CHAPTER-6
ENVIRONMENTAL MANAGEMENT PLAN

6.1 GENERAL
The Environmental Management Plan proposes to integrate the baseline conditions, impacts likely to occur, and the supportive and assimilative capacity of the system. The most reliable way to achieve the above objective is to incorporate the management plan into the overall planning and implementation of the project. The Environmental Management Plan (EMP) for the proposed fisheries harbour is classified into the following categories:

- Land Environment
- Water Environment
- Air Environment
- Control of Noise
- Greenbelt Development
- Socio-Economic Environment

6.2 LAND ENVIRONMENT
The proposed project is to be constructed in the existing port area. The area required for the project is about 4.87 ha in the land area and 1.21 ha in the sea area. The harbour construction would require large quantities of construction materials which shall be pronounced from nearby quarries. The impacts of the construction phase on the environment would be transient in nature lasting only till the construction activities continue. The surface roads, which are proposed to be utilized during construction, shall be black topped to avoid fugitive dust. These measures will reduce the entrainment of fugitive emissions to a large extent. Adequate provisions shall be made for timely repair of roads. On completion of construction the roads shall be black topped.

For the proposed fishing harbour, construction material shall be taken from approved vendors, who will be sourcing their material from existing quarry. No quarry is proposed to be specifically opened for the construction of the proposed Navabhandar fisheries harbor project, which are located at outside the study area. It is recommended that the borrow areas are located if possible, at a distance of 1 to 1.5 km from major habitations. The borrow areas after extraction of construction material shall be properly leveled and grass sodded. If some of the sites cannot be leveled, then an adequate drainage system needs to be provided so that there is no accumulation of water. Since, the construction material is to be extracted from existing operating
quarries, located outside the study area. Hence, the project proponents are not required to implement management measures related to quarry slope stabilization.

6.3 SOLID WASTE DISPOSAL

The solid wastes in a fishery harbour include paper, plastic bags, plastic containers, metal containers, old tyres, pieces of rope, bits of netting, food wrappers, bottles, fruit peels and flotsam like driftwood, generally termed as litter. This type of waste not only makes the harbour look dirty, it can clog drains, foul boat propellers, choke water intakes and so on. Some of the waste may be biodegradable and the rest non-biodegradable.

The key to minimizing this waste is to encourage the use of products that need less packaging or buying in bulk.

Many of the waste items can be recycled. This involves collecting and sorting the discarded materials suitable for recycling. Paper, plastic, glass and aluminium cans can be recycled. Wet organic matter can be converted into compost. In Thailand, old tyres are converted into garbage bins.

The harbour master must ensure that adequate containers are strategically placed within the harbour complex for collecting the litter. It is advisable to have separate containers to facilitate the segregation of waste into bio-degradable and non-biodegradable portions. Floating garbage is best collected by small boats using a scoop net or two vessels working together using a floating net boom.

The harbour incharge shall take all steps to meet the administration requirements. The solid wastes so generated will comprise of old pieces of rope, netting, broken fish boxes, packaging material, etc. The solid waste disposal system proposed are as follows:

Collection

Solid waste comprises of bulky rubbish, old pieces of rope and netting, broken fish boxes etc. A typical collection point made of locally available stone and concrete (the size of the waste centre depends on local requirements) shall be constructed.

Recycling

Metal items shall be collected and sold to scrap dealers. Tyres can be turned into fenders, timber fish boxes can be sold as fuel wood. Styrofoam boxes should be avoided because they break up easily and cannot be recycled safely, and emit dangerous fumes when burnt.

Offal Collection

Fish shall be cleaned and gutted on the journey back to the landing centre. It is recommended the offal should not be dumped inside the fish landing centre basin or
stored in corners within the fish landing centre area. This practice not only gives offensive smells, but also poses a health hazard by attracting pests. Plastic drums of 100-litre capacity with airtight lids shall be bought and used to collect offal from fish markets or moored boats.

Process Description:
Step 1: MSW along with Fish waste (offal) collected from the Fish landing centre shall be transferred to a platform
Step 2: Waste from platform shall transferred into the bio-mechanical composting machine where waste is shredded and mixed with Saw dust or paper which acts as absorbent. Bacterial inoculum is also fed into the composting machine. In a processing time of 15 minutes, waste will be uniformly shredded and mixed with bacteria which can perform speedy digestion of the organics. Raw compost is drawn as output from the bio-mechanical composting machine. Batch size of the machine will be 125 kg minimum. In 12 cycles the entire waste can be digested to form raw compost.
Step 3: The raw compost is cured for 2 weeks to get a good quality compost material.
Step 4: The final compost shall be ready to use for gardening.

Components of the Solid waste treatment system:
- One no. of composting machine
- One shredder
- Suitable curing system
- Bagging arrangement.

The cost of the solid waste management system comes to Rs. 20 lakh, including cost of civil, electrical, mechanical components. The municipal solid waste collected during construction and operation phases shall be disposed at dumping yard, located and about 10 km away from the harbor site.

Organic waste Composter
Fish/ organic wastes collected from the waste collection bins are brought to the organic waste converter platform for composting. Waste from the platform is shredded and then transferred to aorganic waste composter machine where the waste is mixed with a suitable absorbent like paper or sawdust. This is followed by addition of bacterial inoculum inside the converter for organic waste digestion. The raw digested material is left for curing for about 15 days to get a good quality compost. The compost can be used as manure for the greeneries in and around the Fishing
Harbour. A total sum of Rs.20 Lakhs is earmarked for Organic waste composter. A provision of Rs.6.9 million has been earmarked for the solid waste disposal. The details are given in Table-6.1.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item</th>
<th>Cost (Rs. Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>One covered tempo for conveyance of solid waste to the landfill</td>
<td>2.5</td>
</tr>
<tr>
<td>2.</td>
<td>Manpower cost for 4 persons @ Rs.5000/month for 2 years including 10% escalation/year</td>
<td>0.4</td>
</tr>
<tr>
<td>3.</td>
<td>Cost for solid waste management system</td>
<td>2.0</td>
</tr>
<tr>
<td>4.</td>
<td>Organic Waste Composter</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6.9</strong></td>
</tr>
</tbody>
</table>

6.4 WATER ENVIRONMENT

The major source of water pollution in the construction and operation phases is the sewage generated by the workers and employees. During construction phase about 21 m$^3$/day of sewage is expected to be generated. It is proposed to construct twenty (20) community toilets within the labour camps. An amount of Rs.40,000 is likely to be spent for construction of a community toilet. Thus, a total expenditure of Rs.0.8 million is likely to be incurred for this purpose.

As a part of control of water pollution 20 `Community toilets’ and 1 septic tank need to be constructed. The total cost required will be Rs.1.1 million. The details are given in Table 6.2.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Unit</th>
<th>Rate (Rs./unit)</th>
<th>Number</th>
<th>Total cost (Rs. million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Community toilets</td>
<td>40,000</td>
<td>20</td>
<td>0.8</td>
</tr>
<tr>
<td>2.</td>
<td>Septic tanks</td>
<td>300,000</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>1.1</strong></td>
</tr>
</tbody>
</table>

During operation phase, sewage collected from the fish handling and auction hall at the end of the sewers would be given secondary treatment in a specially built sewage treatment unit to be set up at one corner of the fishery harbour complex.

The proposed sewage treatment unit would include fully covered RCC tanks for collecting sewage water taking into account hydraulic gradient, site elevation and outfall conditions of Mirya bay, screening, grit removal, settling tank, de-sludging tank, filtering through up-flow filter bed device and finally disinfect the overflowing sewage in chlorine dosing tank or by UV radiation before letting the same through outfall to Mirya bay. Outfall would be designed hydraulically to meet the future design flows.

The proposed sewage treatment unit would be compact and utilise innovative design in
order to minimize land requirement. Designs would be used which have been proven and successfully applied in other sites/locations treating municipal sewage at similar flow rates. Further the sewage treatment unit would be designed to be aesthetically attractive and visually compatible with the surrounding area and land uses. The location of STP shall be outside the High Tide Line

Other buildings in the fishery harbour complex with conveniences like WC/urinal, bath and wash water have facility for primary treatment in septic tanks of appropriate size and in turn connected to general sewerage system. Sewer lines, inspection chambers and manholes would be built wherever required in the fishery harbour complex to collect and guide sewage.

**Effluent Treatment Plant**

The effluent treatment is necessary to protect and maintain the health of the rivers, lakes & sea, failing which the health of the water bodies is under deterioration, thereby threatening the public health, wildlife habitat, fisheries, recreation and ultimately the quality of human lives. The treated waste water can also be used for the purposes where drinking water quality is not required.

Effluent treatment plant is essential in a fishery harbour for various reasons listed below:

I. To separate the solid waste generated whilst fish processing procedures.
II. To maintain hygienic standards and EU compliance.

The waste water after treatment is proposed for use in green belt, in & around the harbour. Effluent treatment plant is proposed to be located near the Boat repair area in proposed layout Navabhandar Fishery harbour. Effluent from the auction hall is collected into a manhole which, thereafter leads to the screen chamber of ETP. Layout of ETP is enclosed as Figure-6.1

The treated water from the ETP will be sent to the Green Belt area by drip/ sprinkler irrigation. A non-return valve has been placed after the treatment plant to avoid the reverse flow.
6.5 CONTROL OF OIL POLLUTION

Oil pollution occurs in harbour basins when leaks from shore facilities for the supply of diesel fuel to fishing vessels find their way into the harbour water; when vessels pump out oily bilge water in port; when used engine oil is dumped overboard and when an accident results in leakage of fuel oil. To mitigate oil pollution, the fishery harbour incharge shall take necessary action to:

- Provide shore-based reception facilities for oily wastes (bilge water and spent oil) from vessels
- Minimise leaks while bunkering.
- Assist those responsible for containment and clean-up operations if a major oil spill occurs in the vicinity.
Oily wastes

Oily wastes discharged to reception facilities are usually mixtures of oil and water and in some cases, solids. The composition ratio of these solids can differ considerably, depending on the type of wastes given as below:

**Bilge water** consists mainly of water contaminated with oil, whereas

**Waste oil** and fuel residues consist mainly of oil contaminated with water.

The oil collected by the separators may then be returned to a recycling plant by authorised collectors. In Visakhapatnam, main port has a fixed installation of 100 m$^3$ capacity to service cargo ships and an 8 m$^3$ mobile tanker to collect oily bilge water from some 100 fishing vessels ranging from 15 to 25 m in length. The mobile tanker is fitted with a vacuum pump and an oil-resistant hose to span four vessels moored abreast. In Phuket (Thailand), a much smaller mobile tanker (1 m$^3$) was used for collecting oily bilge water. In the proposed, mobile tanker of lower capacity (1 m$^3$) are proposed to be used.

Reception facilities for used engine oil inside harbours are intended as a temporary storage only, whereas the reception facilities for bilge water need to separate the oil from the considerably larger volume of water. The oil may then be transferred to the used oil storage facilities for collection at a later date, and the treated water returned to the sea. Waste or spent engine oil can be recycled 100% and it is now very common for refineries to collect used oil from harbours, car repair shops and petrol stations.

### 6.6 CONTROL OF OIL SPILLS

When a oil spill occurs in the vicinity of the fishery harbour, the harbour incharge will render assistance to the team responsible for combating the spill and for subsequent clean-up operations. There are four main methods of combating an oil spill:

- Mechanical recovery
- Dispersant use
- In-situ burning
- Allowing the oil to come ashore for clean-up later.

Mechanical containment and recovery of oil is the most desirable option. Booms are used for containment, and skimmers are used to recover oil from the water surface. Natural or induced agitation of water causes dispersion of oil into the water column. Dispersants are mixtures of surfactants in one or more solvents, specifically formulated to enhance the rate of this natural process and thereby reduce the amount of oil coming ashore.
In-situ burning has the advantage that it rapidly removes large volumes. But it poses fire hazards, and has limitations when the thickness of the oil slick is less than 2 mm. Emulsions burn poorly, if at all.

The last option of letting the oil come ashore is chosen only when the shoreline can be cleaned relatively easily or has low environmental, social or economic value.

Considering the size of the proposed fisheries harbour mechanical containment in the form of booms is recommended. Booms prevent the spreading, and facilitate oil recovery.

6.7 AIR ENVIRONMENT

Control of Emissions

Minor air quality impacts will be caused by emissions from construction vehicles, equipment and DG sets, and emissions from transportation traffic. Frequent truck trips will be required during the construction period for removal of excavated material and delivery of select concrete and other equipment and materials. The following measures are recommended to control air pollution:

- Contractor will be responsible for maintaining properly functioning construction equipment to minimize exhaust.
- Construction equipment and vehicles will be turned off when not used for extended periods of time.
- Unnecessary idling of construction vehicles to be prohibited.
- Effective traffic management to be undertaken to avoid significant delays in and around the project area.
- Road damage caused by sub-project activities will be promptly attended to with proper road repair and maintenance work. An amount of Rs. 2.0 million has been earmarked for this purpose.

Air Pollution control due to DG sets

The Central Pollution Control Board (CPCB) has issued emission limits for generators upto 800 kW. The same are outlined in Table-6.3, and are recommended to be followed.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Emission limits (gm/kwhr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO₂</td>
<td>9.2</td>
</tr>
<tr>
<td>HC</td>
<td>1.3</td>
</tr>
<tr>
<td>CO</td>
<td>2.5</td>
</tr>
<tr>
<td>PM</td>
<td>0.3</td>
</tr>
</tbody>
</table>
### Parameter Emission limits (gm/kwhr)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Emission limits (gm/kwhr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoke limit*</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Note: * Light absorption coefficient at full load (m$^{-1}$)

The above standards needs to be followed by the contractor operating the DG sets.

**Control of Pollution due to increased vehicles**

The major source of air pollution in the proposed project is the increased vehicular movement in the project construction and operation phases. The movement of other vehicles is likely to increase, as the commissioning of the project would lead to significant development in the area. Thus, as a control measure, vehicles emitting pollutants above the standards should not be allowed to ply either in the project construction or in the operation phases. Vehicles and construction equipment should be fitted with internal devices i.e. catalytic converters to reduce CO and HC emissions.

All the roads in the vicinity of the project site and the roads connecting the construction site should be paved or black topped to minimize the entrainment of fugitive emissions. If any of the roads stretches cannot be black topped or paved due to some reason or the other, then adequate arrangements must be made to spray water on such stretches of the road.

- Dust will be generated with the movement of vehicles and handling of construction materials. Water sprinkling shall be done at least thrice a day at the construction sites, haul roads and other access roads of the project area. Measures such as covering the trucks while transporting the construction material shall be initiated to control fugitive dust as also to control the re-suspension of particulate matters from the excavated materials.

- Smoke emission from vehicles and other mechanical devices like D.G set, etc, which may be used during construction, should be controlled with suitable mitigation measures and all vehicles/equipment deployed in the project shall have valid emission control certification from respective authorities.

- All the staff involved in construction shall be provided with suitable Personnel Protective Equipments (PPEs) such as dust masks, ear plugs, gum boots, gloves, etc.

- Idling of delivery trucks or other equipment should be avoided during loading and unloading of construction material.

- All construction vehicles should comply with emission standards of Central
Pollution Control Board (CPCB) and be maintained properly.

- Use of Ready-mix concrete wherever possible shall be explored. In the case of use of Concrete Mixer, Concrete Mixer should be mounted on shelter with top and slides closed.

6.8 CONTROL OF NOISE

The construction and operation phases are likely to increase the vehicular traffic in the area, which can lead to increase in the ambient noise levels mainly along the road alignment. It is proposed to develop a greenbelt along the road stretches near to the habitation sites. Three rows of trees will be planted.

The contractors will be required to maintain properly functioning equipment and comply with occupational safety and health standards. The construction equipment will be required to use available noise suppression devices and properly maintained mufflers.

- vehicles to be equipped with mufflers recommended by the vehicle manufacturer.
- staging of construction equipment and unnecessary idling of equipment within noise sensitive areas to be avoided whenever possible.
- use of temporary sound fences or barriers to be evaluated.
- notification will be given to residents within 300 feet (about 90 to 100 m) of major noise generating activities. The notification will describe the noise abatement measures that will be implemented.

The following Noise Standards for DG sets are recommended for the running of DG sets during the construction:

- The maximum permissible sound pressure level for new diesel generator sets with rated capacity upto 1000 KVA shall be 75 dB(A) at s distance of 1 m from the enclosure surface.
- Noise from the DG set should be controlled by providing an acoustic enclosure or by treating the enclosure acoustically.
- The Acoustic Enclosure should be made of CRCA sheets of appropriate thickness and structural/ sheet metal base. The walls of the enclosure should be insulated with fire retardant foam so as to comply with the 75 dB(A) at 1m sound levels specified by CPCB, Ministry of Environment & Forests.
- The acoustic enclosure/acoustic treatment of the room should be designed for minimum 25 dB(A) Insertion Loss or for meeting the ambient noise standards, whichever is on the higher side.
- The DG set should also be provided with proper exhaust muffler to attenuate noise level by at least 25 dB(A).
- Efforts will be made to bring down the noise levels due to the DG set, outside its premises, within the ambient noise requirements by proper siting and control measures.

A proper routine and preventive maintenance procedure for the DG set should be set and followed in consultation with the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

It is known that continuous exposure to noise levels above 90 dB(A) affects the hearing of the workers/operators and hence has to be avoided. Other physiological and psychological effects have also been reported in literature, but the effect on hearing acuity has been specially stressed. To prevent these effects, it has been recommended by international specialist organizations that the exposure period of affected persons be limited as specified by Occupational Safety and Health Administration (OSHA) in Table-6.4.

<table>
<thead>
<tr>
<th>Maximum equivalent continuous Noise level dB(A)</th>
<th>Unprotected exposure period per day for 8 hrs/day and 5 days/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>8</td>
</tr>
<tr>
<td>95</td>
<td>4</td>
</tr>
<tr>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>105</td>
<td>1</td>
</tr>
<tr>
<td>110</td>
<td>½</td>
</tr>
<tr>
<td>115</td>
<td>¼</td>
</tr>
<tr>
<td>120</td>
<td>No exposure permitted at or above this level</td>
</tr>
</tbody>
</table>

The construction and operation phases are likely to increase the vehicular traffic in the area, which can lead to increase in the ambient noise levels mainly along the road alignment. It is proposed to develop a greenbelt along the road stretches near to the habitation sites. Three rows of trees will be planted.

Ear protective devices should be used by the construction workers where they are exposed to steady noise levels above 85 dB

6.9 ODOUR MANAGEMENT

There are a number of systems that have the potential to reduce the community amenity impact of fishing harbour. These technologies include:

- Odour neutralising agents - Chemical agents are added to the litter and feed (depending on type of chemical agent) to reduce the moisture content of the waste and inhibit anaerobic microbial degradation.
**Windbreak walls** - Odour impact walls at the exhaust end of tunnel ventilated sheds. These walls can be made from plywood, shade cloth, straw bales or vegetative screening. If constructed of vegetative screens, windbreak walls can improve visual amenity.

**Air scrubber** - Air is passed through a film or mist of water to remove the odorous compounds through chemical absorption, or chemical/biological reaction with an additive such as sodium hypochlorite.

**Biofilter** - Air is passed through a damp porous medium such as peat, soil or wood chippings, which provides an environment where high numbers of odour-reducing bacteria can live.

**Short stacks** - Odorous compounds are released from low heights above the building height (approximately 5 m). This aids the dispersion process prior to reaching sensitive receptors such as neighbours.

**Active oxygen** - Odorous compounds are oxidised by oxygen (O2). Energy is provided to oxygen to increase the energy level of stable O2 molecules and promote the oxidising potential of oxygen.

**Ozone treatment** - Odorous compounds are oxidised by ozone at room temperature.

**Incineration** - Odorous compounds are oxidised at high temperatures (>600°C).

### 6.10 GREENBELT DEVELOPMENT

It is proposed to develop greenbelt around various project appurtenances, which will go a long way to achieve environmental protection and mitigation of pollution levels in the area.

Depending upon the topo-climatological conditions and regional ecological status, selection of the appropriate plant species has been made. Various criteria adopted for selecting the species for greenbelt development are:

- plant should be fast growing;
- preferably perennial and evergreen;
- indigenous;
- resistant to SPM pollution, and
- should maintain the ecological and hydrological balance of the region.

The general consideration involved while developing the greenbelt are:

- Trees growing upto 10 m or above in height with perennial foliage should be planted around the perimeter of the proposed project area.
- Trees should also be planted along the road side in such a way that there is dust control.
- Generally fast growing trees should be planted.
Since, the tree trunk area is normally devoid of foliage up to a height of 3 m, it may be useful to have shrubbery in front of the trees so as to give coverage to this portion.

Taking into consideration the above parameters, the greenbelt development plan has been evolved for the proposed alternatives to reduce the pollution levels to the maximum possible extent. The plantation will be at a spacing of 2.5 x 2.5 m. The greenbelt area has been proposed around the harbour premises with the area of 1980 Sqm. An amount of Rs. 0.8 million has been earmarked for greenbelt development and maintenance of plant saplings grown as a part of the programme. The species recommended for greenbelt development are listed in Table-6.5.

**Table-6.5: Recommended species for greenbelt development**

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Plant species</th>
<th>Common Name</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cocos nucifera</td>
<td>Nariyal</td>
<td>Arecaceae</td>
</tr>
<tr>
<td>2</td>
<td>Pongamia pinnata</td>
<td>Karanj</td>
<td>Fabaceae</td>
</tr>
<tr>
<td>3</td>
<td>Ficus bengalensis</td>
<td>Vadlo</td>
<td>Moraceae</td>
</tr>
<tr>
<td>4</td>
<td>Alstonia scholaris</td>
<td>Indian devil tree</td>
<td>Apocynaceae</td>
</tr>
<tr>
<td>5</td>
<td>Delonix regia</td>
<td>Gulmohar</td>
<td>Caesalpinaceae</td>
</tr>
<tr>
<td>6</td>
<td>Cassia siamea</td>
<td></td>
<td>Mimosaceae</td>
</tr>
<tr>
<td>7</td>
<td>Albizia lebbeck</td>
<td>Kalo Sarsado</td>
<td>Mimosaceae</td>
</tr>
<tr>
<td>8</td>
<td>Calotropis gigantea</td>
<td>Akada</td>
<td>Asclepiadaceae</td>
</tr>
<tr>
<td>9</td>
<td>Casuarina equisetifolia</td>
<td>Saru</td>
<td>Casuarinaceae</td>
</tr>
<tr>
<td>10</td>
<td>Azadirecta indica</td>
<td>Neem</td>
<td>Meliaceae</td>
</tr>
</tbody>
</table>

**6.11 PREVENTION OF SOIL CONTAMINATION**

Vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. Oil interceptors will be provided for vehicle parking, wash down and refueling areas within the construction camps. Fuel storage will be in proper bunded areas. All spills and collected petroleum products will be disposed off in accordance with Ministry of Environment & Forests (MoEF) and State Pollution Control Board (SPCB) guidelines. Fuel storage and refilling areas will be located at least 1000 m from water bodies as directed by the Site Engineer. In all fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the top soil will be stripped, stockpiled and returned after cessation of such storage and refueling activities.

**6.12 SAFETY PRACTICES DURING CONSTRUCTION**

The Contractor is required to comply with all the precautions as required for the safety of the workers. The contractor will supply all necessary safety appliances such as safety goggles, helmets, masks, etc., to the workers and staff. The contractor shall to comply
with all regulation regarding, working platforms, excavations, trenches and safe means of entry and egress.

In order to guarantee construction safety, efficient lighting and safety signs shall be installed on temporary roads during construction and adequate traffic regulations shall be adopted and implemented for temporary roads.

- Provide personal protective equipment to the labours.
- Ensure the labours are trained to work on the specific project.
- For untrained labour - training should be provided before permission to work on the site.
- The contractor shall provide, if required, erect and maintain necessary (temporary) living accommodation and ancillary facilities during the progress of work for labour to standards and scales approved by the Engineer-In charge.
- Contractor shall follow all relevant provisions of the Factories Act, 1948 and the Building & other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction & maintenance of labor camp.
- Construction camps shall not be proposed within 1000m or sufficiently away from nearest habitation to avoid conflicts and stress over the infrastructure facilities, with the local community. The location, layout and basic facility provision of each labour camp shall be submitted to Engineer prior to their construction.
- Safety and sanitation facility should be provided in the labour camp. Uncontaminated water shall be supplied to the construction workers at labour camps.
- The contractor shall arrange for a readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone, Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital
- Always maintain a fully equipped first aid box in the construction camp.

Some of the safety sign boards to be displayed at construction site are as follows;
6.13 DISPOSAL OF CONSTRUCTION WASTE

Debris generated during construction phase, pavement structure shall be suitably reused in the proposed construction, subject to the suitability of the material and the approval of the Engineer. The contractor shall suitably dispose off unutilized debris material; either through filling up of borrow areas created for the project or at pre-designated dump locations, subject to the approval of the Engineer. Debris generated from pile driving or other construction activities shall be disposed such that it does not flow into the marine water or form mud puddles in the area. The contractor as per regulations in force shall identify dumping sites.
6.14 AWARENESS CAMPAIGNS
An awareness campaign needs to be conducted for various fishermen. This campaign could comprise of:

- Inter-personal communication
- Use of video and slide shows
- Deployment of posters, videos, stickers and signboards
- Organizing group activities.

Inter-personal communications
With the assistance of local village headmen and elders, project objectives, need to cooperate and use of pollution control facilities can be explained.

Video and slide shows, posters and stickers
Video recording of post and pollution control facilities can be made and displayed to local fishermen.
Posters, stickers, signboards highlighting oil and garbage pollution, featuring appeals to reduce them can be displayed.

Group activities
Community support and participation, is the key to ensure that hardware inputs are put to proper use and upkeep of post premises. Group activities can be planned for direct action and to focus attention on the problem of harbour pollution and its mitigation.

6.15 TRAFFIC MANAGEMENT
The construction activities could lead to increased traffic due to plying of construction vehicles. Likewise, increase in fish landings at the Navabhandar Harbour would also increase the traffic in the area. The following measures are recommended:

- Locals will be informed about the construction schedule.
- Traffic management with diversion through alternate routes will be implemented by providing adequate sign boards.
- Upon project completion, quick clearance of debris, etc. will facilitate access by customers to local business and residents to their households
- Placement of traffic staff to facilitate easy of movement.
- Two broad situations influence the planning for emergencies. The more common event is a vehicle incident or breakdown which causes a degree of lane blockage, and consequential restriction or even temporary loss of use of the roads. The resulting delays may rapidly extend to the surrounding road network. Prompt remedial action is then called for to restore free flow and minimise the congested conditions that in themselves can aggravate the risk of further
breakdown and/or incidents.

- The second situation involves collision and possible fire or explosion and is potentially more dangerous and requires a rapid response from the emergency services.

6.16 **DECONTAMINATION OF CONTAINERS**

In the industrialized fishing nations the traditional plant fibre has been replaced by plastic. It has been common to make the fish basket in sizes ranging from units which could take around 10 kg up to those able to take 100 kg. The container will be cleaned properly with disinfectant and then rinsed with water. Completely dry all the containers and reuse it. The damaged container will be sold to the nearest recyclers.

6.17 **FIRST AID POST**

**Development of medical facilities**

It is proposed to develop 1 first-aid posts manned by a doctor and support staff are recommended to be developed during construction phase. The first-aid posts should be located such that they are close to major construction sites and labour camps/colonies.

The details of manpower, infrastructure requirement for these first-aid posts are given as below:

**Manpower**

Doctors : 1

Qualification : M.B.B.S./M.D.

The doctors employed in the dispensary, reside in the staff quarters adjacent to the dispensary. The para-medical staff required for assistance to these doctors is given below:

<table>
<thead>
<tr>
<th>Para medical staff</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary Nurse</td>
<td>2</td>
</tr>
<tr>
<td>Attendant</td>
<td>1</td>
</tr>
<tr>
<td>Driver</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
</tr>
</tbody>
</table>

**Infrastructure**

**First-aid post** : A semi-permanent building shall be constructed for each first-aid post. These posts will have the following facilities:

- First aid post with essential medicines including ORS packets.
- First aid appliances, splints and dressing material
- Stretcher, wheel chair etc.

The doctor posted at the first-aid posts, shall also coordinate the anti-malarial campaign be carried out under his immediate personal supervision. A systematic campaign shall be conducted in the months of March and September which are the
breeding months of mosquito. An Ambulance Van will be there continuously in case of any emergency occur.

6.18 SOCIAL UPLIFTMENT OF THE FISHERMEN COMMUNITY

The provision of Rs.10.00 lakh is earmarked for the social Upliftment of the fishing villages. The amount shall be given to the fishermen Community for development initiatives like:

- village roads,
- community halls,
- bus shelters,
- footpaths,
- distribution of free medicine

6.19 SUMMARY OF IMPACTS AND MANAGEMENT MEASURES

The impacts and management measures outlined in the EMP are summarized in Table-6.6.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Issues / Impacts</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Pre-construction Stage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Clearances and Approvals</td>
<td>(i) Secure regulatory clearances such as CRZ Clearance of CRZ rules, GoI</td>
<td>Fisheries Department</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) Obtain planning permissions from relevant local planning authority and the local administration</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Site clearance</td>
<td>Site clearance shall be carried out to in such a way that the clearance and grubbing waste is disposed immediately in the designated dumping site identified for the project. In no case the waste material shall not be disposed in the sea or any other sensitive environment components.</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td><strong>During Construction Stage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Infrastructure provisions at construction camps</td>
<td>The Contractor during the progress of work will provide, erect and maintain necessary living accommodation and ancillary facilities for labour as per the requirements of applicable labour regulations of Government of India. All the work sites and camp sites shall also be provided with basic sanitation and infrastructure as per the requirements of Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996.</td>
<td>Contractor</td>
</tr>
<tr>
<td>S. No.</td>
<td>Issues / Impacts</td>
<td>Mitigation Measures</td>
<td>Responsibility</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>Transportation of construction materials</td>
<td>The contractor shall bring construction material only from approved quarries. Vehicles carrying construction materials shall be covered with Tarpaulin sheets to minimize fugitive dust during transportation</td>
<td>Contractor</td>
</tr>
<tr>
<td>3</td>
<td>Ambient Air quality</td>
<td>All the vehicles must have valid PUC certificates at all the time during construction phase of the project. Water sprinkling shall be done to suppress the dust emissions from the site. All the DG sets used for construction shall have valid consents from Maharashtra Pollution Control Board and shall have built-in stacks to reduce the air emission impacts.</td>
<td>Contractor</td>
</tr>
<tr>
<td>4</td>
<td>Noise</td>
<td>The construction materials shall be properly maintained and barricades shall be provided around the site for reducing the noise levels. All the workers will be provided with personal protective equipment including ear plugs and other necessary provisions by the contractor.</td>
<td>Contractor</td>
</tr>
<tr>
<td>5</td>
<td>Water</td>
<td>The quality of water (marine, river and wastewater discharged from the labour camps) shall be analysed once in three months during construction, for its compliance to the disposal standards of pollution control authority.</td>
<td>Contractor</td>
</tr>
<tr>
<td>6</td>
<td>Emergency Management</td>
<td>First aid kits and emergency treatment facilities shall be provided by the contractor at the work sites, camp sites and all other ancillary facilities.</td>
<td>Contractor</td>
</tr>
<tr>
<td>7</td>
<td>Greenbelt development</td>
<td>Green belt with adequate number of trees shall be developed and shall be maintained to ensure at 80% survival rate.</td>
<td>Contractor and Fisheries Department</td>
</tr>
<tr>
<td>8</td>
<td>Marine Environment</td>
<td>• Disturbance to marine environment during construction phase</td>
<td>Contractor</td>
</tr>
</tbody>
</table>

**Operation Stage**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Issues / Impacts</th>
<th>Mitigation Measures</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monitoring Operational Performance</td>
<td>The Fishing harbour management shall monitor the operational performance of the various mitigation measures implemented in the project. This shall include overall hygiene practices of the Fishing harbour, performance of wastewater treatment plant, impacts due to dredging material dump site, survival rate of trees, quality of river water, marine water and sediment quality</td>
<td>Fisheries Department and Fishing harbour management,</td>
</tr>
</tbody>
</table>
6.20 ENVIRONMENTAL MANAGEMENT CELL
It is proposed to form an Environmental Management Cell comprising of 2 officials from Fisheries Department of Gujarat. The team would be responsible for all monitoring and compliance of Environmental related parameters.

6.21 OTHER MEASURES
In addition to the above measures few more Management measures to be taken care at the stage of DTP are as follows:

- Use of lead free painting in the fishing harbor area
- Maximum use of renewable energy (like solar lights etc.)
- Use of Eco friendly material for construction (eg. RMC)
- Details of Fire fighting System
6.22 BUDGET

The total budget required for implementation of EMP is Rs. 9.9 million. The details are given in Table 6.8

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Cost (Rs. million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Solid Waste Management</td>
<td>6.9</td>
</tr>
<tr>
<td>2.</td>
<td>Sanitary facilities at labour camps</td>
<td>1.1</td>
</tr>
<tr>
<td>3.</td>
<td>Greenbelt development</td>
<td>0.8</td>
</tr>
<tr>
<td>4.</td>
<td>Purchase of noise meter</td>
<td>0.1</td>
</tr>
<tr>
<td>5.</td>
<td>Provision of Social Up-liftment of fishermen community</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>9.9</strong></td>
</tr>
</tbody>
</table>