

Figure 10-1: Proposed Institutional Mechanism for Environmental Management

10.1.3 Institutional Mechanism for Implementation of Mitigation Measures

The effective implementation and close supervision of the environmental management to mitigate the environmental impacts, which are likely to arise due to the construction and operational phases of the project could be achieved through a suitable institutional mechanism. The proposed institutional mechanism recommended for the implementation of the mitigation measures is presented in Figure 10-2.

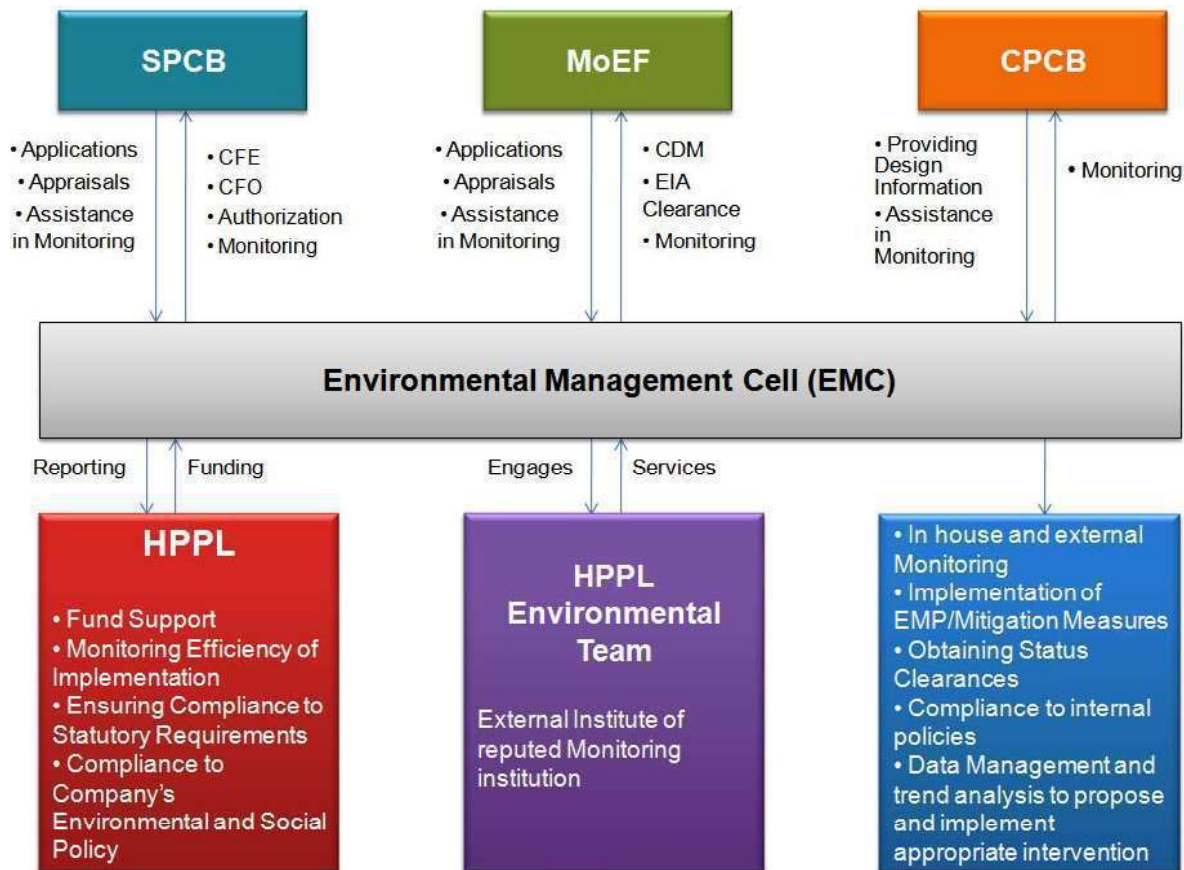


Figure 10-2: Institutional Mechanism for Implementing Mitigation Measures

A proper institutional mechanism to understand and implement appropriate environmental management measures during various stages of the project is a pre requisite and has a strong bearing for the overall success of the project management. Implementation of the Environmental Management measures will become easy once a good project management team is in place.

10.1.4 Approach towards Voluntary Compliance

During operational phase, HPPL may adopt an Environmental Management System (EMS) which can be proposed to be certified under ISO 14000. The objective of ISO 14000 is to establish a system to assess, monitor and manage environmental performances, which can be used to promote continual environmental improvement and prevention of pollution.

- Identify and list out environmental aspects due to the operation of the proposed project
- Determine the key operations that have significant environmental impacts
- Identify and track environmental legislations, policies, codes and other relevant requirements
- Establish objectives and targets (Environmental Management Plan)
- Formulate an Environmental Management System

For successful implementation of the formulated Environmental Management System, HPPL will ensure that the essential resources (with defined roles and responsibilities) are made available to implement, maintain and improve the Environmental Management System.

10.2 Environmental Management Cell (EMC)

Apart from having an Environmental Management Plan, it is also necessary to have a permanent organizational set up charged with the task of ensuring its effective implementation of mitigation measures and to conduct environmental monitoring. The major duties and responsibilities of Environment Management Cell are:

- To implement the environmental management plan
- To assure regulatory compliance with all relevant rules and regulations
- To ensure regular operation and maintenance of pollution control devices
- To minimize environmental impacts of operations as by strict adherence to the EMP
- To initiate environmental monitoring as per approved schedule
- Review and interpretation of monitoring as per approved schedule
- Review and interpretation of monitoring results and corrective measures in case monitored results are above the specified limit
- Maintain documentation of good environmental practices and applicable environmental laws as ready reference
- Maintain environmental related records
- Coordination with regulatory agencies, external consultant, monitoring laboratories
- Maintain log of public complain and the action taken

The proposed environmental management cell should have all basic record keeping facilities such as hard ware/software facilities, adequate space, vehicle (transport) and basic furniture and all simple instruments such as GPS, Digital camera, Hand held noise metre etc. The cell should have all basic environmental management data of the project that includes but not limited to the following:

- Environmental Impact Assessment Reports (both well preserved soft and hard copy)
- All valid and up to date environmental clearances papers
- All latest Environmental legislations, policies, codes and manuals for ready references
- A list of consultants on environmental management need to be kept with yearly revision of the list. This will help to receive proper advice in case of an emergency or a requirement and also to implement day to day environmental management activities

Over a period of time a system to understand and absorb the new revisions and changes in the environmental requirements and practices are to be established. This can only be achieved by regular training and genuine capacity building initiatives. All this require a sound positive attitude of top level management towards environmental management.

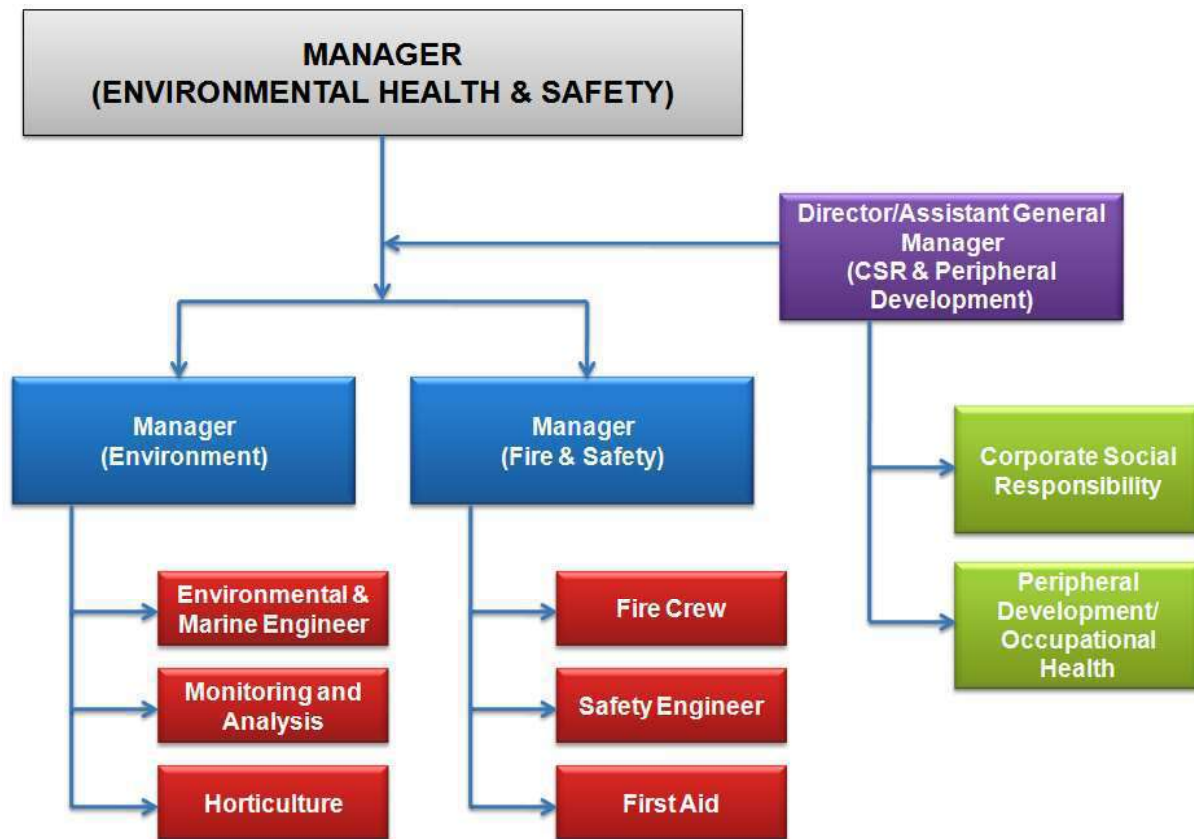


Figure 10-3: Organizational Setup for Environmental Management Cell

10.3 Greenbelt Development Plan

With rapid industrialization and consequent deleterious impact of pollutants on environment, values of environmental protection offered by trees are becoming clear. Trees are very suitable for detecting, recognizing and reducing air pollution effects. Monitoring of biological effects of air pollutant by the use of plants as indicators has been applied on local, regional and National scale. Trees function as sinks of air pollutants, besides their bio-aesthetical values, owing to its large surface area.

The greenbelt development not only functions as foreground and background landscape features resulting in harmonizing and amalgamating the physical structures of the plant with surrounding environment, but also acts as pollution sink. Thus, implementation of afforestation program is of paramount importance. It will also check soil erosion, make the ecosystem more complex and functionally more stable and make the climate more conducive. With a view to attenuate noise propagation and mitigate fugitive air pollution impacts, it is planned to develop a greenbelt all along the periphery of project site. Compatible species will be identified by HPPL for greenbelt. Saplings will be suitably nurtured. Regular watering will be undertaken. Soil conditioning and fertiliser application will be undertaken. If required, suitable soil treatment will be provided to ensure good growth of tree cover. Greenbelt development will be carried out in and around the proposed port along the roadside and on the vacant areas to reduce pollution as well as to improve aesthetic value within barge/vessel loading facility premises. Species recommended by horticulturists will be selected on the basis of air pollution tolerance index of tree. Selection of the plant species will be based on their adaptability to the existing geographical conditions and the

vegetation composition of the forest type of the region. During the development of the green belt within the project area, it has to be emphasized that those native plant species should be planted which are good ornamental values and are fast growing with excellent canopy cover.

The selection of plant species for the development depends on various factors such as climate, elevation and soil. The plant species should exhibit the following desirable characteristic in order to be selected for plantation.

- Should be fast growing and providing optimum penetrability.
- Should be wind-firm and deep-rooted
- Should form a dense canopy
- As far as possible, the species should be indigenous and locally available.
- Species tolerant to air pollutants like PM, SO_x and NO_x should be preferred
- Should be permeable to help create air turbulence and mixing within the belt
- Plants will be preferably indigenous and would be native of the area.
- Introduction of monocultures and alien plant species would be avoided to the maximum possible extent
- Further Plants will:
 - Be fast growing and attaining a height of 5 m or more in 3 to 4 years
 - Have thick canopy cover
 - Be preferably evergreen
 - Have large leaf area index
 - Be resistant to specific air pollutants
 - Maintain species diversity
 - Be able to attenuate noise generated within the area
 - Be well adapted to the existing soil conditions

As per the stipulations of MoEF, greenbelt will be provided all around the project site boundary.

10.3.1 Species for Plantation

The species proposed will have broad leaves. Trees will be selected based on the type of pollutants, their intensity, location, easy availability and suitability to the local climate like coastal adoptability. They have different morphological, physiological and bio-chemical mechanism/ characters like branching habits, leaf arrangement, size, shape, surface (smooth/hairy), presence or absence of trichomes, stomatal conductivity proline content, ascorbic acid content, cationic peroxides and sulphite oxidize activities etc to trap or reduce the pollutants. Species to be selected will fulfil the following specific requirements of the area:

- Tolerance to specific conditions or alternatively wide adaptability to eco-physiological conditions
- Rapid growth
- Capacity to endure water stress and climate extremes after initial establishment
- Differences in height and growth habits
- Pleasing appearances; and
- Providing shade

The pollutants namely dust/fugitive emissions, sulphur dioxide, smoke and carbon dioxide along with the noise pollution can be effectively curbed by planting the below mentioned specific floral species. Based on the above, the recommended species for greenbelt and plantation are given in Table 10-2.

Table 10-2: Recommended Plants for Greenbelt

S. No.	Botanical name	Importance
1	<i>Acacia auriculiformis</i>	Tall Evergreen drought resistant Avenue tree
2	<i>Ailanthus excelsa</i>	Tall branched semievergreen tree
3	<i>Albizia lebbek</i>	Branced evergreen leguminous tree
4	<i>Alstonia scholaris</i>	Beautiful medicinal tree
5	<i>Neolamarckia cadamba</i>	Beautiful tree with large leaves
6	<i>Azadirachta indica</i>	Neem oil & neem products
7	<i>Bauhinia racemosa</i>	Ornamental tree
8	<i>Cassia fistula</i>	Ornamental and bark is a source of tannin
9	<i>Cassia siamea</i>	Ornamental avenue tree
10	<i>Cocos nucifera</i>	Coconut palm
11	<i>Dalbergia sissoo</i>	Avnue and timber tree
12	<i>Dendrocalamus strictus</i>	Bamboo products
13	<i>Casuarina equisetifolia</i>	Pulp and construction material
14	<i>Delonix regia</i>	Ornamental avenue tree
15	<i>Eucalyptus sp</i>	Grown in high density along the boundary
16	<i>Ficus benghalensis</i>	Shade and a source of food for birds
17	<i>Ficus racemosa</i>	Edible fruits
18	<i>Ficus religiosa</i>	Shade and a source of food for birds
19	<i>Gmelina arborea</i>	Timber
20	<i>Grewia robusta</i>	Avenue tree
21	<i>Holoptelia integrifolia</i>	Fibre and timber
22	<i>Leucaena leucocephala</i>	Fodder and pulp wood
23	<i>Mangifera indica</i>	Edible fruit
24	<i>Michelia champaca</i>	Scented flowers
25	<i>Mimosops elengi</i>	Shade and edible fruit
26	<i>Muntingia calabura</i>	Shade and edible fruit
27	<i>Phoenix sylvestris</i>	Palm and the grown up palms can be easily transplanted. Good soil binder
28	<i>Pongamia pinnata</i>	Source of biodiesel
29	<i>Polyalthia pendula</i>	Majestic tree with drooping branches
30	<i>Polyalthia longifolia</i>	Avenue tree
31	<i>Samania saman</i>	Shade, timber and fruits are a good live stock feed
32	<i>Shorea robusta</i>	Tall and locally adapted Timber tree.
33	<i>Spathodea companulata</i>	Ornamental avenue tree
34	<i>Terminalia bellerica</i>	A common local tree of timber vlue.
35	<i>Syzygium cumini</i>	Edible fruits
36	<i>Tamarindus indica</i>	Tamarind fruit and leaf
37	<i>Tectona grandis</i>	Timber
38	<i>Terminalia arjuna</i>	Timber and shade tree
39	<i>Terminalia catappa</i>	Edible almond nuts

10.4 Biodiversity Conservation and Management Plan

The main aim of Conservation of Biodiversity is to ensure “No Net Loss”. The biodiversity-related conventions are based on the premise that further loss of biodiversity is unacceptable. Biodiversity must be conserved to ensure it survives, continuing to provide services, values and benefits for current and future generations. The following approach has been chosen by the International Association for Impact Assessment (IAIA) to help achieve ‘no net loss’ of biodiversity:

- Avoidance of irreversible loss of biodiversity.
- Seeking alternative solutions to minimize biodiversity losses.
- Use of mitigation to restore biodiversity resources.

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- Compensation for unavoidable loss by providing substitutes of at least similar biodiversity value.
 - Looking for opportunities for enhancement

CHAPTER 11

SUMMARY AND CONCLUSION

11 Summary and Conclusion

11.1 Introduction

As a part of major initiative to propel the industrial growth of Karnataka, the State Government has introduced Industrial Policy 2006-11 with an aim to increase the growth of GDP, strengthen manufacturing industries, increase share of exports from Karnataka, to generate additional employment of at least 10 lakh persons in the manufacturing and service sectors, to reduce regional imbalance and ultimately aim at overall socioeconomic development of the State. In line with, the Directorate of Ports and Inland Water Transport Department, Government of Karnataka signed a lease agreement with Honnavar Port Private Limited (HPPL), a consortium formed by North Canara Seaports Private Limited (NCS) and GVPR Engineers Limited (GVPR) to develop Honnavar port at the mouth of Sharavathi River in Uttarakannada district of Karnataka. The consortium also signed a lease agreement for the use of Portland to develop port related activities at Honnavar.

11.2 Project Location

The proposed barge /vessel loading facility is located at the mouth of River Sharavati towards North west of Kasarkod Tonka village in Uttara Kanada district in Karnataka. The identified shoreline for Honnavar Barge / Vessel loading facility is in the notified port limits (declared as minor port by Government of Karnataka) and latitude / longitude of port limits are given below.

Point	Latitude	Longitude
Point A	14°18'02.86"N	74°25'11.94"E
Point B	14°18'02.86"N	74°22'01.12"E
Point C	14°13'26.69"N	74°24'17.81"E
Point D	14°13'26.69"N	74°26'35.36"E

11.3 Need for Development of Barge / Vessel loading facility

Liberalization of the Indian economy has led to significant growth and India is fast emerging as one of the largest economies of the world. This growth will provide a major thrust to trade. About 95% by volume and 70% by value of Indian exports are channeled through maritime Route. Foreign Trade Policy envisages doubling of Indian share in the global market. Hence, there is an immediate necessity to augment the Indian infrastructure by expanding or creating new Ports. Since, existing ports are saturated or congested and have limited scope for expansion there is a great need for development of green-field ports along East and West coasts. Based on the growing demand/export potential in the state, the Government of Karnataka also has estimated that Karnataka coast would need more seaports/barge/vessel loading facility along Coast. Bellary district in Karnataka is blessed with many industrial projects that makes it second fastest growing city in the state. Out of the ports of the state, NMPT, the major port currently caters to the cargo requirements in the southern districts of the state and is operating at 89% capacity (in 2008 – 2009). Cargos such as granite, fertilizer, molasses, iron ore, wood logs, coal with other agro products and steel products also has the potential to grow in demand and supply which will increase the traffic. The capacity at the port is not adequate to cater to the demand of this region. This will increase the traffic across the proposed Barge/ Vessel loading facility.

About 27% of the power demand of Karnataka is met by that generated from coal based power plants. JSW Energy Limited (JSWEL) has commissioned coal based thermal power plant in Karnataka. JSWEL is also proposing to develop another unit of 600 MW in Bellary. Two coastal coal based thermal power plants are also proposed to be set up with capacities of 1015 MW and 4000 MW in Tadri and Mangalore respectively. The demand supply gap of coal is expected to increase in the coming years. The development of Barge/ Vessel loading facility will meet the capacity requirements of the region and Karnataka State and in turn is expected to boost the economy of State.

11.4 Project Benefits

- Employment potential during construction phase and operational phase is estimated about 500 and 50 persons respectively.
- Employment opportunities to the local people for skilled, semi-skilled and unskilled work force during the construction and operation phases
- Increase in education and health facilities in the project area
- Significant benefits to local people and to the region as a whole and positive impact on the socio-economic conditions of the project region
- Proposed dedicated rail/road corridor will provide good connectivity and also offers an efficient and cost effective supply chain/ value proposition to the local importers and exporters in the State of Karnataka and neighbouring states

11.5 Project Description

11.5.1 Salient Features of Barge/ Vessel Loading Facility

S. No	Parameter	Description
12.	Land Area	44 Ha (~98.84 acres)
13.	Cargo handling capacity	Handling Capacity: 4.9 MTPA <ul style="list-style-type: none"> • Coal - 2.7 MTPA • Iron Ore – 1.0 MTPA • General cargo – 1.2 MTPA • Granite – 0.16 MTPA • Fertilizer – 0.2 MTPA • Molasses with Agro Products – 0.15 MTPA • Steel Products – 0.4 MTPA • Sugar – 0.29 MTPA
14.	Cargo Storage	<ul style="list-style-type: none"> • Iron Ore – 1.8 Ha • Coal - 7 Ha • Other General Cargo – 6.10 Ha
15.	Cargo handling equipment	Barge/Vessel loader, mobile harbor cranes, pay loaders
16.	Berthing facilities	Berth of length 440 m and width 30 m
17.	Length of Northern Breakwater	820 m
18.	Length of Southern Breakwater	865 m
19.	Navigation Facilities	Approach Channel (Inner/ Outer): Length: 1395/2280 m; Width: 100/100 m; Depth:(-) 10/10 m Turning Circle: Diameter: 250 m; depth: (-)10.0 m
20.	Dredging and Reclamation	<ul style="list-style-type: none"> • Capital dredge material: 3.9 MCM • Reclamation: 1 MCM of dredged material will be used.. • Remaining dredge material will be disposed

S. No	Parameter	Description
		During periods of strong near shore currents (during peak wet season), it is suggested to dispose the sediment offshore at greater depths (>30 m).
21.	Navigational Aids	<ul style="list-style-type: none"> Channel marker buoys; Fairway marker Buoy; Breakwater marker lights; Berth Corner Lights
22.	Connectivity	<ul style="list-style-type: none"> National Highway - NH 17 (~ 2.0 km) towards East. Nearest Railway Station - Honnavar (~ 5.0 km) towards East Proposed Rail Corridor Connecting project site to Manki Railway station of about 15 km Road Corridor connecting project site to NH17.

11.5.2 Utilities & Services

11.5.2.1 Water Supply

Water requirement during the construction is expected to be around 15m³/day. Water demand during operational phase of barge/ vessel loading facility is estimated as 7m³/day. The water requirement will be met from Karnataka Rural water supply and sanitation agency which includes supply to Barge/vessels, staff and users. In addition to that water required for dust suppression system and fire fighting will be sourced from Sharavati River.

11.5.2.2 Power Supply

Power requirement during construction phase is expected to be around 1 MVA. The power demand is estimated at 1 MVA during operation. Construction phase power requirement will be met from DG sets and operation phase power will be drawn from Substation located at Honnavar (~2 km).

11.5.2.3 Dust Suppression System

Dust suppression equipment will be provided for efficient control of dust pollution on environment during storage and handling of coking 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 have been proposed for efficient dust control system. Dust control is envisaged at following locations:

- barge/ vessel loading /unloading area
- Stockyards

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.

11.5.2.4 Wastewater Management

The wastewater and sewage generated during construction at site and at labour camp will be collected in holding tank and periodically transferred to nearby Treatment Plant. During operation, the sewerage system will be provided to collect the sewage from port administration building, canteen and operation buildings and it will be collected in septic tank followed by soak pits. The cargo storage area will be provided with an extensive drainage and treatment system so that the contaminated water from the stockyard area does not flow directly into the natural water bodies or into the groundwater system. Drainage pits will be provided in the workshop areas, which will be connected to an oily wastewater tank. Oily wastewater if any collected in the oily wastewater separator and will be treated (if required) to meet the discharge standards.

11.5.2.5 Rainwater Harvesting System

Rain water collected from roof of buildings will be channelised through rain water down comers and routed to garland drain around the buildings. These garland drains are connected to the plant storm water drainage network system all around the proposed barge/ vessel loading facility area. Several recharge wells will be located at strategic locations within the port and will be interconnected to the storm water drain network system.

11.5.2.6 Solid Waste Management System

Solid waste from the utilities such as canteen shall be segregated as biodegradable and non-biodegradable waste and collected separately by providing bins at respective places. The collected biodegradable waste shall be subjected to composting and the compost will be used as manure for the development of green belt within the port. The non-biodegradable waste like plastic shall be disposed off to approved vendors of KSPCB/CPCB in a scientific manner.

11.5.2.7 Fire Fighting System

Fire fighting system will be provided to both control and extinguish fires. It is proposed to install Fire Hydrant System, which will be designed to give adequate fire protection for the facility based on Indian Standards or equivalent and will conform to provisions of Tariff Advisory Committee's Fire Protection Manual. A centralised fire station will be provided for attending to all calls which will house three mobile fire tenders. One fire tender will be provided with snorkel attachment.

11.6 Greenbelt Development

An area of about ~3.10 Ha is proposed to be developed as greenbelt. Greenbelt will be developed at stockyards, administration building and along the road areas. The tree species to be used for the green belt development will be in line with the local ecology (indigenous species).

11.7 Project Cost

The capital cost estimate for development proposed barge / vessel loading facility is estimated at ` 450.00 Crores.

11.8 Environmental Impact Assessment

In accordance with the provisions of the EIA Notification, 2006 (as amended) and CRZ notification, 2011, HPPL submitted the proposal (Form-1, Draft Terms of Reference (ToR) and Prefeasibility Report) for consideration by the Karnataka State Level Expert Appraisal Committee (KSEAC) in its meeting held on August 20, 2011 at Bangalore. The committee approved the ToR vide SEIAA letter No: 22 IND 2011 dated September 13, 2011.

11.9 Description of Environment

Project Influenced Area: An area within 10 km radius with port site as boundary has been earmarked for the study as the **Project Influenced Area**. The project site is considered as **core area**. The baseline environmental data was generated for one season (12 Weeks – non monsoon season).

11.9.1 Marine Environment

Existing marine environmental conditions in study area were established through collection and analysis of water and sediment samples at selected locations. Parameters monitored include physical parameters, chemical parameters and biological parameters.

- Temperature is ranged from 29.0°C to 31.0°C
- Salinity is ranged between 21.00 and 34.00 Practical Salinity unit (PSU),
- The presence of a good plankton community structure, good benthic structure and higher Oxygen levels indicate that the waters are free from pollution and also support good aquatic life.
- Observations in terms of chemical and biological parameters reflect ambient coastal processes which are at normal levels coinciding the basic bio-geochemical process of the coastal environment.

11.9.2 Terrestrial Environment

11.9.2.1 Meteorology

As per the IMD climatological table the following are the observations were drawn for period of 1951-1980.

- The daily maximum temperature is 32.9°C and the daily minimum temperature is 20.0°C.
- Maximum and minimum relative humidity of 92% and 64% were recorded at 08:30 hours in the months of July, August and December. Maximum and minimum relative humidity of 88% and 57% were recorded at 17:30 hours in the months of July and December.
- The Maximum rainfall observed is 1196.0 mm during July month and no rainfall was recorded in February. Annual total rainfall was 3753.3 mm.
- Mean wind speed is 7.2 kilometre per hour.

11.9.2.2 Ambient Air Quality

Ambient air quality was monitored at Six (6) locations with twice a week frequency during the season. The air quality parameters such as PM₁₀, PM_{2.5}, SO₂, NO₂, Hg were monitored on 24

hourly basis and CO, O₃, HC were monitored on eight hourly basis. The details of locations and results are given in Table 11-1.

Table 11-1: Ambient Air Quality Monitoring Locations

Station No.	Location	Distance (km) from Project Area	Azimuth Directions	Environmental Setting
A1	Honnavar	2.4	N	Residential Area
A2	Kasarkod	2.5	S	Residential Area
A3	Karki	2.9	N	Residential Area
A4	Ramthirth	3.0	E	Residential Area
A5	Kulkod	4.3	E	Residential Area
A6	Hosad	7.4	SE	Residential Area

- Maximum concentrations of PM₁₀, PM_{2.5}, SO₂ and NO₂ are well within the National Ambient Air Quality Standards during the study period.
- Maximum concentration of PM₁₀ ranged between 23.6 µg/m³ at Ramthirth and 65.69 µg/m³ at Honnavar.
- Maximum concentration of PM_{2.5} ranged between 11.64 µg/m³ at Ramthirth and 35.4 µg/m³ at Honnavar.
- Maximum concentration of SO₂ ranged between 4.6 µg/m³ at Kulkod & Hosad and 8.2 µg/m³ at Honnavar.
- Maximum concentration of NO₂ ranged between 8.6 µg/m³ at Kulkod and 23.8 µg/m³ at Honnavar.
- Maximum Concentration of ozone ranged between 1.3 µg/m³ at Karki and 4.1 µg/m³ at Honnavar
- The CO concentration at all locations was observed less than 1.0 ppm.
- Hydro Carbons and Mercury is found to be Below Detectable Limit at all the locations.

Air quality concentrations are well within the National Ambient Air Quality Standards for Industrial, Residential and Rural areas at all monitoring locations during the study period. Hydro Carbons and Mercury is found to be Below Detectable Limit at all the locations.

11.9.2.3 Ambient Noise Levels

Noise levels were monitored at Six (6) locations once in during study period for 24 hours and the details of locations and results are given in the Table 11-2.

Table 11-2: Ambient Noise Levels

Station No.	Location	Environmental Setting	L _{dn}	L _d	CPCB Standard L _d	L _n	CPCB Standard L _n
N1	Honnavar	Residential Area	47.7	48.9	55	38.8	45
N2	Kasarkod	Residential Area	46.1	47.3	55	37.1	45
N3	Karki	Residential Area	45.1	46.3	55	36.2	45
N4	Ramthirth	Residential Area	43.3	44.4	55	36.0	45
N5	Kulkod	Residential Area	43.5	44.6	55	36.0	45
N6	Hosad	Residential Area	41.4	42.4	55	35.7	45

Day and night time noise levels at all locations are well within CPCB standards for Rural and Residential Areas.

11.9.2.4 Inland Water Quality

Ground and surface water samples were collected at Six (6) locations and the details of sampling locations is given in Table 11-3.

Table 11-3: Water Sampling Locations

Location Code	Location Name	Source	Usage
Groundwater (GW)			
GW1	Honnavar	Bore well	Drinking, Washing and Bathing
GW2	Kasarkod		
GW3	Karki		
Surface Water (SW)			
SW1	Sharavati River at Honavar	River	Nil
SW2	Badgane River at Pavinkurve	River	Nil
SW3	Sharavati River at Nagare	River	Nil

Groundwater:

- pH is ranged between 6.68 & 6.84
- Total dissolved solids ranged between 74 mg/l & 92 mg/l
- Total hardness (as CaCO₃) ranged between 40 mg/l & 48 mg/l
- Chlorides (as Cl⁻) ranged between 7.1 mg/l & 14.2 mg/l
- Fluorides as (F⁻) at all locations is 0.1 mg/l
- Total Coliforms and Faecal were not found in all the monitored locations

All the parameters for groundwater are within the limits specified as per Drinking Water Quality Standards (IS: 10500, 1991)

Surface Water:

- pH is ranged between 6.96 & 7.64
- Total dissolved solids ranged between 26 mg/l & 5496 mg/l
- Total hardness (as CaCO₃) ranged between 12 mg/l & 1040 mg/l
- BoD5 is ranged between 4-12 mg/l.
- Chlorides (as Cl⁻) ranged between 7.1 mg/l & 2982 mg/l
- Fluorides as (F⁻) at all locations is <0.1 mg/l & 1.6 mg/l
- Total Coli forms ranged between 1 MPN/100 & 32 MPN/100
- Faecal Coliforms were not found in all the monitored locations

The parameters for surface water samples are within the limits except Bio Chemical Oxygen Demand (4.0-12.0 mg/l) specified as per Class B, Outdoor bathing (organized), as per Guidelines for Water Quality Management – CPCB 2008.

11.9.2.5 Soil Quality

Considering the soil profile in study area, Five (5) sampling locations were selected and the details of sampling locations are given in Table 11-4.

Table 11-4: Soil Sampling Locations

Station No.	Location	Distance (km) from Project Site Boundary	Environmental Setting
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S1	Port Site	--	--
S2	Honnavar	2.4	Agricultural Land
S3	Kasarkod	2.5	
S4	Karki	2.9	
S5	Apsarkonda	6.2	

Soil types are sandy (S1, S3, S4 and S5) and sandy clay (S2); pH of soils ranged between 6.62 (S4) and 7.86 (S2) indicating slightly acidic to alkaline in nature. Electrical Conductivity varied between 88 μ mhos/cm (S3) and 112 μ mhos/cm (S2); Phosphorus as P varied between 12 mg/100 gm (S4) and 26 mg/100 gm (S2); Potassium (K) varied between 32 mg/100 gm (S4) and 92 mg/100 gm (S2); Sodium Absorption Ratio varied between 1.82 (S3) and 2.12 (S1); Infiltration Rate ranged between 52mm/hr (S2 & S5) and 58mm/hr (S1 & S4); Water Holding Capacity varied between 6.1 % (S4) and 9.3 % (S2); Porosity varied between 32 v/v % (S2) and 38 % v/v (S4); Zinc (Zn) varied between 0.49 mg/kg (S4) and 0.92 mg/kg (S2); Iron (Fe) varied between 0.36 mg/kg (S1) and 0.84 mg/kg (S2); Lead (Pb) is less than 0.02 mg/kg at all locations; Nickel (Ni) is less than 0.02 mg/kg at all locations.

11.9.2.6 Flora and Fauna

None of the Flora and Fauna species observed from the core area/project site belongs to the Rare/Endangered / Endemic / Threatened category.

11.9.3 Socio-economic Conditions

Socio-economic profile in the study area is assessed based on 2011. Census and latest statistical abstract of Uttara Kanada district.

- Total population in Honnavar Taluk is 166390
- Main Workers constitute about 32.3%, Marginal Workers to be about 7.4% of the total population and remaining 60.3% are Non-Workers
- Literacy rate is about 75.8% of total population
- Honnavar town have primary schools, secondary schools and primary health centres
- Fish landing centre within the study area is located at Honnavar.

11.10 Additional Studies

11.10.1 Preliminary Risk Analysis

Various risks associated with the construction and operation of the proposed Barge / Vessel loading facility in terms of identifying the hazards and suggesting the mitigation measures have been addressed under Preliminary Risk Analysis. The Preliminary Risk Analysis (PRA) thus carried out also provided inputs for formulating the onsite Disaster Management Plan (DMP).

Preliminary risk analysis was carried out under the following heads:

- Hazard identification
- Enumeration of potential accidents and typical failure frequencies
- Risk reducing measures

11.10.2 Disaster Management Plan

A framework for Disaster Management Plan was prepared to minimise damages in the event of a disaster. An On-Site Emergency Preparedness Plan and Off-Site Emergency Preparedness Plan were broadly prepared to deal with emergencies and prevent disasters. An institutional framework with clear assignment of roles and responsibilities was broadly prepared with which location of Emergency Control Centre and Assembly Points will be identified. Communication system and alarm systems for effective communication in the event of a disaster are broadly identified. Disaster Management Plan (DMP) for natural hazards such as cyclones was broadly prepared. Mutual aid scheme, composition of District Level Emergency Committee and aspects relating to community involvement for dealing with off-site disasters were broadly prepared.

11.10.3 Social Impact Assessment

The land identified for development of Barge / Vessel loading facility is about 44 ha within the port limits issued by Government of Karnataka. Government of Karnataka has allotted the land for the proposed development. The land proposed for Rail / Road Corridor is a Government / few patches private land and no families are present in the land proposed to be acquired. Hence, No R&R is envisaged due to the proposed development.

11.11 Project Benefits

The Hinterland of the proposed Honnavar barge/ vessel loading facility includes some of the major existing Iron reserve in Bellary Hospet region of Karnataka. The project proponent is involved with suitable mining and mineral exploration for more than two decades. In addition to that project proponent planning to export/import thermal coal, wooden logs, fertilizer and edible oil from various sources. Hence development of Honnavar Barge/ Vessel loading facility offers an efficient and cost effective supply chain/value proposition to the local importers and exporters. One of the main aims of the proposed project is to bring significant socio-economic benefits to the local people and also to the region as a whole. The various project benefits are discussed in this chapter.

In the proposed rail connectivity, railway line will take off from the existing railway station at Manki. The new railway line will have to be laid for a distance of 14.6 km from Manki railway station to the proposed port. New railway line will run parallel to existing railway line for a length of about 8 km and then will take a turn towards sea coast which will then run parallel to the sea coast till the proposed port for the remaining 6.6 km.

Due to the proposed development of Honnavar Barge/ Vessel loading facility, apart from the surrounding region, even the adjoining states would also get a lot of benefits. The benefits may be realised as upcoming of industries such as steel plants, thermal power plants and their allied ancillary units. Other benefits would be generation/providing of either direct or indirect employment to the local people. With the new connectivity through rail and road, there will be a facility to improve the trading, marketing as well as value addition of the local products. The proposed connectivity will also serve to the tourist places nearby thereby improving employment to the local people. The development of Honnavar Barge loading facility will be a boon for the development of the region. The proposed project is likely to have positive impact on the socio economic conditions of the region. The social infrastructure in the region is likely to change due to the creation of more job opportunities and avenues for

income generation. People will have higher income due to direct employment as well as indirect employment and will have higher earning and buying capacities.

The proposed project is likely to have a positive impact on the socio economic conditions of the region. The social infrastructure in the region is likely to change due to the creation of more job opportunities and avenues for income generation. People will have higher income due to direct employment as well as indirect employment and will have higher earning and buying capacities.

The quality of life in the region is likely to improve due to the creation of jobs for the local people so that the dependency changes and there will be more than one earning member in the family, which will provide economic freedom.

As part of corporate responsibility (CSR) initiatives, it is envisaged to create health infrastructure in the form of primary health centre, which will be beneficial to the employees and also local people living in the region as their dependence on nearby towns and cities for quality medical treatment will be reduced. As part of CSR, it is also proposed to conduct periodic health camps and carryout health campaigns which will lead to better health conditions of the people.

HPPL has planned to set up a continuous effort in developing and improving the skills and personality of the youth living in the periphery villages (Kasarkod and Apsarkonda) of the project site. HPPL is planning to undertake the following activities in the project region as part of Corporate Social Responsibility (CSR):

- Basic education facilities for the children of the employees will be provided
- Strengthen primary schools with teaching aids, student education material
- Strengthen upper primary and high schools with teaching aids, mobile laboratory and computer education
- Strengthening of Government hostels for better amenities
- Initiatives for reducing school dropouts
- Financial assistance for professional education
- Funds for setting up of Libraries

11.12 Environmental Management Plan

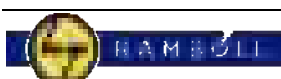
The effective implementation and close supervision of the environmental management to mitigate the environmental impacts, which are likely to arise due to the construction and operation phases of the project could be achieved through a suitable institutional mechanism. The institutional mechanism responsible for the implementation of the mitigation measures is presented in the **Chapter 10**.

11.13 Environmental Monitoring Programme

The environmental attributes to be monitored during construction and operation phase of the project, specific description along with technical details of environmental monitoring including the monitoring parameters, methodology, sampling locations and frequency of monitoring are presented in **Chapter 6**.

11.14 Disclosure of Consultants Engaged

Consultant	Type of Service
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Consultant	Type of Service
L&T-RAMBØLL Consulting Engineers Limited, Hyderabad	Environmental Impact Assessment Study
Centre for Advanced Study in Marine Biology (CASMB), Annamalai University, Parangipettai, Chidambaram	Marine Environmental Surveys
M/s. Vison Labs, Hyderabad	Terrestrial Environmental Surveys
Centre for Earth Science Studies (CESS), Thiruvananthapuram	Delineation of HTL, LTL and CRZ Boundaries with respect to 2011 CRZ notification
Dept of Meteorology and Oceanography Andhra University Vishakapattinam Prof B.S.R. Reddy Prof. K.V.S.R. Prasad Chairman, Board of Studies	Mathematical Modeling study

CHAPTER 12
DISCLOSURE OF CONSULTANTS
ENGAGED

12 Disclosure of Consultants

HPPL has engaged L&T-RAMBØLL Consulting Engineers Limited (L&T-RAMBØLL), Hyderabad to undertake EIA study for the Honnavar Barge/ Vessel Loading Facility in Karnataka. The nature of consultancy service rendered covers both terrestrial and marine environmental assessment.

12.1 Brief Profile of L&T RAMBØLL

L&T-RAMBØLL Consulting Engineers Limited (L&T-RAMBØLL) is a leading multi-disciplinary Indian Consultancy firm formed in 1998 between Larsen & Toubro Limited (L&T – the largest Indian Engineering and Construction Conglomerate) and RAMBØLL (a leading firm of Consultants in Europe). Both L&T and RAMBØLL have over six decades of experience. Following the footsteps of such illustrious parents, L&T-RAMBØLL has made a distinctive mark by creating new standards in providing sustainable solutions. Today, L&T-RAMBØLL is distinguished from others not limited to its lineage but its relentless quest for quality - a unique tradition of placing client's needs above all.

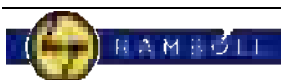
L&T-RAMBØLL has complete access to the technology of RAMBØLL. This technology is customised by L&T-RAMBØLL to serve the needs of Developing World. We offer a diverse array of talents together with practical experience. We assure our clients a professional approach by innovation and evolving optimal solutions. At L&T-RAMBØLL, we recognise that human resources are the key to organisational success.

L&T-RAMBØLL's expertise ranges across a broad spectrum of sectors with special forte in Infrastructure Projects and Industrial Parks/SEZ's. L&T-RAMBØLL has expertise in carrying out Techno-Economic Feasibility Studies, Preparation of Master Plans & Detailed Project Reports and Bid Process Management. L&T-RAMBØLL is rendering the following services for Specialised Industrial Clusters/SEZ's/Industrial Parks/Investment Regions:

- Environmental and Social Impact Assessment including assistance to Client in obtaining necessary clearances/approvals from various statutory authorities: State PCB's, Coastal Zone Management Authorities (CZMA's), MoEF (GoI)
- Field surveys (Terrestrial & Marine Environments) and investigations
- Project formulation/conceptualisation & configuration
- Market study and demand assessment
- Master planning
- Infrastructure design and engineering
- Block cost estimation
- Economic and financial analysis
- Bid Process Management
- Assistance in domestic and international marketing including road shows / investors conference (or meet) for marketing the project.
- Assistance to Client in achieving technical and financial closures

Strengths of L&T-RAMBØLL

L&T-RAMBØLL has a well-equipped Corporate Office at Chennai where RAMBØLL's Danish Experts are positioned permanently. L&T-RAMBØLL's staffs is replete with a wide range of professionals – Planners, Engineers, Designers, Environmental and Social Specialists, Financial Analysts, Project Structuring, Marketing and Privatisation Experts, Construction Supervision Managers – covering a wide spectrum of services. The skills of the Experts are



continuously aligned to suit the changing Client requirements. L&T-RAMBØLL has strategic tie-ups with Associates for specialized services. Services of an eminent group of Expert Consultants are also available to L&T-RAMBØLL. Our clients value the highly motivated and dedicated team of professionals who assure them international quality service through focused and optimal solutions.

L&T- RAMBØLL provides a stimulating working environment. We have assembled a team of skilled, creative and dynamic professionals who strive to translate the organisational ethos into reality. We are supported by experts from RAMBØLL with proven expertise in various fields. To enhance the efficiency of the personnel and enable them to be updated with the latest developments in technology, we organise comprehensive technical training programmes and organisational development programmes at regular intervals.

A creative work environment, motivated staff, structured training, latest methodologies and tools, continuous adherence to quality, adoption of best ethical standards and a keen client orientation are the factors that spur on L&T-RAMBØLL's journey into the future. Our driving philosophy is 'Client First'. We work towards complete satisfaction of our clients by adopting good work practices and meeting their requirements through timely delivery of appropriate solutions. Further for achieving this objective, we have acquired state-of-the-art IT facilities and software to ensure quality in all spheres of our activity.

L&T-RAMBØLL has modern fully computerized offices with latest computational and communication facilities. A large number of high-end computers are available and are connected by a network. Further, Data-one Internet connectivity enables fast exchange of information with the clients, as well as within the offices and the parent companies. These facilities help us to provide our clients high quality services within the shortest possible time.

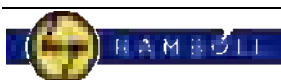
L&T-RAMBØLL has more than 300 employees at 4 offices with a leading consulting group with extensive operations at Chennai, Hyderabad, Delhi and Mumbai.

Quality Policy of L&T-RAMBØLL

L&T-RAMBØLL is committed to achieve and sustain excellence in consultancy services to customers world-wide through an in-house Quality Management System that conforms to ISO 9001:2008. The commitment stated above will be fulfilled by:

- Working towards complete satisfaction of L&T-RAMBØLL's customers by adopting good work practices and meeting their requirements through timely delivery of appropriate solutions.
- Striving to achieve continual improvement of quality management system through periodic review of quality policy, processes and quality objectives.
- Striving to maintain well-qualified and motivated staff by empowering them and providing a stimulating work environment.
- Adhering to the best ethical standards for business behaviour by respecting the rules of law governing L&T-RAMBØLL's business and presenting a well-audited financial statement every year.
- Impelling employees at all levels in achieving the objectives of the organisation and ensuring that all employees are aware of and act within the policy framework of L&T-RAMBØLL.
- Propagating our quality policy and procedures to our sub-consultants and associates and ensuring adherence to the relevant components of the quality system.

Further details may be seen on the following URL: www.ltramboll.com



12.2 Sub Consultants Engaged

The Environmental Impact Assessment study for proposed development of Honnavar Barge/ Vessel loading facility at Karnataka involves both terrestrial and marine environmental surveys. For these surveys, HPPL and L&T-RAMBØLL appointed reputed institutions/agencies and coordinated the surveys as per the guidelines of statutory authorities. The agencies/ organizations identified for conducting the marine and terrestrial environmental surveys are **Centre for Advanced Study in Marine Biology** (CASMB), Annamalai University, Parangipettai, Chidambaram, and **M/s. Vision Labs**, Hyderabad.

As per the requirement of 2011, January CRZ notification, studies with respect to HTL and LTL and surveys were conducted by Centre for Earth Science Studies, Trivandrum.

These three agencies/organizations have been identified based on the credentials, commitment to the quality of output and deliverables, relatively low price, flexibility in fee negotiations, etc.

12.2.1 Brief Profile of “Centre for Advanced Studies in Marine Biology”, Annamalai University, Parangipettai

Nature of consultancy service rendered: Marine Environmental Surveys

The Centre of Advanced Study (CAS) in Marine Biology is a reputed Marine Institute in India which is actively engaged in teaching, research and extension activities with an ideal location and easy access to different biotopes such as estuary, mangrove, backwaters and coastal waters. It has made rapid strides in various facets of Marine Science.

Research contribution through the years to Marine Science pertaining to the tropical environment by this Centre resulted in the establishment of exchange programmes with research institutions of the United Kingdom and the United States of America. The major thrust areas identified for the Centre by the experts of the UGC visiting committee are Biological Oceanography, Physical & Chemical Oceanography, Physiology, Biochemistry & Microbiology, Fishery Science and Ecology & Aquaculture.

The ENVIS Centre (Environmental Information System), which is one among the 78 Centres in the country sponsored by the Ministry of Environment and Forests (MoEF), Government of India, New Delhi, started functioning from March 2, 1992 at the Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai, Tamil Nadu, a pioneering Marine Biological Research Institute.

This Centre is meant to collect information on Estuaries, Mangroves, Coral reefs and Lagoons. The Centre has been serving with a motto to "Collect, Collate and Disseminate" and is engaged in several information services viz., query/answer, and abstract service, press clipping service, publication and development of database for the benefit of user community.

In addition to ENVIS Centre, ENVIS Node on the Environmental Management Capacity Building - Technical Assistance Project (EMCB-TAP) on Estuaries, Mangroves, Coral reefs and Lagoons has been established by the Ministry of Environment and Forests (MOEF), Government of India, under the World Bank (WB) Assistance.

ENVIS centre has also been selected as one among the 20 Sustainable Development Network Partners (SDNP) of ENVIS under Indo-Canada Environmental Facility (ICEF) Project, India. Further details on the agency may be seen on the following URL: www.casmbenvvis.nic.in.

12.2.2 M/s. Vison Labs, Hyderabad

Nature of consultancy service rendered: Terrestrial Environmental Survey

M/s. Vison labs was established in 2002. The agency is offering consultancy services in generation of baseline terrestrial environmental data for the detailed EIA studies. The organization has attained the recognition from the Ministry of Environment & Forests (MoEF), Gol (with vide Gazette Notification No. S.O.2728 (E), dated 25.11.2008). Vison Labs is also an ISO 9001:2000 Certified agency in the fields of environmental monitoring and analytical chemistry and other similar services. Further details on the agency may be seen on the following URL: www.visonlabs.com

12.2.3 Centre for Earth Science Studies (CESS)

Understanding the earth in its totality, transcending the boundaries of disciplines and gaining knowledge on the interactive and competing processes that shape the earth, from its evolution to the present status of ever increasing demand for natural resources, call for an all encompassing and multidisciplinary approach. Establishment of CESS in 1978 by Prof. C. Karunakaran was a recognition and realisation of this need to study earth's processes with a holistic approach.

The primary objective of CESS is to promote modern scientific and technological research and focus on developmental programmes relevant to the country in general and Kerala State in particular. CESS undertakes studies in tune with these objectives in the fields of geosciences, environmental sciences, marine sciences and atmospheric sciences. Programmes are focused in unravelling new scientific knowledge on the internal and surface processes of the south Indian lithosphere and the adjoining Arabian Sea as well as their interaction with the atmospheric cover, to develop knowledge and expertise needed for the use of natural resources in a sustainable way. All programmes have an emphasis to contribute to the thrust areas of research in earth sciences and to the societal needs of the State. Unlike many institutions in the area of geosciences, CESS fosters a tie-up between basic and applied research, with a focus on areas relevant to the society. CESS had, over the years, endeavoured to contribute substantially to natural hazard assessment and mitigation, in understanding atmospheric parameters, coastal processes, natural resource management and probing the dynamic processes of earth. CESS takes pride to be the only 'multidisciplinary earth science institute' in the country today.

Research programmes of CESS are broadly grouped under five major themes as crustal evolution and geodynamics, natural hazards, coastal processes and management, natural resources and environmental management, and atmospheric dynamics. Activities are presently organised under seven divisions, namely, Geosciences Division, Marine Sciences Division, Atmospheric Sciences Division, Resources Analysis Division, Environmental Sciences Division, Chemical Sciences Division and Training & Extension Division with several supporting laboratories.

CESS believes in the motto “Committed to our earth, our future” and strives to take benefits of its research to the society. It also believes that flourishing of basic research will lead to applied technologies that would eventually benefit the industry, prudent environmental management, and natural hazard mitigation, sustainable use of natural resources and in improving the quality of life.

www.cess.in

12.2.4 Flora and Fauna Survey

A detailed survey of flora and fauna of proposed development of Honnavar Barge/Vessel Loading Facility and its environs extending up to a radius of 10 km was carried out under the supervision and guidance of Prof. K. B. Reddy, Professor of Environmental Biology (S. G. H. R & M. C. M. R College of Post Graduate Studies, Malla Reddy Nagar, Guntur) and a senior consultant for flora, fauna and ecology for several major irrigation and hydroelectric projects and his team.

12.2.5 Andhra University

The Department of Meteorology & Oceanography, Andhra University has been the first and foremost in India to offer post graduate teaching and research programs in Oceanic and Atmospheric sciences. The Department was started in 1948 and over the years it contributed immensely for the development of newly emerging branches of science under the stewardship of Late Prof. R. Ramanadham, Prof. V.P. Subhramaynam and Prof. P Koteswararam, etc. The department has produced several distinguished alumni who played key roles in setting the direction for the development of Meteorology & Oceanography at national and international levels. The Department has been identified for DST – FIST sponsored Department in strengthening the teaching and research in the fields of Meteorology and Physical Oceanography

www.andharauniv.in

APPENDIX A

TOR & COMPLIANCE

No. SEIAA 22 IND 2011
STATE LEVEL EXPERT APPRAISAL COMMITTEE, KARNATAKA
(Constituted by MoEF, GoI)

Department of Ecology and Environment
7th Floor M.S. Building, Bangalore.
Dated: 13th September 2011.

To,

M/s. Honnavar Port Pvt. Ltd.,
103, Lalehzar Apartments, 45/1-2,
Palace Road, Bangalore -560 001.

Sir,

Sub: Development of barge/vessel loading facility at Coastal Sand Spit, Kasarakod Tonka, Honnavar Taluk, Uttarakannada District of M/s. Honnavar Port Pvt. Ltd., -
ToRs & Additional ToRs – Regarding.

* * * *

This has reference to your letter-dated: 09.06.2011 regarding the subject mentioned above. Information furnished subsequent to your letters has also been considered.

The proposal is for Development of barge/vessel loading facility at Coastal Sand Spit, Kasarakod Tonka, Honnavar Taluk, Uttarakannada District. This is a project falling under the category 7(e) of the Schedule of EIA Notification 2006.

The State Expert Appraisal Committee (SEAC), Karnataka considered the project during its meeting held on 20th of August 2011. Based on the consideration of the documents submitted and the presentation made by the project proponent, the Committee prescribed the following Terms of Reference (TORs) & Additional ToRs for preparing draft Environmental Impact Assessment (EIA) report for the above mentioned project. You are requested to prepare and submit the draft EIA Report as per ToRs prescribed as follows: -

Executive Summary of the project - giving a *prima facie* idea of the objectives of the proposal, use of resources, justification, etc. In addition, it should provide a compilation of EIA report, including EMP and the post-project monitoring plan in brief.

MODEL TORs

1.0 Introduction

This chapter should cover the following:

- Purpose of the project, project proponent, brief description of the project-name, nature, size, location of the project, its importance to the country and the region.

- Land description- plot/ survey nos/ village, tehsil, district, state & extent of the land.
- Profile of the project proponent, name and contact address with e-mail, implementing organization, organizational chart, project consultants etc.
- Whether the project attracts the provisions of General Conditions of EIA Notification 2006. If so applicability should be discussed.
- The proponent should confirm that the project meets the central/state/local environmental regulations and standards applicable for the project.
- Any litigation pending against the proposed project and/ or any direction/order passed by any court of law against the project, if so, details thereof.
- In case of expansion/ modernization of the project, the environmental compliance status for the existing project should be explained.

2.0 Project Description

This chapter should cover the broader details of the basic activities, location, layout and implementation schedule of the project.

- Type of the project- new, expansion, modernization, container cargo handling facility, fishing, minor / major port etc.
- Relevance of the project in the light of the existing development plans of the region.
- Project coverage, master plan, phasing and scope.
- Description of a project site, geology, topography, transport and connectivity, demographic aspects, socio, cultural and economic aspects, villages, settlements.
- Capacity of the port, types of cargo proposed for handling, cargo handling equipments, ancillary operations, housing, truck parking details etc.
- Technologies involved for design, construction, equipment and operation.
- Use of existing public infrastructure - road, railway and inland waterway net works, water supply, electrical power etc.
- Estimated water budget for the proposed project- during construction/ operation stages.
- Estimated cost of development of the project, environmental cost, funding agencies i.e., whether governmental or on the basis of BOT etc.
- Details of land acquisition, rehabilitation of communities / villages present status of such activities
- Resources, manpower and time frame etc -required for project implementation.
- A map specifying locations of the state, district and project location.
- A map of project area and 10 km area from boundary of the proposed/existing project area, delineating protected areas notified under the wild life (Protection) Act, 1972 / critically polluted areas as notified by

the CPCB from time to time / notified eco sensitive areas / inter-state boundaries and international boundaries.

- A map covering aerial distance of 15 km on the landward side from the proposed project boundary delineating environmental sensitive areas as specified in column no 9(iii), Form I of EIA notification dated 14th Sep 06.
- Land use map of the study area to 1: 25,000 scale based on recent satellite imagery of the project area and 10 kms from the proposed project boundary delineating the cropping pattern, wastelands, forest area and built-up areas, water bodies, human habitation and other surface features such as railway tracks, ports, airports, roads, NH, major industries etc.
- Site lay out plan of the proposed development shall be submitted to a scale of 1:5000, clearly marking the layout of breakwaters, navigation channels, harbour basin, berths, dry docks, workshops, container freight station, cargo handling systems, conveyors, covered and uncovered storage yards, ware houses, roads, railway tracks, effluent disposal point, administrative and operational buildings, utilities, town ships, greenbelt, dredged material disposal, etc. Boundaries of the proposed port shall be shown therein with latitude and longitude.
- Area drainage contour map of the project area and 2-5 km from the proposed project area shall be clearly indicated. In case of any proposed diversion of nallah/canal/river, same shall also be shown in the map.
- Hydrographic charts of the offshore area giving general morphology of the coastal stretch to a scale of 1:50,000 shall be submitted covering water depth up to 10m beyond the maximum proposed dredging depths of the project and covering a distance of 5 km along the coast from the project limits on both sides.
- The CRZ maps indicating the High Tide Level (HTL), Low Tide Level (LTL), demarcated by one of the seven authorized agencies and the project lay out superimposed on the map should be submitted on 1:5000 scale map. This map shall be recommended by the state/Union Territory CZM authority.

3.0 Analysis of alternatives (Technology & Sites)

In case, the scoping exercise results in need for alternatives this chapter shall include:

- Description of various alternatives like locations or layouts or technologies studied.
- Description of each alternative.
- Summary of adverse impacts of each alternative
- Selection of alternative.

4.0 Description of the Environment

4.0 Study Area

As a primary requirement of EIA process, the proponent should collect primary baseline data in the project area as well as in the area falling 5 km from

the proposed project boundary and secondary data should be collected within 15 kms aerial distance from the project boundary, as specifically mentioned at column 9(iii) of Form I of EIA Notification 2006. The study areas mentioned in this document shall be considered for guidance purpose but the exact study area for different environmental attributes (water, air, noise, soil, etc) is to be submitted considering the proposed activities and location, along with proper reasoning, for review and approval by the expert appraisal committee.

4.1 Land Environment

4.1.1 Land

Availability of land for earmarking for the port without causing a due hardship to local habitat and their socio cultural and economic aspects is very important. Data on the land availability is to be ascertained from local authorities, revenue records etc. Justification for the proposed quantum of the area is to be given.

4.1.2 Topography

Baseline data to be given on description of existing situation of the land at the proposed project area including description of terrain hill slopes coastal and inland topography, coastal features (lowland, beaches, littoral areas, shoal areas), terrain features, slope and elevation. Study of land use pattern, habitation, cropping pattern, forest cover, environmentally sensitive places etc, by employing remote sensing techniques (if available) and also through secondary data sources.

4.1.3 Geology

Baseline data to be provided on rock types, regional tectonic setting (reported fractures/faulting, folding, warping), and history of any volcanic activity, seismicity and associated hazards, mainly in the coastal area. Information on quarry yields, strengths of rock, distance of quarries from habitat, restrictions for quarrying, environmental controls, statutory permissions etc., should be provided.

4.1.4 Soil

Soil data including type, classification, characteristics, soil properties etc., are important from engineering considerations for design of structures, loading capacities of cargo stockpiles, green belt development etc. Changes in parameters of soil also may affect plantation and vegetative growth, which in turn may endanger the health of local habitat. Baseline data of the soil, results of investigations carried out to be provided for the project area.

4.1.5 Meteorological Data

Meteorological data covering the following should be incorporated in the EIA report. The data for at least a 10 year period should be presented from the

nearest meteorological station, except for the history of cyclones and tidal surges for which 100 year data is required.

- Wind speed and direction
- Rainfall
- Relative humidity
- Temperature
- Barometric pressures
- History of cyclones

4.2 Water Environment

4.2.1 Ground water

Baseline data of ground water including data of pH, dissolved solids, suspended solids, BOD, DO, coli-form bacteria, oil, heavy metals (depending upon the type of cargo) is to be collected at least for one season. Usage purpose of the ground water, if any, is to be indicated.

4.2.2 Surface Water

Baseline data on location of surface water like lagoons, lakes, tidal inlets, streams, rivers, their details, present quality and their utility, if any, is to be provided. Details of water bodies in the project area shall be described specifically. Water quality is to be monitored for one season.

4.3 Marine Environment

4.3.1 Coastal Hydrology/geomorphology

Coastal hydrology requires collection of oceanographic data during the study period, covering the following parameters:

- Tides
- Waves (wind waves and swells)
- Storm surges
- Currents
- Salinity
- Sea water temperature
- Suspended load, and
- Seabed bathymetry

Baseline oceanographic data should extend at least to depths more than 10m of proposed deepening of the harbor approach and basin as per master plan proposed. A study on likely changes in the sediment transport and littoral drift due to the construction of port particularly the breakwater should to be taken up. Details of mangroves, marshes and other coastal vegetation, sand dunes, coastal stability, seismic characteristics, history of any endangered species, coastal erosion, and shoreline changes should be furnished.

4.3.2 Bed Sediment Contamination

Baseline data on bottom sediments and the associated bottom biota and other physical habitat, at the proposed project area and the neighborhood areas has to be collected and analyzed.

4.3.3 Sea/Harbor Water Quality

Baseline data shall be collected on chemical parameters in the open sea and in the proposed port area for understanding hydro chemical characteristics in the marine environment (such as sea water temp, BOD, DO, pH, TSS, salinity, heavy metals depending upon the cargo, etc.)

4.4 Biological Environment

4.4.1 Marine/Coastal Ecology

Baseline data of aquatic flora and fauna at the project area, including the coastal area is to be ascertained by proper surveys including mangroves and marshes and other coastal vegetation, sand dunes. Data on coastal stability, seismic characteristics, history of any endangered species, coastal erosion, shoreline changes, if any, is also necessary.

4.4.2 Flora and Fauna in the Neighborhood

Details on secondary data on the existing flora and fauna in the study area as well as 15km from its boundary, carried out by an university/institution under the relevant discipline (such as BSI, ZSI, WII, etc) shall be included in the list of flora and fauna along with classification as per Schedule given in the Wild Life Protection Act, 1972 (for fauna) and in the Red Book Data (flora) and a statement clearly specifying whether the study area forms a part of an ecologically sensitive area or migratory corridor of any endangered fauna.

4.5 Air Environment

Base line data of ambient air parameters namely RSPM, nitrogen dioxide, sulphur dioxide, carbon monoxide, heavy metals and other harmful air pollutants depending upon the type of the cargo should be monitored. This data should be collected in an area extending at least 5 km from the project boundary by observation at a number of locations. Specific importance should be attached to areas in close proximity of project say up to 1 km. One season data should be monitored other than monsoon as per the CPCB Norms. One station should be in the up-wind/ non-impact/ non-polluting area as a control station.

4.6 Noise

Baseline data on noise pollution at the project area and the neighbourhood up to 1 km or nearest residential areas is to be monitored as per the CPCB norms.

4.7 Existing Solid Waste Disposal Facilities

Details of authorized municipal solid waste facilities, biomedical treatment facilities and hazardous waste disposal facilities in the area should be inventorized, in case if it is proposed to utilize the same

4.8 Socio-economic and Occupational Health Environments

Baseline data at the project area shall include the demography, particularly on human settlements, health status of the communities, existing infrastructure facilities in the proposed area and area of impact due to the proposed activity. Present employment and livelihood of these populations, awareness of the population about the proposed activity shall also be included.

4.9 Public Utilities

Base line data of existing public utility infrastructure shall be ascertained and reported to assess the impacts of the project on these public utilities in order to incorporate desired methods in the EMP and monitor the same during the construction as well as operational phases of the port.

5.0 Anticipated Environmental Impacts and Mitigation Measures

This Chapter should describe the likely impact of the project on each of the environmental parameters, methods adopted for assessing the impact such as model studies, empirical methods, reference to existing similar situations, reference to previous studies, details of mitigation methods proposed to reduce adverse effects of the project, best environmental practices and conservation of natural resources. The identification of specific impacts followed with mitigation measures should be done for different stages i.e., location of the port, construction including dredging, ship traffic including discharges from vessels and cargo operations.

5.1 Land Environment

5.1.1 Land

Anticipated Impacts:

Impact of project construction/operation on the land requirement / land use pattern should be assessed. Affect of future growth of the port facility and/or of the ancillaries should be carefully assessed by preparing master plans for the port and the ancillaries. Impact on the public utilities arising out of the utilities for the project activities and impact on the natural drainage system are equally important. Prediction of impacts should include impacts on the existing infrastructures like road network, housing, ground water/surface water etc., and loss of productive soil and impact on natural drainage pattern.

Mitigation Measures:

Mitigation measures to reduce adverse effects like adopting soil improvement techniques and adopting suitable design methods to reduce land requirement. Where land acquisition and consequential R&R methods are called for, it should be implemented duly adhering to the norms and complying with pertinent statutory requirements for such land acquisition. Strengthening of road and rail network infrastructure to handle the increase in traffic and truck parking arrangements, integration of Port development with the local land use plan should be planned.

5.1.2 Topography, geology and soil

Anticipated Impacts:

Impact of port construction/operation on the topography due to activities like depletion of hills due to large scale quarrying, filling of low lying area with dredged spoil and borrowed material, damage to existing vegetation/green belt and plantation, changes in land use patterns, disturbance to existing protected areas like mangroves, forests and environmentally sensitive areas/zones should be assessed. Flooding due to filling up of low-lying areas should be assessed. Impacts on the surrounding land use pattern, on infrastructure like housing, ground water, etc should be assessed. Impact of the project construction on the geology and vice-versa should to be studied in detailed. Impact of project construction/operation on the soil parameters, probability of settlement, subsidence, slides, surface drainage, leachets etc., are to be estimated.

Mitigation Measures:

Mitigation measures to reduce adverse effects include study of alternative sites, improving green belt, obtaining construction materials from other sources, usage of alternative construction materials like fly ash, where possible; storm water management etc. Adopting soil improvement techniques and adopting suitable design methods, ground covering etc.

5.2 Water Environment

5.2.1 Ground Water

Anticipated impacts:

Discharge of trade effluent and sewage and its impact. Impact of project construction/operation on the ground water on account of leachets, run off from material and cargo storages and toxic or harmful substances, percolation, sea water intrusion etc.,

Mitigation measures:

Mitigation measures to reduce adverse effects like impervious paving the cargo areas, impervious roads, lined drains, routing surface drainage to settlement tanks/pits etc. Treatment of effluent, recycle/ reuse and disposal

should be planned. Groundwater study on leaches should be carried out periodically and should be correlated with baseline data. Remedial measures should be taken in case of any deviation. Based on the total water budget of the project, the use of ground water should to be reviewed and alternatives to be presented.

5.2.2 Surface Water

Anticipated impacts:

Impact of port operations on surface water sources, contamination due to cargo operations, impact on utility of surface water resources by the neighboring colonies, impact on surface water flow (ex. flooding) due to anticipated obstructions, etc

Mitigation measures:

Protection measures to surface water resources to prevent reduction in their quality due to construction and operational activities and choice of alternative resources. Proposals to treat effluents conforming to standards notified under EP Act 1996 should be submitted.

5.3 Marine Environment

5.3.1 Coastal Hydrology

Anticipated impacts:

Impact of the project construction/operation on the coastal hydrology on account of port construction should be assessed by suitable model studies.

Mitigation measures:

Careful site selection and port design should be planned to minimize impacts due to changes in current patterns and other coastal hydrology. Model experiments or computer simulations of these changes are useful in developing an appropriate design. Shore protection works like construction of sea walls, groynes, sand bye- passing or beach nourishment should be studied.

5.3.2 Bed Sediment contamination

Anticipated impacts:

Impact of the project construction/operation on the bed sediment contamination on account of port construction/operations is to be assessed by suitable empirical/model studies.

Mitigation measures:

A survey of contamination of bottom sediments should be undertaken before dredging.

5.3.3 Sea/Harbor Water Quality

Anticipated impacts:

Impact of the project construction/operation on the sea/harbour water quality on account of port construction is to be assessed by suitable empirical/model studies.

Mitigation measures:

Proper collection and disposal of liquid and solid waste from shore establishment and ships should be planned.

5.4 Biological Environment

Anticipated impacts:

Impacts of the project construction/operation on the marine/coastal ecology on account of port construction should be assessed by suitable empirical/model studies. Impacts due to floodlights on the nesting of sea turtles and other species should be studied

Mitigation measures:

Mitigation measures to reduce adverse effects should be provided.

5.5 Air Environment

Anticipated Impacts:

Impact of project construction/operation on the ambient air quality on account of emissions of dust during construction and cargo handling as well as emission of gases from equipment deployed for construction and cargo handling should be assessed. Prediction due to emissions during cargo handling/ emissions from the ships in the port area/ emissions due to increased traffic, emission inventory for critical pollutants with and without mitigation measures, prediction of the impact due to the existing activity on the proposed project, prediction of impacts due to sanctioned/ongoing projects in the surrounding area on the proposed project and the ambient environment shall be carried out.

Mitigation measures:

Mitigation measures proposed during the construction stage should include dust suppression measures by suitable techniques. Mitigation measures proposed during the operation stage should include alternative solutions such as closed conveyor system, closed silos, closed vehicles to transport dusty cargo etc, mitigation measures to lower the emissions from the ships and green belt development.

5.6 Noise Pollution

Anticipated impacts:

Impact of project construction/operation on the noise and vibration on account of construction equipment, cargo handling equipment and road traffic.

Mitigation measures:

Mitigation measures to reduce adverse effects should be provided.

5.7 Solid Waste Management

Anticipated impacts:

Impact due to non-hazardous and hazardous solid waste generated during the construction and operational stages should be assessed.

Mitigation measures:

Mitigation measures to comply the norms should be planned. Options for minimization of solid waste and environmentally compactable disposal/recycling of waste to conserve natural resources should be planned. Management and disposal of temporary structures, made during construction phase should be planned.

5.8 Socio-economic and Occupational Health Environment

Anticipated impacts:

Predicted impact on the communities of the proposed activity. Details of public and private land in the proposed and immediate surroundings socio-economic status of the affected owners of the private land shall be properly complied. Present status of health, housing, public utilities, commercial structures and transportation should be collected. Impact of the project on socio cultural aspects should be assessed. Socio-economic impacts due to displacement of fishing settlements and population influx due to increased activities should be assessed.

Mitigation measures:

Mitigation measures to reduce adverse effects including satisfactory R&R methods should be planned.

6.0 Environmental Monitoring Program

This Chapter shall include details of environmental monitoring programme. It should include the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules).

- Summary matrix of environmental monitoring, during construction and operation stage
- Requirement of monitoring facilities
- Frequency, location, parameters of monitoring
- Compilation and analysis of data, comparison with base line data and
- compliance to accepted norms and reporting system
- Plantation monitoring program

7.0 Additional Studies

Specific condition Study required	Specific condition Study required
Studies identified by the proponent and the Regulating Authority	Studies directed by the Expert Appraisal Committee while deciding the TOR for the project
Studies identified by the public and other stake holders	Public hearing with the issues raised by the public and the response of the project proponent in tabular form shall be discussed
Risk Analysis and Disaster Management Plan (DMP)	<ul style="list-style-type: none"> • Risk analysis • Safety measures for handling bulk liquid substances • Personal protection equipment • Disaster management Plan (DMP) • Oil spill contingency plan • Emergency response procedures
Natural resource conservation and optimization	Plan of action for conservation of natural resources such as utilization of fly ash and other suitable waste materials availability for the construction of the project. Dredged material utilization and disposal plan should be furnished. Water Conservation measures should be addressed. Energy efficiency measures in the activity arte to be drawn up.
R & R action plans	Detailed R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternative livelihood concerns/employment and rehabilitation of the displaced people, civil and housing amenities being offered, etc and the schedule of the implementation of the project specific R&R Plan. Details of provisions (capital & recurring) for the project specific R&R Plan
Specific studies requirement depending on the site and activity proposed shall be discussed	

8.0 Project Benefits

This chapter shall include benefits accruing to the locality, neighbourhood, region and nation as a whole. It should bring out details of benefits by way of:

- Improvements in the physical infrastructure by way addition of project infrastructure, ancillary industries that may come up on account of the project
- Improvements in the social infrastructure like roads, railways, townships, housing, water supply, electrical power, drainage, educational institutions, hospitals, effluent treatment plants improved waste disposal systems, improved environmental conditions, etc.
- Employment potential –skilled; semi-skilled and unskilled labour both during construction and operational phases of the project with specific attention to employment potential of local population as well as necessity for imparting any specialized skills to them to be eligible for such employment in the project on a long term basis i.e., during operational and maintenance stages of the project and
- Other tangible benefits like improved standards of living, health, education etc.

9.0 Environmental Cost Benefit Analysis

If recommended by the Expert Appraisal Committee at the scoping stage, this chapter shall include the environmental cost benefit analysis of the project.

10.0 Environmental Management Plan (EMP)

- Summary of potential impacts & recommended mitigation measures.
- Allocation of resources and responsibilities for plan implementation
- Administrative and technical setup for management of environment
- Institutional arrangements proposed with other organizations/Govt. authorities for effective implementation of environmental measures proposed in the EIA
- Safe guards/mechanism to continue the assumptions/field conditions made in the EIA Environmental specifications for contractors should cover the required safeguards during the design and construction stage

11.0 Summary & Conclusion (Summary EIA)

It shall be a summary of the full EIA report condensed to ten A-4 size pages at the maximum. It should necessarily cover in brief the following chapters of the full EIA report – Introduction/ Project description/ Description of the environment// Anticipated environmental impacts & mitigation measures/ Additional studies/ Environmental monitoring programme/ Project benefits/ Environmental management plan / Disclosure of consultants engaged

12.0 Disclosure of Consultants Engaged

This chapter shall include the names of the consultants engaged with their brief resume and nature of consultancy rendered.

12.1 Additional Corporate Environmental Responsibility :-

- (i) (a) Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.
- (b) Does the Environment Policy prescribe for standard operation process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/conditions? If so, it may be detailed in the EIA.
- (ii) What is the hierarchical system or Administrative order of the company to deal with environmental issues and for ensuring compliance with the Environmental Clearance conditions details of this system may be given.
- (iii) Does the company have a system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism should be detailed in the EIA report.

Additional TORs: -

1. Details of handling, uploading, transportation of export material.
2. Details of materials proposed to be imported.
3. Breeding season of fish and their abundance.
4. Identification of mangroves in backwaters and the impact of the project on the flora and fauna in the mangroves.
5. Impact of dredging on fish breeding and the juveniles


The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and the data provided by other Organization(s)/Laboratories including their status of approvals etc. In this regard Office Memorandum No. F. No. J-11013/77/2004-IA.II(I) dated 30th June, 2011 available on the MoEF, GoI website <http://www.moef.nic.in> may please be referred.

The ToRs prescribed by the State Expert Appraisal Committee, Karnataka should be considered for the preparation of EIA / EMP report for the above mentioned project in addition to all the relevant information as per the Generic Structure of EIA given in Appendix III and III-A in the EIA Notification, 2006. On finalization of EIA/EMP prepared as per ToRs and addressing and incorporating all concerns raised during public consultation, the same should be submitted to the SEAC for prior environmental clearance.

The ToRs prescribed will be valid for a period of two years for submission of the EIA/EMP report.

You are also requested to submit the filled up information as per the format enclosed as Annexure.

Yours faithfully


(Dr. M. H. Balakrishnaiah)
Secretary,
SEAC.

Copy to: -

1. The Secretary to Government, Department of Ecology and Environment, Govt. of Karnataka, Bangalore.
2. Chairman, Karnataka State Pollution Control Board, KSPCB, Parisar Bhavan, 4th & 5th Floor, Church street, Bangalore -560 001, it is requested that the public consultation of the above project may be conducted within stipulated period in accordance to the procedure laid in the EIA notification, 2006.
3. Guard File.

ToR- Compliance

SL.NO	TOR – SEIAA, Karnataka	COMPLIANCE
1	Introduction	<p>Chapter 1 : Introduction , Page Number 1.1, Final EIA</p> <ul style="list-style-type: none"> • Background • Details of Project Proponent • Applicable Legal and Policy Framework • Project Site <ul style="list-style-type: none"> • Features of Project Site and its surroundings • Connectivity • Need for Development of Honnavar Barge/ Vessel Loading Facility • Project Development Plan • Environmental Impact Assessment • Approach and Methodology <ul style="list-style-type: none"> • Project Influenced Area (PIA)/Study Area • Study Period • Methodology • Structure of EIA Report
2	Project Description	<p>Chapter 2 : Project Description , Page Number 2-1, Final EIA</p> <ul style="list-style-type: none"> • General • Location • Land Availability • Barge /Vessel Loading - Traffic <ul style="list-style-type: none"> • Iron Ore • Coal • General and Other Cargos • Traffic for Honnavar • Field Surveys and Investigations <ul style="list-style-type: none"> • Bathymetry • Geotechnical Investigation • Oceanic Investigation • Mathematical Model Studies <ul style="list-style-type: none"> • Wind-wave model and near shore wave transformation and Wave Tranquillity • Hydrodynamic Model Studies • Cohesive/Mud transport (MT) model • Non- Cohesive Sediment transport • Shoreline Changes Study • Dredge Disposal study • Honnavar Barge/Vessel Loading Facility Development Plan <ul style="list-style-type: none"> • Barge/Vessel Loading Facility Layout • Cargo Handling Capacity • Design Vessel Size and Dimension • Berthing Facilities • Operation Downtime and Effective Working Hours • Breakwaters • Approach Channel and Turning Circle • Dredging and Disposal • Cargo Handling

		<ul style="list-style-type: none"> • Cargo Storage Area • Shore Protection Works • Fendering and Mooring Systems • Navigational Aids • Port Crafts • Existing Hinterland Connections and Road/Rail Network • Proposed Dedicated Rail/Road Corridor • Utilities and Services • Pollution Control Aspects • Coastal Regulation Zone Compatibility • Green areas and Greenbelt Development • Project Cost • Project Implementation Schedule • Corporate Social Responsibility
3	Analysis of Alternatives	<p>Chapter 3: Analysis of Alternatives , Page Number 3-1 in Final EIA</p> <ul style="list-style-type: none"> • General • Alternate Options <ul style="list-style-type: none"> • Alternative 1: Straight Channel with berth and Stockyard on Kasarkod side • Alternative 2: Channel along the present river mouth and berth and Stockyard on Kasarkod side • Alternative 3: Channel made after cut opening the Kasarkod spit with the berth and backup area on Kasarkod side • Alternative 4: Channel made after cut opening the Kasarkod spit with berth and backup area on Honnavar side • Comparison of Layouts • Selection of Best Layout
4	Description of the Environment	<p>Chapter 4: Description of the Environment , Page Number 4-1 in Final EIA</p> <ul style="list-style-type: none"> • General • Study Area • Land Environment <ul style="list-style-type: none"> • Land • Land Use – Land Cover Study Methodology • Topography • Geology • Soil • Water Environment <ul style="list-style-type: none"> • Groundwater • Surface Water • Marine Environment <ul style="list-style-type: none"> • Coastal Hydrology/ Geomorphology • Bed Sediment Contamination/Bed Sediment Quality • Sea/Harbour Water Quality • Biological Environment

		<ul style="list-style-type: none"> • Marine/Coastal Ecology • Fisheries • Flora and Fauna in the Area • Air Environment <ul style="list-style-type: none"> • Meteorological Data from Nearest Meteorological Station (Honnavar) • Meteorological Scenario during Study Period • Ambient Air Quality • Noise <ul style="list-style-type: none"> • Results and Discussion • Observations • Socio-Economic and Occupational Health Environment <ul style="list-style-type: none"> • Population Characteristics • Medical Facilities • Educational Facilities • Details of Fishing Villages and Fish Landing Centres • Existing Solid and Liquid Waste Disposal Facilities <ul style="list-style-type: none"> • Public Utilities • Archaeological Monuments
5	Anticipated Environmental Impacts and Mitigation Measures	<p>Chapter 5 : Anticipated Environmental Impacts & Mitigation Measures , Page Number 5-1, Final EIA</p> <ul style="list-style-type: none"> • General • Land Environment <ul style="list-style-type: none"> Potential Impact due to Project Location Potential Impact during Construction Potential Impact during Operations • Water Environment <ul style="list-style-type: none"> Potential Impact due to Barge/ Vessel Loading Facility Location Potential Impact due to Construction Potential Impact during Operation • Marine Environment (Coastal Hydrology/Bottom Contamination, Sea/Harbour Water Quality) <ul style="list-style-type: none"> Potential Impact due to Barge/ Vessel Loading Facility Location Potential Impact due to Construction Potential Impact during Operation • Biological Environment (Coastal and Marine Ecology) <ul style="list-style-type: none"> Potential Impact due to proposed Facility Location Potential Impact due to Construction Potential Impact due to Operation • Air Environment <ul style="list-style-type: none"> Potential Impact during Construction Potential Impact due to Operation • Noise Pollution <ul style="list-style-type: none"> Potential Impact during Construction Potential Impact during Operation • Solid Waste Management <ul style="list-style-type: none"> Potential Impact during Construction Potential Impact during Operation • Anticipated Potential impacts due to the proposed Rail/Road

		<p>alignment</p> <ul style="list-style-type: none"> Socio-Cultural Impact <ul style="list-style-type: none"> Potential Impact due to proposed Facility Location Potential Impact during proposed Facility Operation
6	Environmental Monitoring	<p>Chapter 6: Environmental Monitoring , Page Number 6-1, Final EIA</p> <ul style="list-style-type: none"> Budgetary Estimates for Environmental Management Environmental Monitoring Programme Compliance Reports Plantation Monitoring Programme On-site Mock Drills Requirements
7	Additional Studies	<p>Chapter 7: Additional Studies , Page Number 7-1 , Final EIA</p> <ul style="list-style-type: none"> Public Hearing Preliminary Risk Analysis Disaster Management Plan Dredge Material Utilization & Disposal Plan Social Impact Assessment Corporate Social Responsibility
8	Project Benefits	<p>Chapter 8 : Project Benefits, Page Number 8-1, Final EIA</p> <ul style="list-style-type: none"> Introduction Infrastructure Facilities <ul style="list-style-type: none"> Rail Connectivity Road Connectivity Induced development Improved Socio-economic Conditions <ul style="list-style-type: none"> Quality of Life Health Educational Facilities Corporate Social Responsibility (CSR) Employment Opportunities
9	Environmental Cost Benefit Analysis	SEIAA not Suggested Environmental Cost benefit Analysis in the scoping stage of the Project
10	Environmental Management Plan	<p>Chapter 10 : Environmental Management Plan , Page number 10-1, Final EIA</p> <ul style="list-style-type: none"> Components of EMP Administrative and Technical Setup for Environmental Management <ul style="list-style-type: none"> Institutional Framework of EMP Institutional Mechanism for Implementation of Mitigation Measures Approach towards Voluntary Compliance Environmental Management Cell (EMC) Greenbelt Development Plan <ul style="list-style-type: none"> Species for Plantation Biodiversity Conservation and Management Plan
11	Summary & Conclusion	<p>Chapter 11 : Summary & Conclusion , Page Number 11-1, Final EIA</p> <ul style="list-style-type: none"> Introduction Project Location Need for Development of Barge / Vessel loading facility

		<ul style="list-style-type: none"> • Project Benefits • Project Description <ul style="list-style-type: none"> Salient Features of Barge/ Vessel Loading Facility Utilities & Services • Greenbelt Development • Project Cost • Environmental Impact Assessment • Description of Environment <ul style="list-style-type: none"> • Marine Environment • Terrestrial Environment • Socio-economic Conditions • Additional Studies <ul style="list-style-type: none"> • Preliminary Risk Analysis • Disaster Management Plan • Social Impact Assessment • Project Benefits • Environmental Management Plan • Environmental Monitoring Programme • Disclosure of Consultants Engaged
12	Disclosure of Consultants Engaged	Incorporated in the Report.
Additional ToRs		
1	Details of Handling , Uploading , transportation of export material	Cargo handling Details are provided in the chapter 2 : Project Description in Section 2.3
2	Details of materials proposed to be imported	Traffic for the Proposed Barge/ Vessel Loading facility are discussed in the chapter 2: Project description
3	Breeding season of fish and their abundance	Most common Varieties of fish are discussed in the chapter 4: Description of Environment in section 4.5.2: Fisheries.
4	Identification of mangroves in back waters and the impact of the project on the flora and fauna in the mangroves	There is no mangroves in the project site, in the project influence area (PIA) there are mangroves but is about 2.4 km away from the proposed site. Impacts due to the proposed project are negligible.
5	Impact of dredging on fish breeding and the juveniles	Impacts due to dredging activities are discussed in Chapter 5: Anticipated potential impacts.

APPENDIX B
SOIL ANALYTICAL RESULTS

Appendix B Soil Analysis Result

Table B-1: Soil Analysis result

S. No	Parameters		Units	S1	S2	S3	S4	S5	Agriculture Soil Limits
1	Texture		--	Sandy	Sandy Clay	Sandy	Sandy	Sandy	--
2.	Particle Size Distribution	Sand	%	72	62	70	74	68	--
		Silt	%	04	10	06	04	08	--
		Clay	%	24	28	24	22	24	--
3.	Color		Hazen	Light Brown	Brown	Light Brown	Light Brown	Brown	--
4.	Soil Type		--	Sandy	Sandy Clay	Sandy	Sandy	Sandy	--
5.	pH (10% Slurry)		--	7.23	7.86	6.78	6.62	6.92	6.50-8.00
6.	Conductivity		μS/cm	96	112	88	92	102	<500
7.	Bulk density		gram/cc	1.04	1.16	1.05	1.02	1.09	1.0-1.5
8.	Porosity		% v/v	36	32	36	38	36	--
9.	S.A.R		%	2.12	1.96	1.82	1.93	1.97	--
10.	Infiltration capacity		mm/h	58	52	56	58	52	--
11.	Nitrogen as N		mg/100gr m	26	86	28	25	28	150-300
12.	Potassium as K		mg/100gr m	36	92	34	32	36	300-360
13.	Phosphorus as P		mg/100gr m	16	26	16	12	18	65-80
14.	Zinc as Zn		mg/kg	0.63	0.92	0.73	0.49	0.63	--
15.	Cadmium as Cd		mg/kg	0.02	0.02	0.02	0.02	0.03	--
16.	Cat ion exchange Capacity		meq/100g r	1.36	1.28	0.88	0.92	0.82	--
17.	Alkali Metals		mg/kg	1.2	0.98	1.13	0.99	0.76	--
18.	Permeability		Cm/s	8.3	9.8	8.6	8.9	8.4	--
19.	Water holding capacity		%	6.3	9.3	6.5	6.1	6.7	--
20.	Chromium as Cr		mg/kg	0.02	<0.02	0.02	0.02	0.02	--
21.	Copper as Cu		mg/kg	0.12	0.08	0.16	0.11	0.1	--
22.	Iron as Fe		mg/kg	0.36	0.84	0.46	0.42	0.46	--
23.	Manganese as Mn		mg/kg	0.06	0.04	0.04	0.06	0.04	--
24.	Lead as Pb		mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	--
25.	Nickel as Ni		mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	--

S1 - Port Site
S2 - Honavar
S3 - Kasarkod
S4 - Karki
S5 - Apsarakonda

APPENDIX C
INLAND WATER QUALITY RESULTS

Appendix C Inland Water Quality Results

Table C-1: Groundwater Quality

S. No.	Parameter	Requirement (Desirable Limits)	Permissible Limits in the Absence of Alternate Source	Units	GW1	GW2	GW3
1	pH	6.5 – 8.5	No Relaxation	-	6.68	6.78	6.84
2	Colour	5	25	Hazen	01	02	01
3	Taste	Agreeable	-	-	Agreeable	Agreeable	Agreeable
4	Odour	Unobjectionable	-	-	Unobjectionable	Unobjectionable	Unobjectionable
5	Conductivity	--	--	00000000	126	118	146
6	Turbidity	5	10	NTU	1.10	1.20	1.1
7	Temperature	--	--	OC	25.2	25.4	25.6
8	Total Dissolve solids	500	2000	mg/L	78	74	92
9	Total Solids	--	--	mg/L	80	76	96
10	Total Hardness as CaCO3	300	600	mg/L	40	40	48
11	Total Alkalinity	200	600	mg/L	30	40	40
12	Calcium as Ca	75	200	mg/L	12.8	12.8	12.8
13	Magnesium as Mg	30	100	mg/L	1.9	1.9	3.8
14	Residual Chlorine	0.2 min	-	mg/L	<0.02	<0.02	<0.02
15	BOD (3 days at 27oC)	03	03	mg/L	Nil	Nil	Nil
16	COD	05	05	mg/L	Nil	Nil	Nil
17	Dissolved Oxygen	04	04min	mg/L	5.0	4.9	5.0
18	Chloride as Cl-	250	1000	mg/L	14.2	7.1	14.2
19	Sulphate as SO4	200	400	mg/L	10.6	6.7	9.6
20	Fluorides as F-	1.0	1.5	mg/L	0.1	0.1	0.1

S. No.	Parameter	Requirement (Desirable Limits)	Permissible Limits in the Absence of Alternate Source	Units	GW1	GW2	GW3
21	Nitrates as NO3	45	100	mg/L	1.3	1.3	1.9
22	Sodium as Na	--	--	mg/L	9.2	7.4	9.7
23	Potassium as K	--	--	mg/L	0.4	0.4	0.4
24	Phenolic Compounds	0.001	0.002	mg/L	<0.001	<0.001	<0.001
25	Cyanides	0.05	NO Relaxation	mg/L	<0.02	<0.02	<0.02
26	Anionic Detergents	0.2	1.0	mg/L	<0.02	<0.02	<0.02
27	Cyanides as CN	0.05	--	mg/L	<0.02	<0.02	<0.02
28	Cadmium as Cd	0.01	NO Relaxation	mg/L	<0.01	<0.01	<0.01
29	Arsenic as As	0.01	NO Relaxation	mg/L	<0.001	<0.001	<0.001
30	Copper as Cu	0.05	1.5	mg/L	<0.01	<0.01	<0.01
31	Lead as Pb	0.05	NO Relaxation	mg/L	<0.02	<0.02	<0.02
32	Manganese as Mn	0.1	0.3	mg/L	<0.02	<0.02	<0.02
33	Iron as Fe	0.3	1.0	mg/L	<0.1	<0.1	<0.1
34	Chromium as Cr6+	0.05	NO Relaxation	mg/L	<0.01	<0.01	<0.01
35	Zinc as Zn	5	15	mg/L	<0.02	<0.02	<0.02
36	Salinity	100	--	mg/L	02	04	04
37	Mercury as Hg	0.001	NO Relaxation	mg/L	<0.002	<0.002	<0.002
38	Total Nitrogen	--	--	mg/L	0.04	0.06	0.06
39	Total phosphorus	--	--	mg/L	0.01	0.02	0.02
40	Free Ammonia As NH4	--	--	mg/L	Nil	Nil	Nil
41	Coliform Organisms	--	--	MPN/ 100 ml	Nil	Nil	Nil
42	Faecal Coli	--	--	MPN/	Nil	Nil	Nil

S. No.	Parameter	Requirement (Desirable Limits)	Permissible Limits in the Absence of the Alternate Source	Units	GW1	GW2	GW3
	form Organisms			100 ml			

Table C-2: Surface water Quality

S. No	Parameter	Units	IS:2296 Class C Limits	SW1	SW2	SW3
1	Ph	-	6.50 – 8.50	7.08	7.64	6.96
2	Colour	Hazen units	300	22	26	02
3	Conductivity	µS/cm	--	1186	8668	48
4	Turbidity	NTU	5.0	6.30	8.8	2.20
5	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6	Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
7	Temperature	°C	°C	25.6	25.4	25.1
8	Dissolved Oxygen	mg/L	4 min	4.60	4.80	4.90
9	BOD (3 days at 27°C)	mg/L	3	12	10	04
10	COD	mg/L	5	38	34	10
11	Total Dissolved Solids	mg/L	1500	744	5456	26
12	Total Solids	mg/L	--	758	5468	30
13	Total Hardness	mg/L	--	152	1040	12
14	Chloride as Cl ⁻	mg/L	600	35.5	2982.0	7.1
15	Fluorides as F ⁻	mg/L	1.5	0.8	1.60	<0.1
16	Sulphate as SO ₄	mg/L	400	468.5	65.3	3.9
17	Alkalinity	mg/L	--	40	50	10
18	Nitrates as NO ₃	mg/L	--	8.9	15.2	0.04
19	Cyanides as CN	mg/L	0.05	<0.02	0.02	<0.02
20	Calcium as Ca	mg/L	--	35.2	312.0	3.2
21	Magnesium as Mg	mg/L	--	15.4	62.4	0.96

S. No	Parameter	Units	IS:2296 Class C Limits	SW1	SW2	SW3
22	Sodium as Na	mg/L	--	197.8	1507.9	4.6
23	Potassium as K	mg/L	--	3.1	8.4	0.4
24	Iron as Fe	mg/L	50	0.22	0.22	0.04
25	Chromium Cr ⁶⁺	mg/L	0.05	0.02	0.03	<0.01
26	Cadmium as Cd	mg/L	0.01	<0.01	<0.01	<0.01
27	Lead as Pb	mg/L	0.1	<0.02	<0.02	<0.02
28	Copper as Cu	mg/L	1.5	0.08	0.09	<0.01
29	Arsenic as AS	mg/L	0.2	<0.001	<0.001	<0.001
30	Selenium as Se	mg/L	0.05	<0.01	<0.01	<0.01
31	Phenolics as C ₆ H ₅ OH	mg/L	0.005	< 0.001	< 0.001	< 0.001
32	Zinc as Zn	mg/L	15	0.012	0.22	<0.02
33	Mercury as Hg	mg/L	--	<0.0002	0.0004	<0.0002
34	Salinity	ppt	100	212	326	06
35	Anionic detergents as mbas	mg/L	1	0.06	0.12	0.02
36	Residual Chlorine	mg/L	0.2	<0.04	<0.04	<0.04
37	Manganese as Mn	mg/L	0.002	<0.02	0.04	<0.02
38	Total Nitrogen	mg/L	--	0.28	0.21	0.06
39	Total phosphorus	mg/L	--	0.08	0.11	<0.02
40	Free Ammonia as NH ₄	mg/L	--	Nil	Nil	Nil
41	Coli form Organisms	MPN/100 ml	--	26	32	01
42	Faecal Coli form Organisms	MPN/100 ml	--	06	12	Nil

APPENDIX D
MARINE ANALYTICAL RESULTS

Appendix D Marine Analytical Results

Table D-1: Physico-Chemical Properties

S. No.	Location Code	Temp. (°C)	Salinity (‰)	pH	TSS (mg/l)	Turbidity (NTU)	DO (mg/l)	BOD (mg/l)
1.	HMSL- 1-HT	29.0	26	7.4	28.0	10	5.658	0.464
2.	HMSL-1-LT	30.5	21	7.2	33.6	12	5.222	0.960
3.	HMSL-2-HT	29.0	32	8.2	29.0	8	5.947	1.216
4.	HMSL-2-LT	30.0	34	8.1	24.0	9	5.593	0.960
5.	HMSL-3-HT	29.0	31	8.1	65.0	7	5.189	1.104
6.	HMSL-3-LT	31.0	30	8.0	81.4	7	5.462	1.168
7.	HMSL-4-HT	30.0	32	8.0	68.6	9	5.801	0.400
8.	HMSL-4-LT	31.0	31	8.0	51.0	8	5.004	0.544
9.	HMSL-5-HT	31.0	33	8.2	62.6	4	5.642	1.472
10.	HMSL-5-LT	30.0	33	8.2	75.4	5	5.220	1.200
11.	HMSL-6-HT	29.0	33	8.2	72.2	3	5.852	1.072
12.	HMSL-6-LT	30.0	30	8.0	86.0	3	5.769	0.928
13.	HMSL-7-HT	29.0	31	8.1	54.4	5	5.820	1.264
14.	HMSL-7-LT	30.0	30	8.0	44.2	6	5.092	1.376
15.	HMSL-8-HT	29.0	25	7.5	32.4	8	6.205	1.040
16.	HMSL-8-LT	30.0	24	7.3	45.6	8	6.624	1.168
17.	HMSL-9-HT	31.0	28	7.7	44.2	7	6.866	0.720
18.	HMSL-9-LT	31.0	28	7.7	32.2	9	6.545	1.216

Table D-2: Nutrients – Water

Location Code	Parameters (µmol/l)						
	NO ₂	NO ₃	NH ₄	TN	IP	TP	SiO ₃
HMSL-1-HT	0.345	7.230	0.971	22.950	1.019	1.562	32.204
HMSL-1-LT	0.517	8.435	1.079	25.634	0.831	1.151	32.225
HMSL-2-HT	0.249	10.802	0.648	26.171	0.944	1.069	15.422
HMSL-2-LT	0.268	7.875	0.722	19.729	0.906	1.110	21.499
HMSL-3-HT	0.383	8.177	0.681	21.205	0.755	1.028	25.742
HMSL-3-LT	0.268	8.865	0.664	26.574	0.944	1.274	20.683
HMSL-4-HT	0.326	10.113	0.374	24.695	0.680	1.069	21.590
HMSL-4-LT	0.192	7.832	0.415	25.768	1.019	1.192	18.074
HMSL-5-HT	0.284	8.865	0.174	25.097	0.982	1.110	17.801
HMSL-5-LT	0.555	7.789	0.689	23.218	1.284	1.397	19.888
HMSL-6-HT	0.230	6.756	0.166	26.574	0.982	1.110	15.037
HMSL-6-LT	0.134	8.392	0.257	27.245	0.793	1.069	18.314
HMSL-7-HT	0.115	10.974	0.648	20.534	0.755	1.151	12.607
HMSL-7-LT	0.153	7.875	0.739	17.850	1.284	1.644	13.132
HMSL-8-HT	0.172	8.435	0.432	21.205	1.548	1.726	35.966
HMSL-8-LT	0.149	9.296	0.448	24.560	0.944	1.480	30.299
HMSL-9-HT	0.345	8.005	0.623	25.231	0.906	1.028	37.983
HMSL-9-LT	0.230	8.865	0.988	26.708	1.359	1.767	41.702

Table D-3: Heavy Metal variations in Water

Parameters	Parameters (µg/l)					
	Cd	Cu	Fe	Pb	Zn	Hg
HMSL-1-HT	1.24	18.12	59.65	16.72	31.88	0.012
HMSL-1-LT	1.08	12.06	97.82	15.22	34.62	0.024
HMSL-2-HT	1.15	40.92	90.24	16.32	55.64	0.048
HMSL-2-LT	1.14	52.82	75.62	20.73	62.96	0.042
HMSL-3-HT	0.98	54.24	98.24	23.46	63.32	0.024
HMSL-3-LT	1.38	49.44	94.12	25.02	66.36	0.012
HMSL-4-HT	1.25	48.24	84.69	22.52	60.72	0.008
HMSL-4-LT	1.56	37.98	55.76	11.94	73.56	0.006
HMSL-5-HT	1.68	44.78	82.64	33.72	59.63	0.018
HMSL-5-LT	0.94	41.56	95.63	34.26	58.58	0.006
HMSL-6-HT	0.6	49.23	63.22	22.22	56.25	0.010
HMSL-6-LT	1.56	46.92	91.25	19.32	53.04	0.018
HMSL-7-HT	1.35	31.56	94.81	11.52	46.96	0.024
HMSL-7-LT	0.63	17.94	20.68	16.95	45.42	0.012
HMSL-8-HT	0.83	10.74	18.28	15.82	59.94	0.036
HMSL-8-LT	1.39	24.36	29.864	19.23	54.38	0.028
HMSL-9-HT	1.26	30.56	86.28	28.62	51.32	0.042
HMSL-9-LT	1.55	33.91	82.16	26.42	68.06	0.054

Table D-4: Heavy Metal variations in Sediment

Sl. No.	Station Code	$\mu\text{g/g}$					
		Cd	Cu	Fe	Pb	Zn	Hg
1.	HMSL-1-HT	1.08	12.00	1459.2	14.48	17.92	0.024
2.	HMSL-1-LT	0.84	8.04	1978.0	13.48	13.08	0.028
3.	HMSL-2-HT	0.79	27.28	15880.0	10.88	35.76	0.016
4.	HMSL-2-LT	0.76	35.20	17500.0	13.80	44.64	0.015
5.	HMSL-3-HT	0.85	36.16	18664.0	15.64	48.88	0.012
6.	HMSL-3-LT	0.92	32.96	19436.0	16.68	44.24	0.006
7.	HMSL-4-HT	0.80	32.16	18400.0	15.00	40.48	0.012
8.	HMSL-4-LT	1.04	25.32	5576.0	17.96	13.04	0.008
9.	HMSL-5-HT	1.12	56.52	22860.0	22.48	66.40	0.014
10.	HMSL-5-LT	1.10	61.04	22368.0	22.84	65.72	0.011
11.	HMSL-6-HT	0.40	0.80	1132.28	14.48	42.35	0.013
12.	HMSL-6-LT	1.04	31.28	16396.0	12.88	39.36	0.012
13.	HMSL-7-HT	0.75	21.04	9480.0	17.68	18.64	0.010
14.	HMSL-7-LT	0.81	11.96	2068.0	14.60	16.28	0.014
15.	HMSL-8-HT	1.12	7.16	1828.8	13.88	15.96	0.012
16.	HMSL-8-LT	1.38	16.24	2986.4	16.00	12.92	0.016
17.	HMSL-9-HT	1.15	47.04	18628.0	19.08	52.20	0.018
18.	HMSL-9-LT	0.95	42.60	18216.0	17.60	58.04	0.014

Table D-5: Microbiology in Water

S. No.	Station Code	EC	FC	PA	PK	SF	SH	S	TC	TVC	VC	VP
1.	HMSL-1-HT	27x10 ¹	29x10 ¹	18x10 ¹	23x10 ¹	-	16x10 ¹	23	13x10 ²	25x10 ²	8	16
2.	HMSL-1-LT	22x10 ¹	24 x10 ¹	15x10 ¹	20x10 ¹	-	10x10 ¹	10	11 x10 ²	16x10 ²	10	-
3.	HMSL-2-HT	23 x10 ¹	31 x10 ¹	14 x10 ²	18 x10 ²	23	20 x10 ²	16 x10 ¹	16 x10 ³	31x10 ⁴	15x10 ¹	19x10 ¹
4.	HMSL-2-LT	18 x10 ¹	28 x10 ¹	11 x10 ²	15 x10 ²	18	15 x10 ²	11x10 ¹	14x10 ³	22x10 ⁴	10x10 ¹	15x10 ¹
5.	HMSL-3-HT	15 x10 ¹	35 x10 ¹	13 x10 ²	21 x10 ²	15	11 x10 ²	20 x10 ¹	10 x10 ³	19x10 ⁴	22 x10 ¹	13 x10 ¹
6.	HMSL-3-LT	10 x10 ¹	32 x10 ¹	10 x10 ²	18 x10 ²	10	18 x10 ²	15 x10 ¹	18x10 ³	13x10 ⁴	16x10 ¹	11x10 ¹
7.	HMSL-4-HT	21x10 ¹	28 x10 ¹	12x10 ²	15x10 ²	28	20x10 ²	13x10 ¹	13 x10 ³	24x10 ⁴	20 x10 ¹	18x10 ¹
8.	HMSL-4-LT	15 x10 ¹	20 x10 ¹	17x10 ²	10 x10 ²	22	13 x10 ²	10 x10 ¹	16x10 ³	26x10 ⁴	12 x10 ¹	15 x10 ¹
9.	HMSL-5-HT	24x10 ¹	39 x10 ¹	20x10 ²	19x10 ²	-	15x10 ²	22x10 ¹	19x10 ³	15x10 ⁴	19	24
10.	HMSL-5-LT	19x10 ¹	27 x10 ¹	16x10 ²	13x10 ²	-	11x10 ²	16x10 ¹	50 x10 ³	10x10 ⁴	14	8
11.	HMSL-6-HT	20 x10 ¹	33 x10 ¹	17 x10 ²	14 x10 ²	21	21x10 ³	15 x10 ¹	17 x10 ³	31x10 ⁴	12x10 ¹	20x10 ¹
12.	HMSL-6-LT	13 x10 ¹	31 x10 ¹	18x10 ²	11x10 ²	16	14 x10 ³	10 x10 ¹	13 x10 ³	23x10 ⁴	80	13x10 ¹
13.	HMSL-7-HT	14x10 ¹	25 x10 ¹	15x10 ²	10x10 ²	-	12x10 ²	18x10 ¹	12 x10 ³	21x10 ⁴	25	20
14.	HMSL-7-LT	10x10 ¹	20 x10 ¹	10x10 ²	16x10 ¹	-	17x10 ²	14x10 ¹	18x10 ³	15x10 ⁴	13	24
15.	HMSL-8-HT	28x10 ¹	29 x10 ¹	18x10 ²	23x10 ²	-	22x10 ²	14x10 ¹	21 x10 ³	36x10 ⁴	13	18
16.	HMSL-8-LT	23 x10 ¹	23 x10 ¹	14x10 ²	17 x10 ²	-	12x10 ²	10x10 ¹	20 x10 ³	28x10 ⁴	10	12
17.	HMSL-9-HT	19x10 ¹	33	12x10 ¹	15x10 ¹	16	14x10 ¹	19	26 x10 ³	29x10 ⁴	-	8
18.	HMSL-9-LT	14x10 ¹	30	70	11x10 ¹	12	90	12	14 x10 ³	22x10 ⁴	-	5

Table D-6: Microbiology in Sediment

S. No.	Station Code	EC	FC	PA	PK	SF	SH	S	TC	TVC	VC	VP
1.	HMSL-1-HT	23x10 ²	36x10 ²	15x10 ²	20x10 ²	26	19x10 ²	21 x10 ¹	10x10 ⁴	20x10 ⁵	14 x10 ¹	18 x10 ¹
2.	HMSL-1-LT	12x10 ²	30 x10 ²	12x10 ²	10x10 ²	18	15x10 ²	17 x10 ¹	17 x10 ⁴	18x10 ⁵	11 x10 ¹	11 x10 ¹
3.	HMSL-2-HT	28 x10 ²	24 x10 ²	10 x10 ³	15 x10 ²	23 x10 ¹	15 x10 ²	13 x10 ²	19 x10 ⁴	34x10 ⁵	18x10 ²	15x10 ²
4.	HMSL-2-LT	15 x10 ²	22 x10 ²	18 x10 ³	12 x10 ²	15 x10 ¹	10 x10 ²	10x10 ²	13x10 ⁴	30x10 ⁵	15x10 ²	13x10 ²
5.	HMSL-3-HT	19 x10 ²	31 x10 ²	18 x10 ³	24 x10 ²	20 x10 ¹	13 x10 ²	24 x10 ²	13 x10 ⁴	22x10 ⁵	20 x10 ²	18 x10 ²
6.	HMSL-3-LT	17 x10 ²	22 x10 ²	13 x10 ³	20 x10 ²	12 x10 ¹	16 x10 ²	20 x10 ²	10 x10 ⁴	18x10 ⁵	18x10 ²	15x10 ²
7.	HMSL-4-HT	23x10 ²	25 x10 ²	16x10 ³	18x10 ²	25 x10 ¹	24x10 ²	16x10 ²	11 x10 ⁴	20x10 ⁵	25 x10 ²	28x10 ²
8.	HMSL-4-LT	12 x10 ²	20 x10 ²	10 x10 ³	13 x10 ²	17 x10 ¹	20 x10 ²	12 x10 ²	18 x10 ⁴	13x10 ⁵	21 x10 ²	23 x10 ²
9.	HMSL-5-HT	20x10 ²	35 x10 ²	24x10 ³	13x10 ²	18	13x10 ²	13x10 ²	13 x10 ⁴	18x10 ⁵	13 x10 ¹	21 x10 ¹
10.	HMSL-5-LT	15x10 ²	30 x10 ²	21x10 ³	10x10 ²	10	18x10 ²	16x10 ²	11 x10 ⁴	15x10 ⁵	10 x10 ¹	15 x10 ¹
11.	HMSL-6-HT	26 x10 ²	30 x10 ²	12 x10 ³	17 x10 ²	25 x10 ¹	24x10 ²	17 x10 ³	15 x10 ⁴	26x10 ⁵	16x10 ²	13x10 ²
12.	HMSL-6-LT	18 x10 ²	24 x10 ²	17 x10 ³	13x10 ²	20 x10 ¹	20 x10 ²	13 x10 ³	17 x10 ⁴	20x10 ⁵	15x10 ²	10x10 ²
13.	HMSL-7-HT	10x10 ²	28 x10 ²	18x10 ³	15x10 ²	18	16x10 ²	21x10 ³	18 x10 ⁴	17x10 ⁵	21 x10 ¹	25 x10 ¹
14.	HMSL-7-LT	18x10 ²	22 x10 ²	13x10 ³	10x10 ²	14	10x10 ²	17x10 ²	15x10 ⁴	12x10 ⁵	18 x10 ¹	20 x10 ¹
15.	HMSL-8-HT	23x10 ²	34 x10 ²	12x10 ³	21x10 ²	22	20x10 ²	16x10 ²	16 x10 ⁴	32x10 ⁵	18x10 ¹	13 x10 ¹
16.	HMSL-8-LT	18 x10 ²	30 x10 ²	17x10 ³	15 x10 ²	17	15x10 ²	12x10 ²	12 x10 ⁴	25x10 ⁵	15 x10 ¹	80
17.	HMSL-9-HT	15x10 ²	25 x10 ²	10x10 ²	19x10 ²	20 x10 ¹	18x10 ²	13 x10 ¹	12 x10 ⁴	25x10 ⁵	28	23
18.	HMSL-9-LT	10x10 ²	21 x10 ²	15x10 ²	13x10 ²	15 x10 ¹	15x10 ²	80	10 x10 ⁴	20x10 ⁵	23	18

Table D-7: Phytoplankton

Sl.No	Name of the Species	Nos./l					
		HMSL-1-HT	HMSL-1-LT	HMSL-2-HT	HMSL-2-LT	HMSL-3-HT	HMSL-3-LT
1.	<i>Trichodesmium erythraeum</i>	63	62	68	51	127	75
2.	<i>Coscinodiscus gigas</i>	9	*	13	10	35	13
3.	<i>Coscinodiscus centralis</i>	32	12	141	120	193	61
4.	<i>Coscinodiscus radiatus</i>	12	*	68	103	*	31
5.	<i>Skeletonema costatum</i>	*	*	*	*	175	66
6.	<i>Cyclotella</i> sp.	*	*	*	2	13	*
7.	<i>Planktonella sol</i>	*	6	*	*	*	*
8.	<i>Lauderia borealis</i>	*	89	*	*	*	31
9.	<i>Thalassiosira subtilis</i>	*	128	26	*	18	48
10.	<i>Ditylum brightwellii</i>	36	54	*	*	39	92
11.	<i>Triceratium favus</i>	8	9	12	*	13	13
12.	<i>Triceratium reticulatum</i>	*	*	*	*	22	*
13.	<i>Chaetoceros indicus</i>	421	236	128	111	478	241
14.	<i>Chaetoceros affinis</i>	440	151	103	128	539	325
15.	<i>Chaetoceros coarctatus</i>	*	*	64	*	*	*
16.	<i>Chaetoceros debilis</i>	123	*	64	*	*	66
17.	<i>Chaetoceros diversus</i>	99	*	51	34	189	136
18.	<i>Biddulphia heteroceros</i>	*	*	43	26	*	*
19.	<i>Bellerochea</i> sp.	*	*	111	*	*	*
20.	<i>Bellerochea malleus</i>	10	10	17	*	158	57
21.	<i>Odontella sinensis</i>	*	12	111	26	66	35
22.	<i>Odontella mobiliensis</i>	24	16	132	34	44	22
23.	<i>Eucampia zoodiacus</i>	*	*	12	*	*	48
24.	<i>Streptothecha thamensis</i>	*	*	*	10	*	*
25.	<i>Leptocyindrus danicus</i>	*	*	43	13	114	*
26.	<i>Bacillaria paradoxa</i>	12	*	*	*	*	*
27.	<i>Rhizosolenia setigera</i>	75	*	13	*	92	*
28.	<i>Rhizosolenia styliformis</i>	71	39	47	30	211	246
29.	<i>Rhizosolenia alata</i>	95	47	103	34	171	158
30.	<i>Pleurosigma normanii</i>	12	10	*	11	18	18
31.	<i>Pleurosigma directum</i>	*	*	*	*	48	*
32.	<i>Nitzschia sigma</i>	*	*	43	26	39	*
33.	<i>Nitzschia longissima</i>	*	*	12	38	180	61
34.	<i>Nitzschia seriata</i>	290	89	77	77	224	92
35.	<i>Stephanopyxis palmeriana</i>	24	*	*	*	57	*
36.	<i>Thalassiothrix frauenfeldii</i>	131	58	128	112	197	136
37.	<i>Thalassionema nitzschioides</i>	91	*	64	73	298	75
38.	<i>Asterionella glacialis</i>	*	*	265	98	272	263
39.	<i>Prorocentrum micans</i>	4	*	*	*	*	*
40.	<i>Ceratium macroceros</i>	*	16	*	21	*	*
41.	<i>Ceratium furca</i>	20	9	26	11	*	48

Sl.No	Name of the Species	Nos./l					
		HMSL-1-HT	HMSL-1-LT	HMSL-2-HT	HMSL-2-LT	HMSL-3-HT	HMSL-3-LT
42.	<i>Ceratium tripos</i>	*	*	8	34	35	*
43.	<i>Ceratium fusus</i>	*	*	11	10	*	*
44.	<i>Ceratium extensum</i>	*	*	*	*	*	31
45.	<i>Ceratium trichoceros</i>	36	11	21	26	*	*
46.	<i>Protoperidinium oceanicum</i>	*	*	*	*	48	18
47.	<i>Protoperidinium depressum</i>	*	*	*	*	26	*
48.	<i>Peridinium sp.</i>	*	*	*	21	*	*
49.	<i>Noctiluca sp.</i>	*	*	26	*	*	*
50.	<i>Anabeana nostac</i>	12	*	*	*	*	*
	Total	2150	1064	2051	1290	4139	2506

No.	Name of the Species	Nos./l					
		HMSL-4-HT	HMSL-4-LT	HMSL-5-HT	HMSL-5-LT	HMSL-6-HT	HMSL-6-LT
1.	<i>Trichodesmium erythraeum</i>	83	60	158	91	75	49
2.	<i>Coscinodiscus gigas</i>	12	7	12	10	*	28
3.	<i>Coscinodiscus centralis</i>	159	179	77	48	67	69
4.	<i>Coscinodiscus radiatus</i>	75	83	12	20	52	45
5.	<i>Skeletonema costatum</i>	123	155	77	63	60	49
6.	<i>Cyclotella sp.</i>	*	*	*	2	*	*
7.	<i>Lauderia borealis</i>	*	10	54	40	32	37
8.	<i>Thalassiosira subtilis</i>	40	*	36	56	12	16
9.	<i>Ditylum brightwelli</i>	44	13	50	28	40	65
10.	<i>Triceratium favus</i>	28	14	10	12	*	*
11.	<i>Triceratium reticulatum</i>	12	16	*	*	*	*
12.	<i>Chaetoceros peruvians</i>	*	*	27	*	*	*
13.	<i>Chaetoceros messanesis</i>	218	*	*	*	*	*
14.	<i>Chaetoceros curvisetus</i>	*	*	54	48	270	175
15.	<i>Chaetoceros indicus</i>	377	314	324	190	*	*
16.	<i>Chaetoceros affinis</i>	313	242	428	306	321	346
17.	<i>Chaetoceros coarctatus</i>	*	*	27	*	*	*
18.	<i>Chaetoceros debilis</i>	*	*	63	28	*	*
19.	<i>Chaetoceros diversus</i>	159	119	*	*	488	439
20.	<i>Chaetoceros brevis</i>	*	*	41	*	*	*
21.	<i>Bacteriastrum comosum</i>	*	*	*	12	*	*
22.	<i>Biddulphia heteroceros</i>	*	*	27	*	*	*
23.	<i>Bellerochea malleus</i>	28	83	*	11	179	73
24.	<i>Odontella sinensis</i>	12	*	32	24	48	45
25.	<i>Odontella mobiliensis</i>	16	*	59	36	32	33
26.	<i>Leptocylindrus danicus</i>	32	44	*	*	56	49
27.	<i>Rhizosolenia setigera</i>	32	24	*	*	67	85
28.	<i>Rhizosolenia styliformis</i>	151	131	86	60	52	53
29.	<i>Rhizosolenia alata</i>	60	56	68	52	175	122
30.	<i>Hemidiscus hardmannianus</i>	*	*	14	*	40	33

31.	<i>Hemiaulus sinensis</i>	*	*	*	*	32	12
32.	<i>Pleurosigma normanii</i>	28	*	11	12	*	53
33.	<i>Pleurosigma directum</i>	*	32	*	*	*	*
34.	<i>Nitzschia sigma</i>	*	12	45	24	60	37
35.	<i>Nitzschia longissima</i>	*	*	54	36	*	*
36.	<i>Nitzschia seriata</i>	60	83	333	139	190	85
37.	<i>Nitzschia closterium</i>	*	48	*	*	*	*
38.	<i>Stephanopyxis palmeriana</i>	83	*	*	*	*	49
39.	<i>Thalassiothrix frauenfeldii</i>	131	155	302	103	246	159
40.	<i>Thalassionema nitzschioides</i>	159	123	63	63	119	130
41.	<i>Asterionella glacialis</i>	286	321	54	44	421	329
42.	<i>Dinophyses tripos</i>	*	11	12	*	*	*
43.	<i>Ceratium macroceros</i>	*	*	86	28	*	*
44.	<i>Ceratium furca</i>	44	28	41	36	52	28
45.	<i>Ceratium tripos</i>	*	*	23	*	*	*
46.	<i>Ceratium fusus</i>	40	10	14	10	40	37
47.	<i>Ceratium trichoceros</i>	*	40	*	12	*	*
48.	<i>Protoperidinium oceanicum</i>	32	52	23	16	36	61
49.	<i>Protoperidinium depressum</i>	28	12	*	*	12	57
50.	<i>Noctiluca sp.</i>	40	*	*	*	16	12
51.	<i>Anabeana nostac</i>	*	*	23	*	*	*
	Total	2905	2477	2820	1660	3290	2860

Sl.No	Name of the Species	Nos./l					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
1.	<i>Trichodesmium erythraeum</i>	60	50	75	63	108	73
2.	<i>Coscinodiscus gigas</i>	10	*	33	13	*	53
3.	<i>Coscinodiscus centralis</i>	115	96	96	54	125	98
4.	<i>Coscinodiscus radiatus</i>	28	25	46	38	63	45
5.	<i>Skeletonema costatum</i>	*	125	163	163	271	248
6.	<i>Planktonella sol</i>	3	*	*	*	*	*
7.	<i>Lauderia borealis</i>	*	*	21	13	13	11
8.	<i>Thalassiosira subtilis</i>	24	25	*	*	*	*
9.	<i>Ditylum brightwelli</i>	*	*	142	188	42	41
10.	<i>Triceratium favus</i>	10	4	38	42	54	20
11.	<i>Triceratium reticulatum</i>	*	*	33	29	33	12
12.	<i>Chaetoceros messanesis</i>	*	*	163	283	167	126
13.	<i>Chaetoceros curvisetus</i>	*	*	*	*	*	85
14.	<i>Chaetoceros indicus</i>	552	254	*	*	*	*
15.	<i>Chaetoceros affinis</i>	425	375	267	213	213	187

Sl.No	Name of the Species	Nos./l					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
16.	<i>Chaetoceros debilis</i>	48	38	*	*	*	*
17.	<i>Chaetoceros diversus</i>	44	21	388	267	300	142
18.	<i>Bacteriastrum comosum</i>	40	50	*	*	*	*
19.	<i>Biddulphia heteroceros</i>	24	25	*	*	*	*
20.	<i>Bellerochea malleus</i>	28	25	71	63	138	171
21.	<i>Odontella sinensis</i>	36	38	46	17	63	126
22.	<i>Odontella mobiliensis</i>	48	50	38	13	42	85
23.	<i>Eucampia zoodiacus</i>	*	*	54	42	513	57
24.	<i>Leptocylindrus danicus</i>	*	*	33	*	*	85
25.	<i>Bacillaria paradoxa</i>	16	13	*	*	*	*
26.	<i>Rhizosolenia setigera</i>	*	*	*	88	188	*
27.	<i>Rhizosolenia styliformis</i>	48	79	213	163	200	183
28.	<i>Rhizosolenia imbricata</i>	32	*	*	*	*	57
29.	<i>Rhizosolenia alata</i>	175	100	188	213	217	142
30.	<i>Hemidiscus hardmannianus</i>	*	*	29	21	38	20
31.	<i>Hemiaulus sinensis</i>	*	*	13	13	46	12
32.	<i>Pleurosigma normanii</i>	12	13	*	11	*	*
33.	<i>Pleurosigma directum</i>	*	*	42	*	*	*
34.	<i>Nitzschia sigma</i>	24	25	*	*	*	*
35.	<i>Nitzschia longissima</i>	123	79	88	*	*	*
36.	<i>Nitzschia seriata</i>	91	113	146	108	258	159
37.	<i>Nitzschia closterium</i>	44	*	*	*	*	*
38.	<i>Stephanopyxis palmeriana</i>	20	12	46	21	*	*
39.	<i>Thalassiothrix frauenfeldii</i>	115	125	142	67	167	211
40.	<i>Thalassionema nitzschioides</i>	99	*	75	204	88	183
41.	<i>Asterionella glacialis</i>	*	*	275	250	133	171
42.	<i>Ceratium macroceros</i>	12	13	50	42	46	*
43.	<i>Ceratium furca</i>	*	25	*	*	*	45
44.	<i>Ceratium tripos</i>	12	13	42	33	29	65
45.	<i>Ceratium fusus</i>	10	11	21	25	*	85
46.	<i>Ceratium extensum</i>	*	*	*	*	54	*
47.	<i>Ceratium trichoceros</i>	*	33	*	*	*	*
48.	<i>Protoperidinium oceanicum</i>	12	*	67	71	38	24
49.	<i>Protoperidinium depressum</i>	*	*	46	46	33	*
50.	<i>Noctiluca sp.</i>	48	29	42	21	13	*
	Total	2388	1884	3232	2898	3693	3022

Table D-8: Zooplankton

Sl. No	Name of the Species	Nos./m ³					
		HMSL-1-HT	HMSL-1-LT	HMSL-2-HT	HMSL-2-LT	HMSL-3-HT	HMSL-3-LT
1.	<i>Evadne</i> sp.	*	*	287	174	*	*
2.	<i>Paracalanus parvus</i>	230	197	575	304	522	266
3.	<i>Pontella danae</i>	3	*	*	*	*	*
4.	<i>Pseudodiaptomus serricaudatus</i>	*	*	*	*	261	48
5.	<i>Pseudodiaptomus aurivilli</i>	*	*	41	43	*	*
6.	<i>Acrocalanus gibber</i>	262	230	800	543	261	*
7.	<i>Acrocalanus gracilis</i>	131	164	677	587	174	*
8.	<i>Temora stylifera</i>	*	*	*	*	290	*
9.	<i>Acartia danae</i>	*	*	103	65	116	97
10.	<i>Acartia spinicauda</i>	125	131	*	4	58	193
11.	<i>Acartia erythraea</i>	98	*	*	*	*	*
12.	<i>Oithona similis</i>	16	131	390	152	*	*
13.	<i>Oithona brevicornis</i>	*	66	328	*	290	145
14.	<i>Oithona spinirostris</i>	*	*	924	*	*	*
15.	<i>Oncaea venusta</i>	*	*	62	43	*	*
16.	<i>Corycaeus danae</i>	131	98	41	65	145	241
17.	<i>Corycaeus catus</i>	295	230	103	52	145	97
18.	<i>Euterpina acutifrons</i>	131	164	677	391	377	410
19.	<i>Lucifer hansenii</i>	*	*	21	*	*	*
20.	<i>Oikopleura parva</i>	*	*	*	*	58	*
22.	<i>Oikopleura dioica</i>	262	197	205	174	*	*
23.	Shrimp zoea	33	*	*	*	*	*
24.	<i>Tintinnopsis tubulosa</i>	*	*	*	*	232	217
25.	<i>Tintinnopsis beroidea</i>	66	*	*	*	*	*
26.	<i>Tintinnopsis butzschii</i>	*	*	*	*	261	97
27.	<i>Eutinnus tenuis</i>	*	*	*	*	174	*
28.	<i>Favella philipiensis</i>	131	98	103	87	29	97
29.	Bivalve veliger	459	230	*	*	*	217
30.	Gastropod veliger	492	*	*	*	*	*
31.	Crustacean nauplii	*	*	*	*	*	217
32.	Copepod nauplii	1082	918	841	869	927	1087
33.	Barnacle nauplii	131	*	123	*	*	*
34.	Polychaete larvae	66	66	*	*	*	48
	Total	4144	2920	6301	3553	4320	3477

S.no.	Name of the Species	Nos./m ³					
		HMSL-4-HT	HMSL-4-LT	HMSL-5-HT	HMSL-5-LT	HMSL-6-HT	HMSL-6-LT
1.	<i>Diphyes dispar</i>	*	45	39	29	*	*
2.	<i>Evadne</i> sp.	*	*	393	202	*	*
3.	<i>Penilia</i> sp.	*	*	*	29	*	*

S.no.	Name of the Species	Nos./m ³					
		HMSL-4-HT	HMSL-4-LT	HMSL-5-HT	HMSL-5-LT	HMSL-6-HT	HMSL-6-LT
4.	<i>Paracalanus parvus</i>	671	476	275	202	534	321
5.	<i>Pontella danae</i>	*	45	*	*	*	*
6.	<i>Pseudodiaptomus aurivilli</i>	*	*	39	*	*	*
7.	<i>Acrocalanus gibber</i>	373	249	118	173	314	184
8.	<i>Acrocalanus gracilis</i>	149	113	197	202	220	138
9.	<i>Temora stylifera</i>	*	136	*	*	*	*
10.	<i>Labidocera pavo</i>	*	*	*	*	126	46
11.	<i>Acartia danae</i>	186	91	*	*	314	115
12.	<i>Acartia spinicauda</i>	112	68	157	58	126	46
13.	<i>Acartia erythraea</i>	*	*	315	*	*	*
14.	<i>Oithona similis</i>	*	227	*	29	189	230
15.	<i>Oithona brevicornis</i>	373	91	*	*	314	184
16.	<i>Oncaea venusta</i>	186	159	*	*	157	92
17.	<i>Corycaeus danae</i>	410	227	118	58	314	276
18.	<i>Corycaeus catus</i>	186	204	236	115	189	138
19.	<i>Copilia vitrea</i>	37	23	*	*	*	*
20.	<i>Euterpina acutifrons</i>	335	385	275	144	314	344
21.	<i>Sagitta enflata</i>	*	*	*	29	*	*
22.	<i>Oikopleura parva</i>	*	136	79	*	*	*
23.	Shrimp zoea	*	*	39	*	*	*
24.	<i>Tintinnopsis tubulosa</i>	335	181	*	*	126	184
25.	<i>Tintinnopsis butzschii</i>	298	*	*	*	*	92
26.	<i>Eutinnus tenuis</i>	75	272	*	*	157	*
27.	<i>Favella philipiensis</i>	*	91	79	115	*	*
28.	Bivalve veliger	*	249	472	461	346	482
29.	Gastropod veliger	*	*	*	*	251	344
30.	Copepod nauplii	1565	725	511	951	1068	758
31.	Barnacle nauplii	224	*	*	*	*	*
32.	Polychaete larvae	75	*	39	29	*	*
		5590	4193	3381	2826	5059	3974

Sl. No	Name of the Species	Nos./m ³					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
1.	<i>Exoskeleton from molt of Barnacle</i>	*	*	*	23	*	30
2.	<i>Evadne</i> sp.	276	276	*	*	*	*
3.	<i>Penilia</i> sp.	*	46	*	*	*	*
4.	<i>Paracalanus parvus</i>	827	896	511	482	680	623
5.	<i>Pontella danae</i>	*	*	170	92	240	119
6.	<i>Pseudodiaptomus aurivilli</i>	98	46	49	46	*	*
7.	<i>Acrocalanus gibber</i>	2166	2067	243	230	80	237
8.	<i>Acrocalanus gracilis</i>	1871	2526	292	161	400	178
9.	<i>Centropages furcatus</i>	39	92	*	*	320	*
10.	<i>Temora stylifera</i>	*	115	73	230	*	*

Sl. No	Name of the Species	Nos./m ³					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
11.	<i>Labidocera pavo</i>	*	*	97	*	*	*
12.	<i>Acartia danae</i>	*	*	146	46	160	119
13.	<i>Acartia spinicauda</i>	98	46	122	69	80	89
14.	<i>Acartia erythraea</i>	39	*	*	*	*	*
15.	<i>Oithona similis</i>	79	*	243	138	600	326
16.	<i>Oithona brevicornis</i>	*	*	170	230	320	237
17.	<i>Oncaea venusta</i>	98	*	243	69	120	178
18.	<i>Corycaeus danae</i>	59	*	267	230	400	326
19.	<i>Corycaeus catus</i>	39	*	146	138	200	356
20.	<i>Microsetella rosea</i>	20	*	*	*	*	*
21.	<i>Euterpina acutifrons</i>	138	92	535	482	600	593
22.	<i>Sagitta enflata</i>	*	46	*	*	*	*
23.	<i>Oikopleura dioica</i>	79	161	*	*	*	*
24.	Shrimp zoea	20	23	24	23	*	*
25.	<i>Tintinnopsis tubulosa</i>	*	*	*	92	160	59
26.	<i>Tintinnopsis butzschii</i>	*	*	97	138	400	178
27.	<i>Eutinnus tenuis</i>	*	*	194	23	0	89
28.	<i>Favella philipiensis</i>	79	115	73	230	160	119
29.	Bivalve veliger	591	184	316	253	440	504
30.	Gastropod veliger	*	*	413	344	320	326
31.	Crustacean nauplii	*	*	292	*	*	*
32.	Copepod nauplii	1122	*	778	*	1200	1127
33.	Barnacle nauplii	276	46	*	689	*	*
34.	Phyllosoma larvae	98	*	*	*	*	*
	Total	8112	6777	5494	4458	6880	5813

* - Organisms not present

Table D-9: Finfish Eggs

Sl. No	Name of the Species	Nos./m ³					
		HMSL-1-HT	HMSL-1-LT	HMSL-2-HT	HMSL-2-LT	HMSL-3-HT	HMSL-3-LT
	Engraulidae						
1.	<i>Setipinna taty</i>	18	15	22	10	13	15
2.	<i>Stolephorus tri</i>	5	3	6	4	2	5
3.	<i>Engraulis</i> sp.	18	13	15	6	3	9
	Clupeidae						
1.	<i>Sardinella fimbriata</i>	8	7	3	10	12	10
2.	<i>Sardinella gibbosa</i>	7	6	5	9	5	8
3.	<i>Sardinella longiceps</i>	3	9	4	3	6	9
	Mugilidae						
1.	<i>Mugil cephalus</i>	20	23	25	18	13	20
2.	<i>Mugil</i> sp.	15	13	16	*	*	*
3.	<i>Liza tade</i>	*	*	*	12	10	9

4.	<i>Liza dussumieri</i>	10	8	5	10	15	13
		104	97	101	82	79	98
Sl. No	Name of the Species	Nos./m ³					
		HMSL-4-HT	HMSL-4-LT	HMSL-5-HT	HMSL-5-LT	HMSL-6-HT	HMSL-6-LT
	Enraulidae						
1.	<i>Setipinna taty</i>	13	12	10	12	10	9
2.	<i>Stolephorus tri</i>	*	*	*	2	5	2
3.	<i>Thryssa dussumieri</i>	5	6	3	5	9	6
4.	<i>Thryssa hamiltonii</i>	*	*	*	4	3	5
5.	<i>Thryssa mystax</i>	4	2	3	2	4	2
6.	<i>Engraulis sp.</i>	8	4	7	8	5	6
	Clupeidae						
1.	<i>Anadontostoma chacunda</i>	3	4	5	*	*	*
2.	<i>Sardinella fimbriata</i>	6	9	5	5	4	8
3.	<i>Sardinella gibbosa</i>	*	*	*	6	3	2
4.	<i>Sardinella longiceps</i>	5	5	3	7	9	5
5.	<i>Sardinella sp.</i>						
	Mugilidae						
1.	<i>Mugil cephalus</i>	10	12	15	15	18	13
2.	<i>Mugil sp.</i>						
3.	<i>Liza tade</i>	13	10	12	12	15	12
4.	<i>Liza dussumieri</i>	10	10	13	10	12	11
	Total	77	74	76	88	97	81
Sl. No	Name of the Species	Nos./m ³					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
	Enraulidae						
1.	<i>Setipinna taty</i>	10	15	18	12	18	15
Sl. No	Name of the Species	Nos./m ³					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
2.	<i>Thryssa dussumieri</i>	5	6	3	*	*	*
3.	<i>Thryssa hamiltonii</i>	4	2	5	*	*	*
4.	<i>Thryssa mystax</i>	2	2	3	*	*	*
5.	<i>Engraulis sp.</i>	10	9	8	*	*	*
	Clupeidae						
1.	<i>Sardinella fimbriata</i>	10	12	10	8	9	5
2.	<i>Sardinella longiceps</i>	15	13	12	10	11	15
	Mugilidae						
1.	<i>Mugil cephalus</i>	12	10	15	15	13	18
2.	<i>Mugil sp.</i>	10	12	18	*	*	*
3.	<i>Liza tade</i>	*	*	*	10	15	17
4.	<i>Liza dussumieri</i>	10	15	18	18	12	13
	Total	88	96	110	73	78	83

* - Organisms not present

Table D-10: Finfish Larvae

Sl. No	Name of the Species	Nos./m ³					
		HMSL-1-HT	HMSL-1-LT	HMSL-2-HT	HMSL-2-LT	HMSL-3-HT	HMSL-3-LT
	Enraulidae						
1.	<i>Thryssa</i> sp.	*	*	1	*	*	*
2.	<i>Sardinella longiceps</i>	*	*	1	*	*	*
	Clupeidae						
1.	<i>Anadontostoma chacunda</i>	*	*	1	1	*	*
2.	<i>Sardinella</i> sp.	*	*	*	*	*	1
	Carangidae						
1.	<i>Caranx</i> sp.	1	*	*	*	*	*
	Teraponidae						
1.	<i>Terapon jarbua</i>	*	1	*	*	*	*
	Total	1	1	3	1	0	1
Sl. No	Name of the Species	Nos./m ³					
		HMSL-4-HT	HMSL-4-LT	HMSL-5-HT	HMSL-5-LT	HMSL-6-HT	HMSL-6-LT
	Enraulidae						
1.	<i>Thryssa</i> sp.	*	*	1	*	*	*
2.	<i>Stolephorus tri</i>	*	*	1	*	*	*
3.	<i>Engraulis</i> sp.	*	*	*	*	1	*
	Chirocentridae						
1.	<i>Chirocentrus dorab</i>	1	*	*	1	*	*
	Lutjanidae						
1.	<i>Lutjanus</i> sp.	*	1	*	*	*	*
	Teraponidae						
1.	<i>Terapon jarbua</i>	1	*	*	*	*	*
	Ambassidae						
1.	<i>Ambassis commersoni</i>	*	*	*	1	*	*
	Total	2	1	2	2	1	0
Sl. No	Name of the Species	Nos./m ³					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
	Clupeidae						
1.	<i>Sardinella</i> sp.	*	*	1	*	*	*
2.	<i>Stolephorus tri</i>	*	*	*	*	*	1
	Chirocentridae						
1.	<i>Chirocentrus dorab</i>	*	*	*	*	1	*
	Mugilidae						
1.	<i>Liza</i> sp.	1	*	*	*	*	*
	Ambassidae						

1.	<i>Ambassis commersoni</i>	1	*	*	*	*	*
	Platycephalidae						
1.	<i>Platycephalus indicus</i>	*	*	*	1	*	*
	Total	2	0	1	1	1	1

Table D-11: Macrobenthos

Sl. No.	Name of the Species	Nos./m ²					
		HMSL-1-HT	HMSL-1-LT	HMSL-2-HT	HMSL-2-LT	HMSL-3-HT	HMSL-3-LT
	Polychaetes						
1	<i>Armandia longicaudata</i>	25	*	50	*	75	50
2	<i>Armandia intermedia</i>	*	75	*	50	*	*
3	<i>Chone collaris</i>	50	*	25	*	50	25
4	<i>Cirratulus chrysoderma</i>	*	50	*	75	*	*
5	<i>Dorvillea gardineri</i>	25	*	50	*	25	75
6	<i>Euclymene annandalei</i>	*	25	*	50	*	25
7	<i>Exogone clavator</i>	75	*	*	75	50	*
8	<i>Fabricia filamentosa</i>	*	*	25	*	*	50
9	<i>Lopadorhynchus uncinatus</i>	50	25	*	25	25	*
10	<i>Nephtys sphaerocirrata</i>	*	*	75	*	*	25
11	<i>Notomastus aberans</i>	25	50	*	25	75	*
12	<i>Polydora ciliata</i>	*	*	*	75	*	75
13	<i>Prionospio cirrifera</i>	*	25	25	*	50	*
14	<i>Syllis longocirrata</i>	50	*	*	25	*	25
	Bivalves						
1	<i>Anadara veligers</i>	25	50	75	*	25	*
2	<i>Cardium veligers</i>	*	75	*	25	*	50
3	<i>Donax veligers</i>	50	*	25	*	75	*
4	<i>Meretrix veligers</i>	*	50	*	50	*	100
	Gastropods						
1	<i>Nassarius veliger</i>	*	50	*	75	*	50
2	<i>Natica veliger</i>	25	*	75	*	25	*
3	<i>Oliva veliger</i>	*	50	*	50	*	75
4	<i>Turritella veliger</i>	75	*	25	*	50	25
	Amphipods						
1	<i>Gammarus sp.</i>	75	*	25	*	50	*
2	<i>Grandidierella sp.</i>	*	75	*	50	*	25
3	<i>Ampithoe romondi</i>	50	*	25	*	100	*
4	<i>Phaxocephalus holbolli</i>	*	25	*	75	*	50
	Isopods						
1	<i>Angeliera phreaticola</i>	*	125	75	*	25	*
2	<i>Mirocerberus sp.</i>	50	*	*	100	*	75
3	<i>Jaeropsis beuroisi</i>	*	25	50	*	25	*
	Total	650	775	625	825	725	800

* - Organisms not present

Sl. No.	Name of the Species	Nos./m ²					
		HMSL-4-HT	HMSL-4-LT	HMSL-5-HT	HMSL-5-LT	HMSL-6-HT	HMSL-6-LT
	Polychaetes						
1	<i>Armandia longicaudata</i>	25	*	50	*	75	*
2	<i>Boccardia polybranchia</i>	*	75	*	25	*	25
3	<i>Chone collaris</i>	50	*	25	*	50	*
4	<i>Cirratulus filiformis</i>	*	25	*	75	*	50
5	<i>Dorvillea gardineri</i>	75	*	50	*	25	*
6	<i>Eunice indica</i>	*	75	*	25	*	75
7	<i>Epidiopatra gilchristi</i>	25	*	25	*	50	*
8	<i>Goniada emerita</i>	*	50	*	50	*	50
9	<i>Nereis capensis</i>	*	*	*	*	25	*
10	<i>Notomastus aberans</i>	25	25	*	25	*	25
11	<i>Scolopella capensis</i>	*	*	75	*	75	*
12	<i>Polydora ciliata</i>	50	50	*	25	*	75
13	<i>Prionospio cirrifera</i>	*	*	75	*	50	*
14	<i>Syllis longocirrata</i>	*	75	*	50	*	25
15	<i>Syllidia armata</i>	50	*	25	*	25	*
	Bivalves						
1	<i>Anadara veligers</i>	*	75	*	25	*	50
2	<i>Cardium veligers</i>	50	*	75	*	25	*
3	<i>Donax veligers</i>	*	50	*	50	*	75
4	<i>Meretrix veligers</i>	75	*	25	*	50	*
	Gastropods						
1	<i>Nassarius veliger</i>	25	*	75	*	50	*
2	<i>Littorina veliger</i>	*	50	*	25	*	25
3	<i>Bullia veliger</i>	75	*	25	*	75	*
4	<i>Natica veliger</i>	*	25	*	50	*	25
5	<i>Oliva veliger</i>	50	*	75	*	25	*
	Amphipods						
1	<i>Grandidierella</i> sp.	25	*	75	*	50	*
2	<i>Ampithoe romondi</i>	*	50	*	25	*	25
3	<i>Ampithoe rubricata</i>	50	*	50	*	75	*
4	<i>Caprella mendax</i>	*	75	*	25	*	50
5	<i>Phaxocephalus holbolli</i>	25	*	25	*	25	*
	Isopods						
1	<i>Angeliera phreaticola</i>	*	25	*	*	*	50
2	<i>Mirocerberus</i> sp.	25	*	75	*	25	*
3	<i>Calabozoa pellucida</i>	*	75	*	25	*	25
4	<i>Paragnathia formica</i>	25	*	50	*	50	*
	Total	725	800	875	500	825	650

* - Organisms not present

Sl. No.	Name of the Species	Nos./m ²					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
	Polychaetes						
1	<i>Armandia longicaudata</i>	*	*	50	*	25	*
2	<i>Chone collaris</i>	25	50	25	*	75	*
3	<i>Cirratulus chrysoderma</i>	*	25	*	50	*	50
4	<i>Dorvillea gardineri</i>	25	*	75	*	25	*
5	<i>Eunice indica</i>	*	50	*	25	*	75
6	<i>Exogone clavator</i>	50	75	25	*	*	*
7	<i>Goniada emerita</i>	*	*	*	75	25	25
8	<i>Prionospio malmagreni</i>	*	25	*	100	*	25
9	<i>Nephtys dibranchis</i>	25	*	25	*	*	*
10	<i>Notomastus aberans</i>	*	75	*	25	*	75
11	<i>Onuphis</i> sp.	75	*	50	*	25	*
12	<i>Scolopella capensis</i>	*	25	*	75	*	50
13	<i>Phyllodoce tubicola</i>	25	*	75	*	50	*
14	<i>Pisionidens indica</i>	*	50	*	100	*	25
15	<i>Prionospio cirrifera</i>	*	25	*	*	75	*
16	<i>Syllidia armata</i>	25	*	25	50	25	*
	Bivalves						
1	<i>Anadara veligers</i>	75	*	50	*	75	*
2	<i>Cardium veligers</i>	*	100	*	75	*	25
3	<i>Donax veligers</i>	50	*	25	*	50	*
4	<i>Meretrix veligers</i>	*	75	*	50	*	25
	Gastropods						
1	<i>Littorina veliger</i>	100	*	50	25	50	*
2	<i>Natica veliger</i>						
3	<i>Oliva veliger</i>	*	75	*	75	*	25
4	<i>Turritella veliger</i>	25	*	25	*	25	*
	Amphipods						
1	<i>Ampithoe romondi</i>	75	*	50	25	*	125
2	<i>Ampithoe rubricata</i>	*	25	*	*	50	*
3	<i>Phaxocephalus holbolli</i>	50	*	25	50	*	100
	Isopods						
1	<i>Angeliera phreaticola</i>	25	*	50	*	50	*
2	<i>Calabozoa pellucida</i>	*	75	*	50	*	75
3	<i>Paragnathia formica</i>	25	*	25	*	50	*
	Total	675	750	650	850	675	700

* - Organisms not present

Table D-12: Meiobenthos

Sl. No.	Name of the Species	Nos./10 cm ²					
		HMSL-1-HT	HMSL-1-LT	HMSL-2-HT	HMSL-2-LT	HMSL-3-HT	HMSL-3-LT
	Nematodes						
1	<i>Daptonema conicum</i>	11	13	10	14	15	16
2	<i>Desmoscolex falcatus</i>	6	8	7	9	5	6
3	<i>Enoploides</i> sp.	8	9	13	15	10	11
4	<i>Halalaimus filum</i>	10	12	16	18	12	14
5	<i>Pandolaimus</i> sp.	12	14	10	11	11	13
6	<i>Polygastrophora</i> sp.	6	8	7	9	5	8
7	<i>Pselionema</i> sp.	4	6	3	5	9	10
8	<i>Theristus</i> sp.	13	14	15	17	10	12
9	<i>Viscosia</i> sp.	10	12	8	9	12	14
10	<i>Diodontolaimus</i> sp.	5	8	4	7	6	9
11	<i>Neochromodra</i> sp.	10	12	13	14	16	18
12	<i>Spirinia</i> sp.	8	9	6	7	5	9
	Foraminiferans						
1	<i>Ammonia beccarii</i>	3	6	7	9	10	12
2	<i>Bolivina abbreviata</i>	4	5	6	7	6	8
3	<i>Cibicides lobatulus</i>	2	3	5	8	5	7
4	<i>Cornoboides advena</i>	5	7	3	5	8	9
5	<i>Cymbaloporetta bradyi</i>	*	*	5	7	2	3
6	<i>Discorbis</i> sp.	5	6	8	9	4	6
7	<i>Eliphidium</i> sp.	4	5	7	8	3	4
8	<i>Eponides repandus</i>	7	9	4	5	6	7
9	<i>Globigerinoide glutinata</i>	6	7	6	8	4	5
10	<i>Hauerina miocenica</i>	3	5	2	5	6	7
11	<i>Lagena semistriata</i>	*	*	5	9	*	*
12	<i>Lagena striata</i>	3	6	*	*	3	7
13	<i>Lagena marginata</i>	2	4	5	6	4	9
14	<i>Loxostoma perrectum</i>	5	6	4	5	7	8
15	<i>Neoconorbina crustata</i>	3	5	3	7	2	4
16	<i>Nonion depressulum</i>	2	4	5	6	4	5
17	<i>Oridosalis umbonatus</i>	6	8	4	5	3	7
18	<i>Quinqueloculina</i> sp.	7	9	3	8	6	9
19	<i>Rosalina bradyi</i>	2	5	*	*	3	6
20	<i>Rosalina globularis</i>	7	8	5	6	9	11
21	<i>Rotalia calcar</i>	3	4	3	7	5	8
22	<i>Ammonia tepida</i>	6	9	10	12	13	14
23	<i>Ammonia dentata</i>	2	5	4	7	6	8
24	<i>Spirillina limbata</i>	3	4	5	6	4	5
25	<i>Spiroloculina</i> sp.	5	7	8	9	5	6
26	<i>Textularia agglutinans</i>	7	9	6	8	6	9
	Cumacea						

Sl. No.	Name of the Species	Nos./10 cm ²					
		HMSL-1-HT	HMSL-1-LT	HMSL-2-HT	HMSL-2-LT	HMSL-3-HT	HMSL-3-LT
1	<i>Campylaspis</i> sp.	3	*	4	*	5	*
2	<i>Nannastacus</i> sp.	*	5	*	6	*	*
	Harpacticoids						
1	<i>Canuella</i> sp.	7	9	5	8	3	6
2	<i>Euterpina acutifrons</i>	5	6	3	7	5	8
3	<i>Laophonte thoracica</i>	2	4	5	6	4	5
4	<i>Macrosetella</i> sp.	6	8	*	*	3	4
5	<i>Microsetella</i> sp.	3	5	2	4	*	*
6	<i>Stenhelis</i> sp.	4	6	3	5	4	7
	Ostrocodes						
1	<i>Conchoecia</i> sp.	3	7	4	8	3	5
2	<i>Cypridina</i> sp.	5	8	3	7	8	9
3	<i>Leptocythere</i> sp.	2	3	*	*	4	6
4	<i>Tanella indica</i>	*	*	7	9	*	*
	Archiannelid						
1	<i>Protodrilus helgolandicus</i>	4	6	3	5	7	8
2	<i>Protodrilus brevis</i>	*	*	4	6	*	*
	Tanaidacea						
1	<i>Sphaerosyllis</i> sp.	7	9	5	8	3	5
	Total	256	347	283	386	299	387

* - Organisms not present

Sl. No.	Name of the Species	Nos./10 cm ²					
		HMSL-4-HT	HMSL-4-LT	HMSL-5-HT	HMSL-5-LT	HMSL-6-HT	HMSL-6-LT
	Nematodes						
1	<i>Daptonema conicum</i>	10	12	11	14	10	12
2	<i>Desmoscolex falcatus</i>	7	9	5	8	9	11
3	<i>Enoploides</i> sp.	10	12	10	12	13	14
4	<i>Gonionchus</i> sp.	6	8	7	9	8	9
5	<i>Halalaimus filum</i>	7	9	5	7	6	8
6	<i>Pandolaimus</i> sp.	13	15	10	12	10	12
7	<i>Quadricoma</i> sp.	8	9	4	5	7	8
8	<i>Theristus</i> sp.	12	16	8	9	13	15
9	<i>Tricoma</i> sp.	7	8	5	7	5	8
10	<i>Stephanolaimus</i> sp.	9	10	13	14	7	9
11	<i>Odontophora</i> sp.	3	5	*	*	4	7
12	<i>Spirinia</i> sp.	12	13	11	14	10	12
13	<i>Neochromodora</i> sp.	8	9	4	7	5	6
	Foraminiferans						
1	<i>Ammonia beccarii</i>	3	5	8	9	7	5
2	<i>Bolivina abbreviata</i>	5	7	9	10	8	9

Sl. No.	Name of the Species	Nos./10 cm ²					
		HMSL-4-HT	HMSL-4-LT	HMSL-5-HT	HMSL-5-LT	HMSL-6-HT	HMSL-6-LT
3	<i>Cornoboides advena</i>	9	10	6	8	10	12
4	<i>Cymbaloporella bradyi</i>	7	9	5	7	5	8
5	<i>Diffusilina</i> sp.	2	3	*	*	3	6
6	<i>Discorbis</i> sp.	6	8	4	5	4	8
7	<i>Eponides repandus</i>	7	9	6	8	9	7
8	<i>Globigerina rubber</i>	3	6	5	6	5	9
9	<i>Globigerinoides glutinata</i>	8	9	4	7	6	8
10	<i>Hauerina miocenica</i>	3	5	7	8	3	5
11	<i>Lagena striata</i>	2	3	3	5	4	6
12	<i>Lagena marginata</i>	4	5	*	*	2	4
13	<i>Lagena quadrata</i>	*	*	3	4	*	*
14	<i>Loxostoma perrectum</i>	5	6	2	5	3	5
15	<i>Nonion depressulum</i>	8	9	4	6	4	6
16	<i>Oridosalis umbonatus</i>	3	5	3	7	2	4
17	<i>Planorbulinella larvata</i>	6	9	2	6	3	7
18	<i>Quinqueloculina</i> sp.	8	10	6	9	5	6
19	<i>Rosalina bradyi</i>	*	*	3	5	*	*
20	<i>Rosalina globularis</i>	10	12	8	9	7	9
21	<i>Ammonia tepida</i>	7	9	6	8	6	8
22	<i>Ammonia dentata</i>	11	10	13	14	12	15
23	<i>Asterorotalia trispinosa</i>	9	10	7	8	4	6
24	<i>Spirillina limbata</i>	3	4	*	*	5	8
25	<i>Spiroloculina</i> sp.	8	9	5	6	3	5
26	<i>Textularia agglutinans</i>	2	6	8	9	5	7
27	<i>Triloculina austriaca</i>	4	5	3	4	2	6
	Cumacea						
1	<i>Campylaspis</i> sp.	3	*	4	5	*	9
2	<i>Gynodiastylis</i> sp.	*	7	*	*	7	*
3	<i>Nannastacus</i> sp.	5	*	6	8	*	5
4	Harpacticoids						
5	<i>Canuella</i> sp.	7	9	4	6	3	6
6	<i>Cervinia</i> sp.	3	5	*	*	4	8
7	<i>Diarthrodes</i> sp.	5	7	5	9	8	9
8	<i>Euterpina acutifrons</i>	2	5	*	*	2	4
9	<i>Laophonte thoracica</i>	6	8	3	5	4	6
10	<i>Macrosetella</i> sp.	2	3	4	6	8	9
11	<i>Microsetella</i> sp.	3	5	*	*	5	6
12	<i>Stenhelia</i> sp.	*	*	7	8	*	*
	Ostrocodes						
1	<i>Conchoecia</i> sp.	9	11	8	9	3	5
2	<i>Cypridina</i> sp.	3	5	*	*	4	7

Sl. No.	Name of the Species	Nos./10 cm ²					
		HMSL-4-HT	HMSL-4-LT	HMSL-5-HT	HMSL-5-LT	HMSL-6-HT	HMSL-6-LT
3	<i>Leptocythere</i> sp.	8	10	5	7	*	*
4	<i>Tanella indica</i>	*	*	3	4	5	7
5	<i>Tanella kingmaii</i>	2	3	*	*	3	4
	Archiannelid						
1	<i>Protodrilus helgolandicus</i>	3	4	2	5	5	6
2	<i>Protodrilus brevis</i>	2	3	*	*	3	7
	Rotifera						
1	<i>Rotaria rotatoria</i>	*	*	3	4	*	*
	Tanaidacea						
1	<i>Heterotanais oerstedii</i>	7	8	4	6	5	8
	Total	325	411	281	373	303	416

* - Organisms not present

Sl. No.	Name of the Species	Nos./10 cm ²					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
	Nematodes						
1	<i>Daptonema conicum</i>	10	12	11	13	8	9
2	<i>Draconema</i> sp.	4	5	6	8	4	7
3	<i>Gonionchus</i> sp.	6	9	10	12	9	10
4	<i>Halalaimus filum</i>	10	12	7	9	7	8
5	<i>Oxystomina</i> sp.	7	8	10	12	8	9
6	<i>Polygastrophora</i> sp.	8	9	6	7	5	6
7	<i>Quadracoma</i> sp.	5	6	10	12	4	7
8	<i>Theristus</i> sp.	10	12	15	16	18	21
9	<i>Tricoma</i> sp.	7	8	*	*	5	6
10	<i>Stephanolaimus</i> sp.	8	9	6	8	4	7
11	<i>Odontophora</i> sp.	3	5	5	9	3	8
12	<i>Neochromadora</i> sp.	10	15	12	13	19	22
13	<i>Spirinia</i> sp.	8	11	15	18	12	14
	Foraminiferans						
1	<i>Ammonia beccarii</i>	6	8	4	5	5	9
2	<i>Bolivina abbreviata</i>	2	5	6	7	3	6
3	<i>Cornoboides advena</i>	7	9	8	9	4	7
4	<i>Cyclammina</i> sp.	4	5	*	*	5	8
5	<i>Cymbaloporella bradyi</i>	2	4	2	3	4	5
6	<i>Discorbis</i> sp.	6	7	8	10	5	9
7	<i>Eponides repandus</i>	8	9	3	5	5	8
8	<i>Globigerinoides glutinata</i>	5	8	7	9	3	6
9	<i>Lagena semistriata</i>	2	5	*	*	4	5
10	<i>Lagena striata</i>	5	7	8	9	6	8

Sl. No.	Name of the Species	Nos./10 cm ²					
		HMSL-7-HT	HMSL-7-LT	HMSL-8-HT	HMSL-8-LT	HMSL-9-HT	HMSL-9-LT
11	<i>Lagena marginata</i>	*	*	3	5	*	*
12	<i>Lagena quadrata</i>	3	6	*	*	3	5
13	<i>Nonion depressulum</i>	6	7	8	9	2	6
14	<i>Pararotalia minuta</i>	8	10	6	8	5	7
15	<i>Quinqueloculina</i> sp.	9	11	7	9	6	8
16	<i>Rosalina globularis</i>	7	9	6	7	4	5
17	<i>Rotalia calcar</i>	3	5	*	*	5	6
18	<i>Ammonia tepida</i>	7	9	5	9	6	8
19	<i>Ammonia dentata</i>	10	12	7	9	4	5
20	<i>Spirillina limbata</i>	4	5	6	7	3	6
21	<i>Spiroloculina</i> sp.	5	6	3	5	2	4
22	<i>Textularia agglutinans</i>	7	8	4	6	3	5
23	<i>Triloculina austriaca</i>	8	9	6	7	4	7
	Cumacea						
1	<i>Campylaspis</i> sp.	*	2	4	5	3	7
2	<i>Gynodistylis</i> sp.	*	*	3	6	*	*
3	<i>Nannastacus</i> sp.	3	5	*	*	4	6
4	<i>Picrocuma</i> sp.	*	*	7	9	*	*
	Harpacticoids						
1	<i>Canuella</i> sp.	9	11	5	7	4	5
2	<i>Cervinia</i> sp.	4	5	*	*	5	6
3	<i>Diarthrodes</i> sp.	6	8	4	5	3	4
4	<i>Euterpina acutifrons</i>	8	9	3	6	4	5
5	<i>Laophonte thoracica</i>	5	6	4	5	5	6
6	<i>Macrosetella</i> sp.	6	10	6	9	4	5
7	<i>Stenhelia</i> sp.	4	5	6	8	4	6
	Ostrocodes						
1	<i>Conchoecia</i> sp.	9	11	3	5	6	9
2	<i>Cypridina</i> sp.	4	5	*	*	7	8
3	<i>Leptocythere</i> sp.	*	*	5	7	*	*
4	<i>Tanella indica</i>	5	6	*	*	3	5
	Archiannelid						
1	<i>Protodrilus helgolandicus</i>	3	5	*	*	2	4
2	<i>Protodrilus brevis</i>	4	6	4	5	*	*
	Tanaidacea						
1	<i>Heterotanais oerstedii</i>	2	5	*	*	6	9
2	<i>Apseudes setosus</i>	6	8	4	5	3	7
	Total	298	392	278	357	260	369

* - Organisms not present

APPENDIX E
FLORA & FAUNA SURVEY RESULTS

Appendix E List of Flora & Fauna in Uttara Kannada District based on Secondary Data

Table E-1: List of plant species and their status

S.no	Name of plant species	Family	Habit	IUCN/ WPA Status
1.	<i>Acacia concinna</i>	<i>Mimoseae</i>	liana	
2.	<i>Achronychia pedunculata</i>	<i>Rutaceae</i>	tree	
3.	<i>Actinodaphne hookeri</i>	<i>Lauraceae</i>	tree	
4.	<i>Adenia hondala</i>	<i>Passifloraceae</i>	climber	Vulnerable
5.	<i>Adiantum sp.</i>	<i>Adiantaceae</i>	(fern)	
6.	<i>Ageratum conyzoides</i>	<i>Asteraceae</i>	Herb	
7.	<i>Aglaia roxburgiana</i>	<i>Meliaceae</i>	tree	
8.	<i>Agrostistachys longifolius</i>	<i>Euphorbiaceae</i>	shrub	
9.	<i>Ailanthus malabarica</i>	<i>Simarubaceae</i>	tree	
10.	<i>Alangium salvifolium</i>	<i>Alangiaceae</i>	shrub	
11.	<i>Albizzia odoratissima</i>	<i>Papilionaceae</i>	tree	
12.	<i>Allophyllus cobbe</i>	<i>Sapindaceae</i>	shrub	
13.	<i>Alpinia galang</i>	<i>Zingeberaceae</i>	Herb	
14.	<i>Alseodaphne semicarpifolia</i>	<i>Lauraceae</i>	tree	
15.	<i>Alstonia scholaris</i>	<i>Apocynaceae</i>	tree	
16.	<i>Amphelocissus tomentosa</i>	<i>Vitaceae</i>	climber	
17.	<i>Anamirta cocculus</i>	<i>Menispermaceae</i>	climber	
18.	<i>Ancistrocladus heyneanus</i>	<i>Ansistrocladacea</i>	shrub	
19.	<i>Antidesma menasu</i>	<i>Euphorbiaceae</i>	shrub	
20.	<i>Apama siliquosa</i>	<i>Aristolocaeae</i>	shrub	
21.	<i>Apananthe cuspidata</i>	<i>Meliaceae</i>	tree	
22.	<i>Aphanomixis polystachy</i>	<i>Meliaceae</i>	tree	Vulnerable
23.	<i>Aporosa lindleyana</i>	<i>Euphorbiaceae</i>	tree	
24.	<i>Archieodendron monodelphum</i>	<i>Papilionaceae</i>	tree	
25.	<i>Ardesia solanaceae</i>	<i>Myrsinaceae</i>	shrub	
26.	<i>Arenga wightii</i>	<i>Palmae</i>	palm	
27.	<i>Argeria nervosa</i>	<i>Convolvulaceae</i>	climber	
28.	<i>Aristolochia tagala</i>	<i>Aristolocaeae</i>	climber	Vulnerable
29.	<i>Artabotrys odoratissima</i>	<i>Anonaceae</i>	shrub	
30.	<i>Artocarpus heterophyllus</i>	<i>Moraceae</i>	tree	
31.	<i>Artocarpus hirsutus</i>	<i>Moraceae</i>	tree	
32.	<i>Asparagus racemosus</i>	<i>Liliaceae</i>	tree	
33.	<i>Atlantia racemosa</i>	<i>Rutaceae</i>	ree	
34.	<i>Beilschmedia wighti</i>	<i>Lauraceae</i>	herb	
35.	<i>Bigonia sp.</i>	<i>Bigoniaceae</i>	tree	
36.	<i>Bischofia javanica</i>	<i>Euphorbiaceae</i>	orchid	
37.	<i>Bombax ceiba</i>	<i>Malvaceae</i>	palm	
38.	<i>Bridelia scandens</i>	<i>Euphorbiaceae</i>	liana	
39.	<i>Bulbophyllum sp.</i>	<i>Orchidaceae</i>	tree	
40.	<i>Calamus thwaitesii</i>	<i>Palmae</i>	tree	
41.	<i>Calicarpa tomentosa</i>	<i>Verbinaceae</i>	shrub	
42.	<i>Calicopteris floribonda</i>	<i>Combretaceae</i>	tree	
43.	<i>Calophyllum apetalum</i>	<i>Clusiaceae</i>	climber	
44.	<i>Calophyllum tomentosum</i>	<i>Clusiaceae</i>	shrub	
45.	<i>Calotropis gigantea</i>	<i>Asclapiadaceae</i>	shrub	
46.	<i>Canarium strictum</i>	<i>Simarubaceae</i>	tree	
47.	<i>Canthium angustifolium</i>	<i>Rubiaceae</i>	tree	
48.	<i>Canthium dicoccum</i>	<i>Rubiaceae</i>	shrub	
49.	<i>Capparis heyneana</i>	<i>Capparidaceae</i>	palm	
50.	<i>Caralia brachiata</i>	<i>Rhizoporaceae</i>	tree	

S.no	Name of plant species	Family	Habit	IUCN/ WPA Status
51.	<i>Careya arborea</i>	Myrtaceae	shrub	
52.	<i>Carissa carandus</i>	Apocynaceae	herb	
53.	<i>Caryota urens</i>	Palmae	shrub	
54.	<i>Casearia ovata</i>	Flacourtiaceae	tree	
55.	<i>Casereia rubicans</i>	Flacourtiaceae	tree	
56.	<i>Cassia tora</i>	Papilionaceae	tree	
57.	<i>Cassine glauca</i>	Celastraceae	tree	
58.	<i>Cayrataia sps.</i>	Vitaceae	climber	
59.	<i>Celastrus paniculatus</i>	Celastraceae	climber	Lower Risk / Near Threatened
60.	<i>Celtis philiphinensis</i>	Urticaceae	tree	
61.	<i>Centela asiatica</i>	Umbelliferae	herb	
62.	<i>Chassalia curviflora</i>	Rubiaceae	shrub	
63.	<i>Chassalia ophioxylodes</i>	Rubiaceae	herb	
64.	<i>Chenomorpha fragrans</i>	Apocynaceae	liana	Endangered
65.	<i>Chilocarpus atriviridis</i>	Apocynaceae	climber	
66.	<i>Chionanthus malabarica</i>	Oleaceae	tree	
67.	<i>Chromolina oderata</i>	Asteraceae	herb	
68.	<i>Chrysophyllum lanceolatum</i>	Sapotaceae	tree	
69.	<i>Cinnamomum malabathrum</i>	Lauraceae	tree	Vulnerable
70.	<i>Cissus javanica</i>	Vitaceae	climber	
71.	<i>Clausena wildenovii</i>	Rutaceae	tree	
72.	<i>Cleidon speciform</i>	Euphorbiaceae	tree	
73.	<i>Clematis gouriana</i>	Ranunculaceae	climber	
74.	<i>Clerodendron viscosum</i>	Verbinaceae	herb	
75.	<i>Combretum latifolium</i>	Combretaceae	liana	
76.	<i>Combretum ovalifolium</i>	Combretaceae	liana	
77.	<i>Connarus wighti</i>	Combretaceae	shrub	
78.	<i>Croton malabaricus</i>	Euphorbiaceae	shrub	
79.	<i>Curcuma Spp.</i>	Zingeberaceae	herb	
80.	<i>Cyclea peltata</i>	Menispermaceae	climber	
81.	<i>Cymbidium biclor</i>	Orchidaceae	orchid	
82.	<i>Cyperus rotundus, Linn</i>	Cyperaceae	grass	
83.	<i>Dalbergia horrida</i>	Papilionaceae	liana	
84.	<i>Dalbergia rubiginosa</i>	Papilionaceae	liana	
85.	<i>Dalberiga tamerindifolia</i>	Papilionaceae	liana	
86.	<i>Debregasea longifolia</i>	Urticaceae	shrub	
87.	<i>Delinia pentagyna</i>	Dilliniaceae	tree	
88.	<i>Dendrobium macrostachy</i>	Orchidaceae	herb	
89.	<i>Dendrobium Spp.</i>	Orchidaceae	orchid	
90.	<i>Derris scandens</i>	Papilionaceae	liana	
91.	<i>Derris uliginosa</i>	Papilionaceae	liana	
92.	<i>Desmodium triquetrum</i>	Papilionaceae	herb	
93.	<i>Desmos lawii</i>	Anonaceae	shrub	
94.	<i>Dimocarpus longan</i>	Sapotaceae	tree	
95.	<i>Dimorphocalyx beddomei</i>	Euphorbiaceae	tree	
96.	<i>Dioscorea bulbifera</i>	Dioscoriaceae	climber	
97.	<i>Dioscorea oppositifolia</i>	Dioscoriaceae	climber	
98.	<i>Diospyros buxifolia</i>	Ebenaceae	tree	
99.	<i>Diospyros candolleana</i>	Ebenaceae	tree	Vulnerable
100.	<i>Diospyros crumenata</i>	Ebenaceae	tree	
101.	<i>Diospyros oocarpa</i>	Ebenaceae	tree	
102.	<i>Diospyros paniculata</i>	Ebenaceae	tree	Vulnerable
103.	<i>Diospyros pruriens</i>	Ebenaceae	tree	
104.	<i>Diploclisia glaucansis</i>	Menispermaceae	climber	

S.no	Name of plant species	Family	Habit	IUCN/ WPA Status
105.	<i>Diploclisia palmatus</i>	Cucurbitaceae	climber	
106.	<i>Dipterocarpus indicus</i>	Dipterocarpaceae	tree	Endangered
107.	<i>Dracena terniflora</i>	Liliaceae	Herb	
108.	<i>Drypetes confertiflorus</i>	Euphorbiaceae	Tree	
109.	<i>Dysoxylum malabaricum</i>	Meliaceae	tree	Endangered
110.	<i>Elatostemma lineolatum</i>	Urticaceae	herb	
111.	<i>Eleagnus conferta</i>	Eleagnaceae	shrub	
112.	<i>Eleocarpus serratus</i>	Urticaceae	tree	
113.	<i>Elephantopus scaber</i>	Asteraceae	herb	
114.	<i>Embelia ribes</i>	Myrsinaceae	liana	
115.	<i>Embelia tsjeriun -cottam</i>	Myrsinaceae	shrub	Vulnerable
116.	<i>Emelia sonchifolia</i>	Asteraceae	herb	Vulnerable
117.	<i>Epiprinus malotoformis</i>	Euphorbiaceae	shrub	
118.	<i>Eranthemum sps.</i>	Acanthaceae	herb	
119.	<i>Erycibe paniculata var. wightiana</i>	Convolvulaceae	climber	
120.	<i>Erycibe paniculata</i>	Convolvulaceae	climber	
121.	<i>Eugenia macrocephala</i>	Myrtaceae	shrub	
122.	<i>Euodia-luna anakanda</i>	Rutaceae	tree	
123.	<i>Euonymus indica</i>	Celastraceae	tree	
124.	<i>Euphorbia hirta</i>	Euphorbiaceae	herb	
125.	<i>Ficus callosa</i>	Moraceae	tree	
126.	<i>Ficus drupacea</i>	Moraceae	tree	
127.	<i>Fucus heterophylla</i>	Moraceae	tree	
128.	<i>Ficus hispida</i>	Moraceae	tree	
129.	<i>Ficus nervosa</i>	Moraceae	tree	
130.	<i>Ficus racemosa</i>	Moraceae	tree	
131.	<i>Flacourtia montana</i>	Flacortiaceae	tree	
132.	<i>Flacourtia sepiaria</i>	Flacortiaceae	shrub	
133.	<i>Garcinia gummi-gatta</i>	Clusiaceae	tree	Lower Risk / Near Threatened
134.	<i>Garcinia morella</i>	Clusiaceae	tree	Vulnerable
135.	<i>Garcinia talbotii</i>	Clusiaceae	tree	
136.	<i>Glochidion mlabaricum</i>	Euphorbiaceae	shrub	
137.	<i>Glochidion velutinum</i>	Euphorbiaceae	tree	
138.	<i>Glycosmis pentaphylla</i>	Rutaceae	shrub	
139.	<i>Gnetum ula</i>	Gnetaceae	liana	
140.	<i>Gomphandra tetrandra</i>	Icacinaceae	shrub	
141.	<i>Goniothalamus cardiopetalus</i>	Anonaceae	shrub	
142.	<i>Gouania microcarpa</i>	Rhamnaceae	liana	
143.	<i>Gymnocranthera canarica</i>	Myristicaceae	tree	Vulnerable
144.	<i>Gymnostachium sp.</i>	Acanthaceae	herb	
145.	<i>Hemidesmus indica</i>	Apocynaceae	climber	
146.	<i>Hibiscus furcatus</i>	Malvaceae	shrub	
147.	<i>Hippocrateya grahami</i>	Hippocrateaceae	liana	
148.	<i>Holigarna arnottiana</i>	Anacardiaceae	tree	
149.	<i>Holigarna grahami</i>	Anacardiaceae	tree	
150.	<i>Homalium zeylanica</i>	Flacortiaceae	tree	
151.	<i>Hopea ponga</i>	Dipterocarpaceae	tree	
152.	<i>Hoya ovalifolia</i>	Asclapiadaceae	climber	
153.	<i>Hydnocarpus pentadra</i>	Flacortiaceae	tree	Vulnerable
154.	<i>Hymenodictyon obvatum</i>	Rubiaceae	tree	
155.	<i>Ichinocarpus fruitiscence</i>	Apocynaceae	climber	
156.	<i>Ixora brachiata</i>	Rubiaceae	shrub	
157.	<i>Ixora lanceolata</i>	Rubiaceae	shrub	
158.	<i>Ixora nigricans</i>	Rubiaceae	shrub	

S.no	Name of plant species	Family	Habit	IUCN/ WPA Status
159.	<i>Ixora polyantha</i>	Rubiaceae	shrub	
160.	<i>Jasminum malabaricum</i>	Oleaceae	climber	
161.	<i>Knema attenuata</i>	Myristicaceae	tree	Lower Risk / Near Threatened
162.	<i>Lagestroemia lanceolata</i>	Lythraceae	tree	
163.	<i>Lansium annamalayanum</i>	Meliaceae	tree	
164.	<i>Leea indica</i>	Leeaceae	shrub	
165.	<i>Legenandra sp</i>	Araceae	herb	
166.	<i>Litsea floribunda</i>	Lauraceae	tree	
167.	<i>Litsea mysorens</i>	Lauraceae	tree	
168.	<i>Lobelia nicotifolia</i>	Lobeliaceae	herb	
169.	<i>Lophopetalum whightianum</i>	Celastraceae	tree	
170.	<i>Luvanga sarmentosa</i>	Rutaceae	climber	
171.	<i>Macaranga peltata</i>	Euphorbiaceae	tree	
172.	<i>Madhuca neerifolia</i>	Sapotaceae	tree	Vulnerable
173.	<i>Mallotus philippinensis</i>	Euphorbiaceae	tree	
174.	<i>Mallotus stananthus</i>	Euphorbiaceae	shrub	
175.	<i>Mallotus tetracoccus</i>	Euphorbiaceae	tree	
176.	<i>Mangifera indica</i>	Anacardiaceae	tree	
177.	<i>Margaratiera indica</i>	Euphorbiaceae	tree	
178.	<i>Maytenus rothiana</i>	Celastraceae	shrub	
179.	<i>Melastoma malabathrum</i>	Melastomaceae	herb	
180.	<i>Memecylon malabaricum</i>	Melastomaceae	shrub	
181.	<i>Memecylon terminale</i>	Melastomaceae	shrub	
182.	<i>Memecylon umbellatum</i>	Melastomaceae	tree	
183.	<i>Mesa indica</i>	Myrsinaceae	shrub	
184.	<i>Mesua ferrea</i>	Clusiaceae	tree	
185.	<i>Meyna laxiflora</i>	Rubiaceae	tree	
186.	<i>Mimosa pudica</i>	Mimoseae	herb	
187.	<i>Mimusops elengi</i>	Sapotaceae	tree	
188.	<i>Molluca spicata</i>	Papilionaceae	climber	
189.	<i>Morinda citrifolia</i>	Rubiaceae	shrub	
190.	<i>Musenda frondosa</i>	Rubiaceae	shrub	
191.	<i>Myristica dactyloides</i>	Myristicaceae	tree	Vulnerable
192.	<i>Myristica fetua</i>	Myristicaceae	tree	
193.	<i>Myristica malabarica</i>	Myristicaceae	tree	Vulnerable
194.	<i>Neolitsea zeylanica</i>	Lauraceae	tree	
195.	<i>Nergamia alata</i>	Rutaceae	herb	
196.	<i>Nothapodytes nimmoniana</i>	Icacinaceae	shrub	Endangered
197.	<i>Nothopodia racemosa</i>	Anacardiaceae	tree	
198.	<i>Oberonia sp.</i>	Orchidaceae	orchid	
199.	<i>Ochlandra rheedi</i>	Graminae	grass	
200.	<i>Olea dioca</i>	Oleaceae	tree	
201.	<i>Ophiorhiza mungo</i>	Rubiaceae	herb	
202.	<i>Ophiorhiza pumila</i>	Rubiaceae	herb	
203.	<i>Osyris arborea</i>	Santalaceae	shrub	
204.	<i>Oxalis corniculata</i>	Oxalidaceae	herb	
205.	<i>Palaquium ellipticum</i>	Apocynaceae	tree	
206.	<i>Palidata pallida</i>	Orchidaceae	Herb	
207.	<i>Pandanus tectorius</i>	Pandanaceae	shrub	
208.	<i>Peramigyna monophylla</i>	Rutaceae	shrub	
209.	<i>Persea macrantha</i>	Lauraceae	tree	Endangered
210.	<i>Pinanga dicksonii</i>	Palmae	palm	
211.	<i>Piper sps</i>	Piperaceae	herb	
212.	<i>Polyalthia fragrans</i>	Anonaceae	tree	

S.no	Name of plant species	Family	Habit	IUCN/ WPA Status
213.	<i>Pongamia pinnata</i>	<i>Papilionaceae</i>	tree	
214.	<i>Pothos scandans</i>	<i>Araceae</i>	climber	
215.	<i>Psychotria dalzelli</i>	<i>Rubiaceae</i>	shrub	
216.	<i>Psychotria flavida</i>	<i>Rubiaceae</i>	shrub	
217.	<i>Psychotria nigra</i>	<i>Rubiaceae</i>	shrub	
218.	<i>Pterocarpus marsupium</i>	<i>Papilionaceae</i>	tree	
219.	<i>Pterospermum diversifolium</i>	<i>Teliaceae</i>	tree	
220.	<i>Pterospermum reticulatum</i>	<i>Teliaceae</i>	tree	
221.	<i>Randia dumentorum</i>	<i>Rubiaceae</i>	tree	
222.	<i>Randia rugulosa</i>	<i>Rubiaceae</i>	climber	
223.	<i>Rhyncostylis tomentosum</i>	<i>Orchidaceae</i>	herb	
224.	<i>Rubia cordifolia</i>	<i>Rubiaceae</i>	climber	
225.	<i>Rubus fockei</i>	<i>Rosaceae</i>	climber	
226.	<i>Saraca asoca</i>	<i>Papilionaceae</i>	tree	
227.	<i>Schefflera venulosa</i>	<i>Araliaceae</i>	climber	
228.	<i>Semicarpus kathlekanensis</i>	<i>Anacardiaceae</i>	tree	Critically Endangered
229.	<i>Smilax zeylanica</i>	<i>Smalacaeae</i>	climber	Lower Risk / Near Threatened
230.	<i>Solanum xanthocarpum</i>	<i>solanaceae</i>	shrub	
231.	<i>Sterculia guttata</i>	<i>Sterculiaceae</i>	tree	
232.	<i>Streptospermum personatum</i>	<i>Bignoniaceae</i>	tree	
233.	<i>Strobilanthes Spp.</i>	<i>Acanthaceae</i>	hrub	
234.	<i>Strombosea zeylanica</i>	<i>Olacaceae</i>	tree	
235.	<i>Strychnos walichiana</i>	<i>Loganiaceae</i>	shrub	
236.	<i>Stmplocos racemosa</i>	<i>Symplocaceae</i>	tree	
237.	<i>Synadeniurm grahami</i>	<i>Euphorhiaceae</i>	shrub	
238.	<i>Syzygium caryophyllatum</i>	<i>Myrtaceae</i>	tree	
239.	<i>Syzygium cumuni</i>	<i>Myrtaceae</i>	tree	
240.	<i>Syzygium gardneri</i>	<i>Myrtaceae</i>	tree	
241.	<i>Syzygium hemispericum</i>	<i>Myrtaceae</i>	tree	
242.	<i>Syzygium laetum</i>	<i>Myrtaceae</i>	tree	
243.	<i>Syzygium zeylanica</i>	<i>Myrtaceae</i>	tree	
244.	<i>Taebermontana heyneana</i>	<i>Apocynaceae</i>	tree	
245.	<i>Terminalia paniculata</i>	<i>Combretaceae</i>	tree	
246.	<i>Tetrameles nudiflora</i>	<i>Dasticeae</i>	tree	
247.	<i>Thunbergia fragrans</i>	<i>Thunbergiaceae</i>	tree	
248.	<i>Toddalia asiatica</i>	<i>Rutaceae</i>	climber	
249.	<i>Tragia hispida</i>	<i>Urticaceae</i>	climber	
250.	<i>Trema orientalis</i>	<i>Urticaceae</i>	tree	
251.	<i>Trichelia connaroides</i>	<i>Papilionaceae</i>	tree	
252.	<i>Tridax procumbens</i>	<i>Asteraceae</i>	Herb	
253.	<i>Uvaria narum</i>	<i>Anonaceae</i>	shrub	
254.	<i>Vateria indica</i>	<i>Dipterocarpaceae</i>	tree	Critically Endangered
255.	<i>Venda Sp.</i>	<i>Orchidaceae</i>	orchid	
256.	<i>Ventilago calculeata</i>	<i>Rhamnaceae</i>	shrub	
257.	<i>Ventilago maderaspatensis</i>	<i>Rhamnaceae</i>	shrub	
258.	<i>Vepris bilocularis</i>	<i>Rutaceae</i>	tree	
259.	<i>Vitex altissima</i>	<i>Verbinaceae</i>	tree	
260.	<i>Vitis discolor</i>	<i>Vitaceae</i>	climber	
261.	<i>Walsura trifolia</i>	<i>Meliaceae</i>	tree	
262.	<i>Wendlandia thyrsoides</i>	<i>Rubiaceae</i>	shrub	
263.	<i>Xanthophlum flavoscens</i>	<i>Xanthophyllaceae</i>	shrub	
264.	<i>Xantolis tomentosa</i>	<i>Sapotaceae</i>	tree	

S.no	Name of plant species	Family	Habit	IUCN/ WPA Status
265.	<i>Zanthoxylum ovalifolium</i>	Rutaceae	shrub	
266.	<i>Zingiber cervunum</i>	Zingiberaceae	Herb	
267.	<i>Zizyphus oenoplia</i>	Rhamnaceae	shrub	
268.	<i>Zizyphus rugosa</i>	Rhamnaceae	Herb	
269.	<i>Avicennia alba</i>	Avicenniaceae	mangrove	
270.	<i>Avicennia marina</i>	Avicenniaceae	mangrove	
271.	<i>Avicennia officinalis</i>	Avicenniaceae	mangrove	
272.	<i>Rhizophora apiculata</i>	Rhizophoraceae	mangrove	
273.	<i>Rhizophora mucronata</i>	Rhizophoraceae	mangrove	
274.	<i>Excoecaria agallocha</i>	Euphorbiaceae	mangrove	

Table E-2: List Of Amphibians (Frogs) Reported To Occur In Uttara Kannada District

S.No	Family	Scientific Name	Endemiic
1	<i>Ichthyophiidae</i>	<i>Ichthyophis bombayensis</i>	Yes
2	<i>Ichthyophiidae</i>	<i>Ichthyophis malabarensis</i>	No
3	<i>Bufonidae</i>	<i>Duttaphyrnus melanostictus</i>	Yes
4	<i>Bufonidae</i>	<i>Pedostibes tuberculosus</i>	No
5	<i>Microhylidae</i>	<i>Microhyla ornate</i>	No
6	<i>Microhylidae</i>	<i>Microhyla rubra</i>	Yes
7	<i>Micrixalidae</i>	<i>Micrixalus saxicola</i>	Yes
8	<i>Ranixalidae</i>	<i>Indirana beddomii</i>	Yes
9	<i>Ranixalidae</i>	<i>Indirana semipalmata</i>	No
10	<i>Dicroglossidae</i>	<i>Euphlyctis cyanophlyctis</i>	Yes
11	<i>Dicroglossidae</i>	<i>Fejervarya brevipalmata</i>	Yes
12	<i>Dicroglossidae</i>	<i>Fejervarya caperata</i>	Yes
13	<i>Dicroglossidae</i>	<i>Fejervarya granosa</i>	Yes
14	<i>Dicroglossidae</i>	<i>Fejervarya kudremukhensis</i>	Yes
15	<i>Dicroglossidae</i>	<i>Fejervarya mudduraja</i>	Yes
16	<i>Dicroglossidae</i>	<i>Fejervarya rufescens</i>	No
17	<i>Dicroglossidae</i>	<i>Fejervarya sahyadris</i>	Yes
18	<i>Dicroglossidae</i>	<i>Hoplobatrachus tigerinus</i>	Yes
19	<i>Dicroglossidae</i>	<i>Sphaerotheca leucorhyncus</i>	No
20	<i>Dicroglossidae</i>	<i>Sphaerotheca breviceps</i>	Yes
21	<i>Rhacophoridae</i>	<i>Philautus cf. bombayensis</i>	Yes
22	<i>Rhacophoridae</i>	<i>Philautus neelanethrus</i>	Yes
23	<i>Rhacophoridae</i>	<i>Philautus cf. ponmu</i>	Yes
24	<i>Rhacophoridae</i>	<i>Philautus cf. tuberothumus</i>	Yes
25	<i>Rhacophoridae</i>	<i>Philautus cf. wynaadensis</i>	Yes
26	<i>Nyctibatrachidae</i>	<i>Polypedates maculates</i>	No
27	<i>Nyctibatrachidae</i>	<i>Polypedates cf. pseudocruciger</i>	Yes
28	<i>Nyctibatrachidae</i>	<i>Rhacophorus malabaricus</i>	Yes
29	<i>Nyctibatrachidae</i>	<i>Nyctibatrachus cf. aliciae</i>	Yes
30	<i>Nyctibatrachidae</i>	<i>Nyctibatrachus cf. humayuni</i>	Yes
31	<i>Nyctibatrachidae</i>	<i>Nyctibatrachus cf. major</i>	Yes

S.No	Family	Scientific Name	Endemiic
32	<i>Nyctibatrachidae</i>	<i>Nyctibatrachus cf. petraeus</i>	Yes
33	<i>Ranidae</i>	<i>Clinotarsus curtipes</i>	No
34	<i>Ranidae</i>	<i>Sylvirana aurantiaca</i>	Yes
35	<i>Ranidae</i>	<i>Sylvirana temporalis</i>	No

Table E-3: List Of Avian Fauna (Birds) Reported From The Project influenced area

S.No	Common name	Scientific Name	Conservation Status
1	Grey Junglefowl	<i>Gallus sonneratii</i>	
2	Indian Peafowl	<i>Pavo cristatus</i>	
3	Lesser Whistling-duck	<i>Dendrocygna javanica</i>	
4	Grey-capped Pygmy Woodpecker	<i>Dendrocopos canicapillus</i>	
5	White-bellied Woodpecker	<i>Dryocopus javensis</i>	
6	Lesser Yellownape	<i>Picus chlorolophus</i>	
7	Common Flameback	<i>Dinopium javanense</i>	
8	Greater Flameback	<i>Chrysocolaptes lucidus</i>	
9	Heart-spotted Woodpecker	<i>Hemicircus canente</i>	
10	White-cheeked Barbet	<i>Megalaima viridis</i>	
11	Brown headed Barbet	<i>Megalaima zeylanica</i>	
12	Crimson-fronted Barbet	<i>Megalaima rubricapilla</i>	
13	Coppersmith Barbet	<i>Megalaima haemacephala</i>	
14	Malabar Grey Hornbill	<i>Ocyrceros griseus</i>	Range Restricted, Endemic
15	Great Hornbill	<i>Buceros bicornis</i>	
16	Malabar Pied Hornbill	<i>Anthracoceros coronatus</i>	
17	Common Hoopoe	<i>Upupa epops</i>	
18	Malabar Trogon	<i>Harpactes fasciatus</i>	
19	Indian Roller	<i>Coracias benghalensis</i>	
20	Common Kingfisher	<i>Alcedo atthis</i>	
21	Blue eared Kingfisher	<i>Alcedo meninting</i>	
22	Stork-billed Kingfisher	<i>Halcyon capensis</i>	
23	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	
24	Pied Kingfisher	<i>Ceryle rudis</i>	
25	Blue-bearded Bee-eater	<i>Nyctyornis athertoni</i>	
26	Green Bee-eater	<i>Merops orientalis</i>	
27	Blue-tailed Bee-eater	<i>Merops philippinus</i>	
28	Chestnut-headed Bee-eater	<i>Merops leschenaulti</i>	
29	Common Hawk Cuckoo	<i>Hierococcyx varius</i>	
30	Indian Cuckoo	<i>Cuculus micropterus</i>	
31	Banded Bay Cuckoo	<i>Cacomatis sonnerati</i>	
32	Asian Koel	<i>Eudynamys scolopacea</i>	
33	Greater Coucal	<i>Centropus sinensis</i>	
34	Vernal Hanging Parrot	<i>Loriculus vernalis</i>	
35	Rose-ringed Parakeet	<i>Psittacula krameri</i>	
36	Plum-headed Parakeet	<i>Psittacula cyanocephala</i>	

S.No	Common name	Scientific Name	Conservation Status
37	Blue winged Parakeet	<i>Psittacula columboides</i>	Range Restricted, Endemic
38	Asian Palm Swift (Palm Swift)	<i>Cypsiurus balasiensis</i>	
39	Alpine Swift	<i>Tachymarptis melba</i>	
40	Crested Treeswift	<i>Hemiprocnis coronata</i>	
41	Rock Eagle Owl	<i>Bubo bubo bengalensis</i>	
42	Spot belied Eagle Owl	<i>Bubo nipalensis</i>	
43	Brown Wood Owl	<i>Strix leptogrammica</i>	
44	Sri Lankan Bay Owl	<i>Phodilus assimilis</i>	
45	Sri Lanka Frogmouth	<i>Batrachostomus moniliger</i>	
46	Grey Nightjar	<i>Caprimulgus indicus</i>	
47	Rock pigeon	<i>Columba livia</i>	
48	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	
49	Spotted Dove	<i>Streptopelia chinensis</i>	
50	Emerald Dove	<i>Chalcophaps indica</i>	
51	Pompadour Green Pigeon	<i>Treron pompadora</i>	
52	Yellow-footed Green Pigeon	<i>Treron phoenicoptera</i>	
53	Green Imperial Pigeon	<i>Ducula aenea</i>	
54	Mountain Imperial Pigeon	<i>Ducula badia</i>	
55	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	
56	Purple Swampphen	<i>Porphyrio porphyrio</i>	
57	Common Coot	<i>Fulica atra</i>	
58	Bronze-winged Jacana	<i>Metopidius indicus</i>	
59	Pheasant tailed Jacana	<i>Hydrophasianus chirurgus</i>	
60	Red-wattled Lapwing	<i>Vanellus indicus</i>	
61	Oriental Honey-buzzard	<i>Pernis ptilorhynchus</i>	
62	Black Kite	<i>Milvus migrans</i>	
63	Brahminy Kite	<i>Haliastur indus</i>	
64	Crested Serpent Eagle	<i>Spilornis cheela</i>	
65	Shikra	<i>Accipiter badius</i>	
66	Besra	<i>Accipiter virgatus</i>	
67	Eurasian Sparrowhawk	<i>Accipiter nisus</i>	
68	Crested Goshawk	<i>Accipiter trivirgatus</i>	
69	White-eyed Buzzard	<i>Butastur teesa</i>	
70	Black Eagle	<i>Ictinaetus malayensis</i>	
71	Rufous-bellied Eagle	<i>Hieraaetus kienerii</i>	
72	Common Kestrel	<i>Falco tinnunculus</i>	
73	Peregrine Falcon	<i>Falco peregrinus</i>	
74	Little Grebe	<i>Tachybaptus ruficollis</i>	
75	Darter	<i>Anhinga melanogaster</i>	Near Threatened
76	Little Cormorant	<i>Phalacrocorax niger</i>	
77	Great Egret	<i>Casmerodius albus</i>	
78	Intermediate egret	<i>Mesophyx intermedia</i>	
79	Little egret	<i>Egretta garzetta</i>	

S.No	Common name	Scientific Name	Conservation Status
80	Cattle Egret	<i>Bubulcus ibis</i>	
81	Indian Pond Heron	<i>Ardeola grayii</i>	
82	Little Heron	<i>Butorides striatus</i>	
83	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	
84	Oriental White Ibis	<i>Threskiornis melanocephalus</i>	Near Threatened
85	Woolly-necked Stork	<i>Ciconia episcopus</i>	
86	Painted Stork	<i>Mycteria leucocephala</i>	Near Threatened
87	Lesser Adjutant Stork	<i>Leptoptilos javanicus</i>	Vulnerable
88	Asian Fairy Bluebird	<i>Irena puella</i>	
89	Blue-winged Leafbird	<i>Chloropsis cochinchinensis</i>	
90	Golden-fronted Leafbird	<i>Chloropsis aurifrons</i>	
91	Brown Shrike	<i>Lanius cristatus</i>	
92	Long-tailed Shrike	<i>Lanius schach</i>	
93	Rufous Treepie	<i>Dendrocitta vagabunda</i>	
94	White-bellied Treepie	<i>Dendrocitta leucogastra</i>	Range Restricted, Endemic
95	House Crow	<i>Corvus splendens</i>	
96	Large-billed Crow	<i>Corvus macrorhynchos</i>	
97	Ashy Woodswallow	<i>Artamus fuscus</i>	
98	Eurasian Golden Oriole	<i>Oriolus oriolus</i>	
99	Black-hooded Oriole	<i>Oriolus xanthornus</i>	
100	Black-headed Cuckooshrike	<i>Coracina melanoptera</i>	
101	Small Minivet	<i>Pericrocotus cinnamomeus</i>	
102	Scarlet Minivet	<i>Pericrocotus flammeus</i>	
103	Bar-winged Flycatcher-shrike	<i>Hemipus picatus</i>	
104	White-browed Fantail	<i>Rhipidura aureola</i>	
105	Black Drongo	<i>Dicrurus macrocercus</i>	
106	Ashy Drongo	<i>Dicrurus leucophaeus</i>	
107	White-bellied Drongo	<i>Dicrurus caerulescens</i>	
108	Bronzed Drongo	<i>Dicrurus aeneus</i>	
109	Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	
110	Black-naped Monarch	<i>Hypothymis azurea</i>	
111	Asian Paradise-flycatcher	<i>Terpsiphone paradisi</i>	
112	Common Iora	<i>Aegithina tiphia</i>	
113	Large Woodshrike	<i>Tephrodornis gularis</i>	
114	Common Woodshrike	<i>Tephrodornis pondicerianus</i>	
115	Blue-capped Rock Thrush	<i>Monticola cinclorhynchus</i>	
116	Blue Rock Thrush	<i>Monticola solitarius</i>	
117	Malabar Whistling Thrush	<i>Myophonus horsfieldii</i>	
118	White-throated Thrush	<i>Zoothera citrina cyanotus</i>	
119	Eurasian Blackbird	<i>Turdus merula</i>	
120	Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	
121	Red-throated Flycatcher	<i>Ficedula parva</i>	
122	Verditer Flycatcher	<i>Eumyias thalassina</i>	

S.No	Common name	Scientific Name	Conservation Status
123	White-bellied Blue Flycatcher	<i>Cyornis pallipes</i>	Range Restricted, Endemic
124	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	
125	Oriental Magpie Robin	<i>Copsychus saularis</i>	
126	White-rumped Shama	<i>Copsychus malabaricus</i>	
127	Chestnut-tailed Starling	<i>Sturnus malabaricus</i>	
128	White-headed Starling	<i>Sturnus erythropygius</i>	
129	Brahminy Starling	<i>Sturnus pagodarum</i>	
130	Common Myna	<i>Acridotheres tristis</i>	
131	Jungle Myna	<i>Acridotheres fuscus</i>	
132	Hill Myna	<i>Gracula religiosa</i>	
133	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	
134	Great Tit	<i>Parus major</i>	
135	Black-lored Tit	<i>Parus xanthogenys</i>	
136	Dusky Crag Martin	<i>Hirundo concolor</i>	
137	Barn Swallow	<i>Hirundo rustica</i>	
138	Wire-tailed Swallow	<i>Hirundo smithii</i>	
139	Red-rumped Swallow	<i>Hirundo daurica</i>	
140	Northern House Martin	<i>Delichon urbica</i>	
141	Black-crested Bulbul	<i>Pycnonotus melanicterus gularis</i>	
142	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	
143	Red-vented Bulbul	<i>Pycnonotus cafer</i>	
144	Yellow-browed Bulbul	<i>Iole indica</i>	
145	Grey headed Bulbul	<i>Pycnotus priocephalus</i>	Range Restricted, Endemic
146	Black Bulbul	<i>Hypsipetes leucocephalus</i>	
147	Ashy Prinia	<i>Prinia socialis</i>	
148	Oriental White-eye	<i>Zosterops palpebrosus</i>	
149	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	
150	Thick-billed Warbler	<i>Acrocephalus aedon</i>	
151	Common Tailorbird	<i>Orthotomus sutorius</i>	
152	Common Chiffchaff	<i>Phylloscopus collybita</i>	
153	Tickell's Leaf Warbler	<i>Phylloscopus affinis</i>	
154	Greenish Warbler	<i>Phylloscopus trochiloides</i>	
155	Indian Scimitar Babbler	<i>Pomatorhinus horsfieldii</i>	
156	Dark-fronted Babbler	<i>Rhopocichla atriceps</i>	
157	Rufous Babbler	<i>Turdoides subrufus</i>	Range Restricted, Endemic
158	Jungle Babbler	<i>Turdoides striatus</i>	
159	Brown-cheeked Fulvetta	<i>Alcippe poioicephala</i>	
160	Bengal Bushlark	<i>Mirafra assamica</i>	
161	Malabar Lark	<i>Galerida malabarica</i>	
162	Sykes Lark	<i>Galerida deva</i>	
163	Pale-billed Flowerpecker	<i>Dicaeum erythrorhynchus</i>	
164	Thickbilled Flowerpeker	<i>Dicaeum agile</i>	

S.No	Common name	Scientific Name	Conservation Status
165	Plain Flowerpecker	<i>Dicaeum concolor</i>	
166	Purple-rumped Sunbird	<i>Nectarinia zeylonica</i>	
167	Purple Sunbird	<i>Nectarinia asiatica</i>	
168	Loten's Sunbird	<i>Nectarinia lotenia</i>	
169	Small Sunbird	<i>Nectarinia minima</i>	Range Restricted, Endemic
170	Little Spiderhunter	<i>Arachnothera longirostra</i>	
171	House Sparrow	<i>Passer domesticus</i>	
172	Chestnut-shouldered Petronia	<i>Petronia xanthocollis</i>	
173	Forest Wagtail	<i>Dendronanthus indicus</i>	
174	White-browed Wagtail	<i>Motacilla maderaspatensis</i>	
175	Citrine Wagtail	<i>Motacilla citreola</i>	
176	Yellow Wagtail	<i>Motacilla flava</i>	
177	Grey Wagtail	<i>Motacilla cinerea</i>	
178	Indian Silverbill	<i>Lonchura malabarica</i>	
179	White-rumped Munia	<i>Lonchura striata</i>	
180	Black-throated Munia	<i>Lonchura kelaarti</i>	
181	Scaly-breasted Munia	<i>Lonchura punctulata</i>	
182	Common Rosefinch	<i>Carpodacus erythrurus</i>	

Table E-4: List Of Mammals Reported to occur in the Project Affected Area

S.No	Common name	Scientific Name	Conservation Status
1	Hanuman langur	<i>Semnopithecus entellus</i>	Lower risk/ near Threatened
2	Lion-tailed macaque	<i>Macaca silenus</i>	Endangered
3	Bonnet macaque	<i>M. radiata</i>	
4	Slender loris	<i>Loris lydekkerianus</i>	
5	Tiger	<i>Panthera tigris</i>	Vulnerable
6	Leopard	<i>P. pardus</i>	Endangered
7	Jungle cat	<i>Felis chaus</i>	
8	Leopard cat	<i>Prionailurus bengalensis</i>	
9	Rusty spotted cat	<i>P. rubiginosa</i>	
10	Dhole	<i>Cuon alpinus</i>	Vulnerable
11	Golden jackal	<i>Canis aureus</i>	Vulnerable
12	Small Indian civet	<i>Viverricula indica</i>	
13	Malabar civet	<i>V. civettina</i>	
14	Asian palm civet	<i>Paradoxurus hermaphroditus</i>	Critically Endangered
15	Brown palm civet	<i>P. jerdoni</i>	
16	Brown mongoose	<i>Herpestes fuscus</i>	Vulnerable
17	Stripe-necked mongoose	<i>H. vitticollis</i>	Data deficient
18	Common mongoose	<i>H. edwardsi</i>	
19	Otter	<i>Lutra sp.</i>	
20	Nilgiri marten	<i>Martes gwatkinsi</i>	
21	Malabar giant squirrel	<i>Ratufa indica</i>	Vulnerable
22	Giant flying squirrel P	<i>Petaurista petaurista</i>	Vulnerable

S.No	Common name	Scientific Name	Conservation Status
23	Travancore flying squirrel	<i>Petinomys fuscocapillus</i>	lower risk/Near threatened
24	Muntjac	<i>Muntiacus muntjak</i>	Vulnerable
25	Chevrotain	<i>Tragulus meminna</i>	
26	Wild pig	<i>Sus scrofa</i>	
27	Sambar	<i>Cervus unicolor</i>	
28	Gaur	<i>Bos gaurus</i>	
29	Elephant	<i>Elephas maximus</i>	Vulnerable
30	Porcupine	<i>Hystrix indica</i>	Endangered
31	Pangolin	<i>Manis crassicaudata</i>	
32	Sloth bear	<i>Melursus ursinus</i>	lower risk/Near threatened
33	Black-naped hare	<i>Lepus nigricollis</i>	Vulnerable

Table E-5: Important Butterflies, reported in Honnavar region

S.No	Scientific Name
1.	Common Mime Common Jay
2.	Tailed Jay
3.	Common Bluebottle,
4.	Common Mormon
5.	Blue mormon
6.	Five-Bar Swordtail
7.	Malabar Branded Peacock,
8.	Red Helen, ,
9.	Giant Redeye Lime
10.	Common Palmfly, ,
11.	Common Sailer
12.	Short Banded Sailer
13.	Chestnut-streaked Sailer,
14.	Blackvein Sergeant,
15.	Indian Palm Bob Rustic,
16.	Chestnut Angle
17.	Tamil Yeoman
18.	Common Cerulean
19.	Western Centaur
20.	Oakblue
21.	Common Leopard
22.	Common cerulean
23.	Common Silverline,
24.	Common Banded Awl
25.	Large Oak Blue
26.	Brown Awl
27.	Water Snow Flat
28.	Grass Demon
29.	Common Baron
30.	Indian Palm Bob
31.	Conjoined Swift
32.	Common Branded Demon,
33.	Giant Red Eye,
34.	Dark Palm Dart
35.	Common Red Eye
36.	Chestnut Bob
37.	Paris Peacock
38.	Madras Ace

S.No	Scientific Name
39.	Indian Ace
40.	Great Evening Brown
41.	Common Emigrant, ,
42.	Three-spot Grass Yellow
43.	Mottled Emigrant
44.	Common Grass Yellow
45.	Three-spot Grass Yellow
46.	Common Hedge Blue
47.	Dark Cerulean
48.	Plains Cupid
49.	Common Sergeant
50.	Grey Count
51.	Baronet
52.	Redspot Duke
53.	Double-branded Crow
54.	Brown King Crow
55.	Banded Blue Pierrot
56.	Zebra Blue
57.	Malayan
58.	Plains Cupid
59.	Western Centaur Oakblue
60.	Large Oak Blue
61.	Long Banded Silverline
62.	Western Centaur Oakblue
63.	Common Mime Common Jay
64.	Tailed Jay
65.	Common Bluebottle, , ,
66.	Common Mormon
67.	Five-Bar Swordtail
68.	Plains Cupid
69.	Western Centaur Oakblue
70.	Large Oak Blue
71.	Long Banded Silverline
72.	Western Centaur Oakblue
73.	Plains Cupid

APPENDIX F
AIR QUALITY MONITORING RESULTS

Appendix F Ambient Air Quality Results

Table F-1: Air Quality Monitoring Results

Parameter	PM10				PM2.5				NO ₂				SO ₂				CO				O ₃			
	No. of samples	Maximum (µg/m ³)	Minimum (µg/m ³)	Mean (µg/m ³)	No. of samples	Maximum (µg/m ³)	Minimum (µg/m ³)	Mean (µg/m ³)	No. of samples	Maximum (µg/m ³)	Minimum (µg/m ³)	Mean (µg/m ³)	No. of samples	Maximum (µg/m ³)	Minimum (µg/m ³)	Mean (µg/m ³)	No. of samples	Maximum (mg/m ³)	Minimum (mg/m ³)	Mean (µg/m ³)	No. of samples	Maximum (µg/m ³)	Minimum (µg/m ³)	Mean (µg/m ³)
Monitoring Station & Category																								
A1 (Residential)	26	65.6	42.5	55.9	26	35.4	21.2	27.7	26	23.8	18.4	21.3	26	8.2	5.9	7.0	26	<1.0	<1.0	<1.0	26	4.1	2.3	3.2
A2 (Residential)	26	54.9	36.9	46.0	26	26.8	19.3	22.9	26	18.2	16.2	17.1	26	6.9	5.1	5.9	26	<1.0	<1.0	<1.0	26	4.0	2.5	3.3
A3 (Residential)	26	27.1	19.6	24.0	26	21.5	10.3	12.6	26	12.4	10.0	11.2	26	5.9	4.2	5.0	26	<1.0	<1.0	<1.0	26	3.0	1.6	2.2
A4 (Residential)	26	23.6	19.2	21.7	26	11.6	9.6	10.6	26	9.4	8.2	8.7	26	4.8	4.1	4.4	26	<1.0	<1.0	<1.0	26	3.0	1.8	2.5
A5 (Residential)	26	24.6	18.6	21.2	26	12.2	8.9	10.4	26	8.6	7.6	8.2	26	4.6	4.0	4.3	26	<1.0	<1.0	<1.0	26	2.9	2.0	2.5
A6 (Residential)	26	29.4	21.3	25.6	26	16.9	12.0	14.1	26	12.6	10.1	11.3	26	4.6	4.1	4.3	26	<1.0	<1.0	<1.0	26	3.0	2.0	2.4

A1 – Honnavar

A2 – Kasarkod

A3 – Karki

A4 – Ramirth

A5 – Kulkod

A6 – Hosad

APPENDIX G

POPULATION DETAILS

Appendix G Population & Socio-Economic Details of Honnavar

Table G-1: population details of settlements within 10km radius of Project site

S.no	Name	Level	Settlement type	No of households	Total population	Total male population	Total female population
1	Mundgod	Taluk	Total	17163	90738	48973	41765
2	Mundgod	Taluk	Rural	13852	74565	40643	33922
3	Mundgod	Taluk	Urban	3311	16173	8330	7843
4	Jaddigadde	Village	Rural	12	57	26	31
5	Kelginkeri	Village	Rural	68	377	206	171
6	Talgod	Village	Rural	185	917	453	464
7	Horbhag	Village	Rural	144	786	378	408
8	Hosad	Village	Rural	32	149	69	80
9	Santeguli	Village	Rural	135	708	347	361
10	Keremane	Village	Rural	118	576	285	291
11	Navilgone	Village	Rural	429	2061	1050	1011
12	Kadle	Village	Rural	355	1609	823	786
13	Haldipur	Village	Rural	2044	10132	5053	5079
14	Pavinakurve	Village	Rural	172	969	455	514
15	Karki	Village	Rural	1274	6007	3039	2968
16	Duggur	Village	Rural	55	291	149	142
17	Vandoor	Village	Rural	184	922	468	454
18	Nilkod	Village	Rural	189	797	395	402
19	Salkod	Village	Rural	910	4073	2064	2009
20	Hosakuli	Village	Rural	556	2660	1321	1339
21	Kasarkod	Village	Rural	1401	7604	3801	3803
22	Apsarkonda	Village	Rural	86	437	218	219
23	Hosapatna	Village	Rural	464	2484	1247	1237
24	Gunavante	Village	Rural	528	2639	1313	1326
25	Kelgin-Idgunji	Village	Rural	324	1534	759	775
26	Arolli-Mundagod	Village	Rural	164	782	394	388
27	Mavinkurva	Village	Rural	700	3348	1607	1741
28	Mandalakurve	Village	Rural	46	257	130	127
29	Nagre	Village	Rural	240	1210	607	603
30	Hadinbal	Village	Rural	439	2075	1036	1039
31	Hadgeri	Village	Rural	79	348	168	180
32	Honavar (TP)	Town	Urban	3750	17824	9006	8818
33	Honavar	Taluk	Total	32808	160331	80018	80313
34	Honavar	Taluk	Rural	29058	142507	71012	71495
35	Honavar	Taluk	Urban	3750	17824	9006	8818
36	Honavar (TP) - Ward No.1	Ward	Urban	238	1192	595	597
37	Honavar (TP) - Ward No.2	Ward	Urban	389	1798	893	905
38	Honavar (TP) - Ward No.3	Ward	Urban	102	474	243	231
39	Honavar (TP) - Ward No.4	Ward	Urban	390	1710	855	855
40	Honavar (TP) - Ward No.5	Ward	Urban	228	1026	510	516
41	Honavar (TP) - Ward No.6	Ward	Urban	275	1251	623	628
42	Honavar (TP) - Ward No.7	Ward	Urban	242	1196	636	560

S.no	Name	Level	Settlement type	No of households	Total population	Total male population	Total female population
43	Honavar (TP) - Ward No.8	Ward	Urban	250	1367	715	652
44	Honavar (TP) - Ward No.9	Ward	Urban	214	886	423	463
45	Honavar (TP) - Ward No.10	Ward	Urban	244	1217	616	601
46	Honavar (TP) - Ward No.11	Ward	Urban	186	989	488	501
47	Honavar (TP) - Ward No.12	Ward	Urban	155	724	371	353
48	Honavar (TP) - Ward No.13	Ward	Urban	143	745	388	357
49	Honavar (TP) - Ward No.14	Ward	Urban	194	947	484	463
50	Honavar (TP) - Ward No.15	Ward	Urban	190	904	451	453
51	Honavar (TP) - Ward No.16	WARD	Urban	138	586	302	284
52	Honavar (TP) - Ward No.17	WARD	Urban	172	812	413	399
53	Mugali	VILLAGE	Rural	11	49	26	23

Table G-2: Literacy Rate in PIA

S. no	Name	Level	Type	Literate population	Male literate population	Female literate population	Illiterate population	Male illiterate population	Female illiterate population
1	Mundgod	Taluk	Total	54452	33602	20850	36286	15371	20915
2	Mundgod	Taluk	Rural	43482	27489	15993	31083	13154	17929
3	Mundgod	Taluk	Urban	10970	6113	4857	5203	2217	2986
4	Jaddigadde	Village	Rural	28	16	12	29	10	19
5	Kelginkeri	Village	Rural	257	147	110	120	59	61
6	Talgod	Village	Rural	623	355	268	294	98	196
7	Horbhag	Village	Rural	564	301	263	222	77	145
8	Hosad	Village	Rural	78	42	36	71	27	44
9	Santeguli	Village	Rural	518	252	266	190	95	95
10	Keremane	Village	Rural	370	209	161	206	76	130
11	Honavar	Taluk	Total	106386	58179	48207	53945	21839	32106
12	Honavar	Taluk	Rural	92439	50734	41705	50068	20278	29790
13	Honavar	Taluk	Urban	13947	7445	6502	3877	1561	2316
14	Navilgone	Village	Rural	1453	820	633	608	230	378
15	Kadle	Village	Rural	1019	573	446	590	250	340
16	Haldipur	Village	Rural	6319	3532	2787	3813	1521	2292
17	Pavinakurve	Village	Rural	580	323	257	389	132	257
18	Karki	Village	Rural	4024	2235	1789	1983	804	1179
19	Duggur	Village	Rural	182	102	80	109	47	62
20	Vandoor	Village	Rural	738	384	354	184	84	100
21	Nilkod	Village	Rural	690	351	339	107	44	63
22	Salkod	Village	Rural	2823	1529	1294	1250	535	715
23	Hosakuli	Village	Rural	2040	1093	947	620	228	392

S. no	Name	Level	Type	Literate population	Male literate population	Female literate population	Illiterate population	Male illiterate population	Female illiterate population
24	Kasarkod	Village	Rural	4936	2696	2240	2668	1105	1563
25	Apsarkonda	Village	Rural	228	141	87	209	77	132
26	Hosapatna	Village	Rural	1571	888	683	913	359	554
27	Gunavante	Village	Rural	1747	956	791	892	357	535
28	Kelgin-idgunji	Village	Rural	1040	577	463	494	182	312
29	Arolli-mundagod	Village	Rural	525	282	243	257	112	145
30	Mavinkurva	Village	Rural	2280	1212	1068	1068	395	673
31	Mandalakurve	Village	Rural	173	100	73	84	30	54
32	Nagre	Village	Rural	821	449	372	389	158	231
33	Hadinbal	Village	Rural	1357	772	585	718	264	454
34	Hadgeri	Village	Rural	116	61	55	232	107	125
35	Honavar (tp)	Town	Urban	13947	7445	6502	3877	1561	2316
36	Honavar (tp) - ward no.1	Ward	Urban	904	474	430	288	121	167
37	Honavar (tp) - ward no.2	Ward	Urban	1429	764	665	369	129	240
38	Honavar (tp) - ward no.3	Ward	Urban	420	222	198	54	21	33
39	Honavar (tp) - ward no.4	Ward	Urban	1470	748	722	240	107	133
40	Honavar (tp) - ward no.5	Ward	Urban	807	415	392	219	95	124
41	Honavar (tp) - ward no.6	Ward	Urban	1048	529	519	203	94	109
42	Honavar (tp) - ward no.7	Ward	Urban	931	517	414	265	119	146
43	Honavar (tp) - ward no.8	Ward	Urban	1064	574	490	303	141	162
44	Honavar (tp) - ward no.9	Ward	Urban	755	375	380	131	48	83
45	Honavar (tp) - ward no.10	Ward	Urban	806	457	349	411	159	252
46	Honavar (tp) - ward no.11	Ward	Urban	595	329	266	394	159	235
47	Honavar (tp) - ward no.12	Ward	Urban	563	313	250	161	58	103
48	Honavar (tp) - ward no.13	Ward	Urban	540	305	235	205	83	122
49	Honavar (tp) - ward no.14	Ward	Urban	749	417	332	198	67	131
50	Honavar (tp) - ward no.15	Ward	Urban	705	378	327	199	73	126
51	Honavar (tp) - ward no.16	Ward	Urban	496	270	226	90	32	58
52	Honavar (tp) - ward no.17	Ward	Urban	665	358	307	147	55	92
53	Mugali	Village	Rural	10	9	1	39	17	22

Table G-3: Scheduled Caste & Scheduled Tribe Population in Project Impacted Atea

S. no	Name	Level	Settlement type	Population of scheduled castes	Male scheduled caste population	Female scheduled caste population	Scheduled tribe population	Male scheduled tribe population	Female scheduled tribe population
1	Mundgod	TALUK	Total	13601	6925	6676	3601	1869	1732
2	Mundgod	TALUK	Rural	10695	5489	5206	3286	1695	1591
3	Mundgod	TALUK	Urban	2906	1436	1470	315	174	141
4	Jaddigadde	VILLAGE	Rural	0	0	0	0	0	0
5	Kelginkeri	VILLAGE	Rural	0	0	0	0	0	0
6	Talgod	VILLAGE	Rural	40	18	22	0	0	0
7	Horbhag	VILLAGE	Rural	0	0	0	0	0	0
8	Hosad	VILLAGE	Rural	0	0	0	0	0	0
9	Santeguli	VILLAGE	Rural	5	2	3	0	0	0
10	Keremane	VILLAGE	Rural	41	24	17	30	14	16
11	Honavar	TALUK	Total	7250	3645	3605	268	130	138
12	Honavar	TALUK	Rural	6737	3405	3332	234	113	121
13	Honavar	TALUK	Urban	513	240	273	34	17	17
14	Navilgone	VILLAGE	Rural	172	83	89	0	0	0
15	Kadle	VILLAGE	Rural	101	50	51	0	0	0
16	Haldipur	VILLAGE	Rural	1018	555	463	2	1	1
17	Pavinakurve	VILLAGE	Rural	0	0	0	0	0	0
18	Karki	VILLAGE	Rural	770	391	379	0	0	0
19	Duggur	VILLAGE	Rural	0	0	0	0	0	0
20	Vandoor	VILLAGE	Rural	45	20	25	0	0	0
21	Nilkod	VILLAGE	Rural	8	3	5	0	0	0
22	Salkod	VILLAGE	Rural	71	33	38	6	2	4
23	Hosakuli	VILLAGE	Rural	298	135	163	6	3	3
24	Kasarkod	VILLAGE	Rural	34	9	25	1	0	1
25	Apsarkonda	VILLAGE	Rural	0	0	0	12	6	6
26	Hosapatna	VILLAGE	Rural	3	2	1	3	0	3
27	Gunavante	Village	Rural	19	12	7	3	2	1
28	Kelgin-Idgunji	Village	Rural	6	4	2	0	0	0
29	Arolli-Mundagod	Village	Rural	4	3	1	4	1	3
30	Mavinkurva	Village	Rural	76	40	36	0	0	0
31	Mandalakurve	Village	Rural	13	5	8	0	0	0
32	Nagre	Village	Rural	0	0	0	0	0	0
33	Hadinbal	Village	Rural	191	108	83	0	0	0
34	Hadgeri	Village	Rural	32	15	17	0	0	0
35	Honavar (TP)	Town	Urban	513	240	273	34	17	17
36	Honavar (TP) - Ward No.1	Ward	Urban	17	8	9	0	0	0
37	Honavar (TP) - Ward No.2	Ward	Urban	19	10	9	6	4	2

S. no	Name	Level	Settlement type	Population of scheduled castes	Male scheduled caste population	Female scheduled caste population	Scheduled tribe population	Male scheduled tribe population	Female scheduled tribe population
38	Honavar (TP) - Ward No.3	Ward	Urban	4	1	3	0	0	0
39	Honavar (TP) - Ward No.4	Ward	Urban	103	48	55	1	1	0
40	Honavar (TP) - Ward No.5	Ward	Urban	29	14	15	0	0	0
41	Honavar (TP) - Ward No.6	Ward	Urban	29	16	13	0	0	0
42	Honavar (TP) - Ward No.7	Ward	Urban	27	11	16	17	9	8
43	Honavar (TP) - Ward No.8	Ward	Urban	32	17	15	0	0	0
44	Honavar (TP) - Ward No.9	Ward	Urban	12	5	7	5	1	4
45	Honavar (TP) - Ward No.10	Ward	Urban	0	0	0	0	0	0
46	Honavar (TP) - Ward No.11	Ward	Urban	52	25	27	0	0	0
47	Honavar (TP) - Ward No.12	Ward	Urban	3	2	1	5	2	3
48	Honavar (TP) - Ward No.13	Ward	Urban	0	0	0	0	0	0
49	Honavar (TP) - Ward No.14	Ward	Urban	176	78	98	0	0	0
50	Honavar (TP) - Ward No.15	Ward	Urban	2	1	1	0	0	0
51	Honavar (TP) - Ward No.16	Ward	Urban	8	4	4	0	0	0
52	Honavar (TP) - Ward No.17	Ward	Urban	0	0	0	0	0	0
53	Mugali	Village	Rural	0	0	0	0	0	0

Table G-4: Employment pattern of The Project Impacted Area

S.no	Name	Level	Settlement type	Total working population	Main working population	Main workers- male	Main workers -female	Marginal working population	Male marginal workers	Female marginal workers	Non working population	Non workers (males)	Non workers (females)
1	Mundgod	Taluk	Total	15459	32234	23282	8952	9245	2738	6507	49259	22953	26306
2	Mundgod	Taluk	Rural	14043	27084	19099	7985	8425	2367	6058	39056	19177	19879
3	Mundgod	Taluk	Urban	1416	5150	4183	967	820	371	449	10203	3776	6427
4	Jaddigadde	Village	Rural	17	19	18	1	19	3	16	19	5	14
5	Kelginkeri	Village	Rural	125	256	139	117	8	0	8	113	67	46
6	Talgod	Village	Rural	145	301	237	64	127	46	81	489	170	319
7	Horbhag	Village	Rural	137	268	202	66	83	12	71	435	164	271
8	Hosad	Village	Rural	19	36	35	1	30	12	18	83	22	61
9	Santegulli	Village	Rural	35	189	165	24	38	27	11	481	155	326
10	Keremane	Village	Rural	180	218	178	40	158	18	140	200	89	111
11	Honavar	Taluk	Total	18081	51810	40701	11109	11900	4928	6972	96621	34389	62232
12	Honavar	Taluk	Rural	16829	46113	36017	10096	11372	4639	6733	85022	30356	54666
13	Honavar	Taluk	Urban	1252	5697	4684	1013	528	289	239	11599	4033	7566
14	Navilgone	Village	Rural	420	880	620	260	199	39	160	982	391	591
15	Kadle	Village	Rural	214	542	459	83	181	50	131	886	314	572
16	Haldipur	Village	Rural	1240	3278	2472	806	841	407	434	6013	2174	3839
17	Pavinakurve	Village	Rural	97	358	271	87	17	7	10	594	177	417
18	Karki	Village	Rural	875	2043	1523	520	573	218	355	3391	1298	2093
19	Duggur	Village	Rural	97	201	104	97	0	0	0	90	45	45
20	Vandoor	Village	Rural	277	573	296	277	1	1	0	348	171	177
21	Nilkod	Village	Rural	198	453	256	197	4	3	1	340	136	204
22	Salkod	Village	Rural	568	1603	1201	402	237	71	166	2233	792	1441
23	Hosakuli	Village	Rural	139	913	820	93	91	45	46	1656	456	1200
24	Kasarkod	Village	Rural	371	2042	1715	327	196	152	44	5366	1934	3432

S.no	Name	Level	Settlement type	Total working population	Main working population	Main workers- male	Main workers -female	Marginal working population	Male marginal workers	Female marginal workers	Non working population	Non workers (males)	Non workers (females)
25	Apsarkonda	Village	Rural	69	160	111	49	22	2	20	255	105	150
26	Hosapatna	Village	Rural	239	769	641	128	149	38	111	1566	568	998
27	Gunavante	Village	Rural	409	851	661	190	346	127	219	1442	525	917
28	Kelgin-iggunji	Village	Rural	327	391	348	43	393	109	284	750	302	448
29	Arolli-mundagod	Village	Rural	143	325	197	128	35	20	15	422	177	245
30	Mavinkurva	Village	Rural	457	1180	866	314	246	103	143	1922	638	1284
31	Mandalakurve	Village	Rural	32	89	72	17	23	8	15	145	50	95
32	Nagre	Village	Rural	94	346	314	32	102	40	62	762	253	509
33	Hadinbal	Village	Rural	273	748	583	165	148	40	108	1179	413	766
34	Hadgeri	Village	Rural	114	26	25	1	203	90	113	119	53	66
35	Honavar (tp)	Town	Urban	1252	5697	4684	1013	528	289	239	11599	4033	7566
36	Honavar (tp) - ward no.1	Ward	Urban	90	322	252	70	41	21	20	829	322	507
37	Honavar (tp) - ward no.2	Ward	Urban	158	503	408	95	174	111	63	1121	374	747
38	Honavar (tp) - ward no.3	Ward	Urban	24	148	128	20	4	0	4	322	115	207
39	Honavar (tp) - ward no.4	Ward	Urban	138	535	411	124	32	18	14	1143	426	717
40	Honavar (tp) - ward no.5	Ward	Urban	111	329	232	97	37	23	14	660	255	405
41	Honavar (tp) - ward no.6	Ward	Urban	81	421	348	73	13	5	8	817	270	547
42	Honavar (tp) - ward no.7	Ward	Urban	66	411	355	56	15	5	10	770	276	494
43	Honavar (tp) - ward no.8	Ward	Urban	55	447	397	50	19	14	5	901	304	597
44	Honavar (tp) - ward no.9	Ward	Urban	60	316	256	60	0	0	0	570	167	403
45	Honavar (tp) - ward no.10	Ward	Urban	64	385	327	58	32	26	6	800	263	537

S.no	Name	Level	Settlement type	Total working population	Main working population	Main workers- male	Main workers -female	Marginal working population	Male marginal workers	Female marginal workers	Non working population	Non workers (males)	Non workers (females)
46	Honnavar (tp) - ward no.11	Ward	Urban	94	326	283	43	60	9	51	603	196	407
47	Honnavar (tp) - ward no.12	Ward	Urban	51	221	184	37	34	20	14	469	167	302
48	Honnavar (tp) - ward no.13	Ward	Urban	36	222	190	32	10	6	4	513	192	321
49	Honnavar (tp) - ward no.14	Ward	Urban	78	369	293	76	3	1	2	575	190	385
50	Honnavar (tp) - ward no.15	Ward	Urban	71	281	222	59	28	16	12	595	213	382
51	Honnavar (tp) - ward no.16	Ward	Urban	26	193	169	24	3	1	2	390	132	258
52	Honnavar (tp) - ward no.17	Ward	Urban	49	268	229	39	23	13	10	521	171	350
53	Mugali	Village	Rural	10	17	14	3	8	1	7	24	11	13

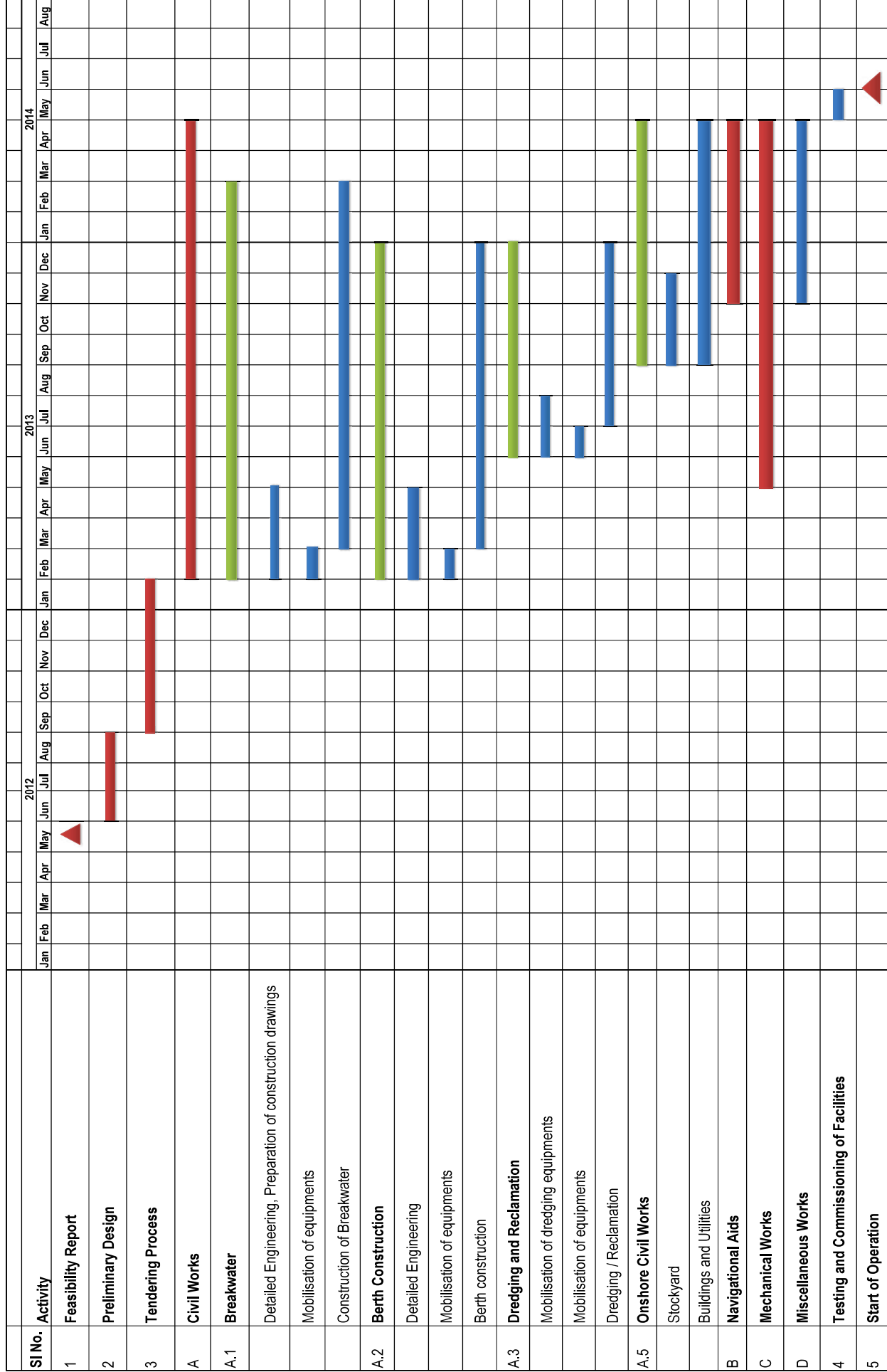
APPENDIX H
PRIMARY WATER QUALITY
CRITERIA FOR CLASS SW-IV
WATERS (FOR HARBOUR WATERS)

**Primary Water Quality Criteria for Class SW-IV Waters
(For Harbour Waters)**

S.No	Parameter	Standards	Rationale/Remarks
1	pH range	6.5-9.0	To minimize corrosive and scaling effect
2	Dissolved Oxygen	3.0 mg/l or 40 percent saturation value, whichever is higher.	Considering bio-degradation of oil and inhibition to is oxygen production through photosynthesis.
3	Colour and Odour	No noticeable colour or offensive odour.	None from reactive chemicals which may corrode paints/metallic surfaces.
4	Floating Matters Oil, grease and scum (including Petroleum products)	10 mg/l	Floating matter should be free from excessive living organisms, which may clog or coat operative parts of marine vessels/equipment.
5	Fecal Coliform	500/100 ml (PAN)	Not exceeding 1000/100 ml in 20 percent of samples in the year and in 3 consecutive samples in monsoon months.
6	Biochemical Oxygen Demand (3 days at 27oC)	5 mg/l	To maintain water relatively free from pollution caused by sewage and other decomposable wastes
7	Biochemical Oxygen Demand (BOD) (3 days at 27oC)	3 mg/l	Restricted for bathing (aesthetic quality of water). Also prescribed by IS:2296?1974.

APPENDIX I
PROJECT IMPLEMENTATION
SCHEDULE

DEVELOPMENT OF BARGE LOADING FACILITIES ST HONNAVAR - PROJECT IMPLEMENTATION SCHEDULE



APPENDIX J
PUBLIC HEARING-MINUTES OF
MEETING

Appendix J Public Hearing Disclosure

Date : 24.12.2011 Bangalore

KARNATAKA STATE POLLUTION CONTROL BOARD
Parisara Bhavan, 1st to 5th Floor # 49, Church Street, Bangalore- 560 001, Karnataka, India
Ph:25581383/25589112/25586520 Fax:25586321
E-mail:ho@kspcb.gov.in Website:http://kspcb.gov.in

ENVIRONMENTAL PUBLIC HEARING NOTIFICATION
No:KSPCB/SEO/(Non-EIA)/EPH/2011-12/665 Date : 20.12.2011

Development of Barge /Vessel Loading facilities by M/s. Honnavar Port Private Limited at Coastal Sand Spit, Kasarakod, Tonka, Honnavar Taluk, Uttarkannada District. The Project has to obtain Environmental Clearance from State level Environment Impact Assessment Authority, Karnataka, as per the EIA Notification dated 14.09.2006 (as amended on 1.12.2009), and is required to go through Environmental Public Hearing. As per the State Level Environment Impact Assessment Authority, Karnataka, Terms of Reference letter dated 13.09.2011 and request of the project proponent letter dated 03.12.2011, the Environmental Public Hearing is being conducted by the Board.

The details of the project are as follows :

1.	Name of the Company and Address	M/s. Honnavar Port Private Limited #103, Lalehzar Apartments, 45/1-2, Palace Road, Bangalore - 560 001
2.	Proposed Location of Site	M/s. Honnavar Port Private Limited, at Coastal Sand Spit, Kasarakod, Tonka, Honnavar, Taluk, Uttarkannada District
3.	Details of Activity	Development of Barge/ Vessel Loading facilities
4.	Brief Description of Pollution Control measures	The Proposed project is coming up in an extent of 44ha (109 acres) There is no trade effluent generation from the activity, oil contaminated water will be treated in oil separator, the run off from berth and stock piles of cargo storage area will be directed to settling ponds and lime is added for neutralization. The Sewerage system is provided to collect sewage from barge/vessel loading facility, administration building canteen and operation building. The Sewage proposed to be treated in septic tank and soak pit. • Dust suppression measures such as water sprinkling. • Use of tarpaulin covers and speed regulations for vehicles engaged in transportation. • Use of specialized ship loader/barge/ vessel loaders and unloaders.
5.	Date, time and venue of Public hearing	27.01.2012 at 11.00 AM at Project Site- Honnavar Port Private Limited, at Coastal Sand Spit, Kasarakod, Tonka Honnavar Taluk, Uttarkannada District
6.	Places of availability of project documents as per EIA Notification, which is kept open to public are:	a. Office of the Deputy Commissioner, U.K. District, Karwar. b. Chief Executive Officer, Zilla Panchayat, U.K. Karwar. c. District Industries Centre, U.K. Karwar. d. Town Municipal Council, Honnavara. e. Village Panchayat Office, Honnavara Village. f. Regional Office, Karnataka State Pollution Control Board, Karwar g. Ministry of Environment & Forest, South Zone Office, E-3/240, Kendriya Sadan, 4th Floor, E & F Wings, 17th Main Road, 2nd Block, Koramangala, Bengaluru - 560 034. h. HELP DESK , Karnataka State Pollution Control Board, Ground Floor No.49, Parisara Bhavan, Church Street, Bengaluru - 560 001.

NOTE: Suggestions, Views, comments and objections of interested bonafide residents, environmental groups and others located at project site and likely to be affected by the proposed project are invited within 30 days from the date of publication of this Notification. They can also make oral /written/E-Mail suggestions to the Karnataka State Pollution Control Board/Chairman, Environmental Public Hearing Committee (Deputy Commissioner, U.K District, Karwar). Interested public can participate in the Public Hearing at the above place. For details please visit our Website:http://kspcb.gov.in.

Sd/- Member Secretary





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TRUE COPY


Assistant Executive Engineer
Port Sub-division, Honnavar
& Nodal Officer



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