaders; Reclaimer; Stacker; Conveyor system; Mobile Loader and mobile harbour cranes
5.	Berthing facilities	Phase I: 2 berths; Phase II*: 3 berths
6.	Length of Northern Breakwater	Phase I – 0m; Phase II – 100m

S. No	Parameter	Description
7.	Length of Southern Breakwater	Phase I – 860m; Phase II* – 1800m
8.	Rock Bund	Phase I: 2150 m, Phase I facility will suffice Phase II requirement
9.	Navigation Facilities	Phase I Approach Channel: Length: 3070 m; Width: 165 m; Depth:(-) 13.3m Turning Circle: Diameter: 460 m; depth: (-)12.7 m Phase I facility will suffice Phase II requirement.
10.	Dredging and Reclamation	• Capital dredge material: 1.8 MCM • Reclamation: 5.5 MCM, 0.94 MCM of dredged material will be used and remaining material will be sourced from nearby areas. • Remaining dredge material disposed beyond (-) 25 m depth offshore at identified disposal ground
11.	Navigational Aids	• Channel marker buoys • Leading light transit markers and storm signals
12.	Connectivity	• A road of 4.5 km of road will be developed to connect SH-123 • Nearest railway station to Redi is Madure located at 22 km from port site, Konkan railways is establishing a new railway station at a distance of approx. 10 km from Redi. It is proposed to establish a new railway line connection from/to the proposed railway station.
13.	Utilities and Services	• Water Supply: Demand during operational phase: ~310 m^3/day; Source: Redi lake and the existing treatment facilities • Power Supply: Demand 13.33 mVA; Source: State Electricity Board • Wastewater Management, Solid Waste Management, Fire Fighting System, Rainwater Harvesting System
14.	Wastewater Management	• Oil-water separator • STP of 50 KLD capacity is proposed at the port premises and the treated sewage will be used or green belt development
15.	Greenbelt Development	• An area of about 13 ha (32 acres) is proposed for greenbelt • Greenbelt of around 30 m wide will be developed along the boundary and greenbelt of about 20-50 m wide will be developed at stockyards

** Cumulative*

3.2.1 Berthing Facilities

The requirements for berths are worked out taking into consideration of throughput, parcel size, cargo handling rates. The Phase-I and Phase II, development involves the development of two berths for dry bulk cargo (Coal/Iron Ore) and one berth for general cargo. The details of berths required are presented in the **Table 1**.

Table 1: Requirement of Berths for Redi Port

S. No.	Type of Berth	Ship Size (DWT)		No. of Berths		Dredged Depth (m)	
		Phase I	Phase II	Phase I	Phase II	Phase I	Phase II
1.	Coal	60,000	60,000	2	2	(-) 13.9	(-) 13.9
2.	Iron Ore	60,000	60,000				
3.	General cargo	--	40,000	-	1		

3.2.2 Breakwaters

In order to protect the harbour basin from incident waves from South, West South West, South West and North West North and to create tranquillity inside the harbour, two rubble mound breakwaters are proposed for Redi.

The harbour area will be protected by a southern breakwater of length 1800m and northern breakwater of 100m. This breakwater is aligned in such a way so as to provide tranquil condition inside the harbour.

The southern breakwater is connected to a rock bund of length 2150m which protects the reclaimed land area from detrimental waves. This rock bund forms the connecting chord between the breakwater and the shoreline. Quantity of quarry stones required is about 27 lakh m^3.

3.2.3 Approach Channel and Turning Circle

The approach channel proposed for Redi port is aligned in the north western direction. The approach channel and turning circle developed for Phase I will cater the Phase II requirements. The dimensions of the approach channel and the turning circle required for the design vessel is as follows:

- Approach Channel
  - Length : 4565 m
  - Width : 165 m
  - Depth : (-) 15.1 m
- Turning Circle
  - Diameter : 460m
  - Depth : (-) 14.5 m

3.2.4 Dredging and Disposal

3.2.4.1 Capital Dredging and Disposal

The capital dredging is proposed to be executed in various phases based on the Developmental Programme envisaged, However, capital dredging required upto Phase II development will be carried out during the Phase I itself. Capital Dredging Quantity is given in **Table 2**.

Table 2: Capital Dredging Quantity

Details of Areas to be Dredged	Cumulative Quantities in Million Cu.m (MCM)	
• Approach channel = (-) 15.1 m • Turning Circle = (-) 14.5 m • Port Basin & Berths = (-) 13.9 m	Silty Sand and clay material	**3.36**

The total estimated quantity of capital dredged material is about **3.36 MCM.** The material to be dredged is of silty sand and clay material, no rock dredging is envisaged.

0.93 MCM of dredged material will be used for reclamation and remaining material will be disposed off in designated offshore area between (-) 25 m to (-) 30 m depth.

3.2.4.2 Maintenance Dredging and Disposal

The estimated quantity of maintenance dredging is about 0.34 MCM to maintain the required depth in approach channel, harbour basin and turning circle. The material will be dumped at the identified offshore disposal area.

4 Baseline Marine Environmental Status

4.1 Coastal Hydrology/Geomorphology

4.1.1 Tides

The tides near the Redi region are mixed type with semi diurnal pattern. Tide levels with respect to Chart Datum as given in Hydrographic Chart No. 2046; Approaches to Redi ($15^0$45' N latitude and $73^0$9' E longitude) are given in **Table 3** and **Figure 2**.

Table 3: Tide Levels

Description	Abbreviation	Tide Level (m) with respect to Chart Datum (CD)
Mean High Water Spring	MHWS	2.2
Mean High Water Neap	MHWN	2.2
Mean Sea Level	MSL	1.6
Mean Low Water Neap	MLWN	1.4
Mean Low Water Spring	MLWS	0.7

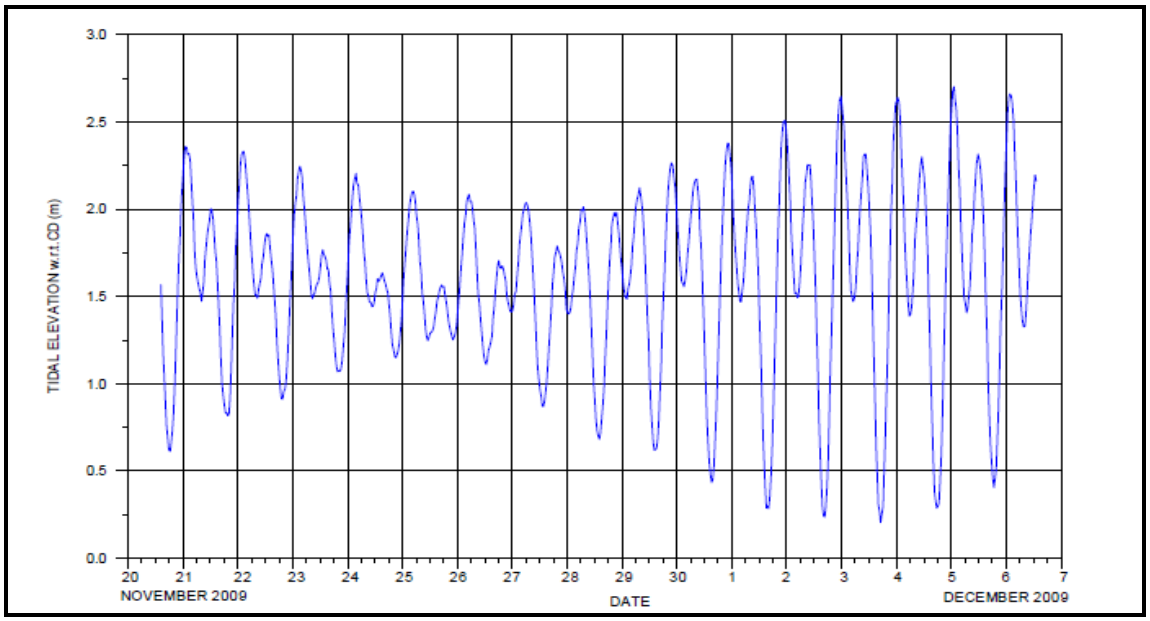


Figure 2: Tidal Variation of Measured Tide at Redi Port

4.1.2 Waves

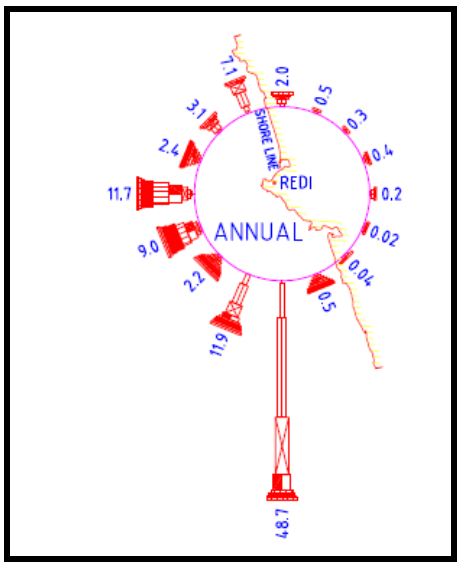


Figure 3: Annual Wave Roses off Redi

The source for the data is BMO, UK at the offshore output locations for a period of 1999-2008 at Redi Project site. The annual wave rose off project site during the above period is presented in **Figure 3**.

It is seen from the wave rose that the marine wind follows the SW monsoon pattern with over 80% of the waves propagating from South to West towards the coast and over 20% of the waves propagating from West to Northwest.

Wave measurement was carried out for a period of sixteen days and during which the wave heights varied from 0.14m to 0.5m. The maximum wave height recorded was 0.68m with a zero crossing wave period varying from 4 to 11 seconds. **Figure 4** and **Figure 5** show the variation of wave heights and zero crossing wave periods.

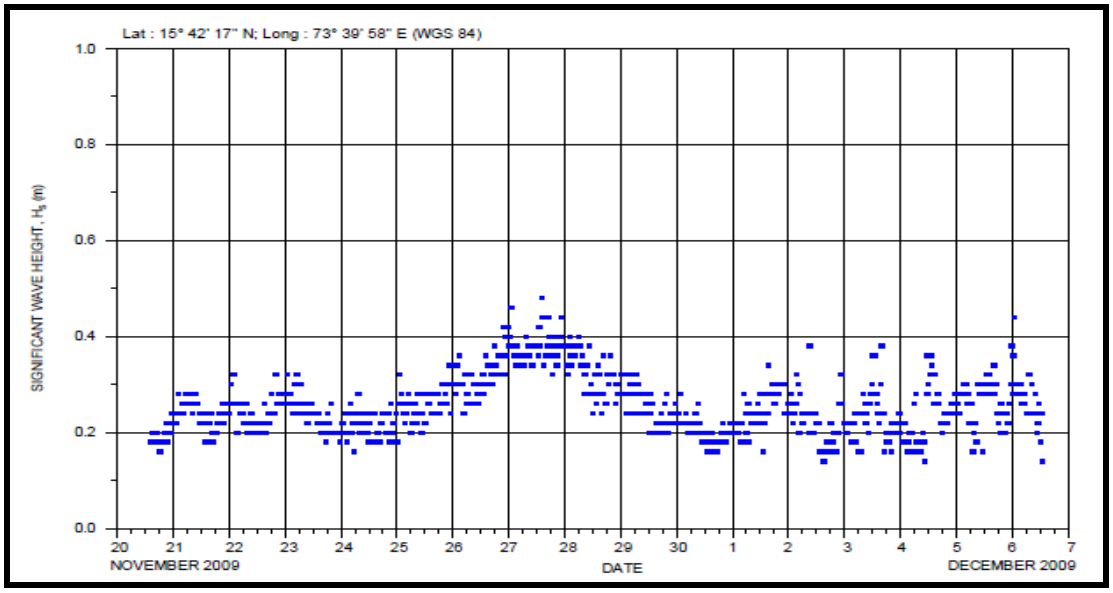


Figure 4: Variation of Significant Wave Height at Redi Port

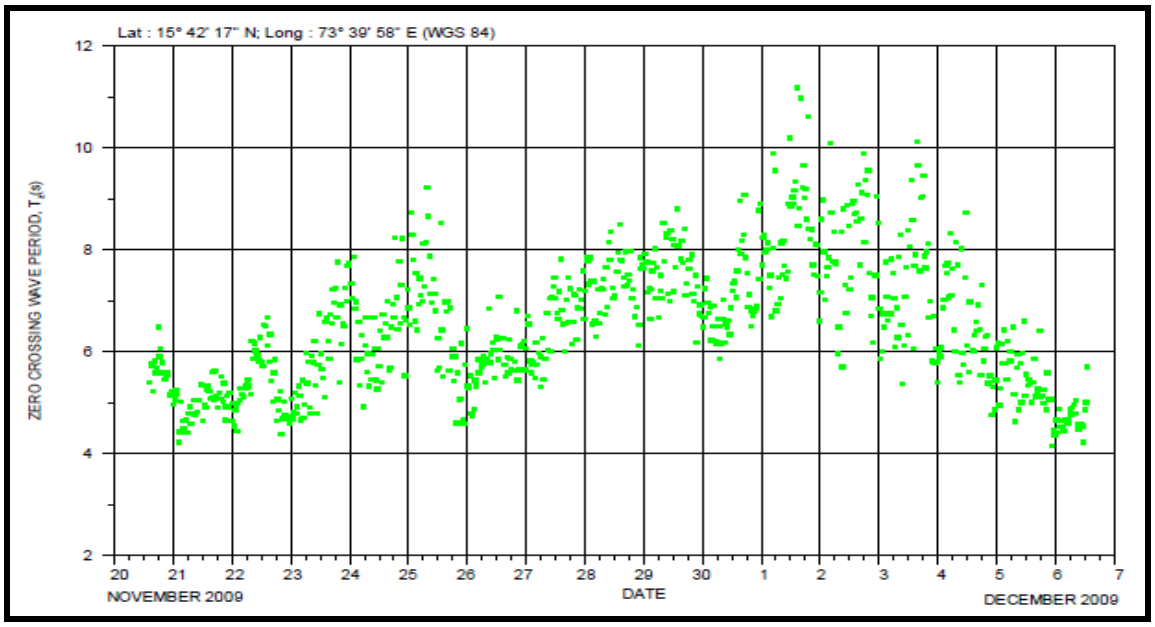


Figure 5: Variations of Zero Crossing Wave Periods at Redi Port

4.1.3 Littoral Drift

Waves induce currents along the coast when they break, known as long shore currents (littoral currents). These currents resulting from oblique wave approach run parallel to the shore in the surf zone. These currents transport sediments disturbed by the waves in the direction of current known as littoral drift or long shore sediment transport.

The littoral drift along the West Coast of India is predominantly from north to south. The littoral transport at the project site is small and this is possibly due coastal formation composed of headlands and rocky beaches.

4.1.4 Currents

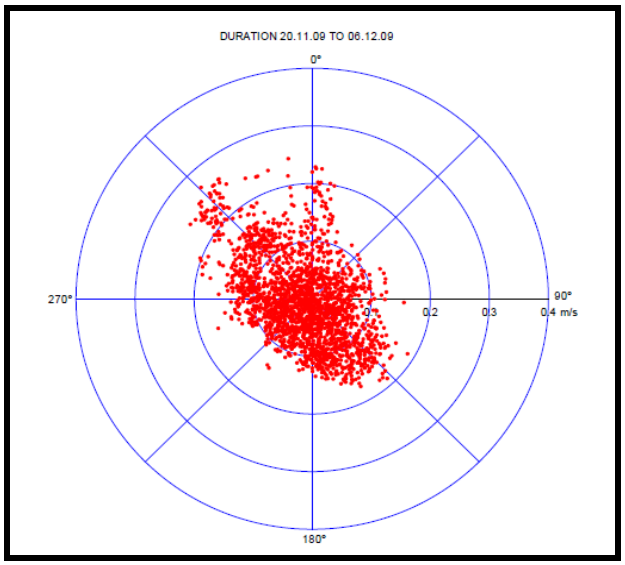


Figure 6: Distributions of Current, Speed and Direction

Maximum current speed during the observation was 0.27m/s, which was predominantly in East to West direction during flood and vice versa during ebb tide. The distributions of current speed and directions in the proposed site are given below in **Figure 6**.

4.1.5 Bathymetry

The region to 12m contour inside the sea consists of offshore islands, scattered rock and varied bathymetry. The observed variation in water depth in the near shore is very steep around the islands and the outcrops. The seabed is composed of bedrock covered with varying thickness of silt mixed clay.

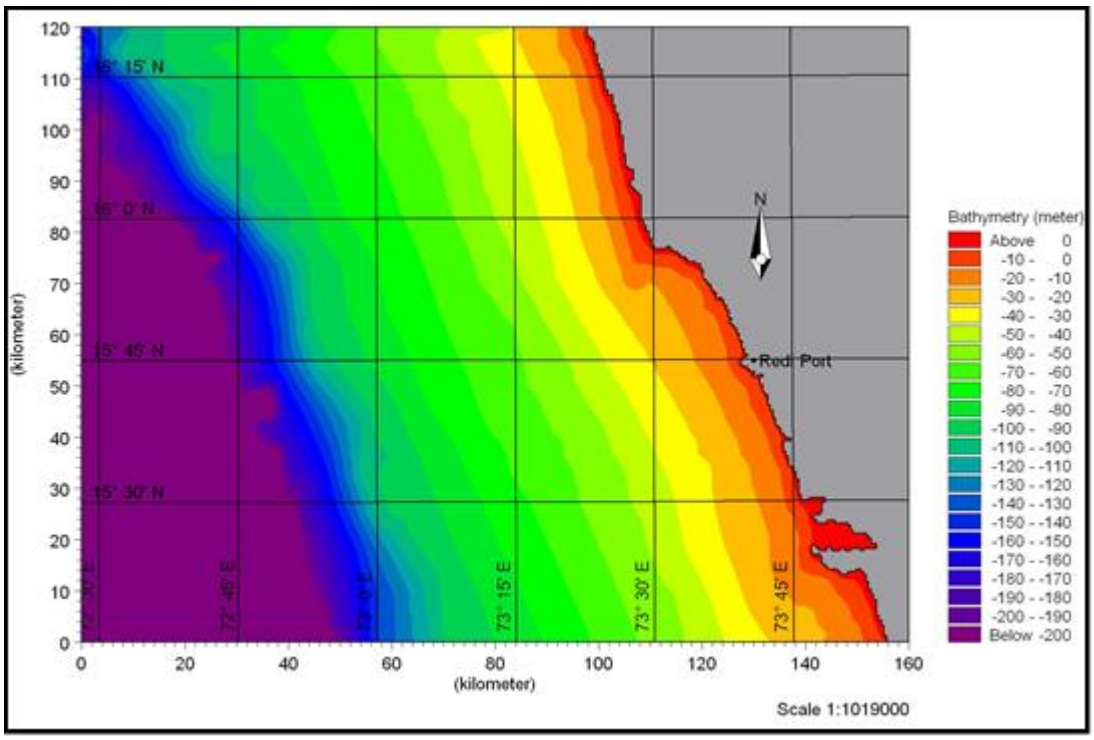


Figure 7: Bathymetry Near Redi Port

A moderate slope was observed in the seabed within a distance of 2km from the shore to 5m contour. This is however variable from 5m to 12m water depth. The 5m, 10m, 15m, 20m water depth occurs within a distance of 290, 1460, 4400 and 7400m respectively from the shoreline. The variation of water depth is undulating within 2km zone where the seabed is composed of rocks. In this area, 10m water depth falls at a distance of 50m near the Port region. Towards Terekhol River on the southern side of the existing port, the seabed exhibits moderate slope with 10m deep contour occurring at a distance of 2.5km from the shoreline. The bathymetry of project region is given as **Figure 7**.

4.1.6 Coastal Geomorphology

The major geomorphologic features along the study stretch includes headland, bay, pocket beach, wave cut cliff, rock outcrops, offshore islands, submerged bedrock and gently raising low peaked hills. The rocky islands and submerged bedrocks are located offshore within 1 to 2 km from shore and are possibly part of the detached portions of coastal headlands. The coastal stretch has exposed beach and buried bedrock under beach sand. Wagle (1990) describes beach rocks as mostly buried in the near shore area extending 1 – 2km with isolated patches of rock outcrops along central west coast of India. These bedrocks are exposed in the intertidal zone and have been instrumental in reducing the wave energy leading to low sediment transport along this stretch.

4.1.7 Geotechnical Investigation

Geotechnical investigations are required to determine various soils / rock parameters at the proposed project location in order to carry out engineering analysis. 5 No.s Land boreholes to a depth of 40 m boring into the soil from the existing ground level and 8 No.s Marine boreholes (MBH 1, MBH 2, MBH 3, MBH 4, MBH 5, MBH 6, MBH 8, MBH 10) to a depth of 30 m and 3 No.s Marine boreholes (MBH 7, MBH 9, MBH 11) to a depth of 50m from existing seabed level were chosen.

Marine boreholes results:

- Soil encountered in the top layers is predominantly silty clay in nature.
- Sand or silty sand is observed in MBH1, MBH7, MBH8 and MBH11 boreholes down to the rocky strata.
- The relative densities of these soils typically range between loose to dense. The upper layers of MBH-4, MBH-6 and MBH8 are found be silty clay with SPTN values less than 6.
- Weathered rock is encountered in all boreholes at varying depths. The observed bedrock is moderately weathered at surface and rapidly grades into sound rock as depth increases.

4.1.8 Shallow Seismic Survey

The shallow seismic record indicates the sub bottom of the study area is composed of rock formation, which is overlain by sediment deposits of silt mixed clay. Buried rocks are exposed above the seabed in the near shore water. The sediment deposit in the survey area is predominantly composed of silty clay. The thickness of the sediment deposit is around 1m to 4 m in the near shore area, this is varying from 10m to 12m in the offshore.

4.2 Marine Eco-sensitive Areas

Proposed port location does not contain environmentally sensitive areas such as National parks / marine parks, sanctuaries, wildlife habitats, corals / coral reefs. It also does not include breeding and spawning grounds of fish and other marine life. As per the list prepared by ENVIS Centre on Wildlife & Protected Areas the Important Coastal and Marine Biodiversity Areas (ICMBAs) within 25km from proposed port boundary are Terekhol at 1.7 km SE and Morjim-Anjuna at 14 km SSE. Coral reefs are found at Malvan Marine Sanctuary located at 40 km and Angira bank at 175km NW (**Figure 8**).

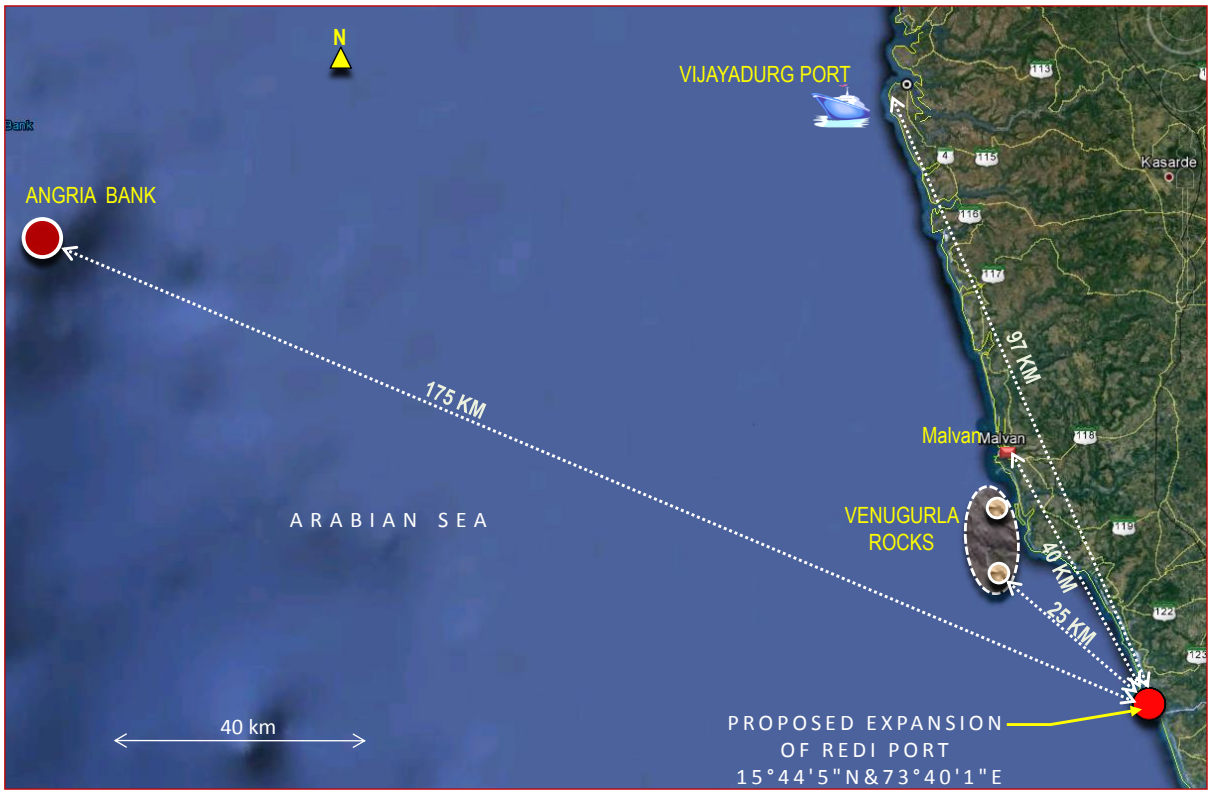


Figure 8: Marine Sensitive Areas In Sindhudurg District (distance from redi port)

4.3 Status of Marine Physico-Chemical and Biological Parameters

4.3.1 Study Area

As per the norms laid out by MoEF&CC an area falling within 5 km from the project boundary and 10 km radius with port site as centre has been earmarked for the study as the study area.

4.3.1.1 Sampling Locations

Water and sediment samples were collected from nine locations. There are five sampling locations (MSL-1, 2, 3, 4, 8 and 9) selected at <5m depth; one sampling location (MSL-6) between 5 and 9 m depth MSL-5 is located at a depth of 10 m and MSL-7 between 25 m and 30 m. The Coordinates of the sampling locations are given in the **Table 4**. A map showing the marine sampling locations is shown in **Figure 9**.

Table 4: Marine Sampling Locations

S. No.	Location Code	Latitude	Longitude
1.	MSL-1	15°44'59.91" N	73°39'16.51" E
2.	MSL-2	15°44'46.00" N	73°39'00.00" E
3.	MSL-3	15°44'18.58" N	73°39'02.41" E
4.	MSL-4	15°44'02.10" N	73°39'43.87" E
5.	MSL-5	15°43'43.27" N	73°38'45.50" E
6.	MSL-6	15°43'31.81" N	73°39'14.14" E
7.	MSL-7	15°41'41.35" N	73°32'26.09" E
8.	MSL-8	15°43'23.55" N	73°40'13.71" E
9.	MSL-9	15°42'58.68" N	73°40'51.35" E

Among the stations, MSL 1, 2 3, 4, 8 and 9 were situated near to shore whereas MSL- 5 and 6 were away from shore and MSL-7 in open sea.

4.3.2 Marine Water Quality

The primary objective of this investigation was to establish baseline data on seawater quality, sediment quality and marine ecology prior to the expansion of Redi port. Methodologies used for the study are therefore clearly aimed at obtaining information on the environmental conditions according to EIA governed protocols defined in standard manuals and reference material (e.g. UNESCO, 1978; Parsons *et al.*, 1984; Standard Methods of the American Public Health Association APHA, 1989, 1998; Grasshoff *et al.*, 1999).

Temperatures, Salinity, Transparency, DO, BOD, Nitrate, Nitrite, Ammonia, Total Nitrogen, Total Phosphorous and Inorganic Phosphate were monitored. All parameters were estimated by using following standard methods. Biological variables have also been studied and this includes planktons (both Phyto and Zooplankton), productivity and benthos (macro & meio). Sediment samples were also collected and analyzed for various parameters including heavy metals.

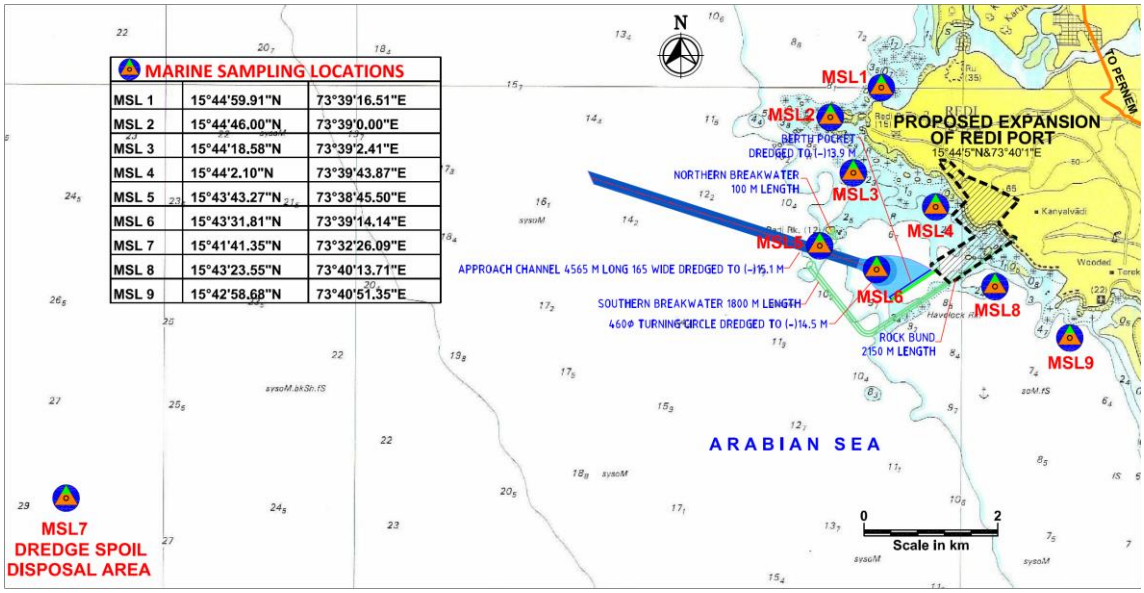


Figure 9: Marine Sampling Locations

4.3.2.1 Physico-Chemical Parameters

The details regarding physical parameters for all monitoring locations are given in **Table 5**.

Table 5: Physico-Chemical Properties

Location Code	Temp.	Salinity	pH	TSS	Turbidity	DO	BOD
	°C	‰		mg/l	NTU	mg/l	
MSL-1-HT	30.0	33	8.2	26.8	3	4.72	0.80
MSL-1-LT	30.0	32	8.1	49.4	5	5.40	0.96
MSL-2-HT	30.0	32	8.1	36.4	3	4.12	1.44
MSL-2-LT	30.5	33	8.2	44.0	2	5.40	1.76
MSL-3-HT	29.5	33	8.2	33.6	3	5.24	1.12
MSL-3-LT	30.0	33	8.2	43.8	4	5.69	0.80
MSL-4-HT	29.5	33	8.2	57.1	6	4.38	1.12
MSL-4-LT	30.5	32	8.1	42.4	5	4.70	1.44
MSL-5-HT	29.5	33	8.2	43.2	4	5.14	0.80
MSL-5-LT	30.5	32	8.1	48.6	2	5.46	0.64
MSL-6-HT	29.5	33	8.1	51.2	4	5.51	0.32
MSL-6-LT	30.5	33	8.2	53.2	3	5.03	1.76
MSL-7-HT	29.5	33	8.2	48.4	3	5.53	0.32

Location Code	Temp.	Salinity	pH	TSS	Turbidity	DO	BOD
	°C	‰		mg/l	NTU	mg/l	
MSL-7-LT	31.0	33	8.2	55.0	4	5.03	0.96
MSL-8-HT	29.5	33	8.2	41.4	2	4.94	0.80
MSL-8-LT	30.0	32	8.1	46.2	5	4.83	1.28
MSL-9-HT	29.5	33	8.2	31.0	2	4.99	1.12
MSL-9-LT	29.5	33	8.2	55.9	4	5.09	1.60

Temperature (°C): The water temperature ranged from 29.5 °C to 31.0 °C. The variation of temperature at all the monitoring locations is shown in **Figure 10**.

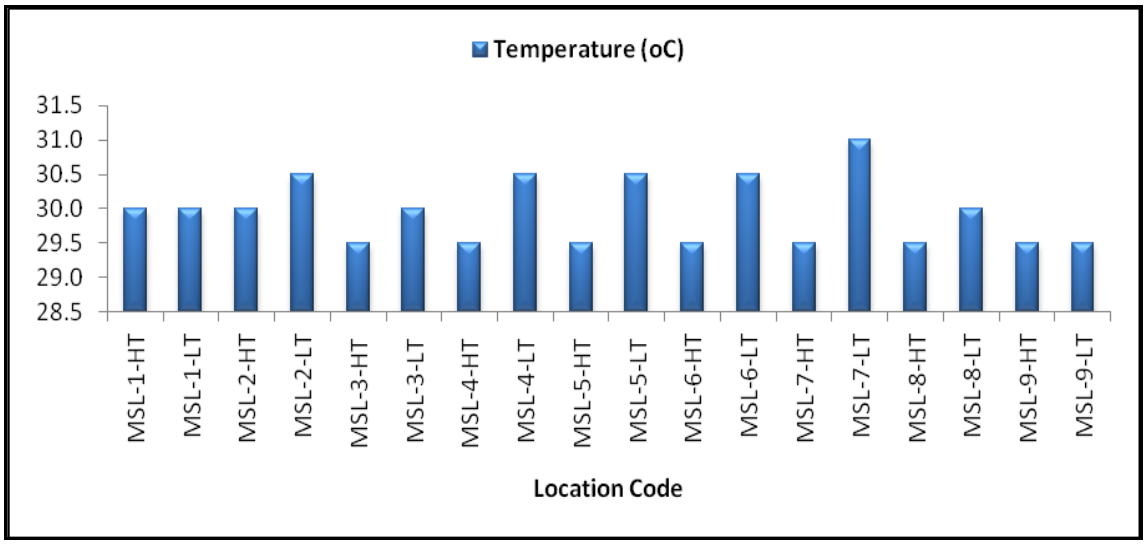


Figure 10: Variations in Temperature

Salinity (ppt): The major variable in the coastal environment is salinity. Usually there is a continuous gradient between shore line area and deep waters, the minimum and maximum salinity observed were 32 and 33 ppt respectively. The variation of salinity at all the monitoring locations is shown in **Figure 11**.

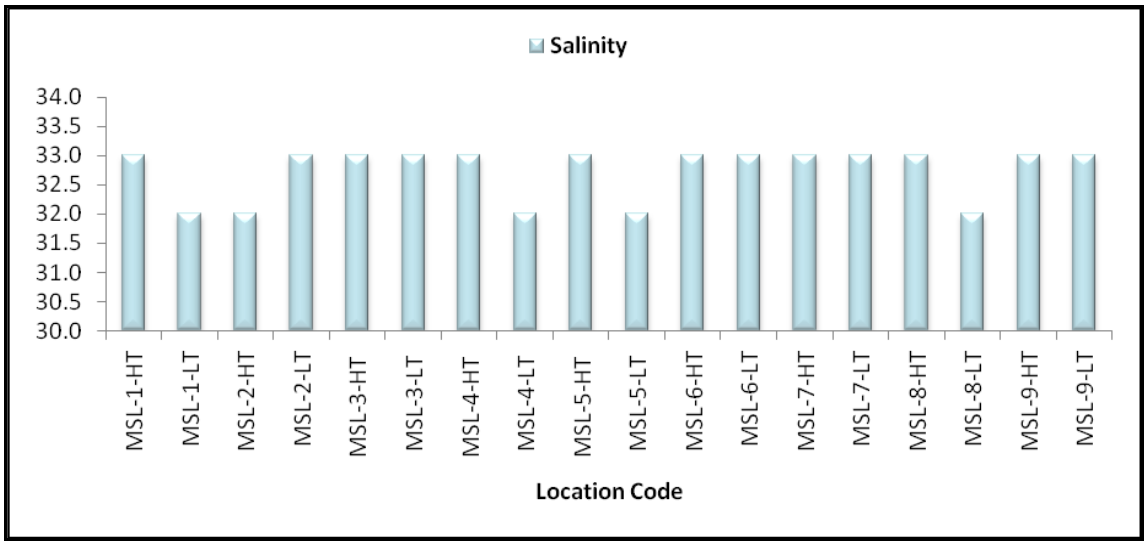


Figure 11: Variations in salinity

pH: The pH value of water in the present study remained alkaline at all stations. It ranged between 8.1 and 8.2. The variation of pH at all the monitoring locations is shown in **Figure 12**.

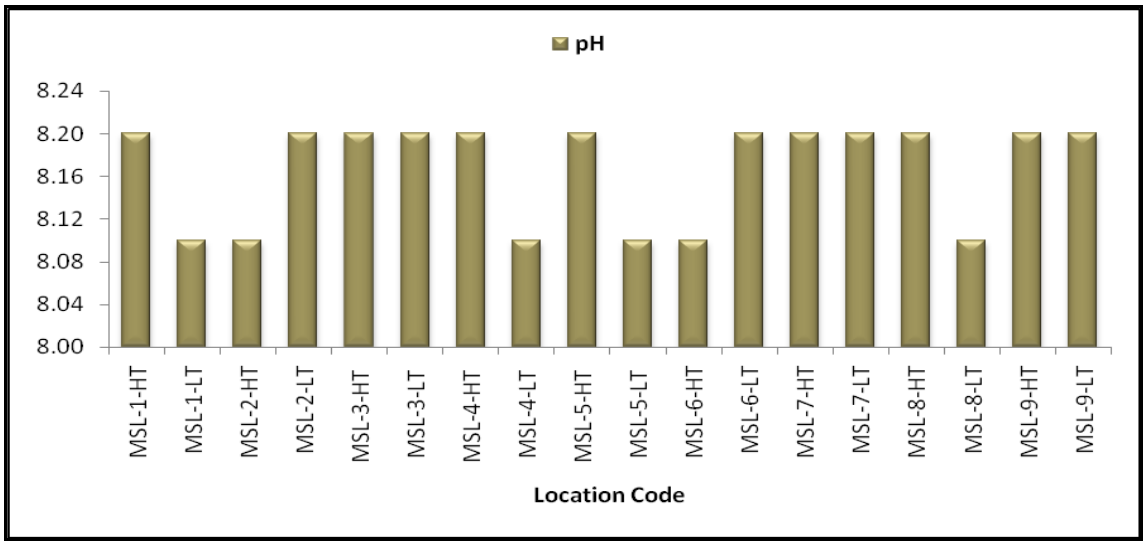


Figure 12: Variations in pH

Turbidity: Turbidity is an expression of optical property of a water sample containing insoluble substances which cause light to be scattered rather than transmitted in straight lines. In most of the waters turbidity is due to colloidal and extremely fine dispersions. The turbidity varied from 2 to 6 Nephlometric Turbidity Unit (NTU). The minimum turbidity was recorded at MSL-2 (LT), MSL-5 (LT) and MSL-8 (HT). The maximum level was recorded at MSL-4 during high tide. The variation of turbidity at all the monitoring locations is shown in **Figure 13**.

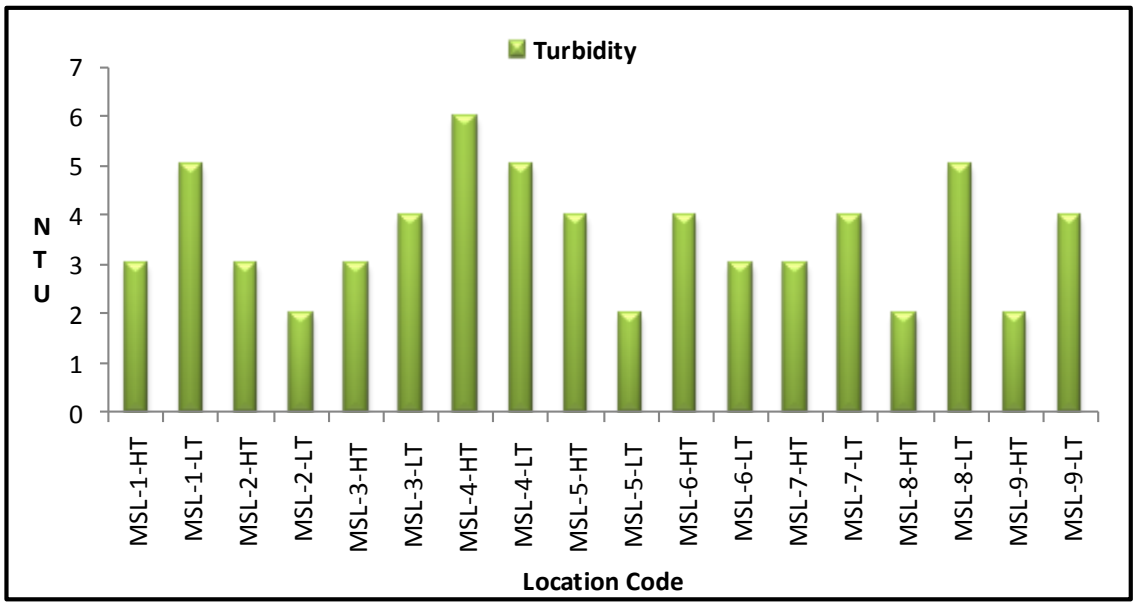


Figure 13: Variations of Turbidity Levels

Total Suspended Solids: Concentrations of suspended Solids are important parameter in water quality management. The Total suspended Solids varied from 26.8 to 57.1 mg/l. The minimum level was recorded in MSL-1 during high tide and the maximum level was recorded at MSL-4 during high tide. The variation of Total Suspended Solids at all the monitoring locations is shown in **Figure 14**.

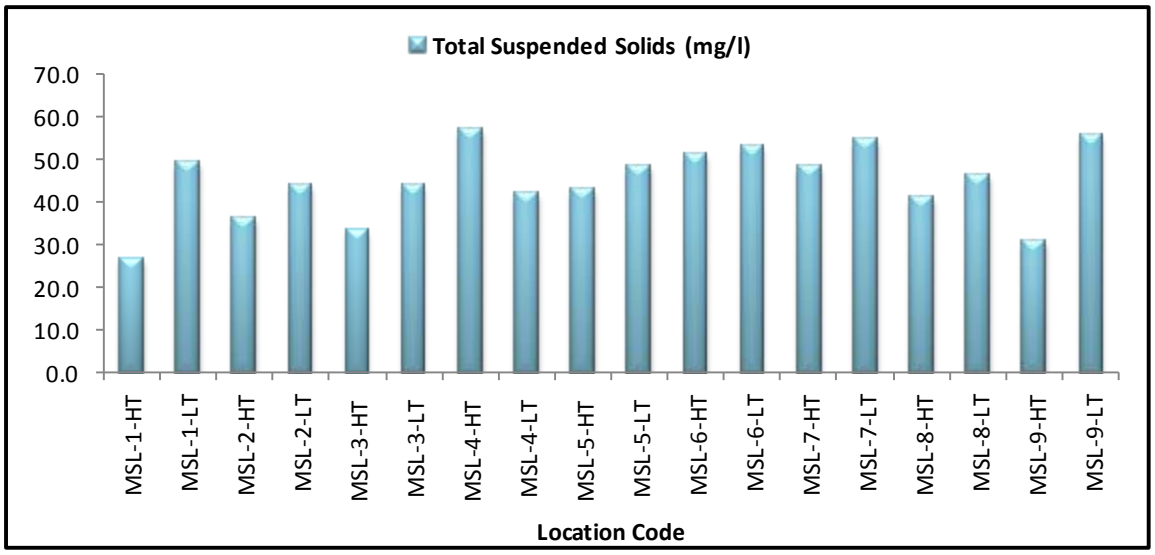


Figure 14: Variations in Total Suspended Solids

Dissolved Oxygen (mg/l): The dissolved oxygen is an index to study the productivity of an environment. The Dissolved Oxygen (DO) varied between 4.12 mg/l to 5.69 mg/l. The minimum value was observed at MSL-2 during high tide and the maximum was recorded at MSL-3 during low tide. The variation of DO at all the monitoring locations is shown in **Figure 15**.

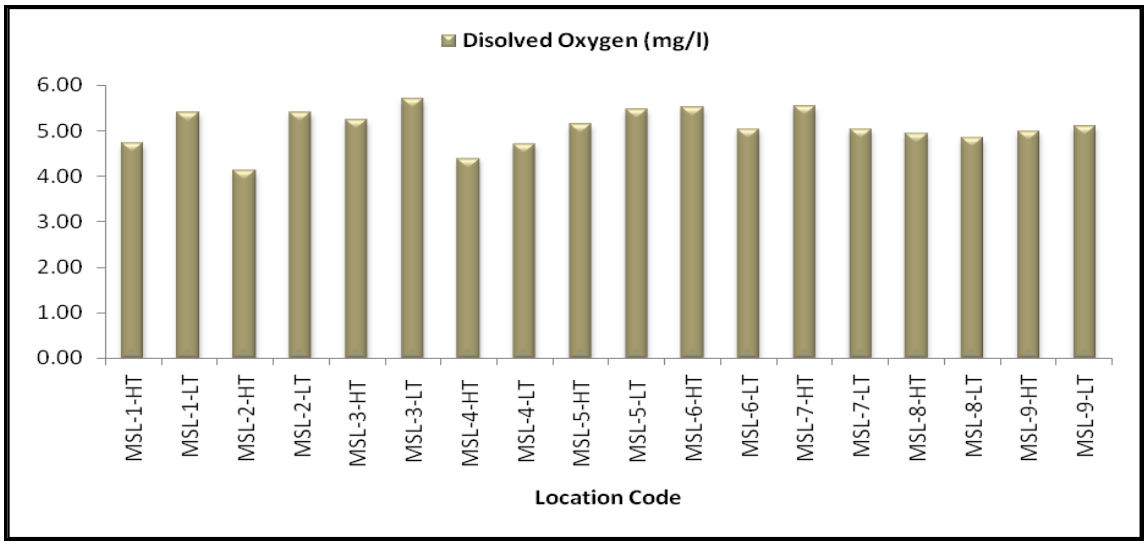


Figure 15: Variations in Dissolved Oxygen Levels

Biological Oxygen Demand (mg/l): The Biological Oxygen Demand (BOD) varied between 0.32 mg/l to 1.76 mg/l. The minimum value was observed at MSL-6 and MSL-7 during high tide for both the locations and the maximum was recorded at MSL-2 and MSL-6 during low tide for both the locations. The variation of BOD at all the monitoring locations is shown in **Figure 16**.

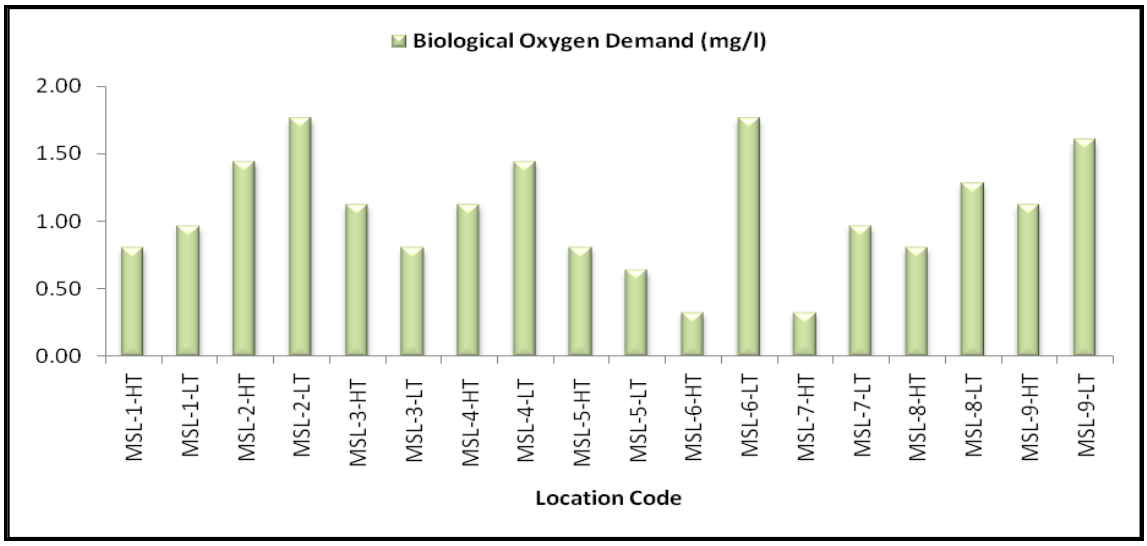


Figure 16: Variations in Biochemical Oxygen Levels

4.3.2.2 Nutrients

The details regarding nutrients for all monitoring locations are given in **Table 6**.

Table 6: Nutrients in water

S. No.	Location Code	Parameters						
		NO_2	NO_3	NH_4	TN	IP	TP	SiO_4
		µmol/l						
1	MSL-1-HT	0.651	8.774	0.241	25.097	0.717	1.603	21.409
2	MSL-1-LT	0.460	6.899	0.191	18.387	0.491	1.850	20.864
3	MSL-2-HT	0.421	6.766	0.149	16.508	0.529	1.850	11.793
4	MSL-2-LT	0.498	6.646	0.224	10.468	0.982	1.562	15.784
5	MSL-3-HT	0.517	5.938	0.266	15.434	0.755	1.562	11.884
6	MSL-3-LT	0.766	6.636	0.125	14.629	0.566	2.137	12.609
7	MSL-4-HT	0.823	6.837	0.399	26.305	0.944	1.274	17.236
8	MSL-4-LT	0.498	6.861	0.249	21.742	0.831	1.397	18.415
9	MSL-5-HT	1.111	3.967	0.199	23.353	0.604	2.055	29.845
10	MSL-5-LT	0.555	7.019	0.232	24.963	0.680	1.521	12.247
11	MSL-6-HT	0.326	7.765	0.133	25.500	0.566	1.973	11.249
12	MSL-6-LT	0.421	7.497	0.274	21.876	0.755	2.302	11.702
13	MSL-7-HT	0.345	9.467	0.282	26.976	0.680	1.932	9.162
14	MSL-7-LT	0.364	8.774	0.291	27.781	1.133	2.261	14.514
15	MSL-8-HT	0.728	9.099	0.091	17.179	0.868	1.726	18.143
16	MSL-8-LT	0.575	6.937	0.374	19.460	1.321	2.548	16.057
17	MSL-9-HT	0.517	9.400	0.274	20.534	1.623	2.425	16.238
18	MSL-9-LT	0.747	9.974	0.349	23.084	1.548	2.137	33.020

Ammonium Ion: The ammonical nitrogen concentration varied from 0.091 to 0.399 µmol/l. The minimum level of ammonical nitrogen recorded at MSL-8 during high tide, whereas the maximum level was recorded at MSL-4 during high tide. The variation of ammonical nitrogen at all the monitoring locations is shown in **Figure 17**.

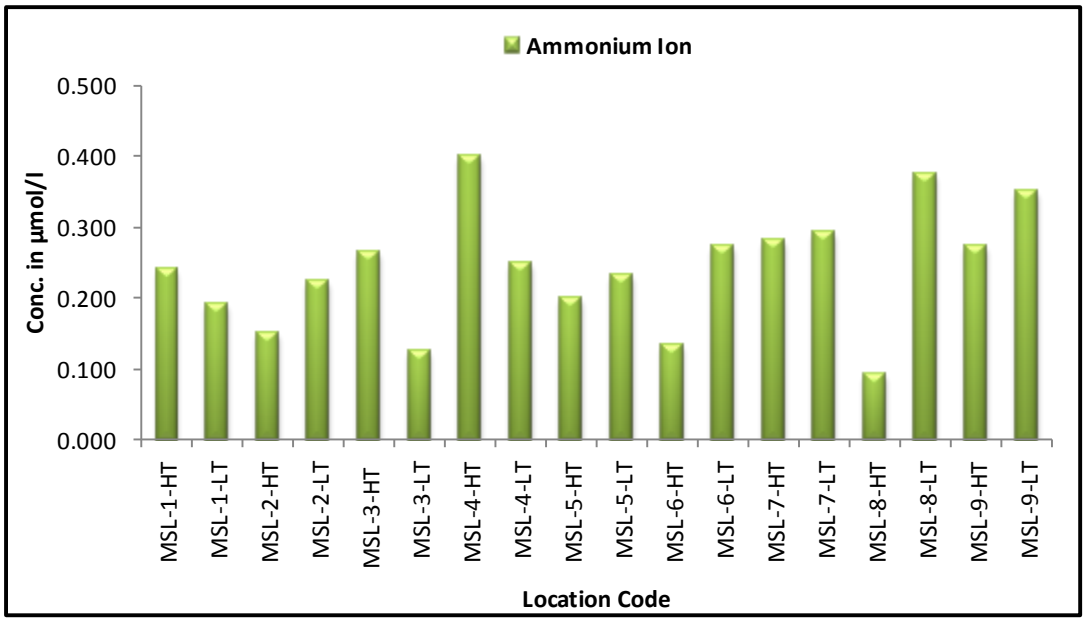


Figure 17: Variations in Ammonium Ion Levels

Nitrite: The nitrite concentration varied from 0.326 to 1.111 µmol/l. The minimum level of nitrite was observed at MSL-6 during high tide whereas the maximum level of was observed at MSL-5 during high tide. The variation of nitrite at all the monitoring locations is shown in **Figure 18**.

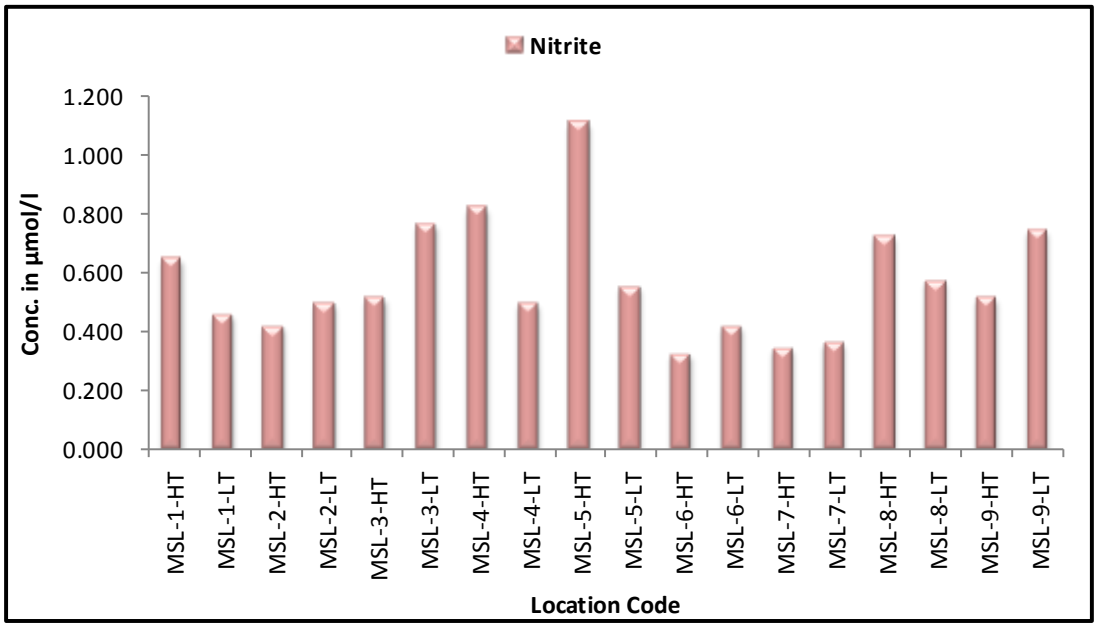


Figure 18: Variations in Nitrite Levels

Nitrate: The nitrate concentration ranged between 3.967 to 9.974 µmol/l. The minimum level of nitrate observed at MSL-5 during high tide, whereas the maximum level of nitrate observed at MSL-9 during low tide. Nitrate levels at all the monitoring locations is shown in **Figure 19**.

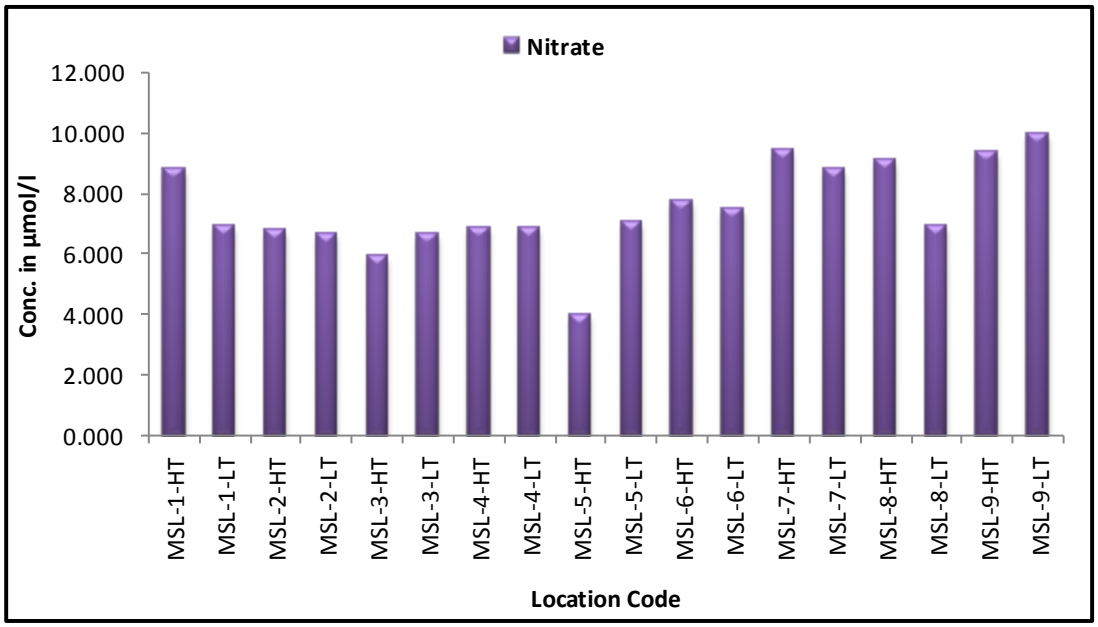


Figure 19: Variations in Nitrate Levels

Total Nitrogen: The Total Nitrogen concentration varied from 10.468 to 27.781 µmol/l. The minimum level of TN observed at MSL-2 during low tide, whereas the maximum level of TN was recorded at MSL-7 during low tide. Total Nitrogen levels at all the monitoring locations is shown in **Figure 20**.

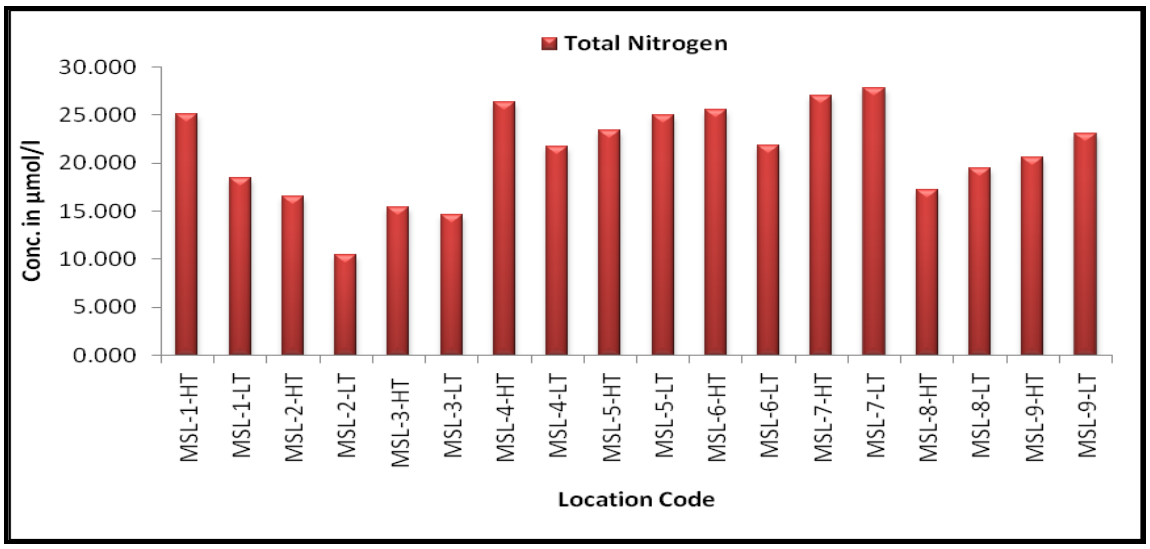


Figure 20: Variations in Nitrogen Levels

Inorganic Phosphate: The inorganic phosphate concentrations in the sampling stations were fluctuated between 0.491 and 1.623 µmol/l. The lower level of inorganic phosphate was recorded at MSL-1 during low tide and the maximum level was recorded at MSL-9 during high tide. Inorganic phosphate levels at all the monitoring locations are shown in **Figure 21**.

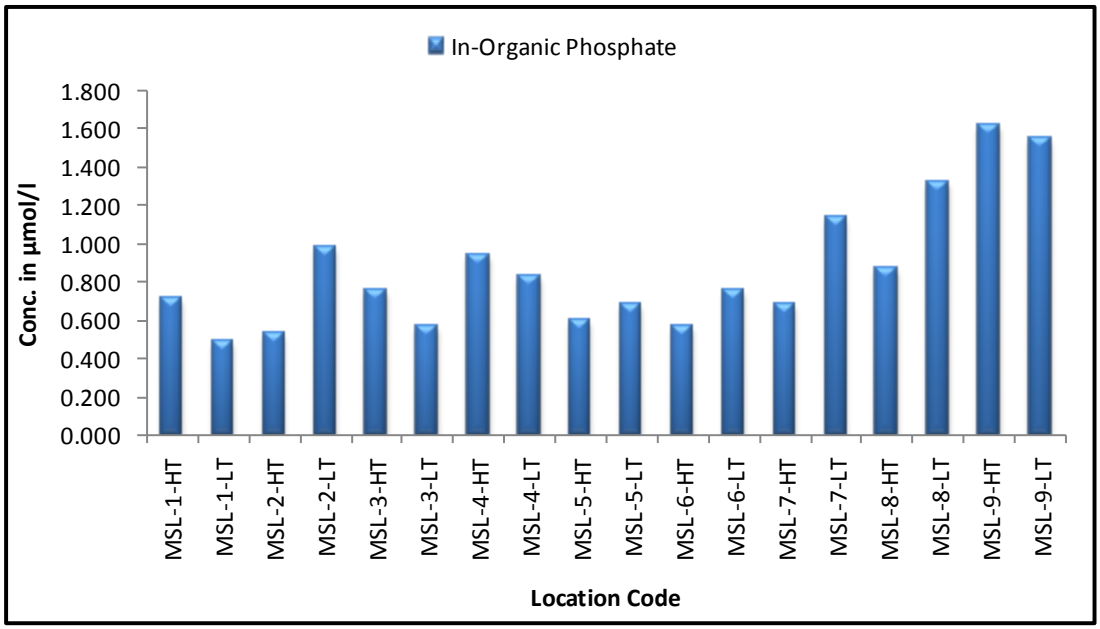


Figure 21: Variations in Inorganic Phosphate Levels

Total Phosphorus: The total phosphorus concentration varied from 1.274 to 2.548 µmol/l. The minimum level was recorded at MSL-4 during high tide and the maximum level was recorded at MSL-8 during low tide. Phosphorus levels at all the monitoring locations are shown in **Figure 22**.

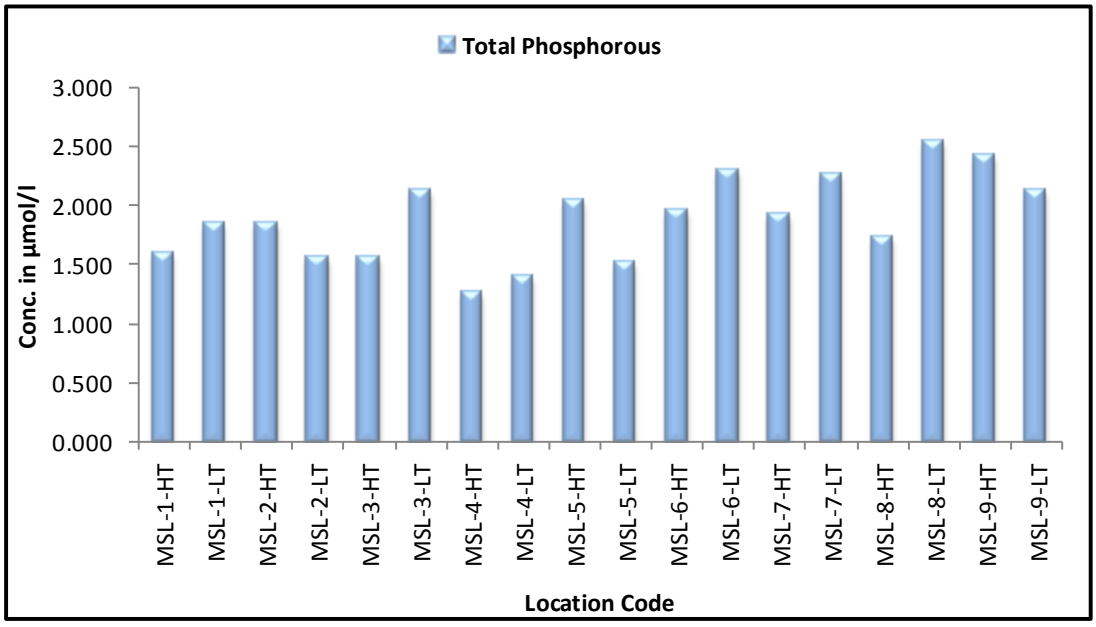


Figure 22: Variations in Total Phosphorous Levels

Silicate: The silicate level was ranged from 9.162 to 33.020 µmol/l. The minimum level was recorded at MSL-7 during high tide and the maximum level was recorded at MSL-9 during low tide. Silicate levels at all the monitoring locations are shown in **Figure 23**.

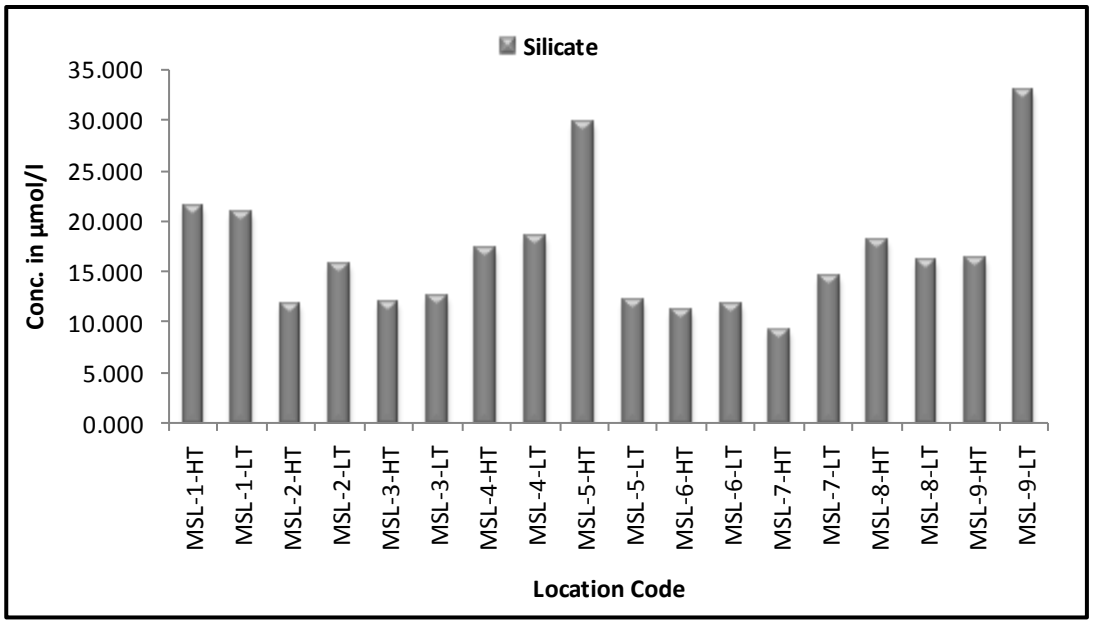


Figure 23: Variations in Silicate Levels

4.3.2.3 Heavy Metals

In water samples the fluctuations of heavy metal such as Cadmium (Cd), Copper (Cu), Iron (Fe), lead (Pb), Zinc (Zn), and Mercury (Hg) have been examined. The results of heavy metal concentrations in the sampling locations are given in **Table 7**.

Table 7: Heavy Metal Concentrations (µg/l) in Seawater

S. No.	Location Code	Parameters					
		Cd	Cu	Fe	Pb	Zn	Hg
		µg/l					
1	MSL-1-HT	1.44	4.08	1319	2.94	8.08	0.006
2	MSL -1-LT	1.64	19.60	5612	7.49	13.35	0.0012
3	MSL -2-HT	1.02	24.39	6538	11.00	18.36	0.0012
4	MSL -2-LT	1.32	24.17	5855	9.22	17.85	BDL
5	MSL -3-HT	1.74	20.38	5874	6.25	14.75	BDL
6	MSL -3-LT	0.68	18.06	5043	5.74	11.38	BDL
7	MSL-4-HT	0.82	7.21	2498	1.36	5.37	BDL
8	MSL-4-LT	0.17	10.39	2946	2.35	6.73	BDL
9	MSL-5-HT	0.05	10.51	3925	2.23	8.98	BDL
10	MSL-5-LT	0.02	17.41	4170	3.72	11.55	BDL
11	MSL-6-HT	0.06	15.89	4315	2.82	11.81	0.005
12	MSL-6-LT	0.04	9.70	3559	2.94	7.99	0.003
13	MSL-7-HT	0.12	8.33	2592	1.76	5.69	BDL
14	MSL-7-LT	0.07	9.49	2488	1.79	6.46	BDL
15	MSL-8-HT	0.10	11.53	3127	2.52	8.26	BDL
16	MSL-8-LT	0.11	3.12	540	0.53	0.97	BDL
17	MSL-9-HT	0.11	7.93	2064	1.57	4.56	BDL
18	MSL-9-LT	0.12	11.52	2016	1.90	4.32	BDL

Cadmium (Cd): The values ranged from 0.02 µg/l at MSL-5 (LT) to 1.74 µg/l at MSL-3 (HT).

Copper (Cu): The values ranged from 3.12 µg/l at MSL-8 (LT) to 24.39 µg/l MSL-2 (HT).

Lead (Pb): The values ranged from 0.53 µg/l at MSL-8 (LT) to 11.00 µg/l at MSL-2 (HT). The variation of Cadmium, Copper and Lead at all the monitoring locations is shown in **Figure 24**.

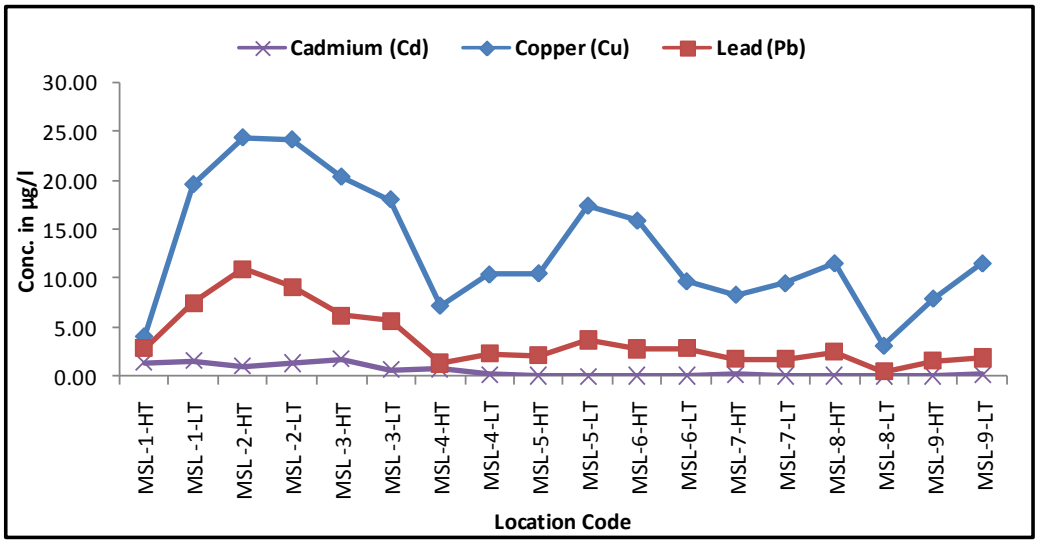


Figure 24: Variations in Cadmium, Copper and Lead

Iron (Fe): The values ranged from 540 µg/l at MSL-8 (LT) to 6538 µg/l MSL-2 (HT). The variation of iron at all the monitoring locations is shown in **Figure 25**.

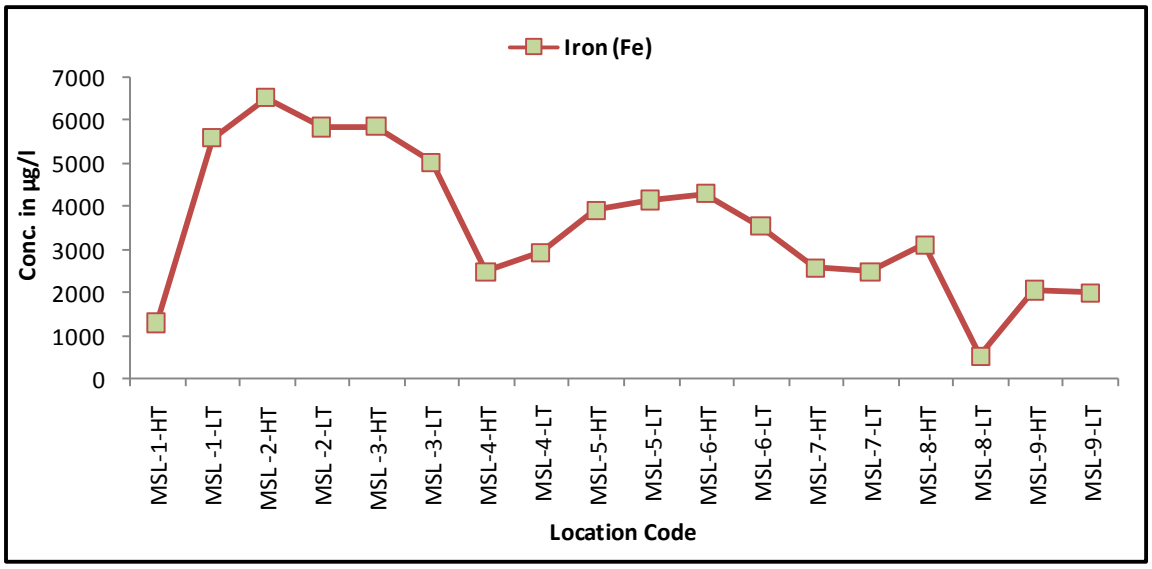


Figure 25: Variations in Iron Concentration

Zinc (Zn): The values ranged from 0.97 µg/l at MSL-8 (LT) to 18.36 µg/l at MSL-2 (HT).

Mercury (Hg): The values ranged from 0.006 µg/l at MSL-1 (HT) to 0.0012 µg/l at MSL-1 (LT) and MSL-2 (HT). The variation of zinc and mercury at all the monitoring locations is shown in **Figure 26**.

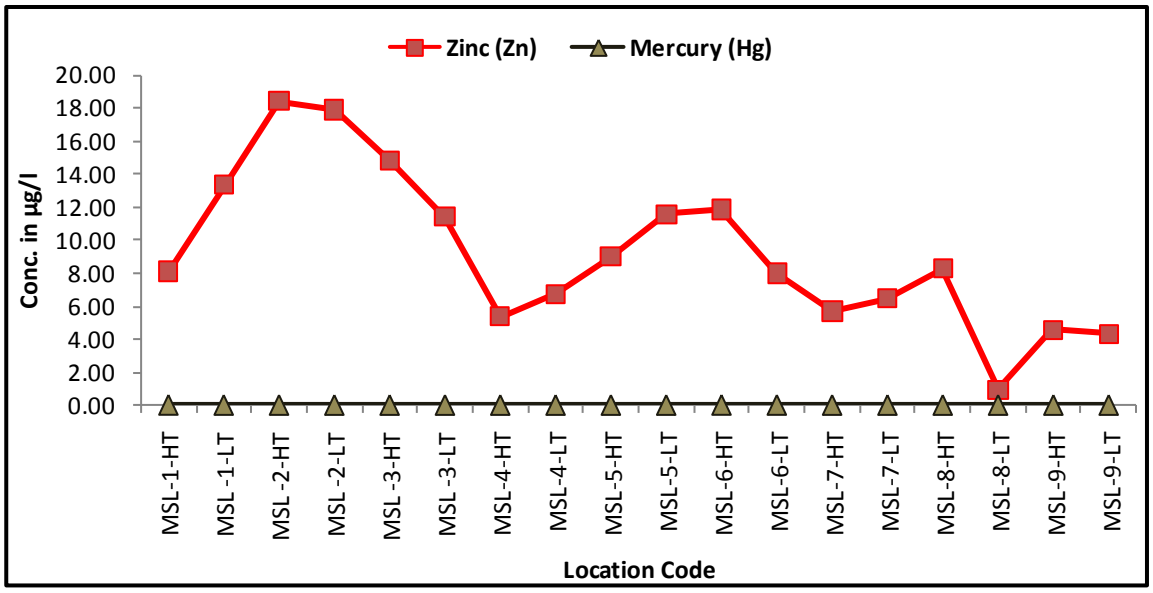


Figure 26: Variations in Zinc and Mercury Concentration

4.3.3 Bed Sediment Quality

4.3.3.1 Physical Parameters

The sediment composition is from sandy to silty in nature. The percentage of sand ranged between 35.50% at MSL-4 during high tide and 61.32 % at MSL-2 during low tide. The silt content varied between 31.92 % at MSL-6 during low tide and 47.00 % at MSL-1 during low tide. The percentage of clay ranged between 4.27 % at MSL-2 during low tide and 26.05 % at MSL-6 during low tide. Oil and grease levels ranged from 206 µg/gm at MSL-9 during high tide to 1418 µg/gm at MSL-4 during high tide. The details of the sediment composition and Oil and Grease are given in the **Table 8** and **Table 9** respectively.

Table 8: Sediment Composition

Location Code	Sand (%)	Silt (%)	Clay (%)	pH	Location Code	Sand (%)	Silt (%)	Clay (%)	pH
MSL-1-HT	45.25	46.44	8.31	8.1	MSL-6-HT	42.19	32.33	25.48	8.1
MSL-1-LT	45.36	47.00	7.63	8.0	MSL-6-LT	42.03	31.92	26.05	8.0
MSL-2-HT	60.71	34.55	4.74	8.2	MSL-7-HT	51.22	42.06	6.72	8.2
MSL-2-LT	61.32	34.41	4.27	8.1	MSL-7-LT	51.14	42.07	6.79	8.3
MSL-3-HT	52.40	41.17	6.43	8.3	MSL-8-HT	38.78	35.63	25.59	8.1
MSL-3-LT	50.79	41.77	7.44	8.0	MSL-8-LT	38.91	35.54	25.55	8.3
MSL-4-HT	35.50	40.18	24.32	7.9	MSL-9-HT	42.42	36.12	21.46	8.1
MSL-4-LT	35.99	40.27	23.74	8.1	MSL-9-LT	42.48	35.32	22.20	8.0
MSL-5-HT	45.58	32.78	21.63	8.2					
MSL-5-LT	46.01	32.37	21.63	8.3					

Table 9: Details of Oil and Grease

Station Code	Oil & Grease (µg/gm)	Station Code	Oil & Grease (µg/gm)
MSL-1-HT	662	MSL-6-HT	1250
MSL -1-LT	912	MSL-6-LT	1136
MSL -2-HT	516	MSL-7-HT	966
MSL -2-LT	438	MSL-7-LT	364
MSL -3-HT	662	MSL-8-HT	668
MSL -3-LT	1288	MSL-8-LT	232
MSL-4-HT	1418	MSL-9-HT	206
MSL-4-LT	1128	MSL-9-LT	442
MSL-5-HT	680		
MSL-5-LT	988		

4.3.3.2 Chemical Parameters

The concentrations of cadmium in sediment ranged between 0.08 µg/gm at MSL-5 during low tide and 4.87 µg/gm at MSL-3 during high tide. The Copper varied between 10.4 µg/gm at MSL-8 during low tide and 60.97 µg/gm at MSL-2 during high tide. The concentrations of Lead varied between 1.76 µg/gm at MSL-8 during low tide and 20.17 µg/gm at MSL-2 during high tide. Iron varied between 2160 µg/gm at MSL-8 during low tide and 19068 µg/gm at MSL-2 during high tide and the zinc varied between 3.88 µg/gm at MSL-8 during low tide and 48.96 µg/gm at MSL-2 during high tide. The concentration of mercury varied between 1 and 47 ng/gm. The total organic carbon in all the sampling locations varied between 3.04 mg/gm at MSL-9 during low tide and 7.73 mg/gm at MSL-2 during low tide. The concentrations of heavy metals and TOC are given in **Table 10**.The variations at all the sampling locations is given in **Figure 27** to **Figure 29**.

Table 10: Heavy Metals in Sediment

Location Code	Parameters (µg/gm)						
	Cd	Cu	Fe	Pb	Zn	Hg (ng/gm)	Total Organic Carbon (mg/gm)
MSL-1-HT	4.80	13.60	5276	9.80	32.32	47	6.00
MSL-1-LT	2.12	51.27	8729	13.73	32.03	6	5.52
MSL-2-HT	3.40	60.97	19068	20.17	48.96	6	6.00
MSL-2-LT	3.74	51.98	18214	16.90	42.84	BDL	7.73
MSL-3-HT	4.87	48.52	14952	11.46	35.40	BDL	4.83
MSL-3-LT	2.28	30.20	8676	5.80	27.04	6	3.59
MSL-4-HT	2.72	24.04	9992	4.52	21.48	BDL	3.73
MSL-4-LT	0.56	34.64	11784	7.84	26.92	6	4.14
MSL-5-HT	0.16	35.04	15700	7.44	35.92	24	6.35
MSL-5-LT	0.08	58.04	16680	12.40	46.20	BDL	5.66
MSL-6-HT	0.20	52.96	17260	9.40	47.24	12	4.28
MSL-6-LT	0.12	32.32	14236	9.80	31.96	6	3.66
MSL-7-HT	0.40	27.76	10368	5.88	22.76	1	4.35
MSL-7-LT	0.24	31.64	9952	5.96	25.84	6	6.97
MSL-8-HT	0.32	38.44	12508	8.40	33.04	BDL	6.56
MSL-8-LT	0.36	10.40	2160	1.76	3.88	BDL	5.45
MSL-9-HT	0.36	26.44	8256	5.24	18.24	6	4.90
MSL-9-LT	0.40	38.40	8064	6.32	17.28	6	3.04

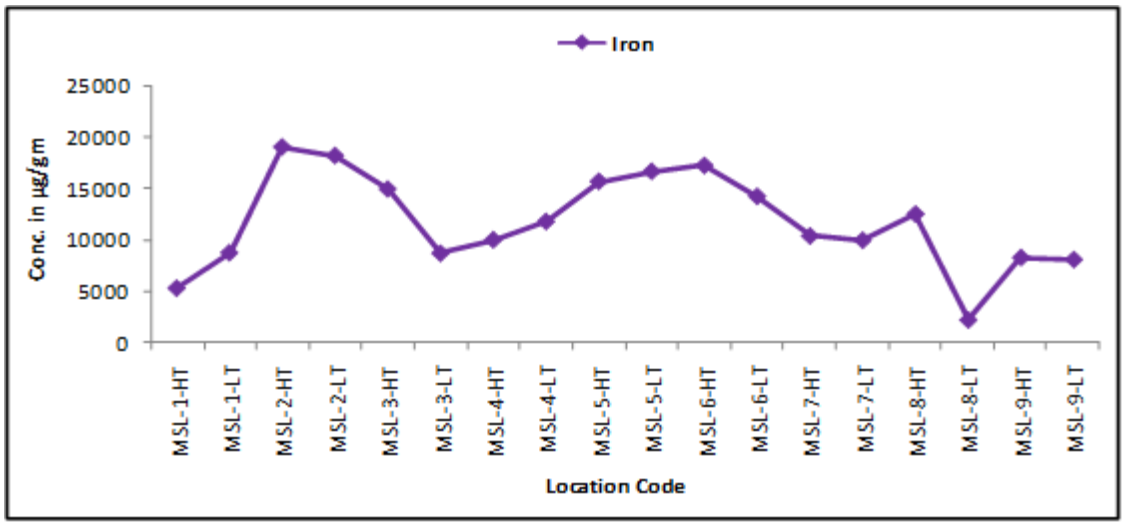


Figure 27: Variation of Iron Concentration in Sediment

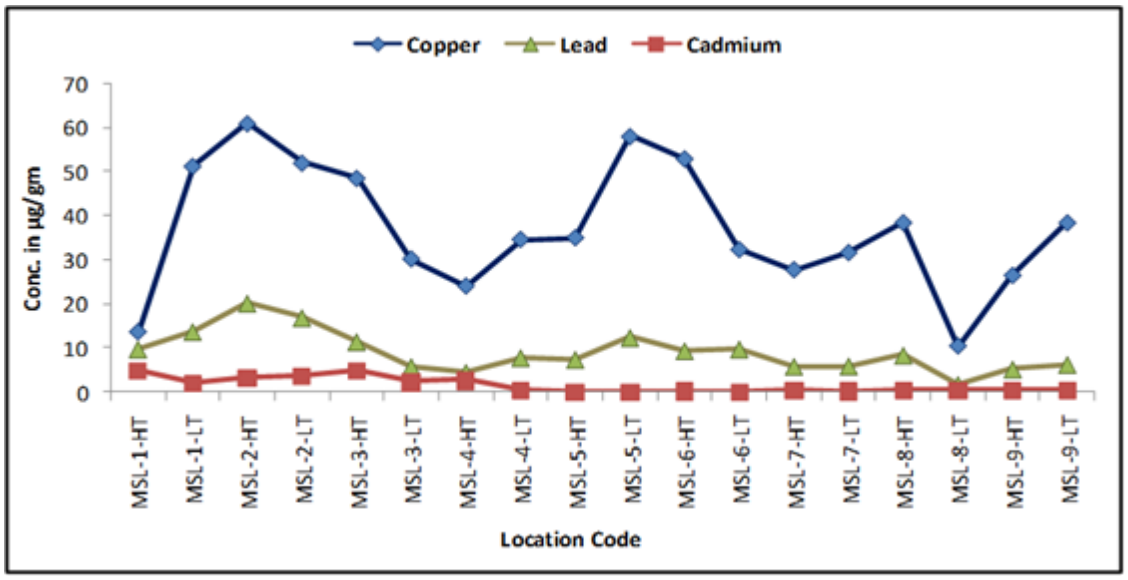


Figure 28: Variation of Copper, Cadmium & Lead in Sediment

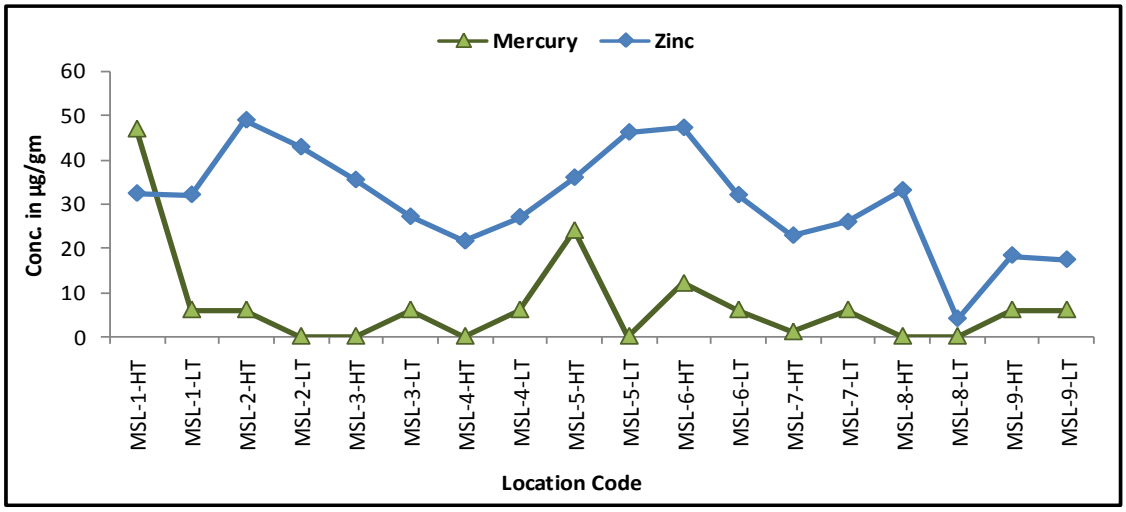


Figure 29: Variation of Zinc and Mercury concentration in Sediment

4.4 General Classification of Marine Life

The general classification of marine life is given below

PLANKTON (Drifting organisms that cannot swim against water currents)	
Whether Plant or Animal	**Size**
Phytoplankton	Picoplankton smallest cells, measuring anywhere from 0.2 – 2 µm (1 µm = 10^{-3} mm or 10^{-6} m). Nanoplankton measures from 2-20 µm. Microplankton measures from 20-200 µm (= 0.2 mm) Mesoplankton measures from 200-2000 µm (= 2 mm) Macroplankton is larger than 2 mm –20 mm (= 2 cm) Megaplankton is larger than 2 cm
Zooplankton	
Bacterioplankton	
NEKTON (free swimmers) This includes fishes, marine mammals and marine reptiles	
Pelagic	Living in the open ocean
Epipelagic	From below the surface to 650 Feet
Mesopelagic	From 650 Feet to 3300feet
Bathypelagic	From 3300 feet to 13,000 feet
Abyssopelagic	From 13,000 feet to 20,000 Feet
Hadopelagic	Beyond 20,000Feet

BENTHOS (Bottom Dwellers)		
Size	**Habitat**	**Mobility**
Microbenthos (Can be observed only with microscope) eg. Bacteria, Foraminerfarans and diatoms. Unicellular Organisms	Epifaunal: live on the surface of the sea bottom. Eg. Starfish, sea anemones, corals, etc	Sedentary: Permanently attached to the substratum and incapable of moving from palce to place, eg. Corals, sea pens, oysters etc
Meiobenthos (multicellular organisms, visible to the naked eye but requires an optical instrument like a magnifying glass to observe finer details)	Infaunal: Capable of burrowing into the substratum eg. Crabs, shrimp bivalves, gastropods etc.	Mobile: Capable of moving from one place to another. Eg. Crabs, bivalves etc
Macrobenthos (Multicellular bottom dwelling organisms that can be clearly seen and observed with the naked eye)		

4.5 Biological Environment/ Status of Marine Life in the Study Area

The details of the various biological parameters monitored and the range of values observed are given in the paragraphs below.

4.5.1 Phytoplankton (Primary Producers) and Primary Productivity

4.5.1.1 Phytoplankton

Surface phytoplankton samples were collected from all nine locations. The population density of phytoplankton ranged between 3,971 cells/L at MSL-8 during low tide to 6,824 cells/L at MSL-6 during high tide. Around 56 species of phytoplankton were recorded from the study area. Among the phytoplankton species, *Pleurosigma normanii, Pleurosigma directum, Cheatoceros curvtus, Coscinodiscus centralis, Cheatoceros affinis, Bacteriostrum comosum, Thalasionema nitzschioides, Ceratium furca, Ceratium tripos, Protoperidinium, Protoperidium depressum,* and *Trichodesmium erythrea,* were found to be present in most of the stations monitored.

The Number of species of Phytoplankton are given in the **Table 11** and graphically shown in **Figure 30**.

Table 11: Number of Species at Each Sampling Location

Location Code	Phytoplankton Density (Nos/l)	Location Code	Phytoplankton Density (Nos/l)
MSL-1-HT	5135	MSL-5-LT	5280
MSL-1-LT	4806	MSL-6-HT	6824
MSL-2-HT	6051	MSL-6-LT	4917
MSL-2-LT	4931	MSL-7-HT	6603
MSL-3-HT	6621	MSL-7-LT	4065
MSL-3-LT	4829	MSL-8-HT	5336
MSL-4-HT	5578	MSL-8-LT	3971
MSL-4-LT	6529	MSL-9-HT	6230
MSL-5-HT	6491	MSL-9-LT	6160

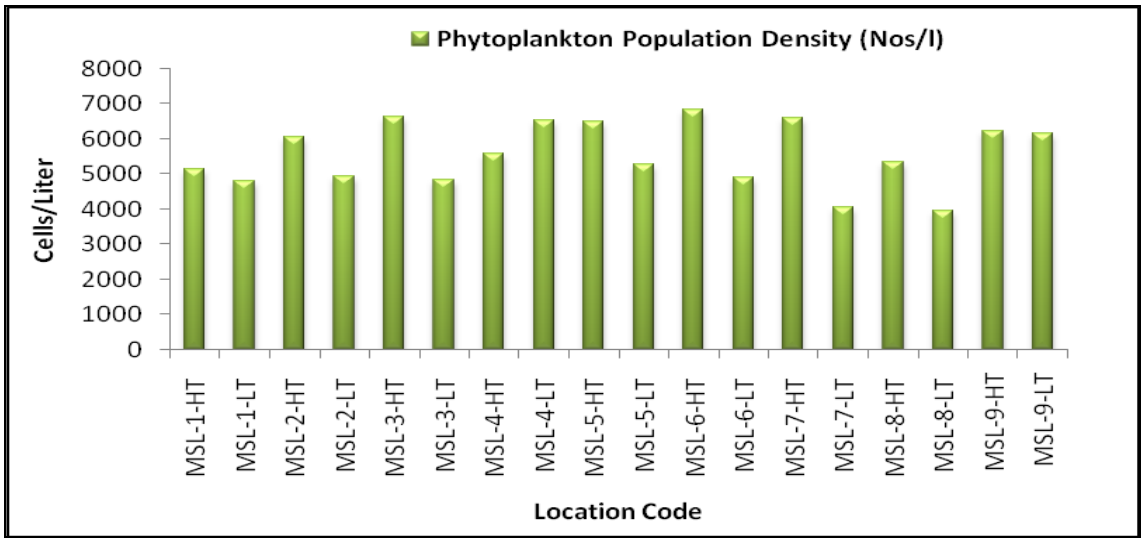


Figure 30: Variations in Phytoplankton Density

4.5.1.2 Primary Productivity

Primary productivity was measured at all locations. The highest level was recorded at MSL-1 (88.58 mg C/m^3/hr) during high tide while the lowest was recorded at MSL- 6 (6.46 mg C/m^3/hr) during low tide.

4.5.1.3 Chlorophyll-a

Chlorophyll-a ranged between 0.26 mg /m^3 at MSL-6 during low tide and 1.19 mg/m^3 at MSL-1 during low tide.

4.5.1.4 Phaeopigment

Phaeopigment ranged between 0.09 mg/m^3 at MSL-6 during low tide and 0.99 mg/m^3 at MSL-9 during low tide.

4.5.1.5 Total Biomass

Total Biomass varied between 13.35 ml/100 m^3 at MSL-9 during low tide and 49.58 ml/100 m^3 at MSL-7 during high tide.

Detailed results for the above parameters are displayed in **Table 12**.

Table 12: Primary Productivity, Chlorophyll-a, Phaeopigment, Total Biomass

S. No.	Location Code	Primary Productivity (mg/C/m^3/hr)	Chlorophyll a (mg/m^3)	Phaeopigment (mg/m^3)	Total Biomass (ml/100 m^3)
1	MSL-1-HT	88.58	1.16	0.58	27.38
2	MSL-1-LT	67.76	1.19	0.76	29.87
3	MSL-2-HT	52.94	0.87	0.41	33.87
4	MSL-2-LT	21.20	0.97	0.43	16.24
5	MSL-3-HT	14.54	0.78	0.31	47.17
6	MSL-3-LT	9.70	0.47	0.28	24.20
7	MSL-4-HT	28.18	0.68	0.33	41.72
8	MSL-4-LT	8.08	0.96	0.41	18.29
9	MSL-5-HT	24.94	0.77	0.26	37.37
10	MSL-5-LT	31.41	0.99	0.59	17.97
11	MSL-6-HT	11.23	0.70	0.38	45.56
12	MSL-6-LT	6.46	0.26	0.09	48.80
13	MSL-7-HT	27.47	0.99	0.56	49.58

S. No.	Location Code	Primary Productivity (mg/C/m³/hr)	Chlorophyll a (mg/m³)	Phaeopigment (mg/m³)	Total Biomass (ml/100 m³)
14	MSL-7-LT	25.86	0.86	0.52	24.40
15	MSL-8-HT	30.50	0.67	0.18	45.32
16	MSL-8-LT	51.41	0.32	0.16	29.54
17	MSL-9-HT	49.79	0.68	0.32	46.36
18	MSL-9-LT	27.55	0.59	0.99	13.35

4.5.2 Zooplankton

Zooplankton abundance varied from a minimum of 3659 cells/m^3 at MSL- 4 (LT) to 9039 cells/m^3 at MSL-8 (HT). Around 55 species of phytoplankton were recorded from the study area. Among the zooplankton *Tintinnopsis tubulosa, Acrocalanus gibber, Euterfina acutifrons, Sagita bifunctata,* Bivalve veliger, Gastropod veliger and copepod naupli were found to be common in all stations.

The Number of species of Zooplankton are given in the **Table 13** and graphically shown in **Figure 31.**

Table 13: Number of Species at Each Sampling Location

Location Code	Zooplankton Density (Nos/m³)	Location Code	Zooplankton Density (Nos/m³)
MSL-1-HT	5980	MSL-6-HT	8003
MSL-1-LT	5183	MSL-6-LT	5880
MSL-2-HT	6141	MSL-7-HT	7150
MSL-2-LT	4198	MSL-7-LT	4817
MSL-3-HT	8563	MSL-8-HT	9039
MSL-3-LT	5472	MSL-8-LT	5140
MSL-4-HT	6207	MSL-9-HT	6200
MSL-4-LT	3659	MSL-9-LT	3969
MSL-5-HT	5684		
MSL-5-LT	3773		

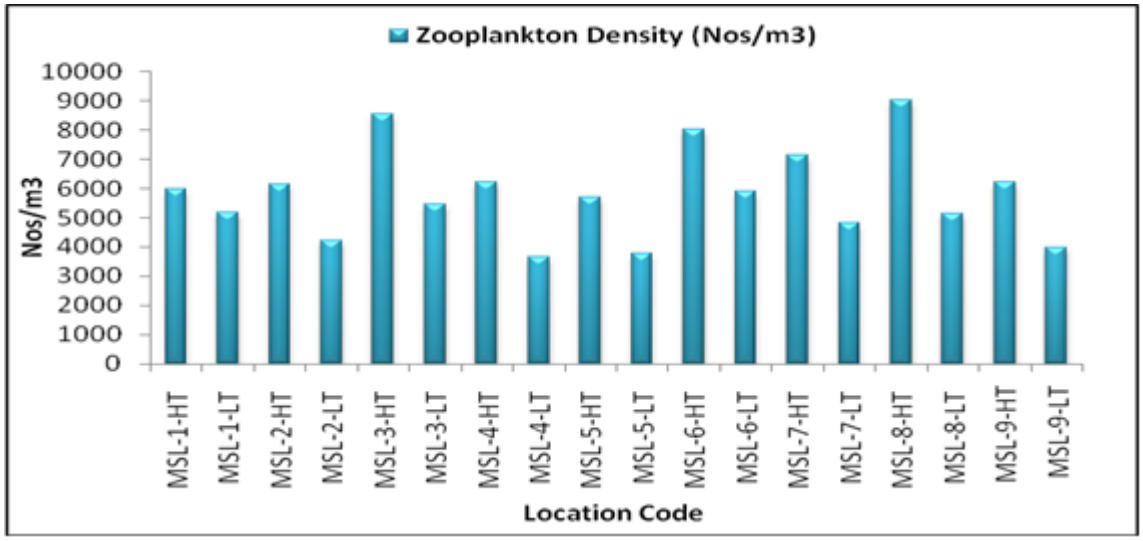


Figure 31: Variations in Zooplankton Density

4.5.3 Benthic Communities (Micro/ Meio/Macro) Both Inter Tidal and Offshore

4.5.3.1 Macrobenthos

Overall macrobenthos was, represented by five taxonomic groups viz., Polychaetes, Bivalves, Amphipods, Gastropods, and Isopods. Around 56 species of macrobenthos was recorded. Minimum Density (550 Nos/m^2) was observed at MSL-3 during high tide. Maximum

density (1025 Nos/m^2) was observed at MSL-8 and MSL-9 during low tide for both the locations. The summary of macrobenthos population is given in the **Table 14** and the variation in macrobenthos population is graphically shown in **Figure 32**.

Table 14: Macrobenthos Population

Location Code	Macro Benthos (Nos/l)	Location Code	Macro Benthos (Nos/l)
MSL-1-HT	675	MSL-6-HT	600
MSL-1-LT	825	MSL-6-LT	900
MSL-2-HT	825	MSL-7-HT	875
MSL-2-LT	875	MSL-7-LT	950
MSL-3-HT	550	MSL-8-HT	850
MSL-3-LT	950	MSL-8-LT	1025
MSL-4-HT	850	MSL-9-HT	800
MSL-4-LT	925	MSL-9-LT	1025
MSL-5-HT	725		
MSL-5-LT	800		

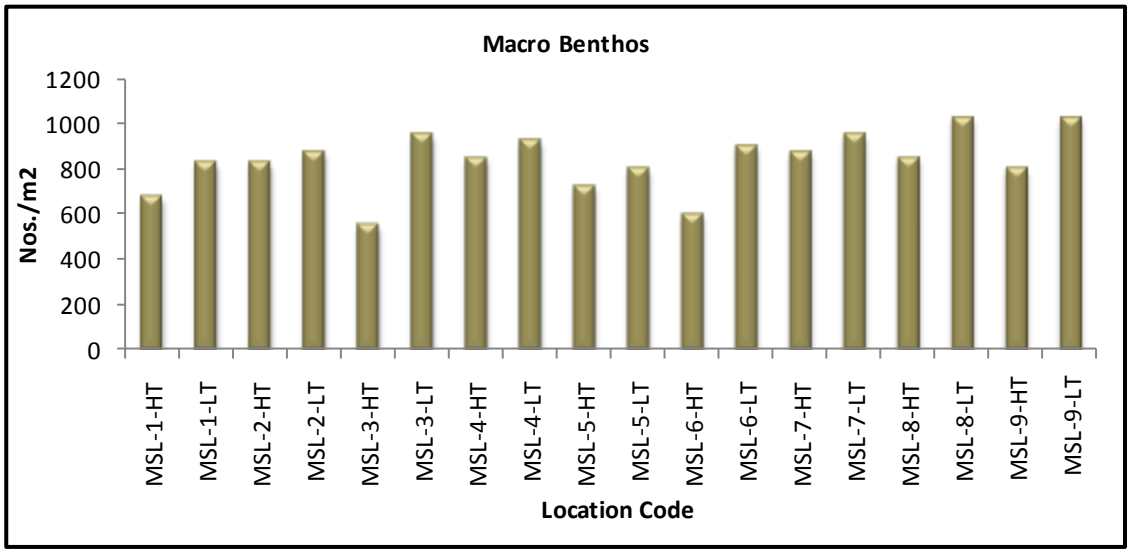


Figure 32: Variations in Population Density of Macrobenthos

4.5.3.2 Meiobenthos

Overall meiobenthos was, represented by 10 taxonomic groups viz., Nematodes, Foraminiferans, Gastrotricha, Cumacea, Oligochaetes, Harpacticoids, Ostrocodes, Archiannelid,Tanaidacea and priapulida during the study. Totally 91 species were recorded. The meiobenthos density was ranged between 186 nos/cm^2 at MSL-1 during high tide and 542 nos/10 cm^2 at MSL-9 during low tide. The Summary of meiobenthos population are given in the **Table 15** and the variation in meiobenthos population is graphically shown in **Figure 33**.

Table 15: Meiobenthos Population

Location Code	Meio Benthos (Nos/l)	Location Code	Meio Benthos (Nos/l)
MSL-1-HT	186	MSL-6-HT	268
MSL-1-LT	288	MSL-6-LT	454
MSL-2-HT	205	MSL-7-HT	195
MSL-2-LT	373	MSL-7-LT	351
MSL-3-HT	238	MSL-8-HT	252
MSL-3-LT	415	MSL-8-LT	421
MSL-4-HT	209	MSL-9-HT	326

MSL-4-LT	363	MSL-9-LT	542
MSL-5-HT	286		
MSL-5-LT	437		

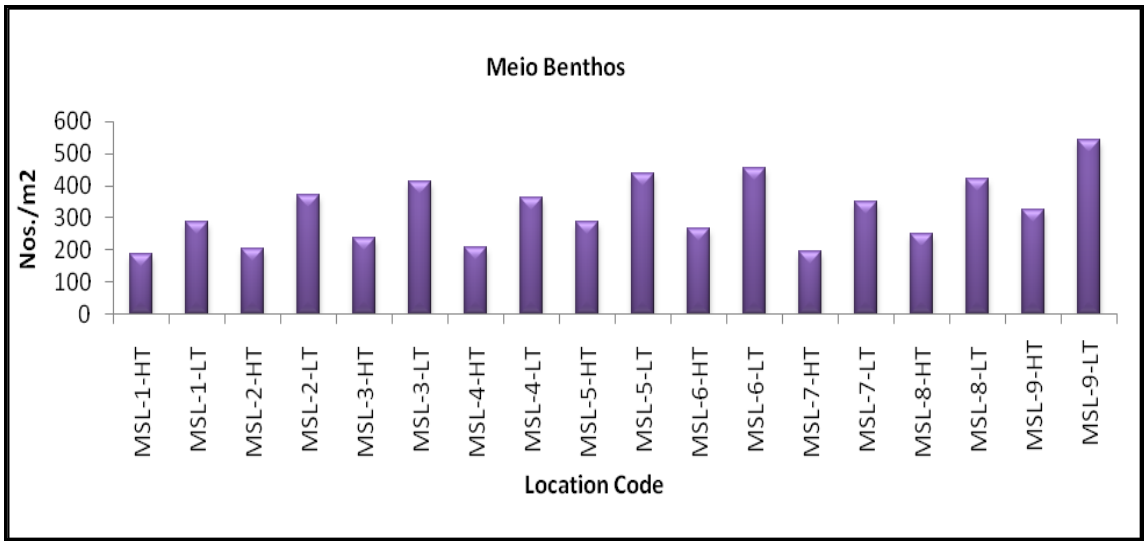


Figure 33: Variations in Population Density of Meiobenthos

4.5.4 Marine Microbial Population

The indicator and pathogenic bacteria isolated from water and sediment samples collected from the marine monitoring locations are described below.

Marine Water Sample's Microbial Load	**Concentration (CFU/ml)**		**Location and Tide**	
Indicator bacteria	**Minimum**	**Maximum**	**Minimum**	**Maximum**
Escherichia coli (ECLO)	18 x 101	20 x 10^4	MSL-2 during low tide	MSL- 1 during high tide
Faecal Coliform (FCLO)	47 x 10^1	52 x 10^4	MSL- 2 during low tide	MSL- 1 during high tide
Pseudomonas aeurginosa (PALO)	10 x 10^1	18 x 10^4	MSL-2 during low tide	MSL-1 during high tide
Proteus-Klebsiella (PKLO)	18 x 10^1	16 x 10^4	MSL-2 during low tide	MSL-8 during high tide
Streptococcus faecalis (SFLO)	12 x 10^0	21 x 10^2	MSL-5 during low tide	MSL-8 during high tide
Shigella (SHLO)	8 x 10^0	18 x 10^3	MSL-2 during low tide	MSL-4 during high tide
Salmonella (SLO)	5 x 10^0	18 x 10^3	MSL-7 during low tide	MSL-6 (HT) and MSL-8 (LT)
Total Coliform (TC)	90 x 10^1	16 x 10^6	MSL-2 during low tide	MSL-4 during high tide.
Total Viable Count -Total Heterotrophic Bacteria (TVC)	20x 10^2	31 x 10^6	MSL-2 during low tide	MSL-4 during high tide
Vibrio cholera (VCLO)	10 x 100	23 x 103	MSL-5 during low tide	MSL-1 during high tide
Vibrio parahaemolyticus (VPLO)	13 x 100	28 x 103	MSL-5 during low tide	MSL-1 during high tide
Marine Sediment Sample's Microbial Load	**Concentration (CFU/mg)**		**Location and Tide**	
Indicator bacteria	**Minimum**	**Maximum**	**Minimum**	**Maximum**
Escherichia coli (ECLO)	16 x 10^2	34 x 10^5	MSL-2 during low tide	MSL- 8 during high tide
Faecal Coliform (FCLO)	33 x 10^2	51 x 10^5	MSL- 2 during low tide	MSL- 1 during high tide
Pseudomonas aeurginosa (PALO)	20 x 10^2	20 x 10^5	MSL-2 during low tide	MSL-1 and MSL-8 during high tide
Proteus-Klebsiella (PKLO)	22 x 10^2	29 x 10^5	MSL-2 during low tide	MSL-8 during high tide
Streptococcus faecalis (SFLO)	18 x 10^0	22 x 10^3	MSL-2 during low tide	MSL-8 during high tide
Shigella (SHLO)	15 x 10^1	26 x 10^4	MSL-2 during low tide	MSL-1 during high tide
Salmonella (SLO)	11 x 10^1	25 x 10^4	MSL-2 during low tide	MSL-9 during high tide
Total Coliform (TC)	15 x 10^3	21 x 10^6	MSL-2 during low tide	MSL-1 during high tide.
Total Viable Count -Total Heterotrophic Bacteria (TVC)	38x 10^3	43 x 10^6	MSL-2 during low tide	MSL-1 during high tide
Vibrio cholera (VCLO)	13 x 10^1	28 x 10^4	MSL-2 during low tide	MSL-8 during high tide
Vibrio parahaemolyticus (VPLO)	20 x 10^1	31 x 10^4	MSL-2 during low tide	MSL-8 during high tide

Bacterial densities were higher in the sediment samples than the water samples. Higher bacterial population in sediments than water is generally due to the rich organic content of the former and the lesser residence time of microorganism in the water than the sediments

4.5.5 Fishes

4.5.5.1 Details of Fishing Villages and Fish Landing Centres

There are no major fishing harbours in the study area. The fishing villages/fish landing centres in the study area and their proximities from the proposed port site are given in **Table 16.** Fishing village map is shown in **Figure 34**.

Table 16: Details of Fish Landing Centres/ Fishing Villages within the Study Area

S. No	Name of the Fish Landing Centre / Fishing Village	Distance from Port (km)	No. of Boats	Population
1.	Redi	1.45	22	218
2.	Keruvada	2.9	Data Not Available	3594
3.	Shiroda	4.3	129	1421
4.	Aronda	4.1	62	422
5.	Adwali Tank	6.0	8	193
6.	Mochemad	7.3	13	187
7.	Muth	8.6	64	803
8.	Querim	3.3	10	198
9.	Harmal	9.4	42	532

Source: Fishery Census of India (2003) & Marine Fisheries Profile of Goa (2005)

A list of fishes either trapped or caught by local fisherman from the fresh water bodies of the study area and fish production in study area are given in **Table 17** and

Table 18..

Table 17: List of Fresh Water Fishes Reported from Rivers in Study Area

S. No	Scientific name	S. No	Scientific name
1.	*Balitora brucei*	15.	*Labeo nigrescens*
2.	*Barilius canarensis*	16.	*Labeo potail*
3.	*Barilius evezardii*	17.	*Mesonemacheilus guentheri*
4.	*Barilius gatensis*	18.	*Nemacheilus anguilla*
5.	*Ctenopharyngodon idella*	19.	*Oreochromis mossambica*
6.	*Cyprinus carpio communis*	20.	*Poecilia (Lebistes) reticulata*
7.	*Danio fraseri*	21.	*Puntius arenatus*
8.	*Dayella malabarica*	22.	*Puntius sahyadriensis*
9.	*Etroplus suratensis*	23.	*Puntius sarana subnasutus*
10.	*Gambusia affinis*	24.	*Rohtee ogilbii*
11.	*Garra bicornuta*	25.	*Salmostoma novacula*
12.	*Garra surendranathanii*	26.	*Schistura sinuatus*
13.	*Glyptothorax lonah*	27.	*Xiphophorus helleri*
14.	*Heteropneustes longipectoralis*		

Table 18: Fish Landing Centre wise – Fish Production

Name of Fish Landing Center	Fish Landing Center wise - Fish Production (In Metric Ton)						
	2005	2006	2007	2008	2009	2010	2011
Muth Ubhadanda	184	326	476	472	472	975	627
Mochemad	35	53	36	56	64	68	46
Aravli-Tank	45	108	109	130	145	215	141
Shironda	259	390	646	624	522	1242	798
Redi	0	0	0	0	80	151	122

Name of Fish Landing Center	Fish Landing Center wise - Fish Production (In Metric Ton)						
	2005	2006	2007	2008	2009	2010	2011
Aronda	Data Not Available						
Querim							
Harmal							
Keruvada							

Source: Fish production report 2011-12, fisheries dept, GoM

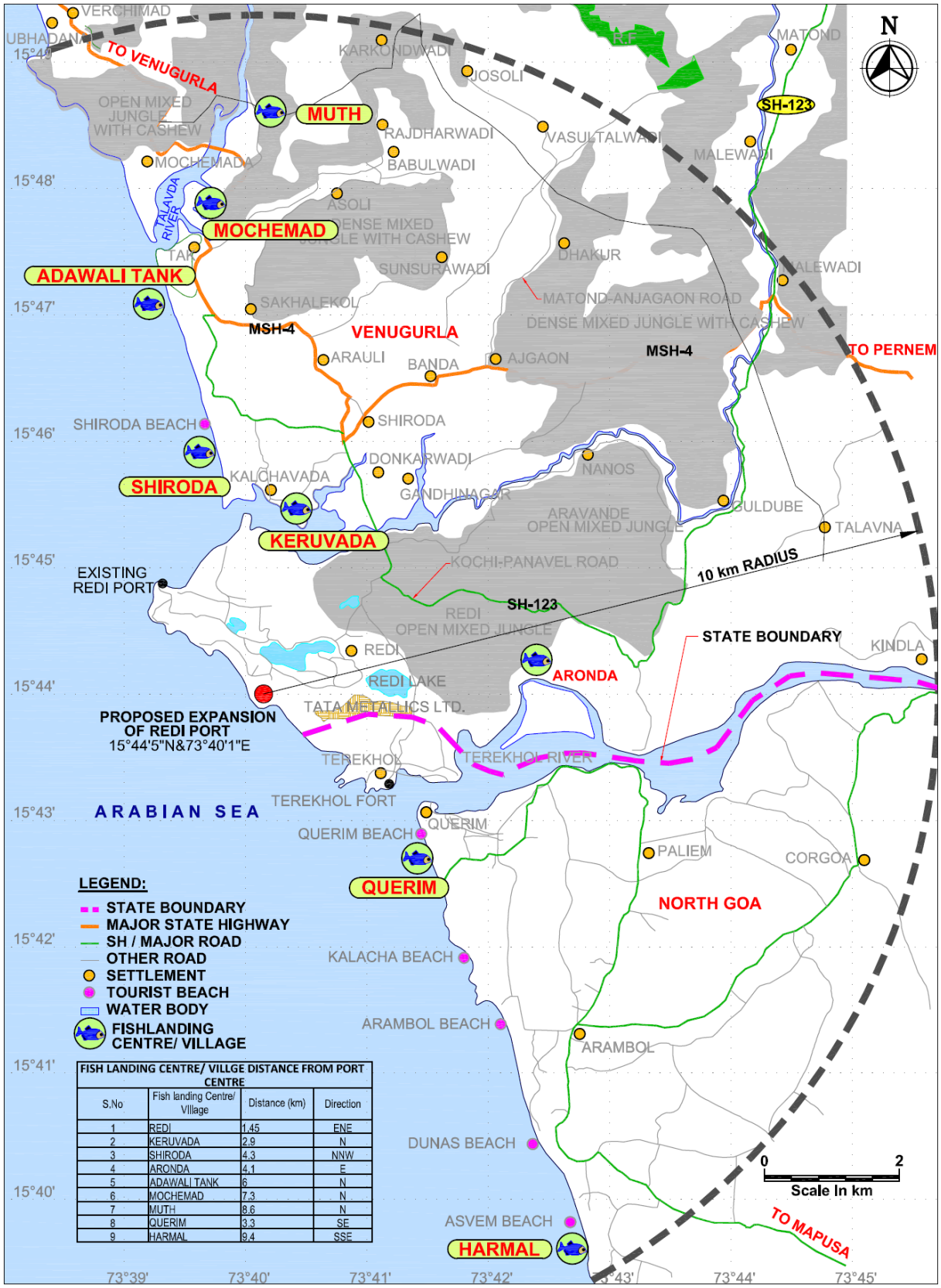
4.5.5.2 Details of Fishing Villages / Fishing Routes & Local Fishing Activities

Based on the latest secondary data available and other related studies and reports, details of fishing activities are summarized in **Table 19**. The table covers details of house hold in the villages, active population in fishing activities and also provides types of boats used for fishing activities in the study area villages. Generally, fishing is undertaken in conventional boats between depth of 5-15m in most of study area villages.

Table 19: Details of Fish Landing Centres/Villages within the Study Area

S. No	Name of the Fish Landing Centre / Fishing Village	Proximity from Port Site (km)	No of Total House hold	Total Members in HH (Population)	Population engaged in Fishing	Population engaged in associated industry	Total Members in Type of Fishing Industry	Mechanical boats	Traditional crafts		No. of Boats	Total No Fishing Nets
									Motorised	Non Motorised		
1	Shiroda	3.6	227	1421	339	230	569	6	91	32	129	2497
2	Aronda	4	96	422	143	96	239	1	5	56	62	1553
3	Adwali Tank	6	51	193	63	52	115	Nil	5	3	8	530
4	Mochemad	7.6	44	187	48	67	115	1	2	10	13	489
5	Muth	8.5	159	803	186	172	358	4	46	14	64	2195
6	Redi	1	47	218	71	24	95	Nil	4	18	22	973
7	Querim	3.4	43	198	37	34	71	Nil	Nil	10	10	158
8	Harmal	9.4	88	532	126	104	230	Nil	40	2	42	497
9	Keruvada	2	-	3594	Data Not Available							

Source: Fishery Census of India (2003) & Marine Fisheries Profile of Goa (2005)



FISH LANDING CENTRE/ VILLGE DISTANCE FROM PORT CENTRE

S.No	Fish landing Centre/ Village	Distance (km)	Direction
1	REDI	1.45	ENE
2	KERUVADA	2.9	N
3	SHIRODA	4.3	NNW
4	ARONDA	4.1	E
5	ADAWALI TANK	6	N
6	MOCHEMAD	7.3	N
7	MUTH	8.6	N
8	QUERIM	3.3	SE
9	HARMAL	9.4	SSE

Figure 34: Fishing Villages in Study Area

4.5.6 Status of Beach/Marine Flora and Vegetation in Study Area

Along the narrow sandy beaches, Beach Vitex (*Vitex rotundifolia*), *Ipomea pes-caprae*, and *Spinifex littorius* were common. Beyond the HTL, there are Coconut trees, Cashew nut, Mango*, Calophyllum inophyllum, Chromolaena odorata,Calotropis procera, Neptunia triquetra, Crotalaria verrucosa, Crotalaria pallida, Zornia gibbosa* are observed. There are no Mangroves or mangrove forests within the core area or proposed project area (**Exhibit 1**).

Exhibit 1: Vegetation in Core Area

Buffer/Study Area: There are no biosphere reserves or national parks or sanctuaries or other protected areas within 10 Km radius of core area. Except for the presence of a few mangroves represented by *Avicennia officinalis, Excoecaria agallocha* and *Rhizophora mucronata* in and along the banks of the Terekhol River and Keruvada Creek, there are no mangrove forests within the study area. Many of the *Avicennia officinalis* plants have attained a height of about 4.5 to 6.0 m while the *Excoecaria agallocha* plants were short but healthy. *Rhizophora mucronata* on the other hand was represented by a few scattered and isolated plants along the banks of the Terekhol River and Keruvada creek within a distance of about 1.0 Km from the coast of the Arabain Sea. Along with the three mangrove species, *Acanthus ilicifolius* and *Acrostichium aureum* in isolated patches were also noticed in association with the mangroves. Mangroves and their associated species are observed near Keruvada Creek located at 3.6 km towards north and Terekhol River located at 3.3 km towards SE[1] (**Exhibit 2**).

Exhibit 2: Mangroves near Keruvada Creek and Terekhol River

4.5.6.1 Mangroves

Mangroves and Mangrove associated species found within a distance of 10 Km from the core area or propose project area. Mangroves and Mangrove Associated Species in Study Area is given in **Table 20**.

Table 20: Mangroves and Mangrove Associated Species in Study Area

Scientific name	Family	Local /Common name

[1] Distances mentioned are along the coast from port boundary

Scientific name	Family	Local /Common name
Mangroves		
Avicennia officinalis	Avicenniaceae	Uppatty
Excoecaria agallocha	Euphorbiaceae	Kannampotti, Kammatty
Rhizophora mucronata	Rhizophoraceae	Peekandal
Mangrove Associates and Coastal Plant species found in study Area		
Acanthus ilicifolius	Acanthaceae	Chully
Acrostichum aureum	Acrostichiaceae	Fern
Alternanthera sessilis	Amaranthaceae	Sessile joyweed
Aniseia martinicensis	Convolvulaceae	White jacket,
Ardisia littoralis	Myrsenaceae	
Bacopa monnieri	Scrophulariaceae	Water hyssop
Caesalpinia crista	Caesalpiniaceae	Seabean
Caesalpinia nigra	Caesalpiniaceae	
Canavalia maritima	Fabaceae	Beach Bean
Cayratia trifolia	Vitaceae	Choorivalli
Clerodendron inerme	Verbenaceae	Puzhamulla
Crinum defixum	Amaryllidaceae	
Cyperus arenarius	Cyperaceae	River Cyperus
Derris scandens	Fabaceae	Jewel wine
Derris trifoliata	Fabaceae	Ponnam valli
Dolichandrone spathacea	Bignoniaceae	Mangrove trumpet tree
Eclipta prostrata	Asteraceae	False Daisy
Eranthemum capense	Acathaceae	
Fimbristylis ferruginea	Cyperaceae	Rusty sedge
Fimbristylis cymosa	Cyperaceae	Button sedge
Fimbristylis polytrichoides	Cyperaceae	Rusty sedge
Flagellaria indica	Flagellariaceae	Climber
Helianthus debilis	Asteraceae	Beach Sunflower
Hemigraphis latebrosa	Acathaceae	-
Hibisus tiliaceous	Malvaceae	-
Hyptis suaveolens	Lamiaceae	American Mint
Ipomoea campanulata	Convolvulaceae	Bindweed
Ipomoea pes-capre	Convolvulaceae	Beach Morning Glory
Mariscus javanicus	Cyperaceae	
Martynia annua	Martyniaceae	Tiger's Claw
Melastoma malabathricum	Melastomaceae	Athirani
Pandanus fascicularis	Pandanaceae	Thazha
Pedalium murex	Pedaliaceae	-
Phragmites karka	Poaceae	Karkas
Pogostemon mysosuroides	Lamiaceae	-
Premna serratifolia	Verbenaceae	-
Samadera indica	Simaroubaceae	-
Sauropus bacciformis	Phyllanthaceae	-
Scaevola sericea	Goodeniacea	Beach naupaka
Sesamum alatum	Pedaliaceae	-
Sphenoclea zeylanica	Sphenocleaceae	Chickenspike
Spinifex littoreus	Poaceae	Whiskers of Ravana
Stachytarpheta jamaicensis	Lamiaceae	Blue Porterweed
Thespesia populnea	Malvaceae	Portia Tree
Tylophora tetrapetala	Asclepiadaceae	-
Vitex rotundifolia	Verbenaceae	Beach Vitex
Wedelia chinensis	Asteraceae	Chinese Wendelia
Zoysia matrella	Poaceae	Manila Grass

4.5.7 Other Marine Sensitive Species in Study Area

Proposed port location does not contain environmentally sensitive areas such as National parks / marine parks, sanctuaries, wildlife habitats, corals / coral reefs, Seaweed/ Sea Grass beds. It also does not include breeding and spawning grounds of fish, nesting grounds of turtles, foraging grounds for Marine Mammals and other marine life.

4.5.7.1 Turtle Nesting

The turtle nesting in the proposed project site was not recorded. In Sindhudurg district, Kunkeshwar beach and Tarkarli beach which are ~70km and ~35km from the proposed project site used to have relatively good nesting of Olive Ridleys prior to the increase of tourism activities in those areas.

4.5.7.2 Coral/Coral Reefs

It is observed that, there are no coral reefs existing in the proposed project site as well as study area. Corals reefs that have been reported from Vengurla Rock Islands, Malvan and Angria Bank in Sindhudurg district. Of these sites, corals are most abundant at Malvan and along a shallow sunken atoll on the continental shelf in the area called the Angria Bank. Eleven species of corals are reported from Malvan waters (ICMAM Project Directorate Report, 2002). Marine Sensitive Areas In and Around Proposed Project Expansion Area are shown in **Figure 8**.

4.5.7.3 Marine Mammals

No marine mammals were recorded in the study area during the survey and also there is no record of this group in the previous literatures.

4.5.7.4 Seaweed/ Sea Grasses

No major Seaweed and Sea grass species are reported in the proposed project area. Critical Habitat Information System of Malvan-Dept. of Ocean Development (2001) reported a total of 32 species of macro-algae and one species of sea grass from the study area. There were 12 species of Rhodophyceae, 11 species of Chlorophyceae and 9 species of Phaeophyceae. The dominant species of seaweeds were *Caulerpa peltata*, *Sargassum illicitolium*, *Amphiroa tragilissima*, *Padina tetrastomatica*, *Spatoglossum asperum* and *Stocheosporum marginatum*.

4.5.7.5 Avifauna

No major bird species are reported in the proposed project and study area. The avifauna of Sindhudurg district is rich, with 121 species including 66 residents, 24 true migrant and 28 residents with migratory population. Vengurla Rock is an Important Bird Area (IBA) site and has a good population of edible-nest swiftlet (*Aerodramus fuciphagus*) which is located at 25 km from Redi port.

5 Impact, Mitigation, Conservation and Management Plan

The potential impacts on the marine environment due to the development of berths for handling of dry bulk cargo and general cargo have been identified considering the nature and extent of the activities associated with the project implementation and operation and presented in detail in the EIA reports. To mitigate likely environmental impacts during construction and operation phases due to landside and marine side activities, suitable

mitigation measures are incorporated as a part of planning process. The Marine Biodiversity Management and conservation Plan along with specific mitigation measures are provided in Error! Reference source not found..

- Marine Environment - Mitigation measures
- Atmospheric Environment - Mitigation measures

Outline of Proposed Conservation Measures

WATER QUALITY MAINTENANCE AND PROTECTION TO MARINE ORGANISMS
❖ Turbidity levels will be maintained as to the baseline data by continuous monitoring and proper care by way of stopping the activities whenever there is increase in turbidity by way of land sliding/bottom turbulence so as to avoid any impact either to water quality or to marine organisms
❖ Discharge of waste into the sea will be prohibited
❖ Ensure that slop tanks will be provided to barges/ workboats for collection of liquid/ solid waste
❖ Marine environmental monitoring as per environmental monitoring programme
❖ Dredge Management Programme shall include measures to avoid entrapment of macro marine fauna.
❖ Care will be taken to prevent the contaminated run-off from the construction site to the nearby natural streams, if any
❖ Optimized utilization of the water
❖ Wastewater and sewage generated shall be treated in septic tanks with soak pits without draining into the marine environment
❖ Discharge of treated wastewater as per marine discharge standards
❖ Ships will be prohibited from discharging wastewater, bilge, oil wastes, etc. into the near-shore as well as harbour waters by adopting International Convention for the Prevention of Pollution from Ships (MARPOL) 1974/1978, Consolidated Edition, IMO, 1991, including 1992 amendments to Annex 1 and 2002 amendments
❖ Ships shall conduct ballast water exchange at least 200 nautical miles from the nearest land and in water at least 200 m in depth prior to calling at port.
❖ Floating, marking buoys, Signboards will be displayed to educating the seafarers about the orientation of approach channel
❖ Acoustic Barriers and Enclosures and the conveyor galleries will be covered.
❖ Regular Interactions shall be initiated with the fishing community and conflicts, if any with fishing community shall be amicably resolved in all cases.
❖ Shoreline Protection Techniques such as Sand by passing if required will be carried.
STOCKING AND MAINTENANCE OF COAL AND IRON ORE
❖ Scientific and regulated stacking of coal and Iron ore
❖ Provision of paved surfaces at handling places

- ❖ Periodic cleaning of spills, if any
- ❖ Greenbelt Development
- ❖ Use of multi-purpose Cranes such as Gantry Type and dust suppression system etc.,
- ❖ Use of tarpaulin covers and speed regulations for vehicles engaged in transportation

AWARENESS PROGRAMMES ON CONSERVATION OF MARINE DIVERSITY

- ❖ Awareness programmes for local fisher population, company labourers and employees shall be undertaken to highlight bio-diversity conservation.
- ❖ Awareness regarding fisheries related issues among fishing community.
- ❖ Creation of awareness among villagers and fishermen shall be undertaken as part of conservation measures

6 Marine Environment Monitoring Programme

It is suggested that a continuous monitoring programme covering all the seasons on various aspects of the coastal environs need to be undertaken by a competent organisation available in the State or by entrusting to the National Institutes/renowned Universities with rich experiences in marine science aspects. The monitoring should cover various physico-chemical parameters coupled with biological indices such as microbes, plankton, benthos and fishes on a periodic basis during construction and operation phase of the project. Any deviations in the parameters shall be given adequate care with suitable measures to conserve the marine environment and its resources. Further the data collected shall also be compared with secondary data available for the Maharastra coast so as to arrive at a meaningful management plan.

The proposed environmental monitoring program is outlined below:

Table 6-1: Environmental Monitoring Program

Environmental Attributes	Parameters to be monitored	No. of Sampling Locations	Frequency of Monitoring	Standards Methods for Sampling & Analysis	Compliance
Construction Phase					
Marine Water Quality	Physical, Chemical and Biological In addition to the above, Alpha, Beta emitters	Six (06) • Dredge Spoil Disposal Area (during dumping) • Approach Channel • South of Southern Breakwater • Harbour basin • Near Terekhol river mouth • Keruvada	Once a month both for low tide and high tide periods during construction period	Bottom sampler (and analysis by using standard methods.	Primary water quality standards for coastal water (SW –IV)

Environmental Attributes	Parameters to be monitored	No. of Sampling Locations	Frequency of Monitoring	Standards Methods for Sampling & Analysis	Compliance
		Creek			
Plankton and Benthic Communities	Phytoplankton, Zooplankton and Benthic Communities	Six (06) • Dredge Spoil Disposal Area (during dumping) • Approach Channel • South of Southern Breakwater • Harbour basin • Near Terekhol river mouth • Keruvada Creek	Once a month during construction	Plankton net of diameter of 0.35 m, No.25 mesh size 63 μ and analysis by using standard methods.	Baseline marine Plankton and Benthic Community data
Sediment Quality	Physical, Chemical and Biological	Six (06) • Dredge Spoil Disposal Area (during dumping) • Approach Channel • South of Southern Breakwater • Harbour basin • Near Terekhol river mouth • Keruvada Creek	Once a month during construction	Grab Sampling and analysis by using standard methods	Baseline marine sediment quality data
Coastal Shoreline	Erosion/accretion	7 km stretch on either side of port boundary	Twice a Year	GIS, remote sensing techniques and ground verification	Satellite imagery shall be obtained before commencing the construction activity. CRZ Map/CZMP of project location
Bathymetry (During Dredging and Disposal)	Changes in Sea Bed Levels	Dredge Spoil Disposal Site	Once in Quarter	Standard Bathymetric Survey using The ECO Sounder: ODOM Echotrac CVM dual frequency Echo Sounder	Baseline Bathymetry
Operation Phase					
Marine Water	Physical, Chemical	Five (05)	Once a	Bottom sampler	Primary water quality

Environmental Attributes	Parameters to be monitored	No. of Sampling Locations	Frequency of Monitoring	Standards Methods for Sampling & Analysis	Compliance
Quality	and Biological In addition to the above, Alpha, Beta emitters	• Approach Channel • South of Southern Breakwater • Harbour basin • Near Terekhol river mouth • Near Keruvada Creek	month	(and analysis by using standard methods.	standards for coastal water (SW –IV)
Plankton and Benthic Communities	Phytoplankton, Zooplankton and Benthic Communities	Five (05) • Approach Channel • South of Southern Breakwater • Harbour basin • Near Terekhol river mouth • Near Keruvada Creek	Once a month	Plankton net of diameter of 0.35 m, No.25 mesh size 63 μ and analysis by using standard methods.	Baseline marine Plankton and Benthic Community data
Sediment Quality	Physical, Chemical and Biological	Five (05) • Approach Channel • South of Southern Breakwater • Harbour basin • Near Terekhol river mouth • Near Keruvada Creek	Once a month	Grab Sampling and analysis by using standard methods	Baseline marine sediment quality data
Coastal Shoreline	Erosion/accretion	7 km stretch on either of port boundary	Twice a Year	Satellite imagery, GIS, remote sensing techniques and ground verification	Baseline Satellite imagery procured before commencement of construction/ Shoreline from Survey of India Topo sheet. CRZ Map/CZMP of project location
STP - Inlet & Outlet	Physical, Chemical and Biological Parameters	Two (02) STP Inlet/ outlet	Daily	Grab Sampling and analysis by using standard methods	As per MPCB stipulation in CTE/CTO.

7 Alternative and Additional Livelihood Options

In order to conserve the coastal waters adjacent to the project site area and to enhance the livelihood options of the fishermen communities located in and around this area, a holistic environmental management plan with adequate conservation measures, judicious utilisation of marine bio-resources besides novel technologies for adoption by fishermen so as to enhance the additional and alternate livelihood option are outlined below;

7.1 Marine Ornamental Fishes

Technologies are available nowadays from the CMFRI, Mandapam as well Centre of Advanced Study in Marine Biology, Annamalai University for promotion of culture of marine ornamental fishes such as Clowns, Damsels, ornamental shrimps etc., The proponent can establish a marine ornamental fish village by creating a common facility for the supply of filtered disease free sea water as well the other facilities in the fishermen groups for practising the culture of ornamental fishes including breeding, rearing and development of saleable adult fishes. This will provide ample opportunity for the fisherwomen to have additional livelihood options in addition to routine fishing and other related activities

7.2 Seaweed culture

The Red seaweed *Eucheuma cottoni* (*Kappaphycus alvarezii*) has the promise to culture in the shallow coastal waters including creeks and estuaries as demonstrated in the Tamilnadu coast can also be undertaken as livelihood options. This can be carried out both by rope culture and bamboo raft culture. The technologies are already perfected by the CASMB, AU and they may offer adequate training for this purpose.

7.3 Mud crab fattening

Water crab or post moult crab represents a stage in crab's life cycle. During the catch the fishers used to get water crabs every day which fetches cheaper rates as it contains more of water than flesh. This reduces the profit of the fishers. Instead, in the present intervention, the post-moult or water crabs caught by the fishers would be kept in captivity (cage/pen) for a short period of 20- 30 days until they 'flesh out' or normal crabs. Since the fattening period is less, the crabs can be fed with dry and trash fish which is available in the same location. Multiple market and buy-back arrangement will be made with crab collector, buyers and exporters, so that the regular raw material flow will be facilitated.

7.4 Sea cage Culture of Finfish

Aquaculture practices offer best economic returns to the fish farmers and help to reduce fishing pressure from the wild. In Sindhudurg coast, fish culture is not popular and therefore there is lot of scope for aquaculture in the area. The government may encourage the aquaculture practices of finfish especially Seabass (*Lates calcarifer*) and Cobia (*Rachycentron canadum*) in the area. Seabass and cobia have great demand in the international and domestic markets. Sea cage culture of these finfishes will bring in rapid changes in terms of fish production and economic activity of fishermen in the area. Training has to be imparted to the fisher-folk for the finfish culture.

7.5 Sea cage Fattening of Lobster

The small lobsters caught during the lobster collection can be grown in sea cages in the area for fattening to marketable size. The Central Marine Fisheries Research Institute (CMFRI),

Kochi has successfully demonstrated sea cage culture of lobsters in several fishing villages on participatory sea cage farming including Kanyakumari fishers.

7.6 Rope/ Raft culture of Mussel

Mussel naturally attach to any substrate. Rope and raft culture techniques have been perfected in India. The yield through rope and raft culture will be many folds. Rope culture of mussel is widely adopted in Northern Kerala. The mussel grows to 80-100 mm size within 6 months of culture period. The commercial mussel culture practices can be encouraged in the coastal area.

7.7 Installation of Solar Drier

The sun drying of fishes is one of the most important and famous preservative techniques. The solar driers are designed to be suitable for all seasons; it dries fast in summer and dry safe in winter and rainy seasons. The dryers are atomized and user-friendly which finds more utility since these driers are functioning out of Radiation Principle. The product dried will never lose its natural characters besides the natural colours and vitamins will be protected.

Driers can be designed according to the need and necessity, the investment on the proposed Hi-tech models will find pay back within a span of 18 to 24 months. In a nutshell, this system of drying is identified to be more economic, safe and fast in drying technology.

8 Budgetary Estimate for Environmental Management

Environmental monitoring programme was formulated and the same will be implemented. The budgetary estimate for complete Environmental Management which includes marine diversity conservation and management during construction phase is INR 14.8 Crores and recurring cost during operational phase is INR 2.8 Crores.

9 Summary and Conclusion

The results of the Primary and secondary surveys indicated that the physico-chemical and biological parameters did not vary much except a few parameters which showed only marginal variations. The surface water temperature, salinity, pH, TSS and turbidity were within the permissible level as suggested by Dept. of Oceanography, SOEST, Hawaii (2012). The variation noticed between the stations was only marginal and it might be due to seasonal changes, geographical location and sampling time. The range of ecologically sensitive chemical parameters such as Oxygen, BOD, nutrients was also at the optimal concentration corresponding to the seasonal variation as suggested by Khadanga, 2012. Similarly, the level of Heavy metals (Sediment, water and fauna) were also within the permissible limit as per the limits suggested by USA Environmental Protection Agency, 2009. The sand, silt and clay fraction at each of the stations along with their textural classification indicated that the sand and silt percentage was higher during this survey (Jones, 2000). The microbial population showed general trend in water and sediment samples during this survey. The maximum colony count was observed in sediment compared to the water samples.

With regard to biological entities, the phytoplankton species predominantly belonging to two groups namely diatoms and dinoflagellates. Three groups of macro zooplankton namely, calanoids, cyclopoids, and harpacticoids and two groups of micro zooplankton namely, spirotricha and larval forms and “others” groups of zooplankton were recorded. Of the above said groups, calanoida were found to be the dominant group. Fish Eggs under Seven groups and Fish larvae under ten groups were recorded.

Among the macro benthic organisms four groups are reported among those polychaetes topped the list. Amphipods and gastropods in the order of abundance of the total benthic organisms collected. The nine groups of meio-benthic organisms are reported and dominated by foraminiferans followed by nematodes, harpacticoids and ostracodes.

Ecologically sensitive areas like Biosphere Reserves, National Parks, Wildlife Sanctuaries and other protected areas (PA) are not found within 10 km radius of the project site. Ecological sensitive areas and marine protected areas of Sindhudurg District are located beyond 25 km distance from the project site. Project site is far away from the Malvan marine sanctuary area declared by Maharashtra Government. The primary data collected during comprehensive survey period as well the secondary data collected do not reflect the existence of any critical flora and fauna in the study area as well as project area.

Redi coastal waters suggests that the physico-chemical and nutrient parameters exhibited only marginal variation, which is comparable to the levels recorded in the coastal waters elsewhere. Further, the results of physico-chemical and biological parameters indicate that the water is well oxygenated and nutrients are adequate supporting fairly good plankton population, the base in the food chain. The other parameters like benthos and fisheries are also appeared to be normal. It is again reiterated that the Malvan marine biological resources available in the Malvan sanctuary may not represent the present project site area.

However, project proponent is advised to take up mitigation measures suggested above in order to adopt sustainable development concept.

Appendix E

MoEF&CC Office Memoradum's pertaining to Forest Clearance

No. J-11013/41/2006-IA.II(I)

Government of India

Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110003.
Telefax: 24362434

Dated the 2nd December, 2009

OFFICE MEMORANDUM

Sub: Procedure for consideration of proposals for grant of environmental clearance under EIA Notification, 2006, which involve forestland and or wildlife habitat – Regarding.

The issue regarding the procedure to be followed for consideration of proposals for grant of environmental clearance under EIA Notification, 2006, which involve forestland and or wildlife habitat has been under consideration of this Ministry. The issue has been discussed and deliberated at length and the provisions of EIA Notification, 2006 as contained in para 8 (v) of the said notification have also been considered.

2. It has now been decided that the following procedure shall be adopted in dealing with such cases.

(i) The proposals for environmental clearance will not be linked with the clearances from forestry and wildlife angle even if it involves forestland and or wildlife habitat as these clearances are independent of each other and would in any case need to be obtained as applicable to such projects before starting any activity at site.

(ii) While, considering such proposals under EIA Notification, 2006, specific information on the following should be obtained from the proponent:

(a) Whether the application for diversion of forestland involved in the project has been submitted? If so, what is the status of grant of forestry clearance? It would be essential that in such cases, the application for diversion of forestland has been submitted by the project proponent before they come for environment clearance and a copy of the application submitted for forestry clearance along with all its enclosures should also be submitted by the proponent along with their environment clearance application.

(b) Information about wildlife clearance, as applicable to the project should also be obtained. The project proponent should submit their application for wildlife clearance / clearance from Standing Committee of the National Board for Wildlife to the Competent Authority before coming for environment clearance and a copy of their application should be furnished along with environment clearance application.

(iii) The proposal from environmental angle will be appraised by the respective Expert Appraisal Committee and recommendations made on the same which will be processed by the IA Division and approval obtained from the Competent Authority. However, while granting environmental clearance to projects involving forestland, wildlife habitat (core zone of elephant/tiger reserve etc.) and or located within 10 km of the National Park /

Wildlife Sanctuary (at present the distance of 10 km has been taken in conformity with the order dated 4.12.2006 in writ petition no. 460 of 2004 in the matter of Goa Foundation Vs Union of India), a specific condition shall be stipulated that the environmental clearance is subject to their obtaining prior clearance from forestry and wildlife angle including clearance from the Standing Committee of the National Board for Wildlife as applicable. Further, it will also be categorically stated in the environment clearance that grant of environmental clearance does not necessarily implies that forestry and wildlife clearance shall be granted to the project and that their proposals for forestry and wildlife clearance will be considered by the respective authorities on their merits and decision taken. The investment made in the project, if any, based on environmental clearance so granted, in anticipation of the clearance from forestry and wildlife angle shall be entirely at the cost and risk of the project proponent and Ministry of Environment & Forests shall not be responsible in this regard in any manner.

(iv) A copy of the clearance letter, besides others, shall also be endorsed to (i) IGF(FC), MoEF, (ii) IGF(WL), MoEF, (iii) PCCF of respective States and (iv) Chief Wildlife Warden of the State.

Note: There will not be any need to refer the files relating to grant of environmental clearance from IA Division to FC Division and or Wildlife Division during consideration of proposals under EIA Notification, 2006, as done at present in view of the course of action stipulated at paras 2(i) – (iv) above.

This issues with the approval of the Competent Authority.

(S.K. Aggarwal)
Director

To

All the Officers of IA Division

Copy to:-

1. PPS to AS(JMM)
2. PPS to ADG(F)
3. PPS to ADG (Wildlife)
4. IGF(FC)
5. Advisor (GKP)
6. Advisor (NB)
7. Director (PLA) with a request to issue necessary instructions to all the SEIAAs/SEACs to follow the above instructions.
8. Website of the Ministry.

No. J-11013/41/2006-IA.II(I)
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110003.
Telefax: 24362434

Dated the 9th September, 2011

OFFICE MEMORANDUM

Sub: Consideration of projects for grant of environment clearance under EIA Notification, 2006, which involve forestland – Procedure to be followed – further clarifications - Regarding.

Ministry of Environment & Forests had earlier issued an office memorandum vide no. J-11015/200/2008-IA.II(M) dated 31.3.2011 prescribing the procedure to be followed for consideration of projects for environmental clearance, which involve forestland.

2. Based on the experience gained in implementation of the instructions contained in the above referred O.M. and taking into consideration the inputs / feedback received from various stakeholders as also in light of the judgment of the Hon'ble Supreme Court dated 6.7.2011 in the IA No. 1868, 2091, 2225-2227, 2380, 2568 & 2937 in W.P. No. 202 of 1995 – T.N. Godavarman Thirumulpad Vs. UOI & Ors in Lafarge Mining / Forest case, the matter has been further considered.

3. Now, therefore, in partial amendment of the above referred O.M. dated 31.3.2011, it has been decided that the following procedure shall be adopted for consideration of projects for environmental clearance, which involve forestland:

(i) At the stage of consideration of proposals for TOR in respect of the projects involving forestland, the project proponents would submit a credible proof in support of the fact that they have already submitted their application to the concerned Competent Authority for diversion of the forestland involved in the project.

(ii) At the stage of consideration of proposals for EC in respect of projects involving forestland, the project proponent would inform the respective EACs about the status of their application for forestry clearance along with necessary supporting documents from the concerned Forest Authorities. It will clearly be informed to the EAC whether the application is at the State level or at the Central level. The EAC will take cognizance of the involvement of forestland and its status in terms of forestry clearance and make their recommendations on the project on its merits. After the EAC has recommended the project for environmental clearance, it would be processed on file for obtaining decision of the Competent Authority for grant of environmental clearance. In the cases where the Competent Authority has approved the grant of environmental clearance,

the proponent will be informed of the same and a time limit of 12 months, which may be extended in exceptional circumstances to 18 months, a decision on which will be taken by the Competent Authority, will be given to the proponent to submit the requisite stage-I forestry clearance. The formal environmental clearance will be issued only after the stage-I forestry clearance has been submitted by the proponent.

(iii) In the eventuality that the stage-I forestry clearance is not submitted by the proponent within the prescribed time limit mentioned at para (ii) above, the proposal for environmental clearance will stand rejected and the entire process of obtaining environmental clearance will have to be initiated de-novo as per the procedure prescribed under EIA Notification, 2006.

4. The requirement of information / data / documents for such projects as specified in office memorandum no. J-11013/41/2006-IA.II(I) dated 26.4.2011 will, however, continue to be completely followed .

This issues with the approval of the Competent Authority.

(Dr. S.K. Aggarwal)
Director

To

1. All the Officers of IA Division
2. Chairpersons / Member Secretaries of all the SEIAAs/SEACs
3. Chairman, CPCB
4. Chairpersons / Member Secretaries of all SPCBs / UTPCCs

Copy to:-

1. PS to MEF
2. PPS to Secretary (E&F)
3. PPS to SS(JMM)
4. Advisor (NB)
5. Website, MoEF
6. Guard File

No. J-11013/41/2006-IA.II(I)
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110003.
Telefax: 24362434

Dated the 18th May, 2012

Office Memorandum

Sub: Consideration of projects for grant of environment clearance under EIA Notification, 2006, which involve forestland – procedure to be followed – Further Clarifications - Regarding.

In continuation to this Ministry's Office Memorandum of even no. dated 9th September, 2011 regarding the above mentioned subject, the matter has been further considered and examined in the Ministry. Accordingly, para 3(iii) of the above referred O.M. is substituted by the following:

"(iii) In the eventuality that the stage-I forestry clearance is not submitted by the project proponent within the prescribed time limit mentioned at para (ii) above, as and when the stage-I forestry clearance is submitted thereafter, such projects would be referred to EAC for having a relook on the proposal on case by case basis depending on the environmental merits of the project and the site. In such a situation the EAC may either reiterate its earlier recommendations or decide on the need for its reappraisal, as the case may be. In the eventuality, a reappraisal is asked for, the Committee will simultaneously decide on the requirement of documents / information for reappraisal as also the need for a fresh public hearing."

This issues with the approval of the Competent Authority.

(Dr. S.K. Aggarwal)
Director

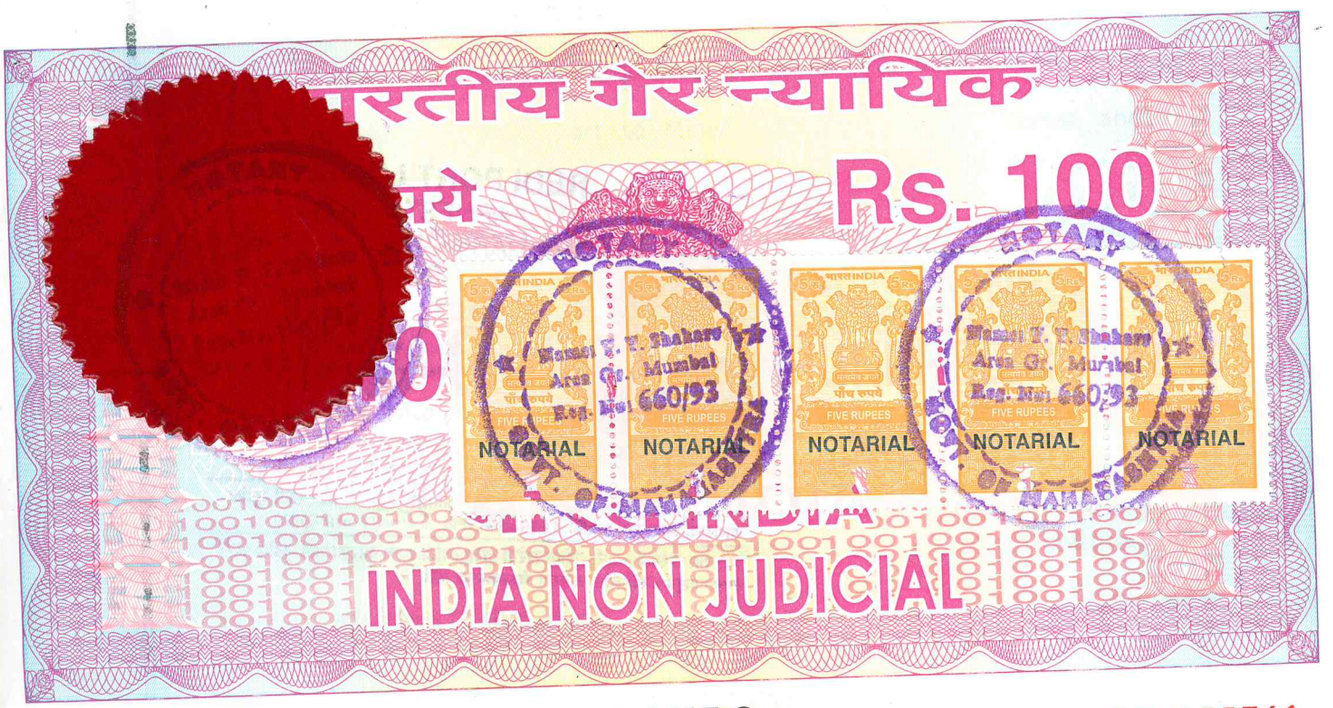
To

1. All the Officers of IA Division
2. Chairpersons / Member Secretaries of all the SEIAAs/SEACs
3. Chairman, CPCB
4. Chairpersons / Member Secretaries of all SPCBs / UTPCCs

Copy to:-

1. PS to MEF
2. PPS to Secretary (E&F)
3. PPS to JS(RG)
4. Website, MoEF
5. Guard File

Appendix F
Notarized affidavit



महाराष्ट्र MAHARASHTRA ◑ 2017 ◑ RW 155361

प्रधान मुद्रांक कार्यालय, मुंबई
प.मु.वि.क्र. ८०००९०
27 JUN 2017
सक्षम अधिकारी

AFFIDAVIT – CUM- UNDERTAKING

श्री. प्र. ना. विचारे

I, Dr.Earnest Joseph John , Managing Director of Redi Port Ltd, having registered office at 107, 10th floor, Earnest House, 194, Nariman Point, Mumbai – 400 021 do hereby solemnly affirm and state as under :-

1. I say that Redi Port Ltd, the developer of Redi Port (hereinafter referred to as "the site") situate at village : Redi, Tal : Vengurla, Dist : Sindhudurg,State : Maharashtra as per Government Resolution dated 18.10.2008 passed by Government of Maharashtra.

REDI PORT LIMITED
107, EARNEST HOUSE,
194, NARIMAN POINT,
MUMBAI - 400 021.

मुद्रांक विकत घेणाऱ्याचे नाव
मुद्रांक विकत घेणाऱ्याचे पत्ता
मुद्रांक विक्रीबाबतची नोंद वही अनु. क्रमांक _____ दिनांक 3 JUL 2017
2453

मुद्रांक विकत घेणाऱ्याची सही परवानाधारक मुद्रांक विक्रीत्याची सही

परवाना क्रमांक : ८०००९०

मुद्रांक विक्रीचे ठिकाण/पत्ता: श्री. कल्पेश प्रमजी गाला
सीमला स्टेशनरी मार्ट, शॉप नं. ९, ऐसप्लेनेड मेन्शन,
एम. जी. रोड, सीटीसीविल कोर्ट जवळ, काळाघोडा, मुंबई २३.

शासकीय कार्यालयासमोर /न्यायालयासमोर प्रतिज्ञापत्र सादर करणेसाठी मुद्रांक कागदाची आवश्यकता नाही. (शासन निर्णय दि. ०१/०७/२००४ नुसार)

ज्या कारणासाठी ज्यांनी मुद्रांक खरेदी केला त्यांनी त्याच कारणासाठी मुद्रांक खरेदी केल्यापासून ६ महिन्यात वापरणे बंधनकारक आहे.

2. I say that Redi Port Ltd (hereinafter referred to as "the project proponent") has submitted proposal for environment clearance for Expansion of Redi Port to Ministry of Environment, Forest and Climate Change (MoEF & CC) , New Delhi.

3. I say that the project proponent has not commenced any construction activity at the site till date.

4. I say that on behalf of project proponent, I herein give an undertaking that the project proponent will commence construction works only after obtaining all necessary clearances from statutory authorities to that effect.

5. This affidavit is to be submitted to Ministry of Environment, Forest and Climate Change (MoEF & CC), New Delhi as required by Expert Appraisal Committee (Infra-2).

DEPONENT

-: VERIFICATION:-

Verified and signed on this day of July 2017 that the contents of the affidavit are true to the best of my knowledge and belief

Solemnly affirmed at Mumbai)
This day of July 2017)

Before me

I know the the deponent

Advocate

BEFORE ME
T. T. SHAHARE
NOTARY, GREATER MUMBAI.
6 JUL 2017

REGISTER SERIAL No. 7800
PAGE No. 18 DATE 6/7/17